

# L.U.S.T.LINE

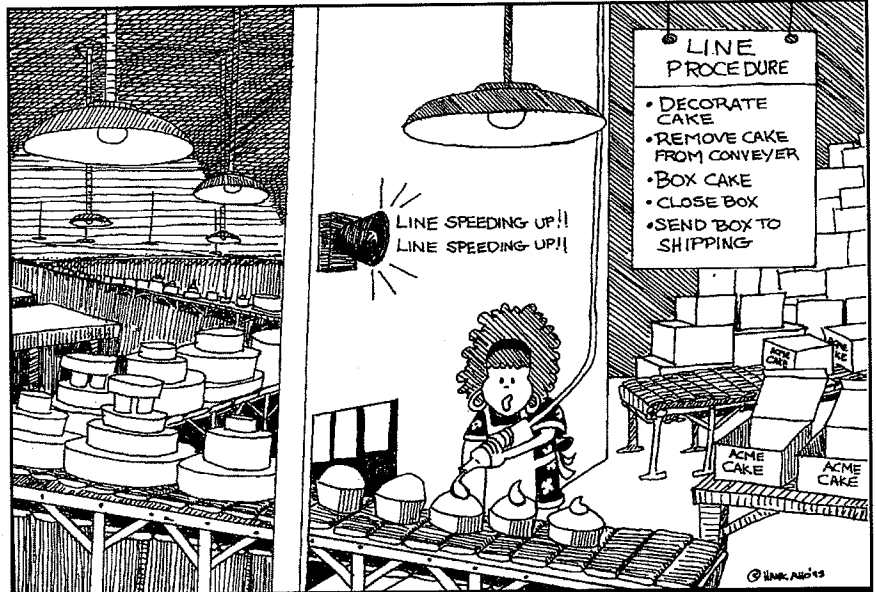


A Report on Federal & State Programs To Control Leaking Underground Storage Tanks

## Stop the World...It's Time to Step Off and Regroup!

### With LUST Sites Piling Up, Ponderous Cleanup Policies are Giving Way to Risk-Based Alternatives

**"I** always think of Lucille Ball at the cake factory," says Gilberto Alvarez, an Environmental Engineer with the EPA Region 5 UST/LUST office. "She gets a job at this cake factory and the cakes are coming in on the conveyor belt nice and slowly and she's putting whipped cream on them. Then the cakes start coming in faster and faster and everything starts falling apart—the cakes and the cake boxes are piling up and falling on the floor, and she starts going nuts."



"THAT'S ABOUT HOW STATE REGULATORS FEEL WHEN THE LUST sites start coming into their boxes," says Alvarez. "First, they sit down and think, 'Okay, I can handle this and that site.' But, the next thing they know the sites begin to pile up and they start falling behind and people are calling in and complaining—it gets overwhelming real fast."

In this hurry up and catch up world, there are times when we'd all do well to turn off the conveyor belt, take a deep breath, then figure out what really needs to happen with them there cakes. To carry this metaphor a tad further, some of those cakes will be the fancy wedding cakes that need lots of tender love and care. Other cakes will be birthday cakes—some more gooey, some less gooey. Then there are the plain cakes with no frills...maybe some powdered sugar.

All these different cakes require different levels of attention, and one big conveyor belt probably won't do

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the trick...there's no need to put the plain cakes on the same track as the wedding cakes. The same holds true for LUST sites, each site is different; each has a different set of hydrogeologic, geographic, and sociocultural characteristics; and at each site, the risk to human health and the environment is not equal. Is it necessary, then, to put the high risk sites on the same track as the low risk sites? The answer that's gaining momentum nationwide is "no."

### **What Really Needs to Happen at Them There Sites?**

One thing that keeps many corrective actions on a one-track system is the almighty, non-negotiable, somewhat arbitrarily-based cleanup standard. Many state programs require that all sites be cleaned up to some standard, be it numerical, non-detect, or background, rather than evaluate each site from the standpoint of what really needs to be done and when.

"We've been locked into some fairly rigid cleanup standards," explains Ron Pedde, Manager of the Texas Natural Resource Conservation Commission (TNRCC) Responsible Party Remediation Section. "But many people who work on these sites—regulators, consultants, and responsible parties alike—have had this gut feeling that maybe

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we're doing a lot more to clean up these sites than we need to. Here in Texas we were finding out that the numeric standards we had originally set were more stringent than necessary."

For state cleanup fund administrators, state LUST managers, and private industry, one of the biggest frustrations surrounding cleaning up to standard is that many remediation efforts become open-ended investments in time, money, and man and woman power. (State funds alone are contributing approximately \$1 billion annually to the cost of remediating petroleum releases.) In many instances, cleaning up those last few hundred parts per million of hydrocarbons is the most tedious and expensive part of the cleanup.

"We're not reluctant to spend the money," explains Peg Chandler of the BP Oil Company's Environmental Resources Management Group," but there gets to be a point of diminishing returns. It's the '80/20' principle—you spend 80 percent of your money to clean up 20 percent of the problem. There are sites where we legitimately should be focusing our time and attention—our resources—to protect human health and the environment, but there are many sites where we're spinning our wheels and wasting manpower and money."

"We need to be dealing with a standard that is reasonable," says Matt Small, an Environmental Engineer with EPA's Region 9 UST/LUST Office. "There are many kinds of standards: the performance-based standard, where you clean up to what your analytical instrument can detect; the technology-based standard, where you clean up to the limits of the technology, such as an asymptotic level on a soil vapor

extraction system; the more subjective standard, where you're required to restore the site to its "original condition"; the numerical standard, where you cleanup to a given number; or the risk-based standard, where you calculate the risk associated with ingestion of specific quantities of a particular compound and clean up to acceptable risk levels. But there are inherent problems associated with each of these kinds of standards," says Small.

Many professionals involved in the business of environmental remediation would prefer not to waste money at sites that aren't posing any risk to human health and the environment. Many feel it is far more reasonable to shoot for site-specific cleanup goals that are based on an actual or potential exposure risk to human health and the environment. Once these site-specific cleanup targets are established, corresponding corrective action alternatives can be evaluated—the greater the risk, the more attention the site receives in terms of corrective action and oversight.

"Logic says you have to handle each site differently," says Dennis Rounds, Executive Director of South Dakota's Petroleum Release Compensation Fund and Chairman of the American Society of Testing Materials' (ASTM's) Exposure/Risk Assessment Task Group. "Each site has different site characteristics, different potentials for exposure, different hazards, and different existing and potential land uses."

The ASTM Task Group, made up of interested and knowledgeable parties from the public and private sectors, is about to circulate for review a second draft of its "ASTM Standard for Risk-Based Corrective Action." The task group has forged ahead with a sense of urgency, in hopes that this consensus document will serve as a model to help streamline the corrective action decision making process by providing standard procedures for assessing the potential for exposure and risk from petroleum releases.

The ASTM Task Group has tried to develop a standardized approach, using exposure and health risk information to determine urgency and amount of cleanup that's needed for each site. As far as the Task Group is concerned, this assessment process should begin as early in the investigation process as possible so that the

### **LUSTLine**

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The New England Interstate Water Pollution Control Commission was established by an Act of Congress in 1947 and remains the oldest agency in the Northeast United States concerned with coordination of the multimedia environmental activities of the States of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

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type and extent of remediation necessary for each site can be determined early on and re-assessed as the site work proceeds. The resulting determinations could range from a need for no action to a need for extensive and complex remediation.

### Moving Right Along

What appears to be wanting is a process for addressing all sites up front to get them onto some appropriate track and to move them forward. As LUST sites pile up, the good-intentioned tradition of requiring all sites to be cleaned up to standard begins to unravel, as regulators focus on the worst sites, while other sites sit in limbo until someone has time to usher them into the remedial mode—a kind of de facto prioritization without due process.

"We would like to see all sites move forward toward cleanup completion," says Lisa Lund, Deputy Director of EPA's Office of Underground Storage Tanks. "Human health and the environment are better protected when actual work is going on at sites, rather than when they just sit there.

"It also gets down to costs," adds Lund, "the longer you wait, the more expensive the cleanup. If you can move things forward and make some early decisions on what information to collect, then the data gathering is better, the work is more directed, and the outcome is more effective.

"All these factors have to come together to encourage us to stop thinking that we have to oversee every site out there. We can't do it, and we don't need to do it. The risk is not that great at a lot of these sites."

The effectiveness of this type of approach has a lot to do with getting good information about critical points early on in the process, but even more important, making decisions on what those critical points are. Once you go out and get that information, you can make decisions about what needs to happen at that site, and for state regulators, how much oversight is necessary.

### Decisions, Decisions

"It's very much a decision process," explains Matt Small, who is also a member of the ASTM Task Group. "You make some judgments about whether this site needs to be cleaned up immediately and completely, or whether it can wait a little while, or

whether you can adjust the cleanup standards and not clean up to the most stringent standard. All along the process, as you get more information and more data, you use it to try and build your conceptual model of what really needs to be done at the site and how soon.

"You're dealing with exposure and the likelihood of exposure," Small continues. "Because the health risks of these petroleum compounds are fairly well defined, what you really need to know is the possible exposure pathways so that you can plug all this information into your assessment model."

Risk-based exposure assessment incorporates the concept of exposure pathways and the potential for exposure risk with knowledge about the health risk to the receptors (i.e., the people who could be harmed by the contaminant). But, if no one is actually going to be exposed, then theoretically the cleanup standard can be adjusted to reflect that.

Let's say you have a couple of sites with petroleum releases. The first one is located in a remote area that has a very high clay content, it's 500 feet to groundwater, and there are no plans to develop the land. The second site is in an area where groundwater is at 10 feet, a drinking water source, and the contamination is in the middle of a neighborhood where people have basements and could be exposed to vapor infiltration and explosion hazards. The exposure risk is going to be much different for these two sites.

### The Natural Biodegradation Factor

The concept of natural biodegradation has emerged as a big factor in the risk-based site cleanup equation, because it may provide the basis for determining a "no action" or "monitor only" option at low risk sites. Mounting evidence points to the fact that when left in the ground long enough and under the right conditions, nature plays a hand in cleaning up petroleum contamination. Naturally occurring microorganisms in the soil can develop quite an appetite for petroleum hydrocarbons, converting them into harmless by-products, such as carbon dioxide and water. Because of biodegradation, plumes will reach an equilibrium and won't expand any further—most of the time they will start to retreat.

Again, you need to have information about the site—the soil conditions, the climate, the amount of available oxygen in the subsurface, the water chemistry of the area—before you can make any assumptions about biodegradation. But this natural remediation process can be factored into the assessment model, and it's something you can monitor to verify that your assumptions are correct—to ensure that the contaminant is degrading and not moving toward a potential receptor. As a result, at certain low-risk sites, nature may provide all the corrective action that's really required. (See "Beyond Cleanups For Cleanup's Sake" on page 4.)

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Lisa Lund, EPA OUST

"In many instances, we are allowing a certain amount of contamination that we predict will clean itself up to remain in place," says Ron Pedde of the Texas NRCC. "If we have a release at a site, we need to be able to predict what's going to happen with that release at a given time at a given place. We need to be able to make decisions that say, 'given the data we have at this time, we are comfortable that this plume isn't going to move any place for whatever reason.' Some of the major oil companies have been working with us on this. We've gone back and continued to do quarterly monitoring, and we're finding that contaminant levels are decreasing. Natural degradation seems to be behaving the way we would expect it to."

EPA Region 5 is also considering working with the majors on testing exposure assessment systems.

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## LUST Investigation & Remediation

# Beyond Cleanups for Cleanup's Sake

by Jim Lundy

**I**n conversations with LUST site managers in Minnesota and other states, I have sensed a growing frustration with the traditional LUST response mind-set, which presumes that corrective action is a foregone conclusion. This frustration, coupled with an awakened sense of responsibility toward the public resources that make LUST cleanups possible in many states, has prompted widespread interest in defining a new philosophy for LUST corrective action.

SO, WHAT KIND OF NEW PHILOSOPHY should this be? Anyone with several years of experience in the LUST cleanup business can verify that engineered corrective action is often better at reducing a large problem to a small problem than at reducing a small problem to no problem. Because engineered corrective actions are seldom able to return sites to pristine conditions, we leave contamination in the ground virtually every time a site is closed. We do this, however, with a large measure of certainty that the site poses no further risk to human health and the environment.

Perhaps, in evolving our new LUST corrective action philosophy, we need to replace the usual question of "what corrective action technique do we choose?" with a more fundamental question: "Why are we doing cleanups?" Restated, "Does 'how clean is clean?' really matter?"

The Minnesota LUST program, as well as other state LUST programs, was created in response to our need to deal quickly and effectively with petroleum releases that were affecting people—we needed a means to deal with such threats as petroleum-contaminated drinking water supplies, vapors in basements and sewer lines, or explosive conditions in homes and businesses. To be responsive to these dangerous situations, we set about treating every site as if it were a significant or potential threat to human health, requiring engineered corrective actions wherever feasible.

Over the years, however, we have realized that although some LUST sites pose significant health concerns, many do not. In fact, groundwater monitoring data collected from all kinds of sites in the Minnesota LUST program show that once a release occurs, the dissolved

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phase plume quickly reaches a limited size. After that, it doesn't change very much in size, unless there are unusual hydrogeologic conditions, such as man-made conduits, or nearby pumping wells.

This behavior is due to natural subsurface processes, including natural biodegradation, dispersion, adsorption, and volatilization. Researchers, consultants, and regulators have a basic understanding that natural biodegradation is a process that occurs at the fringe zones of virtually every dissolved petroleum plume. The result is analogous to the flow of glacial ice—the contaminant mass is conveyed toward the edges where it degrades, but the shape of the plume does not change very much. We call this a "self-limiting" or "stable" plume.

Cutting off the snowfall on the glacier, or halting the leak that's contributing to the plume eventually melts the glacier or degrades the plume. It's just a matter of time. The key question is, how much time are we willing to allow? That answer

ultimately depends on the intended use of the site.

Because many sites pose a low or insignificant human health risk, and because our data indicate that many groundwater plumes are self-limiting, we can reasonably conclude that a "monitoring only" approach may well be appropriate for many sites, while still protecting human health and the environment. First, however, it is crucial that each site be investigated to sufficiently address human impacts for both present conditions and potential future conditions. At those sites where investigations show an elevated human health risk, we should be shooting for the best engineered corrective actions possible.

But, if investigation shows a plume to be self-limiting and human health and environmental impacts are not foreseen, we should at least ask ourselves what benefit there is in undertaking corrective action... unless we simply want to cleanup for cleanup's sake. We should be asking ourselves: Given the information we have about this site, what level of action is most appropriate?

