

L.U.S.T. LINE



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

This Above All:

**To Thine
Own
Tank Be
True**

*And So it Must Follow,
As Night Follows Day,
That the Same Goes For
Piping....Too!*

W. Tankspere



Show me a tank owner who cares not if tank or pipe do leak, and I'll show you a fool. For LUST is the tank owner's scourge, an affliction beset with liability, cleanup, soil removal ... costs. 'Tis an affliction that needs must be foiled by some approved means of leak detection...

vapor monitoring, manual or automatic tank gauging, groundwater monitoring, interstitial monitoring, automatic line leak detecting, tightness testing, inventory control. But heed this, whatever the leak detection, 'tis the owner/operator's own covenant with tank and pipe that is of greatest consequence.

LEAK DETECTION. "It NEEDS TO BE DONE. Hell, it has to be done! I'm just not sure what I'm going to do about it." These are the words of one tank owner, who's sentiments are not particularly unique. Most tank owner/operators recognize the need for leak detection and UST regulation. But, these days, they are also up against a number of other crucial business decisions....facility upgrading, financial responsibility, vapor recovery and, in some cases, to stay in business or not to stay in business.

No question about it, owning an UST is a big deal. This is why long term upgrade investment choices must be made very carefully, and investing in a reliable leak detection system is unquestionably in the best spirit of good business and public relations. Cleanup and liability costs for most leaking USTs are considerably higher than the capital costs of installing leak detection equipment. Also, any effort to detect leaks as early as possible reflects well on the tank owner in the context of the community as a whole.

Although none of the the EPA approved methods (including secondary containment with interstitial monitoring) is fail-safe and guarantees detection of all leaks, most will work successfully in most environmental situations as long as proper procedures are followed. States have the option of being more restrictive than EPA when deciding which methods to allow within their jurisdiction. Many states are setting up their own mechanisms for reviewing and approving leak detection design, performance, equipment and/or personnel.

For any leak detection investment to be truly effective, it is in the tank owner's best interest to be sure that the method or device works properly and performs it's intended function, at all times. If the leak detection method depends upon human assistance, then it is in the tank owner's interest to be sure that the human works properly and performs his or her intended function. Negligence of such investments can be devastating. Monitoring wells have been confused with fill pipes! Automatic tank gauges have been switched off!

UST regulators in Maine have found that the prevailing practice of groundwater monitoring has not been sufficiently in practice. Currently, Maine tank owners have leak detection options of secondary containment, vapor monitoring or groundwater monitoring. A large percentage of tank owners have chosen groundwater monitoring, because it is the cheapest alternative. However, a survey of groundwater monitoring in the State showed that only 25% of the facilities were actually doing the required weekly sampling. Sixty one percent were not sampling at all. Only 10%

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To Thine Own Tank, *continued*

of the facilities maintained the required log.

Clearly in this situation people have been the weak link in the chain, in spite of the time and energy State of Maine personnel have spent training tank owners on how and why the monitoring should be done. "The trained owners apparently didn't filter the information down to the operators," says George Seel of the DEP. "Our inspectors have arrived at some sites and needed large hammers and crow bars to break through the asphalt covering the monitoring wells. The wells were installed then paved over. The human element just hasn't been reliable." The DEP has gone back to the legislature to seek a double-walled tank requirement for new USTs. As it is, double-walled tanks are the second preferred leak detection option in Maine.

The crux of the matter is that word must continue to spread far and wide that lackadaisical leak detection is bad business! Lackadaisicalness simply makes no sense. Why not just go out and punch a hole in the wretched tank? Why not breathe in the customer's face after you've stuffed yourself with garlic? What's it all about, after all? As somebody once said, *be mindful of thy monitoring and all else too. This above all, to thine own tank be true!*

States and localities are also thinking about how to monitor the monitoring as part of their UST site inspection programs, some have already implemented monitoring inspection programs. Fire Marshal Glen Gordon

heads up an aggressive monitoring inspection program in Renton, Washington. Any leak detection proposal is verified by a Department inspector whose sole function is monitoring the UST monitoring. "We tag every tank and link the tag number to our computerized inspection file," Gordon explains. "Every year we inspect monitoring records."

Renton, which receives all its water from a sole source aquifer, has adopted secondary containment and monitoring requirements for new UST facilities. Fire Marshal Gordon says 93% of the facilities have complied with new and existing facility monitoring requirements, and points out that so far no facilities have folded because of the City's UST requirements.

Some local agencies have found that having a trained inspector present during release detection tests effectively ensures that tests are conducted properly. Other jurisdictions require release detection installers, testers, and tank owners to keep detailed records of site conditions, events, time, results, etc., during a test and submit these records for agency review. The State of Rhode Island has a system for keeping close tabs on precision testers, which was described in LUSTLine Bulletin #10. Mountain View, California is another City that is on the leak detection monitoring offensive. Gary Leinweber discusses *Monitoring the Monitoring* in a detailed article on page 4 of this issue.

One Detector, Two Detectors, Three Detectors, Four...

When it comes to deciding on leak detection, the market has responded with so astounding an assortment of devices that even the most discerning UST experts are scratching their heads. The large menu of choices allows the consumer to shop around and compare technologies, services, and prices. Prospective buyers, however, need to be aware that there is not yet a time-tested leak detection track record.

"There's always got to be a learning curve for these new technologies," said a Shell Oil Company spokesman. "We're learning about the monitoring systems - not only in terms of evaluating the different systems for reliability, but also in terms of sorting out what states will accept. We don't want to invest in these systems unless we're comfortable with them."

"The deluge of leak detection systems is part of the problem," explains Jim Rocco of BP Oil Company. "We are approaching this cautiously, and are trying to come to a point where we are investing in reliable systems that allow for minimal human intervention. Any time a bell or whistle

goes off, we send in an expert to check it out."

So, how can tank owners - large or small - respond to this challenge? Some tank owners are sure to adopt the Scarlett O'hara "Fiddle dee dee, I'll worry about that tomorrow," approach. Others will settle for some acceptable minimum standard. But, many a tank owner, true to the spirit of the environment, the community, and the protection of their own liability, will seek solutions which will ultimately afford peace of mind.

The consumer in search of leak detection enlightenment must first think about which method he or she wants or can afford (secondary containment with interstitial monitoring, vapor monitoring, automatic tank gauging, tightness testing, etc.). It is also very important to make sure that the chosen method is suitable to conditions at the UST site (see OUST's chart on page 3).

Once the method has been selected, then all the pros and cons of the different devices available to that method must be sorted out. Information might come by way of vendors, trade associations, distributors, federal, state and local regulators, seminars, and most significantly, through the grapevine.

On the federal level, EPA has done a bang-up job of pulling together information on leak detection for use by UST regulators, vendors, installers, and tank owners. Look for a list of EPA publications at the end of this article.

Many tank owners are giving a lot of thought to long term planning for the future of their UST systems. Norm Sell, owner of Norm's Conoco in Lincoln, Nebraska is in the process of trying to figure out whether his tanks will come out for good, or whether it will pay to replace them. He says many of the service stations in his area are owned by major oil companies who can afford to sell their gasoline for less. "My tanks are 27 years old, they were owned by other oil companies before I bought the station, and I know they need to be replaced soon."

"Right now I have two people who are responsible for inventory control. Of my 14 employees, no one else does this job but these two people. We've kept good records over the years, and we'll also have the annual tightness test. If I do replace, I'm thinking about putting the tanks in an underground vault where we can personally inspect them. The pipes will run through a culvert to the dispensers. I've heard a lot about this type of installation - there's no guesswork, and I think the investment would pay in the long term. A lot of tank owners are going that

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LUSTLine

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Prepared by the NEIWPCC with a grant (#CT-901661) from the U.S.

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

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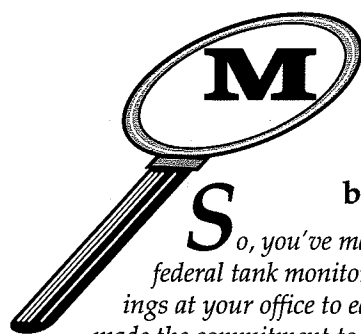
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Some Factors to Consider in Selecting Leak Detection

Detection Option	Site-Specific Factors	Tank-Related Factors	Cost Factors
Ground-Water Monitoring	Do not use if ground-water level is greater than 20 ft, if clay soil is present, or if existing product is already on the ground water.	Product must be able to float on water and not mix easily with water.	Well installation: \$15 - \$70/ft depth Equipment: \$200 - \$5,000 per tank.
Vapor Monitoring	Do not use at sites where soil is saturated with water, the backfill is clay, or soil vapor levels are too high.	Product must evaporate easily or substance that evaporates easily must be added to the tank.	\$1,200 - \$6,000 per tank for equipment and installation.
Secondary Containment with Interstitial Monitoring	Site conditions (such as too much water) may require use of containment that completely surrounds tank or piping.	A double-walled system must be able to detect a release through the inner wall.	Total installed cost of \$5,000 - \$12,000 per tank.
Automatic Tank Gauging (ATGS)	If water collects in excavation, ATGS must have a water sensor.	To date, used primarily at sites with gasoline and diesel in tanks under 15,000 gallons.	Cost per tank: Equipment = \$2,300 - \$3,900 Installation = \$500 - \$3,000.
Tank Tightness Testing	Volumetric methods must account for presence of ground water and product temperature.	To date, used primarily at sites with gasoline and diesel tanks under 15,000 gallons.	\$250 - \$1,000 per test per tank for problem-free test. If problems occur, costs may be much higher.
Inventory Control	None	None	Under \$200, but <i>must be combined with tank tightness testing.</i>
Manual Tank Gauging	None	Limited to tanks under 550 gallons when used alone or under 2,000 gallons when combined with tightness testing.	Under \$200, but <i>may also require tightness testing.</i>
Automatic Line Leak Detectors	None	Used only for pressurized lines.	Total installed cost of \$400 - \$2,000 per line.
Line Tightness Testing	None	Used only for piping.	\$50 - \$100 per test per line if conducted with tank test. May be more expensive if conducted alone. Must do test every 3 years.



