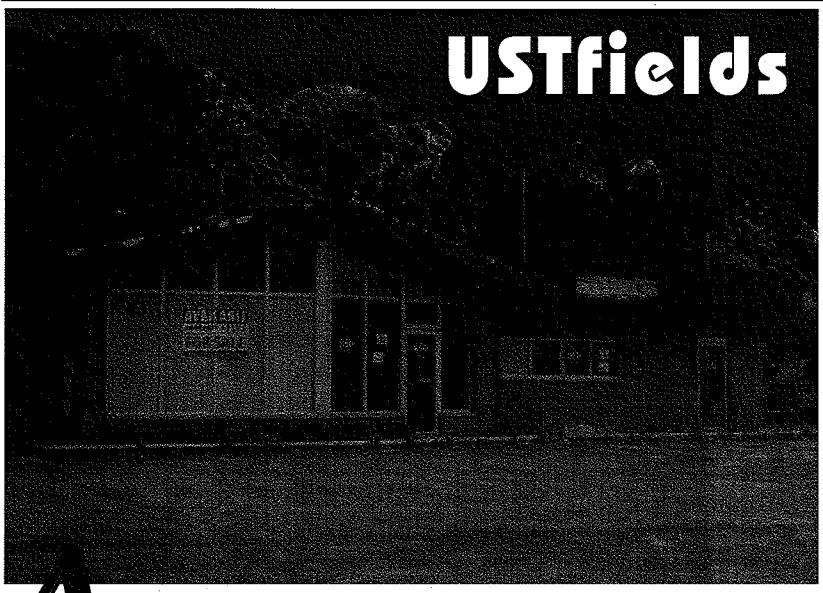
New England Interstate Water Pollution Control Commission

**Boott Mills South
100 Foot of John Street
Lowell, Massachusetts
01852-1124**

**Bulletin 34
February
2000**

L.U.S.T.LINE

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



Abandoned Gas Stations—By Any Other Name—Are Still a Cause for Concern

by Heather Nifong

A gas station with the pump islands intact has been closed for at least a year, probably longer. It's on a moderately busy street. The station building has deteriorated, weeds are growing through the pavement, and the owner and operator lack the wherewithal to remove the tanks and improve the property. No one else has sought to purchase the site for reuse. Sound familiar?

This property and the hundreds, maybe thousands, of properties like it pose an administrative problem for environmental regulators. Take, for example, the seemingly simple matter of nomenclature: Are these sites brownfields? USTfields? LUSTfields? Do they belong in a voluntary cleanup program? A LUST program? The answer to such puzzlers is, of course, tangled in bureaucratese, which dictates, to some extent, who will pay to assess, clean up, and redevelop these sites.

Properties with underground storage tanks (USTs) include service stations, dry cleaners, and auto body shops—some of the most common small businesses in America. When these businesses shut down, such as those that opted not to comply with the 1998 UST upgrade requirements, the owners and operators cannot always afford to investigate and remediate the environmental contamination. The properties are often abandoned and remain that way, because the real estate itself is generally not worth enough to compel potential buyers to pay for the tank

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removal and remediation, let alone get embroiled in potential issues of liability.

Abandoned properties with USTs are a cause for concern, because they may give rise to a number of associated problems. For example, they may:

- Harm human health and the environment as a result of soil and groundwater contamination,
- Cause injury because of dilapidated buildings,
- Attract open dumping, vandalism, and criminal activity,
- Reduce local employment opportunities and tax revenues,
- Lower surrounding property values, and
- Limit economic growth and development.

LUSTLine

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LUSTLine is a product of the New England Interstate Water Pollution Control Commission (NEIWPCC). It is produced through a cooperative agreement (#CT825782-01-0) between NEIWPCC and the U.S. Environmental Protection Agency.

LUSTLine is issued as a communication service for the Subtitle I RCRA Hazardous & Solid Waste Amendments rule promulgation process.

LUSTLine is produced to promote information exchange on UST/LUST issues. The opinions and information stated herein are those of the authors and do not necessarily reflect the opinions of NEIWPCC.

NEIWPCC was established by an Act of Congress in 1947 and remains the oldest agency in the Northeast United States concerned with coordination of the multimedia environmental activities of the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

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LUSTLine is printed on Recycled Paper

U.S. EPA Terms

BROWNFIELDS = Abandoned, idled, or underused industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. Brownfields can be located in urban, suburban, and rural areas.

USTFIELDS = Brownfields with petroleum underground storage tanks.

While smaller in size and ordinarily limited to petroleum contamination, these properties exceed hazardous waste sites in number, and the scope of their collective impact on communities is far greater. However, because nearly all federal funding for brownfields assessment, cleanup, and redevelopment comes from CERCLA (the Comprehensive Environmental Response, Compensation, and Liability Act), petroleum-contaminated brownfields sites are not eligible for most brownfields financial assistance, unless the petroleum contamination is commingled with a hazardous substance.

EPA Encourages States to Address USTfields

EPA has responded to the problem of abandoned properties with USTs in several ways. For example, it coined the term "USTfield" and introduced the "USTfield Initiative" to increase recognition of these sites and encourage the exchange of ideas among state and local regulators. As part of this initiative, the Utah UST program has undertaken a pilot project to develop a process that can be replicated by other states for transforming USTfields into ready-for-reuse properties.

Sammy Ng, Acting Director of EPA's Office of Underground Storage Tanks (OUST), recently issued a memorandum stating that the LUST Trust Fund may now be used to assess abandoned sites for a release even if there is no physical evidence that a release has occurred. This allowance is based on experience or other available information that indicates the likelihood of a release from an UST with certain characteristics, including type, age, and condition. Unfortunately, no new money will be available, and, as before, the LUST Trust Fund cannot be used for tank removal, except when necessary for corrective action.

EPA has also begun to provide forums for USTfields issues at both its annual national conference on brownfields and its annual UST/LUST national conference.

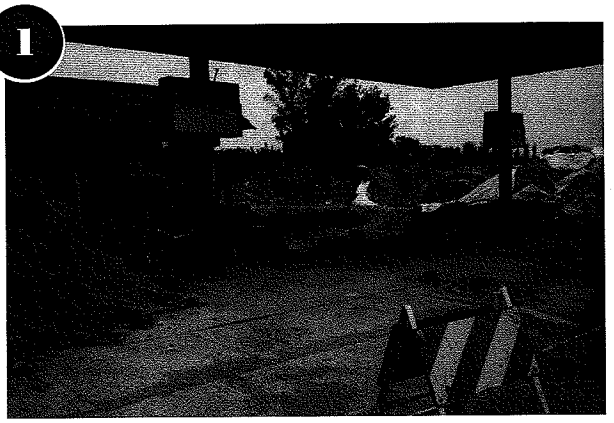
States Begin to Rally to the Cause

The response of state governments to abandoned properties with USTs depends on two main factors: the organizational structure and compatibility of the regulatory programs (i.e., LUST versus brownfields versus state voluntary cleanup programs), and the amount of coverage provided by the state petroleum fund for LUST corrective action.

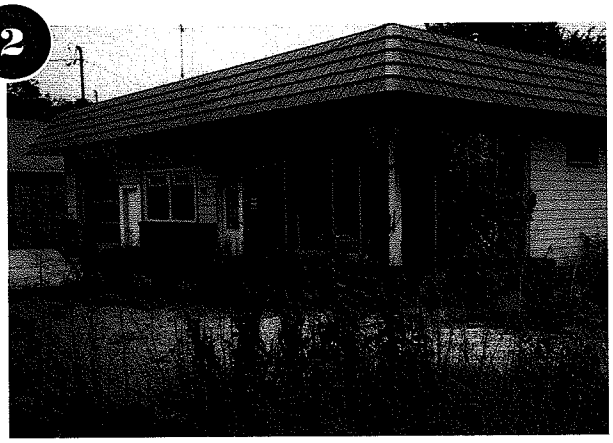
In **Illinois**, for example, the brownfields program works with both the LUST and voluntary cleanup programs. The Illinois LUST program manages the cleanup of UST sites by tank owners and operators and issues No Further Remediation letters. As in many other states, the voluntary cleanup program is a separate program and, for a fee, offers oversight services for both petroleum and hazardous substance cleanups.

Voluntary cleanup programs are more commonly associated with brownfields redevelopment, because they extend their services to all parties; in contrast, the LUST cleanup program is open only to tank owners and operators. Also, the voluntary cleanup program typically enrolls sites that are contaminated with hazardous substances, which corresponds to the federal brownfields financing scheme.

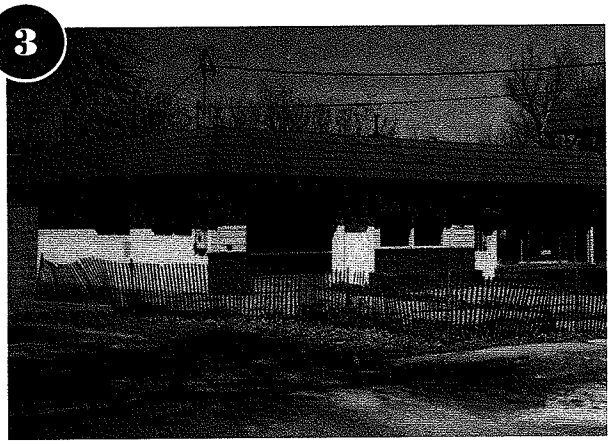
Abandoned UST sites in Illinois are eligible candidates for the state's Brownfields Redevelopment Grant Program, which awards municipalities up to $120,000 for site assessments and preparation of remedial action plans. Forty percent of Illinois



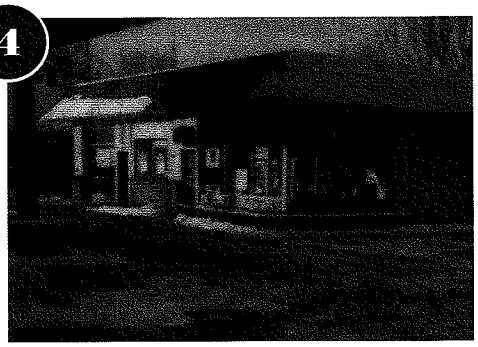
▲ *In 1989, a gas station in Lockport, Illinois, reported an UST release. The UST owner removed five tanks but failed to fully remediate the site. The owner soon abandoned the property altogether.*



▲ *In 1992, the site had grown weedy, attracted vandals, and lowered surrounding property values.*



◀ *By 1996, the City of Lockport had stepped in to maintain the property's physical appearance. However, the cleanup costs and liability associated with the property continued to repel prospective buyers. In 1998, the city applied to Illinois EPA for a brownfields redevelopment grant in cooperation with a new site owner who had purchased the property at a county auction. Using the grant, the city conducted an environmental investigation and, after applying Illinois's risk-based cleanup objective, determined the site could be remediated for less than $25,000.*



▶ *As a result of the City of Lockport's efforts to assess the site and develop new remediation objectives, the new property owner moved forward to complete the cleanup and installed a new parking lot and replaced the roof. Today, a retail telecommunications business occupies the the building.*

grant recipients are using the money to investigate UST sites. Illinois has also published a guide to help brownfields redevelopers and reluctant tank owners and operators evaluate site cleanup potential, maximize use of the state UST Fund, and resolve liability concerns.

In **Texas**, the Brownfields Redevelopment Initiative is coordinated with the voluntary cleanup program. UST sites are eligible for brownfields site assessments only if a used oil tank is present (because of CERCLA funding restraints). Texas operates a separate Petroleum Storage Tank (PST) State-Lead Program to take corrective action at leaking PST sites that cannot be addressed by the owner or operator. Funding for the State-Lead Program comes from both the Texas PST Remediation Fund and the LUST Trust Fund.

New Hampshire offers a family of petroleum reimbursement funds that includes some coverage of abandoned sites. Only after cleanup costs for a petroleum-contaminated site exceed petroleum reimbursement fund coverage limits is the site eligible for participation in the state's brownfields program.

Beginning this year, **Pennsylvania** will expand use of its Storage Tank Fund to pay for tank removal and limited site cleanups at abandoned UST sites.

State regulators aren't the only ones who are encouraging the cleanup of USTfields. **Chicago** operates its own Abandoned Service Station Management Program, using city funds to help return these sites to productive use and ensure that former stations already in reuse have dealt properly with USTs. Besides the environmental issues associated with closed gas stations, the Chicago program responds to issues of criminal activity and building safety.

Through its USTfields pilot project, **Utah** will explore the major administrative issues facing state regulators, such as authority for oversight, funding mechanisms, site prioritization, risk-based cleanup, land ownership and site access, cost recovery, and liability. Ideally, this effort should stimulate discussion among environmental regulators and lead to better integration of LUST programs and brownfields incentives.

■ *continued on page 4*

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New Partnerships Are Working in Illinois

Third parties who wish to clean up and redevelop abandoned UST sites in Illinois have several options available. Which option they follow, however, depends on site-specific circumstances.

One option assumes that the tank owner or operator has reported a tank release and is eligible for reimbursement of cleanup costs from the state UST Fund, but cannot afford the up-front expenses. In this case, a third party may enter into agreement with the tank owner or operator to pay the cleanup costs on their behalf. Afterward, the tank owner or operator submits the reimbursement claims to the UST Fund, and the resulting payments go into an escrow account to pay back the third party.

A second strategy that third parties can use to access the UST Fund for cleanup costs is to request a transfer of the tank registration from the tank owner or operator to themselves. This action enables third parties to access the UST Fund directly (tank registration is a requirement of Fund eligibility). Upon the registration transfer, however, a third party becomes subject to all of the tank regulations. The resulting liability may be unacceptable to some redevelopers. Also, this strategy will work only if the tanks are still in the ground.

Another option available to third parties seeking help with USTfields is to apply for a state Brownfields Redevelopment Grant. Although only cities are eligible to receive these grants, many of the Illinois grant recipients are working in cooperation with a third party. As mentioned before, the grant will pay for site investigations and for the development of cleanup objectives, up to $120,000. The grant requires a 30 percent match from municipalities. In some cases, the match requirement is being met with funds from a third party. Third parties are also committing to follow through with site cleanups, if needed, in exchange for the city's site assessment work under the grant.

These options are succeeding in Illinois because the parties involved understand the benefits of partnership.

Abandoned properties with USTs need not be doomed to neglect and dereliction. State and local environmental regulators are applying their own unique combinations of authority, resources, and organizational structure to the problem of USTfields.

Chicago Takes the Initiative: A Case Study

The City of Chicago used its own funds to handle a former gas station on the city's southeast side. In addition to its broken windows and unlocked doors, the abandoned building housed a stray pregnant dog. Miscellaneous garbage, auto parts, abandoned vehicles, mattresses, and tires were strewn about the site. Two pump islands, three fill pipes, and three vent pipes existed on the property, indicating the presence of at least three USTs.

