UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 1 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: OSWER Directive 9610.17: Use of Risk-Based Decision-Making in UST Corrective Action Programs

FROM: Elliott P. Laws
Assistant Administrator

TO: Regional Administrators
Regions I-X

I am pleased to provide the attached copy of OSWER Directive 9610.17, which encourages the use of risk-based decision-making in underground storage tank (UST) corrective action programs. A risk-based approach is consistent with the Administrator's efforts to ensure that our environmental cleanup programs are based on the application of sound science and common sense and are flexible and cost-effective.

EPA's regulations for the UST corrective action program already give States latitude to tailor their programs. They do not specify cleanup levels or administrative procedures that States must follow. They simply provide that State or local cleanup programs must be protective of human health and the environment.

In other words, EPA's regulations allow States to make choices about how they will design and conduct their corrective action programs. OSWER has long recognized and accepted the responsibility of helping States build corrective programs based on these general principles. That was the impetus for a directive on corrective action streamlining issued two years ago and is the impetus for the directive on risk-based decision-making. These directives are tools that Regional Offices can use to help States build flexibility into their UST corrective action programs.

As presented in this policy statement, the use of risk-based decision-making in UST corrective action programs is conceptually and operationally compatible with the CERCLA remedial and RCRA corrective action programs, EPA's guidance on development of

comprehensive State ground water protection programs, and the environmental justice and brownfields initiatives.

OSWER's Office of Underground Storage Tanks (OUST) has been working with Regional Offices and State and local UST programs for some time to promote the use of risk-based decision-making. With the issuance of this directive, the Regional Offices now have tangible evidence of EPA's support of this approach and therefore should be able to promote it more effectively. In addition, OUST will be working with the Regional Offices to help them use risk-based decision-making in UST corrective action activities on Indian lands.

The policy statement includes a description of our strategy for helping State and local UST programs implement risk-based decision-making. In cooperation with a committee of the American Society for Testing and Materials (ASTM), a group whose membership includes both OUST and Regional Office staff is planning a training program; a number of States have already requested the training.

The use of risk-based decision-making could help State and local UST programs deal with UST releases more quickly and efficiently. Given that 34,000 UST releases were reported in 1994 alone, the need to speed up the corrective action process is obvious. I hope I can count on your support of OSWER's ongoing efforts to help State and local agencies streamline their corrective action programs and introduce the use of risk-based decision-making.

Attachment

cc: UST/LUST Regional Program Directors
UST/LUST Regional Branch Chiefs
Regional Division Directors
ORC contacts
OSWER Office Directors
Assistant General Counsel, Superfund Branch
OUST Management Team

United States Environmental Protection Agency
Washington, DC 20460

EPA OSWER Directive Initiation Request

1. Directive Number: 9610.17

2. Originator Information

Name of Contact Person	Mail Code	Office	Telephone Code
Ivr Auerbach	5401 (W)	OUST	703 308-8862

3. Title
Use of Risk-Based Decision-Making in UST Corrective Action Programs

4. Summary of Directive (include brief statement of purpose)
The purpose of this directive is to encourage UST implementing agencies to use risk-based decision-making in their corrective actionprograms and to provide guidance on the application of this approach.

5. Keywords
Corrective action, risk, underground storage tanks, UST implementing agencies

6a. Does This Directive Supersede Previous Directive(s)? [X] No [ ] Yes What directive (number, title)

b. Does It Supplement Previous Directive(s)? [X] No [ ] Yes What directive (number, title)

7. Draft Level
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This Request Meets OSWER Directives System Format Standards.

	Date
9. Signature of Lead Office Directives Coordinator Shushona Clark, OUST Directives Coordinator Shushona Clark	2/24/95
10. Name and Title of Approving Official Lisa Lund, Acting Director, OUST Lisa Lund	2/24/95

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OSWER Directive 9610.17
March 1, 1995

USE OF RISK-BASED DECISION-MAKING IN UST CORRECTIVE ACTION PROGRAMS

INTRODUCTION AND STATEMENT OF PURPOSE

As applied to corrective action at UST release sites, risk-based decision-making is a process that utilizes risk and exposure assessment methodology to help UST implementing agencies make determinations about the extent and urgency of corrective action and about the scope and intensity of their oversight of corrective action by UST owners and operators.