Monitoring the Monitoring

Inspecting Vapor Monitoring Systems

by Gary Leinweber

So, you've managed to get the largest tank owner in town to agree to install a vapor monitoring system to meet federal tank monitoring requirements. It's been a long haul....visits to the site, letters explaining the requirements, meetings at your office to educate him on the subject and finally, even legal action. But the time and effort paid off - he's finally made the commitment to install the system. Now you can sit back and relax, right? **WRONG!** The fun has just begun.

I'D LIKE TO TAKE YOU THROUGH THE STEPS we have evolved, here in Mountain View, California, for approving, inspecting and finally, accepting a vapor monitoring system. A lot of these ideas were formulated in the aftermath of mistakes we've made in our own local program over the last three years.

If I were to pick one vehicle that has proven to be the most successful for identifying problems and working our way up that learning curve, it would have to be the *site visit*. In other words, get out of the office, put on your grubbies, and get your mental wherewithal onto the site.

Keep in mind, our goal is to see to it that these leak detection systems do what they are supposed to do for the protection of both the environment and the tank owner.

Pre-Approval

We have zeroed in on four prerequisites to approving or allowing any vapor monitoring installation:

- 1) a site map with proposed locations for the vapor wells;
- 2) a basic vapor site assessment;
- 3) a basic understanding of the vapor monitoring system being proposed; and
- 4) an "out."

• **Review the site map** - Placement of the vapor wells should adequately cover (i.e. monitor) the tanks, product lines and dispensers. For low volatility products such as waste oil, diesel, or kerosene, require two or more vapor wells per tank.

• **Review the site assessment** - The assessment must confirm the presence of a properly engineered backfill, or your vapor monitoring system won't be reliable. Also, carefully review the background vapor levels at the site. Is it already highly contaminated? Is this a high-throughput facility where spills are apt to be a continual problem? You might think twice about the applicability of vapor monitoring in these situations. (See *The Leak Detection Dilemma* on page 8.)

• **Get familiar with the proposed monitoring system** - Check with other cities/states that have approved this system (check with manufacturer) to

find out what problems, if any, they have experienced. Also, find out the sensitivity of the sensor and the kind of accuracy you can expect. Don't be afraid to pin down the manufacturer or manufacturer's representative to get the answers you need if they are not addressed in product literature to your satisfaction.

• **Leave yourself an "out"** - If a new monitoring system is being proposed (i.e. one that has not been installed in your city/state), let the contractor and facility owner know up-front, **in writing** that it is approved on a trial basis only (i.e. six months). If, during that time, it fails to perform adequately or meet literature specifications, out it comes. If there are documented problems with these units in the field, require that they be addressed prior to approval. It is a heck of a lot easier to get problems and concerns squared away before any approval is given.

Background Levels

Although manufacturers of vapor monitoring equipment may claim that they can measure vapor levels up to 20,000 ppm, keep in mind that the higher the background, the lower your comfort level in deciding when a leak has, in fact, occurred. Also, the higher the background level, the higher the deviations in vapor readings above and below that level you are likely to see. With such uncertainty, when do you blow the whistle and require the facility owner to investigate a "possible" leak?

There appear to be three ways out of this dilemma:

- 1) only allow vapor monitoring leak detection systems on those sites where background vapor levels are below 1,000 ppm;
- 2) clean up the site prior to approving a vapor monitoring system installation; or
- 3) initiate a database for plotting vapor levels and determine at the outset how high above background constitutes a "leak" so that arguments won't ensue down the road.

The second option is okay, but I have yet to see a cleanup that didn't drag on and on. Option three is extremely labor intensive. It is also

subject to problems when using an aspirated vapor monitoring system where background levels can actually decrease over time due to the "cleaning" effect of aspirating vapor out of the wells. Because of these problems, our city has chosen to go with the first option - if the background vapors are too high, a different monitoring option must be proposed.

Verify Installation

Assuming our first hurdle has been overcome - low background levels, good backfill, well coverage, etc. - you will want to be sure that installation conforms to the agreed upon site plan. Here are a few items to check for:

- Make sure that the well placement submitted to you on the map jives with what you actually see on the site;
- Get out your tape measure and measure the depths of the vapor wells - wells for the tanks should extend to the bottom of the tanks, while those for piping or dispensers should be no more than 2-3' deep;
- Verify that the vapor well casing is slotted at the bottom of the casing only - slotting at the top will allow every surface spill to be detected;
- Check the control panel and make sure it has power and the alarms are functioning;
- Be sure your building official has inspected and approved the electrical installation;
- Get the manufacturer or an authorized manufacturer's representative to "sign off" that the system has been properly installed. Also, have him bring his calibration gas and expose each sensor to it to verify that they are properly calibrated.

Until all these items are verified by your field inspector, **don't sign off on anything!**

Monitoring

Once you've gotten through the installation verification hoop, for heaven's sake, don't drop the ball. Monitoring systems don't take care of

themselves or last forever - they are prone to breakdown and require service just like any other electronic system. The sinister thing about monitoring systems is that they can *appear* to be working normally, when in fact they are not. This can give both you and the facility owner a false sense of security. It is most humbling to remove a tank that had been monitored, had no evidence of alarms and find out it is a leaker. Try explaining that one to the facility owner!

The point is, either you or a reputable contractor who knows the system inside out must inspect the system periodically if you are to have any confidence that the site is clean and being monitored properly. Because we have a small town of 11 square miles and approximately 70 sites, we chose to establish an inspection program every six months.

This accomplished two things - first, it got the facility owner's attention that the system was not just there to sit on a wall, that it was actually performing a job that we felt was critically important to the protection of our soil and groundwater; and second, it opened our eyes to the shortcomings of the systems.

The basic philosophy of our monitoring inspection program is, whenever possible, simulate a leak and see if the system can detect it. In the case of vapor monitoring, we bring along a cylinder of 1,000 ppm isobutane in air (obtainable from any major gas distributor), release some gas into a plastic bag and place the sensor into the bag. We hope to see a reading in the neighborhood of 1,000 ppm on the tape or LED readout. Since our alarm level has been set at 1,000 ppm, it is also a good test for the alarm.

The second thing we test for is ability to zero. Take the sensor out of the bag and allow it to be exposed to the atmosphere. We expect a zero reading. By physically proving that the sensor is accurately reading 0 ppm (when exposed to air) and 1,000 ppm (when exposed to a calibrated gas), you can be pretty confident that the sensor is doing its job and is linear within this range.

Don't hide behind the excuse that you don't want to mess with the sensors because of the liability. Sensors in vertical wells are easily removed and are extremely durable. If you still feel nervous, you may want to budget some money for sensor replacement...just in case. Testing a sensor with calibration gas takes no more than 5 to 10 minutes and a cylinder of calibration gas will last you a long time.

Sensor Calibration

In over three years of testing sensor calibration, we have found a

number of interesting phenomenon:

- "Static" sensors (i.e. sensors that only sense vapor which passes directly over the sensor face) seem to go out of calibration more frequently the higher the background vapor level. In this case, the vapor may actually change the characteristics of the sensor over time;
- Sensors used in aspirated vapor monitoring configurations (i.e. sensors that sense vapor which has been aspirated from a well) seem to last longer than static sensors due to the "cleaning" effect of fresh air being aspirated over the sensor face immediately after a reading has been taken;
- Sensors cannot be calibrated by checking voltage. We've had numerous instances where the contractor assured us the sensors were calibrated and billed the facility owner for this service, when in fact he had only checked a voltage and the sensor would not calibrate to a gas standard.
- We have yet to find a vapor monitoring system which will alarm when the sensor dies or drifts out of calibration...another good argument for establishing an aggressive inspection program.

Find Your Ghosts While They're Manageable

Although a major part of the inspection process involves checking the calibration of the sensors, take the time to do some simple, but worthwhile, additional inspections such as inside the dispensers, overflows, Red Jackets, and vapor wells. You'd be surprised how many "ghosts" you find, and how many small problems you'll be able to correct before they become big problems.

Finally, it is essential that you talk with the facility owner/operator to let him/her know what you are doing, what you've found and why it's so important. An effective monitoring program can help assure you and the facility owner that the money invested in installing and maintaining this leak detection system has bought the best insurance policy against major leaks and liability that he could hope to find.

Developing and implementing a vapor monitoring inspection program is a lot of work and requires a dedicated staff. The payoff is the confidence and satisfaction you feel in being able to head off a major leak and help minimize damage to the environment as well as the facility owner's pocketbook. ■

Gary Leinweber is Manager of the Hazardous Materials Division of the Mountain View, California Fire Department.

Up and Running...