Any new LUST site management philosophy should focus our finite economic resources (i.e., public funds) on the LUST sites that are most apt to affect human health and the environment. "Plume management" is the term I use to describe an approach that addresses the risk posed by petroleum releases in terms of an appropriate level of corrective action. High risk sites would, of course, require engineered solutions that are designed to help speed up naturally occurring biologic cleanup processes, to protect both people and the environment.

But in the case of fully investigated low risk sites, where the cont-

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aminant source (i.e., tanks, lines) is removed and the contaminant plume can be shown to be stable, these sites might require no action other than sufficient groundwater monitoring to assure low risk. This strategy seems sensible and correct, and acknowledges that we haven't the resources to treat each discovered release as if it were a major environmental or human health problem.

### **Following the Plume Management Scenario**

What would it mean to adopt plume management as a guiding strategy for addressing LUST sites? For one thing, it would free us from performing marginally beneficial cleanups.

Consider a site like the one I reviewed recently, where the investigation defined a release affecting the water table in a clay till. The contamination source had been removed, drinking water supplies had not been fouled, nor, based on our risk assessment, were they likely to be, and no utilities or basements were at risk in terms of vapor problems.

Knowing the tanks had been removed and that there had not been a recent massive release, but a suspected "slow leak" over a longer period of time, I checked the groundwater monitoring data. Quarterly results over one year showed that although contaminant concentrations exceeded the cleanup goal, the contaminant concentrations in the groundwater were decreasing significantly over time. Inasmuch as the source had been removed and the exposure risk was low, we decided that natural biodegradation was sufficient to take care of the problem and no other corrective action was necessary. I expect that an additional year of groundwater monitoring will verify that the plume is degrading in place very nicely without any corrective action.

Alternatively, another feasible corrective action that I know of for a site of this type would have been to excavate and transfer the soils off site—potentially exposing many people at a probable cost of about

\$50,000. On the other hand, we could have employed a marginally effective pump and treat system, or even an *in-situ* technology, at a considerably higher cost, but without necessarily significantly reducing risk or increasing environmental benefit. In this case, the plume management alternative freed me to conserve corrective action dollars for some other site more worthy of the expense.

Plume management means we can prioritize not only corrective action dollars, but our efforts too. For example, over the years, the Minnesota LUST program has managed 6,678 sites, 3,592 of which are still on-going. This means that some project managers have about 150 sites each, and some hydrogeologists have up to 250 sites each, a sometimes overwhelming project load. Using plume management as a strategy, project managers can make relatively quick decisions on the low risk sites, saving valuable time for the proper management of sites that pose a greater risk to human health and the environment.

Plume management allows us to adopt the physician's pledge to "first, do no harm." Many misguided corrective actions are, thankfully, only ineffective, but there are some in the record that arguably worsened site conditions.

As an example, consider again a site like the one above, except suppose 2,000 yards of contaminated soils were excavated and trucked away. The excavation was then filled with clean sand. However, the soil removal was not a complete corrective action, and much of the contaminant mass remains in the excavation sidewalls from where it now migrates into the formerly clean fill. Now, heavily contaminated groundwater occupies the entire former excavation and whatever stability the plume may have had has certainly been disturbed.

In this case, the initial corrective action has been undone...and that's not all. Because the excavation came too close to the street and the original clay till soil (the one naturally occurring protective feature of the

site) has been removed, the city now reports vapor impacts in the sewer lines and trench backfill.

In plume management terms, managing LUST releases means managing the risk posed. Most people in this business would probably agree that where drinking water has been affected by a LUST release, or where vapor problems emerge, or where the dissolved plume does not appear to be stable, there is a clear risk to human health and the environment, and we should devote all necessary resources and effort to achieve a proper corrective action to address the problem.

But where a LUST release poses a low to negligible risk to human health or the environment, why require corrective action? (Of course, bankers, lenders, and property transfer issues add another dimension to the apparent simplicity of this concept, but that's another article.) The question remains: Do we want to do cleanups for cleanup's sake or do we want to prevent unacceptable risk to human health and the environment? Let us graciously acknowledge that there is also honor in making a decision against unnecessary or ineffectual corrective action.

And while the debates rage on, many would agree that natural biodegradation is occurring by default. One researcher claims that even at sites where engineered corrective actions have been installed, natural biodegradation is the dominant mechanism of contaminant mass reduction. At many low risk sites, perhaps no other response is necessary. But...will the public accept this approach? ■

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*Jim Lundy is a hydrogeologist who, until very recently, was with the Minnesota Pollution Control Agency's LUST Cleanup program. Jim has now moved over to the agency's superfund program. Jim would like to acknowledge that this article benefited from discussions with and review by Mitch Chiodi and Steve Thompson, both hydrogeologists with the MPCA LUST Cleanup program.*

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**LUST Investigation & Remediation**

# UST - Related Standard Development Under ASTM

The American Society for Testing and Materials (ASTM) is a large voluntary consensus standard development system, which has recently seen increased activity in the storage tank arena. ASTM serves as an organizational roof under which interested and knowledgeable parties gather to reach and document consensus on a particular system or process. Multiple small task groups are currently working on ASTM Standards under Subcommittee E-50.01 for Storage Tanks. Once successfully balloted, the resulting standards can be referenced in regulations and contracts.

It behooves UST-related regulatory agencies to review and, if interested, actively participate in the development of ASTM standards, so that the standards reflect environmental interests and are not surprises when finally approved. Interested parties may join ASTM (\$50.00/year) to receive and vote on proposals. Contact the group chair if you are willing and able to either actively participate or act as a peer reviewer for informal drafts as they are completed. For more information on subcommittee activities in general, contact ASTM's Rose Tomasello at 215/299-5487.

**The following UST-related ASTM standards are currently under development:**

- **Standard for Statistical Inventory Reconciliation (SIR) and its Evaluation**

*Purpose:* To develop a standard on what characteristics SIR methods should have, and how they should be evaluated to demonstrate performance.

*Chair:* Ken Wilcox, Ken Wilcox & Associates - 816/229-0860.

- **Standard for UST Internal Inspection Alternatives**

*Purpose:* To develop a standard on what characteristics methods should have in order to assess integrity of USTs for the purpose of upgrading.

*Chair:* Jim Bushman, Bushman & Associates - 216/769-3694.

- **Guide for Corrective Action for Petroleum Releases**

*Purpose:* To provide a logical, timely, and economical framework and general sequence for site assessment and remediation of subsurface petroleum releases. Also, to provide a model for streamlining regulatory processes. This draft standard is complete, and is going through final balloting.

*Contact:* Jim Rocco, BP Oil Co. - 216/586-6706.

- **Standard for LUST Risk-Based Corrective Action**

*Purpose:* To develop a practice for risk-based corrective action which is intended to standardize procedures for determining the level of complexity required for risk assessments and for interpreting the results in order to establish risk-based cleanup goals.

*Chair:* Dennis Rounds, South Dakota Petroleum Release Compensation Fund - 605/773-3769.

- **Standard for UST Accelerated Site Characterization**

*Purpose:* To develop a standard for the incorporation of field techniques into assessments of petroleum releases which result in site characterizations

that are relatively quick and cost-effective, yet adequately comprehensive to support critical corrective action decisions.

*Co-chairs:* Paul Perlwitz, Mobil Oil Co. - 703/849-6340; and Chet Clarke, Texas Natural Resource Conservation Commission - 512/908-2218.

- **(potential) Standard for UST Closure and Disposition**

*Purpose:* Interest in addressing areas in which there are currently no comprehensive standards or regulations. Initial efforts will be to develop a standard for the handling, storage, and disposal of a UST and its residuals upon removal.

*Contact:* Jim Rocco, BP Oil Co. - 216/586-6706

**Completed ASTM Standards on Site Assessment Practices**

- **E 1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process**, features the Phase I

site assessment process. It includes guidance on site reconnaissance, interviews with owners and operators, interviews with local government officials, data evaluation, and report preparation procedures.

- **E 1528, Standard Practice for Environmental Site Assessments: Transaction Screen Process**, is a companion practice that provides an

alternative approach to the conduct of an environmental site assessment of commercial real estate. It includes a Transaction Screen Questionnaire and a 3-section guide to assist in completing the questionnaire.

**To order these ASTM standards, contact the Customer Services Department, ASTM, 1916 Race St., Philadelphia, PA 19103. Phone: 215/299-5585.**



## LUST Investigation & Remediation

# Yes, Virginia, UST Cleanups Can Move Faster and Cost Less Breaking Out of That New Technology Catch 22

by Deborah L. Tremblay and Jay A. Evans



**T**o date, more than 220,000 leaking underground storage tanks have been identified nationwide—of these 170,000 cleanups have been started, while only 80,000 have reached completion. Each year, the gap widens as the number of cleanups started outpaces the number of cleanups completed. Also, cleanups can be very expensive, sometimes costing over \$1 million per site. What can we do to narrow this gap...to clean up sites more quickly and at less cost?

PART OF THE ANSWER LIES IN IDENTIFYING barriers to the use of alternative corrective action technologies that have the potential to clean up more contaminated sites in less time or at reduced cost. Traditional cleanup technologies have the advantage of being familiar, well-known processes, but they lack the promise shown by improved technologies.

So, if these alternative cleanup technologies are so good, why aren't they being used routinely? To answer this question, EPA recently queried state agencies, EPA regions, and cleanup consultants. The respondents were asked three questions: Which technologies are currently being used?; What are the barriers to wider use of improved methods?; and What do regulators and cleanup consultants need to overcome these barriers?

### What Cleanup Technologies are Currently Used?

Generally, states rely on traditional cleanup technologies. Contaminated soils are most commonly handled by excavation and disposal at a landfill or treatment facility. Contaminated groundwater is typically remediated by "pump and treat" methods, using extraction wells to pump groundwater aboveground for treatment.

Most states indicate that they are open to the use of alternative technologies and are using them to some degree. For example, many states report some success with soil vapor extraction and air sparging. Several states have also found that active bioremediation can achieve effective cleanups, particularly for relatively low levels of contamination.

Nevertheless, states report that traditional, off-site disposal or treatment methods are used at about 68

percent of all sites. On-site technologies, which only occasionally involve improved technologies, are used at about 32 percent of all sites. Overall, a very low percentage of sites are remediated using alternative technologies. Most states rely on traditional technologies for corrective action simply because they are familiar with them. Both regulators and UST owners tend to be conservative regarding newer technologies because they fear liability should the technology fail as a result of inappropriate use.

***Most states rely on traditional technologies for corrective action simply because they are familiar with them. Both regulators and UST owners tend to be conservative regarding newer technologies because they fear liability should the technology fail as a result of inappropriate use.***

### Why Don't Alternative Technologies Get More Attention?

EPA's study group identified several barriers to the use of alternative technologies: lack of performance data; lack of training for consultants; lack of training for state staff; lack of understanding of the technologies; and complex or time-consuming permit processes. The first four barriers boil down to a lack of information

about these newer technologies. People working with LUST cleanups need to know how alternative technologies work and how particular methods apply to site-specific situations.

Lack of information is a significant technology barrier and accounts for a general reluctance on the part of state staff to approve or promote newer cleanup methods. One respondent said that state regulators need proof that alternative technologies, such as active bioremediation, have performed successfully and cost-effectively before the state can approve their use. This reluctance on the part of states in turn discourages consultants and tank owner/operators from proposing their use.

### Overcoming the Barriers

State regulators and cleanup consultants have identified four types of products and services that they believe will help encourage more use of alternative technologies:

- Training, workshops, demonstrations, and conferences that illustrate the use of corrective action equipment and technologies for state staff and consultants.
- User's manuals that provide information on how each technology should be implemented and evaluated (e.g., step-by-step instructions and checklists). Case studies could be incorporated into this type of manual.
- Communication from states to consultants and tank owner/operators indicating agency willingness to accept the use of alternative technologies.

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• Assistance in streamlining projects so that administrative and oversight processes are simplified and more effective, especially in such areas as permitting, corrective action plan review, and information management.

### **EPA's Role in Breaking Down Barriers**

In questioning state agency personnel and cleanup consultants, EPA staff have gained a far clearer picture of what the Agency can do to help change attitudes concerning the selection of cleanup technologies. EPA has developed several projects to help regulators, consultants, and tank owner/operators make the best decisions possible when selecting remediation options. Some of these projects include:

- A cost guide that provides information on equipment costs for alternative technologies.
- A matrix that shows when alternative technologies can be used and how long each takes to attain cleanup levels.
- The continued sponsorship of nationwide demonstration projects

that show how alternative technologies work at specific types of sites.

- Workshops that match cleanup experts to site managers from several states. Participants will gather to discuss one specific technology and/or a common problem that each state wants to address.
- A manual that state regulators can use to evaluate and approve corrective action plans that incorporate alternative technologies.
- Educational outreach materials, such as fact sheets, training materials, and easy-to-use manuals on alternative technologies.
- To streamline administrative and oversight processes, EPA is promoting the development of state guidance and oversight systems that allow fast action on all sites, while focusing oversight only on those sites that pose the highest risks.
- EPA will help states use their financial assurance funds to speed up action at sites and reduce cleanup costs. This will involve educating state fund managers on improved technologies so that they can influence which technologies are used.

To protect human health and the environment from the hundreds of thousands of releases that require corrective action, EPA must help state and local agencies make the best use of alternative cleanup technologies. EPA must also encourage state and local agencies to streamline administrative and oversight processes so that it is easier to use these newer technologies. In turn, consultants and tank owner/operators need to be open to using technologies that have proven to be faster, more effective, or less costly. With cooperation from all of the players involved, our cleanup challenges can be met. ■

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*Jay Evans is an Environmental Protection Specialist with EPA OUST. He works on release detection, compliance inspection, and corrective action projects.*

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### ■ **Stop the World . . . continued from page 3**

"We want to pick some of these sites at random and see if the models are accurately predicting what contamination levels should be over given periods of time," says Gilberto Alvarez.

### **Pathways, Tracks, Tiers, Classes...Take Your Choice**

It's often very difficult for state programs to operate on a site-specific sliding cleanup scale: the process requires regulators to take risks and make decisions. In some ways, it's much easier for state agencies to establish a standard and require everyone to meet that standard. To operate on a sliding scale, you need to be sure that you are not being arbitrary and capricious.

"As a regulator you are held accountable for your decisions," says Alvarez, "and one bad experience can make you gun shy for the rest of your career. Even watching somebody else get burned on a particular decision can make you skittish.

"This is why a process with carefully defined decision points is so

important," explains Alvarez. "The ASTM Task Group has formulated a process that's available to states to adopt as part of their policy. I'm just not sure how many states are ready to accept it."