The city's Abandoned Service Station Management Program initiated the work needed for enforcement action, including writing a ticket for environmental violations. The Department of Animal Care and Control was notified about the dog. After the site owner failed to appear at the Administrative Hearing, a default judgment was issued. The property then became a target site for the city and was slated for cleanup.

Through the city's Nuisance Abatement ordinance, the Department of Environment demolished the building and removed not only the tanks but also all of the open dumped waste and the abandoned vehicles. The Department of Environment also secured the site and filed a lien on the property for the cost of the abatement work.

While petroleum contamination may still be present, the property should hold more appeal for potential redevelopers now that Chicago has removed the immediate safety hazards and prevented further deterioration of the site.

It's Time to Get Creative

Abandoned properties with USTs need not be doomed to neglect and dereliction.

As the preceding examples show, state and local environmental regulators are applying their own unique combinations of authority, resources, and organizational structure to the problem of USTfields. Their strategies may not—and probably won't—fit your particular situation. That's okay. Reflect, instead, on the imaginative thinking behind their solutions and consider how your agency or department can bring about similar opportunities for closed gas stations in your own state or hometown.

To learn more about USTfields, plan to attend EPA's UST/LUST conference in Portland, Oregon on March 20–22, 2000, where a workshop will be held on abandoned tank sites. ■

Heather Nifong is Outreach Coordinator with the Illinois Environmental Protection Agency's Office of Brownfields Assistance. For more information about the Illinois Brownfields program, contact Heather at: epa8125@epa.state.il.us.

About OUST's USTfields Initiative

OUST's USTfields Initiative is working to assist stakeholders in tackling problems encountered during the cleanup and reuse of UST sites. The next step for OUST is to work with *interested* states to outline their own program efforts to clean up and redevelop UST sites and to compile a list of impediments and accomplishments encountered in their redevelopment efforts. OUST is also considering a collaborative effort with the International City/ County Management Association (ICMA) to foster coordination between state and local officials to help resolve issues they face in redeveloping UST facilities. OUST intends to make available to all interested parties as much useful information as possible about ongoing redevelopment efforts across the nation via its Web site. ■

Field Notes

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

PEI INVESTIGATES REFUELING FIRES

The dispensing of gasoline into the fuel tank of a motor vehicle is a safe operation. Americans pump gasoline into their cars between 16 and 18 billion times each year, generally without incident. The oil companies' track record in this regard is enviable.

I am now in my twenty-second year at PEI. Until September 1999, the only refueling fires that were reported to me were caused either by an open flame (smoking), lack of electrical continuity between the nozzle and the grounded dispenser, or a spark from the engine compartment (motor running).

Within the last five months, however, 48 ignitions of gasoline vapors during the refueling of motor vehicles at service stations have been verbally reported to PEI. While a substantial majority did not involve personal injuries, we have received reports that a woman and a dog have died in separate refueling accidents.

Most fires occurred during exceptionally dry weather. There were no open flames and the engines were turned off. Continuity was verified between the nozzle and dispenser in almost all cases. PEI members, oil companies, and fire authorities that investigated the cause of these accidents concluded that in 100 percent of the cases, static electricity was the source of ignition. People familiar with these accidents were surprised when they first learned about them and have become increasingly concerned about the number of fires that have occurred over time.

Naturally, these fires raise questions about why they are occurring now and didn't occur in the past. Possible answers include the following:

- **Fuel chemistry.** Has the chemical composition of gasoline changed in a way that the conductivity of the fuel has also changed?

- **Finish of the driveway or forecourt.** Is the paved surface of the refueling area sufficiently dissipative?

- **Tires.** Tires are being made with less carbon (conductive) and more silica (nonconductive). Does this composition make a difference?

- **Electrically insulated conductive components.** Are all conductive parts, and in particular all metal parts, in the area of the vehicle's tank system connected in an electrostatically dissipative manner so that the insulated conductors are not a source of ignition? We hear that this issue can be a problem even if the vehicle is grounded.

- **Plastic filler inlets.** Today, some fuel tank filler necks are made of nonconductive plastics with a metal trapdoor opening. Some are connected to molded fiberglass fuel tanks. Could refueling transmit a charge to the insulated plastic filler neck that, in turn, might cause a spark to jump to the grounded nozzle?

- **Customers reentering their vehicles during refueling.** An electrostatic charge is generated through friction between clothing and the car seat to such an extent that electrostatic discharges to the vehicle body or to the filling nozzle are possible, especially if the motorist is wearing rubber-soled shoes. A Midwestern oil company warned of this hazard in a November 24, 1999, memo to its dealers, sellers, and jobbers stating that "...a flash fire can result from this discharge if sufficient flammable vapors are present. Therefore, customers should be discouraged from reentering their vehicles while fueling is underway." More than half of the fires that have been reported to PEI involved the motorist reentering the vehicle at some point during the refueling process.

Unfortunately, we don't have any definitive answers. We are in the process of collecting information on similar incidents so the industry can get a better handle on the cause(s) of the problem. If you are aware of refueling fires presumably caused by static electricity, we would like to know about them. Include as much detail as possible to help us understand what happened. Please include the make, model, and year of the vehicle, the type of fuel used, the type of tires and driveway finish, the customer action while refueling, and any other information that you believe would be useful. A form that can be used is available on PEI's Web site: www.pei.org.

The information we receive in response to this request will be summarized and made available, upon request, to interested parties. No oil company or PEI member names will be divulged. All responses will be confidential. Please direct your correspondence or telephone responses on this issue to Bob Renkes at PEI, (918) 494-9696. ■

Leak Prevention

Tank-nically Speaking

by Marcel Moreau

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

TANK MANAGEMENT 101

You Too Can Be a "Professional" UST System Owner/ Operator

This UST Manager is:
(a) an Amateur
(b) a Professional

I am a firm believer in the power of words. For as long as I've been in the tank business, and for a long time before, tank owner types have been neatly compartmented as "major oil," "oil jobber," "private," "government," and, of course, "mom and pop." While these labels have some utility in characterizing UST ownership, they do not address a vastly more important characteristic—the quality of UST management. If we are to enlist the power of words in the quest for better UST management, I believe we need to adopt some new labels. I would like to introduce two new terms to describe tank owner/operator managers: "the professional" and "the amateur."

The Amateur Versus the Professional

Professional storage system managers are fully aware of the hazardous nature of fuel storage and their responsibility to supply us with the fuel we need in ways that are as protective of human health and the environment as possible. They have a keen sense of responsibility and continually strive to acquire knowledge about and practice the skills of their profession.

Amateur storage system owner/operators are barely aware of the hazards posed by their activities and their corresponding responsibility to protect human health and the environment. Many operate in blissful ignorance of the standards of their industry and the potential consequences of their activities.

Simply stated, the problem with UST management in this country is that there are too many amateurs in charge of our UST systems. The ultimate goal of UST regulatory programs is to have a universe of UST systems that are managed in a professional manner. The regulatory challenge then becomes one of finding ways to institute or encourage the amateur tank manager to make the upgrade to professional tank manager. While new words do not necessarily make this challenge any easier, they can help to frame the issues in a more concrete manner.

So, what do professional tank managers need to help them do their job better? One basic need is relevant information. Where can an inquisitive UST manager go to get the information she or he needs to do a professional job? To put my words where my soap box is, I developed two lists: a short list of technological Achilles' heels that have led to the downfall of too many USTs and a list of behavioral Achilles' heels that seem to bedevil UST managers. They are not by any means complete lists, but these issues continue to resonate in my experience with USTs, UST operators, and UST release incidents.

The Technological Achilles' Heels of UST Systems

UST equipment vendors and installers prefer to give UST owners and operators the impression that the technology they are selling will protect an UST system against all manner of accidents that may have befallen such systems in days of yore.

While some of the issues have changed, the fact remains that no UST system can be permanently vaccinated against releases. An UST manager's greatest vulnerability may, in fact, be this sense of invulnerability. Professional UST managers should know enough about their storage systems to recognize the likely weak points. Only then can they take steps to ensure that their Achilles' heels do not receive that fatal arrow.

Following is my list of Achilles' heels that professional UST managers should evaluate with regard to each storage system for which they are responsible:

Strike Plates

"Strike plates" or "wear plates" are steel reinforcing plates that are installed beneath tank openings. In fiberglass tanks, they protect against the impact of the gauge stick. In steel tanks, they protect against corrosion problems that can occur when water is not promptly removed from a tank.

In 1985, strike plates became standard beneath all fiberglass tank openings. For about 10 years prior to that year, they were present only beneath openings intended to be fill openings. The presence of a strike plate in a fiberglass tank can be determined by lowering a strong magnet on a string down the fill pipe and seeing if it "sticks."

Strike plates became an optional component of STI-P3 tanks beginning in 1982 and a standard component beneath all tank openings in 1987. If your steel tank warranty includes both internal and external corrosion protection, then the tank has strike plates installed. Older steel tanks that have been upgraded by internal lining often have a strike plate installed beneath the fill opening as part of the lining procedure.

The absence of strike plates is a cause for concern, especially for fiberglass tanks. Fortunately, there are retrofit devices known as "tank bottom protectors" that are inexpensive and easy to install in fiberglass or steel tanks that provide equivalent protection to strike plates. If you have any doubts about whether your tanks are equipped with strike plates, install retrofit tank bottom protectors sooner rather than later. Tank bottom protectors are cheap insurance against potentially major releases.

Working Capacity

Most tank owners assume that if they requested and paid for a 10,000-gallon tank, then the tank will hold 10,000 gallons. What most tank owners don't know is that the "nominal capacity" of a tank (e.g., the facility has three 10,000-gallon tanks) is not the same as the actual tank capacity (the maximum volume of liquid that a tank will actually hold as listed on the tank chart). In addition, the actual capacity of motor fuel tanks can be reduced by as much as 10 percent because of the installation of overfill prevention devices.

Since 1987, steel tanks have been required by their construction standard (UL 58) to hold no less than their nominal capacity, so the actual capacity of a steel tank is usually equal to or slightly more than the nominal capacity.

An UST manager's greatest vulnerability may, in fact, be this sense of invulnerability. Professional UST managers should know enough about their storage systems to recognize the likely weak points.

The fiberglass tank construction standard, UL 1316, has no similar capacity specification. While many fiberglass tanks do, in fact, hold their nominal capacity, a few sizes—notably those with a nominal capacity of 10,000 gallons—have actual capacities that are significantly less. For example, an 8-foot-diameter, 10,000-gallon tank manufactured by Owens Corning has an actual capacity of 9,728 gallons, while an 8-foot diameter, 10,000-gallon Xerxes tank holds 9,816 gallons in the single-walled version and 9,684 gallons in the double-walled version.

These actual capacities are further reduced by overfill prevention hardware that is intended to shut off or restrict flow into the tank at a point that is substantially below the actual capacity of the tank. Information concerning the level at which the overfill device will trigger (what I call the "working capacity") is hardly ever conveyed to the UST manager.

If they are unfamiliar with working capacity, tank mangers are more likely to order more fuel than will fit in the tank, which, because of the problems inherent in overfill prevention hardware, results in frustrated delivery personnel, opportunities for spills, and the creation of hazardous situations. (See *LUSTLine* #21, "What Every Tank Owner Should Know About Overfill Prevention," and #31, "If Only Overfill Prevention Worked.")

Professional UST managers must know the working capacity of their tanks and should plan fuel deliveries so that the liquid volume in the tank never exceeds the working capacity.

Type of Overfill Prevention Installed in the Tank

Not all overfill prevention devices are compatible with all types of tank delivery techniques. UST owner/operators should know both the type of overfill prevention installed and some details of the method of fuel delivery into the tank. (Refer to *LUSTLine* #21 for a discussion of overfill prevention hardware.) Here are things you should know about your delivery procedures:

- **Gravity Versus Pumped Flow** Briefly, product is usually delivered into larger underground tanks by gravity flow from the tanker to the UST. In this case, product is metered into the truck but is not metered when it is delivered into the UST. In some cases, especially for military, government, post office, municipal, and school facility tanks, delivery contracts require that the quantity of fuel be metered directly into the tank. In most cases, when a meter is introduced into the delivery process, a pump is used to push the product through the meter and into the UST so as not to slow down the delivery. The distinction between gravity and pumped deliveries is extremely important for accident-free deliveries.
- **Loose- Versus Tight-Fill Connections** Most often, delivery hoses are tightly clamped to the fill pipe opening during the deliv-

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■ **Tank-nically Speaking** *from page 7*

ery (tight fill). Occasionally, however, delivery hoses are connected to a short length of pipe that is loosely inserted into a fill pipe (loose fill), the same way you fuel your car. Loose fills can present a fire hazard, because flammable vapors can be released at grade around the fill pipe. NFPA 30 limits loose fills for Class I liquids (e.g., gasoline) to tanks of 1,000 gallons or less. As a general rule, tight-fill deliveries are preferable to loose-fill deliveries.

- **Direct- Versus Remote-Fill Pipes** Fill pipes usually enter directly into the tank (straight or direct fill). But if tanker access is a problem, the fill pipe opening may be some distance from the tank (remote fill). When a remote fill is installed, there is almost always a direct fill as well that is used as a gauge opening for measuring the product level. Often, the remote fill is joined to the direct fill with a below-grade "T" connection.
- **Drop-Tube Devices for Overfill Prevention** Devices installed in the drop tube of USTs (commonly called flapper valves or shut-off devices) should not be used with:
  - Pressurized deliveries, because they are not designed to withstand the extra pressure produced by the pump and will fail.
  - Loose fills, because when the overfill device closes, product will rapidly back up the fill pipe and spill onto the ground. If the pipe that is inserted into the fill pipe is too long, it will interfere with the closing of the overfill device.
  - Remote fills, unless there is a "trap door" at the top of the direct-fill pipe that automatically closes, except when a gauge stick is inserted. Drivers often leave the cap for the direct fill off during the delivery, because they stick the tank before and after the delivery and do not see the need to replace the cap during the delivery. If the flapper valve closes with the cap off, product will flow up the fill pipe and onto the ground, rather than down the fill pipe into the tank.
- **Float Vent Valves for Overfill Prevention** Float vent valves are not compatible with a number of common UST features (including suction pumps, coaxial Stage I vapor recovery, pressurized deliveries, and remote-fill pipes) and are a poor method of overfill prevention even when they work as they are intended. (See *LUSTLine* #21 and #31 for more information.) My recommendation is to remove all float vent valves and replace them with drop-tube shut-off devices and overfill alarms.
- **Alarms for Overfill Prevention** Overfill alarms can generally be used with all types of delivery equipment, but they must be located where they will alert the delivery driver, not the cash register attendant or the facility manager. Be sure that they are clearly labeled so the driver knows what they are and loud enough to awaken a dozing delivery person.