New EPA Case History Database and Library System

Ever wonder what cleanup technologies are being used to remediate UST sites in other states? Do you get recommendations from contractors on new site assessment techniques that you have never heard about? What's a mobile soil washer? Is such a technology currently available? How much does it cost to use bioremediation over three years? Who can I call to get more information about a given technology?... I just started this job last week!

Do these questions sound familiar? State and local UST program personnel nationwide are asking these kinds of questions everyday. Often the answers are tough to come by. But don't despair. Help is here....simply call "COLIS."

"COLIS" stands for Computerized On-Line Information System. The system was developed by EPA's Risk Reduction Lab's Engineering Releases Control Branch under the direction of OUST. With this system, anyone who is interested in accessing specific cleanup information (case histories, publications, cost data, etc.) can easily do so with the aid of a personal computer and a modem. The system manages case histories that have been filed by On-Scene Coordinators (OSCs) from around the country on corrective actions for cleaning up sites that have been contaminated by hazardous materials. USTs make up one of four primary modules in the system.

The best news of all? It is easy to use - you don't need an account with a special password or a COLIS guide to find your way around in the system. Simply give COLIS a call and punch away. The COLIS is user-friendly and requires little knowledge about computers.

Early in the UST program, EPA and the states recognized the need to facilitate technology transfer among personnel involved in UST programs. This is particularly important because of the varying levels of experience among UST personnel throughout the country; a circumstance attributed to such factors as the relative newness of the UST programs, high turnover within program staff, and the introduction of numerous new technologies to contend with the large number of UST cleanups. COLIS was designed to support some of these pressing program needs by providing:

- a nationwide overview of UST corrective actions;

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States Offer "Mom and Pops" a Hand

SO FAR, 10 STATES - IOWA, RHODE ISLAND, Vermont, New Jersey, South Dakota, Maine, Michigan, Pennsylvania, Ohio, Oregon - have passed statutes that create financial assistance programs to help owners and operators pay for replacement and upgrade of underground storage tanks. The majority of these states are offering direct loan programs; the others are offering grants, interest subsidies, loan guarantees or some combination thereof.

The rationale behind such programs is to help owners and operators meet state and federal technical standards without incurring major financial hardship and/or going out of business. Furthermore, a protected tank and a clean site can help owners and operators to obtain the financial assurance needed to meet state and federal financial responsibility requirements.

Grant and direct loan programs are primarily directed toward assisting small rural "mom and pop" gas stations. The State of Vermont, for example, is offering a direct, zero interest, loan program covering retailers who sell less than 20,000 gallons a month. Pennsylvania is providing loans to owners or operators who have 20 or fewer tanks and who have had a leak.

Small businesses with tanks or other environmental hazards are often denied loans from lending institutions due to either a lack of credit worthi-

ness, or due to the potential environmental liability the lending institution may incur if the business fails and the lender needs to foreclose on the property. State loan and grant programs are often the only resource small businesses can turn to for financial assistance.

The majority of loan programs are the direct loan type because they address most candidly the lending and solvency problems faced by small rural owners and operators. However, some states such as Iowa have deliberately chosen not to offer direct loan programs. These programs generally cost more in direct and administrative costs and often states are not equipped to handle loan processing. Some states also feel they do not want to risk making loans to people who have been rejected by a bank.

An alternative to direct loan or grant programs is a loan guarantee program, which is used in Iowa. This type of program focuses on credit worthy businesses who can't get a loan because of environmental risks. Loan guarantee programs remove a bank's potential liability, because the state agrees to guarantee (i.e. pay) a large portion of the loan if an owner or operator fails to make interest payments. These programs assist owners and operators indirectly by making loans more generally available through lending institutions.

Another indirect form of assistance

is an indirect subsidy program. This kind of program reduces the interest rate banks normally charge owners and operators who seek loans for upgrade and/or corrective action. The state has a number of ways it can arrange to pay a bank the difference between the regular interest rate and the reduced rate. Interest subsidy programs do not increase the availability of loans for small businesses, but they do assist those who may not be able to afford a market rate loan.

One type of assistance program is not necessarily better or worse than another, what matters is that it works for that particular state. A state can maximize its chances for success by first surveying its tank population to be clear about the needs of those it is trying to assist. Next, it needs to know the current lending situation in the state for owners and operators as well as lenders willingness to participate in a state assistance program. Finally, the state should weigh this information against the amount of money it has to spend and the administrative burden it wants to incur....all before launching into a state assistance program. ■

For more information on this subject contact Linda Reidt Critchfield, US EPA Office of Underground Storage Tanks, at 202/475-9379.

Getting Out the Kinks

A New Generation of Piping Systems

A NEW GENERATION OF FLEXIBLE DOUBLE-walled piping systems is soon to emerge on the UST market. These systems, one developed by Buffalo Tank and the other by Total Containment, meet EPA standards for piping and get to the heart of traditional underground piping bugaboos. First of all, they provide a dramatic reduction in plumbing joints - the major sources of piping failure - because they are made of hose-like materials instead of short rigid segments with a lot of connection fittings. The systems also have the extra protection of a secondary containment wall for piping, pumps and dispensers which allows for easy leak detection, location and repair without environmental contamination.

Functionally, the two systems are similar. The differences seem to be in materials used, types of connectors, the approach to the flexible piping

scenario, and packaging. Both systems are awaiting UL approval.

Some of the important features found in both systems include flexible primary carrier piping which can be replaced at grade level without excavation, minimal downtime for leak repair, visible piping joints that are accessible from grade level, lines that are not affected by ground movement or pump surges, and an outer containment jacket that is made of non-corrodable material.

According to Keith Osborne, spokesman for Buffalo Tank, the flexible piping system was developed because the company is getting into tank leasing. "We didn't want to undertake ownership and the associated liability unless we were comfortable with all the hardware, particularly the piping system, since piping is the major cause of UST leaks." The Buffalo Tank flexible piping system will

be marketed and packaged through the leasing program, but will be available without the lease package. (We will discuss tank leasing in the next issue of LUSTLine.)

Tom Schruben at EPA's Office of Underground Storage Tanks says this new technology is very encouraging. "We look forward to the swift introduction of this kind of piping into the marketplace." ■

For more information on Total Containment's Enviroflex piping system, Contact Mike Gurnicz at 215/524-9274.

For more information on Buffalo Tank's flexible piping system, Contact Dean Flessas at 708/574-5950.

Leak Detection Using A Tracer

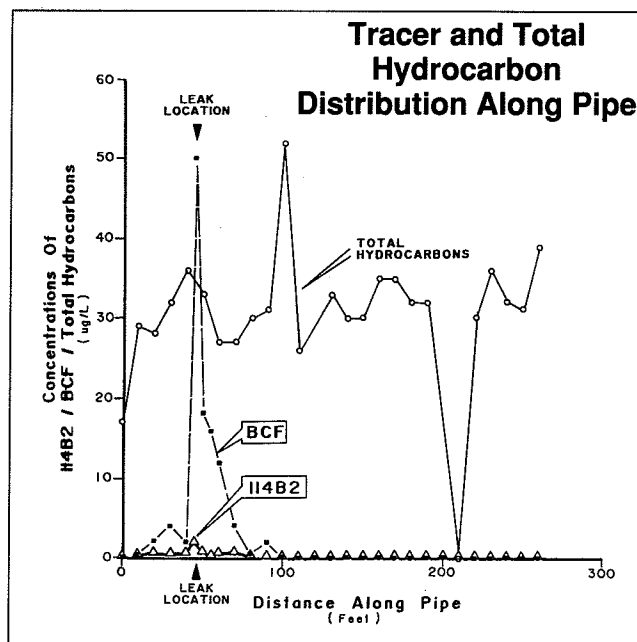
It's simple, but it works. A non-volumetric leak test that is performed by mixing a tracer, a volatile chemical concentrate, with the liquid product inside a tank or pipe. If the product leaks out, the tracer leaks out with it and evaporates through the soil air space. Probes are placed in the soil near the tanks and pipes to collect the tracer vapors in the soil in the event of a leak. The vapors are then analyzed by means of a very sensitive chromatographic measurement. If there is tracer in the soil, you have a leak, if not, you don't...and the whole do is done while tanks and piping remain in service.

This tracer technology was developed and set in motion four years ago by Dr. Glenn Thompson of the Tracer Research Corporation (TRC) in Tucson, Arizona. The company has held a tight rein on quality control, which is probably the biggest reason they have not grown more rapidly. But things are gaining momentum; their specially retrofitted vans and field chemists and geologists are now strategically located throughout the United States, there is another TRC office in Princeton, N.J., not to mention one van in Europe. Much of the work is done out of the vans by the field professionals.

TRC's tracer chemicals can be detected in the low parts per trillion level in the soil gas, thus they can be added to the product in the tank in very low concentrations (typically only a few ppm), they have no impact on the physical properties of the product, and pose no threat to groundwater. Because of the sensitive detection levels, the method can detect very small leaks in tanks and piping. TRC claims the tracers are useable with any product-fuels, lubricants, waste oil, water, hazardous waste, and volatile or non-volatile chemicals.

More good news, the tanks do not have to be filled to perform the test, and testing is not affected by tank size, thermal expansion, air pockets, vibrations, wind, or background levels of soil vapors. Leaks can be confirmed by retesting with a different tracer.

