

L.U.S.T.LINE

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



T *Hark*

The concept is positively alluring. With more than 262,000 UST releases reported nationwide, more and more folks in the tank cleanup business have been drawn to its sphere of possibility. Like a flame nourished by prevailing winds, it is gaining momentum... this thing called risk-based corrective action, otherwise known as RBCA or "Rebecca."

Papers and whole sessions were devoted to it at EPA's 1994 UST/LUST Conference in St. Louis last March, and more discussion is planned for the 1995 conference. EPA's Office of Underground Storage Tanks (OUST) recently issued an "open letter" to federal and state UST program staff and state fund managers, outlining RBCA as one technique to streamline and improve the UST program. The American Society for Testing and Materials (ASTM) is also working on developing standards for RBCA.



ReBeCCA Beckons

By considering risk in their LUST site deliberations, federal and state regulators see the opportunity for taking control of a runaway train that's already made mincemeat of corrective action a la traditionnelle. If applied in the ideal sense, a risk-based decision-making process provides regulators with a basis for

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What's All The Fuss About?

LUST regulators, regulatees, consultants, and industry folks alike seem to have struck a harmonious cord with regard to their general appreciation for the concept of RBCA. And what, pray tell, is this concept? According to Webster's, "risk" is "the possibility of suffering harm or loss." Although the dictionary doesn't define "corrective action," a loosely constructed definition of the term could read "the doing of something to alter or remove that which is wrong or injurious." Hence, the concept of RBCA, as it pertains to LUST sites, goes something like this, "making decisions which will remove the risk to human health and the environment posed by petroleum releases."

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grouping their contaminated sites into categories or classifications that will allow releases of petroleum and other regulated substances to follow established remedial pathways, based on the definable and measurable possibility that a given release will impact human health and the environment. While RBCA is not a substitute for corrective action, it is a process for determining the amount and urgency of action necessary.

For regulators, RBCA provides a decision-making framework that allows them to take into account not only the potentially harmful effects of contaminants associated with UST system releases, but also the site-specific factors that influence the extent to which human health and environmental receptors may be exposed to those contaminants. These factors can then be incorporated into their corrective action decisions and management strategies, which include establishing site-specific cleanup goals; establishing requirements for responsible parties; determining how much corrective action oversight is necessary; and determining what, if any, further remedial action is necessary.

A risk-based corrective action approach also allows for the allocation of limited resources for maxi-

mum protection of human health and the environment. Investigators can focus on site assessment and data collection and evaluate remedial alternatives for economic viability, as well as for exposure or risk reduction.

"While we believe that most sites will fall into tier 1 and 2 categories which tend to be less resource intensive, that's not to say the risk-based approach will be less expensive at all sites," cautions Lisa Lund, acting director of EPA OUST. "The process calls for the collection and use of site-specific data, and where risk levels are high, cleanup requirements may be more stringent than they otherwise might be. On the other hand, at low risk sites, this approach is potentially more cost-effective than the more traditional practice of basing cleanup requirements on some generic environmental standard that may or may not be relevant or appropriate to site-specific situations."

The Flex Factor

While there may be consensus about the concept of RBCA, the application and use of RBCA is as varied as the parties who are attempting to implement it, be they regulators, regulatees, or other vested or interested entities. Throughout the country, different components and combinations of risk-based decision-making and corrective action are being developed and put into practice to meet general or specific demands made upon individual parties.

"The beauty of risk-based decision-making," explains Lund, "is that it provides flexibility, which has been the cornerstone of the UST program philosophy. For example, states can take a framework such as the ASTM emergency standard and flesh it out to suit their respective regulatory mandates.

"The overriding goal of RBCA and the UST program is to protect human health and the environment," says Lund. "The RBCA framework allows states flexibility in setting target cleanup levels on either a generic or a site-specific basis. But this does not in any way mean that these cleanup goals are less protective. Within the risk-based decision-making process, UST

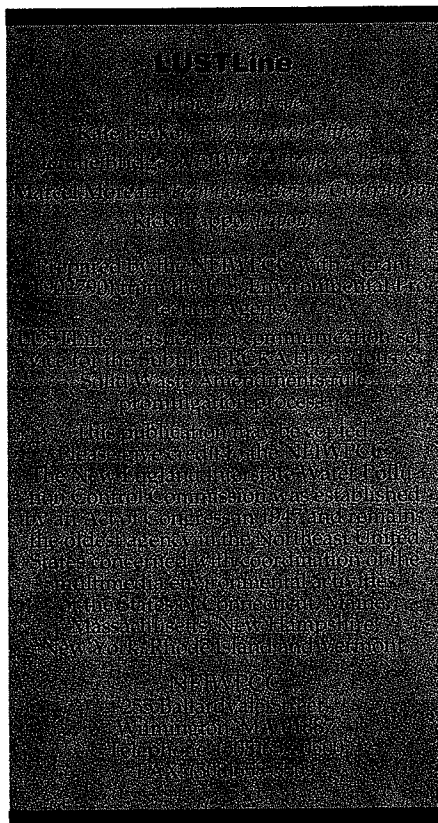
implementing agencies can choose from a wide range of options to meet their goals. It's the goal that's important, not how you get there. You may choose option X, Y, or Z as long as it gets you where you need to be.

"The process itself has built-in flexibility in terms of decision pathways, or tiers, or whatever you want to call them," adds Lund. "The process entails up-front decisions about how a site will move forward with the understanding that adjustments will be made as additional information warrants. In most cases, as work proceeds at a site, even if it's just monitoring, more information is gathered, and RPs or consultants or regulators may want to re-evaluate to see if their chosen path is still appropriate. It's important to note, however, that the regulatory goal, no matter what the pathway, is to achieve similar levels of protection."

The Need for RBCA

Whatever its application and use, RBCA has risen out of an explicit need to master a work load that has grown too large...and is seemingly out of control. The "why" of RBCA can be seen from the history of federal and state UST regulatory programs. When Congress passed the enacting legislation for RCRA Subtitle I in 1984, authorizing EPA to write regulations for the management of underground storage tanks, very few states had their own UST programs up and running. Many states had only anecdotal or loosely documented evidence of environmental problems originating from releases from tanks. "In Georgia, state environmental protection officials had even commented to Congress that tanks weren't a problem and didn't need to be regulated," says Marlin Gottschalk, former corrective action manager for the Georgia UST Management Program.

It's been a long and winding trip since then. Many states are regulating more UST facilities than all other facilities combined under the authorities granted them by all other federal and state environmental laws. Under stringent reporting requirements, more than a quarter million confirmed releases have been reported to state UST offices across the country. Most states have



received several thousand release reports and have been able to resolve or complete remediation for only a small percentage of them. And more releases are reported each month as tanks are upgraded, closed, or, in many cases, discovered. The only hope for many states is that new reports of releases begin to taper off after the 1998 tank upgrading deadline.

"The battle lines are drawn," says Gottschalk. "It's the awe-inspiring and/or terrifying numbers of leaking USTs against the limited state resources of staff, time, and money.

"Most state corrective action staff carry a caseload of three to four hundred corrective action projects," explains Gottschalk, "many with no real significant threat to human health or the environment. Because of insufficient regulatory oversight caused by the excessive workload, many projects 'fall in the crack', slowing down or stopping until a third party complains. And many states are either experiencing solvency problems with their trust funds or are anticipating shortages in the future. Basically, there aren't enough people, dollars, and hours to take care of all the releases that have been, or are yet to be discovered."

In the misty midst of this, RBCA beckons. ■



Risk and LUST

by Matthew C. Small

Risk, as defined in more than one dictionary, refers to the possibility of suffering harm or loss (voluntarily or involuntarily). Risk assessment is a process that's used to answer the question "How risky is it?" and is generally based on the likelihood of harm to humans and/or the environment. Risk management is used to answer the question "What'll we do about the risk?" and applies risk assessment information to make a regulatory decision. Comparative risk analysis is a means for comparing and classifying competing risks.

At LUST sites we are usually concerned with assessing exposure and toxicological risks connected with the movement of petroleum products from a source (i.e., leaking pipes or tanks), along a pathway (i.e., soil vapor, free product migration, groundwater flow), to a receptor (e.g., groundwater, surface water, water well, humans).

Exposure risk assessments, which generally consist of contaminant fate-and-transport studies, are used to predict likely exposure levels for vapors (i.e., inhalation); product in soil (i.e., ingestion and skin contact); and product dissolved in water (i.e., ingestion, skin contact, inhalation). These predicted levels can then be used in a toxicological risk assessment to determine physical hazards (i.e., fire and explosion); whole body effects (i.e., toxicity); teratogenic effects (i.e., birth defects); mutagenic effects (i.e., genetic defects); and carcinogenic effects (i.e., cancer).

The uncertainty associated with exposure and risk assessment can be reined-in by conducting more comprehensive site assessments; quantifying model uncertainty through sensitivity analysis of site parameters; choosing conservative risk levels and assumed site parameters; comparing contaminant migration and cleanup progress to predicted values; adjusting the model and then re-evaluating; and monitoring sites to verify that corrective action is complete. ■

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The Model ASTM "Tiered" Approach

The ASTM *Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM ES 38-94) is based on a "tiered" approach to risk and exposure assessment, where successive tiers call for increasingly sophisticated levels of data collection and analysis. ASTM's model, puts forth a 3-tiered approach:

• **Tier 1** entails a qualitative risk assessment that is based on general site assessment information. These data identify obvious environmental impacts (if any), potentially affected sensitive receptors (e.g., schools, homes, water bodies), and significant exposure pathways (e.g., drinking water wells, recreational use of streams, vapor transport). This information is typically sufficient to help categorize sites and determine acceptable time frames for corrective action (immediacy of response), if necessary. ASTM

expects that about 40 to 45 percent of all sites will fall into this category.

• **Tier 2** calls for the collection of more site-specific data to determine appropriate risk-based actions. At this level, the reasonable maximum impact of a contaminant on a site is evaluated through the use of site-specific characterization and monitoring data, conservative projections of expected contaminant levels after treatment and potential plume migration, and reasonable maximum exposure

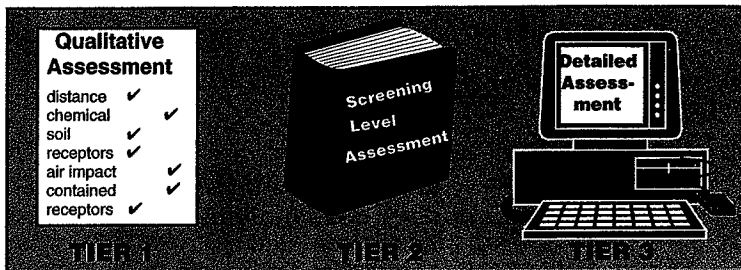
scenarios. This information is used to set conservative corrective action objectives that are protective of human health and the environment. ASTM projects that 35 to 40 percent of all sites will be categorized into Tier 2.

• **Tier 3** assessment focuses completely on site-specific conditions. At this level, more sophisticated mathematical descriptions of fate and transport phenomena are used and descrip-

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tions of a range of possible exposures/risks are generated. Site-specific risk assessment models may be developed. ASTM projects that about 20 percent of all sites will end up in Tier 3.

The goal of all tiers is to achieve similar levels of protection for human health and the environment. The difference among tiers is that, in moving to higher tiers, corrective action can become more efficient and cost-effective because the conservative assumptions of earlier tiers are replaced with more realistic site-specific assumptions. The ASTM 3-tiered RBCA approach serves only as a framework that users, and states



in particular, can use to evolve their own UST corrective action decision-making program.

Texas, for example, has developed a risk-based approach that entails site classification which is based on site similarity to specific exposure scenarios. Sites fall into one of four classes. Site classification is determined by using the state's new Limited Site Assessment protocol.

Site cleanup levels are determined by the responsible party's using one of two established procedures:

Plan A, a conservative approach based on established default exposure assumptions and

risk management considerations; or Plan B, a site-specific risk assessment procedure that incorporates less default conservatism and allows for more site-specific considerations.

Ohio's risk-based approach to corrective action uses four tiers of risk assessment. The complexity of risk assessment increases as needed from Tier 1 through Tier 4. ■

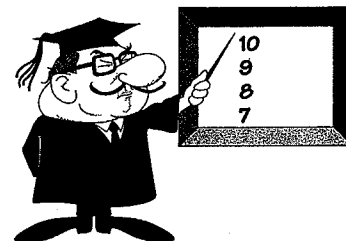
Risk-Based Corrective Action

The Top Ten Misconceptions

by Curtis C. Stanley and Paul C. Johnson

Recently, ASTM finalized development of Emergency Standard ES 38-94 *Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*. The ASTM guide establishes a framework for conducting corrective action at petroleum release sites. This new and innovative framework represents a paradigm shift over previous corrective action methodologies. In the past, most corrective action methodologies have been based on achieving generic health-based or technology-based cleanup goals. Risk-based corrective action, otherwise known as "RBCA", has been developed to provide a technically defensible, consistent, multi-tiered, exposure/risk-based assessment methodology, which provides a strong basis for site specifically determining site classification and initial response, cleanup goals, and corrective action for soil and groundwater. Most importantly, the RBCA framework is protective of human health and the environment, while being practical and cost effective.

Because the RBCA approach represents a paradigm shift for corrective action and because the RBCA process has just started to be implemented, many misconceptions have developed. To help clarify the RBCA process, let's take a look at the "top ten" misconceptions that we've encountered across the country.



Misconception #10

"RBCA is just another naked attempt by industry to pollute the environment..."

In fact, the RBCA ASTM standard is a consensus document which was developed by a diverse, multi-disciplinary technical committee, which consists of representatives from EPA, state agencies, consulting, banking, insurance, and industry. Before it adopted the document as an ASTM emergency standard, the committee considered comments from over 200 various entities across the country. The technical committee considers the RBCA framework to be protective of human health and the environment while helping to effectively allocate resources. The process itself is designed to help improve

project management for both the regulated and the regulator.

Misconception #9

"RBCA cleanup goals are less stringent, so cleanups will be cheaper at all sites..."

Cleanup goals developed under the RBCA framework may be less or more stringent than the somewhat arbitrary numerical values that many states currently employ. The most important aspect of RBCA is that cleanup goals are protective of human health and the environment. State risk-based MCLs are generally consistent with the more conservative values that are provided in a typical RBCA look-up table as an initial screening level.

Misconception #8

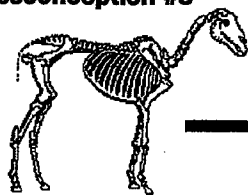
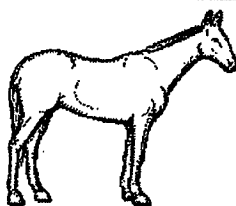
"The ASTM RBCA emergency standard is a 'How to' guide for conducting RBCA..."

The ASTM Guide for RBCA describes the general framework for conducting RBCA. It was written with built-in flexibility so that, by using this framework, state and local UST managers can customize their programs and keep them consistent with legislation and policy.

Misconception #7

"RBCA is very complex and involves the use of many mathematical equations at every site..."

The equations used in the ASTM Tier 1 process are relatively straight forward (simple and conservative) and

Misconception #8**ASTM Guide****State Program**

are based on EPA guidance. These calculations are only performed once in the development of the Tier 1 Look-Up Table. In Tier 2, the user has the option of using somewhat more sophisticated models or of using the same values derived from the look-up tables at an "alternate compliance point." Finally, relatively complex models can be used as part of the Tier 3 process. To help in this effort, user-friendly tools, such as the API DSS risk assessment software, has been developed.