"There are several critical decision points," says Lund. "The first decision, from the standpoint of state regulators, centers on how much and what type of information they need early on in the assessment process so that they can determine how that site should be handled throughout the remediation process. Depending on what is known about a particular site in terms of risk and exposure, a state can establish different possible remedial paths or directions that a site might need to follow.

"State regulators have gained considerable experience over the years and are in a position to make up-front decisions on general categories of risk that sites fall into," Lund continues. "Each category could then follow its own specified path, or track, or whatever you want to call it. Then, of course, it's very

important that the state provide up-front guidance on what steps an owner or operator should take at their site for that particular category. This guidance should define goals for what a cleanup in that particular category needs to achieve, what information will be required, and at what points along the process the state would expect to hear from the owner or operator.

"For example," says Lund, "let's say a site comes in with information that puts it into, say, a 'class 2' category. The state should be able to provide the owner and the operator and the consultant with guidance on what has to happen at that site. If the site is a class 2, everyone understands what remediation track or path that site will take.

"It could be that at class 2 sites, natural bioremediation is the treatment of choice and that only monitoring and verification need occur. The point is," says Lund, "the guidance spells that out, so owners and operators and their consultants can go forward and do it, with or with-



out direct oversight from the state.

"It ties in with streamlining," adds Lund, "because the guidance is there and, ideally, you've trained your consultants so that they know what to do. Then, depending on the risk associated with the site, you'll give that site different levels of attention. It may come back in for a check at certain points, or it may not—depending on how the risk has been defined."

Using a tiered approach to evaluating and categorizing exposure and risk, ASTM is not alone in its effort to define a risk-based corrective action process. The American Petroleum Institute (API), a number of major oil companies, EPA, and several states have stepped back and looked at LUST site corrective actions in terms of the process. API has developed an "Exposure and Risk Assessment Decision Support System" (DSS) software package. Shell Oil Company and a number of other major oil companies have developed their own exposure/risk-based corrective action approach for LUST sites.

For many states, moving away from the one-track cleanup standard will be an evolving process, but changes are already in the works in many parts of the country. Texas, Massachusetts, Minnesota, Ohio, Wisconsin, California, Montana, and Hawaii have either initiated or are in the process of initiating risk-based LUST site cleanup programs and policies. The Texas Natural Resource Conservation Commission has recently adopted a "Risk-Based Corrective Action" program which establishes procedures for determining site priority categories that responsible parties must use to determine target cleanup levels.

The Massachusetts Department of Environmental Protection (DEP) has redesigned its cleanup program so that it "balances the need for certainty and flexibility by the regulated community with the needs of all Massachusetts citizens for timely and permanent cleanups which leave no significant risk to health, safety, public welfare, and the environment."

The Massachusetts DEP sees its redesigned program as a "roadmap" for conducting assessments and cleanups. Its guidance document describes the new process in terms of a highway, "with a variety of entrance and exit points, fast and

***The MA DEP describes its new process in terms of a highway ... "with a variety of entrance and exit points, fast and slow lanes, and signs to describe how releases will be identified and addressed with a level of DEP oversight that is appropriate for each site."***

slow lanes, and signs to describe how releases will be identified and addressed with a level of DEP oversight that is appropriate for each site." The program provides "off-ramps" at any point where DEP's standards for cleanup have been met, and establishes performance standards and "driving speeds" for moving through the process.

#### **No More Tears**

When things got out of control at the cake factory, Lucy just stood there and cried—as only Lucy could cry. But inasmuch as tears are inappropriate and fairly ineffectual behavior for the regulatory set, a proactive

"How are we gonna improve the process?" attitude might help alleviate a certain amount of the tension and frustration brought on by LUST site overload. There is little argument that as LUST sites pile up, many people involved in site cleanup will need to step back and regroup.

Now at this point, you might be saying, "Right, that's easy for you to say. It's not that simple." Indeed, nothing's all that simple, especially change...especially process change in government. But, as Jim Lundy points out in his article, "Beyond Cleanups for Cleanup's Sake," we need to ask ourselves "Why are we doing cleanups?" If it's to protect public health and the environment, need all sites be treated equally? Can we instead move these sites along more efficiently and effectively by using different risk-based tracks?

There are many more exciting topics associated with this risk-based exposure assessment theme that we really need to explore—things like, modeling to predict exposure; property transfer issues; land use and deed restrictions or "institutional controls" as an aid to reducing cleanup at appropriate sites; risk management; cleanup alternatives; field analytical techniques; or cleanup funds versus LUST programs. If you have some thoughts about all of this, let us know. ■

## **Do You Have Leak Detection? If you don't, read on...**

**All underground storage tanks and piping must have leak detection by December 22, 1993.**

New tanks and tanks installed before 1980 are already required to have leak detection. But as of the end of 1993 every federally regulated tank in America must have leak detection.

Owners and operators who have tanks and piping without leak detection can be fined. Having leak detection is a good business practice that keeps track of your product and helps you avoid the cost of cleaning up a leak. Most importantly, leak detection protects human health and the environment.

#### **There's help!**

You can call EPA's toll-free Hotline at (800) 424-9346 to ask questions about leak detection. You can use the same Hotline number to order a free publication on leak detection methods and basic federal requirements by asking for "Straight Talk on Tanks" (publication # is EPA 530/UST-90/012).



## LUST Investigation & Remediation

# Remediating Contamination in Fractured Media

## Is the Problem Slipping Between the Cracks?

by Robert W. Hillger

As the gap between the numbers of LUST sites identified by state UST/Lust programs and the numbers being remediated continues to widen, more and more cleanup technologies are emerging to help address the various cleanup scenarios and "streamline" the process as well. Many of these technologies are quite successful; if properly integrated, they can both achieve cleanup levels mandated by state programs and do the job more efficiently. There is, however, one cleanup scenario that is very much in need of attention—the remediation of contamination in fractured media. Needless to say, it "ain't easy" to streamline remediation and comply with cleanup standards when you're dealing with a problem that is rarely addressed and barely understood by most environmental contractors.

Fractured media, by definition, comprises those stratigraphic formations and/or bedrock that have a structured or random lattice of cracks and fissures that may or may not be interconnected. Many fracture systems transport groundwater and act as pathways for migrating plumes of contamination. Inasmuch as it is difficult to predict where these paths will take migrating plumes, much less to determine how to get at the contamination once you know where it is, these sites present significant cleanup challenges. For these reasons, perhaps, we rarely hear of new technologies for tackling some of the tough issues encountered during site assessments or of treatability studies for this kind of geology.

### Survey Indicates Nationwide Concern

To better understand this problem, the EPA Risk Reduction Engineering Laboratory conducted a national survey in November 1992. The survey consisted of a list of questions that focused on the technical issues associated with conducting site assess-

ments, corrective actions, and site monitoring at LUST sites with fractured media contamination. State UST/LUST program coordinators were asked to evaluate the relative importance of this issue in their state, to estimate the percentage of LUST sites with contamination in fractured media, to describe the most significant problems in remediating this kind of contamination, and to suggest what they need to help resolve the problem.

Thirty-seven state programs responded to the survey. Here are highlights of some of the most significant issues gleaned from the survey:

- In general, hydrocarbon contamination in fractured media was considered a significant problem in 8 of the 10 EPA Regions. It is a critical issue in Regions 1, 2, 3, 4, and 5.
- Efficient and timely protocols for site characterization and technology assessment are not widely available or generally understood by either contractor or regulatory agency personnel.
- A "field manual" that describes alternative treatment technologies applicable to fractured media is needed. The manual should provide the necessary guidelines for determining the best possible remediation approach and design criteria from pilot scale to field implementation.
- A method of cost/benefit analysis is needed to determine the value of both data collection (site assessment) and effective corrective action (site remediation). How do you determine if and when the benefit of site cleanup justifies the expense? Little or no data are currently available to answer this kind of question.
- Because of the complicated geology and groundwater flow regimes commonly encountered in fractured media, it is often difficult to determine the responsible party(s).
- Case study information on actual

*Fractured media, by definition, comprises those stratigraphic formations and/or bedrock that have a structured or random lattice of cracks and fissures that may or may not be interconnected. Many fracture systems transport groundwater and act as pathways for migrating plumes of contamination. Inasmuch as it is difficult to predict where these paths will take migrating plumes, much less to determine how to get at the contamination once you know where it is, these sites present significant cleanup challenges.*

field experiences or some kind of a national bulletin board to access technical information on the issue is needed.

- Professional geologists, hydrogeologists, and engineers with 5 or more years of "field experience" are needed to help state programs evaluate fractured media sites. It appears that there are not enough of these specialized professionals to go around.
- States suggest that workshop forums would be a useful means of addressing "real needs" in terms of training, protocols, guidance documentation, sharing technical expertise, and demonstrations.

### Those Lingering Questions

The issues identified in the survey separated out into the categories of site characterization, corrective action, and technology transfer. Here is a brief synopsis of the issues raised within these categories and suggested ways in which these issues might be addressed:

**Site Characterization**- Although documents describing methods and protocols for characterizing contaminated sites are available from several EPA research laboratories, they are not widely used or recognized as

available sources. (See EPA Technology Transfer Information on this page) Many survey respondents reported that they have difficulty in using available assessment techniques when the site indicates that there may be heterogeneous geology and complicated hydrogeology.

The EPA regions and the states requested the following kinds of site characterization assistance:

- Guidance in recognizing the likelihood of heterogeneous geology and/or anisotropic flow (flow in variable directions) in an area near a release. Failure to recognize heterogeneity or anisotropy is a common occurrence that often results in inadequate plume delineations and unsatisfactory site remediations.
- Site-specific examples and experiences that pertain to fractured media investigations.
- A "forum" or publication that deals with state-of-the-art characterization of fractured media sites.

**Corrective Action** - Little information pertaining to remediation of fractured media sites is available. Likewise, few studies have been generated that assess and evaluate state-of-the-art technologies that may be useful for remediating these sites. More often than not, any usable remediation data (e.g., protocols, design parameters) generated by cleanup contractors at waste sites generally remain confidential. In many instances, regional and state data are inaccessible because of the potential for future litigation.

The regions and states requested the following kinds of corrective action assistance:

- Critical assessments of technologies that are applicable to site cleanup, including effectiveness and costs.
- A database of "actual experiences" in remediating contamination in fractured media.
- Training.
- Information about and access to relevant literature.
- Research and development, including site demonstration projects, on new technologies to advance the state-of-the art and provide new tools to address the problem.

**Technology Transfer** - Both site char-

acterization and corrective action require the transfer of "critical" information to a wide variety of personnel. Data on fractured media site characterization and corrective action must be collected, interpreted, and compiled in a manner that will be useful in responding to many of the questions raised by the participants in this survey. The questions on this subject ranged from the theoretical (e.g., "Does Darcy's Law apply?") to those pertaining to standard operating procedure (e.g., "How can a representative soil sample be collected?") to those that may ultimately prove to be unanswerable (e.g., Is it really feasible to remediate fractured bedrock and, if so, can we justify the costs?).

Significant, practicable tasks which would assist in technology transfer include:

- Generating "user friendly" technical bulletins on technologies that have been successful in remediating fractured media.
- Designing a workshop to discuss

relevant issues and to initiate the development of appropriate protocols for site assessment/characterization and corrective action situations.

Remediation of contamination in fractured media is critical in cases where potable groundwater resources are at stake. Such cases generally drive the state-of-the-art in remediation technology forward. In many instances, however, it may be almost impossible to remediate sites in a cost-effective manner. These programmatic issues must be addressed on a site-by-site basis. In the meantime, EPA has a better understanding of the problems that state response personnel face in tackling the tough problems lurking in the cracks of fractured media at LUST sites. I hope that this insight will be a catalyst for new initiatives in this area. ■

*Robert Hillger is a Research Project Manager with the EPA Risk Reduction Engineering Lab in Edison, New Jersey.*

## EPA Technology Transfer Information

There are 3 ways in which you can receive and/or keep abreast of EPA's UST-related technological publications: the EPA Technology Transfer Newsletter; the Office of Research and Development's (ORD's) Publication Announcement; or by simply placing an order for specific information. Here's the scoop:

### Technology Transfer Newsletter

This semiannual newsletter lists titles and descriptions of printed publications that are available from the Center for Environmental Research Information (CERI). The newsletter provides interested parties, such as environmental decision makers, engineers, and federal, state, and local personnel, with access to the broad range of currently available technology transfer documents produced by ORD.

### ORD Publication Announcement

This quarterly publication lists titles of project summaries from ORD. Complete reports listed in this publication are available from the National Technical Information Service (NTIS).

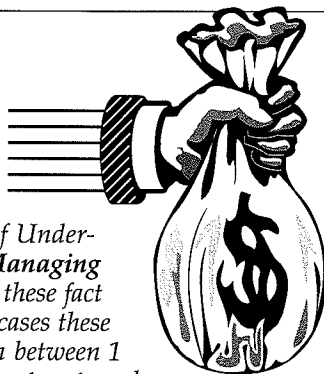
### Ordering Information

To order specific technical publications or to have your name put on one or both of the other two mailing lists, write:

U.S.EPA  
Center for Environmental Research Information  
ORD Publications Unit  
26 West Martin Luther King Dr.  
Cincinnati, OH 45268  
Phone: 513/569-7562 Fax: 513/569-7566

**LUST Investigation & Remediation**

# Controlling UST Cleanup Costs



In this issue of *LUSTLine* we conclude the series of fact sheets prepared by the EPA Office of Underground Storage Tanks on controlling UST cleanup costs. This issue includes **Fact Sheet #4: Managing The Process** and **Fact Sheet #5: Understanding Contractor Code Words**. The audience for these fact sheets is owners and operators who have little or no experience with remediating sites. In many cases these individuals are in Group 4 of the federal financial responsibility requirements—those who own between 1 and 12 USTs. The first 3 fact sheets were about: *Hiring a Contractor, Negotiating the Contract, and Interpreting the Bill*.

## Managing The Process

### Playing Your Part

When managing a site assessment or cleanup, you are both a supervisor and a customer. As a supervisor, you need to know how to get the best cleanup for your money. You can find this out by studying a copy of your state's UST cleanup regulations, which are available from your state UST or LUST program. Most states have a fund to help UST owners pay for cleaning up tank leaks. The fund is generally managed by a state fund administrator, who you should contact to see if you're eligible to receive these funds and to learn about other requirements (e.g., invoices).