Employees of the Massachusetts Department of Public Works (DPW) opted for the tracer approach after the frustration of a number of false negative (undetected leaks) and false positive tank test results. "The tracer method pinpointed leaks in the line and ruled out any leaks in the four tanks," says DPW's Laurie Grainawi. "It was in the winter, a busy time of the year for the snowplows, and we were able to repair the line quickly without interruption to service."



The Tracer Method In Practice

The TRC technology has a variety of leak detection applications. For USTs, it meets EPA requirements for precision testing and monthly monitoring. The *precision test* is performed by releasing tracer into the tank, then performing a soil gas survey three weeks later. The samples are analysed both for the tracer and hydrocarbon vapors. The tracer provides information on if and where the tank is leaking. The hydrocarbons show the extent of contamination.

If the tank is to be retested annually, the probes are left in the ground for later use. For a typical UST facility, the annual retest would be the most cost effective way to use this particular tank testing approach ... 'cause the cost's the rub, so to speak. For example, an annual test for three 9,000 gallon tanks on one site costs about \$2,890, or \$963.33 per tank, the first year (prices quoted 1/12/90). This price includes an initial \$1,000 start-up charge (for installation of the monitoring probes, etc.) plus \$630.00 per tank to test the three tanks (price applies to tanks up to 9,999 gallons). Because the probes are already installed, your per tank cost would drop to about \$494.67 in subsequent years.

For *monthly monitoring*, a tracer dispenser is placed in the tank to release tracer continuously at a rate that is appropriate for the tank size and the rate of product consumption. Each month, samples are collected in special tubes from the soil gas probes around the tanks and pipes, and mailed to the TRC lab for analysis. The results are interpreted by TRC staff and re-

ported to the tank owner. The records remain on file at TRC.

Monthly monitoring for larger tank installations is handled with an "aspirated" monitoring system, whereby probes are continuously evacuated. In this case, groups of probes are manifolded together and connected to a permanently installed continuous air evacuation pump. The installation cost for the aspirated system is greater than for the other "passive" system, but fewer probes are required to cover a given area.

For *pipelines*, the TRC method is uniquely suited to locating leaks in very long lines, or where pipelines cannot be taken out of service and leaks are known to exist, but cannot be located by other means. For these reasons the technology has been well received by United States Air Force. "The method is particularly good for locating leaks in tanks and long runs of piping without shutting down the system," said an Air Force spokesman. Long transfer lines can be monitored using a leak detection hose that is installed in the soil above the existing pipeline. The hose replaces the probes for collection of soil gas and extends the sampling interval up to 400 feet.

In large *aboveground tanks*, tracer is added to the fuel in the tank and probes are inserted under the tank bottom. Due to the broad area of the tank bottom, an air flow field is established below the tank in a way that both assists in moving the tracer to the detection probes and insures that leakage from any point on the tank floor can be detected. ■

For more information on TRC's tracer leak detection technology contact Rhonda Evans at 602/888-9400.

To Our Readers:

We welcome your comments and suggestions on any of our articles. Call or write Ellen Frye at NEIWPCC

The Leak Detection Dilemma

by Marcel Moreau

IT USED TO BE THAT YOU COULD GO TO A TRADE SHOW AND GET THE "DIRT" ON leak detection methods and machinery from all the competing vendors. This information was biased, of course, but if you listened judiciously and talked to as many salespeople as possible, you could sort out a reasonable picture of the strengths and weaknesses of the assorted technologies.

But I came away from this year's Petroleum Equipment Institute trade show in Nashville feeling somewhat overwhelmed by the variety of leak detection equipment that is now on the market. Furthermore, it appears that all manufacturers now strive to be all things to all UST sites. They all hawk some version of an electronic black box into which a multitude of sensors - free product and soil vapor detectors, internal tank level monitors, piping leak detectors - can be plugged in almost any combination. Now, because everyone is selling the whole range of approaches to leak detection mentioned in the federal register, vendors aren't as willing to point out the deficiencies of the assorted technologies.

When we get right down to the "nuts and bolts" of the leak detection hardware, it turns out that many of the devices being marketed are identical to those of the competitor...save the color of the control box. For example, many passive soil vapor sensors use adsorber technology, and there is only one manufacturer of this type of sensor. The majority of automatic tank gauges use a magnetostrictive sensor, again, manufactured by a single company. I also discovered that, in some cases, even the internal software for these devices is identical because it is provided by the same supplier.

This uniformity of hardware has its plusses and minuses. On the plus side, this means that many devices are going to have virtually identical performance characteristics (assuming proper installation), so a tank owner can choose a vendor more on the basis of availability of quality maintenance services - a factor which will be important as these devices age. On the minus side, if any of these devices are flawed, the flaw will be widespread.

If I Were A Tank Owner About to Invest...

In the interest of initiating discussion as well as making some sense of the leak detection conundrum, I would like to present some of my thoughts about where the different leak detection methods are most appropriate or where they had best be avoided. I'll point out what I would look for if I were a tank owner about to invest in some sort of leak detection hardware. If you have ideas to add or to dispute, let LUSTLine know.

For purposes of discussion, let's break down the leak detection methods into four categories:

- **EXTERNAL** - soil vapor and groundwater monitoring,
- **INTERNAL** - automatic tank gauge, inventory plus tightness testing, manual tank gauging,
- **INTERSTITIAL** - between the walls of a double contained system,
- **PIPING** - monthly monitoring, tri-annual testing or check valve location for suction, line leak detector plus monthly monitoring or annual tightness testing for pressurized piping.

Although some of the leak detection options must meet certain state and federal site criteria, such as depth to groundwater or soil permeability, let's assume that these criteria are met. For discussion purposes, we will be

concerned with hardware and technique. Let's also assume we're in a motor fuel dispensing operation, dealing with tanks in the 5000 to 8000 gallon range.

So, what site conditions and hardware considerations would influence my choice of leak detection method?

External Leak Detection Methods

SITE CONDITION CONSIDERATIONS

- **Soil vapor monitoring** - This approach is useful if background contamination is less than 1,000 ppm (as determined by the site assessment), and the environmental sensitivity is moderate (there are basements and subsurface utilities around, but not within 100 feet). Tracer techniques, which monitor the outside environment for a trace gas (see page 7) which has been injected into the storage system, would work regardless of the existing background contamination.
- **Groundwater monitoring** - This approach is suitable where there is no existing free product on the water table, and the environmental sensitivity of the site is low (there are no water wells, basements, subsurface utilities or important groundwater resources in the vicinity).

HARDWARE CONSIDERATIONS

- **Soil vapor** - I would look for a reliable,



quantitative sensor which could be easily calibrated to ensure its performance is constant over time. Because of the variability of the concentration of contaminants in soil gas, over time, it would be wise to take frequent (probably daily) readings to be better able to interpret what is going on, unless the site is exceptionally clean (less than 100 ppm background contamination) to begin with.

- **Groundwater monitoring** - Stay away from any sensor which can be set to ignore any amount of free product. Some sensors can be adjusted to ignore up to an inch of product before the alarm goes off. You want to know about the first eighth inch of product, not the first eighth over an inch. Beware of floating sensors with long umbilical cords to the top of the well which might hang up. I like the dissolving string devices, where a weight is suspended from a product soluble string. This device is easy to understand, easy to maintain, and can easily be tested to see if it works.

Internal Leak Detection Methods

SITE CONDITION CONSIDERATIONS

- **Automatic tank gauge** - This method is particularly useful as a retrofit to an existing corrosion protected tank, especially at a site with pre-existing contamination. From a tank owner's

perspective, this is the only leak detection technology which has a direct business benefit...it can facilitate inventory recordkeeping.

- *Inventory plus tightness test* - This approach is useful where the site does not warrant a large investment of money, just yet, and where you can rely on the personnel at the site to stick the tanks accurately and consistently and to keep good records. The environmental sensitivity at the site would also need to be low.

- *Manual tank gauging* - This is a good method for waste oil tanks.

HARDWARE CONSIDERATIONS

- *Automatic tank gauge* - Look for a device where the software calculates the standard deviation and probability of detection for each tightness test. This is usually indicated by a device which runs the test for a variable amount of time, depending primarily on the temperature stability of the system being tested. This technique will yield the most reliable tightness test information. I like the magnetostriuctive probe technology for its simplicity and accuracy.

- *Inventory plus tightness test* - Use a stick with eighth inch increments, a tank chart with eighth inch increments, and an operator who can read a ruler to an eighth of an inch. Be sure you know the exact dimensions of the tank (length and diameter) and that the tank is not severely tilted.

For a tank test, I would look for one which is computer controlled and which uses the computer to calculate statistical parameters for each individual tank test. This way the standard deviation and the probability of detection are known for each individual tank test, not just the tests run at some evaluation facility. Among the non-volumetric tests, I think the tracer technology is viable. The vacuum technology seems less reliable when there is a water table present.

- *Manual tank gauging* - Make sure the stick is accurate and the operator can read it.