The primary purpose of this policy statement is to encourage the use of risk-based decision-making as an integral part of the corrective action process at sites where leaking underground storage tank (UST) systems have released petroleum products into the environment and thus created risks to human health and tlie environment. In addition, this policy statement provides guidelines to help UST implementing agencies develop and use risk-based decision-making in a manner consistent with the federal law and regulations applicable to UST corrective action. Some State and loca1;uST implementing agencies have already taken steps to initiate the use of risk-based decision-making in their corrective action programs. EPA plans to begin using risk-based decision-making where it implements such programs--primarily on Indian lands--and expects to work with State and local agencies to help more of them initiate or improve risk-based processes.

Where risk-based decision-making is incorporated ,into the UST corrective action process, the result is usually called risk-based corrective action (RBCA). The American Society for Testing and Materials (ASTM) recently issued an emergency standard for risk-based corrective action; the ASTM standard provides a detailed scientific and technical framework that can be adapted by UST implementing agencies for use in their corrective action programs. Thus, the ASTM standard constitutes one possible starting point for development of a process using the risk-based approaches described in this policy statement. Additional information about the ASTM standard appears later in this document.

Risk-based decision-making is consistent with EPA policies and regulations governing UST corrective action and with the approaches being taken by other EP A programs involved in protection of ground water and cleanup of environmental contamination.

- EPA's regulations dealing with UST corrective action [40 CFR Part 280] are aimed at protecting human health and the environment. Under the regulations, UST implementing agencies, including EP A, are expected to establish goals for cleanup of UST releases based on consideration of factors that could influence human and environmental exposure to contamination. Where UST releases affect ground water being used as public or private drinking water sources, EP A generally recommends that cleanup goals be based on health-based drinking water standards; even in such cases, however, risk-based decision-making can be employed to focus corrective action and guide UST implementing agencies, oversight activities.

- EPA's guidance on the development of Comprehensive State Ground Water Protection Programs (issued November 1992) urges States to take current and prospective uses of ground water, as well as relative risks to human health and the environment, into consideration when establishing goals for the remediation of contaminated ground water . Within this framework, EPA recommended that States use health-based drinking water standards as the remediation goal for ground water that is already used, or could reasonably be expected to be used, for drinking water. In all other cases, States can set cleanup goals based on aquifer priority and other site-specific considerations.

- In the Superfund program, risk-based decision-making plays an integral role in determining whether a hazardous waste site belongs on the National Priorities List. Once a site is listed, qualitative and quantitative risk assessments are used as the basis for establishing the need for action and determining remedial alternatives. To simplify and accelerate baseline risk assessments at Superfund sites, EP A has developed generic soil screening guidance that can be used to help distinguish between contamination levels that generally present no health concerns and those that generally require further evaluation.

- The Resource Conservation and Recovery Act (RCRA) Corrective Action program also uses risk-based decision-making to set priorities for cleanup so that high-risk sites receive attention as quickly as possible; to assist in the determination of cleanup standards; and to prescribe management requirements for remediation of wastes.

BACKGROUND

In the 1980s, to satisfy the need to start corrective action programs quickly, many UST implementing agencies decided to utilize regulatory cleanup standards developed for other purposes and apply them uniformly to UST release sites to establish cleanup requirements. With experience, however, it has become increasingly apparent that applying such standards without consideration of the extent of actual or potential human and environmental exposure is an inefficient means of providing adequate protection against the risks associated with UST releases. Similarly, UST implementing agencies have found that applying identical reporting and review procedures to the planning and conduct of all corrective actions is inefficient for them and for UST owners and operators. These problems have become increasingly serious as the number of UST release sites has multiplied. As of October 31, 1994, more than 270,000 releases had been reported nationwide. In 1994, 34,000 confirmed releases were newly reported. The upcoming 1998 deadline for upgrading, replacing, or closing UST systems likely will increase that number; as owners and operators look at their tank systems to decide whether to upgrade, replace, or close them, they often will discover contamination not previously identified.