As supervisor, you manage the contractor; don't let the contractor manage you. Your contractors should have demonstrated their understanding of state UST regulations during the bidding process. But by knowing the regulations yourself, you can ensure that your cleanup will meet state standards and increase your chances of payment from the state fund. You can help yourself even more by reminding the contractor to stick to the scope of work and by inspecting the site while work is being done as often as possible.

As a customer, you can expect work to be completed for the agreed upon price or some reasonable approximation of that price. Pay more attention to what's being done than to the rates being charged. Paying high rates for necessary work is more valuable than paying low rates for unnecessary work.

Keep an eye on tasks that contractors tend to overdo. Check with your state fund or UST program to see if it limits the following activities:

- Excavating and hauling soil
- Sending soil and water samples to

the lab for testing

- Installing monitoring wells

### Controlling Costs

As a supervisor and as a customer, you are responsible for keeping costs in line. When weighing the numbers:

- **Know** what the state fund for USTs will or will not pay for. Question the contractor on the need to perform certain tasks and on the prices for tasks.
- **Check** with your state UST program to see if it has a schedule of reasonable rates for standard site assessment and cleanup procedures.
- **Require** contractors to get your written permission to perform tasks not included in the scope of work.
- **Visit** the site regularly and question the need for on-site personnel and equipment, especially if they are not working. Make some unannounced visits.
- **Investigate** new methods for treating soil on-site as opposed to hauling it off-site for treatment or disposal. Your state UST program may have requirements about this.
- **Account** for all costs and services and get dates on all invoices. Your state fund administrator may need dated forms and invoices to process your request for payment.
- **Scrutinize** your bill with your contractor. Compare the prices for projected work with the charges for completed work; make sure everything is justified.
- **Make sure** expensive senior staffers aren't doing the work that less experienced staffers could perform (e.g., soil sampling). Ensure that staffers with the necessary skills are carrying out the work.

### Documentation

Ask the contractor to keep a daily log of activities that can be inspected

upon request. This protects you from being overcharged, and it provides information for the state fund administrator should questions arise about your claims for payment.

Require invoices on a regular basis. Sit down with your contractor and go over the first invoice to make sure you both understand what is required. Feel free to ask your contractor to justify questionable charges. The need for good detailed invoices can't be overstated.

And remember, the sooner a spill is cleaned up, the better. The longer you wait, the more the damage will spread and the more the cleanup will cost.

## Understanding Contractor Code Words

Here are a limited number of definitions that are often used by LUST site contractors. The definitions focus on cleanup technologies and terms associated with the chemical components of gasoline. This list does not include types of site investigation or cleanup equipment.

**Activated Carbon Adsorption** is a widely used method of cleaning groundwater. In it, particles of carbon are used to remove chemical compounds from water.

**Air Sparging** is a method of removing VOCs (see definition) from groundwater. Compressed air is forced through a well screen placed in the aquifer causing a bubbling effect in the groundwater. Contaminants in the groundwater are forced into the soils above the aquifer. These contaminants can then be removed by soil vapor extraction.

**Air Stripping** is a method in which groundwater contaminated with petroleum is mixed with air. The mixing process removes the dissolved petroleum from the water by

transferring it into the air. Local air pollution rules may prohibit using this method.

**Aquifer** is a water-bearing stratum (layer) of permeable rock, sand, or gravel.

**Bioremediation** is the natural process in which naturally occurring microorganisms (i.e., bacteria) break down petroleum products in the soil.

**Enhanced bioremediation** refers to the addition of microorganisms or chemicals to speed up the natural rate of breakdown of petroleum products in the soil.

**BTEX** is the abbreviation for Benzene, Toluene, Ethylbenzene, and Xylene, which are chemical compounds in gasoline. Site investigations often measure the amount of these compounds in soil and groundwater; as such, they are often called indicator chemicals.

**Free Product** is the petroleum product that resides in the spaces between soil particles or floats on top of the groundwater and is generally more accessible for removal or treatment.

**Groundwater** is the water within the earth that supplies wells and springs.

**Incineration** is the process of burning soils or sludges at a high temperature to destroy contaminants. Air pollution control devices are usually needed to comply with local or state regulations.

**In-Situ** means within place and is often used to refer to the location of activities (i.e., *in-situ* soil treatment).

**Land Farming** is a method of removing petroleum compounds from soils. Contaminated soils are removed from the ground, spread over a given area, and periodically tilled to speed up the release of VOCs and breakdown of the contaminants.

**Monitoring Well (Observation Well)** is a hollow, perforated cylinder inserted into a special hole or boring in the ground for the purpose of obtaining groundwater samples.

**MTBE** is the abbreviation for Methyl Tertiary Butyl Ether, which is a blending agent added to gasoline.

**Permeability** is the quality or the

■ continued on Page 17

## Field Notes

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

### What About the One Million USTs That Still Need to be Upgraded, Replaced, or Closed?

According to the figures we see and hear at PEI, there are about 1,400,000 petroleum storage tanks (actually a lot more if you count the unregulated tanks) still buried in the ground. We believe that some 400,000 of those tanks meet the federal rule that requires them to be protected from corrosion. That leaves nearly one million USTs that need to be either upgraded with cathodic protection, or replaced or closed by December 1998. We assume that sometime during the next 5 years, 3 of every 4 of the remaining unprotected tanks will be pulled and not replaced. That leaves 250,000 tanks to upgrade by 1998.

At first blush, producing and installing a quarter of a million tanks over the next 5 years appears to be well within the capacity of the industry. After all, that number breaks down to 50,000 tanks per year. During the late 1980s, the UST industry manufactured between 60,000 and 80,000 USTs a year.

But, as they say, that was then and this is now. Over the past few years, the UST industry has been manufacturing only a shade above 30,000 tanks a year, and that includes tanks for new facilities as well as replacement tanks. Furthermore, production is not expected to increase much until 1998 when a large segment of tank owners around the country attempt to bring their facilities into compliance.

It may very well be, if tank production stays the same and estimates of the UST population are correct, that tank manufacturers, distributors, and installers will be called upon to replace 100,000 to 150,000 tanks in 1998. By that time, it's highly unlikely that such a demand can be met, especially if orders are compressed into the last few months of 1998—as so often happens when people attempt to comply with regulatory deadlines.

In light of these figures, it has occurred to some of us in the equipment industry that EPA and the states would be well served to consider some financial incentives—and penalties—to persuade UST owners to upgrade and/or replace their USTs well in advance of the December 1998 deadline. Here are some ideas:

- Offer low-cost loan programs for new tanks but make lower interest rates time-dependent (e.g., increase interest rates as '98 approaches).
- Lower tank registration fees and state reimbursement deductibles if an owner's tanks have been upgraded.
- Tie-in state fund eligibility with upgrade status.
- Publicize plans to enforce the 1998 compliance deadlines.
- Emphasize the positive aspects of upgrading tank systems sooner than later. (*Editor's note: In the case of states with cleanup funds, it may appear that there are no positive aspects—it's cheaper to do nothing and let the fund pay for the cleanup. But in fact, if you upgrade sooner, you are less likely to have a leak in the first place, and your neighbors and the environment will be much better off for it. Also, the cost of upgrading will likely skyrocket in the late '90s. Thus, ever considering the time value of money, an earlier upgrade is cheaper than a last-minute upgrade.*)
- Send a poster (e.g., "Another Environmentally Responsible Tank Owner...") indicating that they have complied with federal/state upgrade requirement to UST owners who have upgraded their systems. ■

*If any states are embarking on upgrade incentive programs please let us know here at LUSTLine.*

## Leak Prevention

# Tank - nically Speaking

by Marcel Moreau

Marcel Moreau is a nationally recognized petroleum storage specialist whose column, *Tank-nically Speaking*, is a regular feature of LUSTLine. As always, we welcome your questions, opinions, and technical interests.

## How Empty Must A Leaking Tank Be For A Leaking Tank To Test Tight?

Not so long ago, there was one, and only one, kind of underground storage tank tightness test—a “precision test.” One criteria of the test was that it could “detect a leak anywhere in the complete underground storage tank handling equipment” (NFPA 329, 4-3.10.3, 1983 edition). Using the technology of the time, the test required that the storage system be filled “to a point above grade where volumetric measuring equipment can be used” (ibid., section 4-3.12.1). In those days, the only acceptable tank test was an overfilled volumetric test.

But, on September 23, 1988, all that changed. On that day, the federal rule redefined tightness test to mean a procedure that evaluates “any portion of the storage tank that routinely contains product” (40 CFR 280.43(c)). Because storage tanks are not routinely filled into the fill pipe, especially now that overfill prevention devices are becoming commonplace, the level of product in a tank that is being tested varies considerably. In fact, a quick scan of EPA Region 10’s list of certified leak detection methods (sixth edition, September 15, 1993) reveals that while most methods require the tank to be more than 50 percent full, a handful of volumetric tightness tests are certified for levels of 0 percent to 100 percent...Hmmm.

The issue of how full a tank should be when tested would be irrelevant if only tight tanks were being tested. The level of product in a tank doesn’t matter when you test a tank that’s not leaking. But what if the tank is leaking?

When a tank is leaking, the rate of liquid flow through a hole is proportional to the size of the hole and the pressure of the liquid at the hole. While it’s pretty obvious that larger

holes allow more liquid to flow through them than smaller ones, for some readers the effect of pressure on leak rates may be less obvious. So let’s take a moment to discuss the relationship between flow rate and pressure.

### Flow Rate and Pressure

The operating principle of a “super soaker” toy water gun is a good example of the relationship between flow rate and pressure. The super soaker works by pumping air into the gun’s water reservoir—the more you pump, the greater the pressure in the water reservoir, the faster the flow rate out the nozzle, and the farther the water shoots.

Diving to the bottom of the deep end of a pool is a pressure experience that is, perhaps, more familiar to most people. The deeper you go, the more the weight of the water above you exerts pressure on your body (and ears). The same would hold true if you plunged into a tank of gasoline (which you must never do!).

The point of these examples is that pressure increases with increasing depth of a liquid, and for that UST with a hole in it, the greater the depth of the liquid above the hole, the faster the liquid flows through the hole. When it comes to volumetric tank tightness testing, we can say that for a given size hole located near the bottom of the tank, the rate that a liquid flows through the hole will depend on how full the tank is.

Other factors affect the flow of liquid through a hole—the viscosity of the liquid and the porosity, permeability, and moisture content of the soil outside the hole—but let’s keep it simple and assume these variables have no effect.

How much does the leak rate vary with pressure? The diagram on page 15 is borrowed from a paper by

Detlev Hasselman, P.E. entitled “Let’s Get Some Reality Back Into Tank Testing,” presented at the California Underground Storage Tank Conference in San Diego. The diagram shows an 8-foot diameter tank buried 3 feet below grade with a hole in the bottom. If we do the math for a tank that has a leak rate of 0.1 gallon per hour (gph) when filled to grade with gasoline, we find that the leak rate diminishes to .072 gph when the tank is filled to tank top and to .036 gph when it is half full. The leak rate at 11 percent capacity is a minuscule .008 gph. Obviously, when the tank is empty the leak rate is zero. Herein lies the problem of testing tanks that are nearly empty: their leak rate is so slow that you are virtually assured that they will pass the test.

The point of this discussion is that the same tank that has a leak rate of, say, .15 gph when 95 percent full, a clear leaker by EPA standards, has a leak rate of .079 gph when tested at 50 percent capacity, clearly below the minimum detectable leak rate of 0.1 gph specified in the federal regulations. This means that in the real world, more tanks pass underfilled volumetric tests than overfilled tests. Inasmuch as underfilled tests also have economic and convenience advantages that make them very popular with tank owners, it stands to reason that many leaks are going undetected for longer periods of time.

Okay, these leak rates aren’t torrential by any standard. But, in the minimum interval between tightness tests (1 year) plenty of damage can be done. A leak of 0.1 gph adds up to 876 gallons per year. If the goal of tank tightness testing is to protect human health and the environment, overlooking leaks of nearly 900 gallons a year doesn’t make me feel warm and fuzzy. (And inventory



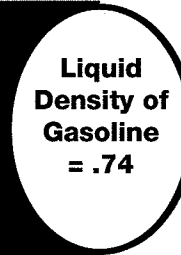
control hasn't a prayer of finding a leak of this size.) So, how did we get into this tank testing pickle?

### Leak Rate Roulette Can be Dangerous

The problem is that the federal definition of tightness test neglects to set a standard pressure at which to run a tightness test. In the absence of such a standard, tightness testers tend to lean toward doing what is convenient. Generally, it is more convenient to test a half empty tank than a nearly full tank.

The State of Maine used to require that all tightness tests be conducted with a standard 4-pound pressure at the bottom of the tank. This created a level playing field for all test methods in that all test methods would be attempting to measure the same leak rate in any given tank. Lobbying efforts have since removed this requirement from the rules.

## Effect of Liquid Depth on Tank Leak Rate

	Amount of Fill	Fill Height (Inches)	Bottom Pressure (PSI)	Equivalent Leak (GPH)
	(100% + 3')	130	3.471	.100
	(100 %)	94	2.510	.072
	(95 %)	85	2.270	.065
	(60 %)	55	1.468	.042
	(50 %)	47	1.255	.036
	(20 %)	18.7	.500	.014
	(11 %)	10	.267	.008

California has addressed the problem by defining the routine operating level of a storage tank as the "highest product level that occurred since the last tightness test" (LG-125, Oct. 23, 1992) and requiring that all tightness testing be conducted at least at this level. This requirement ensures that, during a tightness test, the leak rate (if any) will be of the same magnitude as the "worst case" leak rate since the last test for any given tank.

But, to my knowledge, most of the country is still playing leak rate roulette, gambling that the level at which a tank is tested will be sufficient to produce a measurable leak rate. So, next time you are tracking down the source of gasoline vapors in a storm drain, and your suspect tanks have all tested "tight," take note of how full the tanks were when they were tested, and ask yourself, "How empty must a leaking tank be for a leaking tank to test tight?" ■

## QUESTIONS, Tank-nically Speaking...

**Reader's Question:** "Why is it, if we are looking for 0.1 gph leaks, that tightness test methods fail tanks when the leak rate is .05?"

**Marcel's Response:** The short answer to this question is easy: "statistics." A more meaningful answer, however, requires considerable explanation. Let's begin by looking at what the EPA definition of tightness test did to improve the way we test tanks. The biggest improvement, as far as I'm concerned, is the performance standard that states that a leak of 0.1 gph must be detected with a probability of at least 95 percent and with less than a 5 percent probability of false alarm.

The 95 percent probability of detection means that if I were to test 100 tanks, each leaking at a rate of 0.1 gph, I would correctly identify 95 of these tanks as leakers. The 5 percent probability of false alarm means that if I were to test 100 tanks, each tight, I would incorrectly identify five of these tanks as leakers.