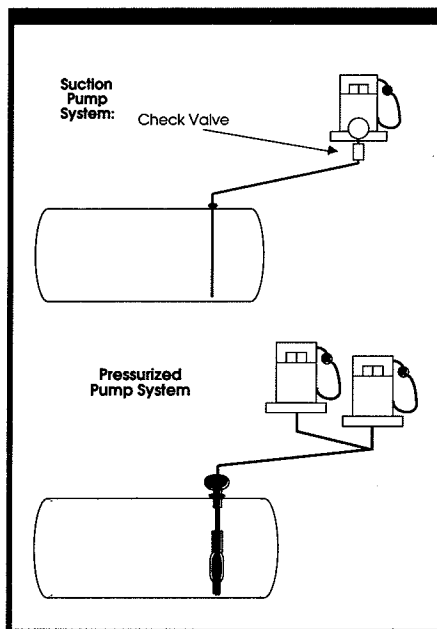
Interstitial Leak Detection Methods

SITE CONDITION AND HARDWARE CONSIDERATIONS

- *Double-walled tanks* - I prefer double-walled tanks over excavation liners, especially in high groundwater situations. These systems are ideal for new installations at moderate to high environmental risk sites, and wherever the capital expense is affordable.

In terms of hardware, I prefer a monitoring technique which monitors both walls of the tank, regardless of water table level. The fiberglass tank manufacturers offer a hydrostatic

system which uses liquid in the interstitial space to monitor both walls. Pressure or vacuum based methods are available for steel tanks. Vapor sensing systems appear to be too sensitive for use in the interstitial spaces of tanks.



Piping Leak Detection Methods

SITE CONDITION CONSIDERATIONS

- *Suction systems* - I would use a suction-based system with the check valve under the pump wherever possible. (See the LUSTLine #10 article, *Pumping Product*, for a comparison of advantages and disadvantages of pressure vs. suction piping.)

- *Pressurized systems* - These are most useful at high volume multiple dispenser facilities. For new systems, double contained piping is best. For existing systems in low environmental risk areas, I would use a computerized line leak detector which is also capable of performing line tightness tests if the pump is not turned on for a sufficient period of time (a few hours).

HARDWARE CONSIDERATIONS

- *Suction pumping systems* - Federal regulations call for a means of verifying that there is only one check valve in the system and that product will flow back into the tank. A simple way of doing this is to have a small bleeder valve on the check valve body just below the point where the check valve seals. If the bleeder valve is opened and air is sucked in, the system is properly installed. If the bleeder valve is opened and product dribbles out, the system is not properly installed.

No manufacturer that I am aware of is making a check valve which includes such a bleeder valve. How-

ever, there are models available where the workings of the check valve can be verified through a side access cover without having to remove the entire check valve assembly from the piping system.

- *Pressurized pumping systems* - For new systems, I would use double-walled piping sloped back to a containment sump on top of the tank, with a float switch in the sump to indicate presence of liquid. The high density polyethylene (HDPE) secondary containment piping is flexible and simple to install. The new totally flexible piping systems now being developed (see article on page 6) looks like a good idea.

For existing pressurized systems, I might go for a line leak detector and a yearly tightness test if the site had a low environmental risk. Otherwise, I would retrofit double-walled piping or invest in a computer controlled line leak detector which is capable of performing a piping tightness test whenever the system is quiescent for a long enough period.

A hardware note: Be sure there is someone in the area who can install and maintain the equipment. Competent maintenance services for these devices will be important in the coming years, especially when the alarm bell goes off and you need to determine if there is a leak or just a defective device. These services may be difficult to come by in the next few years as most service personnel will be getting their training on the job.

So, those are my choices. What are yours? ■

NOTE

Marcel Moreau, a regular contributor to LUSTLine, is a petroleum storage specialist. Since Marcel has his opinions and you have your opinions and questions, we would like to nurture the possibilities of greater knowledge.

So, beginning with the next issue of LUSTLine, we have invited Marcel to spearhead a new column which we will call:

TANK-nically Speaking.

We invite you to send us your technical questions and opinions in hopes that we can generate some dialogue. Please mail your questions or thoughts to:

LUSTLine
NEIWPC
85 Merrimac St.
Boston, MA 02114.

You Too Can Host A Trade Show On UST Technologies

The UST technologies market is exploding with new developments in leak detection, monitoring, and cleanup. State inspectors need to keep up-to-speed on the latest leak detection methods and equipment. Contractors, consultants, and UST owner/operators could use an opportunity to see equipment, compare prices and features, and ask questions...all at one convenient location. So, WHY NOT HOST A TRADE SHOW?

New Mexico and California held successful trade shows in conjunction with UST conferences and training sessions. These efforts seem to have really made a difference. Now OUST has compiled the experiences of these two states plus tips from national trade associations into some "How-tos" for states interested in sponsoring UST equipment trade shows. In just a few pages, EPA provides:

- Tips and how-tos on planning and conducting a trade show
- A timeline/checklist of tasks
- A schedule of some upcoming national trade shows.

Contact Lela Carney at 202/382-6964 for a copy.

Kudos for OUST's New Leak Detection Handbook

OUST's newest publication, *Detecting Leaks: Successful Methods Step-By-Step*, was written to help state UST program personnel understand the various allowable detection methods, how they work, potential problems, and available solutions. Each section of the book provides a step-by-step description of the method, a list of things that could go wrong, and a matching list of fixes.

Another appropriate user group for this publication is leak detection vendors and installers. A review in the Petroleum Equipment Institute's (PEI) *Tulsa Letter*, a major trade newsletter, says many in the tank industry will get "substantial benefit from this material...It is, in our opinion, the easiest to read and most complete document published to date on release detection."

To order copies of this publication #EPA/530/UST-89/012, write: US EPA OUST, P.O. Box 6044, Rockville, MD 20850, or contact your EPA Regional Office.

Leak Detection Enforcement

With the first leak detection deadline just past and others on the horizon, OUST is moving into the final stages

EPA HQ UPDATE

of a Leak Detection Enforcement Project designed to assist states in conducting their own compliance and enforcement activities. In the first phase of the project, OUST staff visited Austin, TX; San Diego, CA; New Hampshire, and Alexandria, VA, where tank tightness testing requirements have been enforced for several years, to learn how these jurisdictions conduct their prevention/enforcement activities. OUST found that, despite differences in organization, local needs, and the size and composition of their regulated universes, these jurisdictions use very similar processes to enforce prevention requirements without using the full extent of enforcement authorities (e.g., without administrative order authority).

In phase II of the project, OUST used what was learned from phase I to develop an "idealized" process for conducting leak detection/enforcement. Using this scheme, OUST is working with Michigan and South Carolina to develop a strategy and identify specific activities that can be implemented in response to Federal leak detection compliance deadlines.

Phase III of the project gets into the marketing of leak detection compliance. In February, OUST is sponsoring a workshop for Regional program staff to explain this process, provide available resources to help states implement this process, and to begin to establish a Regional compliance and enforcement esprit de corps.

OUST believes this project has identified some efficient ways for state UST programs without large staffs to conduct these leak detection/enforcement activities, and is eager to share this information with states.

To learn more about the project or to participate, contact your EPA Regional State Coordinator/Officer or Josh Baylson at OUST, 202/475-9725.

Corrective Action Plan Pilots

Projects to improve corrective action plans (CAPs) are underway in Maryland and Delaware. The projects, conducted jointly by OUST and Region III, were developed to identify ways to begin UST corrective actions as soon as possible after the discovery of a release. As a result of visits to over half a dozen state UST programs, (Continued On Page 12)



What Do We Have Here?

An Inspector's Guide to Site Assessment at Tank Closure

plus Field Testing Instruments...At A Glance
Soil and Water Sampling...At A Glance

It's a video!... actually 3 videos on one tape, a 30-minute feature presentation on site assessment at tank closure, plus 2 short presentations, one on field testing instruments (14-minutes) and another on soil and water sampling (7-minutes), plus a companion booklet. *What Do We Have Here?* is the second video on UST closure produced by the New England Interstate Water Pollution Control Commission (NEIWPCC) with a grant from the EPA Office of Underground Storage Tanks. The first video, *Tank Closure Without Tears*, deals with safety issues.

In the new feature video you'll explore the stimulating, captivating, and sometimes befuddling subject of site assessment at tank closure, with help from six UST inspectors around the country, and a certain Chief Inspector Closure who points out clues - "those telltale signs that somethin' leaked or spilled."

You'll see how the inherent characteristics of petroleum products provide clues or evidence of contamination. You'll reflect upon the basics of inspecting tank closures: planning, documentation, field equipment, field observation, field analysis, closure in-place, and finally, the decision of whether the site is in good shape or whether further investigation and monitoring is necessary.

For those who would like to know more about available field testing equipment, or the "ABCs" of soil and water sampling, you can stay tuned for parts 2 and 3.

The companion booklet follows the video outline, but discusses some of the issues in more detail. (The booklet will be available in early spring.)

Copies of the *What Do We Have Here?*, video and companion booklet can be:

• borrowed from
NERWI, 2 Fort Rd.,
South Portland, ME
04106,
for the prepaid charge
of \$5.00

• purchased from
NEIWPCC, 85 Merrimac
St., Boston, MA 02114,
for the prepaid cost of
\$45.00 for the set, or
\$5.00 for the booklet
alone. (Until the
booklet is available, the
video can be purchased
by itself for \$40.00.)

Copies of *Tank Closure Without Tears* - video and companion booklet - can also be borrowed for \$5.00 or purchased for \$30.00.

The LUST Trust Beat

THE LUST TRUST FUND WAS INITIATED IN 1986 to provide funding to states for the cleanup of abandoned leaking USTs and oversight of responsible party cleanups. The EPA Office of Underground Storage Tank's (OUST) most important indicator of program success is tracking monthly state expenditures to ensure that the funds are being directed to states with both the need and the capability to spend. This article provides background data and "tips" for state officials on methods for improving state Trust Fund spending.