Misconception #6

"Values contained in the ASTM Look-Up Table have been approved as ASTM standards..."

Although the equations used to derive values in the ASTM Look-Up Table are technically defensible, the look-up table presented in the ASTM document is provided as an example only. It stands to reason that in developing any look-up table, the equations used to derive values should be based on a consensus approach and should be technically defensible. Because the equations and parameter values used to derive look up table values are generic and very conservative, these values are useful for screening such things as chemicals and exposure routes and may satisfy the criteria for early regulatory closure. In addition to providing conservative risk-based values, look-up tables can incorporate other values such as aesthetic criteria. Finally, look-up table values should be "evergreen" so that they can be adjusted as our scientific understanding grows.

Misconception #5

"In moving to higher tiers, corrective action goals become less protective..."

Screening values used for Tier 1 are generic and very conservative. The same level of risk (10^{-4} - 10^{-6}) is con-

sidered between tiers. In this manner, the same level of protection is achieved between tiers. Site-specific rather than generic factors are considered at higher tiers. This allows for a more realistic determination of potential exposure, while still considering a risk range between 10^{-4} and 10^{-6} . When required, site-specific information allows for better informed decisions.

Misconception #4

"The user can move directly to any tier at will..."

RBCA is designed to assist with site classification and appropriate initial response prior to conducting a tiered analysis. Tier 1 is designed as a generic screening level which will help focus site assessment and additional risk evaluation, if necessary. Tiers 2 and 3 call for site-specific information and require additional resources. Depending on the results of Tier 1, the additional levels of effort associated with Tiers 2 and 3 may not be necessary.

Misconception #3

"RBCA is an alternate approach to computer programs such as API DSS, RISKPRO, CALTOX, etc...."

As we discussed earlier, RBCA is a framework for evaluating sites from an exposure/risk perspective. Risk-based software such as those mentioned above are tools which can be used (where appropriate) as part of the RBCA process. The level of model sophistication (and data requirements) should be commensurate with the appropriate tier.

Misconception #2

"RBCA is not compatible with anti-degradation policies..."

The initial steps of RBCA are used to help classify sites by urgency of response and to determine appropriate initial response. Use of the classification and initial response features

will help in allocating resources where they are most needed. Where anti-degradation policies are in effect, several approaches can be considered including:

- Using Non-Attainment Zone policies such as those prescribed by the San Francisco Regional Water Quality Control Board
- Using alternate compliance points for achieving cleanup goals, which may be applied at points other than the source area such as the property boundary.
- Determining realistic "beneficial use" (e.g., residential, commercial/ industrial, sensitive environmental habitat)
- Using institutional controls (e.g., deed/land use restrictions)
- Establishing longer time frames for achieving compliance.

Misconception #1

"Look-up table values alone are adequate for determining site cleanup goals..."

As stated earlier, look-up table values are generically-based and are very conservative. These values are intended to be used as screening tools for determining if additional assessment is needed. The true power of RBCA is that it allows the user to go to higher level tiers, as needed, to determine site-specific risk. Tiers 2 and 3 provide the user with options for determining site-specific target levels (SSTLs). In most cases, the decision to move to a higher tier is based on answers to the following questions:

- Are the assumptions used in a lower tier appropriate, relative to site-specific conditions?
- Are the goals established from a higher tier analysis likely to be less costly to achieve?
- Is the cost for additional analyses acceptable relative to the cost required to achieve the lower tier's goals? ■

Curt Stanley is a hydrogeologist with the Shell Development Company in Houston, Texas. Curt is a member of the ASTM RBCA Task Group and is chairman of the API Risk/Closure Group within the Soil/Groundwater Technical Task Force. Paul Johnson is an associate professor at Arizona State University in Tempe, Arizona and is a member of the ASTM RBCA Task Group.



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Risk-Based Corrective Action: *Georgia Style*

by Marlin R. Gottschalk, Ph.D.

In Georgia, we are currently overseeing more than 2,700 on-going corrective actions with a technical staff of 12 engineers, geologists, and environmental specialists. A team of four of these professionals oversees five state contractors scheduled to provide corrective action on about 100 federal and state trust fund sites. The remaining eight staff members provide regulatory oversight on an average of over 300 projects each. And based on the rate and amount of claims received to date, our state trust fund, which has received over \$39 million in fees in its first 6 years, may ultimately sustain a total liability and payout of between \$500 million and \$1 billion, using stringent RCRA-style cleanup criteria and standards. These numbers have become unbearable.

Bringing RBCA to the Real World

To facilitate our handling of this workload and to control and conserve monies from our trust fund, Georgia has developed and implemented its own version of RBCA. Conceptually, it shares some features of the ASTM model. But it is a simpler, more straight-forward process that most UST owners and operators and their consultants can easily understand and implement.

Under current Georgia UST regulations, our goals for corrective action for petroleum-contaminated groundwater reflect established standards from our drinking water and water quality programs. That is, if withdrawal points for public and non-public water supplies are in proximity to a dissolved plume, we apply federal and state Maximum Contaminant Levels (MCLs). If those drinking water sources do not exist nearby, we substitute in-stream water quality (WQ) standards for the protection of local surface waters. If the highest groundwater contaminant levels at a particular site fall

below these standards, no further action is generally required because we assume that free product and soil contaminants have been remediated to or do not exist above state action levels. This process parallels the decision-making framework in Tier 1 of ASTM's RBCA standard.

If groundwater contaminant levels exceed MCLs or in-stream WQ standards, our regulations call for remediation of that contamination to those goals, unless "an appropriate risk assessment" demonstrates that cleanup to those levels is not necessary to protect human health or the environment. In those cases, the responsible party may propose such corrective action alternatives as higher cleanup concentrations, a plan to monitor the groundwater contaminant plume, or "no action."

Although our regulations specifically reference "risk assessment," we prefer to receive "risk-of-exposure assessments" or simple "exposure assessments" (i.e., the first step of the full risk assessment process used to establish risks and cleanup goals at Superfund sites). We maintain this preference because the toxicology studies (i.e., the evaluations of health risk for these exposures) have already been satisfactorily completed. Those studies led to the promulgation of the enforceable drinking water and surface water standards found in our environmental regulations. Instead, under our UST regulations, we prefer to estimate the probability that a groundwater contaminant plume will migrate downgradient and impact a water well or creek or pond to such a degree that water in the well exceeds MCLs or water in the creek or pond exceeds in-stream WQ standards.

Predictions

Groundwater flow and contaminant fate-and-transport models can be used to assess the risk of exposure to these potentially impacted water

resources. Using worst case values from the range of hydrogeological data measured at a site as a conservative estimate of downgradient transport, some models yield results that reflect an absolute answer, "yes" or "no", as to whether the plume will reach the receptor with unacceptable concentrations of petroleum contaminants. Alternately, using a Monte Carlo simulation approach, where the full range of site-specific data is used in a series of model runs, we can produce a probability map of potential impact. We can estimate the percent probability that a given contaminant concentration will reach an identified potential receptor (e.g., an estimated 80 percent probability that benzene exceeding 71.28 ug/L will contact Mud Creek).

If simple models, like one-dimensional transport equations, can help us predict that petroleum contaminants should not communicate with downgradient receptors and cause violations of appropriate regulatory standards, then we do not require further corrective action, again assuming free product and soil contaminants have been remediated to or do not exist above state action levels. However, we do require that the dissolved contaminant plume be monitored to validate the model that was used and to verify that intrinsic remediation is reducing the plume via natural degradation processes. The monitoring plan must include the use of sentinel wells to give ample warning of any unforeseen impacts.

Whereas simple models predict an undesirable downgradient impact, more sophisticated two-dimensional or three-dimensional models may be used to more realistically approximate real-world flow/ fate/transport processes. If these model runs result in a prediction of no impact, then a monitoring program is initiated. This process parallels decisionmaking in ASTM's Tier 2. However, if an undesirable impact is unavoidable, as predicted by the computer simulation, then the model can be used to back-calculate dissolved concentrations that are protective of downgradient water resources. By means of such predictions we are often able to establish alternate concentration limits as the objectives for the corrective action. This step approximates ASTM's Tier 3.

The use of computer models, especially probabilistic ones, to predict plume movement requires a willingness on the part of the responsible party, his/her environmental consultant, and the state regulator to accept risk. EPA's John Wilson states that "all models are wrong, some are useful." With that premise, we must acknowledge that computer models are only high-tech crystal balls used to forecast what will happen to a dissolved plume over time and space.

This is why it's crucial that we implement a monitoring plan that allows us to catch instances where information that leads to our prediction was incomplete and make adjustments so that whatever actions are going on at that site fit this new information. In those cases, we may incur added costs in capturing a plume that has unexpectedly gotten away and threatens to impact a drinking water supply or other water resource. But if we can control "wrong guesses" to a low percentage, then the savings on the vast majority of sites, where the predictions were accurate and where there was no required remediation or a reduced level of remediation, should far exceed those losses.

Transitioning RCBA to the Regulatory World

This fall, we proposed amendments to our UST Rules that will be considered for adoption in January 1995. In doing this, we have taken an important first step toward codifying our approach to RBCA. The proposed regulations call for a two-part Corrective Action Plan (CAP). The new Corrective Action Plan - Part A will include a Release Response Report, which incorporates the information typically required in the initial abatement report, initial site characterization report, and free product removal report into a single document.

If the data reported in CAP - Part A indicate that free product does not exceed an allowable thickness, that groundwater contamination does not exceed MCLs or WQ standards, as applicable, and that soil contaminants fall below thresholds calculated to be protective of groundwater that is used for drinking water or that outfalls to surface waters, then no further action is required. Otherwise, the CAP - Part

A must include a Site Investigation Plan to gather information needed to develop the new Corrective Action Plan - Part B.

CAP - Part B will contain the Contamination Assessment Report, including a delineation of soil and groundwater contaminant plumes and other site-specific hydrogeologic data needed to prepare the proposal for corrective action. This proposal must include corrective action objectives for free product removal and soil and groundwater remediation. These objectives may include alternate concentration limits for soil and groundwater corrective action if a "risk assessment" demonstrates that cleanup to MCL and WQ standards is not necessary to protect human health and the environment.

Our confidence in "risk assessments" founded on modeling results can be increased by using valid field data in appropriate models. The use of EPA-approved or other standard methods in sample collection and analysis and in quality control and assurance yields the most reliable field data. However, there are a large number of groundwater flow and contaminant fate-and-transport models in use. In order to standardize the use of groundwater models and the data requirements for their use, Georgia has undertaken a regionally funded state program improvement project to develop written protocols for this portion of our risk-based corrective action program. This work is on-going.

I think it's important to note, at this point, that our proposed soil contaminant thresholds do not include values for Total Petroleum Hydrocarbons (TPH). We are dropping TPH as a regulated parameter because there are no other enforceable environmental standards for TPH contamination, specifically as MCLs or in-stream WQ standards. Because there is no identified health risk associated with TPH contamination, we are proposing threshold values for individual petroleum constituents that we know pose risks and for which enforceable standards have been promulgated. These constituents are four volatile organic compounds (VOCs) (i.e., benzene, toluene, ethylbenzene and xylene) and a suite of 15 polynuclear aromatic hydrocarbons (PAHs).

The screening of these new regulatory parameters will generate higher analytical costs at the front end, but should save in overall project costs. One reason for this saving is that the threshold values for PAH are going to be in the 10s or 100s of mg/kg. With these data in hand, we project that fewer sites will be so heavily contaminated that they will have to be cleaned up. We did some modelling that showed that, in many cases, you can have as much as 500 or 600 mg/kg PAHs in the soil and still not impact groundwater above enforceable water quality or water supply standards.

The setting of alternate concentration limits, if approved, may result in some required cleanup, but possibly to a less stringent standard. The site will need to be monitored to validate the predictions of the "risk assessment" and to verify intrinsic remediation processes. On the other hand, alternate concentration limits may indicate that corrective action is not needed and that monitoring is all that is required.

As a result, we project that corrective action plans that propose lower cleanup objectives or monitoring only will translate into significant savings in time and money for our staff and state trust fund, as well as for Georgia UST owners. We hope to be able to expeditiously resolve releases by establishing cleanup goals that result in little or no potential for significant off-site impact. In doing this, we can focus our resources on sites that pose real threats to human health and the environment and require a high level of effort and oversight.

This is RBCA, Georgia style. It seems straightforward and easy to visualize—if there's little or no risk from a release, back off on the corrective action requirements. Initial feedback and comment from the regulated community in Georgia has been positive. Because it is good science that makes sense for regular people in the real world, we feel it should work. ■

Marlin Gottschalk is the former Corrective Action Manager for the Georgia UST Management program. He is now Program Manager in Georgia's Air Protection Branch.

LUST Investigation & Remediation**RBCA** *in the State of Bliss*

by Chet Clarke

Risk-Based Corrective Action (RBCA) was developed with the goal of maximizing available LUST site cleanup resources to ensure the protection of the public and the environment. While many folks in the LUST site cleanup business may have heard of RBCA and understand the process, not as many are privy, as yet, to the practical benefits of RBCA.

To illustrate RBCA in action, last June, Curt Stanley of Shell Oil Company and I led a workshop at the State Fund Administrators Conference in Montana. We asked all attendees to assume the identities of LUST regulators in the states of Concern and Bliss. Participants were to leave all of their own regulatory biases and methodologies outside the door.

In our scenario, the State of Concern used pre-established, "generic" cleanup levels to determine when a site could be closed. Concern did not have an effective system for classifying LUST sites for regulatory coordination. The State of Bliss, on the other hand, was a RBCA state and used a Tier 1 lookup table and a site classification system, much like the one contained in the ASTM emergency RBCA standard, which provides response action pathways based on threat to human health and the environment.

Regulators from both Concern and Bliss were given the task of developing corrective action plans for two hypothetical LUST sites using site data and cost information for different corrective action alternatives which we provided. Both states addressed the same LUST site problems. State of Bliss regulators evaluated the two sites using both Tier 1 and Tier 2 scenarios. Each state was given a budget of \$800,000 to completely address both sites (\$400,000/site).

Site 1 was a high risk site where a release had occurred recently. Vapors from the release site had already infiltrated an office building and a downgradient domestic well

was threatened. Site 2 was a low risk site where the release had occurred 10 years ago and had impacted groundwater. A water well, located 600 feet downgradient, tapped a deeper, confined aquifer at 200 feet. The well was cased to 100 feet. The release posed no risk to any receptor.

Because the State of Concern had no system for classifying sites so that they could move ahead down pathways that reflected an appropriate level and urgency of response, the regulators had to address both sites simultaneously using the same protocol. State of Bliss regulators had a site classification system at their disposal which enabled them to qualitatively evaluate the site risks and narrow the scope of appropriate corrective action alternatives.

The scenarios that follow will seem repetitive at first, but read on. Look at how the processes begin to shift in ways that will ultimately make a big difference in the life of the project. Ask yourself, is either scenario more or less protective of human health and the environment?

Corrective Action in the State of Concern

• Site 1 - High Risk

To address the vapor impact to the office basement, the regulators recommended the immediate installation of a soil vapor extraction system with monthly air monitoring. To contain the plume, they recommended testing and installing a groundwater pump and treat system with quarterly groundwater sampling. Following these initial emergency actions, a site assessment was to be undertaken.