This introduction of statistics into tank tightness test results has introduced some confusion over why, if we are looking for leaks with a magnitude of 0.1 gph, tank testers declare a tank to be leaking when the measured leak rate exceeds a smaller number, usually something like .05 gph. To get our arms around this concept, we need to introduce some more terms, specifically the "minimum detectable rate" and the "threshold for calling a leak."

The **minimum detectable leak rate** is the regulatory standard for the smallest size leak that can be reliably detected. The federal rule has set this number at 0.1 gph, and this is the number that all tightness test methods must demonstrate they can detect in order to be certified.

The **threshold for declaring a leak** is a little more complicated to explain. When a volumetric test is performed, the result is expressed as a leak rate (e.g., .03 gph). If this leak rate exceeds a certain number (the threshold for declaring a leak) the tank fails the test. If, for example, a brand of tightness test has a .06 gph threshold for declaring a leak, and test results for a particular tank show a measured loss of liquid of .07 gph,

the tank would fail the test and be declared a leaker. The threshold for declaring a leak varies for different tightness testing systems but is typically around .05 gph. The threshold for declaring a leak for a particular brand of test can be found in the manufacturer's certification of test performance.

But why is the threshold for declaring a leak different from the minimum detectable leak rate? Measuring leak rate is difficult because the volume of product being monitored is usually large and changes in response to such factors as temperature, tank deformation, vapor pockets, and evaporation or condensation of the product in the tank. Because of these variables, there is always some amount of uncertainty surrounding measurements made during a tightness test. (See LUSTLine #15, "Rulers Lie...") Therefore, to be 95 percent sure of detecting that 0.1 gph leak, we call a tank a "leaker" whenever the measured leak rate gets close to 0.1 gph.

It's a matter of probability. Say, for example, you're driving through a small town that raises extra money

■ continued on page 16

by ticketing motorists—even if they're going a fraction of a mile over the 40-mph speed limit. Statistically speaking, if we drove through town at exactly 40 mph (as indicated by the automobile speedometer), we would probably be ticketed for exceeding the speed limit about 50 percent of the time because our speedometer is not perfectly accurate and is subject to measurement error.

If you want to reduce the probability of getting a ticket, you need to drive through town somewhat slower than 40 mph to allow a margin for error. But say you want to drive through town as fast as you can without getting a speeding ticket. If you know the amount of error in the speedometer, you can determine how close you can get to 40 mph and still be reasonably sure that you're not exceeding the limit.

So, you have the speedometer calibrated and find that it's accurate to plus or minus 10 percent of the indicated speed—if the speedometer indicates 40 mph, the actual speed is somewhere between 36 and 44 mph. No wonder you're getting tickets 50 percent of the time! Knowing the speedometer's margin of error, you can now drive through town at 37 mph (your actual speed is between 33.3 and 40.7 mph) and avoid getting tickets about 95 percent of the time. In this analogy, 40 mph is the detectable speeding rate, and 37 mph is the threshold for avoiding a ticket at the 95 percent confidence level.

Now, to see if you really understand all this, go out and explain it to an irate tank owner who's just been told her tank flunked a tightness test because the measured leak rate is .07 gph, even though the rule says we're looking for leaks of 0.1 gph. Let me know how you make out. ■

**P.S.** For those of you who would like a slightly more rigorous explanation of thresholds and minimum detectable leak rates, check out EPA publication 625/9-89/009 "Volumetric Tank Testing: An Overview." If you are really a stickler for detail, try EPA publication 600/2-88/068a, "Evaluation of Volumetric Leak Detection Methods for Underground Fuel Storage Tanks." Both documents are available for free from: EPA Publications and Information Center, 11029 Kenwood Road, Cincinnati, OH 45242.

## Leak Prevention

# Farm\*A\*Syst—Unregulated Doesn't Mean Unprotected

by Cindy Sanford

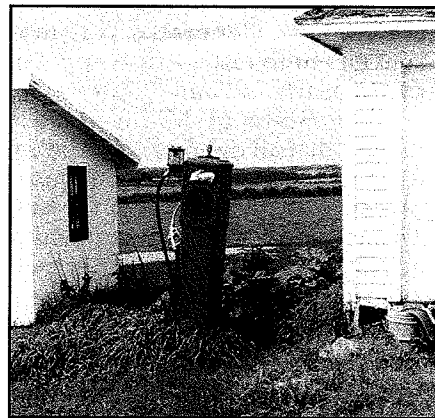
**Q**uality groundwater is the lifeblood of the rural community, providing nearly every resident with drinking water and supporting livestock operations on many farms. Yet many of the programs designed to protect groundwater quality do not cover private water wells. A new national program has been set in motion to help fill this gap. The Farmstead Assessment System (Farm\*A\*Syst) offers rural residents and farmers useful tools to protect their drinking water from petroleum leaks and spills and other potential threats. Currently, over 40 states are developing or operating Farm\*A\*Syst programs.

WITH THE ASSISTANCE OF TRAINED support staff, participating farmers and rural residents are asked to complete a series of ten self-assessment worksheets that cover such topics as petroleum product storage, wastewater treatment, and pesticide storage and handling. The worksheets include easy-to-understand rankings that help participants analyze the "risk level" of their practices. Once they've completed these risk rankings, which can be completed in a few hours depending on how many practices or facilities apply, the farmers work with the Farm\*A\*Syst staff to formulate a management plan to bring these risks under control. Farm\*A\*Syst programs are voluntary; the information derived from the worksheets is confidential.

The petroleum storage tank worksheet addresses both underground and aboveground storage tanks and may be adapted for home heating oil storage. Most unregulated USTs are aging single-walled steel tanks that are subject to corrosion. Many farmers have tanks that are more than 20 years old and often located close to, or upslope from their drinking water wells. Farm\*A\*Syst participants examine risks associated with spill and overflow protection, secondary containment, type of monitoring, tank closure, and the location of the tank in relation to the drinking water well.

### Small But Risky

"Farm\*A\*Syst studies show that petroleum storage and handling is the most frequent high groundwater pollution risk identified on farms," explains Gary Jackson, Farm\*A\*Syst's national director. "Once



*At least 30 years old, this farm UST has not been used for ten years. Note the leaning pump and proximity to buildings which will complicate removal.*

farmers learn about the environmental liability and the clean-up costs associated with leaking tanks, they are quite interested in improving their petroleum storage system. Unfortunately, many of those improvements are financially difficult for farmers, and currently no cost-share programs exist to help them with this problem."

EPA estimates that more than one in four USTs are leaking, but actual numbers are hard to come by. Farm petroleum storage tanks under 1,100-gallon capacity and home heating oil tanks are specifically exempted under RCRA. In a 1990 study of unregulated tanks, EPA recognized that unregulated tanks are as likely to release their contents—mostly petroleum products—as regulated tanks, but that owners of exempt tanks might be less likely to detect and report these releases.

Although exempt tanks outnumber regulated tanks more than two to one, EPA and other regulators are reluctant to expand regulations to cover these tanks, believing that owners don't have the expertise and



*Farm\*A\*Syst staff assessing aboveground tanks.*

money to meet regulatory requirements. Furthermore, the administrative and enforcement costs may be too great for states. Instead, many state agencies are relying both on educational and technical assistance programs to ensure proper tank management and on restrictions to address newly installed tanks.

In many ways, owners of unregulated tanks have higher stakes where groundwater protection is concerned than the gas station owner or convenience store operator with regulated tanks. For one thing, rural tank owners generally rely on private water wells for all household uses. If their petroleum storage tanks leak and contaminate the water supply, their health and the health of their families is at risk.

For example, in March, 1991, *Popular Science* magazine covered a story about an Ohio farmer who developed health problems similar to Parkinson's disease, which were linked to petroleum-contaminated water. The farmer, John Shilling, discovered a small hole that had rusted through a 575-gallon underground gasoline tank that had been abandoned on his property 40 years earlier. According to Shilling, "Every time the water table rose, gasoline leached into the wells that supply water to our home."

In addition to direct health risks, rural residents face potential liability associated with leaking storage tanks that can cripple family finances. "Posing more than a health hazard, a leaky underground storage tank threatens a family's financial well-being," says environmental attorney Richard Castelnuevo. "If there is a leak or an overflow, a property owner is obliged to pay for the cleanup even though the tank is unregulated. If groundwater becomes contaminated, cleanup may be nearly impossible."

One farm family in Door County,

Wisconsin has spent more than a year and \$200,000 trying to clean up a gasoline leak from an underground tank. The release involved both well water and soil contamination. The cleanup cost will easily exceed the value of the property.

USTs, regulated and unregulated, can also hold up real estate deals and disrupt the financing of property. Before closing on a deal, a purchaser wants assurance that any tank on the property is safe, which often means removal of the tank.

### Prevention Sense

The rapid growth of Farm\*A\*Syst demonstrates that self-assessments are a sound method for addressing pollution problems. Over the years many industries have gained experience in coping with environmental regulation and have successfully turned to self-assessments to protect against liability. In essence, Farm\*A\*Syst helps farmers and rural residents practice this same preventative medicine.

The national Farm\*A\*Syst office is currently developing a program on petroleum storage to train support staff at state Farm\*A\*Syst offices. The training program will be in a slide/tape format, so that the state Farm\*A\*Syst programs can alter it to accurately present information on programs and policies in their area.

Farm\*A\*Syst's national office is jointly supported and staffed by the EPA, the United States Department of Agriculture (USDA) Extension Service, and the USDA Soil Conservation Service. The organization publishes a bimonthly newsletter and has recently released a national directory that includes lead contacts for the state Farm\*A\*Syst programs and information on the status of each state program.

*For more information on Farm\*A\*Syst, contact: Farm\*A\*Syst, B142 Steenbock Library, 550 Babcock Drive, Madison, WI 53706, 608/262-0024. ■*

*Cindy Sanford is a Project Assistant with the National Farm\*A\*Syst Office*

### ■ Controlling UST Costs *continued from page 13*

state of being permeable (i.e., of having pores or openings that permit liquids or gases to pass through). Sandy soils are permeable.

**Plume** is often used to describe the shape of the contaminated area, which is usually elongated. **Delineating the plume** refers to the act of determining the boundaries of the plume.

**Recovery Well** is a well installed for the purpose of pumping contaminated water or free product from an aquifer for treatment. Recovery wells are generally larger in diameter than monitoring wells.

**Remediation** is the process of cleaning up contamination.

**Site Investigation** is the process of confirming that a release of petroleum product has occurred; it can involve determining the extent of soil and groundwater contamination caused by that release.

**Soil Borings** are holes drilled in the ground to determine soil structure and/or to monitor for the presence of contaminants in the soil.

**Soil Vapor Extraction** draws (with a vacuum pump) fresh air into the ground and brings toxic contaminants up to the surface where they can be treated and safely discharged.

**Soil Vapor Survey** is a method used to collect and analyze volatile petroleum hydrocarbons from subsurface soils. Vapor samples are collected from a borehole using a hand or vacuum pump and analyzed in the field.

**Soil Venting** is a method used to remove gasoline vapors from soils without excavation. This method can be performed passively with vents that are open to the atmosphere or actively with the use of pressure or vacuum pumps.

**TPH** is the abbreviation for Total Petroleum Hydrocarbons. The level of TPH can be used to determine the amount of contamination at a site.

**VOCs**, Volatile Organic Compounds, are carbon-containing compounds that readily vaporize (i.e., change from a liquid to a gas) at normal temperatures and pressures. ■

## Leak Prevention

# Tanks Down East

by W. David McCaskill

David McCaskill is a petroleum storage specialist with the Maine Department of Environmental Protection. **Tanks Down East** is a regular feature of LUSTLine. As always, we welcome your comments.



## Ghastly Tank Stories That Would Have Turned Out Differently With Secondary Containment Failures and Releases at New UST Installations

**T**HE ORDEAL IS FINALLY OVER. THOSE old bare steel tanks have been yanked out and carted away. You'd watched in horror while half your property was dug up and shipped off to a secure landfill. The new tanks are single-walled cathodically protected steel, the submerged pumps have line leak detectors, the piping is fiberglass, and the whole system is monitored by a picket line of wells. All you have to do is check the wells once a month and have the local tank testing company pressure test the lines once a year. You're settling back for another 20 years of selling gas and plodding through life's more mundane problems when...

In this installment of "Tanks Down East" I would like to tell a few strange but true stories involving new USTs installed after our initial tank rules that simply required leak detection, but prior to our current rules that require mandatory secondary containment with continuous monitoring.

I often ask myself, while reflecting on the virtues of secondary containment, "how would a new 'up to spec' tank fail?" There were the early problems associated with fiberglass reinforced plastic (FRP)—some of the tanks were cracking, especially under the tank ends, because of the lack of proper backfill support, and some experienced dipstick damage at the tank bottom under the fill pipe. But, new tank design, improved installation techniques, and the addition of striker plates have virtually eliminated these problems. Steel tanks, on the other hand, aren't as susceptible to support problems. They might fail because of corrosion caused by improper installation or a

manufacturing defect. But, here in Maine, we did have a cathodically protected steel tank fail...for no apparent reason.

### The Gash Story #1

The owner at this facility got a complaint from a customer who, after filling up his car, hadn't even left the gas station when his car quit. It didn't take long to figure out that something was wrong with the gasoline. Sure enough, when the USTs were checked, one was found to contain several feet of water. When the tank was removed, we found a 3-foot long hairline split in a welded seam along the bottom third of the tank. There was no evidence of improper installation, and the installer assured us that the tank had been properly air/soap tested above grade prior to installation.

The tank manufacturer was kind enough to double the owner's money back (in the form of a double-walled tank), but the jobber had to pay for extensive soil removal and free product recovery. Six years later, the problem is still there and a long-term groundwater extraction system has been installed. Then there are the legal ramifications—the owner sues the installer/jobber who in turn sues the tank manufacturer.

A similar failure occurred somewhere else in New England. It also involved a cathodically protected steel tank; again, there was no apparent reason for the failure. The moral of this story is, things happen, but you don't need to have a catastrophic failure. A double-walled

tank would have provided more structural protection and, if monitored properly, could have detected the leak long before someone's automobile gas tank did.

### Wrap Those Rascals Story #2

One day my inspection partner and I got the urge to skip a meeting and head out to look at some newly installed UST systems. We targeted a convenience store/gas station where the UST system had been replaced about 4 months earlier. The system consisted of single-walled FRP tanks and piping with submerged pump delivery.