Though the number of releases is, and will continue to be, daunting, regulators have made tremendous progress over the last six years. All States and territories, as well as a

number of local governments, have corrective action programs employing a total of about 1,500 technical staff. Nearly all corrective actions are undertaken by UST owners and operators with State and local oversight. Cleanups have been initiated at more than 209,000 sites (of the more than 270,000 at which releases have been reported) and completed at more than 107,000 of them. In spite of this progress, UST implementing agencies face the challenges posed by the more than 163,000 cleanups still underway.

Forty-six States have established State financial assurance funds to help owners and operators satisfy the Federal statutory requirement for evidence of ability to pay the costs of corrective action. These funds serve as both a mechanism for satisfying the Federal financial responsibility requirements and a source of financial assistance to help UST owners pay for corrective actions. While these funds together collect more than $1 billion dollars a year, many are beginning to face solvency issues as reimbursement requests increase. Currently, claims waiting to be paid exceed $1.3 billion. Unfortunately, when reimbursement is not immediately available, corrective actions tend to slow down.

To help UST implementing agencies deal with these challenges, EPA provides support for streamlining (i.e. , simplifying and accelerating) administrative and field investigation processes; promotes the use of cleanup technologies that offer alternatives to traditional excavation and landf1lling (for soils) and pump-and-treat (for groundwater); and assists States in building strong State assurance funds. EPA believes that risk-based corrective action processes are another tool that can facilitate UST implementing agencies' efforts to move all sites forward expeditiously while still assuring protection of human health and the environment. Taking risk into account is not a new idea. In November 1992, in its guidance on streamlining of corrective action processes (OSWER Directive No. 9650.13: Streamlined Implementation of UST Corrective Action Requirements), EPA described four situations in which risk factors could be taken into account in corrective action decision-making. This policy statement builds on concepts articulated in that document.

WHAT IS RISK-BASED DECISION-MAKING?

Risk-based decision-making is a process UST implementing agencies can use to make determinations about the extent and urgency of corrective action and about the scope and intensity of their oversight of corrective action by UST owners and operators.

The real value of risk-based decision-making lies in its potential to help UST implementing agencies and UST owners and operators oversee/manage cleanups of UST releases based on relative risks to human health and the environment. In addition, risk-based decision-making can provide a coherent decision-making framework to help keep transaction costs under control. Thus, while risk-based decision-making can be as protective of human health and the environment as other approaches, it offers a scientifically sound and administratively effective way to respond to the pressures for timely action at large numbers of sites and efficient use of both public and private resources. It is important to recognize

that risk-based decision-making is not intended to be primarily a money-saving tool, even though its use may save money in many cases. At high-risk sites (which account for only 20 to 30 percent of all sites), risk-based cleanups could cost more than those based on other procedures for establishing cleanup goals.

Risk-based decision-making is a mechanism for identifying necessary and appropriate action throughout the corrective action process. Depending on known or anticipated risks to human health and the environment, appropriate action may include site closure, monitoring and data collection, active or passive remediation, containment, or institutional controls. In all cases, the objective is the same, i.e. , to ensure that adequate protection of human health and the environment is provided. The availability of options such as allowing contamination to remain in place or using institutional controls to prevent exposure will depend on applicable State and local laws and regulations.

WHAT RISK-BASED DECISION-MAKING IS NOT

There are a number of common misconceptions about risk-based decision-making. This section attempts to deal with several of them.

- Risk-based decision-making is not just a means of identifying sites requiring no further action. Once an UST release is confirmed, the key decision to be made at all stages of the corrective action process is what action is required in order to protect human health and environmental quality .Only when it can be determined that all necessary risk-reduction action has been completed or alternative measures have been taken can a site be closed out.