Results of the site assessment revealed that after a year of soil vapor extraction, soil cleanup levels for the unsaturated zone were achieved. Furthermore, the domestic well had not yet been impacted after a year of groundwater pump and treat; however, groundwater cleanup targets beneath the source area

were still exceeded. The regulators recommended proceeding with 2 more years of groundwater pump and treat action. After 3 years of operation, the domestic well had not been impacted, but groundwater cleanup levels had still not been met.

At this point, the regulators recommended that a year of air sparging be instituted in an attempt to bring groundwater contaminant concentrations below cleanup guidelines. This action would entail an additional year of groundwater pump and treat and a year of soil vapor extraction to prevent an air-sparging induced vapor problem. The office basement was monitored for vapors.

After a year of air sparging, groundwater concentrations were reduced, but cleanup targets had still not been met. The regulators recommended an additional year of groundwater monitoring. After 5 years of activity, groundwater concentrations still exceeded target cleanup levels and, therefore, the site could not be closed.

• Site 2 - Low Risk

The regulators recommended a year of soil vapor extraction to address soil contaminant concentrations at the low-risk site. They also recommended that a groundwater pump and treat system be tested and installed and that a quarterly groundwater monitoring program be initiated to address groundwater contamination.

Assessment and monitoring results indicated that after a year of soil vapor extraction, soil cleanup levels were met. However, after 3 years of pump and treat operation, groundwater contaminant concentrations still exceeded target levels. After an additional year of air sparging, groundwater cleanup levels were still not met. In a nutshell, after a project life of 5 years, groundwater concentrations continued to exceed target cleanup levels and, therefore, the case could not be closed.

RBCA in the State of Bliss

A Tier 1 Qualitative Risk Assessment

The Bliss regulators classified the two sites and determined that Site 1 was a Class 1 case (immediate threat to human health/environment), which demanded immediate attention. Site 2 was a Class 4 case, which could progress in a monitoring mode. The regulators chose to focus their efforts on Site 1 until it was under control.

• Site 1 - High Risk

To address the problem of vapors in the office basement, the regulators called for immediate employment of a soil vapor extraction system. After a year of monitoring, this vapor problem was resolved. To contain the groundwater plume, the regulators recommended that a groundwater pump and treat system be tested and installed and that the groundwater be sampled quarterly. Following these emergency actions, a site assessment was completed.

The assessment results showed that after a year of soil vapor extraction, unsaturated zone soil cleanup levels were met, and that after a year

of groundwater pump and treat, the domestic well had not been impacted. However, health-based groundwater cleanup targets had not been met. The regulators recommended 2 more years of groundwater pump and treat action.

After 3 years of pump and treat activity, the domestic well had not been impacted and groundwater cleanup levels beneath the source area had been met. Groundwater was monitored for another year to verify site compliance with Tier 1 standards. After 4 years of project life, the state was able to close the site.

• Site 2 - Low Risk

Because this site was initially classified as low risk, it was placed in a monitoring mode for a year. At this point, the regulators recommended a year of soil vapor extraction to address soil contaminant concentrations. The first year of groundwater monitoring indicated that groundwater contaminant levels were below Tier 1 health-based limits and, therefore, groundwater cleanup should not be required. To verify this conclusion, the regulators recommended an additional year of

quarterly groundwater monitoring.

After a year of soil vapor extraction activity, assessment and monitoring results indicated that soil cleanup levels had been met. The second year of groundwater monitoring verified that Tier 1 groundwater cleanup targets had been met and that site closure was appropriate. After a project life of 2 years, the regulators recommended site closure.

A Tier 2 Assessment Using Site-Specific Data

• Site 1 - High Risk

To address the vapor impact to the office basement, the Bliss regulators recommended implementing a soil vapor extraction system. After a year of monitoring this vapor problem was resolved. To contain the plume, the regulators also recommended that a groundwater pump and treat system be tested and installed and that quarterly groundwater sampling be instituted. Additional assessment results revealed that unsaturated zone soil cleanup levels had been met and that the domestic well had not been impacted after a year of groundwater pump and treat

■ continued on page 10

CORRECTIVE ACTIONS AND ASSOCIATED COSTS IN THE STATES OF BLISS AND CONCERN						
Recommended Corrective Action	Corrective Action Cost					
	State of Concern		State of Bliss (Tier I)		State of Bliss (Tier 2)	
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
• Assessment	\$50,000	\$30,000	\$70,000	\$40,000	\$70,000	\$40,000
• Soil Vapor Extraction (installation/O&M)	\$180,000 (2 yr)	\$140,000 (1 yr)	\$140,000 (1 yr)	\$140,000 (1 yr)	\$140,000 (1 yr)	
• Vapor Monitoring	\$24,000 (2 yr)		\$12,000 (1 yr)		\$12,000 (1 yr)	
• Pump and Treat (test/installation/O&M)	\$320,000 (4 yr)	\$320,000 (4 yr)	\$280,000 (3 yr)		\$200,000 (2 yr)	
• Air Sparging	\$200,000 (1 yr)	\$200,000 (1 yr)				
• Groundwater Monitoring	\$25,000 (5 yr)	\$25,000 (5 yr)	\$20,000 (4 yr)	\$10,000 (2 yr)	\$15,000 (3 yr)	\$5,000 (1 yr)
• Soil/Groundwater Modeling					\$20,000	\$20,000
TOTAL COST	\$759,000	\$715,000	\$522,000	\$190,000	\$457,000	\$65,000

activity. However, health-based groundwater cleanup targets had not been met at the source area.

Because groundwater contaminants had been contained adequately, additional assessment was undertaken to collect the data necessary to support fate and transport analysis of the groundwater contaminants. Based on this additional site assessment data and the results of the fate and transport modeling, the regulators concluded that once Tier 1 soil cleanup levels were met and within 2 years of groundwater pump and treatment, groundwater contaminant concentrations in excess of the Tier 1 target levels should not extend off-site. Therefore, the regulators recommended an alternate compliance point for the downgradient property line. They called for another year of groundwater pump and treat activity.

After 2 years of treatment operation, the domestic well had not been impacted, and groundwater cleanup levels at the alternate compliance point were met. To verify site compliance with the Tier 2 objectives, groundwater monitoring was undertaken for another year. After 3 years of project life the case was eligible for closure.

• Site 2 - Low Risk

Because this site was initially classified as low risk, it was placed in a monitoring mode for one year. The year of groundwater monitoring indicated that groundwater cleanup levels were below Tier 1 health-based limits, so groundwater cleanup should not be required. Soil contaminant concentrations exceeded the Tier 1 soil to groundwater protection standards. Based on site information, the release occurred 10 years ago, and groundwater contaminants traveled a maximum distance of 85 feet from the source area, and the downgradient well is installed in a groundwater zone that is apparently isolated from the impacted groundwater zone. The regulators recommended that the site be evaluated under Tier 2.

In response, additional information was collected and used to support a Tier 2 contaminant fate-and-transport modeling evaluation of the site. These results were consistent with the monitoring information which indicated that soil contami-

nant concentrations should not exceed the Tier 1 groundwater standards. The Tier 2 evaluations also indicated that soil contaminant concentrations were adequately protective of the groundwater.

The assessment and monitoring results indicated that after a year of soil vapor extraction, soil cleanup levels were met. Based on a Tier 2 evaluation of the site, site closure was deemed feasible and was recommended after a project life of less than 2 years.

The Long And The Short Of It

In working through the various corrective action examples from the states of Concern and Bliss, the workshop participants came to the following conclusions:

- Each site was addressed to an appropriate level of protection.
- In the State of Concern, cleanup costs exceeded the available budget and site closure was never achieved (see cost chart).
- In the State of Concern, the cost of remediating the low-risk site was

essentially the same as the cost for the high-risk site.

- In the State of Bliss, the risk-based assessment costs were higher, but overall project costs were less than the costs for the same projects in the State of Concern.
- In Bliss, both sites were completely addressed and closed within budget.
- In Bliss, cost differentials between the high- and low-risk sites were significant. In fact, both sites were addressed using either Tier 1 or Tier 2 for less than the cost of addressing one site in Concern.
- Up-front site classification in Bliss allowed the regulators to attend to the high-risk site, while at the same time moving the low-risk site onto a less resource-intensive track. As a result, limited staff and funds were available for use at the high-risk site. ■

Chet Clarke is Manager of the Responsible Party Remediation Section of the Texas Natural Resource Conservation Commission's Petroleum Storage Tank Division.

API's New Standard 2015, "Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry from Decommissioning Through Recommissioning" Available

This new edition of Standard 2015 provides safety practices for preparing, emptying, isolating, ventilating, atmospheric testing, cleaning, entry, hot work, and recommissioning activities in, on, and around atmospheric and low pressure storage tanks that have contained flammable, combustible, or toxic materials. This standard directs the user from decommissioning (removal from service) through recommissioning (return to service) and applies to stationary tanks used in all sectors of the petroleum and petrochemical industry.

This publication also includes the following appendices:

- Description of Petroleum Storage Tank Hazards
- Vapor-Freeing the Tank
- Control of Ignition Sources
- Tank Cleaning Precautions and Procedures for Specific Tank Designs and Products
- Planning Checklist
- Oxygen and Flammable Vapor Analyzers

Copies of API Standard 2015, *Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry from Decommissioning Through Recommissioning*, May 1994 (Order No. 855-20155), may be purchased for \$60.00 each. Send orders to Order Desk, American Petroleum Institute, 1220 I St., N.W., Washington, D.C. 20005. Phone: (202) 682-8375. Fax: (202) 962-4776. ■

LUST Investigation & Remediation

OUST's New Alternative Cleanup Technology Manual Provides Insight for LUST Site Decision Makers

by Debbie Tremblay

During the past 2 years EPA's Office of Underground Storage Tanks (OUST) has been promoting the use of alternative technologies at LUST sites. Alternative technologies—technologies that are proven but not yet widely used—can make cleanups faster, more effective, and less costly than traditional options such as pumping and treating or landfilling.

Although the use of alternative technologies has increased at an encouraging rate, significant road blocks to their widespread use still exist. According to state regulators, one of the most common barriers is the lack of technical guidance explaining how to review corrective action plans (CAPs) that propose alternative technologies. Without such a guidance, state regulators are not confident of their review of CAPs that propose alternative technologies. Regulators have requested guidance on what to look for in a CAP, what's critical, what's not, and how to tell if a technology will actually reach cleanup goals.

In response to state needs, OUST developed a manual entitled *How To Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites: A Guide For Corrective Action Plan Reviewers*. This guide is designed to help state regulators answer two basic questions:

- Has an appropriate cleanup technology been proposed?
- Does the CAP provide a technically sound approach to the cleanup?

Written in simple, straight-forward, "plain English," the manual takes the reader through the many steps involved in reviewing a CAP. The manual does not advocate the use of one technology over another; rather it focuses on appropriate technology use, taking into consideration site-specific conditions and the nature and extent of contamination.

Each chapter discusses one technology and describes its soil and groundwater applications in detail.

The following technologies are covered:

- Soil Vapor Extraction
- Air Sparging
- Biosparging
- Bioventing
- Biopiles
- Natural Attenuation
- Land Farming
- Thermal Desorption

The guide has been distributed to state LUST programs, state field offices, state fund administrators, and EPA regional offices. Consultants, contractors, and other private firms

can obtain the guide for \$22.00 from the U.S. Government Printing Office (GPO) by writing to the Superintendent of Documents, P.O. Box 371945, Pittsburgh, PA 15250-7954 and ordering stock number 055-000-00479-0. GPO does not provide a binder, but any 2-inch binder will accommodate the document. The phone number for GPO is (202) 512-1800; the fax number is (202) 512-2250. ■

Debbie Tremblay is Team Leader of OUST's Corrective Action Technology Team (CATT).

RBCA Training In The Works

The ASTM Exposure/Risk Assessment Task Group, which developed the RBCA emergency standard, is actively working to move the standard through the ASTM process to a final standard by the end of 1995. The task group has also set itself the goal of encouraging the implementation of the RBCA concept, among UST regulators in particular. As a result, two sub-task groups have been formed, a training group and a marketing group. The task group agreed that the primary audience for the initial effort would be state and federal UST regulators.

Training development is well underway, and preliminary versions of the first four modules have been offered in Arizona, Illinois, Pennsylvania, and Virginia. These modules provide 1) an introduction to risk assessment and fate-and-transport of chemicals of concern; 2) an explanation of how to use the ASTM RBCA practice; 3) instruction on how to implement RBCA on a state-specific (or site-specific) basis; and 4) steps for developing a state-specific RBCA process.

The task group has held several planning meetings and has conducted a survey to define state interest in using and implementing RBCA as a corrective action process. The response has been greater than expected. Twenty-two states have indicated that they are ready to receive RBCA training. Recent inquiries suggest that that number will shoot up to 30 very soon.

Fortunately, or unfortunately, as the case may be, this swelling interest in RBCA training has created a work load problem for the task group, who are all volunteers. The task group is doing its best to meet the demand. Training has been scheduled for Utah and is being planned for Idaho for this December. A schedule for training sessions for other states is still in the planning stage. The group's goal is to select up to ten states, one in each EPA region, who will be fully trained in all four modules, and who will implement RBCA as their state's corrective action decision-making option. Other states will be provided training as time permits.

If you are interested in implementing RBCA in your state and would like training, contact Gerald W. Phillips, EPA Region 5 UST Program Manager and Chair of the ASTM RBCA Marketing Group at (312) 886-6159. For more information on RBCA training efforts, contact Steve McNeely, Office of Underground Storage Tanks, at (703) 308-8889.

LUST Investigation & Remediation

Three Variations on the Theme of Cost Recovery

California, Minnesota, and New Mexico

by Anna Richards

Nearly all states receive federal LUST Trust Fund grants to pay for corrective action at high-priority leak sites. But not all the states who receive these funds have set up procedures for getting responsible tank owners or operators to reimburse their state for LUST Trust funds spent to clean up the sites. Here are three good reasons why such a procedure should be in place:

- Federal law requires states to recover LUST Trust funds spent on corrective action.
- The threat of having to pay back these monies to the state regulatory agency often serves as strong motivation to responsible parties (RPs) to take action and keep control of the purse strings.
- Recovered funds are plowed back into the state's corrective action program.

During the cost recovery session at the 1994 national UST/LUST conference in St. Louis, participants asked many questions about the problems that could arise when a state attempted to recover LUST Trust funds. In spite of the facts that each state's regulatory environment is different and that the tools available for cost recovery vary widely, states have much to gain by just getting started. They can deal with the problems as they arise.

Here are a few practical tips gleaned from states who are already recovering their LUST Trust funds. Read the state examples that follow for more details on these topics.

- Start by establishing a site-specific accounting system for tracking expenditures at those sites where you have spent LUST Trust funds. Track everything from staff time and expenses to legal and contractual services. In order for you to know how much money to

attempt to recover, you need site-specific accounting.

- Start your invoicing procedure with an eye toward achieving voluntary payment. Some states have successfully retrieved the bulk of their funds through voluntary payments.
- Develop form letters and questionnaires that can be modified easily for specific sites.
- Consider starting with "big ticket" sites where contractual services money has been spent. Contract costs, which are usually well documented, tend to be greater than administrative costs.
- Document all decisions made throughout the cost recovery process, especially those that involve compromises and negotiations—you may need that information later.

The following three examples show how California, Minnesota, and New Mexico implemented cost recovery. Contacts in each state are listed at the end of each section.

California

California has been recovering funds since 1988. Although many local agencies get a portion of the LUST grant through contracts with the state, the state does all of the cost recovery. Using accounts kept by the local agencies, the state sends out bills approximately twice a year.