Pressurized Pumping Systems

Pressurized pumping systems are the most common cause of major releases of petroleum products. Most retail facilities today have this type of pumping system. If you're not sure, remove the dispenser covers and check to see whether you have any pulleys and v-belts inside the dispenser. If these items are absent, you have pressurized piping.

Frequent and effective leak detection on pressurized piping is critical. Submersible pumps should be equipped with *electronic* line leak detectors (see *LUSTLine* #29, "Of Blabbermouths and Tattletales—The Life and Times of Automatic Line Leak Detectors") that search for small leaks whenever the piping is idle for a half-hour or so, and secondary containment with a sensor to continuously monitor for leaks. Anything less for leak detection on pressurized piping is foolhardy.

Dispensers

Dispensers have lots of connections and fittings that can come loose and leak. Depending on the location, some of these leaks can remain undetected by inventory control, line leak detectors, and line tightness testing, although they can almost always be seen if you bother to look.

Remove dispenser side panels once a week and conduct a thorough visual inspection. Check around filters, meters, and unions for evidence of moisture or drips. Look in the dispenser pan or the soil beneath the dispenser for evidence of drips or moisture. If you see anything that looks like it might even be thinking about leaking, have it attended to right away.

Spill Containment Manholes

Spill containment manholes around fill pipes are a maintenance headache, because they accumulate water, product, dirt, rags, cigarette butts, Styrofoam cups, and so on. They are also subject to use and abuse from delivery personnel. In addition, they are orphans—facility operators seem to think that it is the delivery person's responsibility to maintain them, and delivery personnel believe they are the responsibility of the facility operator.

Failure to keep spill containment manholes clean and functional can lead to a variety of problems, ranging from water and dirt in the fuel (remember that these devices generally drain into the tank) to improper attachment of delivery hoses (in northern climates, they can fill with ice to the point where they interfere with the delivery hose connection) that can lead to spills. Check spill containment manholes weekly and remove and properly dispose of any dirt, water, or product that may be present. If drain mechanisms are broken or gaskets or seals are torn, have them fixed right away.

Secondary Containment

If you have invested in secondary containment, you've made a wise decision. However, make sure that you have gotten and continue to get the protection that you paid for. Double-walled tanks are reasonably trouble-free, but secondarily contained piping can be a problem child. Be sure that your piping is completely contained by checking whether you have containment sumps both under your dispensers and at the tank top. If you have no sumps under your dispensers, plan to add some sooner rather than later. If you have no tank top sumps, then, in my book, you

haven't got secondary containment.

Tank top sumps are prone to filling up with water whenever it rains. However, do not rest easy simply because your sumps never have much water in them. Maybe they do not accumulate water because they are not liquid-tight. If water is leaking out, so will product, and you don't have secondary containment.

If you are having secondarily contained piping installed, be sure that the installer tests both dispenser and tank top sumps according to the manufacturer's instructions to ensure that they are liquid-tight at the time of installation. Testing is usually done by filling the sumps with water and letting them sit for a period of time to see whether the water drains out.

If you have existing secondary containment, have it tested on an annual basis to verify that the containment is liquid-tight. There have been cases in Maine where tank owners were rudely surprised to find that what appeared to be a minor leak contained in a sump turned out to be a major release that escaped through the bottom of a leaky sump.

The Behavioral Achilles' Heels of UST Management

Know Your Leak Detection System

Do you know what your leak detection system is detecting? Does it check your tanks, piping, or both? Does it conduct tests periodically or relatively continuously? How does it alert you to a suspected release? How does it alert you if something is not quite right with the leak detection system itself? What is the recommended maintenance and/or calibration interval? Have you read your owner's manual?

Leak detection hardware is to an UST what brakes are to a car. You may not know how to fix your car's brakes, but you should know how they "feel" so you can tell when something is not right. Likewise, you should know enough about your leak detection system so that you are comfortable with what it does and know how to respond when an alarm goes off or it malfunctions.

If you don't have an owner's manual for your leak detection system, get one from the installer, the distributor, or the manufacturer. Spend a little time with it so that you understand the basics of how your system works, what kinds of problems it detects, what might cause false alarms, and what the warning messages mean. If the owner's manual is less than helpful, get a knowledgeable manufacturer's representative, installer, or (gulp!) regulator to give you a detailed overview of your system. Here are some leak detection essentials that you should know:

- **How often should your leak detection system be maintained?** If no maintenance schedule is specified in your product literature, do not be lulled into believing that your device will run unattended and trouble-free forever. If no maintenance interval is specified, a one-year maintenance schedule is recommended. At the very least, be sure that any sensors are tested annually to verify that the alarm goes off when the sensor is exposed to conditions that simulate a leak.

Leak detection hardware is to an UST what brakes are to a car. You may not know how to fix your car's brakes, but you should know how they "feel" so you can tell when something is not right.

- **What do you do if there is an alarm?** Prominently post emergency response names and phone numbers and instruct on-site personnel regarding the circumstances that require notification of upper management and/or outside personnel. Ensure that on-site personnel know what to do when there is even the possibility of an emergency situation or a possible spill or leak.
- **What do you do if you keep getting false alarms?** One of the more vexing aspects of today's leak detection systems is that false alarms are frequent. Very often, alarms can be traced to accumulations of water in secondary containment systems or improper programming, but some devices give warnings when product levels are too low or too high or even when they are out of paper. Do whatever it takes to eliminate false alarms. If a secondary containment sump takes on water, get the installer to fix it, as this condition is most often traceable to an installation problem. If the installer can't or won't fix the problem, find another installer.

Keep an Eye on Inventory

Although inventory is not the best leak detection method in the world, it can still provide valuable information that can help avoid problems. If you have an ATG that gives you product volume information, then daily inventory variances should be very small. If this is not the case, then perhaps there is something wrong with the ATG programming, your meter calibration, or some other aspect of the inventory procedure.

Once the ATG is properly calibrated, work on tuning your inventory procedures so that inventory variances can routinely be kept to single digits on most days if you don't pump much volume, or a half percent of sales if you do pump large volumes. If you can achieve this goal (and not by having someone fudge the numbers), then when there is an indication that something is wrong, inventory records can be a valuable tool in understanding the magnitude of the problem.

In a recent case in Maine, the physical evidence in the tank top sump indicated a minor release, but the inventory records indicated a much more significant problem. Had anyone paid attention to the inventory records, the true nature of the problem could have been discovered before product came pouring out into a drainage ditch.

Keep Personnel Informed

All on-site personnel should know the basics of how the storage system works, the meaning of the various warning signals that might occur, how to respond, and who to report to if problems are noted. Here are a few examples that illustrate why it is important to have informed personnel:

- The overfill warning on an ATG sounded at a facility during an

■ *continued on page 10*

■ **Tank-nically Speaking** *from page 9*

overfill incident that resulted in several fatalities. When the cash register attendant was asked what the alarm meant, she replied that it meant that the delivery person would soon be coming in to have her sign the delivery receipt.

- The head of a tank regulatory program traveling in another state noticed that a facility was experiencing slow flow. He reported the incident, which turned out to be a major release that had been going on for some time.
- At a recent class I was teaching for UST owners and operators, I was discussing how line leak detectors indicate leaks by reducing the flow rate, when one of the participants in the front row of the class gasped. It seems she had a pump that had frequently experienced slow flow but she had always thought it was a problem with the pump.

A little investment in employee education can have big returns in facility safety, security, and profits.

Invest in Preventive Maintenance

To ensure that alarms perform in a meaningful way, it is important to minimize false alarms resulting from such things as water entry into sumps, clogged filters that reduce flow rates, or equipment malfunctions. It is also important to make sure that real alarms aren't occurring because of things like leaky unions, improperly installed filters, or bad seals on meters.

Have a storage system check-up conducted at least once every year. This time is a great opportunity to have spill containment manholes cleaned and repaired, overfill prevention devices checked, leak detection sensors tested, sumps checked for tightness, unions and fittings checked for leaks, ATGs maintained, piping and line leak detectors tested, crash valves checked, filters changed, hoses checked for cracks, fill caps checked for tightness, meters calibrated, and, in general, the facility looked over by a trained and experienced eye.

Historically, many UST managers have approached storage systems with an "if it ain't broke, don't fix it" attitude. As facility throughputs have increased dramatically in the last decade, equipment is being asked to work harder and longer, and customer expectations of convenience and reliability have never been higher. It is a wise UST manager who recognizes that an invoice for preventive maintenance is a much better investment than a box of "out-of-order" covers for his or her nozzles.

I Haven't Got Time for All This!

I can hear the moans and groans from facility managers now. "I have too much to do already!" "You think I have nothing better to do than look after my storage system? I have a business to run!" Running a convenience store these days is a complex and highly competitive enterprise. Maintaining the facility appearance, retaining employees, keeping the shelves stocked and the bathroom clean, and managing the fuel storage system can keep a facility manager hopping. There are several solutions:

- Delegate tasks to on-site personnel, where appropriate. Make them personally responsible for inspecting hoses, nozzles, dispensers, and spill containment manholes, and reward them for keeping things shipshape and noticing potential problems.
- If the company has a substantial number of UST facilities, hire one person whose responsibilities lie solely in the realm of underground storage. Having a knowledgeable and conscientious person in a responsible position can work wonders for keeping storage systems operational, leak-free, and in compliance.
- Establish a service contract with a reputable pump and tank contractor who will assume responsibility for routine inspections and maintenance of your UST facilities.

The Achilles' Heel of UST Regulations

For better or for worse, storage system technology in the United States is going to stay where it is for a while. The next big improvements in protecting human health and the environment from UST releases are going to come from people—not technology. Petroleum industry experience for many decades has been that influencing the behavior of people who manage USTs is a frustrating task. I expect that upgrading UST managers from amateurs to professionals is a challenge that will make the drive for 1998 upgrade compliance look like a picnic in the country. ■

EPA HQ UPDATE

Web Page on UST System Performance Evaluation

For the past year, multiple organizations have been involved in some way in UST system performance evaluation. To spread the word about these efforts, OUST has established a Web page that briefly describes projects, both public and private, that are completed, under way, or planned. This information is available at http://www.epa.gov/swerustl/ustsystm/usteval.htm.

Although some work has been completed, many unknowns remain regarding environmental performance at UST sites. With limited resources in both government and industry, collaboration is often the key to progress. We hope this list of projects not only links interested parties to findings but also encourages collaboration in pursuing the additional work needed.

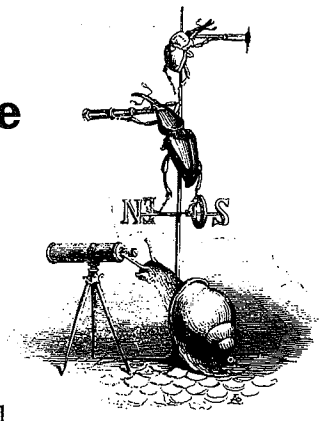
If you are involved in any of the projects listed, please review the information on the Web site to ensure that it is up-to-date. If you have a project to add, please share the relevant information with us.

If you are interested in coordinating with EPA to further UST system performance evaluation, contact Bill Lienesch at lienesch.william@epa.gov. As always, your general information requests can be addressed by calling EPA's Hotline, (800) 424-9346. ■

Leak Prevention

Looking Ahead to a Future of More Effective UST Management and Operation Practices

Room for Improvement



By James M. Davidson and Daniel N. Creek

Over the last 20 years, many improvements have been made to underground storage tank (UST) systems. Engineering and design changes have reduced fuel losses from mechanical failures. Increasingly diligent management and operation practices have helped reduce losses due to human errors and maintenance mishaps. In the process of developing these improvements, a wealth of UST literature has been created.

To bring all of this information into focus, we recently completed a document titled *Survey of Current UST Management and Operation Practices* (1999) for the California MTBE Research Partnership. During the course of our survey, we uncovered more than 100 references that provide detailed information on UST management and operation. In addition, we had the benefit of more than 100 publications by the EPA that address various aspects of owning and operating USTs. These references provide extensive information on how UST operations are typically conducted.

Improvements to UST management and operation practices have advanced incrementally. These advancements have occurred over time as the required upgrades have been implemented and as UST systems knowledge has increased. However, fuel losses from USTs still happen, and, consequently, there is still room for improvement. To further reduce fuel losses from USTs, we must continue to improve the design, installation, management, and operation of USTs.

In this article, we present some possible future improvements to management and operation practices for USTs. (See "Tank-nically Speaking" on page 6 for a discussion on immediate steps that can be taken to improve O&M practices.) We compiled this list of improvements by analyzing the UST literature and by conducting an interactive workshop with UST experts. The suggested improvements featured in this article focus on research and development topics that might lead to further identifying, reducing, and eliminating gasoline releases from USTs.

[Note: The full study on which this article is based also presents suggestions for current improvements to UST practices and discusses the causes of gasoline losses from USTs. The full report, which can be obtained by calling (714) 378-3278, will soon be available for downloading at: www.ocwd.com/nwri.]

Future Improvements

Based on our review of the current UST practices literature and the information gleaned from our UST experts workshop, we organized suggestions for future improvements to UST management and operation practices into the following general categories:

- **Equipment Design**
- **UST System Installation**
- **Leak Detection Systems**
- **Customer Education**
- **UST System Inspection and Maintenance**
- **Owner/Operator Certification and Training**
- **Tanker Driver Certification and Training**
- **Regulatory Enforcement**

Within these eight categories, a number of specific topics were identified that might lead to improved UST practices in the future; these topics are discussed below. The reader should note that not all of these potential improvements are of "equal value" for reducing or eliminating gasoline losses from USTs. Most of them require some research, development, or analysis before it can be determined that they would be widely beneficial.

■ Equipment Design

Possible improvements in equipment design include:

- UST systems that are designed to minimize vapor losses to the subsurface, including losses from the vapor return lines, the UST headspace, the vapor recovery systems, the tank vent lines, and the fillports. This effort may include modifications to materials (compatibility and/or permeability problems), condensate pots/sumps, and fittings/connectors (design changes).
- A means for performing post-installation tightness testing of overfill containment sumps. A protocol for this type of testing is needed.
- Design and implementation of overfill protection systems that cannot be easily disabled or that do not malfunction because of inappropriate tank fill-up procedures.
- Development and implementation of a well-defined protocol for integrity testing of secondary containment systems.
- Compatibility and permeability testing (particularly vapor-phase testing) of selected UST system components for use with MTBE-enriched gasoline and/or ethanol-enriched gasoline.