- Risk-based decision-making is not just a means of identifying sites at which corrective action can be deferred. EP A encourages UST implementing agencies to categorize sites for the purposes of identifying appropriate initial responses and providing guidance to UST owners and operators on steps that will lead to timely completion of cleanup. EPA does not support the use of risk-based decision-making to prioritize sites, if prioritization implies that some sites would receive attention/action while others are ignored. EPA encourages UST implementing agencies to ensure that UST owners and operators take action as promptly as possible at all UST release sites and to concentrate their own resources on conducting oversight of corrective actions at sites posing the highest risks. Prompt action at low-risk sites may include determinations that monitoring or interim actions are necessary or that no active cleanup is necessary; a risk-based decision-making process can help make such determinations defensible.

- Risk-based decision-making does not supplant the initial steps specifically required by EPA regulations to define site characteristics, contaminant levels, and actual or potential exposures; indeed, in a risk-based process, these steps are critical. Likewise, action to mitigate immediate threats to human health or the environment is required, and a risk-based process can help UST implementing agencies make timely determinations of the need

for such action. In addition, when establishing monitoring and reporting requirements, remediation goals, and identifying alternatives to active remediation, a risk-based process can provide more flexibility than traditional one-standard-for-all-sites approaches.

- Risk-based decision-making does not require multiple studies of site characteristics, cleanup options, or other factors at all sites. In all cases, data collection and analysis need not be more elaborate or extensive than is necessary to provide scientifically and technically sound answers to the questions at hand--to perform an initial site assessment; to provide data needed for exposure assessment; to provide a basis for establishing cleanup goals. For example, expedited site assessment involving the use of field measurements and geophysical techniques is consistent with risk-based decision-making, as long as it provides the data that UST implementing agencies have determined are necessary to categorize sites or take other steps in the process.

RELATIONSHIP TO ASTM STANDARD ON RISK-BASED CORRECTIVE ACTION

This policy statement lays out broad guidelines for the use of risk-based decision-making in UST corrective action programs. A detailed framework for taking risk factors into account in making corrective action decisions has been developed by ASTM and issued as an emergency standard entitled Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites [ES-38-94] .The ASTM standard is an example of how risk-based decision-making can be incorporated into the UST corrective action process in a manner consistent with this policy statement. EP A supported and participated in developing ES-38-94 and believes that its technical content is sound.

UST implementing agencies need not use ES-38-94 in its entirety, but it may be a good starting point for the development of a risk-based process tailored to applicable State and local laws and regulatory practices. One limitation that UST implementing agencies must take into account when using ES-38-94 is that it deals exclusively with human health risks; there will, of course, be cases in which ecological risks have to be considered in establishing cleanup goals.

With support from EPA and other organizations, the ASTM Subcommittee E50.01 on Storage Tanks, which developed ES-38-94, is also developing tools and a training program to help UST implementing agencies understand the concepts of risk-based decision-making and the ASTM standard. Tools being developed include a set of step-by-step worksheets, generic training materials, and an ASTM program to certify instructors who are qualified to provide training. EP A is committed to ensuring that quality training is available to UST implementing agencies interested in considering the adoption of a risk-based approach.

WHERE AND HOW IN THE CORRECTIVE ACTION PROCESS CAN RISK-BASED DECISION-MAKING BE USED?

Wherever there is a confirmed UST release, owners and operators must take action to prevent further releases, control emergency conditions (e.g. , fire and explosion hazards), remove free product, if any, and perform a site assessment. UST implementing agencies should ensure that field measurements and/or laboratory analysis to determine the extent of contamination are appropriately used. Timely collection of appropriate data during the site assessment is critical to successful utilization of risk-based decision-making. After the site assessment is completed, risk-based decision-making comes into play. The principal--but not necessarily the only--uses of risk-based decision-making are described here.