All leak sites are billed, even those where LUST Trust funds spending amounts to only a few hours of a project manager's or inspector's time. California bills for the actual costs of the local agency's technical staff plus an amount not to exceed 50 percent of those costs. This last percentage covers the administrative costs of the local agency.

A second notice of the bill reminds the responsible party that the amount may increase due to interest and legal costs if the bill has to be turned over to the state's attorney general for legal action. No legal action has been used so far to recover



funds in California; 85 to 90 percent of the state's demands are actually paid.

California estimates it that spends about 18 cents to recover one dollar. Enough money is recovered that the state can include recovered funds in its annual budget as a funding source. The amount budgeted is \$4 to 5 million annually.

Contact: Mike Harper (916) 227-4326

Minnesota

Minnesota developed its cost recovery program in 1989 as an EPA pilot project. In Minnesota, each project manager is responsible for initiating and following through on cost recovery. The program uses form letters and documents, which it updates regularly.

Each project manager sends out cost recovery letters as soon as the state begins to spend dollars. If the responsible party claims a lack of funds, a 10-page Financial Disclosure Form is mailed out requiring the responsible party to substantiate the claim. The threat of assessing interest, indirect costs, legal fees, and costs of a collection agency to pursue cost recovery and the threat of reducing the percent of reimbursement from Minnesota's Petrofund make the original recovery amount more acceptable to the responsible party.

Minnesota may chose to use legal action if the responsible party does not pay. This action is usually a Stipulation Agreement, which outlines the amount and terms of payment. Minnesota sets up payment plans for those who cannot pay the full amount all at once.

About the same time he/she sends out the first cost recovery letter to the RP, the project manager also begins the process of filing an environmental lien. Minnesota has learned that it is important to file a lien as soon as the state starts spending money, because completing the process takes a couple of months during which time the property could be sold.

In Minnesota, three conditions must be met before an environmental lien can be filed. First, the responsible party must be the owner of the property at the time the lien is filed. Second, the lien must be written to be applied to only the contaminated property. Third, a legal description

of the site (about two pages) must be written.

The responsible party is notified that the state intends to file the lien and that he (or she) has the opportunity to discuss the issue at a monthly meeting of the State Petro Board. The lien is open ended; it specifies no dollar amount. The elapsed time for obtaining a lien takes about 6 weeks (i.e., from requesting a time slot on the agenda of the board's monthly meeting to getting its approval in writing). There is a filing fee of \$7 to \$20, paid to the county in which the site is located.

Minnesota is beginning to turn some claims over to a collection agency. It is still too early to tell how this tool will improve the number of cost recoveries. Minnesota already collects 85 to 90 percent of claims issued. To date, Minnesota has received \$753,512 through its cost recovery efforts.

Contact: Jean Hanson (612) 297-8595

New Mexico

New Mexico has been recovering LUST Trust Funds since 1989. The state has a Cost Recovery Unit made up of three financial specialists, who are housed in the administrative wing of the Environment Department and who track expenditures from three funds—the state Corrective Action Fund, the LUST Trust Fund, and the federal Superfund. The Department tracks administrative and contractual expenditures including legal, technical, and management staff time; equipment purchase and use; vehicle use; utility use at sites; and professional services contracts. For indirect costs, a percentage of the expenditures listed above is calculated by using the same percentage allowed in the state's LUST grant.

In all cases so far, recovery of LUST Trust Funds has been limited to "big ticket," state-lead sites. Cost recovery has been accompanied by legal action to enforce corrective action regulations and operating standards. The costs are often collected as a result of negotiating a settlement agreement, which may include penalties and prepayment of cleanup monies in addition to recovery of LUST Trust Funds already spent.

a practical approach to cost recovery can lead to the retrieval of a substantial percentage of funds—funds which in turn can be returned to your state corrective action program.

In New Mexico the following steps are taken to recover costs:

- 1) The Program Manager requests a cost summary from the Cost Recovery Unit (5-day turnaround).
- 2) The Program Manager writes a letter to the tank owner/operator summarizing LUST Trust Fund expenditures and requesting payment by a certain date. The bill is typically not paid by that date.
- 3) The Program Manager requests legal assistance from Office of General Counsel to file a Complaint in state District Court.
- 4) The Program Manager requests a cost package from Cost Recovery Unit (30 days). This contains all documentation for costs covered in the earlier cost summary. Management, technical staff, and legal counsel work together from this point.
- 5) The complaint is filed in District Court. From here, the case can go one of two ways:
 - Discovery, interrogatories, and hearing can be conducted. The judge decides on the liability and validity of claim.
 - Most often, the owner/operator requests a meeting to negotiate at some point during the legal process. During negotiations, the Department aims to collect at least 90 percent of costs, but sometimes gets less. (The range is 40 to 100 percent.)
- 6) The owner/operator's lawyer sends a check to the state lawyer. The money may be from owner/operator or insurance company or a combination.
- 7) Recovered money goes into a restricted cash account and is used, through professional services contracts, for corrective action at other LUST Trust Fund sites. Records of expenditures

from this account are kept by both the Cost Recovery Unit and the UST Bureau. The prepaid cleanup monies which are collected are deposited into the Corrective Action Fund and used for state-lead cleanup or reimbursement.

Right now, New Mexico recovers costs only where contractual expenditures have occurred. New Mexico has recovered \$940,000 in LUST Trust funds at 17 sites, and over \$2.5 million in prepaid cleanup costs. Contact: Anna Richards (505) 827-0173

Cost Recovery Tailored To Your State

State cost recovery programs have taken a variety of forms. It is probably safe to say that no state has recovered 100 percent of its LUST Trust funds. But, as the three state examples above illustrate, a practical approach to cost recovery can lead to the retrieval of a substantial percentage of funds—funds which, in turn, can be returned to your state corrective action program. It may well be worth your effort to start by targeting sites where large sums of money have been spent.

Finally, refine your program after it's up and running. For example, some of the states that have had cost recovery programs for several years are now developing procedures for addressing those sites where responsible parties claim inability to pay back LUST Trust funds. Minnesota has developed a standardized questionnaire for gathering financial information from these businesses and has put operators of modest means on payment plans. New Mexico uses an informal prioritization system. The variety of solutions continues to expand. Let's continue to share our ideas for improving cost recovery programs in future issues of LUSTLine. ■

For more information on cost recovery or to receive a copy of EPA's 1994 cost recovery policy statement (OSWER Directive 9610.10A) call Amy Hazelline (OUST) at (703) 608-8838.

Anna Richards is Manager of the New Mexico Underground Storage Tank Bureau's Remedial Action Program.

State Cleanup Funds

Part 1 - State Cleanup Fund Evolutions

Or, There's More Than One Way To Skin A Cat. And, By The Way, What Do You Plan To Do With The Cat?

In the July 1987 issue of *LUSTLine*, we wrote an article called "Chug! Chug! Puff! Puff!...Pulling USTs Up, Over, And Into The Land Of Insurability." The article referred metaphorically to the story "The Little Engine That Could." Like the little blue engine, EPA and the states face an up-hill struggle to get the UST universe over the very steep risky tank hill and into the land of insurability, where unprotected USTs will be removed or replaced by protected tanks that also have leak detection devices installed.

As early as 1986, Florida had introduced a unique "Early Detection Incentive Program." In Florida's program, if tank owners reported a release within a certain time frame, the state would pay for the clean up. By 1989, the year EPA's financial responsibility rule became effective, there were 36 state cleanup funds; there are now 46.

State funds evolved as a means of cleaning up petroleum releases from thousands of unprotected and uninsurable underground storage systems. They became a means of short-circuiting the finger-pointing who's-responsible-for-what brouhaha that often left cleanups in terminal limbo. State funds are unprecedented in that they use public funds to clean up privately owned messes before they become bigger messes...in order to protect human health and the environment.

Today's state fund administrators have their hands full. The gap between confirmed releases and corrective action closures continues to widen so that state fund administrators are entangled in heaps upon heaps of cleanup applications, complex administrative issues, cost control challenges, fraudulent claims, threats of fund raids, and so on. State fund administrators and LUST program managers alike are also recognizing that traditional approaches to site cleanup have not necessarily been effective and that changes are in order—changes in how to define a "cleanup," how to conduct a cleanup, how to evaluate a cleanup; as well as how

to interact and communicate with the responsible party, the consultant, the contractor, and each other.

In general, legislatures established cleanup funds as relatively short-term means to an end. Some legislatures established their funds with built-in sunset clauses; some sunsets have been extended; some funds are more open-ended. State funds evolved rapidly, and they continue to evolve. Eventually, some funds will dissolve; others will metamorphose in some way.

State fund administrators are looking down the road to make sure that their programs are heading in a direction that will help ensure that cleaned up sites are in compliance and ready to enter the land of insurability. UST owners and operators who remain in business will need to be in full compliance with UST regulations by 1998. How will state funds fit into this picture? There is no one answer—as they say, "There's more than one way to skin a cat." The question is, Where will states go from here?

In the next few issues of *LUSTLine*, we'll venture onto the state cleanup fund highway to examine some directions that state fund programs might take. We'll look at examples of state fund programs that operate in partnership with private insurers and other programs that are set up to dovetail with the insurance industry as sites are cleaned up and come into compliance.

But first, recognizing that it helps to know where you've come from in order to know where you're going, we've asked Pat Rounds, Administrator, and Tom Norris, Environmental Risk Manager, of the Iowa Underground Storage Tank Financial Responsibility Program, to provide a crash course on the history of UST environmental liability insurance. Then, using the example of Iowa's financial responsibility program, they will discuss how states can begin to promote FR self-sufficiency.

Environmental Liability Insurance 101

In 1984, when it enacted the Hazardous and Solid Waste Amendments to RCRA, the law that mandated that EPA regulate the underground storage of petroleum products and hazardous substances to protect human health and the environment from accidental releases, Congress didn't address compensation for environmental damages that resulted from such releases.

Cleanup costs from petroleum storage releases can run into the hundreds of thousands of dollars. In gen-

eral, these costs are the responsibility of the businesses that operated or currently operate the leaking underground storage tanks (USTs). Historically, these businesses have looked to insurance carriers for help in covering their financial losses.

Many attempts have been made to access funds from businesses and their insurance carriers to pay for the cleanup of environmental contamination. However, before we place the financial burden on either party by accusing him or her of being the culprit with deep pockets, let's explore the factors involved in business financial risk management and insurance as a risk financing mechanism.

Risk Management

Accidental losses are a fact of life. To manage financial risks and potential losses, business ventures can utilize two primary risk management mechanisms: Risk control or risk financing.

- **Risk Control** is a management technique which seeks to reduce the frequency or severity of an accidental loss or to make such a loss more predictable. It may involve avoiding the loss (no UST, no leak...), preventing the loss (better UST system), loss reduction (quicker response to leak), and contractual transfer (owner leases UST system to another

party who is responsible for any leaks).

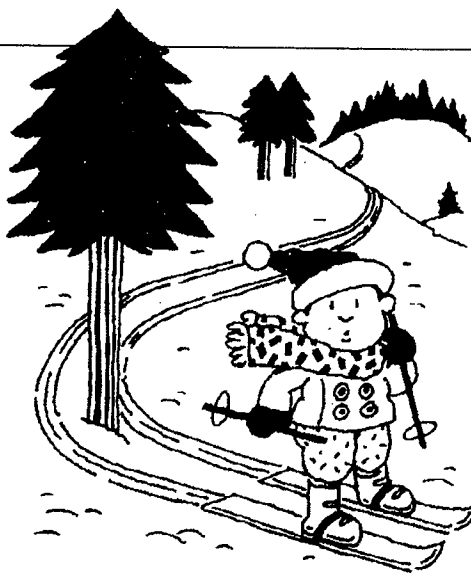
- **Risk Financing** is the process of funding losses that were not sufficiently controlled. In general, risk financing techniques can be divided into two categories: Risk retention and risk transfer. Risk retention is the use of funds that originate from within the business, such as savings from past profits, or money borrowed to pay for the loss. Risk transfer can generally be divided into insurance and non-insurance mechanisms. Insurance includes all insurance contracts that place the financial burden on an outside party, while non-insurance generally pertains to "hold harmless," or indemnity, type agreements.

Both risk control and risk financing require that potential loss be fully identified before it can be properly managed. If a potential loss is not identified or not adequately quantified, the risk management mechanism will not adequately provide the financial resources necessary when the loss does occur.

Risk Transfer

Insurance is a mechanism that businesses use to transfer a risk from the business to an insuring entity. The insuring entity is willing to accept the transfer based upon a contractual agreement whereby the insurer accepts a premium (the cost of the insurance policy) in exchange for providing coverage to an identifiable and statistically predictable risk (potential loss).

For the insurance carrier to be able to cover a potential loss, it must collect sufficient premiums from a "similar class of risks" (UST operators) to enable it to have sufficient reserves (enough money set aside) to provide coverage on the realized risks (pay for cost of cleanup and third party liability claims). If risks or potential losses are not adequately identified up front, then reserves will be inadequate to pay the costs associated with the losses. Thus, if reserves are insufficient, the insurance may no longer be a viable risk transferring mechanism.



The LUST Factor

Underground storage of petroleum products is directly related to America's reliance on the automobile—as the nation's automobile population burgeoned, gas stations popped up anywhere and everywhere. By the early 1980s, there were an estimated two million USTs at nearly 750,000 facilities throughout the United States. A large percentage of these USTs were located at retail gas stations. About 80 percent of the tanks were constructed of bare steel.

With few exceptions, after a UST was installed, that was that. It would serve its petroleum storage function unmonitored and untested. For all practical purposes, USTs were out of sight and out of mind. Although most UST owners and operators would "stick" their tanks for inventory purposes, they would fail to notice the loss of a few gallons a day, associated with normal shrinkage and expansion of the product. Existing industry standards and available technologies were incapable of detecting "small" releases. Therefore, operators had no way of knowing that slow leaks were occurring and had no reason to change their UST management practices.

As we know today, even "small" releases can have a catastrophic impact on drinking water supplies. Over time, "small" releases can add up to thousands of gallons of petroleum product in soils and groundwaters. Even the most well-intentioned owners and operators—those who measured the product in their tanks every day and never noticed a leak—may have contributed to the billions of dollars of

environmental damages that have resulted from LUSTs.

Standard Business Insurance Issues

Without recognizing the potential financial loss from small undetectable leaks, most businesses did not include such risks in their financial risk management plans. Slow releases from corroding tanks were not as much a concern as risks such as fire, theft, and premises liability. The bottom line is that funds were not set aside to provide for environmental cleanup.

Businesses, including gas stations, usually relied upon comprehensive general liability (CGL) insurance to provide coverage for normal business liabilities. The insurance industry claims that because there was little known about the harmful effects of underground petroleum products releases, these CGL policies neither anticipated coverage for nor reflected the financial risk presented from these environmental damages.

Still, as environmental damage became apparent, claimants attempted to get into the deep pockets of the insurance industry when businesses came up dry. In most instances, carriers denied coverage for environmental damages based upon the contractual language of the CGL policies and in part because such damages were expected (not accidental) with routine UST operating procedures.

With the onset of environmental awareness and subsequent environmental claims in the early 1970s, standard CGL policies began to include a pollution exclusion, which specifically stated that the insurance did not apply to damage arising from the release of contaminants unless the release was sudden and accidental.

Even after the addition of the exclusion, numerous legal decisions held that standard CGL still covered environmental damage. Although the insurance industry claimed it did not contemplate coverage for environmental damages, strict liability for past practices resulting in environmental damages became commonplace. By 1985, the resulting

■ *continued on page 16*

unexpected financial hardship to the insurance industry culminated in a standard absolute pollution exclusion clause on CGL policies.