■ UST System Installation

Poor UST installation practices can be a primary cause of fuel release to the environment. Installation practices are complex because of the large number of system components and the many separate steps required during installation, each of which must be done properly if leaks are to

■ *continued on page 12*

■ Room for Improvement

from page 11

be avoided. The potential for problems is greatly increased if unqualified or unlicensed workers conduct UST installation or maintenance work. The problems we identified indicate that human error is the primary challenge to overcome during UST system installation. Possible improvements to the UST installation process include:

- Requirement that all personnel involved in UST system installation activities (e.g., materials/equipment selection, tank placement, sensors placement, corrosion protection installation and testing, leak detection system installation and testing) be trained and certified.
- Qualified third-party oversight for key aspects of UST system installation.
- Complete QA/QC documentation that covers materials and equipment used, equipment performance certifications, personnel involved in the installation, and installation procedures followed.

■ Leak Detection Systems

Numerous systems associated with USTs require periodic maintenance and testing, including the leak detection systems on the tanks, product piping, and under-dispenser containment sumps. Testing these different leak detection systems requires varying approaches and methods based on the equipment being tested and the leak detection sensitivity required. There is a wide range of leak detection equipment available and a wide range of testing methods that can be used to evaluate system tightness.

The most important possible improvement to leak detection systems is to determine the adequacy and sensitivity of these systems. If current systems are found to be inadequate to detect and prevent small/subtle gasoline losses, then improved systems may need to be researched and developed. This is particularly true if generally recalcitrant additives like MTBE are added to gasoline.

■ Customer Education

Customer education and public outreach regarding leak prevention at service stations is another possible area for future improvement. Some localities have implemented programs to educate members of the general public about their role and responsibility in the proper handling and use of gasoline. This effort has primarily consisted of "don't top-off your tank" stickers or flyers. These programs, which often stress air-emission reductions, could readily be changed and expanded to include other spill prevention benefits, such as protection of water resources. Areas that could be addressed in public outreach efforts include:

- The importance of not "topping off the tank" during fueling (provides air benefits and helps prevent subsurface contamination),
- Avoiding and reporting surface spillage, and
- Avoiding customer drive-offs (with dispenser hose still engaged in the car).

Possible ways to disseminate this educational information include the following: placing educational stickers or signs near/on all dispensers; inserting information in credit card customers' monthly bills; setting up point-of-sale flyers and materials; preparing public service announcements for radio and television; and providing instructional videos for driver-education classes and traffic schools.

■ UST System Inspection and Maintenance

Since December 1998, all new and upgraded UST systems are required to have leak detection and protection from spills, overfills, and corrosion. However, because of the wide variety of acceptable equipment, inspection and maintenance requirements for these systems are not standardized. (As of October 1998, more than 250 leak detection systems had undergone third-party evaluations.)

The absence of inspection and maintenance practice leads to the potential for human error, equipment malfunction, and, hence, accidental releases of gasoline to the environment. Possible improvements to future UST system inspection and maintenance practices include:

- Expanded training and certification requirements for all personnel involved in UST system maintenance and testing (e.g., corrosion protection systems, leak detection systems, overfill protection systems, product dispensers, vapor recovery systems).
- Qualified third-party oversight for key aspects of UST system maintenance and testing.
- Complete QA/QC documentation and reporting during all phases of maintenance and testing of UST systems. This documentation should be kept on-site and copies forwarded to the appropriate regulatory agencies.
- Periodic inspection of fill riser spill containment boxes that are not secondarily contained for liquid leak tightness. A protocol is needed for inspecting and quantifying leakage from these boxes.
- Development of well-defined protocols for maintenance, inspection, and testing of the various types of UST equipment. Although most equipment manufacturers have operations and maintenance manuals for their specific piece(s) of equipment, more care is needed to ensure that appropriate protocols are used.
- Development of a site-specific "Best Management Practices" document for each UST system. (The U.S. Postal Service is working toward this goal for its USTs.) The document should be kept on-site at all times.

■ Owner/Operator Certification and Training

No federal programs require the certification or training of UST owners, operators, inspectors, or contractors. Many states have certification and licensing programs for contractors involved with the installation, removal, and upgrade of USTs. However, field and literature information suggest that the current level of training may be inadequate. Possible future improvements include:

- Expanded training and certification for spill response and reporting, site maintenance and cleanup, inventory control, overfill prevention, operating and understanding leak detection and alarm systems, and third-party oversight.
- Development and implementation

of an education and certification program for service station attendants.

■ Tanker Driver Certification and Training

Tanker driver training programs and materials have been available for years and have surely produced benefits. However, further refinements and improvements can be made to help reduce overfills and surface spillage. Possible future improvements include:

- More rigorous training programs for all tanker drivers, including lessons on drivers' roles in avoiding and reducing spills, spill response and reporting, tank gauging, the purpose and function of overfill protection devices and spill boxes, vapor recovery systems, and health and safety.
- Consistent certification requirements for all tanker drivers (Note: U.S. Department of Transportation requirements already exist).

■ Regulatory Enforcement

Enforcement of the existing UST regulations is a key part of ensuring compliance and preventing fuel losses from UST systems. To improve the enforcement process, some possible future improvements include:

- Consolidation of regulations to reduce overlap and improve clarity.
- Expanded training for regulatory inspectors and verification of the uniformity of that training.

Improvement Must Be Ongoing

Some UST owner/operators and regulatory bodies are already implementing some of these practices. They are to be commended for their progress. Nevertheless, more improvement is possible. By continuing to develop and implement improved management and operation practices, fuel losses from USTs can be reduced even further. ■

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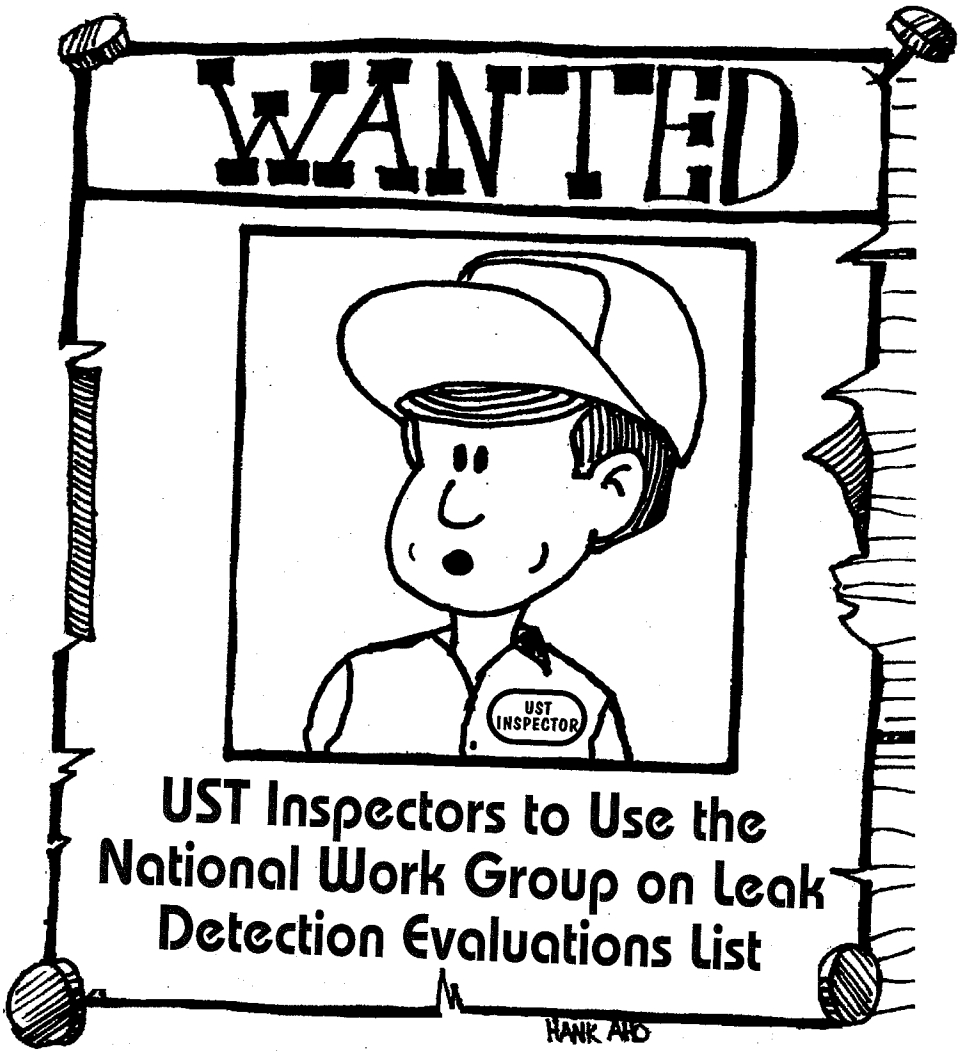
Leak Prevention



by Curt Johnson

As we enter the new millennium and the underground storage tank (UST) program deadlines are all part of the past century, we need to take a fresh look at where we are headed. In the past we worked hard to try to encourage UST owners and operators to install the required leak detection, corrosion protection, and spill and overfill prevention equipment. Now it is time to make sure that owners and operators are using the equipment and using it properly.

Determining whether equipment is being used is fairly straightforward. Determining whether it is being used properly is much more difficult and requires a basic knowledge of the operating principles of the equipment, along with ready access to a comprehensive source of technical information pertaining to the equipment.

When it comes to leak detection equipment, the current National Work Group on Leak Detection Evaluation's (NWGLDE) "List of Leak Detection Evaluations for Underground Storage Tank Systems" can be a valuable resource for UST inspectors. It provides the essential technical information needed to determine whether leak detection equipment is properly applied and operated in the field.

In the past, the NWGLDE List has been promoted primarily as a means for determining whether a certain type of leak detection equipment was properly third-party tested in accordance with an accepted protocol. This publication, however, contains a much broader scope of information that can serve as an important tool for UST inspectors. I am thinking particularly about Part II

■ *continued on page 14*

■ **NWGLDE** *from page 13*

of the publication— "Leak Detection Equipment Specifications"—which provides important tips for making sure that leak detection equipment was installed and is being operated so that it performs according to manufacturer specifications and within EPA UST regulatory performance requirements.

Let me give you a few examples of how UST inspectors can use Part II of the NWGLDE List to check the application and operation of a few methods of leak detection during a compliance inspection.

Automatic Tank Gauging (ATG) Method

The ATG equipment specification sheets have the following 10 categories that provide the UST inspector with information on the correct application and operation of an ATG.

Certification

- As indicated on the NWGLDE List, some tank gauges are certified for two leak rates, 0.1 and 0.2 gph (the others are certified to detect only 0.2 gph leak rates). Make sure that the ATG is set up to test at the appropriate leak rate.
- Because the same ATG can have a different test period and a different waiting time, depending on the leak rate used, confirm that the test period and the waiting time correspond to the appropriate leak rate.

Leak Threshold

- When the leak threshold can be determined, make sure that a leak is being declared when the test results equal or exceed the threshold listed under this category in the NWGLDE List. Remember that the leak threshold is always less than the regulatory standard (0.2 gph). When the measured leak rate exceeds this listed threshold, the test result indicates a suspected release.

Applicability

- Identify the product stored in the tank and make sure that it is listed under this category in the NWGLDE List. Watch out for waste oil tanks. Because properties of used oil are not constant, only mass-based ATG systems are able to test them.

Tank Capacity

- Because different ATGs are limited to different maximum tank sizes, compare the tank volume to the volume listed for maximum tank size. If the volume exceeds the maximum volume listed, then the test results are not acceptable based on the EPA test protocol requirements.
- Check the product level in the tank when the tests are run to make sure that they fall within the acceptable range indicated under this item. The third-party test indicates that test results where the product level is outside this range are not valid.
- As indicated later under the "Comments" category, check for and be concerned about ATG tests that are conducted at consistently low levels.

Waiting Time

- Check the waiting time between delivery and testing, and between dispensing and testing to ensure that the minimum time periods listed under this category are met. If waiting times are shorter than required, then the test results are not acceptable based on the EPA test protocol requirements.

Test Period

- As indicated earlier under "Certification," the test period must correspond to the leak rate. Verify that the tests are being run at least as long as the test period indicated. If the test did not last long enough, then the test results are not acceptable based on the EPA test protocol requirements.

Temperature

- Check the equipment invoice against the manufacturer's probe specifications to determine the number of temperature sensors that are installed on the probe. There must be at least as many indicated under this category in the NWGLDE List to ensure that there are enough in use at all acceptable product test levels. Note: Do not attempt to physically inspect the probe.

Water Sensor

- If a tank gauge stick and water finder paste are available, check the water level and compare this reading against the equipment's water sensor reading. The sensitivity and possible tank tilt (because the stick and gauge are not in the same location) need to be considered when comparing the readings.

Calibration

- Always check records to make sure that the temperature sensors (or thermistors) and probe are being calibrated regularly based on the manufacturer's instructions. Without calibration, this equipment may not detect a leak at the required leak rate or may indicate a leak when none exists.

Comments

The NWGLDE List includes the following comments regarding our group's concerns about the installation and operation of ATGs:

- Check to determine whether and be concerned when an ATG is installed in a manifolded tank system. At present the NWGLDE List shows that none of the ATG systems listed has been evaluated in manifolded tank systems.
- Because ATGs test only the portion of the tank containing product at the time of the test, consistent testing at low product levels should be a concern to inspectors. This situation could allow a leak to go undetected. EPA regulations require testing of the portion of the tank that routinely contains product, which means that the test should be run while the tank is filled as close as possible to its highest level during the month.

Non-volumetric Tank Tightness Test (NVTTT) Method

The NVTTT equipment specification sheets have the following 11 categories that provide the UST inspector with information on proper equipment application and operation.

Certification

- Be aware that the NVTTT is a qualitative method. Thus, the equipment is certified to be able to detect a leak at the listed leak rate, but cannot generate a leak rate during the test.

Leak Threshold

- NVTTT methods use several different ways to determine a leak. One is to put the tank under pressure or vacuum and monitor for loss of either. A second is to put a microphone in the tank, place the tank under vacuum, and listen for bubbles in the area below the product level and the whistling of air in the ullage area. Another is to inject a tracer compound into the tank and monitor for the tracer in the soil outside the tank. For some methods, inspectors will be able to review the test data and verify whether a leak has occurred based on the information in the NWGLDE List. For others, an inspector will only be able to review the data to see whether they look reasonable.

Applicability

- Identify the product stored in the tank using the NVTTT method and make sure that it is listed under this category in the NWGLDE List. Again, watch out for waste oil tanks, because some NVTTT equipment cannot be used for waste oil.