- **To categorize or classify sites:** Comparison of contaminant levels at UST release sites with risk-based criteria can be used to place sites into categories for which there are prescribed initial response actions and/or subsequent steps in the corrective action process. For each category , UST implementing agencies could direct owners and operators to proceed with cleanup according to an acceptable standardized approach. Thus, at low-risk sites, UST owners and operators often would not have to develop site-specific corrective action plans and often could take the prescribed steps without constant oversight by UST implementing agencies. At high-risk sites, UST implementing agencies' policies regarding submittal of corrective action plans and oversight of UST owners' and operators' activities can be incorporated into the steps specified for that category .Such a process could make it possible for appropriate action to be taken in timely fashion at all sites. EP A is not prescribing or recommending any particular categorization scheme. UST implementing agencies choosing to take this approach will need to develop their own. The one included in the ASTM standard is a potential starting point.

- **To aid in establishing cleanup goals:** Risk-based cleanup goals can be either generic or site-specific. Generic goals based on conservative assumptions about factors that may influence human and environmental exposures can be developed for contaminants generally present at UST release sites. Such generic cleanup goals can be designed to provide adequate protection of human health and the environment in the great majority of corrective action cases. Their use generally will cut down on site-specific data collection and analysis and thus expedite corrective action. There are sites where it will be more cost-effective to gather site-specific data and set site-specific cleanup goals based on exposure and risk assessment methodology. Where conditions are similar to those used to establish the applicable generic cleanup goals, site-specific goals may not be significantly different, and the costs of the additional data collection and analysis may negate any savings associated with site-specific goals. UST implementing agencies also should consider the administrative costs of negotiating and overseeing the implementation of site-specific goals as they design and develop a risk-based process. EPA believes that a balance can be achieved between the costs and benefits of employing such a process.

- To decide on levels of oversight of UST owners and operators: Where allowed by State and/or Federal law, both the reporting requirements imposed on UST owners and operators and the extent of oversight by the regulatory agency can be varied in accordance with varying risk levels. Categorizing sites based on risk levels can facilitate such differential oversight. Both the frequency and content of reporting by UST owners and operators can differ based on site categorization. Similarly, whether and how often corrective action sites are inspected, and whether and how UST implementing agencies review technical reports coming from UST owners and operators can be linked to categorization. Thus, regulatory agencies can focus the bulk of their compliance inspection and evaluation resources on those sites where human health and environmental risks are highest.

IMPLEMENTATION OF RISK-BASED DECISION-MAKING

EPA believes that UST implementing agencies should have flexibility to implement, or experiment with, risk-based decision-making in various ways reflecting their differing regulatory mandates. Risk-based decision-making can be phased-in to allow time for needed statutory or regulatory changes. Also, it can be implemented initially through pilot projects to test or demonstrate its effectiveness.

EPA is willing to provide advice and assistance, as explained later in this policy statement, but decisions on whether and how to proceed are solely within the province of UST implementing agencies. In all cases, of course, the process must provide adequate protection of human health and the environment. This section provides general advice on ways to prepare for risk-based decision-making implementation.

- **Building internal and external support:** UST regulators, tank owners and operators, consultants, lending institutions, and environmental and community interest groups all may have concerns about the use of risk-based decision-making in corrective action programs. For example, where a risk-based process might lead to a decision to leave some contamination in place, there may be concerns about liability for the consequences of possible future exposure to such contamination. To enlist the support of interested groups, UST implementing agencies should explain their reasons for wanting to move toward risk-based decision-making and address concerns that such groups may have. Involving such groups in deciding whether and how to use risk-based decision-making will be very valuable in ensuring the long-term success of this approach.

- **Up-front decisions:** Decisions will need to be made about a range of scientific and technical, regulatory , and organizational issues. For example, UST implementing agencies will have to define the criteria (or screening levels) and data requirements for categorizing or classifying sites; decide which risk assessment, fate and transport, and exposure models can be used in performing analyses; delineate procedures to be used in deciding upon cleanup requirements; and identify the circumstances, if any, under which UST owners and operators

will be allowed to use institutional controls or alternative compliance points. UST implementing agencies will also have to make decisions on program management issues, such as where and when oversight and review will occur and how intensive they will be. Coordination with State funds may be a critical issue.