This type of pressurized piping system has a pump located in the tank; product is forced up through the piping into the dispenser. EPA rules require that, in addition to the 0.2 gph leak detection requirement for tanks and piping, pressurized pumps be equipped with a line leak detector that monitors for gross leaks, greater than 3 gallons per hour. This "gross" leak detection requirement was imposed on pressurized piping systems because, under pressure, they can release a lot of product over a short time. Thus, when the line leak detector senses a large leak, it greatly reduces the flow of product to the nozzle. The customer then complains and the operator is, thereby, alerted to the possible leak.

As part of our inspection we, of course, looked for the line leak detector, which is located on the pump manifold which is in turn mounted on top of the tank. To access these manifolds, one must look into a manhole pit which is often guarded

by impossibly heavy metal covers that must be painstakingly pried open through the precise manipulation of two screwdrivers. (Thankfully, new manhole cover designs include user-friendly lifting handles.)

I popped the top on one manhole at this site and was greeted by a heady whiff of BTEX compounds. There is usually some residual soil contamination in these pits from routine maintenance, but this odor was beyond residual. I told my companion that we had a problem here and suggested that he check the monitoring wells. They happened to have some here even though they weren't required for this site.

Each of the 4 wells surrounding the tanks had a 3- to 4-inch layer of product on top of the groundwater. As a customer started to fill up at this pump, product came squirting out of the pump manifold—just like one of those “super soakers”—right before our eyes. A maintenance person was dispatched and, upon inspection, found that the gasket in the “functional element” was torn and had caused the leak. Five hundred gallons of product was pumped from these monitoring (turned recovery) wells. This facility was not doing proper inventory control so the leak would have continued for a long time if my partner and I hadn't been mysteriously drawn to the site.

The moral of this story is that line leak detectors monitor for leaks downstream in the piping, but they don't detect leaks upstream in the manifold itself. This component of the pressurized piping system is not protected against gross leaks as intended by the federal UST rule—an oversight of the rule I would say. It seems to me that secondary containment is the only technically feasible way to achieve complete leak detection on a submersible pump manifold.

### Story #3

A station operator called our field response office one day to report that his daily inventory showed a loss of 1,200 gallons over the course of 3 days. Upon investigation, we opened the submerged pump manholes and found leakage around some of the line leak detector top bolts, along with a lot of contaminated soil. (A few years ago there was a run of faulty line leak detec-

tors that were springing leaks around the top bolts.) This time the daily inventory did its job—sort of—but there was still a lot of gasoline to clean up. The moral of the story is that it's really important to keep good daily inventory records, but secondary containment with continuous monitoring would have really helped minimize the damages.

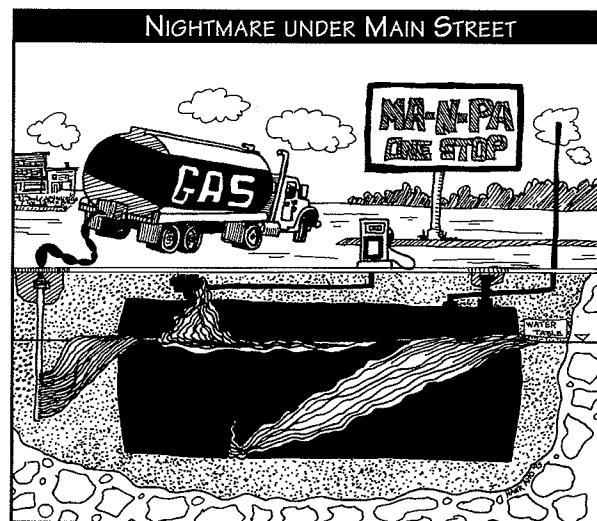
### Story #4

We had another situation where the station owner had the presence of mind (and the money) to install secondary containment when it wasn't even required. He also made a practice of visually checking his submerged pump containment sumps even though they were equipped with continuous leak detection (i.e., float switches). This float switch would lift up if there was an inflow of liquid and activate an alarm. During one of his monthly inspections he found some 5 gallons of gasoline in the piping sump. It was another faulty line leak detector bolt. The line leak detector was leaking around the top bolts and the float switch in the sump had jammed so that the alarm couldn't activate.

This is a scary story, because the owner had secondary containment with leak detection and things still went wrong. Life isn't always perfect. The heart-warming part of the story is that because of the owner's conscientious eyeball and investment in secondary containment, he was spared the heartbreak of a cleanup. The moral to stories 2, 3, and 4 is don't have submersible pump manifolds in an open manhole pit—wrap those rascals up in a liquid-tight container with leak detection AND perform periodic visual checks.

### Down the Wrong Pipe Story #5

My last ghastly story is a commentary on both strange behavior and the notion of using monitoring wells as a leak detection method. Most UST regulators have had at least one incident where a UST monitoring well was topped off with product. There were two such cases in Maine,

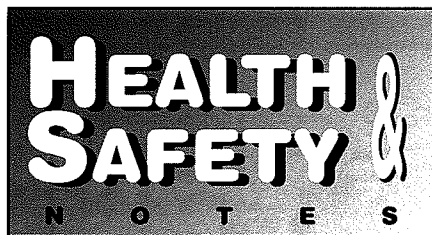


where, in each case, approximately 1,600 gallons of fuel oil was pumped into the wells—a tribute to the permeability of the nice granular backfill used in the tank excavation.

Now, with proper labeling these traumatic ordeals could have been avoided. To make sure that the right product is put in the right place, the American Petroleum Institute (API) established a fill port code system comprised of colors and symbols; a black triangle is the symbol for monitoring wells. That symbol and the words “Monitoring/Observation Well Do Not Fill” should be stamped on the well cover and the cap.

But fill port codes aside, the whole idea of installing a direct conduit (a monitoring well) into the groundwater in the very area where product is routinely handled and likely to spill is somewhat paradoxical. (If only they'd had secondary containment with continuous monitoring instead.) Unless a well is properly sealed, spillage can easily find its way right into the monitoring well. Bentonite (a modified expansive clay) and concrete are generally used to seal wells from surface contaminants. However, most of the bentonite seals that I have seen around UST observation wells have been improperly compacted and hydrated. The end result kind of looks like someone lost his or her oatmeal breakfast.

So, keep in mind, creepy things do happen in the hidden world of USTs—not all that often—but it only has to happen once at your site to make you wonder how you could have avoided the problem—perhaps by taking nothing for granted, not even that brand new UST installation. ■



## CONFINED SPACES KILL!

### What Does OSHA's New Permit-Required Confined Spaces Final Rule Have to do With USTs?

by Matthew E. Fitzgerald

*Let's get one thing straight right from the start: entry into an underground storage tank is entry into a confined space and is, therefore, covered by OSHA's permit-required confined space entry standard (PRCS), 29 CFR 1910.146.*

THE EFFORT TO PROMULGATE A standard for entry into a confined space is almost as old as the Occupational Safety and Health Administration (OSHA) itself. It has taken seventeen years for OSHA to publish its final rule for confined space entry; the rule was published on January 14, 1993. The standard, which became effective in April, contains "requirements for practices and procedures to protect employees in general industry from the hazard of entry into permit-required confined spaces," and affects some 240,000 businesses—including businesses involved in entering underground or aboveground storage tanks.

When tank removal, repair, or installation activities involve entry into a tank, they are covered by the standard. Why? Because OSHA considers any entry into a storage tank to be a *general industry operation* regardless of the reason for entry; therefore, general industry standards apply, including the confined space standards. The actual removal or installation of a tank is considered a *construction operation*, and is subject to OSHA's 29 CFR 1926 standards (Construction Industry Standards).

#### OSHA's New Standard Saves Lives

The hazards of confined space entry are real. The procedures and provisions required by OSHA are designed to mitigate those hazards, and, as OSHA suggests in the preamble discussion of the case examples cited later on in this article, compliance with the Permit-Required Confined Space Entry Standard, "would have prevented the deaths and injuries cited in these examples."

Let's begin our discussion of the standard by defining some terms. A "confined space" means a space that:

- Is large enough and so configured that an employee can enter and perform assigned work;
- Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits that have limited means of entry); and
- Is not designed for continuous employee occupancy.

When applying this OSHA standard, the term "permit-required confined space" or "permit space" means a confined space that has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere,
- Contains a material that has the potential for engulfing an entrant,
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section, or
- Contains any other recognized serious safety or health hazards.

For the standard to be applicable, the space must meet not only the characteristics of a confined space but also at least one of the characteristics of a permit-required confined space. USTs meet both definitions and any entry into them must be made in accordance with the requirements of the standard.

The standard requires employers to evaluate their workplaces, identify permit spaces, limit unauthorized access, train workers who will be expected to enter those areas,

and develop a permitting procedure to ensure safe entry into permit spaces.

#### 3 Ways Confined Spaces Kill

Before we discuss the confined spaces entry standard, it's important to highlight just how dangerous confined spaces can be. There are several examples of accidents that involve confined space entry in the preamble of the standard; these examples help to explain why OSHA decided to regulate confined space entry the way it did.

First, there are three basic ways confined spaces kill:

- 1) By depriving the body of oxygen (i.e., the atmosphere in the tank has insufficient oxygen to support life);
- 2) By the toxic action of a component of the confined spaces atmosphere; or
- 3) By engulfment (by a flammable or explosive atmosphere).

The following examples from the preamble to the standard illustrate these three types of hazards.

• **Fatalities in asphyxiating atmospheres** - OSHA uses the terminology "asphyxiating atmosphere" when referring to an atmosphere that contains less than 19.5% oxygen—below this level there is not enough oxygen to supply an entrant's respiratory needs when doing physical work.

**Example #1** A worker in Oklahoma prepared to enter a molasses tank. (OSHA didn't have any UST examples in the preamble, but it's the same principle.) The atmosphere hadn't been tested and no respirators, retrieval lines, or harnesses were provided. Following a long-standing practice at the molasses company, employees removed the

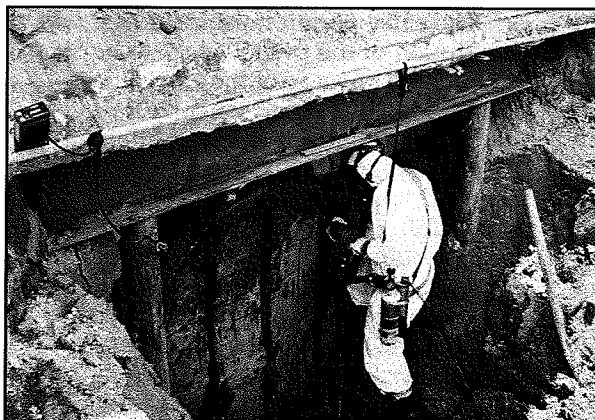


tank lid and allowed the tank to "ventilate naturally" for several hours before entering. No testing of the tank's atmosphere had been undertaken. The first entrant reported feeling ill as soon as he entered and collapsed almost immediately. Two standby workers, as required by the plant's "procedure," entered to rescue him. Each worker collapsed after saying he felt dizzy. All three employees died.

• **Fatalities in toxic atmospheres** - The term "toxic" refers to atmospheres containing gases, vapors, or fumes known to have poisonous physiological effects. The toxic effect is independent of the concentration of oxygen. The most commonly occurring gases are carbon monoxide (a by-product of combustion) and hydrogen sulfide (a by-product of anaerobic decomposition of organic matter).

**Example #1** A foreman and a worker entered an unventilated sewer in Arizona to refuel a gasoline-powered pump. The sewer atmosphere was not tested, and the employer provided no procedures or equipment for rescue. The worker was overcome by carbon monoxide and died. The foreman managed to escape and call the fire department for help. A "passerby" tried to rescue the worker and was also fatally overcome. As a result of this single incident, thirty firefighters and eight co-workers were treated for carbon monoxide poison.

**Example #2** An employee entered a solvent storage tank to remove toluene residues. The employer had rented a self-contained breathing apparatus (SCBA) for this entry and showed the employee how to use it. But again, the tank atmosphere had not been tested, and provisions had not been made for rescue. The employee was provided with a length of rope for his descent into the tank. However, because the employee couldn't fit through the tank's opening while wearing the SCBA, the employer decided to lower the SCBA to him (using the same rope) after the employee reached the bottom of the tank. After entry, the employer lowered the SCBA, but the worker collapsed before he could put it on. The city fire department was called in to help.



Worker entering UST located under an existing building. In this example, entry was necessary to remove remaining product and sludge. Entrant is wearing protective clothing, including an airline respirator with a 5-minute egress bottle. A retrieval line is attached to the airline.

John Beaudry, Occupational Safety Training Inc.

The firemen who responded to the call also could not enter the tank while wearing the SCBA—because of the small opening. They decided that the only way to rescue the victim was to cut open the tank. Despite precautions taken by the firemen during the cutting of the tank, the toluene vapor in the tank ignited. The explosion killed one fireman and injured 16 others. Later, investigators determined that the entrant was dead before the explosion occurred due to the toxic effects of the toluene.

• **Fatalities due to flammable or explosive atmospheres** - In OSHA terminology "flammable or explosive atmosphere" refers to an atmosphere that poses a hazard because flammable gases, vapors, or dusts are present at a concentration greater than 10 percent of the lower flammable limit.

**Example #1** Workers at a refinery were cleaning a large storage tank. Since it had last been cleaned, the tank had been used at various times to store gasoline, gas oil, and light and heavy crude oils. The employer expected that the tank would contain residues from these liquids.

Employee accounts indicated that management had originally followed permit procedures, but that permit requirements were generally ignored the day of the incident. For example, though it was known that the work could generate a flammable atmosphere and that only explosion-proof lighting was allowed where a flammable atmosphere could exist, only two of the twelve lamps illuminating the inside of the tank were

explosion-proof. No life lines were available and no atmospheric monitoring was done.

Five employees were in the tank when it exploded and burned briefly. The workers outside the tank were unable to help them. The fire burned out in just seconds, but by then four of the workers were dead. The fifth entrant died of massive respiratory injuries several days later.

## Pinpointing Dangerous Areas

The first section of paragraph (c) of the standard states that employers are required to evaluate their workplaces and identify any permit spaces. Danger

signs which read "**DANGER - PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER**" must be posted, and access to all permit spaces must be limited. If an employer decides to allow employees to enter permit spaces, that employer must develop a program for permit space entry.

There are some permit spaces that may be entered without meeting all of the provisions of the standard. The requirements to meet this exception are in paragraph (c)(i), and the procedures for entry are in paragraph (c)(ii). For the purposes of this article, I will highlight the requirements of the standard, not the exceptions to it. For further clarification of the exceptions, refer to the standard, codified as 29 CFR 1910.146.