Insurers claim that they did not and could not establish sufficient reserves for environmental damages because of the unknown expense associated with such exposure. Until the 1970s, very limited information was available for determining appropriate cleanup responses or the rates at which incidents would occur. In addition, with minimal environmental regulatory oversight, determining what constituted environmental damage was purely speculative and could not be planned for adequately in advance.

The Decline of the UST Insurance Market

With insufficient information to adequately determine potential losses, the availability of UST insurance dwindled in the 1980s. With the exception of a few large insurance carriers, small- to mid-sized insurers accounted for a significant portion of the remaining UST pollution liability insurance market.

By 1986, a major trade publication identified only eight remaining players in the UST insurance market. Two of the carriers are no longer in business, and another major player had reduced its involvement from over 20,000 policies to under 1,000 by 1993, when financial responsibility requirements became effective for small owners. In many instances, sites needed to "test clean" before coverage could be obtained.

So, if many businesses could not afford to clean up old leaks, and insurers would not or could not assist, what options were left? In addition, what insurer would provide coverage to a site that was already contaminated?

The SARA Factor

In 1986, two years after mandating the regulation of USTs, Congress hoped to eliminate unfunded environmental damages from USTs when it passed the Superfund Amendments and Reauthorization Act (SARA), giving EPA responsibility for developing UST Financial Responsibility (FR) requirements. As with the earlier UST regulations, the

By creating a funding source for pre-existing conditions and not placing all of the financial burden on past and current operators, state funds have filled a void that could not be resolved by using conventional risk management practices.

burden of implementing financial responsibility was passed along to the states.

Prior to SARA, Congress had enacted 16 federal statutes designed to protect groundwater supplies; however, the problem of compensating citizens harmed by releases from USTs was never addressed directly. Various abatement schemes and injunctive relief were created, but pollution victims were relegated to the use of common law remedies and had to rely on the available assets of a particular owner or operator of a leaking UST for compensation. Victim's damages did not seem to be correlated to a defendant's net worth or ability to pay for cleanup.

SARA attempted to correct the LUST compensation problem by requiring that owner/operators demonstrate the ability to pay for cleanup and third party liability if they experience a release (risk financing mechanism). With knowledge that private insurance coverage was limited and that the cost of coverage could be very high, various mechanisms were allowed by the FR legislation.

The Birth of State Funds

Faced with seemingly insurmountable numbers of previously unregulated and mostly small-sized owner/operators in a market which was not adequately addressed by private insurance, both EPA and the petroleum marketing industry encouraged states to develop programs which would allow small owner/operators to comply with the FR requirements. Florida created the first state cleanup fund in 1986. By 1988, there were 17 funds; by 1990,

there were 22 more; and today there are 46. Although not all of these funds as yet qualify as acceptable FR mechanisms, they are all forms of risk financing mechanisms intended to assist UST operators in complying with the federal regulations.

Old Problem, New Approach

The issues facing state funds were quite complex: How to pay for the cleanup of pre-existing contamination; how to provide financial coverage for future releases and comply with FR criteria; and how to maintain the responsibility of UST owners/operators for managing costs and risks while not saddling them with excessive financial burden. To resolve these issues, states found themselves entering into the realm of activities previously handled by private insurance companies.

With 46 state funds, there are also 46 variations on how to solve LUST financial problems. Generally, state funds that have tapped into public funds tacitly acknowledge that contamination was at least partially a "social harm." Many programs were funded through tank fees and charges placed upon product throughput. Currently, state funds are financed with over \$1 billion in revenues per year nationwide.

Some states require owners/operators to be in compliance or in "substantial" compliance with state UST rules in order to be eligible to access the fund; others have no eligibility criteria. The majority of states require eligible RPs to report a release and pay a deductible ranging between \$5,000 and \$25,000; then the fund will pay up to \$1 million. Some states used public funds to address existing contamination through amnesty or incentive programs, providing funding for cleanups if releases were reported by specific deadlines.

By creating a funding source for pre-existing conditions and not placing all of the financial burden on past and current operators, state funds have filled a void that could not be resolved by using conventional risk management practices. By reducing the strict liability burden that is placed on businesses and insurers by other environmental pro-

grams, state cleanup funds eliminate many of the litigation and transaction costs that plague other programs. Cleanups can begin sooner.

Although privately funded mechanisms did not provide adequate FR solutions to many UST owners, the principles of those mechanisms may prove to be integral components of future FR solutions. Recognizing this, Iowa developed its program.

Iowa's Path to FR Self-Sufficiency

Iowa's legislature created three separate programs under the state fund to address past, current, and future leaks, all designed to phase the state out of the business of paying for cleanups. The first was a remedial account program to help owners/operators address existing contamination. Second, a loan guarantee program was established to assist owners/operators in paying for their portion of expenses associated with cleanup and in upgrading their UST systems to comply with the 1998 upgrade standards. Third, a voluntary insurance program was established to meet the FR requirements.

• Remedial Fund

Operators became eligible for benefits from the remedial fund if contamination was discovered and reported by October 26, 1990. If that deadline was not met, owners and operators were not eligible to access the fund. Under this program, owners and operators participate in the funding of remedial costs through a copayment mechanism, except for a limited class (financial hardship cases) of owners/operators who may receive 100 percent funding for their cleanup. In addition, active tank systems must maintain FR to continue to be eligible for remedial benefits. To control costs, all budgets must be preapproved, and competitive bidding is required.

• Loan Guarantee

Iowa's loan program provides a 90-percent state guarantee to lenders to assist small UST businesses in paying for remedial and upgrade expenditures. This mechanism allows operators to obtain necessary financing even if their property (collateral) is contaminated.

• Insurance Program

The Iowa insurance program was designed to provide a separate fund for all releases that occurred after October 26, 1990. The program was established with a nominal tank premium fee. The fee will increase each year until sound actuarial premiums are established to make the fund self-sufficient. Experts in the insurance industry were consulted to help establish guidelines.

To be eligible for state insurance (a qualified FR mechanism), UST systems must be fully upgraded by January 1, 1995. For LUST sites to be eligible for insurance, the site must be eligible for remedial benefits, or responsible parties must sign an affidavit stating that they have the ability to, and will, clean up pre-existing contamination.

With historical contamination being addressed through state funds, private insurance may again become a competitive and cost effective mechanism capable of meeting FR requirements on UST sites throughout the country.

Based on the range of risk presented by the variety of tank systems, monitoring systems, management practices, and the environmental sensitivity of the site, premiums will be established to reflect that risk. The game plan is that after actuarial sound premiums are established, additional state funds will not be needed to subsidize the continued viability of the insurance program.

The Iowa insurance program is designed to be fully self-sufficient and operates on the same basis as a private insurance program. Options have been presented that include selling the program on a "take one/take all" basis, with the state, perhaps, reinsuring for costs that exceed a specific amount. However, if the state were to reinsure, the pro-

gram would slowly increase the dollar level at which state participation would kick in until the state was finally out of the UST insurance business.

What About Private Insurance?

At the time SARA was passed, the cost of obtaining private insurance was prohibitive for small owners. The high costs were attributable both to pre-existing conditions and to the unknowns associated with long-term costs for environmental restoration. Still, in states where there are no funds, private insurance is used widely.

According to one insurance carrier, although the creation of state funds allowed almost all owners/operators to comply with FR requirements, it was the creation of those funds that adversely affected the insurance market. Although there are many factors which affect the insurance industry's ability to provide insurance coverage, one of the key factors is the ability to spread the risk over a large number of sites. The creation of state funds reduced that possibility.

Insurance carriers and outside observers have additional concerns. Insurers speculate that by providing blanket FR coverage with artificially low premiums and deductibles, high risk operations will continue to cause excessive damages and require an inordinate portion of program funding. In addition, they believe that there are insufficient financial incentives for owners and operators to control future releases. Whether these concerns are justified is not yet documented. However, if states address these concerns up front, they will have a good chance of heading off future problems.

State funds may actually be a mixed blessing to insurers. By addressing previous contamination via state funding, insurance coverages can now focus on future releases. What is needed now is a consistent application of site-specific cleanup criteria. With regulators endorsing risk-based corrective actions and site-specific management zones, future costs can be projected and controlled. The door has

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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. He always welcomes your questions, opinions, and technical interests.

What Every Tank Owner Should Know About Overfill Prevention

A couple of LUSTLines ago, I discussed in gory detail the workings of my least favorite overfill prevention device, the float vent valve (LUSTLine Bulletin #18, "Overfill Prevention: Are We There Yet?"). As I wander the country talking to tank owners and operators, regulators, and installers, I become ever more painfully aware that there is a clear and present dearth of information about the workings of overfill prevention equipment. As I search my library for information about overfill devices, I find, too, that there is precious little written about how they work and how they interact with the delivery personnel they inhabit. Ergo...I will hereby attempt to plug this information gap by putting forth a basic primer on overfill prevention. I suggest that you grab a cup of coffee, settle into your chair, and put your thinking caps on...

Some Basic Facts about Fuel Deliveries

To better understand how overfilling occurs and how to prevent it, let's review some relevant facts about how deliveries are made into underground motor fuel storage tanks.

- The volume of fuel delivered into the tank is metered when it is loaded into the tanker truck but not when it is transferred into the the underground storage tank. Fuel transport trucks are compartmentalized so that they can carry different grades and quantities of fuel. When a driver hooks up to a tank, he plans to deliver the entire contents of each fuel compartment into its appropriate tank.
- The driver calculates the amount of ullage (empty space in the tank) by gauging the tank with a stick and referring to a tank chart. He

needs to know that the ullage volume is greater than the volume of the truck compartment that will be emptied into the tank. In general, flow from the tank truck to the UST is by gravity; no pumps are involved. Typical flow rate is about 400 gallons per minute.

- Deliveries into smaller tanks typically involve pumping the product into the tank. In this case, the amount of fuel that is delivered is metered at the tank and only alarms and devices specifically designed for pressurized deliveries can be used. Unless otherwise indicated, this discussion will deal exclusively with gravity deliveries.
- A typical delivery hose is 4 inches in diameter and 20 feet long and has a volume of about 14 gallons.
- Delivery hoses usually connect to fill pipes with an airtight connection known as a "tight fill." Older, smaller tanks may be filled by simply inserting a length of pipe into the tank fill pipe. This is known as a "loose fill." Only overfill prevention alarms can be used with loose fills.
- There is only one valve in the tanker-to-tank delivery path. This valve is located under the belly of the tanker. There are no valves at either end of the delivery hose itself.
- Fire codes require drivers to stand by their vehicles while they make deliveries.

How Does a Delivery Spill Occur?

Typically, a spill during a delivery occurs through some miscalculation (i.e., when the driver attempts to drain a compartment of the tanker that contains more product than there is room for in the tank). In the absence of any overfill prevention

devices, the driver ends up with a tank chock full of product, vent lines that are full of product up to the level of product in the truck, and a delivery hose that is full of product. The only valve in the system is the one under the belly of the tanker, so the 14 gallons of product in the hose and the product in the vent line can neither be returned to the tanker truck nor stuffed into the UST.

The driver's options are either to wait for customers to buy enough product from the UST to empty the vent lines and hose or to disconnect the hose and drain its contents into the manhole around the fill pipe. All too often, the latter option is the most expedient. In the days before tank regulation, the fill pipe manhole had no bottom, and the product drained directly into the environment, producing that all too familiar phenomenon: soil contamination around the fill pipe.

What Do the Rules Say?

The federal UST rules say little about overfill prevention systems except to specify at what liquid level the devices must operate. In addition to the specifications contained in the original rule (September 23, 1988), the overfill specifications were amended on August 5, 1991 to allow more flexibility in the operation of overfill prevention systems.

So, What's the State-of-the-Art in Overfill Prevention?

Although fill pipe manholes on new tanks are liquid tight, the volume of the hose (14 gallons) is roughly three times the volume of the typical spill containment manhole (5 gallons) around the fill pipe. Spill containment manholes (spill buckets) are

great for catching minor drips that may result when the delivery hose is disconnected from the UST, but they are **not** the answer to overfill prevention.

The solution to the tank overfill problem is to stop or severely limit the flow of product into the tank **before** the tank is overfilled, so that product levels never rise into the vent lines and adequate room is left in the tank for the contents of the hose. The ability to drain the contents of the hose quickly and easily is also important to successful overfill prevention.

Let's look at the technologies, regulatory requirements, operational characteristics, advantages, and problems associated with the three common approaches to overfill prevention.

Alarms

Alarms are the least frequently used of the overfill prevention technologies. A typical UST overfill alarm is tied into an automatic tank gauging system. Most automatic tank gauges have the ability to trigger a remote alarm when the liquid level in the tank reaches a programmed level.

• Regulatory Requirements

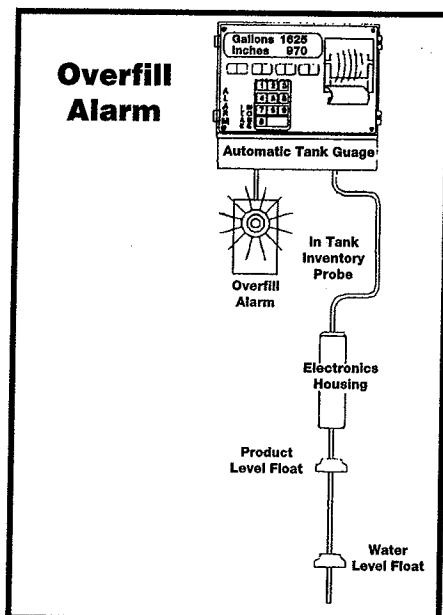
The original rule states that the alarm must be set to trigger when the UST is 90 percent full. The 1991 amendments added an alternative to allow one minute between the time the alarm sounds and the tank overfills. At a delivery rate of 400 gallons per minute, this translates to 400 gallons below tank top.

• Operational Characteristics

When an alert driver hears an overfill alarm, he has 60 seconds to respond by shutting off the delivery valve (or valves, if more than one tank is being filled) that are open. If the driver is alert and conscientious and standing close to the valve, he can close the valve in this time frame. After he has shut the valve, the driver should silence the alarm to restore quiet to the neighborhood. Draining the contents of the hose into the tank is simply a matter of disconnecting it at the truck and holding it in the air until it drains. The hose should drain in a few seconds.

• Advantages

Overfill alarms do not slow down the flow of product into the



UST. They provide the most rapid hose draining capability relative to other overfill prevention devices. They can be used with gravity drop or pressurized deliveries and even loose fills.

• Cautions

The most serious deficiency of alarm systems is that most often the alarm itself is remote from the tank fill pipes and bears absolutely no label to identify it as an overfill device. Furthermore, the tank fill pipes are generally not labeled to indicate to the driver that an overfill alarm is installed at the facility. As a result, when the alarm sounds, the driver is more likely to think that a car theft alarm has gone off than that his tank is about to overfill.

Alarms must be located in the vicinity of the tank fill pipes, clearly visible from where the driver is likely to be standing, and clearly labeled as an overfill protection device with words like: "When alarm sounds STOP DELIVERY IMMEDIATELY." Unless it is properly located and identified, an overfill alarm is not likely to effectively warn the driver of the impending overfill.

The driver must be present and alert in order for the overfill alarm to be effective.