Tank Capacity

- Always check the tank size and/or ullage volume limitations to make sure that it is within the limitations on the NWGLDE List. This step will ensure that the NVTTT will be able to detect a leak at the appropriate leak rate.
- Check the level or volume of the tank, whichever is indicated in the NWGLDE List, when the tests are run to make sure that they fall within acceptable range.

Waiting Time

- Because these methods are independent of temperature, there is usually no waiting time between delivery and testing. However, tests using a tracer do have a waiting time and the inspector needs to ensure that the test complies with the waiting time requirement on the NWGLDE List. If the waiting time is shorter than required, then the test results are not acceptable based on the EPA test protocol requirements.

Test Period

- For tracer tests, the test period is the same as the waiting time. Some NVTTT equipment have very straightforward test periods; others are very complicated. The NWGLDE List normally provides enough information to determine whether the length of the test is sufficient. However, some test periods are dependent on tables that must be obtained from the manufacturer.

Temperature

- As indicated earlier, NVTTT methods are independent of temperature.

Water Sensor

- If you are on-site during a NVTTT vacuum or pressure test and a tank gauge stick and water finder paste are available, check for water in the tank. If water is detected, compare this reading to the equipment's water sensor reading. The sensitivity needs to be considered when comparing the readings.

Groundwater

- All NVTTT methods require that the depth to groundwater within the tank backfill be determined. Always check test records to make sure that the groundwater level was adequately determined and documented. This step is critical for vacuum tests to ensure that the vacuum applied will not collapse the tank. It also provides an opportunity for the tester or the inspector to check for free product. The test should be considered invalid if the tester did not identify and, if necessary, compensate for water in the tank backfill.

Calibration

- Some vendors require the test equipment to be calibrated before each test; others do not. Where applicable, check the operator's records to make sure that the equipment was calibrated.

Comments

Here are some of the issues in this category that should be considered by an inspector:

- For vacuum-type NVTTT equipment used to test older tanks (tanks installed prior to the EPA regulations), it is important for inspectors to determine the type of backfill used around the tanks, because clay backfill may plug the holes in the tank when a vacuum is applied.
- When backfill is saturated with product, vacuum-type NVTT equipment may fail to detect a leak because product, instead of air or water, is drawn into the tank. Inspectors should determine whether monitoring wells within the tank backfill area were checked at the time of the test.

If you would like assistance in determining what to look for during inspections with respect to other types of leak detection equipment, I encourage you to review the NWGLDE List or contact the appropriate NWGLDE member. NWGLDE member phone numbers, fax numbers, e-mail addresses, and business addresses are listed near the front of the NWGLDE List.

In the new millennium, UST inspectors will need to spend more time looking at the operation of leak detection equipment instead of just looking for a box on the wall to confirm that leak detection equipment was installed. The NWGLDE List can be a helpful source of information for UST inspectors performing these inspections. The list can be viewed or downloaded from EPA's Internet home page at *http://www.epa.gov/oust/pubs/index/htm.* ■

Curt Johnson is an Environmental Engineer in the UST and UIC Technical Support Group within the Groundwater Branch of the Alabama Department of Environmental Management, and Chair of the NWGLDE.

MTBE

"Thou Canst Not Stir a Flower Without Troubling of a Star." FRANCIS THOMPSON

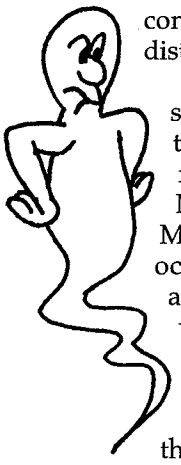
One Expert's Addendum to the "60 Minutes" MTBE Broadcast

by Peter Garrett

Editor's Note: We asked Peter Garrett, a geologist interviewed on the January 16 "60 Minutes" broadcast on MTBE, to share his thoughts about the program and the subject of MTBE. As you will read, Peter's interest in the subject goes way back—to the 1980s—and, as you'll also read, where MTBE is concerned, he doesn't mince words.

On January 16, 2000, *60 Minutes*, devoted two segments to the subject of MTBE—a major milestone in the saga of the rise and fall of methyl tertiary-butyl ether. The MTBE saga began in 1979 when the first such refinery was put on-line. My purpose here is not to critique the *60 Minutes* team, who did a remarkable job of pulling together a multitude of information on a highly technical and political issue. My purpose is to tell "the rest of the story," as I see it, with the hope that it will help us be more circumspect about other environmentally threatening situations that arise in the future.

The MTBE story was initially one in which atmospheric scientists did not hear what groundwater scientists had to say. According to the atmospheric scientists, MTBE and other oxygenates (hydrocarbons with oxygen) could replace lead in gasoline and also reduce smog and carbon monoxide. Groundwater scientists pointed out that MTBE, being very soluble, tends to migrate quickly from gasoline spill sites and contaminate wells at some distance.



I was the groundwater scientist who first saw these implications in the mid-1980s at spill sites in Maine. I first encountered MTBE as a contaminant that occurred in groundwater around gasoline spill sites without the other components of gasoline. ARCO, I discovered, was the primary supplier of MTBE to the petroleum industry, so I called the company to find out more. ARCO employees told me about its properties and characteristics, and I told them that MTBE had the potential to spread gasoline contamination further and faster than anything I had seen before.

To get this information out to the scientific and engineering community, I and two colleagues pulled together all that we could find on MTBE—its history of production, chemical characteristics, fate and transport in the environment, means of identification in the lab, toxicity, methods of treatment—and wrote a paper. We concluded our paper with a discussion of policy options. One was to ban MTBE outright. Another was to insist on total containment of gasoline so that leaks would become rare or nonexistent.

I presented the paper in 1986 at a national conference cosponsored by the National Ground Water Association and the American Petroleum Institute. I also met with half a dozen officials in the EPA Office of Underground Storage Tanks. Following publication of the paper, I received calls from all over the country. There was no doubt in my mind that the message was out (though perhaps only to the groundwater industry).

We Hear What We Want to Hear

It's oft been said that we hear what we want to hear, and that certainly was the case where the EPA and industry were concerned. MTBE production continued to rise as the additive's use in gasoline expanded from that of an octane enhancer to that of an air pollution antidote.

That expansion was enhanced by the Clean Air Act (CAA) Amendments of 1990, which mandated the use of oxygenates. MTBE can now be found in gasoline in virtually every state. In some cities, it constitutes about 10 percent of the gasoline by volume. Concentrations in today's gasolines are several times higher than they were when we began finding MTBE in Maine's groundwater in the mid-1980s. MTBE is produced in the United States, Europe, South America, and Saudi Arabia.

EPA seemed to have ignored the issue of groundwater quality in its zeal to improve air quality. MTBE is very soluble and migrates rapidly in groundwater. In water, it has an objectionable odor and taste, even at low concentrations (tens of parts per billion—ppb). Yet EPA still has not assigned it a drinking water standard, only a nonbinding health advisory. Nor has EPA included MTBE on its target list of volatile contaminants to be analyzed by the standard method used by public water suppliers.

Although the agency has recommended ingestion studies to test for toxicity—which would be very reasonable for a water-soluble contaminant—it has not followed through. Studies have been done on inhalation.

Oil companies are understandably keeping a low profile in this debate. Yet in the mid-1980s, I had detailed discussions with one company's personnel about MTBE's characteristics and behavior in groundwater. Despite the oil industry's internal knowledge of the effects of MTBE on groundwater, oil companies touted MTBE heavily as the best replacement for tetraethyl lead for octane enhancement and as an additive to improve air quality. In the legislative buildup to passage of the CAA, oil companies lobbied for the use of oxygenates. Now they say that they can manufacture a clean-burning gasoline without the use of MTBE. That sounds good to me.

MTBE in the Environment

Since our original paper appeared, much new evidence has come to light that shows that MTBE commonly

occurs in four associations in water in the environment:

- Highest concentrations in groundwater (100s to 1000s ppb) are usually associated with leaking underground storage systems.
- Lower concentrations (10s to 100s ppb) may come from small spills (e.g., customer spillage at a gas station, emptying a lawn mower in the yard).
- MTBE in lakes (less than 35 ppb) comes mostly from two-cycle engines, especially jet skis, which discharge unburned hydrocarbons in exhaust gases directly into the water.
- MTBE vapors that are present in the air from various sources may dissolve in rainfall and cause contamination of groundwater at 1–2 ppb over wide areas. This finding was made by the U.S. Geological Survey in its National Water Quality Assessment Program.

60 Minutes emphasized the first problem. But in 1999, Lake Tahoe banned jet skis on the lake, which, along with its wells, is also used as a water supply for the community. In Maine, where 50 percent of the population uses domestic wells, a recent study has shown that several thousand wells are likely to be contaminated above the state drinking water standard, most probably from small spills.

MTBE is now the second most commonly identified contaminant in groundwater (chloroform is number 1). To achieve this kind of record in a mere two decades of use is incredible. MTBE can be found almost anywhere we look, according to the USGS. But in some states, nobody is even looking. What a tragedy!

States Toll the Bell for MTBE

Several states have played an important role in bringing groundwater contamination by MTBE into the public limelight. In my own State of Maine, Governor Angus King felt he had no alternative to meeting the mandates of the CAA but to use reformulated gas with 11 percent MTBE. But after three well-publicized spill incidents that caused the contamination of a municipal well, a school well, and two dozen domestic wells, he commissioned a study of all public supply wells in the state, and 1,000 domestic wells chosen randomly.

When the results came in, King told his staff to find a gasoline that would meet the requirements for cleaner air without polluting the groundwater. At last an administrator who sees both air and groundwater resources as being valuable! Maine also wisely made MTBE a standard target compound for all volatile analyses of water samples and has thus identified MTBE at all gasoline spill sites since the late 1980s. We now have a maximum exposure guideline (our health-based drinking water standard) set at 35 ppb, though there are some who think it is too high to be protective.

Because MTBE in water smells and tastes bad, California opted to give it a secondary (non-health-based, esthetic) drinking water standard of 5 ppb. Citizens and local authorities have sued the oil companies over their use of MTBE. A University of California study commissioned by Governor Gray Davis concluded that continued use of MTBE was uneconomical, bearing in mind cleanup costs and lower fuel efficiency, among other things. Gasoline producers say that, because California's fuel supply is so heavily dependent on MTBE production, it will take a year or more to make up the deficit of losing 11 percent of the volume of gasoline fuel available in the state.

Beware the Law of Unintended Consequences

The bottom line is that things often have ramifications beyond our own limited imaginings. The environment does not divide itself into an Office of Air and Office of Water, and we should all beware the "Law of Unintended Consequences." As the nineteenth-century poet Francis Thompson wrote, "Thou cans't not stir a flower without troubling of a star." ■

Peter Garrett is Vice-President with the firm of Emery & Garrett Groundwater, Inc. To find out more of what he thinks about MTBE or to let him know what you think, contact Peter by phone at (207) 872-0613 or by e-mail at eggime@eggi.com.

from the editor

Is It Any Wonder That MTBE Is Omnipresent in the Environment?

Gasoline is one contaminant that is a national staple. So let's not be too surprised when we find that MTBE, with its high solubility, its fondness for mingling and commingling in the environment, and its penchant for lingering in the environment, seems to turn up everywhere in the environment—and not just from fuel storage releases. As a nation, we (Harold and Betsy Public) are spilling. dumping, spraying, injecting, and projecting gasoline into the environment in a delightful assortment of ways—an important point that the otherwise balanced and even-handed *60 Minutes* broadcast on MTBE failed to mention.

I can say with pride that we have covered that point in *LUSTLine*—oh, way back in Bulletin #31— in David MacCaskill's article, "A Little Drop'll Do Ya—Maine Study Finds the Presence of MTBE in Drinking Water Wells to Be Widespread and of Curious Origin." David called our attention to the fact that Maine was finding low levels of MTBE in places with no obvious fuel tank source(s). Maine's study concluded that many sources of MTBE in the environment involved small, garden-variety gasoline spills—lawn mower overfills, car accidents, backyard car repair activities.

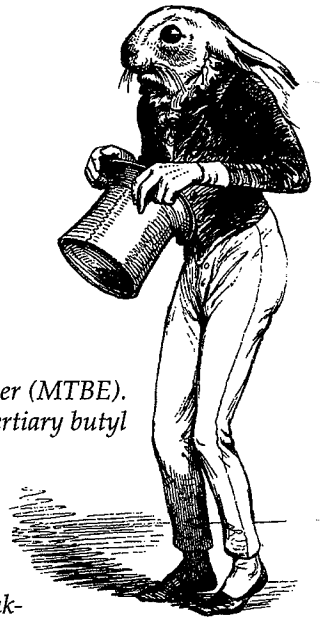
I do not exaggerate when I say that over these past high-MTBE-anxiety years, facts and tidbits about and peripheral to the subject have attached themselves to me like lint. In conversations about gasoline and MTBE, I have learned how to get rid of gophers—dump five gallons of gasoline down the gopher's hole(s)... and a few more gallons for good measure. I have learned that gasoline is a great weed killer—spray it or

■ *continued on page 22*

MTBE

Tertiary Butyl Alcohol (TBA)

MTBE May Not Be the Only Gasoline Oxygenate You Should Be Worrying About



By Steven C. Linder

Over the past several years, the spotlight has been on the gasoline additive methyl tertiary butyl ether (MTBE). However, MTBE may not be the only additive of concern at many gasoline releases. There is also tertiary butyl alcohol (TBA)—one of the more significant gasoline oxygenate additives other than MTBE.

I first learned heard about TBA in August 1998 at a meeting about pilot-testing drinking water treatment technologies at the City of Santa Monica's Charnock Wellfield. Many of us were taken by surprise when the consultant to the potential responsible parties (PRPs) associated with the city's MTBE contamination problem brought up the subject of TBA. He explained that TBA, as well as MTBE, had been detected in the monitoring wells surrounding the drinking water wells and that TBA was likely to be present in the drinking water wells when pumped.

At the time, the PRPs were in a temporary settlement with the City of Santa Monica and Southern California Water Company requiring that they pay more than $4 million per year for purchased imported replacement drinking water. Contending that wellhead treatment was much less costly than replacement water, the PRP companies had, in my opinion, a tremendous incentive to get wellhead treatment on line as soon as possible.

At the meeting, we went on to discuss how TBA could likely have a significant influence on the treatment technologies used to clean up petroleum releases, because air stripping and granular activated carbon were not thought (based on theoretical evaluation) to be effective technologies for TBA. Because TBA had been detected in the wells and identified as an issue, the treatment cost estimates increased substantially.

What Is TBA?