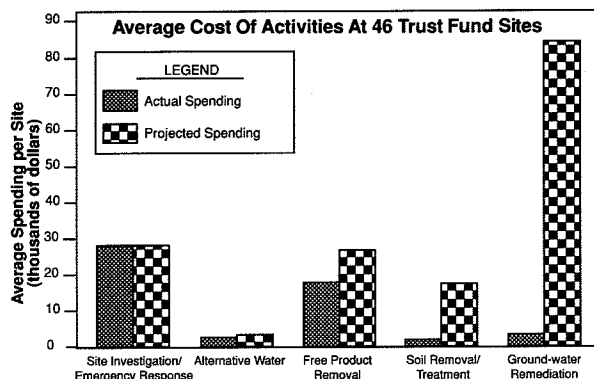
How Much Money is There?

LUST Trust Funds come by way of a 1/10 of one cent per gallon tax on motor fuels which will continue to be collected until \$500 million has accumulated at the U.S. Treasury. Currently the fund totals over \$430 million. It is estimated that the fund will reach its \$500 million goal by October 1990. By the end of FY-90, EPA will have received about \$185 million through Congressional appropriations, leaving a balance of \$315 million in the Trust Fund. Funds will continue to be appropriated to EPA and be available for state programs ... at least for the next few years. In the meantime, OUST will pursue reauthorization of the fund.

Trust Fund Spending Rates

The rate of Trust Fund spending has been increasing. States spent over three times more money in FY-89 (\$27.5 million) than in FY-88 (\$7.2 million). States received \$92.8 million in awards through FY-89. OUST expects that spending will continue to increase as the projected number of confirmed releases grows from 36,000 to over 300,000. This projection is based on implementation of leak detection requirements as of December 1989, along with an increase in state staffing and state actions. Furthermore, Trust Fund

spending is shifting away from less expensive administrative costs to more expensive cleanup activities, the most expensive of which is groundwater remediation.



Tips For Improving LUST Trust Fund Spending

OUST has been tracking Trust Fund spending and reporting processing and has worked closely with five states and three regions to zero-in on common concerns and glitches. One result of this effort has been the following list of "tips" which can help state officials pinpoint delays and expedite state spending on LUST site cleanups. The "tips" attempt to answer such questions as: Are we spending funds on Trust Fund eligible activities and not charging them to the Trust Fund? Is there a problem with our procurement process? Are we spending funds, but not getting the information to the EPA Regions and Headquarters?

Because state financial offices are generally responsible for tracking financial activities, it is important that LUST program staff be an integral part of this process. Financial staff should be encouraged to draw down funds on a monthly basis to ensure that EPA receives the spending data. All activities should fall into one of the EPA financial activity code categories in the chart below. To that end, the codes should be incorporated into LUST pro-

gram staff timesheets. This helps the financial staff eliminate the need for guesswork about program staff activities when conducting drawdowns. State personnel should be using actual timesheet data for drawdowns, rather than projected data based on state budgets.

Tips for Procurement of Cleanup Services

To conduct state cleanups, it is generally necessary to obtain contractors by reviewing submissions from requests for proposals. In many states, this is a lengthy, time-consuming process. States should examine this process and identify unnecessary review and approval steps (e.g. two supervisors checking the same materials) and make concurrent review and approval steps (e.g. by budget and legal staff) whenever possible.

There are also a number of innovative procedures that have been used by some states, which might be helpful in the procurement process.

- Substitute verbal for written approvals to expedite emergency response action (once contracts are in place), complete paperwork after work is underway;
- Establish agreements with other state and federal offices for emergency response, investigation, and oversight services;
- Obtain model contracts from the state procurement office or other state programs;
- Identify and initiate remedial activities before completion of a site investigation, whenever possible. For example, you can start soil removal or remediation while the site investigation is being completed;
- Establish multi-year contracts to eliminate the need to undertake this time-consuming task annually;
- Establish multi-site or task specific contracts rather than site-specific contracts to improve response time;
- Develop standby contracts that authorize a contractor to begin work at new sites immediately;
- Set up pre-approved unit price contracts to begin work at new sites immediately;
- Assemble teams familiar with specific geographic areas of the state to expedite the site investigation process; and
- Use site investigation contractors to oversee corrective action contractors if your available personnel are limited.

Tips for Financial Reporting

As previously mentioned, it is very important that state and federal program people track spending. The first step is to encourage communication

(Continued on Page 12)

Financial Activity Codes

"7" General Support and Management - includes all internal and external state agency support and management direct costs, which benefit the overall LUST program. External costs include contractors, administration, program guidance and implementation, training, community relations, report and proposal writing, and contingency planning.

"E" Site Cleanup Actions - includes all costs associated with site responses taken to prevent or mitigate threats to public health, welfare, or the environment posed by a release (or suspected release) from a petroleum UST, including exposure assessments, site investigations, emergency response, remedial design, and remedial corrective action. This activity code includes most site work, not just cleanup activities. For example, installing monitoring wells to delineate a plume would be charged to the "E" code.

"4" Enforcement - includes all activities necessary to identify a potential owner/operator, such as owner/operator searches, title searches, financial assessments, and issuance of letters, notices and orders to owner/operators to provide information, test tanks, correct leaks and conduct cleanups. Oversight of cleanups and activities associated with developing and supporting cost recovery cases are also eligible. Currently, 95% of remediation for LUSTs is conducted by responsible parties. Because this is an essential part of the Trust Fund program, it is important that state staff charge their time for oversight to the Trust Fund.

(Continued from Page 11)

LUST Trust

between financial staff and LUST program staff to ensure verification of data. Program staff should request copies of reports and updates on Trust Fund spending to cross-check financial and program information. For purposes of OUST's tracking of state spending, it is essential for state programs to have the latest figures on drawdowns to ensure that they receive credit for this in Headquarters' monthly report on national spending. This is especially important at this time, because EPA's agency-wide data base, the Integrated Financial Management System (IFMS), is not operating properly.

Tips on Program Activities Reporting

- Integrate federal program activities reporting (SPMS quarterly activities reports) with current state systems to minimize reporting burden;
- Use cleanup categories on the federal quarterly activities report to demonstrate program progress. For example, "cleanups under control" was established as an intermediate reporting category between cleanup initiation and completion. This enables us to show progress in initiating remediation and protecting human health and the environment, because completing the cleanup of sites could take several years. ■

For more information, contact Dana Tulis at OUST, 202/475-9726.

(Continued from Page 5)

"COLIS" Database System,

- an identification of alternative approaches to respond to leaking UST situations;
- training material for new UST personnel;
- decision making information on the rationale for the selection of site characterization techniques, corrective action responses, and termination procedures;
- insight on the successes/failures of alternative cleanup approaches; and
- cost information on the various aspects of the corrective actions.

These are just some of the benefits one can derive from using this system. Currently, the database has case histories from more than 30 state UST programs, and information on recent UST publications from such sources as EPA and other UST-related sources. ■

For more information on COLIS, call or write to: EPA COLIS Operator
EPA Technical Information Exchange,
Woodbridge Ave., Edison, NJ 08837.
Telephone 201/321-6871 or 6639.

NESCAUM Completes Health Evaluation of Gasoline Vapors

THE NORTHEAST STATES FOR COORDINATED Air Use Management (NESCAUM) has completed a document, *Evaluation of the Health Effects from Exposure to Gasoline/Gasoline Vapors*, which is intended to provide technical support to state environmental and public health departments in assessing potential public health risks from exposure to gasoline and gasoline vapors, primarily as a result of leaking USTs and refueling automobiles at gasoline service stations.

To characterize the toxicity from exposure to the complex gasoline vapor mixture, three major components - benzene, toluene, and xylene - were selected based on their toxicity, quantity in gasoline, and physiochemical properties that enhance their environmental release and potential for human exposure. The document presents comprehensive toxicological profiles for each of these major components and for gasoline. These profiles include acute toxicity, subchronic toxicity, chronic toxicity, neurotoxicity, immunopathological effects, teratogenicity and reproductive effects, genetic toxicology, epidemiological evidence for human cancer, and animal carcinogenicity.

Human exposure doses were estimated for six exposure scenarios. These include exposure of self-service customers, service station attendants, residents living in close proximity to gasoline stations, and residents exposed to drinking water contaminated by gasoline leaking from USTs. The exposure doses were determined by using relevant ambient monitoring

data or by using dispersion modelling with estimated emission rates from a service station.

Risk estimates for short-term and long-term exposure were derived for gasoline, benzene, toluene, and xylene, based on six exposure scenarios. For benzene and gasoline, EPA cancer potency values were used to estimate cancer risks in populations exposed to gasoline vapors. EPA procedures were employed to calculate a non-cancer risk reference dose for exposure to gasoline, benzene, toluene, and xylene.

The most significant risk estimates for both cancer and non-cancer effects were for service station attendants and for residents using contaminated groundwater. It should be noted that exposure doses for UST-related scenarios were based on data from limited case studies. Estimated risks for any given site need to be determined on a site specific basis.

The document presents a qualitative discussion of the major assumptions, uncertainties, and limitations of this quantitative risk assessment. These considerations must be taken into account when applying these data to site-specific cases of exposure to gasoline vapors and in the development of regulatory programs. ■

Copies of the document are available for \$90.00 (\$35.00 for government and non-profit organizations).