## Confined Space Hazard Prevention and Mitigation Program

Paragraph (d) of the standard requires a "permit-required confined space program." During the past 10 years, OSHA has taken a programmatic approach to the mitigation of safety and health hazards. This approach requires that businesses develop and institute a systematic, pre-planned, and integrated program that addresses all aspects of the effort to mitigate a particular hazard. The elements of the permit-required confined space program (PRCSP) include developing procedures for preventing unauthorized entry, identifying and evaluating hazards before entry, and instituting safe permit space entry operations.

As part of the PRCSP, employers must provide and maintain: testing and monitoring equipment;

■ *continued on page 22*

ventilating equipment (when needed to obtain acceptable entry conditions); communications equipment (so person in tank can communicate with attendant outside tank and vice versa); personal protective equipment (insofar as engineering and work practice controls do not adequately protect employees); lighting equipment; barriers and shields; rescue and emergency equipment and any other equipment necessary for safe entry.

The employer must evaluate space conditions before an employee enters the space and monitor the conditions in the space periodically during the entry operation. When testing for atmospheric hazards, the employer is required to test for oxygen content first, then for combustible gases and vapors, and then for toxic gases and vapors. Appendix B of the standard has further guidance on procedures for atmospheric testing in confined spaces.

The employer must supply at least one attendant outside the permit space during the entire entry operation. The different roles played by participants in a confined space entry team (i.e., entrant, attendant, entry supervisors, and person who monitors the atmosphere) must be addressed and clearly defined in the PRCSP. The PRCSP must also include procedures for: summoning rescue and emergency services; preparation, issuance, use, and cancellation of entry permits; coordinating entry team members of different employers; concluding the entry after the operation is complete; and review of entries and revision of the program based on experience.

### Permit System

Paragraph (e) requires that employers develop and implement a permit system before entry can take place. The permit system is a self-certification process which provides written documentation that all the requirements of paragraph (d) have been met before entry is allowed. Appendix D of the standard has examples of permit forms that may be instructive in building a permit system. When the operations described in the entry permit have been completed the entry permit must be canceled (signed) by the entry supervisor. The employer must maintain each canceled entry permit for at least 1 year.

The entry permit must include: a description of the permit space to be entered; the purpose of the entry; the date and authorized duration of entry; the authorized entrants, attendants, and entry supervisor; the expected hazards; control measures; acceptable entry conditions; monitoring results; rescue and emergency personnel to be summoned; communication procedures; equipment to be used; and any additional information or permits that may be necessary to ensure a safe entry operation.

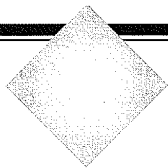
The employer is required to train all employees involved in confined space entry procedures so that they "acquire the understanding, knowledge, and skills necessary for the safe performance of their duties (pertaining to confined space entry)." Training must be supplied to each employee before his or her first assignment to confined space activity, and whenever there is a change in that employee's assigned duties regarding confined space operations. The employer is required to certify that each employee has been trained by maintaining a certification form for each individual.

### Duties

Paragraphs (h), (i), and (j) of the standard spell out the duties of the authorized entrants, attendants, and the entry supervisors, respectively. The duties entail knowing the hazards involved, using equipment properly, communicating with other members of the entry team, and being aware of any changing conditions in the space. The attendant must maintain a continuous and accurate account of the entrants by monitoring the conditions inside the space to determine if it is safe for entrants to remain inside. The attendant may order the entrant to evacuate the space. The entry supervisor terminates the entry permit when operations are complete.

### Emergencies

Paragraph (k) of the standard covers rescue and emergency services. The employer may train and equip emergency services in-house or may call in outside assistance. If outside emergency responders are used, the employer must inform the rescue service of the hazards they may encounter and provide the rescue



## Interactive Video Training Course for UST Inspectors and Workers Now Available

To help UST inspectors and workers meet EPA and Occupational Safety and Health Administration (OSHA) requirements for health and safety training, EPA's Office of Underground Storage Tanks (OUST) worked with the Industrial Training Corporation (ITC) to design and produce an innovative new training course, *Health and Safety Training: An Interactive Video Training Course for UST Inspectors and Workers*. The course teaches workers to recognize, evaluate, and control hazards at UST work sites, and details safe work practices.

*UST Health and Safety Training* can be run on a variety of interactive video systems manufactured by several major companies. The distributor of this course, ITC, supports specific types of equipment. The equipment required to run the program includes:

- IBM PS/2 or Ultimedia Systems with M-Motion or DVA-4000 Cards, touch screen monitor, and Pioneer laser disc player, or
- DVA-4000 Upgrade kits, touch-screen monitor or mouse, and laser disc player (Upgrade kit for AT or PS/2 computers).

OUST has distributed one interactive *UST Health and Safety Training* program to each EPA Regional Office and to EPA's Edison and Cincinnati laboratories. For a limited time, federal, state, and local government agencies will be able to purchase the courseware from ITC at cost. For additional information on the course, its content, the equipment needed to run it, or to purchase the

### What is Interactive Video?

Interactive video combines computer, laser disc, and touch-screen computer display technologies to create an effective teaching system. The system can access full motion video images and sound tracks, create computer graphics, ask questions, and score responses. By using a touch-screen display or a mouse, the system eliminates the need for keyboard and computer expertise. The student can literally control the course at the touch of a finger.

service with access to all permit spaces so that they can prepare appropriate rescue plans before a confined space entry operation takes place.

The standard calls for retrieval systems to minimize the need for entry rescue. This entails the entrant's wearing a body harness with a line attached to his back. For vertical permit spaces greater than 5 feet deep, a mechanical device must be attached to the entrant's line to aid the attendant in removing the entrant from the space.

Emergency planning is a critical element of the overall PRCSP, because, as highlighted in the examples, many times confined space tragedies are compounded by well meaning but ill prepared rescuers. Indeed the National Institute for Occupational Safety and Health (NIOSH) has estimated that some 60 percent of the deaths that occur in confined spaces happen to individuals who entered the space to rescue someone else.

### It's Worth The Effort

Although it was a long time coming, this standard was worth the wait. To some, the requirements may seem too detailed and burdensome; however, the standard really boils down to common sense and lessons learned from previous tragedies. If a requirement doesn't make sense to you, go back and re-read the real life examples. See how differently those stories might have ended if that particular requirement had been put into practice. There is no more powerful justification for the standard than knowing that had its requirements been followed, the deaths in the examples would not have occurred.

This article is intended to give the reader a broad overview of the standard, but in no way is it meant to serve as a health and safety reference for professionals involved in confined space entry procedures. To obtain a copy of the standard please call OSHA's Office of Publications, which can be reached at 202/219-4667. ■

*Matthew Fitzgerald is a Senior Industrial Hygienist with Sciencetech Inc.. For the past two years he has worked exclusively on hazardous waste issues in OSHA's Office of Health Compliance Assistance. See "LUSTLine" Bulletins 16 and 17 for other health and safety articles by Mr. Fitzgerald.*



## Streamlining

# Climbing Out of the LUST Bog

## Creative Thinking and a Commitment to Change Put New Hampshire's LUST Program Back on Track

by Lynn A. Woodard and Harry T. Stewart

"TOTAL QUALITY MANAGEMENT" ("TQM"), "Streamlining"—these concepts seem to crop up in just about every EPA program document that comes across our desks. Conceptually, the idea of streamlining the bureaucratic quagmire sounded terrific, but in our business, daily crises tend to get in the way of good ideas. In the spring of 1991, however, our skepticism gave way to raw necessity when it became clear to us that limited resources and the monumental task of trying to cleanup large numbers of leaking underground storage tank (LUST) sites would require some creative thinking and a commitment to change.

That spring, LUST Program Managers with the New Hampshire Department of Environmental Services (NHDES) realized that, with all the underground storage tank (UST) closures throughout the state, we were racking up LUST sites at a rate faster than the program, as managed at that time, could handle. Backlogs for LUST site technical reviews were at 22 months. Furthermore, an increasing amount of staff time was spent "putting out fires" rather than addressing real long-term priorities. One explanation for this dilemma was that there simply was not enough staff to handle the workload. Although more staff was needed, some kind of change in the way we were doing business was also called for.

In 1991, EPA Region I designated a portion of its contractor support money to assist its states in streamlining their UST/LUST programs. NHDES took advantage of this offer and was assigned an EPA contractor. The rest, as they say, is history.

### The Analysis

Our first streamlining step was to have a meeting between NHDES Program Managers, the Region I

State Coordinator, and the EPA contractor. Our agenda was to develop a flow chart of the state's LUST corrective action process. As part of the process, the Program Managers discussed their understanding of the roles of their programs and the inter-relationships between the programs. Not surprisingly, the Program Managers had differing views as to how all the "pieces of the puzzle" fit together.

After several iterations, we developed a LUST Corrective Action Process Flow Chart, which accurately described the process from site discovery to closure. By doing this, we were able to analyze each piece of the process to determine the "weak links" or places where streamlining would be most effective.

Next, the EPA contractors interviewed the "experts," the program staff who actually do the work. Project Managers (PMs) were asked (after being assured total anonymity) to identify the barriers in the corrective action work process and to propose solutions.

The EPA contractor reviewed a number of NHDES project files to understand and identify significant technical and procedural issues which might also be barriers to a smooth and efficient flow of work. During the file review, the contractors looked at items such as technical report content and format, investigation and remedial methods proposed by consultants and contractors, permitting requirements, NHDES approval procedures, and decision-making processes. This analysis led to the identification of five improvement target areas:

- **Technical Review Backlogs** - The backlogs for NHDES reviews of technical submittals (including

■ continued on page 24

reports and work scope/budget proposals) on "low priority" sites was 22 months in 1991. This situation meant that the NHDES review process was often the greatest bottleneck in the process of getting a site to remediation and closure. With the availability of the State Reimbursement Fund, owners who might have been willing to move forward with cleanup could not because of the state's review process.

• **State Reimbursement Fund Backlogs** - Backlogs for review of reimbursement requests from the Oil Discharge and Disposal Cleanup Fund (State Reimbursement Fund) exceeded 6 months. As a result, contractors were reluctant to move forward with cleanups for facility owners who were "cash poor." Cash flow from the State Reimbursement Fund was controlling the rate of cleanups.

• **Consultant Reports** - According to NHDES staff, many consultant reports and other submittals did not meet NHDES requirements, which significantly increased both review time and the number of reviews per site. NHDES staff perceived that the inadequate reports, in many cases, resulted from a lack of understanding by consultants of NHDES requirements and expectations.

• **Lawyer Involvement** - Because of the complexity of the site remediation process and the risk of enforcement procedures, lawyers were heavily entangled in the process. This involvement often delayed cleanups and increased total project costs because the focus on limiting liability often conflicted with site evaluations for remediation.

• **NHDES Staff Training** - Staff felt they needed additional training in such areas as remediation technologies, negotiation techniques, project management, and program management.

### Implementation

To address the issues raised, NHDES implemented the following program improvements over the last 2 years:

• **Statutory, Regulatory, and Policy Changes** - The following changes in existing statutes, regulations, and policies were undertaken:

- Laws governing the State Reimbursement Fund were changed to clarify language and facilitate accessibility by UST facility

***In the final analysis, our streamlining efforts have sharpened our focus on communication among all parties involved in the LUST corrective action process.***

owners. These changes helped ease the perception that enforcement action by NHDES was a significant risk to facility owners. This action, in turn reduced the amount of legal involvement in the remediation process.

- State Reimbursement Fund regulations were modified to clearly define eligible expenses.
- State Groundwater Protection Rules were revised to better explain the corrective action process and update groundwater cleanup standards.
- The NHDES Virgin Petroleum Contaminated (VPC) Soils Policy was modified to provide for certification of sites with virgin petroleum-contaminated soils to eliminate unnecessary analytical work and to allow *in-situ* soils sampling for characterization of VPC soils for off-site disposal when local conditions prohibit stockpiling.

• **Staff Education and Training** - Staff training improvements were pursued in the areas of remediation technology, negotiation, and project management. Several specific elements of this program are listed below.

- Staff attended a 1-day seminar on bioventing.
- A "technology transfer" program was established so that NHDES staff who had attended technical training seminars were given the opportunity to share their acquired information and skills with the rest of the staff. As part of this program, equipment vendors are occasionally asked to make presentations at "brown bag" luncheons.
- To increase staff negotiating skills, a private contractor was hired to provide a short course, "Negotiate to Win." This course helped staff become more oriented towards creating a "win-win" situation

when negotiating with the regulated community.

- EPA Region I provided a 1-day training seminar on TQM to both the UST and LUST program staffs.

• **Organization and Procedural Changes** - To simplify and streamline the organization and management of the LUST program, NHDES implemented the following changes:

- The State Reimbursement Fund "check cutting" procedure was reorganized to decrease the amount of time required to issue a reimbursement check after approval by the Oil Fund Disbursement Board (OFDB), a board established by statute to administer the Fund.
- LUST Project Managers were placed under one (instead of three) Program Manager to create a sense that PMs are part of a program team and to promote internal consistency in technical reviews and policy decisions.
- A strategy for reducing the backlog of low priority sites was developed. Individual components of the backlog were addressed one-at-a-time and in the order of: reimbursement requests, work plan/budget reviews, and technical reviews. This order was based on recognition that: (1) cleanups at sites owned by small facility owners are limited by cash flow (most complaints on the reimbursement request backlog are related to these sites); and (2) work plans/budgets, which are generally easier to review than technical reports, are generally submitted by facility owners who are willing to move rapidly forward to the next phase.
- All LUST PMs assumed the job of reviewing assigned reimbursement requests. Historically, only two "specialists" (including the Fund Manager) had performed these reviews. This changed the role of the Fund Manager from a processor of reimbursement requests to a manager of PMs performing the reviews.
- A simple management system was implemented to measure program progress and staff production on a weekly basis. This provided management and staff with the means to understand, in "real time," the flow of work and the status of program backlogs and to

get a sense of how well management and staff priorities are synchronized.