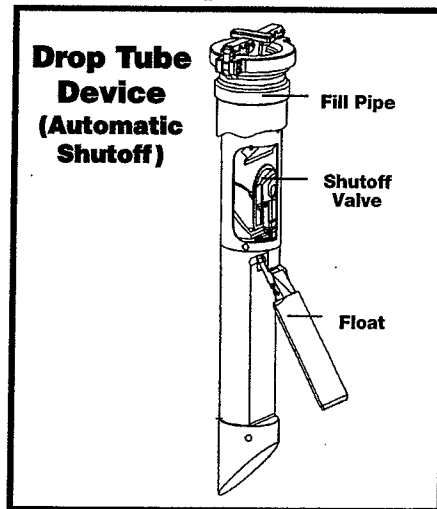
• Cost

The list price of the remote alarm itself is about \$125. This alarm must be connected to an automatic tank gauge, which costs several thousand dollars. The installation cost of the alarm will depend greatly on the location of the automatic tank gauge

relative to the mounting location of the alarm. Remember that the alarm must be near the tank fill pipes to be effective.

Drop Tube Devices

These devices replace a section of the drop tube, a thin aluminum tube that is inserted into the tank fill pipe and extends nearly to the tank bottom. There is usually a float-activated mechanism on the outside of the tube that releases a valve inside the tube that is forced shut by the flow of product. Typically, there is a bypass valve that allows a small amount of product to flow (5- to 10-gallons per minute) after the main valve closes. The bypass valve allows the hose to be drained after the main valve closes. If the delivery is allowed to continue (10 minutes or so after the main valve closes), the bypass valve also closes and the delivery hose can no longer be drained into the tank until the tank liquid level is lowered.



• Regulatory Requirements

Because drop tube devices completely shut off the flow of product into the tank, they are allowed to be installed at a higher level in the tank than other types of overfill prevention devices. The original federal rule specified that these devices must activate at 95 percent of the tank capacity. The 1991 amendments specify that these devices can be installed at even higher levels, as long as the tank top fittings are not exposed to product.

• Operation

As the primary valve is slammed shut by the force of the product flowing by, it creates a hydraulic shock,

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which typically causes the flexible delivery hose to "jump." The alert delivery driver notices this "jump," closes the delivery valve, and proceeds to drain the delivery hose through the bypass valve. Because flow is restricted initially to the bypass opening, the draining of the hose should take a minute or so.

- **Advantages**

Drop tube devices allow the largest percentage of the tank capacity to be used. They are easy to retrofit on existing tanks, as long as the fill pipe goes straight into the tank.

- **Cautions**

The sudden closing of the valve puts great stress on the delivery system. The hose connections to the tank and truck must be secure or they may pop off, creating a significant surface spill. The drop tube must be firmly attached to the fill pipe, and the shut-off device itself firmly attached to the drop tube, or else the tube can become a spear directed at the bottom of the tank, and may pierce it.

If the driver is not near the delivery truck, he may return to a situation where the delivery hose is full of product and the bypass valve has closed. He is now faced with the old dilemma of waiting for customers to buy product and lower the liquid level in the tank or trying to drain a 14-gallon hose into a 5-gallon spill containment manhole.

Fill pipe devices intended for underground storage tank use are designed for gravity deliveries only. If a delivery is made under pressure and the device activates, something is likely to break.

There must be a tight fill connection between the tank and the delivery hose, or else the fill pipe device will create a surface spill when the valve closes and the product has no where to go but up.

The valve mechanism must lift out of the way once the hose is removed so that the driver can stick the tank after delivery. Otherwise, the device is likely to be damaged by a frustrated driver trying to insert a gauge stick into the tank.

- **Cost**

The list price of the device itself is around \$375. Installation consists mostly of carefully attaching the device to a drop tube, a process which should take about an hour.

Vent Line Devices

Vent line devices are commonly known as "ball-float valves" or "float-vent valves." They are perhaps the most commonly used type of overfill prevention. They consist of a short length of pipe that extends down into the top of the tank from the vent opening. There is typically a wire cage fastened to the lower end of the pipe that contains a hollow metal ball. When the liquid level in the tank reaches the ball, the ball floats up and blocks the end of the pipe, blocking the vent opening. Also typical in this arrangement is a 1/8- or 1/16- inch vent hole in the pipe placed there to relieve the pressure in the tank. Manufacturers' recommendations and industry recommended practices require that float-vent valves be installed in extractor fittings to allow for the maintenance and inspection of these devices.

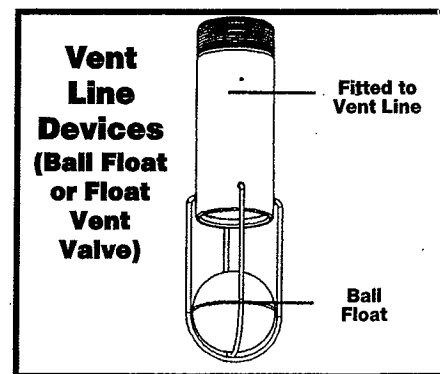
- **Regulatory Requirements**

Float-vent valves, which are classified as "flow-restriction devices" for regulatory purposes, must be set to operate at 90 percent of the tank capacity (original rule) or 30 minutes before the tank is overfilled (1991 amendments). The 30-minute criteria is a little complicated to implement. According to measurements made by one manufacturer, in 30 minutes, a 1/16-inch hole will allow about 120 gallons to flow and a 1/8-inch hole will allow about 420 gallons.

An additional factor to consider is that when the ball first closes the vent, the air occupying the ullage space in the tank is compressed by the weight of the liquid in the tanker truck. The compression factor is about 25 percent of the ullage. For example, a 1,000-gallon ullage space would be reduced to about 750 gallons before the 1/8- or 1/16-inch hole begins to effectively control the flow rate into the tank. Careful calculations are required to use the 30-minute standard correctly.

- **Operation**

Because of the compression of the ullage that occurs when the float-vent valve closes, the delivery flow into the tank reduces slowly, and there is no hydraulic shock. Consequently, there is no hose "jump" and no way for the driver to know that the float-vent valve has closed. The driver becomes aware that some-



thing is awry because the delivery seems to be taking too long. By looking at the observation window in the delivery hose, the driver will see that the hose is full of product. In addition, the driver can feel the hose to tell that the product is not flowing.

At this point the driver can close the delivery valve under the belly of the truck to stop the delivery. However, in order for the hose to drain, the compressed air in the ullage space must be allowed to vent through the small hole in the float-vent valve. If the driver attempts to disconnect the hose before the pressure has been relieved, the pressure will push the product up through the drop tube and the delivery hose and into the driver's face. To avoid such an incident, the driver must wait 30 minutes or more for the pressure to be relieved. After the pressure is relieved, complete draining of the hose will take several more minutes.

- **Advantages**

I cannot think of any operational advantages of the float-vent valve. They are often thought to be the cheapest form of overfill prevention, but the economic gains are small unless they are installed without extractor fittings. An extractor fitting, riser, and manhole are required to allow inspection and maintenance, but these parts are sometimes unwisely omitted.

- **Cautions**

Float-vent valves must not be used with pressurized deliveries because, should the float-vent valve close, the pressure in the tank will rise 10- to 20-times above the tank's design pressure, a situation that has resulted in tank ruptures.

For the float-vent valve to operate properly, the top of the tank must be air tight. Tank-top tightness is most often compromised these days by the drain mechanisms of spill con-

tainment manholes. If the drain mechanism is not airtight, it will become the vent for the tank when the float-vent valve closes, releasing potentially explosive vapors at ground level. In fact, some drivers have learned to bypass float-vent valves by opening the spill containment manhole drain, thus venting the tank through this opening. This practice is very dangerous.

Float-vent valves should not be used with retail suction pumping systems, because the increased pressure in the tank can push product out through the air eliminator at the dispenser, causing a spill at the fuel island.

Float-vent valves are not compatible with coaxial Stage I vapor recovery as the float vent valve does not block the vapor return path around the drop tube, and so after an overfill, the driver ends up with both the delivery hose and the vapor return hose full of product with no place to go.

Float-vent valves will not work with loose fills.

- **Cost**

The list price for the parts (valve itself, extractor, manhole, riser and cap) should come to around \$250. Labor costs at a new site should be small. A retrofit would involve digging down to tank top and re-piping, which could be expensive.

The Bottom Line

At this point, you may have the impression that I haven't an abundance of warm and fuzzy feelings about the current state-of-the-art in overfill prevention. Well, you're right! If I were faced with the prospect of having to install overfill prevention, I'd probably go with a shut-off device, but I would want to be sure that my delivery person(s) knew that these devices were installed, how they worked, and at what liquid level they were set to trigger.

The major stumbling block in overfill prevention is that delivery personnel are expected to know this information through some magical osmotic process. The fact is that delivery personnel (and installers) need some cold hard information on how overfill prevention devices work if they are going to prevent overfills effectively. ■

VIDEO

For More Information On Overfill Prevention...

If you would like to learn more about overfill prevention and deliveries in general, the EPA and a consortium of industry groups have produced the video, "Keeping It Clean: Making Safe and Spill-Free Motor Fuel Deliveries," which contains useful information about spill containment and overfill prevention. This 25-minute video is available for \$59.95, including postage and handling, from the Environmental Media Center at 1-800-522-0362.

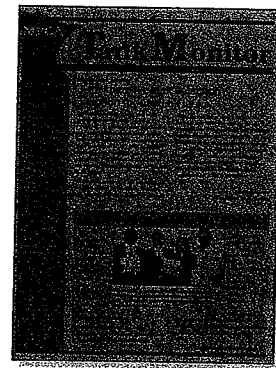
From Our Readers... Tanknically Speaking

Minnesota Awards Program Recognizes Outstanding Owners and Operators

I read with great interest Marcel Moreau's feature, *To Dream The Possible Dream: UST Compliance*, in your June issue of *LUSTLine*. Moreau spoke about the need for a paradigm shift in underground storage tank compliance efforts. Besides making it all too clear why the traditional approach has failed and needs to be reinvented, Moreau posed the question, "Do any state or local agencies issue press releases to say something like, 'Joe's service station was inspected and found to be doing a great job of protecting the environment?'"

This spring, the Minnesota Storage Tank Program did just that when it presented Facility Inspection Awards to three companies: Conklin Company, Inc. of Shakopee; Consolidated Freightways of Blaine; and Anderson Corporation of Bayport. The award was developed by Beth Lockwood's Underground Storage Tank Unit, which is part of the Minnesota Pollution Control Agency's (MPCA) Tanks and Spills Section. The purpose of the Facility Inspection Award is to recognize owners and operators for good tank management. Lockwood says the award will continue to be presented throughout the year to recognize companies for their outstanding efforts.

The award was presented this spring during one of MPCA's Tank Workshops, which are held at various locations throughout Minnesota during the year. Those workshops, one of the Tanks and Spills Section's



many outreach efforts, include presentations and discussions related to current UST issues and provide tank owners and operators an opportunity to gain insights into their tank needs and future plans. Workshop participants also learn the steps of tank installation planning, how to hire a contractor, and what to watch for during tank installation and closure.

As part of recognizing these companies' efforts, the MPCA Public Information office sent news releases, including photos of the company representatives who were at the workshop to receive the awards, to local newspapers and trade publications. Photos and a copy of the news release were sent to the award winners. A story and photo of the award recipients were also featured in the summer issue of MPCA's *Tank Monitor* newsletter. ■

Dave Plante
Public Information Officer
Minnesota Pollution
Control Agency

■ State Cleanup Fund Evolutions *continued from page 17*

been opened for insurers to re-enter the market by providing additional FR options to UST operators.

Now that we have nearly ten years of regulatory history under our belts, and because upgrade deadlines will be imposed as of 1998, we have reason to believe that proper management should now be the industry standard. In addition, implementation of realistic, site-specific, risk-based corrective action levels will allow for a more accurate estimation of the extent of anticipated damages when releases do occur. Therefore, using risk management principals, determining appropriate premiums should no longer present a problem to the insurance industry.

If allowed, market factors will establish realistic levels of deductibles, and insurance policies will place the appropriate emphasis on the proper operation and maintenance of USTs. With a new emphasis on monitoring and testing and with a new awareness of the financial risk associated with deductibles, owners/operators should be more active in controlling and stopping what used to be acceptable, but environmentally damaging, practices.

According to representatives of insurance carriers, the UST private insurance industry is alive and well. With historical contamination being addressed through state funds, private insurance may again become a competitive and cost effective mechanism capable of meeting FR requirements on UST sites throughout the country. At a minimum, private insurance will continue to work with state funds to provide wrap-around or additional coverage.

Where Do We Go From Here?

State funds will be needed for years to come. Instead of fighting over liability issues, state program managers have been able to focus on handling claims, processing payments, generating valuable data bases, and attending to management issues. As the programs have matured, they have begun to direct their attention to such issues as determining the

extent of financial exposure of individual sites, controlling cleanup costs, and obtaining proper funding to maintain program solvency. Long-term cleanups and monitoring of our past problems will continue to be addressed through these programs.

For the future, however, states need to figure out how to address FR and cleanup costs without the use of tax dollars. Risk control and risk financing, mechanisms for managing environmental losses resulting from USTs, are now more reliable. If state funds provide a subsidized financial responsibility mechanism indefinitely, the private sector will find it difficult to be an active participant in the process.

Many states (including Florida, Michigan, Wisconsin, Washington, Massachusetts, Arizona, Kansas, Missouri, Texas, and Iowa) have formed partnerships with, or relied on private firms to provide full financial responsibility benefits and

services to owners/operators. Some states rely on insurers to provide wrap-around coverage to assist operators in complying with FR; in states without funds, private insurers are the primary FR mechanism. The key to the future is taking advantage of the experience and expertise of both state fund programs and private insurers. Efficiencies and economies of scale can be realized by optimizing the resources available to these programs and partnerships.

With proper foresight and cooperation, the future looks bright for UST owners and operators because of state funds and state/private partnerships. Applying insurance standards to current and future practices while addressing past harms with public assistance and management should result in a UST FR network which will help prevent unreasonable risks to society and will be viable and affordable to future generations. ■

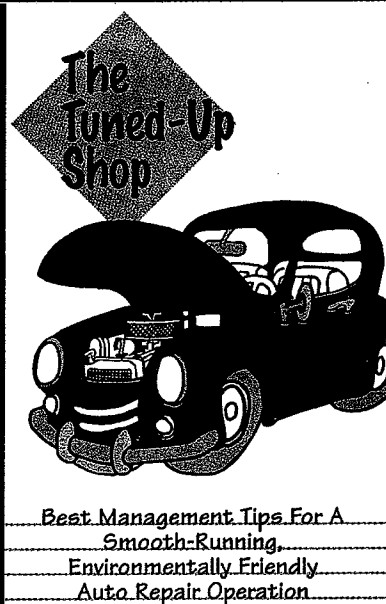
The "Tuned-Up Shop," NEIWPCC's New Video & Booklet on Pollution Prevention at Auto Repair Facilities Now Available

In New England alone, over 9 million registered vehicles will at one time or other need anything from routine maintenance to major surgery—that adds up to tons of used oil, refrigerants, paints, solvents, spent antifreeze, and used tires and batteries. The auto repair business involves handling and managing wastes such as these—wastes that can be harmful to the auto technician's health and the environment.

To ensure that hazardous substances don't end up in the wrong places, generators of hazardous wastes are responsible for complying with a variety of state and federal environmental, health, and safety waste management, handling, and disposal requirements. But, equally important to any auto repair business, is finding ways to cut back on the amount of waste that's generated in the first place. This boils down to 3 basic strategies: reduce, reuse, and recycle.