To order a copy, send a check to NESCAUM, 85 Merrimac St., Boston, MA 02114, or call 617/367-8540.

(Continued from Page 10)

HQ Update,

OUST staff have established that the larger long-term remediation jobs typically take between 9 months to 2 years to get started.

OUST and Region III are developing specific products to enable improvements to take place and result in measurable state progress. These improvements include: developing and presenting a state consultant's day, reducing the time state inspectors spend on recordkeeping (and other lower priority work), and conducting several corrective actions using vacuum extraction systems (VES) technology.

Financial Test of Self Assurance For Local Governments

Early this spring, EPA will propose a rule containing several options that local governments could use to

meet federal financial responsibility requirements. The proposal is now in the final stages of agency review. In the proposal, EPA plans to ask for comments on each option and on how much time local governments will need to comply using self assurance tests or alternative mechanisms.

When the final rule is published, it would allow many of the 29,000 counties, municipalities, school districts, and special purpose governments to meet the requirements by demonstrating that they are financially strong enough to pay for cleanups and third party damages resulting from UST releases. Use of a self assurance test would save each local government hundreds to thousands of dollars per year that they would otherwise spend on insurance or other assurance mechanisms. The down side of this is that local governments using self-tests would have to pay for UST releases should they occur. ■

UST EXCHANGE



The UST Exchange is your forum for promoting the exchange of UST experiences, successes, discoveries, frustrations, and anecdotes. If you have such information, get it off your chest! Write Ellen Frye at NEIWPCC, 85 Merrimac St., Boston, MA 02114, or call 617/861-8088.

"Getting To Yes" In Matters of USTs

by Paul J. Sausville, Chief of the New York State Department of Environmental Conservation

Inspectors, engineers, attorneys and administrators face a number of interesting challenges related to the development of the UST program. Laws must be passed, regulations negotiated, new staff approved, equipment purchased, and state/EPA agreements reached. Above all, thousands of tank owners must be convinced to comply with the new regulations.

The effectiveness of UST regulatory staff and, indeed, the ultimate success of UST regulations depend on each team member's ability to build alliances and develop trusting working relationships with state executive offices, legislatures, interest groups and the regulated public. Effectiveness will hinge largely on skills and aptitudes for reaching wise agreements.

Getting To Yes, a national best selling softbound handbook by Roger Fisher and William Ury of the Harvard Negotiation Project, deals with just this subject.

To improve skill levels of New York State UST staff, the Department of Environmental Conservation (DEC) recently invited the Cornell University School of Management to develop a four-hour training course on effective negotiation. The course, which is based on Fisher and Ury's principles of *Getting To Yes*, provided useful tips on negotiating skills and techniques, resolving conflicts, improving listening skills and settling issues to everyone's satisfaction.

Getting to yes is a science, Fisher and Ury suggest. Success in our daily lives and improvement in compliance with the UST regulations requires that we follow five negotiating techniques:

- *Avoid positional bargaining.* Taking rigid positions is fraught with problems and can be particularly troublesome to a regulator with the responsibility for writing UST regulations.

Positions endanger relationships and may build resistance to your program from the regulated community, your colleagues and executive superiors. Positions are inherently inflexible, inefficient and may result in unwise regulations which stifle new technology for leak prevention, force tank owners to replace storage equipment which is in good condition and

may jeopardize your credibility and that of your agency.

If others choose to negotiate positions, Fisher and Ury recommend that you negotiate on the basis of merit or a mutually agreed upon fair standard (which is the third negotiating technique discussed below) and on the basis of people's interests

- *People's interests should be the center of all negotiations.* Look for interests that you share. Ask questions to discover the real concerns of others. This involves your recognition of five basic human interests which may be threatened in this process - security, economic well-being, sense of belonging, recognition, control over one's life - powerful needs and concerns that motivate all people. If you manage to satisfy both your concerns and theirs, you will have reached a mutually satisfactory solution.

To illustrate this point, let's say that it has become clear that many tank installers are not installing UST systems properly. At the same time, reputable installers are upset because they are being underpriced by other contractors who are taking shortcuts. They also want training for their field foremen. You and the reputable installers have a mutual interest in creating a program to better control tank installations. You also have a potential ally for any legislation or regulation which may become necessary.

Remember, your mutual interests can be satisfied in several ways; with an installer licensing program, with tougher enforcement of installation standards, with a tank installer training program or perhaps in another way. Once you step away from positional bargaining and discover people's interests you also discover there is usually *no one right way* to solve a problem.

As for tank owners, you may be surprised to learn that the economic interests of tank owners may be consistent with many of your goals as an UST regulator. Instead of resistance to upgrading, tank replacement may be the preferred business choice of owners over the wait-and-see alternative and the potentially large costs for cleanup...which could be the result of choosing the wait-and-see alternative.

Also, existing tanks may be too small and obsolete for today's operation. Dispensing equipment may be worn out...and so on. Clearly, understanding the tank owner's interests puts you in a better position to bargain for compliance.

- *Insist on using objective standards which both you and the other party can agree upon.* It gives you the power of legitimacy. In dealing with tank owners, the UST standards must be followed...the standards are not an item for negotiation. While you should never budge except on the basis of objective, reasonable and fair standards, the time frame and methods to achieve compliance may be negotiated to satisfy each of your interests.

- *Invent options for mutual gain.* Avoid premature judgments. Be open to more than one answer to the problem. Be willing to compromise on matters which are a low cost to you and a high benefit to them.

For example, have you ever exceeded the speed limit on the highway? Probably you have. The policeman's job is to enforce traffic laws and, above all, ensure highway safety. He has a number of methods for negotiating your compliance; issue a speeding ticket, give a lecture, give a warning, or perhaps not stop you at all because it might create a traffic jam. Showing an enforcement presence by parking a police cruiser on a busy highway has proven to be effective in obtaining compliance.

The UST inspector has similar options, including formal enforcement and other techniques which may be used to accomplish UST objectives in a way that also satisfies the tank owner's interest. Many inspectors use coaching and give technical advice to tank owners on how to comply with the regulations. This soft approach often proves to be all that is needed to accomplish the goal of environmental protection.

- *Be soft on the people and hard on the problem.* This is the most important negotiating technique. Trust, respect, understanding, friendship and sincerity are essential to maintaining a cooperative relationship. According to Fisher and Ury, this is fundamental to the success of any negotiation. ■

Answers to the following questions have been prepared by the EPA Office of Underground Storage Tanks.

Leak Detection Deadline

Q. If an owner has a tank that is 25 years old and he selects tank tightness testing and monthly inventory control as a leak detection method, does he then need to conduct the first tank test by the deadline of December 22, 1989, or can he merely begin inventory control December 22, 1990?

A. Tank owners who choose the combined method of tank tightness testing and inventory control must begin both methods by the deadline provided in 280.40(c). This means that the initial tightness test for a tank installed before 1965 must be conducted by December 22, 1989. In this combined option, tank testing is the primary method for detecting small leaks, and these tests must be conducted by the deadlines in the phase-in schedule. Inventory control is intended to detect larger leaks that may develop between tightness tests.

Methanol, Other Oxygenated Fuels, and Gasohol

Q. Is methanol considered a hazardous substance? (See sidebar for more information on methanol.)

A. Yes. Methanol is listed in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and must be stored in accordance with the hazardous substance UST system requirements for release detection. Thus, new or upgraded UST systems must utilize secondary containment with monthly interstitial monitoring.

Q. Is M85 considered a hazardous substance?

A. Yes. M85 is a hazardous substance because it is comprised of 85% of a CERCLA-listed substance (not a *de minimis* quantity of methanol) and must be stored in accordance with the hazardous substance UST system requirements for release detection.

Q. Are other high-level methanol fuels considered hazardous substances?

A. Yes. Other high-level methanol fuels are hazardous substances because they are comprised predominantly of a CERCLA-listed substance. The grades of high-level methanol fuels currently under consideration for use in the future contain 90%, 80%, and 70% methanol in unleaded gasoline and are known as M90, M80, and M70 respectively.

Q. Can an existing single-wall UST storing petroleum be converted to store methanol and M85?

A. Yes, methanol and M85 can be stored in an existing single-wall UST system provided that the release detection employed meets requirements for petroleum UST systems. In addition, these fuels may pose special compatibility problems with some existing steel and fiberglass systems - with joints, gaskets, and connections, or internal linings made with certain resins. Methanol or M85 can be stored in existing single-walled UST systems until December 22, 1998, without a variance if reliable release detection is used and if these substances are compatible with the existing systems.

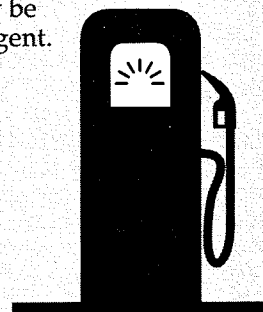
Q. Can owners and operators of USTs storing M100 and M85 in new UST systems obtain a variance from secondary containment?