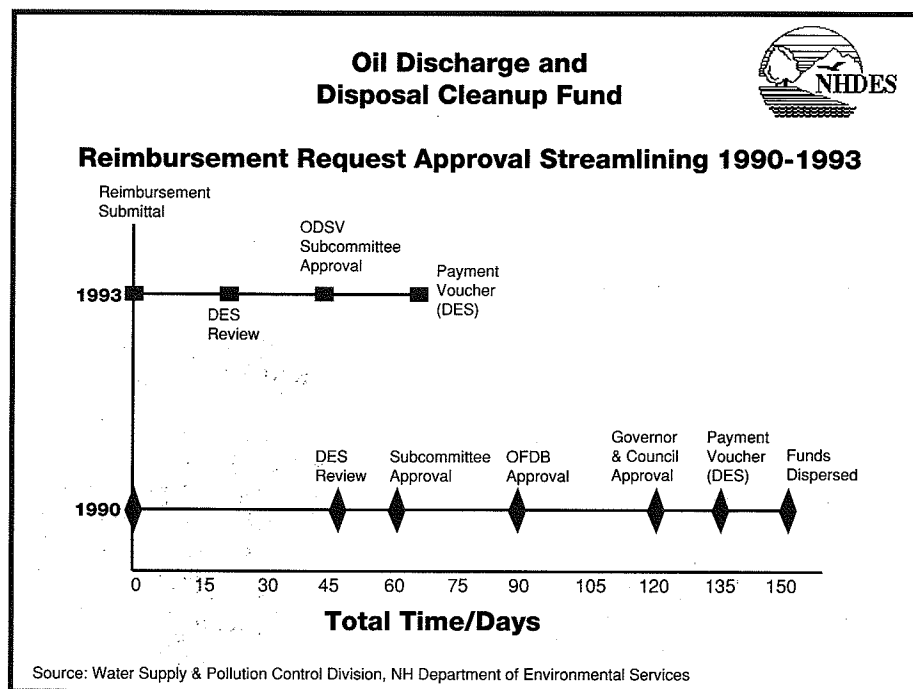
- The Oil Fund Disbursement Board authorized a budget which included money to pay for staff overtime. This effectively increased staff capacity at a relatively low cost compared with adding new staff.

• **Consultant's Days** - Two Consultant's Days were conducted over a 10-month period during 1992 and 1993, a Consultant's Expression Day and a NHDES First Annual Contaminated Sites Corrective Action Consultant's Day.

- The Consultant's Expression Day took place in May 1992. NHDES staff presented an overview of the UST, LUST, and State Reimbursement Fund programs. After these presentations, a long comment/question and answer period was included to allow consultants to critique the NHDES LUST site corrective action program. This information enabled NHDES to resolve problems raised by the consultants, where possible, and to zero-in on key areas for the next Consultant's Day.
- The NHDES First Annual Contaminated Sites Corrective Action Consultant's Day" took place in February 1993. This program was designed to communicate NHDES requirements and philosophies for site remediation to the consulting community, with a focus on "better, faster, and more cost-effective" cleanups and improved communication. The agenda included a detailed description of the NHDES corrective action process, workload prioritization process, and project management system.

All technical staff made short presentations to spread the time demands for presentation development, "break-up" the actual presentations into small increments, and, perhaps most significantly, maximize the staff training value. One unexpected benefit of this process was that the development of the presentations served to clarify the corrective action process for the NHDES staff.

With the assistance of the EPA contractor, NHDES produced a program document for each consultant to take back to the office for ready reference. The body of this docu-



ment contained a copy of each presentation, and the appendices containing other key information such as applicable regulations and policies. This document has since become a "best seller" in the consultant and legal communities; it is now in its third printing.

### Bingo!

Since instituting our streamlining process, we have had the benefit of measurable improvements, which we project will continue as long as we keep on track. Here are some specifics:

- The required time to issue a reimbursement check (after Oil Fund Disbursement Board approval) has been reduced from 90 days to 10 days.
- The backlog of reimbursement requests from the State Reimbursement Fund has been reduced from 5 months to less than 1 month.
- We project that backlogs for "low priority" work scope/budget and technical reviews will be reduced from approximately 6 months to less than 1 and 4 month(s), respectively, by December 1993.
- While "low priority" backlogs have improved, turnaround times for "high priority" submittals have not suffered and have been maintained at less than 2 months.

In the final analysis, our streamlining efforts have sharpened our focus on communication among all parties involved in the LUST correc-

tive action process. NHDES staff continue to recommend and, as a team, implement improvements to internal processes to foster increased staff productivity. Also, we have observed that consultants generally have improved their deliverables to NHDES. In fact, several consultants now routinely make suggestions on how presentations to NHDES can be improved to further streamline the process. For these consultants, helping NHDES to improve the corrective action process is viewed as good business. Predictable, timely decisions by NHDES improve consultant/client relationships, productivity, and profitability.

We have just begun to realize the benefits from our efforts to implement TQM. We expect that improvements in the site remediation process will continue as we identify and implement additional improvements in the LUST corrective action process in the future. We've managed to work our way out of our quagmire. It took some doing—process analysis, creative thought, and the will and commitment to try new ways of doing business—but it can be done. ■

*Lynn Woodard and Harry Stewart are Environmental Engineers with the New Hampshire Department of Environmental Services. Lynn is Supervisor of the Oil Compliance Section. Harry is Administrator of the Groundwater Protection Bureau.*

## New Hampshire's UST Program First to Receive Federal Codification

This October, EPA Administrator Carol Browner signed an Immediate Final Rule entitled "Underground Storage Tank Program; Approved State Program for New Hampshire." The Resource Conservation and Recovery Act (RCRA) of 1976 as amended, authorizes EPA to grant approval to states to operate their own UST programs in lieu of the federal program. This rule allows for approved state programs to be codified, with appropriate state statutes and regulations being incorporated by reference into the Code of Federal Regulations. New Hampshire is the first state to be codified and will serve as a model for other states. Twelve other states have also received EPA approval to run UST programs in lieu of the federal program.

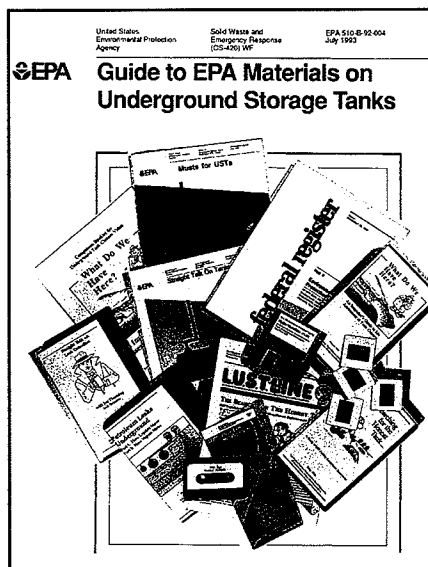
## From OUST to You

EPA's Office of Underground Storage Tanks (OUST) continues to work toward getting appropriate information out to a variety of UST-related audiences to help streamline the vast assortment of leak prevention and corrective action activities underway throughout the country. The publications listed in the following paragraphs are available at no charge and can be obtained by calling EPA's RCRA/Superfund Hotline at 800/424-9346 or by writing:

U.S. EPA  
EPA Publications and  
Information Center  
11029 Kenwood Road  
Cincinnati, Ohio 45242  
Fax orders: 513/892-6685

In response to requests for information about educational resources currently available on USTs, OUST has developed its first annotated **Guide to EPA Materials on Underground Storage Tanks** (publication #: EPA

## EPA HQ UPDATE



510-B-92-004). Designed for quick reference, the guide contains abstracts, cost and ordering information, and other useful details on nearly 90 different titles. Federal, state, and local regulators can use this guide as a reference tool to learn about UST-related publications, videos, slideshows, and software packages which were funded wholly or in part by EPA through June 30, 1992. While not the primary audience, UST owners and operators, consultants, and others who are interested may also find the guide useful.

Hot off the press are two new leak detection booklets designed mainly for UST owners and operators: one is titled **Doing Inventory Control Right: For Underground Storage Tanks** (publication #: EPA 510-B-93-004), the other is titled **Manual Tank Gauging: For Small Underground Storage Tanks** (publication #: 510-B-93-005). Each booklet explains how to perform the leak detection method correctly. UST regulators can use the booklets to promote proper use of leak detection methods and compliance with regulatory requirements. Copies will be sent to EPA Regional program managers, state UST and LUST program managers, state field offices, and state fund administrators.

Other recent information from OUST includes:

### • New Remediation Options Fact

**Sheets: An Overview of Underground Storage Tank Remediation Options** - fact sheets (publication #: EPA 510-F-93-029)

• **Streamlined Implementation: A New Way to Look at UST Corrective Actions** - brochure (publication #: EPA 510-F-93-011)

• **Technologies and Options for UST Corrective Actions: Overview of Current Practice** - handbook (publication #: EPA/542/R-92/010)

• **Organizing a Consultants Day: A Guide For UST Program Officials** - guidebook

• **Underground Storage Tank Program Facts and Figures at Your Fingertips** - fact sheets (publication #: EPA 510-F-93-014).

## EPA to Publish Final Rule on Extending Financial Responsibility Compliance Dates

As you may know, EPA considered a proposed rule that would allow certain members of Group 4 (i.e., petroleum marketers, local governments, and Indian tribes) to become part of a new compliance group subject to a 1998 financial responsibility compliance date if they met certain federally determined criteria. Based on review of comments received on the proposed rule and the rest of the records for the rulemaking, EPA has decided to:

1) **Extend**, from February 18, 1994 to December 31, 1998, the compliance date for tribally-owned USTs that are: located on federally recognized Indian tribes' lands, and in compliance with the technical requirements.

2) **Not Extend** the compliance dates for petroleum marketers and local governments. Their compliance dates remain December 31, 1993 and February 18, 1994 respectively.

EPA is working on a Final Rule that will implement these decisions. The rule should be published in January 1994.



SOUTH CAROLINA

## Streamlining

Need to Solve A Problem?...

# Sometimes It Takes Two (Agencies) To Tango

by Joel Padgett

**W**HEN SOUTH CAROLINA'S State Underground Petroleum Emergency Response Bank (SUPERB) was created to help pay for LUST site assessment and remediation, the South Carolina Department of Health and Environmental Control (SCDHEC) faced an explosion of assessment and cleanup activity throughout the State. As part of this flurry, the South Carolina Department of Transportation (SCDOT) was inundated with requests from UST owners for permission to drill monitoring wells and/or to discharge treated effluent on highway rights-of-way.

Inasmuch as SCDOT was not prepared to process the flood of requests efficiently, the turnaround time from request to receipt of an encroachment permit was often lengthy, causing delays in site cleanup. In addition to the permit problem, SCDOT had recently embarked on an ambitious UST upgrade and replacement program for its own UST systems and had identified a number of releases that would require assessment and cleanup. Meanwhile, over at the SCDHEC,

turnaround time on technical reviews and financial reimbursement (SUPERB) for SCDOT sites was slow because of the swelling numbers of reported releases.

## The Hook-Up

SCDHEC and SCDOT staff decided it would be a good idea if they worked cooperatively to sort out their mutual problems. Two memoranda of agreement resulted from these deliberations; one provides for an efficient procedure for application, review, and approval of encroachment permits for monitoring well installation and/or treated effluent discharge on SCDOT rights-of-way, the other provides for a SCDHEC/SCDOT liaison.

In short, the first memorandum states that:

- All applications for encroachment for UST investigations (and other investigations) will be forwarded to the SCDOT from the UST owner/operator through SCDHEC.
- The requests are to be verified by the SCDHEC as technically necessary.
- The applications are to be technically complete (i.e., contain supporting documentation including, but not limited to, a site map, NPDES

permit, and monitoring well and/or discharge information).

The second memorandum creates a SCDHEC/SCDOT liaison position that is housed in the SCDHEC and funded by the SCDOT. The liaison is a senior hydrogeologist whose primary function is to coordinate and expedite assessment and remediation activities at, and administer SUPERB funds for, SCDOT maintenance facilities and right-of-way construction sites. The liaison's duties include site visits, meetings and consultation with SCDOT personnel and consulting contractors, and technical and fiscal oversight assessment and remediation plans.

A secondary function of the liaison is to coordinate and review all encroachment permit applications submitted to SCDOT through SCDHEC. Finally, the liaison serves as the communication link between SCDOT and other SCDHEC programs. The position is tenured for 2 years, with renewal subject to yearly performance and effectiveness appraisals conducted by both agencies. ■

*Joel Padgett is a hydrogeologist for the Groundwater Division of SCDHEC. He currently serves as the SCDHEC/SCDOT liaison.*



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# An Association of State UST Cleanup Funds is Born

by James Bearzi

**A**N ASSOCIATION OF STATE CLEANUP FUNDS IS AN IDEA whose time has come. By virtue of our common goals of financing cleanup of leaks from USTs and, in many cases, serving as a financial responsibility mechanism, we are in a sense already an association. But the concept of forming a more or less formal group began at the national "State Fund Administrator's Conference" held last June in Vermont. During that time, state fund personnel interested in pursuing the establishment of a national association met and decided to implement a steering committee to explore the feasibility of organizing an association.

Eleven state fund administrators volunteered to serve on the steering committee: Bonnie Friedman (Alaska), Dennis Rounds (South Dakota), Ron Pedde (Texas), Earl Henry (Oklahoma), Rich Murray (Ohio), Gary Blackburn (Kansas), Dick Ostrom (Idaho), Jean Riley (Montana), Scott Brewer (Indiana), Chuck Schwer (Vermont), and James Bearzi (New Mexico), who was elected chairman of the committee. In October, with support from EPA's Office of Underground Storage Tanks, 8 of us met in Denver with OUST's Sammy Ng and Andrea Osborne to begin hashing out the details of setting up the association.

First of all, we decided on a name for the association, "The Association of State Underground Storage Tank Cleanup Funds." Then we drafted a simple mission statement: "to enhance the performance and perception of state UST cleanup funds." It was much harder to identify association goals. How would we go about fulfilling our mission? What do we hope to accomplish? How can this association be of benefit to all fund administrators? After much discussion, the committee drafted 5 general goals:

- To identify issues and challenges pertinent to state UST cleanup funds;

- To create a forum for the development of ideas and solutions to overcome fund challenges;
- To exchange these ideas, information, and possible solutions;
- To facilitate implementation of possible ways to overcome challenges faced by state funds; and
- To develop a consensus to provide a recognized voice on critical fund issues.

Some projects we would like to take on within the next 6 months include: meeting again before the next national conference to further gel the association; playing a more active role in planning the next fund administrators conference; and setting up "work groups" to address specific issues common to most funds (e.g., cost control or claims processing). In fact, our first newsletter will go out to state fund administrators this January.

We are also exploring the issue of the structure of the association. We have 3 basic choices: 1) remain a loose-knit association; 2) become a formal, independent, and autonomous organization; or 3) become affiliated with or join an existing organization, such as the Association of State and Territorial Solid Waste Management Officials (ASTSWMO).

The steering committee will meet again in Washington, D.C. on January 11-12 to discuss many of the issues mentioned above. If you want to know more about what we're up to, or if you'd like to get involved, please call me, James Bearzi, at 505/827-2932, or write me at NMED/UST Bureau; P.O. Box 26110; Santa Fe, NM 87502. ■

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