TBA (CAS# 75-65-0) is a colorless solid or liquid (above 77°F) with a camphor-like odor. One study reports that the odor threshold for TBA is at a vapor concentration of approximately 609 ppm. The chemical formula for TBA is $(CH_3)_3COH$. TBA has a research octane rating of 103, a molecular weight of 74.1, and a specific gravity of 0.79. It is miscible in water. It has a Henry's law constant of 121E-5 (atm-m^3)/(g-mole), which means it's even harder to air strip than MTBE. It has a log K_{oc} of 1.57, which means it doesn't adsorb readily to carbon. And, it has a log K_{ow} of 0.35, which means it prefers to stay in water, once it is there.

TBA has many uses—in extraction of drugs, as a denaturant in ethanol, as a dehydration agent in the manufacture of flotation agents, in fruit essences, in plastics, in perfumes (as a solvent), as a chemical intermediate, and as an additive/blending agent in unleaded gasoline.

Why Is TBA in Gasoline?

TBA is used as a gasoline additive/blending agent. Oxygenates, particularly alcohols, have a long history of use in motor fuels—going back to the beginning of the twentieth century, when ethanol was first promoted for blending into gasoline. At various times, different alcohols (e.g., methanol, isopropyl alcohol, and TBA) were of commercial interest in gasoline blending because of their special performance properties. TBA has been added to gasoline as an antiknock compound.

The Atlantic-Richfield Company (ARCO) began using gasoline-grade tertiary-butyl alcohol (GTBA) in 1969 to improve octane. In 1979, ARCO received approval from EPA to use GTBA at up to 7.0 percent by volume in unleaded gasoline. Also in 1979, Sun Oil Company received an EPA waiver that allowed the use of 2.75 percent by volume methanol along with 2.75 percent by volume GTBA in a blend with unleaded gasoline. ARCO Petroleum Products received a waiver in 1981 and introduced an oxygenate blend containing about 9.5 percent by volume of an equal mixture of methanol and GTBA in Pennsylvania. EPA also has granted waivers for blends of gasoline and GTBA up to 3.5 mass percent oxygen content (16 vol % TBA) and for various blends of methanol and GTBA or other higher-molecular-weight alcohol (cosolvents).

TBA is an impurity in commercial-grade MTBE, which commonly contains methanol and TBA as impurities. In some production processes, TBA is a precursor to MTBE. I am not aware of any publicly available studies that clearly identify the TBA impurity concentration ranges likely to be found in commercial-grade MTBE. (See Figure 1.)

Does TBA Biodegrade Readily?

Unlike the linear alcohols methanol and ethanol, TBA is not easily degraded. Studies have shown no degradation of TBA in anerobic environments and some degradation in aerobic conditions. I understand that TBA was observed to degrade in a few weeks from water that had been collected from the Santa Monica Charnock Wellfield, spiked with TBA and stored in drums.

MTBE is a highly stable compound that is resistant to both biological and chemical reactions occurring

FIGURE 1

Partial Diagram of MTBE and TBA Potential Environmental Transformations

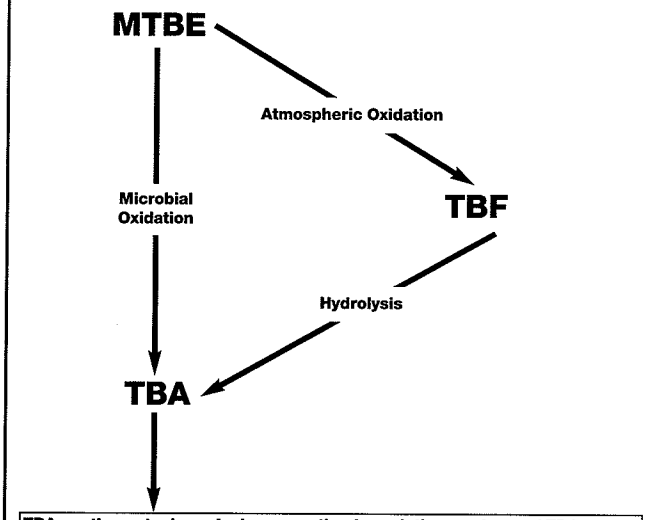
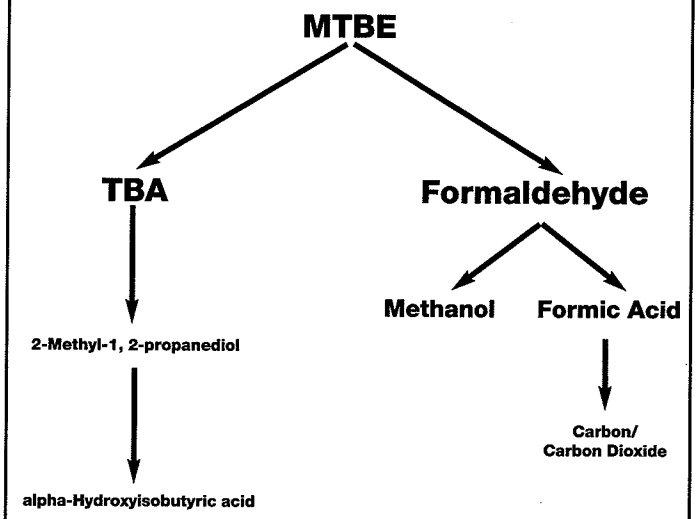


FIGURE 2

Partial Diagram of MTBE and TBA Potential Metabolic Transformations



in the environment. However, under some geochemical and microbial conditions within an aquifer, MTBE may degrade slowly. Some studies have shown accumulation of TBA after it has formed in association with the degradation of MTBE. In these circumstances, TBA may be found as a degradation product of MTBE.

Has TBA Been Found at LUST Sites?

TBA can be a common contaminant in an environment where there have been releases of oxygenated fuels. For example, most of the service station sites examined as part of the Charnock (Santa Monica) MTBE investigation have detectable levels of TBA present in soil and/or groundwater. TBA has been detected at concentrations as great as 18,000 μg/L in groundwater near source areas of groundwater plumes that originate at the gasoline stations examined as part of the Charnock Wellfield investigation. TBA has also been detected in groundwater at gasoline releases in the South Lake Tahoe area.

What Concentrations Are of Concern for TBA?

The California Department of Health Services has established a Drinking Water Action Level of 12μg/L for TBA. Drinking Water Action Levels are health-based advisory levels established by the Department of Health Services for chemicals for which primary maximum contaminant levels have not been adopted.

On September 12, 1997, New Jersey issued an Interim Specific Groundwater Criterion of 100 μg/L for TBA. New Jersey lowered the concentration that it recommends as a goal for groundwater cleanups and for guidance in situations where groundwater is contaminated with TBA from 500 μg/L to 100 μg/L based on the 1995 National Toxicology Program TBA drinking water study on rats and mice.

In May 1995, as part of the National Toxicology Program, the National Institutes of Health published a paper regarding toxicology and carcinogenesis of TBA in rats and mice. The study concluded the following:

> "Under the conditions of these 2-year drinking water studies, there was some evidence *of carcinogenic activity* of *t*-butyl alcohol in male F344/N rats based on increased incidences of renal tubule adenoma or carcinoma (combined). There was no evidence *of carcinogenic activity* in female F344/N rats receiving 2.5, 5, or 10 mg/mL *t*-butyl alcohol. There was equivocal evidence *of carcinogenic activity* of *t*-butyl alcohol in male B6C3F1 mice based on the marginally increased incidences of follicular cell adenoma or carcinoma (combined) of the thyroid gland. There was some evidence *of carcinogenic activity* of *t*-butyl alcohol in female B6C3F$_1$ mice based on increased incidences of follicular cell adenoma of the thyroid gland."

In addition, when ingested, MTBE initially metabolizes to yield TBA and formaldehyde. (See Figure 2.)

What Analytical Methods Should Be Used for TBA Quantification?

TBA presents even greater analytical difficulties than those presented by MTBE. However, commercial laboratories have been able to achieve detection levels for TBA of 10 μg/kg in soil and 5 μg/L in water and quantification levels of 20 μg/kg in soil and 25 μg/L in water as required by EPA and State of California orders.

Extensive work by the USGS, Lawrence Livermore, and many other laboratories indicate that the ethers and TBA are measurable using purge-and-trap GC in conjunction with any of the determinative methods (8015, 8021, or 8260). Based on

■ *continued on page 20*

■ **TBA** *from page 19*

studies of the most widely used oxygenate, MTBE, potential analytical problems exist with methods 8015 or 8021. MTBE can be misidentified when other gasoline components are present, because of coelution of MTBE with these components. This misidentification is most pronounced with method 8015, which uses the nonselective FID detector, but it can be significant even if a PID detector is used. Similar misidentifications are likely when using methods 8015 or 8021 for any ether and/or TBA.

Clinton Church, Paul Tratnyek, and Jim Pankow, of the Oregon Graduate Institute, have developed a direct aqueous injection–GC/MS method for MTBE and its degradation products. They report that this method is able to achieve a detection limit of 0.1 μg/L for both MTBE and TBA.

As part of the Charnock MTBE treatability testing, data quality review procedures for TBA analyses by a mobile laboratory identified high-biased TBA results caused by tert-butyl formate [TBF (CAS# 762-75-4)] hydrolysis to TBA. Therefore, appropriate care (sample storage, preservation, and holding times) should be taken when handling samples to avoid high-biased TBA results.

What Technology Can Be Used to Remove TBA from Water?

GAC isotherm and accelerated column tests performed by two major granular activated carbon (GAC) suppliers predicted that TBA will poorly adsorb to GAC when compared to MTBE adsorption. However, during pilot treatability testing at the City of Santa Monica's Charnock Wellfield, data appeared to show TBA removal by GAC.

During this testing, TBA was spiked to achieve a concentration of 200 μg/L. TBA was removed to below detection levels without any acclimation or transition period in a one-ton carbon vessel. However, in smaller GAC pilot columns, removal of TBA required a transitional period of approximately three weeks. Prior to the acclimation, TBA effluent results were consistent with the GAC isotherm and accelerated column tests. Data generated at a pump and GAC treatment facility adjacent to the City of Santa Monica's Arcadia Wellfield also show TBA removal through GAC vessels. Therefore, TBA is likely destroyed by biological activity in the GAC vessels.

Literature indicates that TBA is highly soluble in water and has a low Henry's law constant, which suggests that air stripping would not be significantly effective because of poor mass transfer of TBA from the aqueous phase to the vapor phase. From what I have been told, this theory appears to be true for a large treatment system that recently went into operation as part of the Santa Monica Charnock project.

At the Charnock Wellfield, UV-oxidation treatment was tested using Calgon's UV-peroxide technologies for water containing known spiked concentrations of MTBE and TBA. During the UV-oxidation tests, treatment of water spiked with MTBE at 1,000 ppb and TBA at 400 ppb required 40 percent more energy than treatment of water spiked with only 1,000 ppb MTBE. UV-oxidation treatment is a viable technology for treatment of water containing TBA. However, UV-oxidation technologies need to be carefully monitored and controlled to assure their effectiveness and avoid unwanted treatment by-products.

Synthetic resin sorbtion technologies have also been tested and found to show promise in aqueous-phase MTBE treatment. Some studies indicate that synthetic resins may be a more cost-effective sorption technology for TBA-contaminated water.

Not to Be Ignored

TBA should not be ignored when addressing gasoline releases. It is a likely contaminant of concern at many LUST sites, although its concentrations are typically lower than those of MTBE at most sites. TBA is a very stable compound in the environment and may not readily degrade in groundwater in many aquifer settings.

From a toxicological point of view, exposure to TBA elicits both noncancer and systemic toxic responses, as well as evidence of carcinogenicity. Furthermore, formaldehyde is an in vivo metabolic product of TBA exposure, and EPA has determined that formaldehyde is a probable human carcinogen (class B1). TBA contamination can be more difficult than MTBE to quantify in water samples, and it is more difficult and costly to remove from water.

Clearly, further research and study is needed to better understand the significance of TBA related to gasoline releases. ■

Steven Linder is an Environmental Engineer with EPA Region 9. He has been a project manager for the Charnock/Santa Monica MtBE Pollution project for the last three years. For more information, contact Steve at linder.steven@epa.gov or (415) 744-2036.

For More Information...

...about TBA, check out the following Web sites:

www.chevron.com/prodserv/bulletin/motorgas/sidebars/oxygenates.html
ntp-server.niehs.nih.gov/htdocs/LT-studies/tr436.html
www.dhs.ca.gov/ps/ddwem/chemicals/mcl/actionlevels_category1.htm
www.lyo.com/html/products/product-selector/tba/etbe-mtbe.htm
ntp-server.niehs.nih.gov/htdocs/Levels/Tr436levels.Html
www.healtheffects.org/Pubs/oxyprog.htm
www.epa.gov/region09/cross_pr/mtbe/charnock/
www.dhs.ca.gov/ps/ddwen/chemicals/mcl/actionlevels_category1.htm
www.ocwd.com/nwri/
www.epa.gov/swerust1/oxygenat/oxytable.htm
cgr.ese.ogi.edu/MTBE/

MTBE

Northeast States Set Forth a Unified MTBE Strategy
Call for Immediate Congressional Action

On January 19, 2000, the Northeast States for Coordinated Air Use Management (NESCAUM), representing the eight states of New York, New Jersey, Massachusetts, New Hampshire, Vermont, Rhode Island, Connecticut, and Maine, urged Congress to enact effective federal legislation regarding reformulated gasoline and MTBE. In launching this call for federal action, the states set forth six core principles designed to protect the region's air and water quality while maintaining an adequate fuel supply and price stability.

The principles were developed by the Northeast Regional Fuels Task Force, consisting of state air and water officials. The Task Force was formed to implement the recommendations included in a comprehensive RFG/MTBE study conducted by NESCAUM last summer at the request of the Northeast governors.

Under federal law passed in 1990, Congress required reformulated gasoline to contain oxygenates, such as MTBE or ethanol. Only Congressional action to lift the oxygen mandate can provide an adequate solution to concerns over current levels of MTBE use. Without changes in federal law, states are effectively prohibited from addressing this significant public concern.

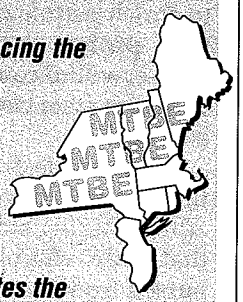
Six Principles for Change

The Northeast states' principles for changes to the current reformulated gasoline program include the following:

- Repeal the 2 percent oxygen mandate for reformulated gasoline (RFG) in the Clean Air Act.
- Phase down and cap MTBE content in all gasoline.
- Clarify state and federal authority to regulate and/or eliminate MTBE or other oxygenates if necessary to protect public health or the environment.
- Maintain the toxic emission reduction benefits achieved to date by the federal RFG program.
- Promote consistency in fuel specifications through the timely implementation of effective federal requirements.
- Provide adequate lead time for the petroleum infrastructure to adjust to ensure adequate fuel supply and price stability.