A. Yes, owners and operators can apply if allowed by state for a variance from the secondary containment requirement. Under such a variance, methanol and M85 can be stored in a petroleum UST system with single-walled, protected tanks and pipes in combination with one of the release detection methods identified in section 240.41 of the Code of Federal Regulations. However, the owner/operator must first demonstrate the effectiveness

Methanol, Other Oxygenated Fuels, and Gasohol

Increased attention is being given to alternatives to gasoline motor fuels. The most frequently proposed alternate fuels are 100% methanol (M100) and a blend of 85% methanol and 15% unleaded gasoline (M85). The main advantage of M100 or M85 as a motor fuel is that it reduces the amount of hydrocarbon emissions from combustion while retaining desired engine performance. Presently, these fuels are in limited, experimental use, often in regions that have failed to attain ambient air quality standards under the Clean Air Act. Various federal, state, and local government programs may soon encourage or mandate the increased use of alternate fuels. However, in the near term, even if national goals for the number of vehicles burning alternate fuels are met, the total number of USTs storing methanol fuels will be relatively small (<1%) compared with the total number of USTs storing regulated regulated motor fuels.

EPA's Office of Underground Storage Tanks has prepared answers to some of the more frequently asked questions about the status of methanol and other similar products that may be stored in UST systems. These questions are being raised now because if methanol fuels are hazardous substances, then UST systems storing them must meet the release detection requirements (secondary containment) for such systems immediately for new systems, and within 10 years for existing systems. Keep in mind, state or local requirements may be more stringent.



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Questions and Answers

of the release detection and provide information on corrective action technologies, health risks, the chemical and physical properties of the stored substance, and the characteristics of the UST site to the implementing agency prior to the operation of the new UST system.

Q. How does an owner or operator obtain a variance?

A. An owner/operator must apply to the implementing agency to obtain a variance. Many approaches to implementing these potential requests were considered during the development of EPA's final rule. At the time, it was concluded that nationwide, class or compound-specific approaches would be unworkable. At present, variances can only be obtained using procedures and criteria developed and implemented on a state-by-state basis. Future developments in the alternative fuels program may warrant a change in this approach.

Q. Are other oxygenated motor fuels and gasohols considered hazardous substances or petroleum?

A. Oxygenated motor fuels and gasohols are considered petroleum and can be stored in accordance with the petroleum UST system requirements.

Many oxygen-containing compounds are now being blended with unleaded gasoline. These compounds are called "oxygenates," a term that includes numerous aliphatic ethers and aliphatic alcohols (aliphatic = straight or branch chained hydrocarbons). The amounts and combinations of oxygenates that can be blended with unleaded gasoline is limited by EPA rules and waivers under section 4 of the Clean Air Act. Refiners have obtained waivers to produce and market seven fuel blends; in addition, two blends in production are exempt from the waiver. The term "gasohol" originally referred to a gasoline-alcohol blend - 10% ethanol and 90% unleaded gasoline. The term is losing its utility as many different alcohols are being used.

Low concentrations of oxygenates in unleaded gasoline do not change the effectiveness of release detection and corrective action technologies, nor do they substantially increase the risks posed at individual sites due to a release as compared to a release of 100% gasoline. Thus, they can be safely stored in petroleum UST systems. ■

Field Notes

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

The petroleum marketing equipment industry has experienced extraordinary changes during the second half of the 1980s. Most of those changes can be attributed to the federal underground storage tank law. Here is what the Petroleum Equipment Institute expects to happen on the UST side of the business in the early 1990s.

- The movement to double-walled tanks is picking up steam. Although it's difficult to quantify this statement since few tank manufacturers report their production numbers, sales of double-walled tanks should represent 20-25% of all USTs sold this year in the United States. Primary purchasers of these tanks will include large industrial users as well as major and independent oil companies.
- The number of tank testing and UST installation companies will continue to proliferate.
- As the number of less experienced testing and installation companies increases, more states will likely require some demonstration of competence by mandating the licensing/certification of these companies.
- More tanks will be internally lined. Tank liners tell us an increasingly large number of their customers are tank owners who want to avoid site assessments. These tank owners view lining as a viable and attractive alternative to replacing their storage systems.
- More technological advances will be made during the next two years in the design and construction of storage vessels, release detection equipment, and tank testing equipment. This will not only come from manufacturers that already have equipment on the market, but also from companies not yet in the industry. PEI still averages about two calls a week from manufacturers, unfamiliar with the petroleum equipment industry, who want more information about the UST market.
- An increasing number of tank owners will replace USTs with above-ground tanks (ASTs). While the smaller ASTs will probably be resting on top of the ground, larger ASTs will be placed in vaults below grade - primarily for space and aesthetic reasons.
- Compliance with a state's UST rules and regulations will continue to depend on the state's diligence and thoroughness in enforcing its law. ■

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To Thine Own Tank

route." (Are we talking about ISTs?-In-ground Storage Tanks?)

For those more interested in the high tech end of the market, many of the available leak detection choices are reliable, sound technologies that seem to get better everyday - which does pose one predicament for the tank owner, "when to say when." Some buyers are awaiting the emergence of more field data, others are awaiting the availability of even better, more reliable and, perhaps, less expensive technologies just around the corner. We've all been through this with computers, software and fax machines.

In response to market demands for such things as more automation, less human intervention and minimal-to-no down time, leak detection systems are becoming increasingly more sophisticated. Many of the newer systems lend themselves to remote monitoring, whereby modems link multiple facilities to a central monitoring terminal. Remote monitoring is

barely off the ground, but may well become common practice for multiple facility surveillance. (For more information on selecting leak detection, see Marcel Moreau's article, *The Leak Detection Dilemma*, on page 8.)

The Environmental Comfort Level

In about 1988, both Chevron and Shell Oil adopted double-walled tank upgrade programs. Spokesmen for both companies say this approach seems more likely to afford long term cost savings, because of such features as the outer containment wall, the interstitial monitoring capability, less dependency on people, and cleanups avoided because product has little opportunity for escaping into the environment. "The double-walled tanks have many plusses, but the biggest benefit is the environmental comfort level," says Bob Lupcho of Chevron.

Insurance companies who offer pollution liability policies are also very concerned about environmental risk comfort levels. "Tank owners have a

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To Thine Own Tank

very significant liability that must be recognized, first and foremost," one insurer points out. "Insurance is a risk transfer mechanism and a portion of this liability is passed on to the carrier. Our ultimate goal in terms of leak detection is to see permanent reliable systems installed. We are also concerned with how well operators will use and maintain those systems. However, we're really interested in the various methods that owners use to come up with a holistic approach toward managing their facility... recordkeeping, leak detection, corrosion protection, upgrading."

"We try to underwrite the tank and the owner," explains another insurance carrier. "We underwrite every tank and piping system on its merits - the more bells and whistles, the better. That's not to say you can't have a good tank sticking program; if it's done conscientiously, it can be reliable. You can get a good sense of how well a facility has been managed by checking past inventory records."

"Good leak detection and monitoring shows up in the quotes we give out. It can make a substantial difference in the premium. But most of the leak detection devices are only as good as how well the insured keeps up with them...the monitoring has to be monitored." ■

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For More Information

This past December was EPA's first leak detection deadline for existing tanks installed before 1965. The next deadline is December 1990 for tanks installed between 1965 and 1969, as well as for existing pressurized piping systems. Clearly the proliferation of available leak detection systems has been, in part, in anticipation of the impending demand.

The EPA Office of Underground Storage Tanks has developed numerous products on leak detection to help regulatory agencies, owner/operators, and leak detection vendors/manufacturers. Here is a list of some of this material.

Leak Detection Information From EPA

- **STRAIGHT TALK ON TANKS: LEAK DETECTION OPTIONS** - An overview of all the leak detection options allowed in the federal regulations.
- **LEAK LOOKOUT** - A 15-page brochure summarizing information about external leak detection methods. Discusses the operation, strengths, and weaknesses of manual and automatic liquid and vapor sensors. Presents information on selecting a leak detection method, including ideal site conditions and site limitations. Includes a list of over 60 companies that manufacture products used as part of external monitoring. (Publication #EPA/530/UST-88/006)
- **VOLUMETRIC TANK TESTING: AN OVERVIEW** - A 40-page booklet summarizing the findings of the EPA "Edison" study. Includes a discussion of the most important factors affecting performance, the estimated performance of the 19 participating methods, how to apply the findings of the study, and a checklist for good tank tightness testing performance. (Publication #EPA/625/9-89-009)
- **LEAK DETECTION VIDEO** (available in spring 1990) - A 30-minute video providing an overview of the principles of each of the allowable tank and piping leak detection methods. Discusses selection of methods, including site conditions, costs, and level of effort involved for each method.
- **DETECTING LEAKS: SUCCESSFUL METHODS STEP-BY-STEP** - A new 200-page handbook for state inspectors and leak detection vendors and installers, with separate chapters for each of the 7 leak detection methods allowed for tanks, and a chapter on piping leak detection. Each chapter includes: a brief description of the principles of each method and the steps involved in its use; potential problems with each step and how to avoid or correct them; and mechanisms that can be used to ensure the method is effective (site inspection, data review, training, and approval/certification). (Publication #EPA/530/UST-89/012)
- **LEAK DETECTION COMPLIANCE TOOL KIT** - A looseleaf binder containing 6 items intended for use by implementing agencies to increase compliance by: increasing awareness of the leak detection regulations and their deadlines; increasing technical understanding of leak detection options; and helping state agency personnel. The kit includes: statement stuffers, an ad slick, a "standard" compliance article, flyers, a 3-page "canned letter" which could be sent by elected officials, regulators, or trade associations, and helpful hints for answering telephone queries.

**For more information on these publications write:
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