NEIWPCC has just completed a 30-minute video and accompanying booklet called *The Tuned-Up Shop: Best Management Tips for a Smooth-Running, Environmentally Friendly Auto Repair Operation*, produced with a grant from EPA-New England. The video, shot from a slide-tape show format, is an entertaining and informative introduction to the kinds of pollution prevention techniques and strategies that are applicable to auto repair/autobody shop businesses.

Copies of the video (with booklet) are available for loan (\$15.00) or for sale (\$25.00) through the NEI Catalog listing #MM-A3. All orders must be prepaid, checks payable to NEIETC, 2 Fort Rd., South Portland, ME 04106. Phone: (207) 767-2539.



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.

The Witches Brew In The Waste Oil Tank

Issues of Waste Oil Management and Storage at Service Stations and Repair Shops



The gang's all here—the excavator with his Jurassic Park earth-eating excavator, the environmental consultant with his space age soil sniffer, and the checklist-toting state inspector, who's overseeing the whole shebang. A gaping hole remains where the gasoline and diesel tanks used to be. Now it's time to deal with that itty bitty 500-gallon waste oil tank.

The state inspector casts a suspicious eye at the soil staining around the fill pipe. He puts the sniffer aside, dons rubber gloves, and takes some soil samples... the old fashioned way. The samples are whisked off to a laboratory for analysis. The top six-inch layer of soil (14 tons) has been set aside until the lab results come back.

"So," you ask, "what's so all-fired special about this waste oily soil?" The rest of the dirty dirt from this site was trucked off to the asphalt batch plant, all for the tidy sum of \$45 a ton. Well, here's the answer. A week later, the state inspector gets the soil test results. It seems that stockpiled soil from the waste oil tank removal is "hazardous waste" because it contains elevated levels of lead.

"Well," you declare, "I knew this dirty dirt wasn't the kind of stuff you'd wanta to sprinkle over your corn flakes, but what do you mean when you say 'hazardous waste'?" Here in Maine, hazardous waste means that a special contractor will have to be hired to haul the soil to an out-of-state hazardous waste incinerator, all for the hefty sum of \$783 a ton. But, not to worry, the state insurance fund war chest will pick up the tab for the dirty dirt disposal, even the waste oil stuff.

In this installment of *Tanks Down East* I'll attempt to address the problems and management practices associated with storing waste oil at service stations and repair shops. Before moving onto the helpful tips department, we'll need to insert a brief discussion about the history of waste oil use and disposal practices, the definition of hazardous waste, and how the "hazard" is introduced into the waste oil—so bear with me.

Our Polluting Past Practices

Waste oil, or, in the politically correct vernacular, "used oil" is defined by EPA as "any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities." In everyday vernacular, waste oil is used motor oil generated from oil changes at service stations, repair shops, car dealerships, fleet service centers, and by Joe Public Do-It-Yourselfer (DIYer).

In the past—the recent past—if it wasn't poured on the ground or down a storm drain, waste oil ended up in small underground storage tanks, usually around 500-gallon capacity, along with other unwanted, "used up" liquids, such as antifreeze and parts cleaners. A waste oil dealer would come to the shop at the request of the shop owner and pump out the tank for little or no charge. The waste oil dealer would then turn a profit by reselling the oil, either to communities, so

they could spray it onto unpaved roads as a means of dust control (road oiling); to reproprocessors, so they could blend it with virgin oil for use as industrial and commercial heating oil; or to re-refiners, so it could once again find itself in a motor oil can.

But the days of free waste oil pick up and road waste oiling are over. Around here, it'll cost you between 30 and 50 cents a gallon for waste oil collection, and \$1.25 a gallon if you've added in any extras to the mix. For this reason, many shop owners in these parts have purchased small waste oil burners which they connect to their waste oil tanks; they heat their repair bays this way in the winter. But this practice can be an unhealthy, even a dangerous proposition.

There are good uses for used oil. It can be re-refined as gasoline, jet fuel, heating oil, and lubricating oil. It can also be filtered and reused, or blended and burned for heat.

A Tainted Brew

Beneficial reuse of waste oil sounds like a good idea, provided we're only talking about waste oil and not all the other questionables that find their way into the tank and, sometimes, into the soil and air. Remember the lead in the soil that skyrocketed the disposal cost in my dirty dirt story? That lead had probably been introduced into the used motor oil by way of leaded gas "blowby" in automobile crankcases. Although leaded gas has been

■ continued on page 24

phased out, it may still linger in tank-bottom sludge and surrounding soils that have been contaminated by releases and overfills. Relatively small amounts of lead can turn a load of waste oil into a hazardous waste.

Briefly, a hazardous waste is any substance that cannot or is not intended to be used for its original purpose and that is listed by the EPA as hazardous or exhibits hazardous characteristics. These characteristics are: ignitability (flash point below 140° F., or below 100° F. if waste oil); reactivity (can react violently or explode); corrosivity (high or low pH); and failure to pass a Toxicity Characteristics Leaching Test (TCLP). Many states consider used oil to be a "special waste" or even a hazardous waste.

Lead and other heavy metals sometimes found in waste oil can be toxic to people and other living things. Cadmium and chromium, for example, can be introduced into engine oil from the metal grindings that result from engine wear.

Some waste oil brews contain an unhealthy dose of chlorinated hydrocarbons (i.e., the solvents used for degreasing and parts cleaning). Even though the mixing of hazardous waste solvents with waste oil is strictly prohibited by law, wastes such as these have been known to end up in waste oil illegally, either as a result of poor housekeeping, or because a frugal shop owner prefers to use his spent solvents as an auxiliary fuel rather than pay out the money for proper disposal or recycling.

To Burn or Not to Burn

No kidding, I've met people who mix their solvents with waste oil and then burn the stuff. Faced with paying someone else to haul it off, some small shop owners in the willywacks of America find it makes perfect sense to put this additional fuel source to good use.

What many of these frugal individuals may not know, or may not care to know, is that when they add these solvents to their waste oil burners, the burners become, in effect, unlicensed hazardous waste incinerators. Furthermore, these individuals may not know that they



are subjecting themselves, their employees, and their neighbors to a mishmash of noxious, or at least questionable, air emissions.

If used oil is to be burned in a small waste oil heater, shop owners should be sure to have all the required permits from state and local fire marshals. Also, federal law requires that these burners be rated at less than 500,000 BTUs per hour, and vented to the outdoors. But, toxic wastes like solvents, paints, or antifreeze should never be burned.

There are so-called "green" aqueous or citrus-based parts cleaners or non-ignitable flammable (high flash point) solvents on the market that can help shop owners comply with state hazardous waste reduction programs. Some salesmen claim that their "green" solvents can be burned with waste oil. This may be true IF the solvent hasn't picked up other hazardous constituents, such as brake cleaner or gasoline, along the way.

The Skinny On Storage

If your waste oil is stored in an underground storage tank, you must perform ongoing leak detection. Manual tank gauging as per EPA is the method that can be used for tanks 2,000 gallons or smaller. The EPA publication, *Manual Tank Gauging For Small Underground Storage*

Tanks (EPA 510-B-93-005), explains how this is done. Basically, the procedure involves taking the tank out of service every week for 36 hours or more while the tank contents are measured. Changes in the liquid volume measured against a standard indicate a possible leak.

But unless you need a lot of storage, it's best to get that waste oil UST out of the ground and into a nice, easy-to-inspect aboveground storage tank (AST). There are several nifty ASTs on the market that are designed with stability in mind and include such safety features as emergency venting and spill containment. There is even one that is rectangular and doubles as a work bench, with a containment lip running around the perimeter. Whichever tank you choose, be sure that the tank is raised off the ground (slightly) by supports so that you are able to see that the tank bottom is not leaking.

Most high volume, quick lube operations in this state store their oil and waste oil in 500- to 1,000-gallon ASTs in a concrete pit or basement located below the oil change bay. For more storage, or if storage space is a problem, an UST with secondary containment, continuous interstitial space monitoring, and spill protection is another way to go. I stress spill protection because the federal UST rules do not require spill or overfill protection if the tank is never

filled with more than 25 gallons at a time. But I'll bet my measly state paycheck that the tank owners in the introductory story never poured more than one 5-gallon oil bucket at a time into their UST.

Nothing raises the eyebrow of a state inspector like a waste oil stain around the old fill pipe. It's a good idea to install a spill bucket, or at least use a funnel when transferring the liquid into the tank. UST waste oil tanks generally have a fill line and a vent line. Lines running from a tank to a waste oil burner are plumbed up the same way as a heating oil furnace.

I still maintain that secondary containment with leak detection is essential for underground piping and that protection from physical damage is essential for aboveground piping. (See "Those Tanks in America's Backyards and Basements" in LUSTLine Bulletin #20 for details.)

Keep Your Waste Oil Clean and Green

Finally, here are some pontificating parting rules of thumb on managing your waste oil so that it is stored safely and can be a reusable resource and not a witch's brew:

- Don't mix any other wastes with your used oil.
- Store used oil aboveground in tanks or drums, if possible. (Storing waste oil in milk jugs and coffee cans 'til heating season begins just won't do.) Be sure waste oil tanks and drums are labeled according to state specifications.
- Check aboveground waste oil tanks or drums regularly for leaks or corrosion.
- Be sure tanks and drums are stored on an impervious surface, and, if outdoors, keep them covered from weather and secured from vandals. Create a berm around the storage area.
- Be sure DIYers are bringing you only waste oil. If the "waste oil" container smells funny or looks funny, don't take it. There are inexpensive kits that tell you if used oil is contaminated.
- Be sure waste oil burners run clean and green by giving them proper maintenance. ■

Field Notes

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

The Petroleum Equipment Lexicon... Don't Leave Home Without It!

UST and LUST regulatory personnel often lose sight of the fact that many of the terms they use routinely in the course of business are, to new employees, largely gibberish. Mention *impact valves* or *sacrificial anodes* to a new employee and chances are you've got some explaining to do. Say something about *hydrostatic tests* or *pressure/vacuum vents* and...well...you might as well be standing in some ancient Roman forum wearing a toga.

Ideally, all new hires should be put through an orientation course where they can be introduced to the meanings of terms they will encounter in the course of their work. Few agencies, however, are able to provide this type of instruction, and seasoned administrators don't have the time to serve as tutors. As a result, new employees are usually left to muddle through as best they can. Since they may not be sure of what they need to know, they may find themselves at a loss as to what questions to ask.

The Petroleum Equipment Institute is in the process of preparing a book to help bridge this gap. Entitled *Petroleum Equipment Lexicon—Terms Used in Petroleum Marketing Operations*, the book's primary purpose is to provide new employees in the petroleum marketing industry with basic information on subjects that they will encounter in their work. The book should also help make readers aware of the multitude of regulatory requirements that now influence the operations of companies in the industry. And because so much of what PEI members do on a daily basis involves the underground storage of petroleum, the book should benefit regulatory personnel in federal, state, and local UST agencies as well.

For veteran employees in the field, the book is intended to serve as a reference source. It contains the names, addresses, and phone numbers of scores of industry organizations and periodical publishers. Moreover, old hands may find in these pages a clarification of some terms that have been consistently puzzling—terms like *adsorption* and *double-tapped bushing*.

A *lexicon* is a compilation of words and phrases used in a particular field. The typical entry in this book begins with a one- or two-line definition of the subject. In some instances, this brief opening definition is adequate. Say you are not familiar with the term *tank conversion chart*, a glance at the first sentence in that entry will provide a basic insight into the subject. To enlarge your understanding of how conversion charts are used in the petroleum marketing business, however, you can read on for another two or three paragraphs.

Do not expect to find definitive engineering or technical data in the lexicon. The reader who wants to know how large the sacrificial anodes should be to protect three 10,000-gallon underground steel tanks will not find the answer here. The entries on *anodes* and *cathodic protection* are intended to explain only in a general way what anodes are and how they work. For precise technical information, the reader can turn to industry recommended practices, many of which are cited in the lexicon.

Publication of the *Lexicon* is scheduled for early 1995. If you wish to receive information on how to order this book, contact PEI, P.O. Box 2380, Tulsa, OK 74101. Phone: (918) 494-9696. Fax: (918) 491-9895. ■

Leak Prevention

New UST Contractor Certification Exams Will Help Northeast Tank Owners Find Out Who's Qualified...And Who's Not!

by Jennie Bridge

The New England states and New York State are joining the growing ranks of state UST programs that want to see qualified, certified contractors installing and removing underground petroleum storage tank and piping systems. By January 1995, underground storage tank (UST) contractors in the Northeast will have access to voluntary, fee-supported, certification exams for UST installation/retrofitting, UST decommissioning (closure), tank tightness testing, and UST cathodic protection. Future tests may address UST site assessment and aboveground storage tanks (ASTs). These tests have been developed by the International Fire Code Institute (IFCI), a non-profit public service benefit corporation, in cooperation with participating state agencies and practicing contractors.

This new regional voluntary certification effort means that tank owners in the Northeast will soon be able to acquire a list of tank contractors who have passed the IFCI exams. IFCI will provide these lists free to participating state agencies, and at cost to the public. The exams will be administered electronically under contract to IFCI by Assessment Systems, Inc. (ASI). Exam development and administration will be fee-supported through IFCI. Participating contractors will pay a fee of \$50 per exam.

Building Consensus Among The Players

In 1993, several states in the Northeast asked the New England Interstate Water Pollution Control Commission (NEIWPCC) to look into the possibility of providing UST contractor certification on a regional basis. NEIWPCC has worked with state regulators and contractors from Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont toward this goal.

Last January, the states reached consensus on the generic technical knowledge that should be addressed in a certification exam for installers and removers. The group agreed on the purpose of a certification program, the essential element of a state licensing program. The group also recognized that although NEIWPCC could assist the states in finding a testing service and identifying training opportunities to be offered on a voluntary basis, the states themselves would have to seek authority for any mandatory certification or licensing program and take responsibility for enforcement. Currently, Maine is the only Northeast state with licensing authority. The state's UST installer certification program has been in place since 1986. Maine has been active in participating in this regional certification evaluation effort, but has no need or interest in using the IFCI testing service.

After issuing a request for proposals from several companies and organizations involved in UST testing and evaluating four submittals, NEIWPCC staff recommended that interested Northeast states work with IFCI to provide the testing portion of the certification program, primarily for reasons of cost.

Except for the State of Maine, neither NEIWPCC nor its member states have either the authority or the funding to develop a certification program. IFCI's proposal has the advantage of being primarily fee-supported. For a minimal investment of state staff time and travel expenses involved in question bank review and state-specific question bank development, IFCI's exam fees cover what would otherwise be costs to the state for exam development, analysis, and administration.

Furthermore, once a state agency recognizes the IFCI exams as a mandatory requirement of its state certification program, IFCI will work with the state to develop a state-specific exam which deals with state-

specific regulatory requirements. Because the state-specific exam fee is separate, and is negotiated between the state and IFCI, the fee can provide potential program income to support a mandatory state certification program. Once a state recognizes the IFCI's exams as mandatory, the state becomes a voting member of the committee that guides IFCI's certification program policy and exam development.

The Northwest states of Idaho, Oregon, and Alaska were among the first in the nation to work with IFCI on state certification programs. Six states in the Northwest and Midwest currently use the IFCI exams in mandatory certification programs. Several other states are working toward this goal.

IFCI, a nonprofit public service benefit corporation, was founded in 1991 to focus on the development and publication of a model fire code. Cosponsored by the International Association of Fire Chiefs, the International Conference of Building Officials, and the Western Fire Chiefs Association, IFCI has assumed responsibility for administration of the Uniform Fire Code and the Uniform Fire Code Standards, as well as the IFCI UST Certification Program.