"The challenge facing the Northeast states and the nation is to identify a program that effectively mitigates the environmental risks posed by MTBE while maintaining the public health benefits of the current RFG program. We simply can no longer accept federal mandates that are barriers to that goal."

Arthur Rocque, Jr.
Connecticut DEP Commissioner



According to Jason Grumet, Executive Director of NESCAUM, "The federal oxygenate mandate is an outdated and inappropriate national policy. These unified principles call on Congress to grant states and industry the flexibility to preserve clean air benefits while balancing other environmental resource concerns."

"The challenge facing the Northeast states and the nation is to identify a program that effectively mitigates the environmental risks posed by MTBE while maintaining the public health benefits of the current RFG program," says Connecticut DEP Commissioner Arthur Rocque, Jr. "We simply can no longer accept federal mandates that are barriers to that goal."

"We need to make sure that we are not throwing the baby out with the bath water," says Steve Majkut, Rhode Island DEM Air Director. "We must maintain the air quality benefits of MTBE while we allow sufficient time for the refining and distribution systems to develop an adequate supply of alternatives. We simply cannot afford a short-term quick fix that sacrifices the clean air benefits in the process."

Other Groups Join NESCAUM in Urging Congress to Act Quickly

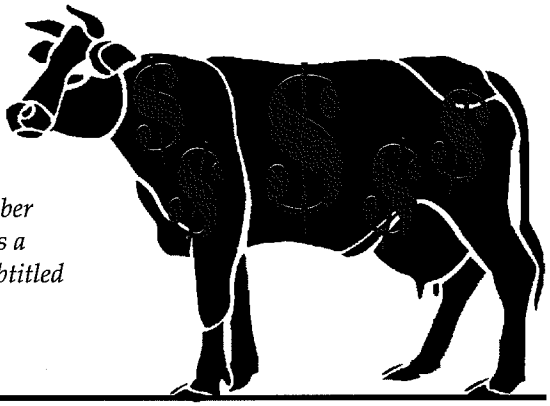
The American Petroleum Institute (API) was quick to express support for the NECAUM recommendations. As noted in a January 20 press release from API: "The recommendations released today by NESCAUM on MTBE provide a useful focus for resolving the problems resulting from the requirement to include oxygenates in federal reformulated gasoline."

On February 3, NESCAUM, API, the American Lung Association, and the Natural Resources Defense Council held a joint press conference, united in their support of the NESCAUM principles and urging Congress to move quickly in changing federal MTBE RFG requirements. The groups also asked U.S. EPA to grant a request by California to exempt gasoline sold in that state from a federal mandatory oxygenate requirement. A waiver would allow California gasoline to contain little or no MTBE. ■

Copies of NESCAUM's RFG/MTBE report may be obtained through the Internet at www.NESCAUM.org or by calling (617) 367-8540.

State Funds

State Funds: The Cash Cows for the New Millennium?



The following is a response by Mary Ellen Kendall, Petroleum Storage Tank Manager with the Virginia Department of Environmental Quality, to an article that appeared in the November 15, 1999, edition of Oil Express *as a "Special Report from SIGMA" subtitled "Milk state tank funds before they run dry—funds will pay for 'mind-boggling' items."*

I recently received a copy of a very disturbing article in a petroleum industry publication urging tank owners to "milk" the state tank funds before they run dry. As a fund administrator and a person who has spent the last 10 years trying to create a fiscally responsible reimbursement program that protects the environment, I was disappointed at the tone and the suggestions that were made to marketers in the article.

Most states have spent the past 10 years trying to develop programs that cover actual costs of cleanup but that deny costs that are not necessary for cleanup (e.g., replacement tanks). Although UST programs vary greatly from state to state, most fund administrators have tried to target corrective action activities that are necessary for cleanup to ensure that funds maximize limited resources and get the best bang for the buck.

Despite this effort, some state funds have had solvency problems, stopping cleanup work and creating a hardship for owners and contractors alike. Others must defer cleaning up sites because of cash shortfalls. That is one reason that I find the article about milking state funds so disturbing. When one owner milks the fund, it means the interests of other owners who are entitled to the benefits of the fund may be compromised.

Among other mind-boggling things, the author suggests that you "find contamination" or buy contaminated property so that, in essence, you can save money on costs that you would normally have to pay as part of the cost of doing business. It implies that state funds were created to enrich petroleum marketers rather than protect the environment. Of course, willful contamination of a site to secure state cleanup funds would be illegal.

This article drives home the point that we still have to be vigilant in administering state funds to ensure that only eligible costs are reimbursed from the fund. There are several tools available to state fund administrators who want to reassess their state funds. Many states have developed rate schedules or use preapproval or pay-for-performance to identify appropriate cleanup activities and provide a baseline for the amount eligible for reimbursement programs.

LUSTLine contains at least one state fund-related article in each issue. These articles provide tips on how to operate state funds, identify potential problems, and avoid fraud and abuse. The annual State Fund Administrators Conference provides other opportunities for administrators to network and learn how other states solved similar problems. New issues arise every day, and fund administrators need to keep up with current developments, cleanup success stories, and state efforts to prevent fraud and abuse.

Please let *LUSTLine* Editor Ellen Frye know if there are fund administration topics that you would like to see addressed in future issues. Working together, I am hopeful that we can dispel the "cash cow" image of state funds in the future. ■

■ From the Editor *from page 17*

dump it on the offending area... more for faster results.

I also recall that, as a child (mind you, this was long before MTBE was even a gleam in the oil industry's eye), I used to (for a small bounty) pick Japanese beetles off of my neighbor's roses, plop them in a jar of gasoline, watch them languish and die, and then eat an ice pop (my bounty). After a few weeks, when the jar was full, I dumped its contents in the back corner of the yard.

Now here's my point: We must take care not to be MTBE vectors. Data collected during the Maine study indicate that small spills of gasoline unrelated to underground or aboveground fuel tanks can significantly affect a water resource. Some folks have scoffed at this notion, saying this, that, and the other thing about why it can't be. But it can be, because of MTBE's roguish nature.

I was chatting with Pat Ellis, the Delaware UST program's own MTBE guru, about the *60 Minutes* mention of a 22,000 ppb well in Glenville, California. I said that level sounded like the well must have contained free product.

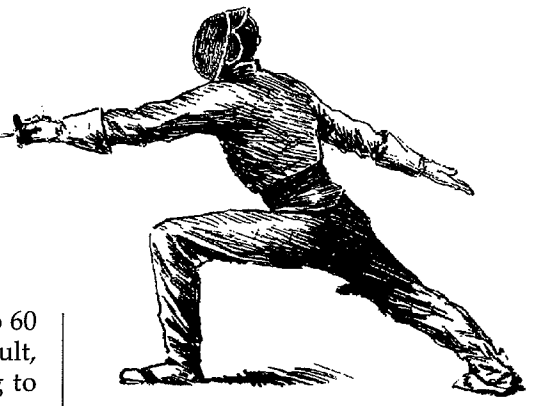
"Oh no," she said, "MTBE can be all by itself at that level. We've got a well at a site here in Delaware that's 25,000 ppb MTBE, barely any benzene to be found. We figure about 100 gallons spilled, which would be about 11 or 12 gallons of MTBE. We have a long, thin, 800-foot MTBE plume."

She explained that if you took pure MTBE and dumped it in water, you would have an MTBE concentration of about 45,000 ppm. If you have MTBE in gasoline at about 11 percent, then the maximum MTBE concentration you should be able to dissolve from is about 5,000 ppm. So you can get high MTBE levels beyond the BTEX edge. And even small gasoline spills can give you a high dissolved MTBE level.

Some gasoline spills are such that they evaporate before they get too far into the soil. But many a small spill will go straight into the ground and, if there is a water table nearby, it will dissolve in the water table, not evaporate. A gopher hole sounds like a perfect conduit to me. ■

State Funds

Combating Cleanup Fund Fraud and Abuse PFP-Style



By Bob Cohen and Brian Dougherty

LUST cleanup fraud and abuse have been estimated to consume 40 to 60 percent of aggregate annual spending by UST cleanup funds. As a result, some cleanups have to be deferred for lack of money. Attempting to increase cleanup spending without conspicuous environmental results may even result in cuts in cleanup funding. In two previous articles (*LUSTLine* #30 and #31), we discussed issues of fraud and abuse of petroleum cleanup trust funds and suggested a variety of approaches for dealing with fraud and abuse:

- Whistleblowers / abuse hotline
- Audit hit teams
- Global tracking software and pattern detection software
- Database of norms
- Interstate list of abusers
- One strike and you're out
- Expanded penalties for fraud (Go directly to jail. Do not pass go.)
- Fixed-fee services / pay for performance

In this article, we'll focus on the last item—pay for performance (PFP). We'll look at PFP as a tool to deal with fraud / abuse and examine how PFP can, itself, be abused.

PFP as a Tool to Prevent Fraud and Abuse

In PFP, the cleanup consultant or contractor (we are using the terms interchangeably) performs the site cleanup with a minimum amount of supervision and is paid only when agreed-upon cleanup milestones have been accomplished. The contractor is given considerable latitude, within the regulatory structure, to engineer and implement the cleanup.

PFP is based on the principle that, given sufficient latitude and financial motivation, consultants will perform cleanups with greater efficiency, speed, and effectiveness. Data from more than 300 PFP projects in progress or completed have confirmed this expectation. Because PFP is focused much more on results than on process, there are inherently fewer opportunities for fraud and abuse than in a reimbursement or preapproval program.

The invoices for PFP payment usually amount to just a few sheets of paper accompanied by a brief technical report that verifies the results. This reduction in paperwork, alone, is an enormous administrative benefit compared with the detailed reimbursement applications that are typical of many trust funds.

A Typical Time and Materials Cleanup Rip-off

The Simpson Consulting Company is located in the Town of Springfield. The company is in the process of cleaning up 10 LUST sites (currently doughnut shops and formerly gasoline stations), all located in Capital City, 100 miles east of Springfield. Mr. Simpson goes to Springfield once a week to check on all 10 operating remedial systems. The trip requires 4 hours total driving time and 30 minutes at each system—a total of 9 hours. But instead of requesting reimbursement for 9 hours, Mr. Simpson requests a reimbursement from the trust fund for 45 hours by billing for the round-trip travel time of 4.5 hours plus the on-site time for *each* site—a total of 45 hours. This discrepancy between actual time spent on the task, 9 hours, and billed time, 45 hours, is abuse of the fund.

To prevent this kind of abuse, the trust fund administrator will have to implement sophisticated and time-consuming procedures, which may include the following:

- Preapproval of all expenditures
- Unit rate rules and tables
- Thorough paper audits
- Field audits
- Third-party review

None of these procedures would be entirely effective against this abuse without significant management oversight to actually account for the site visits.

How PFP Prevents Typical T&M Billing Rip-offs

PFP prevents rip-offs associated with time and materials (T&M) billing, because it pays only for demonstrable and verifiable environmental results. Under PFP, how many sites Mr. Simpson visits on his weekly trip to Capital City has absolutely no bearing on how much he will be reimbursed. Under PFP, it makes no difference how often Mr. Simpson visits Capital City, as long as he visits sufficiently often to meet the applicable regulatory reporting requirements.

If Mr. Simpson chooses to visit a site daily because he wants to run the system as efficiently as possible, that is his business decision. Under PFP, he is more likely to visit the site according to an optimal remedial schedule rather than maximize his visits to maximize his billing under a T&M reimbursement or preapproved schedule. PFP eliminates the potential "gang visits" and "overutilization" abuses "that flesh is heir to"

■ *continued on page 24*

■ **Fraud and Abuse** *from page 23*

with no requirement for intervention or oversight from the regulator. PFP can also minimize other types of fraud and abuse. (See the *LUSTLine* #30 article, "Fraud and Abuse: What State Cleanup Funds Can Learn from Medicare," by Bob Cohen for a discussion of the various types of fraud and abuse.)

Controlling Performance Fraud and Abuse in PFP

PFP is certainly not free from potential fraud and abuse. However, there are fewer opportunities for abuse, and abusers are easier to catch and prosecute. The controls for fraud and abuse under a PFP cleanup are simpler and easier to implement than those needed in a reimbursement or preapproved cleanup. In addition, the controls to prevent or document fraud or abuse in PFP cleanups are aligned with measuring results and not with adherence to a process. Nevertheless, there are several ways the unscrupulous may try to test the reimbursement system in PFP cleanups.

In the PFP world, for example, there may be a temptation to understate the contamination, inasmuch as it could accelerate the payment schedule. Conversely, in the T&M reimbursement world, there may be a temptation for the consultant to overstate the concentrations of chemicals of concern during remediation—the greater the contamination, the longer the system can operate (e.g., pump and treat annuities).

Taking PFP baseline contamination-level measurements just before the treatment is initiated forestalls another type of reimbursement abuse. Because PFP payments are triggered by contamination-level reductions, a contractor might profit handsomely by postponing active remediation and allowing natural attenuation to reduce levels enough to trigger a performance payment.

One of the very first PFP agreements in the early 1990s did not have a procedure for establishing the baseline at the commencement of remediation. After the cleanup contract was signed, a six-month delay ensued because of legal issues. Upon commencing the job, the consultant sampled the monitoring wells, declared the site clean, and requested his $200,000 payment—natural attenuation had completed the job for him. This type of abuse can be prevented if the cleanup fund establishes the baseline for the percentage-reduction payments just before the treatment system begins operation.

Deliberate fabrication or distortion of contamination-reduction data may also tempt PFP contractors. The potential for this type of fraud and abuse has been a concern in Florida, South Carolina, and Oklahoma, the three states that have significant experience in PFP programs. Fortunately, the trust funds and environmental agencies in these states are well equipped to deal with this situation. The personnel are predominantly scientists and engineers, who are fully capable of verifying field results. By splitting samples between the state and the consultant, the potential for fraud is kept in check. Laboratories used to analyze the samples should be different and both should be independent of the cleanup contractor.

PFP is certainly not free from potential fraud and abuse. However, there are fewer opportunities for abuse, and abusers are easier to catch and prosecute.

Unannounced site visits can also deter cleanup abuse and fraud. In one state, at one of the earlier PFP sites, there was an alleged incident in which it appeared the contractor was attempting to distort forthcoming data samples. The consultant was cleaning up using a massive air sparging technique. The consultant notified the state that he planned to do a milestone-sampling event on a Wednesday. Because of a misunderstanding, the environmental agency technician arrived at the site on Tuesday. He found the consultant air sparging all the monitoring points. Needless to say, this practice was quite unacceptable.