Why Certify?

Many UST regulators see installer certification as a means for advancing regulatory compliance in that it gives tank owners the opportunity to select from a list of qualified contractors who are knowledgeable about industry codes and standards. By setting standards for competence for the industry, UST regulators hope to protect public health, welfare, and safety; to prevent pollution from occurring in the first place, which will help save on cleanup costs; and to increase compliance with state UST regulations. Reputable UST contractors have joined UST regulators in their support of this certification effort.

"I think the trend toward getting better qualified people working in this industry is very important. Through this process, you are providing some measure of insurance that the professional installer understands all the proper environmental and safety procedures associated with installing and testing tanks."

John Pirong of Tank Installers of NY

"I feel really good about the certification program," says John Pirong of TINY (Tank Installers of NY). "I think the trend toward getting better qualified people working in this industry is very important. Through this process, you are providing some measure of insurance that the professional installer understands all the proper environmental and safety procedures associated with installing and testing tanks."

The proper installation and removal of UST systems at motor fuel dispensing facilities is essential to preventing pollution and protecting human health and safety, not to mention protecting the livelihood of tank owners. The federal government has set a 1998 deadline for upgrading the nation's USTs to state-of-the-art technical standards. As the federal deadline draws near, there will be an unprecedented demand for tank removals and installations. Substandard work could jeopardize both human health and the environment, cause affected tank owners undue economic hardship as a result of costly environmental remediation, and create another generation of leaking tanks.

Don't Forget The Teeth

Although the IFCI exam will begin by being offered on a voluntary basis to UST contractors in the Northeast, participating state UST managers realize that an exam is only one part of a certification program. An exam only measures knowledge, not whether or

how the knowledge will be applied. Ultimately, many state UST managers in the Northeast plan to seek authority from their legislatures for more comprehensive mandatory certification programs that may include training, enforcement, and field experience requirements.

According to Jim Hynson, whose experience with the Maine Department of Environmental Protection's (DEP's) certification program provided other state UST managers with valuable certification insight, "enforcement capability is perhaps one of the most critical program elements from the perspective of assuring compliance with state and federal regulations. Tank installation is a competitive business. Unless there is an enforcement loop to keep folks honest, low bidders who fail to abide by the standards and cut corners will win. When they win, they are sending the message out that the only way to stay in business is to break the rules. When and if someone breaks the rules, the state needs to be able to take action against that someone and thereby alert other installers that doing things right has a competitive advantage."

A program with teeth provides some mechanism for dealing with bad actors and, if need be, weeding them out. "Certification programs make economic sense," says Hynson. "If one cleanup per year can be prevented, the program will more than pay for itself in dollars saved."

The Maine program includes a state-administered exam, requirements for field experience, continuing education, and license renewal. According to Hynson, Maine DEP staff spend a large portion of their time on enforcement. The program is partially supported by fees, has an unpaid certification board, and operates at roughly a \$60,000 loss per year. However, the state feels that the cost is well worth the investment, especially when compared to the savings realized if just one UST is prevented from leaking. UST cleanup costs vary per state, but remediation costs usually exceed \$100,000 if the contamination has migrated off-site.

The Training Component

States such as Maine and Mississippi

have opted to combine training and certification, that is, to develop and support an in-house training and certification program. However, many states simply don't have the resources for both and are choosing to keep training and certification functions separate. IFCI and LGR Examinations (a company who developed and administers Pennsylvania's certification exam) intentionally do not provide UST training because, as Dave Nelson of IFCI says, "there is great potential for self-serving conflict of interest in providing both testing and training. Even the appearance of 'teaching the test' would severely damage the credibility and level of public confidence in the exam as a measure of candidate competency."

For information on how to take the exam in the Northeast area, contact one of the following state agency contacts:

Connecticut

Scott Deshety, DEP,
(203) 424-3374

New Hampshire

Lynn Woodard, DES,
(603) 271-3644

New York

Russ Brauksieck, DEC,
1-(800) 242-4351

Rhode Island

Marisa Poller or Tom Epstein, DEM,
(401) 277-2797 X 7519 or 7501

Vermont

Ted Unkles, DEC,
(802) 241-3888

For information on how to take the exam or make the IFCI UST exams available in your state either on a voluntary basis or for use as licensing or certification exams, contact:

International Fire Code Institute
5360 Workman Mill Rd.
Whittier, CA 90601
Phone: (310) 699-0541

Jennie Bridge is an environmental scientist with the New England Interstate Water Pollution Control Commission.

Among her responsibilities, Jennie is coordinator of the NEIWPCC UST/LUST Work Group. The regional certification effort is an offshoot of this work group. ■

Leak Prevention

Does The Leak Detection Equipment Used In Your State Meet EPA Performance Standards?

by Curt Johnson

As of December 22, 1990, EPA's underground storage tank regulations (40CFR Part 280, Subpart D) generally require leak detection equipment to meet certain performance standards. To ensure that these performance standards are met, EPA developed a series of standard test procedures for evaluating leak detection equipment. The "Foreword" to each of seven standard test procedures outlines the Agency's policy of how to demonstrate that leak detection equipment meets the performance standards. The policy is explained in the following way:

- EPA does not test, certify, or approve leak detection equipment.
- EPA provides standard test procedures that allow vendors to prove that their equipment meets EPA performance standards.
- EPA recommends that the tester certify that the tests were performed in accordance with the standard test procedures and that the results are those obtained during the test.
- EPA allows tests to be conducted directly by the company or by an independent third-party tester.
- EPA believes tests are "more likely to be fair and objective" and will be preferred by state agencies and tank owners if they are performed by an independent third-party tester.
- EPA defines third-party testers as consulting firms, test laboratories, not-for-profit research organizations, and educational institutions "with no conflict of interest."
- EPA states that upon request, the results of the tests should be made available to regulatory agencies and tank owners.
- EPA allows the use of other test procedures developed or reviewed by nationally recognized associations or independent third-

party testing laboratories which are certified equivalent to EPA test procedures.

Anticipating the need for a list of third-party evaluated leak detection equipment, EPA Region 10 compiled one. EPA headquarters currently distributes updates of this list to all states, EPA regions, and all other interested parties.

Hmmm...

In 1990, when UST regulators from Alabama and other states first had the opportunity to review the EPA policy, we noticed that the policy dictated the type of organization that can perform an evaluation but set no educational or experience requirements for the evaluator. We felt that this was an inherent weakness that could affect the quality of some evaluations.

Because we, as UST regulators, have no authority over the person performing the evaluation, we decided that we needed to be able to ensure that the evaluator performed the evaluation in accordance with EPA standard test procedures.

Because we, as UST regulators, have no authority over the person performing the evaluation, we decided that we needed to be able to ensure that the evaluator performed the evaluation in accordance with EPA standard test procedures. We felt that the best way to do this was to review in detail all evaluation results, data sheets, and test data and to check statistical calculations.

After finding several "certified" evaluations that contained apparent errors in following EPA test procedures, as well as errors in calculations, our review policy proved to be

warranted. Most of the evaluation errors allowed equipment to appear to meet EPA performance standards. Some evaluations were submitted without the certification being signed by the evaluator, and some were performed directly by the vendor.

States Form National Work Group

Because EPA's policy requires nothing more than certification by the evaluator, regulatory authorities in each state must ensure that leak detection equipment has been properly evaluated and meets EPA performance standards. Most states are aware of the need to review the evaluations, but they do not have the resources and/or expertise to accomplish this. Therefore, while they recognize the leak detection equipment listed by EPA Region 10 as acceptable equipment for use in their state, regulatory authorities must also realize that some listed equipment may not have been properly evaluated and may not meet EPA performance requirements.

The Alabama Department of Environmental Management (ADEM) has been able to devote the necessary resources to perform a detailed review of the equipment evaluations and to establish a state list. In the process, we found a few other states who were doing the same thing. To avoid duplication of our efforts, we soon recognized that our resources could be used more effectively by organizing a national work group that would share the results of its evaluation reviews with any of the states that wanted them.

The work group consists of seven state members (Alabama, Michigan, Maine, New York, Tennessee, Oklahoma, California), three EPA regional members (Regions 7 and 10, and Region 10 Idaho Operations), and one representative from EPA's Office of Underground Storage Tanks (OUST). All of the work group members have expertise in the area of leak detection equipment.

Members perform detailed reviews of leak detection evaluation results, test data, calculations, test protocols, and operating procedures. The work group members have set forth as their mission:

"to review evaluations of release detection equipment/procedures to determine if each evaluation was performed in accordance with an acceptable protocol, in order to verify that the equipment/procedures meet EPA performance standards. EPA and member states will share the results of such reviews with interested parties."

Because the work group agrees with EPA that third-party evaluations are more likely to be fair, objective, and preferred by tank owners and state agencies, the group has decided to limit review of evaluations to those performed by independent third-party testers. If a specific EPA standard test procedure is not available to evaluate certain methods of leak detection, the work group will review alternate test procedures to ensure that they meet requirements discussed in the "Foreword" to the EPA standard test procedures.

The results of the work group's reviews of third-party evaluations will be in the form of leak detection equipment data sheets and will include manufacturer, equipment name and model number, applicability, leak threshold, waiting time, test period, maximum tank capacity, tank level requirements, calibration requirements, name of the third-party evaluator, date of evaluation, and other appropriate information and comments.

EPA to Publish Work Group Equipment Data Sheets

The work group and EPA expect to have a draft of the data sheets published and distributed to EPA regions, states, and any other interested parties by early January 1995. EPA Region 10 intends to discontinue its list once the work group data sheets are available in final form. The work group data sheets may be useful to other parties in the following ways:

- They can help owners and operators select appropriate release detection equipment for their specific UST needs.

- They can serve as a reference for inspectors to ensure that leak detection equipment is being used properly.
- They can serve as a means of comparing one vendor's equipment performance to another's.
- They can document EPA's policy on leak detection equipment.
- They can serve as one source of information to help state and/or local governments determine whether or not selected equipment meets their requirements.
- They can serve as a standard for comparison for states who have their own review process or have more stringent requirements.

Our group intends to continue to meet at 6-month intervals to review any new evaluations or existing evaluations that have not previously been reviewed. Leak detection data sheets will be updated following these meetings and distributed by EPA to all interested parties.

Vendors of leak detection equipment who have not submitted their third-party evaluations for review and would like to have them reviewed by the work group should send three (3) copies to: Harold Scott,

USEPA Region 10, 1200 Sixth Avenue, Mail code: WD 133, Seattle, WA 98101. Phone: (206)553-1587. Fax: (206)553-0165.

Also, we are offering to review any alternative test procedures (for leak detection equipment), if three (3) copies of the procedures are submitted (if possible) prior to use to evaluate the equipment. These test procedures should also be sent to Harold Scott.

We encourage everyone to work with us in this effort, and to provide us with any information that will help accomplish our mission. If you have any questions concerning the data sheets after they become available, please contact me at (205)271-7986 or by fax at (205)271-7950 and I will help you get in touch with the appropriate work group member. ■

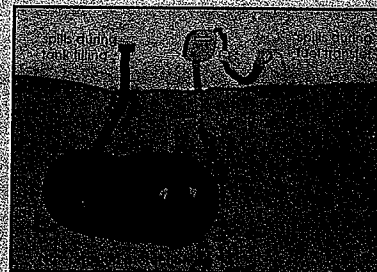
Curt Johnson is the Chief of the Alabama Department of Environmental Management's Underground Storage Tank Compliance Section, and is the chairperson of the work group that is reviewing third-party tests of leak detection equipment.

"Farmstead Petroleum Storage and Handling Training Manual" Available

The Farmstead Assessment System (Farm*A*Syst) has developed a training manual to help farmers and rural residents identify and reduce contamination risks from petroleum tanks. The *Petroleum Storage Training Manual*, designed to be used along with the Farm*A*Syst program's self assessment petroleum storage worksheet, provides management recommendations for both aboveground and underground farm tanks, primarily those under 1,100 gallons. The manual covers storage tank location, tank design and installation, monitoring and leak detection, and tank closure.

The training manual comes in a 3-ring binder and includes a script, 58 slides, a program outline, a hypothetical case, a referral sheet for contacts and references, and a 3.5-inch computer disk with all training components in Word Perfect 5.1. The manual reflects Wisconsin state regulations, but can easily be adapted to other states. The slides are applicable for any state.

Copies of the *Petroleum Storage Training Manual* are available for \$30.00 (make checks payable to the University of Wisconsin) from: National Farm*A*Syst Program, B142 Steenbock Library, 550 Babcock Drive, Madison, WI 53706-1293. Phone: (608) 262-0024. Fax: (608) 265-2775.



Temporary Details For OUST Director

On August 29, OUST Director David Ziegele began a detail to the Immediate Office of the Assistant Administrator for Solid Waste and Emergency Response (OSWER) where he is coordinating OSWER's budget, administration, information management, contracts management, and regulation development activities. David anticipates that his detail will last from 4 to 6 months. In his absence, Lisa Lund is serving as Acting Director and Josh Baylson as Acting Deputy Director of OUST. Josh will also retain his duties as Chief of OUST's Standards Branch.

ASTM Standards

OUST sent copies of two new ASTM standards (*Emergency Standard Guide for Risk-based Corrective Action Applied at Petroleum Release Sites* and *Standard Guide for Corrective Action for Petroleum Releases*) to EPA regional program managers, state LUST program managers, and state fund administrators. OUST also prepared a "flyer" summarizing the ASTM standard on risk-based corrective action (RBCA) to accompany copies of the standard.

Outreach Materials On Disk

OUST has sent a "multi-file" disk, containing electronic copies of several recent publications (*Don't Wait*

EPA HQ UPDATE

Until 1998, Doing Inventory Control Right, Manual Tank Gauging, and an upgrading fact sheet) to EPA Regional UST/LUST program managers and state UST program managers. The package also contained instructions for using the disk, notes for the printer, and samples of the publications. States can use the disk to tailor materials to meet their needs and to make reproducible originals of these documents.

Guide to EPA Materials on Underground Storage Tanks

This version of the catalog comprises the original guide, the supplement published last May, and materials produced through July 31, 1994. OUST has distributed copies to each regional RPM; each state UST, LUST, and State Fund Manager; state field office, regional branch chief; regional public affairs office; and to other interested parties including trade associations. The "Guide" is available on the CLU-IN electronic bulletin board SYSOP at (301) 589-8368. It can also be obtained by calling the RCRA/Superfund Hotline at 1 (800) 424-9346, Monday through Friday from 8:30 a.m. to 7:30 p.m. EST.

Corrective Action Technology Workshops

OUST sponsored four Strategic Technology Exchange Workshops (STEWs) designed to improve the understanding and use of "alternative" remediation technologies at petroleum release sites. Each workshop provided state technical staff with an opportunity to identify, discuss, and propose methods for surmounting barriers to the use of select alternative technologies. The focus of each STEW workshop and its location were:

- *Vapor-Based Technologies* (Dallas)
- *Vapor-Based Technologies* (Hartford)
- *Vapor-Based Technologies: Application in Fractured Media* (Philadelphia)
- *Bioremediation* (Denver)

Coming Soon

- Manual on expedited site assessment
- Additional chapters on vacuum-enhanced pump-and-treat and *in situ* groundwater bioremediation for alternative technologies manual
- Revised *Musts For USTs, Dollars and Sense*, and *Straight Talk On Tanks* (in electronic format)
- Information on tank closure
- Revised material for owners and operators on what to do after discovering a leak or spill.

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