Some treatment technologies may be applied in ways that move the contamination away from the performance measurement points. This strategy may make the contamination levels decline to trigger performance payments, but it does not reduce the contamination; in fact, it can make it worse by spreading it to uncontaminated areas. To prevent and check for this event, PFP agreements authorize the state or implementing agency to install supplemental wells and borings, at its discretion.

EPA's 1996 PFP guidance document (a new revision is due in March) recommends that the state split samples with the consultant at critical and final milestones and that the PFP agreement allow the installation of supplemental wells and borings by the state. This provision will, of course, create some additional administrative burden for already overly stressed state agencies. Nevertheless, the experience of those states using PFP technology has proven that this burden is more than compensated for by the reduced administrative overhead of PFP.

Controlling Pricing Fraud in PFP Cleanups

There are two broad models for setting the prices of PFP contracts: competitive bidding and negotiation. Both present different opportunities for abuse or fraud in setting PFP cleanup prices.

In the bid model, best exemplified by the South Carolina program, using information from a state-approved site characterization, consultants will bid a PFP price. The low bid sets the cleanup price. On state-led cleanups, the lowest bidder is awarded the job. On owner-led cleanups, the lowest bid sets the maximum price the state will reimburse for the cleanup, but the site owner may choose any qualified contractor and pay the price difference personally. South Carolina has not had a problem with fraud and abuse under the bid model.

Strict adherence to fixing the maximum reimbursement at the amount of the lowest bid prevents an opportunity for kickbacks from the contractor to the owner in consideration for selecting a higher-priced contractor. For example, unless the lowest bid sets the cleanup price, the owner and the contractor could privately agree that the contractor would share the profit of the higher-priced cleanup.

Covert collusion between contractors is a time-honored way to subvert any competitive bidding process, especially to raise prices the state pays. Many states have customarily required owners to get three bids on owner-led cleanup work. Often the perception that the owner will choose a known contractor that he or she is believed to favor already deters the submission of bids. An empirical study shows that three-bid procedures produce much higher prices for comparable cleanups than do public, statewide-advertised invitations for bids. Open competition in bidding that draws more contractors into the competition is a very good way to deter private contractor collusion to raise cleanup prices.

Under PFP, whether the state or owner leads, the contractor must reach the cleanup goal within an agreed-upon time frame. That time frame is based on the use of fate and transport models to predict receptor impact. Performance bonds may be required to assure completion. Without such a time frame, the contractor might be motivated to in fact or in effect walk away from a cleanup where recovery rates have flattened out short of meeting the cleanup goal. This abuse can be discouraged by requiring the contractor to post a performance bond or a declining letter of credit.

Controlling Abuse in Negotiated PFP Cleanup Prices

In the negotiated model, where cleanups of individual sites or groups of sites are negotiated between the state and the responsible party or consultant, there is more room for fraud or abuse, because the negotiated model is not tied in tightly to market forces. Following are some areas of potential abuse in negotiated PFPs and suggested controls:

- **Overstatement of the problem to inflate price offers** The consultant overstates the problem as presented in the assessment and thereby justifies a higher dollar amount in the negotiated contract. This situation can happen when the same contractor who does the site characterization also does the cleanup. One way to prevent this problem is to use a different contractor for each activity. This abuse is also discouraged if you assure that the site assessments are carefully specified and thorough and that final sampling events are witnessed and split sampled.
- **Overestimation of remedial efforts to justify high price offers** The contractor bases his or her price offers on an exaggerated portrayal of the amount or difficulty of the contamination to be removed or on a "gold-plated" treatment system. Where cleanup prices are negotiated, environmental agencies should review the corrective action plan to assure that the proposed technology and scope are not excessive or unnecessary.

  States can develop their own internal prices for evaluating contractors, price offers, and for developing counteroffered prices to help prevent this abuse. State staff should also "comparison shop" to find the lowest price paid for a similar cleanup at a similar site. When it comes online this year, EPA's PFP Site Information Exchange Web site will provide pricing information support.

  Focusing negotiations mainly on the price, rather than on the technology, also helps prevent pricing abuse—especially if you know that similar sites are being cleaned up at a lower price. PFP is intended to give broad latitude to the consultant to engineer the cleanup in an efficient and cost-effective manner. If a consultant abuses this procedure, consideration should be given to soliciting alternatives from other consultants.
- **Bait and switch** The consultant negotiates a price based on an expensive technology and then uses a less expensive approach. This problem can be prevented by basing the negotiated price on the prices paid for remediation at similar sites, not on the chosen technology. However, if you must base a PFP price on a specific treatment technology, then this problem can be controlled by structuring the PFP agreement so as to require implementation of the design presented during the negotiations. The agreement must also allow for subsequent modification of that design, or implementation of a new technology, so that the contractor can continue to manage the cleanup effectively.
- **Coasting** The closest we've come to fraud in any PFP cleanup in Florida is when the contractor coasts to the end of an agreement as soon as he suspects that the final milestone will not be reached or that he will not reach it within the allocated budget. We have added language that requires that a timetable be set up for milestone completion. Failure by the contractor to achieve the milestones on schedule or to continue to make good faith efforts to do so can result in a determination of nonperformance and subsequent expulsion from the program as an absolute last resort.

A Viable Antidote

PFP is an effective tool for controlling many types of fraud and abuse, because the nature of PFP focuses attention on results rather than process. The results are subject to scientific verification, and payment amounts are agreed upon before the work is begun. Most of the fraud and abuses associated with reimbursement programs do not have an opportunity to work in PFP. Although PFP can spawn its own type of abuses, these abuses can be controlled by taking simple measures and the controls themselves focus on verifying results rather than on following process. Information on PFP is available at the OUST Web site: http://www.epa.gov/swerust1/pfp/index.htm. ■

Robert S. Cohen, BS, MS, is a professional geologist specializing in LUST cost-containment issues, PFP training, and trust fund audits. For more information, contact Bob in Gainesville, Florida, at bobcohen@ivs.edu or (352) 337-2600.

Brian Dougherty, Ph.D., is an Environmental Administrator with the Florida DEP. He is currently overseeing Florida's scale-up program for pay-for-performance cleanups. For more information, contact Brian at Brian.Dougherty@dep.state.fl.us or (850) 487-3299.

Enforcement

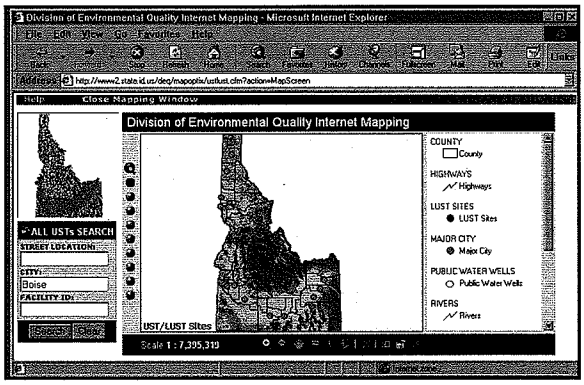
Idaho's UST/LUST Database Can Be Mapped and Queried on the Web

by Matt Walo

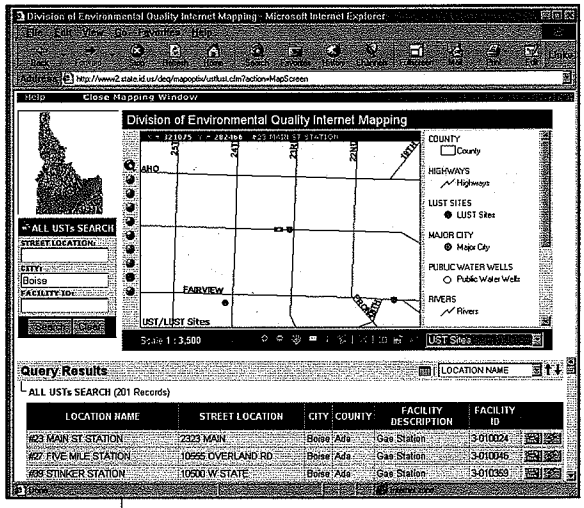
Public information requests (PIRs) about UST/LUST sites were becoming so numerous that the Idaho Division of Environmental Quality (DEQ) needed to find a way to handle the increasing demand. The department decided to look to the Web to deliver information to environmental consultants, real estate brokers, and the public.

We launched our search by looking for an efficient way to combine the Access 97 UST/LUST database data with the corresponding geographic information system (GIS) map data. We attempted to capture all known UST/LUST sites using address matching or GeoCoding and with GPS units. After our site position data were verified, we established a common identification field between our tabular and spatial data.

DEQ selected MapOptix from GeoNorth, Inc., to deliver its maps and data to the Internet. MapOptix is an off-the-shelf product that required little programming and has a fully customizable user interface. It is built upon the ESRI's MapObjects Internet Map Server software and Allaire's ColdFusion.



This entry screen shows (clockwise) the "help" and "close mapping window" bar, the map of Idaho and its features legend, the search window, and the mail locater map.



The results of a query or search run on all USTs in Boise are shown in the bottom table. The map simultaneously updates to show the selected features, the USTs in the Boise area.

How Does It Work?

Members of the public can now perform both database and spatial queries from their office or home computers through a Web browser, such as Internet Explorer. The user sends a request for specific tank information via his or her Web browser to the State of Idaho's Web server. ColdFusion receives that request and selects the desired database data. Those data are passed to MapOptix, which then combines the GIS data and the UST/LUST database data into a map-and-query output format. This information is then sent back to the user as a map image.

In addition to purchasing the MapOptix software (which comes bundled with MapObjects and ColdFusion), we had to purchase a map server to handle the mapping requests. We selected a Silicon Graphics 320 workstation—a 450 MHz, single-processor, NT workstation with 1 GB of RAM and two 14.4 GB hard drives. The SGI machine was selected because of its incredibly fast graphics-rendering speed, which quickly processes and delivers a map back to the user. Hardware and software costs were about $20,000, not including the costs for capturing or processing site data.

Customization

Customizing the user interface alleviates any concern over access to sensitive information in the UST/LUST database. Only information released in the original hard-copy PIR is shown. MapOptix has the ability to allow the same set of data to be displayed with more detailed or sensitive information simply by adding a user group for DEQ staff only. The DEQ staff has its own password and login name that also limits access within the agency to only those staff members involved with the UST/LUST program.

The public user can find UST/LUST sites and information either through the on-screen-interactive map or by performing a database query and then "zooming" to that feature. Once a site is selected, a geospatial operation called a GeoSearch can be performed. A GeoSearch compares the UST/LUST site coordinates (latitude/longitude) to other data layers with the same coordinates. This feature allows the user to investigate whether an UST site has ever had a LUST event or if a prior closed UST site exists.

Buffering, which is a geographical distance query around a selected site, is also possible. A buffer query can reveal other available data layers, such as public water wells, within a given distance of a LUST event. Query results can also be opened directly into a Microsoft Excel spreadsheet.

Up and Running

The interactive Web site has been running since August 1999. Incoming

phone PIRs are directed to the Web site if the caller has access to a computer. The UST/LUST mapping database is updated once a month, and an update notice is posted on the Web site. We have included an online mapping tutorial to aid first-time users.

The interactive site is currently serving around 700 maps per week. The number of manual PIRs for UST/LUST sites has dropped to several per month, compared to several per day before the interactive UST/LUST system began.

Go Ahead, Give It a Try!

The site is optimized for Internet Explorer 4.0 or later. Access to DEQ's interactive mapping application can be found at www2.state.id.us/deq/. Select either the Waste or GIS icon. Select "Interactive UST/LUST mapping." GeoNorth can be reached at www.geonorth.com; SGI at www.sgi.com. If you have questions or comments, contact Matt Walo. E-mail: mwalo@deq.state.id.us or (208) 373-0317.

Matt Walo is a GIS Analyst for the Idaho DEQ.

Enforcement

EPA Region 6 UST Program to Collect Its Largest Fine to Date

On November 24, 1999, Ultramar Diamond Shamrock agreed to pay $375,866 in settlement of EPA's January 1999 administrative penalty order for violations of federal and state UST regulations. Ultramar Diamond Shamrock, headquartered in San Antonio, Texas, was cited for its failure to report and investigate suspected releases, to conduct adequate leak detection, and to monitor corrosion protection systems on metal components of USTs containing gasoline at sites in Arkansas and Texas.

"One gallon of gasoline can contaminate approximately 5 million gallons of drinking water," noted EPA Regional Administrator Gregg Cooke. "Since over half of the drinking water in the United States is obtained from groundwater, releases from underground storage tanks must be prevented." Ultramar has 60 days from the effective date of the Consent Agreement and Consent Order to pay the penalty. Ultramar has also agreed to comply with an enhanced reporting schedule to EPA for one year. ■

OUST Encourages States to Share MTBE Cleanup Info

The MTBE problem is a national issue. Unfortunately, however, we do not know the magnitude of the problem. Few states currently perform routine sampling and monitoring, and what information they have gleaned is not readily networked among the other states. EPA and states together need to make a concerted effort to share experiences and learn from each other.

Currently there is little existing information on the effectiveness of technologies for treating MTBE and groundwater. EPA is encouraging states that have such information to share it via the Internet with other states. This approach can be a simple and cost-effective means for sharing information.

The MTBE problem also emphasizes the need for long-term management strategies and land-use planning. A geographical information system (GIS) is a flexible and useful personal computer and Internet tool that states can use as they strive to better protect public water supplies from UST releases.

EPA HQ UPDATE

OUST is encouraging state UST/LUST programs to undertake the following:

- Begin (and for those states already doing so, continue) to monitor and report MTBE and other oxygenates in groundwater at all UST release sites,
- Aggressively remediate sites where MTBE is found, and
- Coordinate information sharing using their respective Web sites.

OUST will take the lead in linking this information from states' Web sites and provide graphics that depict states' activities on the MTBE section of OUST's home page: (http://www.epa.gov/oust/mtbe). This effort will serve as a clearinghouse for MTBE information.

Our combined sharing efforts will provide appropriate and timely information to interested and affected parties and, as an added benefit, help offset misconceptions about this important issue. This network will also improve public understanding and appreciation of activities under way by EPA and states to protect human health and the environment from all chemicals of concern.

In the near future, OUST will develop an optional form you may use as a guide to help gather and share your state's information about MTBE on your Web site. We will share that form with you as soon as it is available.

For information from OUST on MTBE, contact Hal White, for technical questions and information sharing inquiries, at (703) 630-7177, or Steve McNeely, to discuss how MTBE fits into risk-based decision making (RBDM) programs, at (703) 603-7164.

L.U.S.T.LINE

New England Interstate Water Pollution Control Commission
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