- **Simulations:** After designing a risk-based decision-making process, UST implementing agencies may find it beneficial to run several representative sites through the process. Such simulations--preferably using sites that have already gone through corrective action--may help UST implementing agencies identify problems that were not foreseen when the process was being designed and anticipate questions that UST owners and operators, consultants, and contractors may ask.

- **Training:** Before implementing a risk-based decision-making process, and periodically thereafter, UST implementing agencies will have to train their own staff members, as well as consultants and contractors frequently involved in corrective action, to ensure that they thoroughly understand the risk-based decision-making process and how it affects their work. Basic training in risk and exposure assessment and in the use of fate and transport models, and in other scientific and technical areas may also be necessary. Such training, as well as participation in dry-runs of the risk-based decision-making process will be extremely useful not only for UST regulatory staff, but also for consultants, contractors, lenders, and other stakeholders. Tank owners and operators may not need in-depth training, but an overview of the risk-based decision-making process may be beneficial; among other things, it may help them oversee and interact with the consultants and contractors they hire to undertake corrective action at their facilities.

- **Evaluation:** With implementation of risk-based decision-making, as with all improvement efforts, it is important to be able to document and assess results. For this purpose, UST implementing agencies should identify up-front the ways in which they will measure the impacts of risk-based decision-making and ensure that appropriate data are collected. Developing such measures in advance and collecting real-time data usually will make evaluations less costly and more useful than they otherwise would be and may enable UST implementing agencies to identify opportunities for continuing improvements.

ENVIRONMENTAL JUSTICE CONSIDERATIONS

Residents of low-income and minority neighborhoods may have disproportionately high health risks from environmental pollution--often because many manufacturing and processing, waste treatment and disposal, and other commercial and industrial facilities are located in and around such neighborhoods. EPA urges UST implementing agencies to ensure that the cumulative health risks to people living in such areas are taken into consideration in determining the extent and urgency of needed cleanups of releases from UST systems. A risk-based approach should allow for consideration of these factors at appropriate points in the corrective action process.

REDEVELOPMENT OF CONTAMINATED SITES

Many former commercial and industrial sites containing old or abandoned USTs are being shunned by industries and developers. Their reluctance to use such sites is due in part to uncertainty about their potential liability for cleanup of contamination and the perceived imbalance between the value of such properties and potential cleanup costs. Such sites often are called brownfields--reflecting the appearance of vacant lots where lack of interest in cleaning up or reusing contaminated land has contributed to the general deterioration of urban areas.

Within EPA's Office of Solid Waste and Emergency Response (OSWER), a strategy is being developed that will include actions dealing with UST -related brownfield sites. This strategy will outline measures to prevent sites where UST facilities are located from becoming brownfields and to facilitate assessment, cleanup, and reuse of sites already contaminated by UST releases. Prevention measures will include efforts to encourage compliance with the upgrading, replacement, or closure requirements that take effect in December 1998 and promulgation of a regulation dealing with lender liability for cleanup of contaminated sites.

UST implementing agencies can expedite assessment and cleanup of UST release sites through streamlining of corrective action processes, development of strong State assurance funds, and use of risk-based decision-making. By using a risk-based process that provides for categorization of UST release sites, allows consideration of site-specific factors, where appropriate, and focuses attention on the highest risk sites, States can deal with brownfields sites in a timely fashion and thus encourage economic redevelopment. EP A will work with other UST implementing agencies to carry out this strategy.

EXAMPLES OF STATES' USE OF RISK-BASED DECISION-MAKING PROCESSES

Attached to this policy statement is a description of several examples of risk-based processes already being used by State and local governments. While those described here were developed independent of the ASTM standard, they are similar to it in many respects. Some companies in the private sector also have developed such processes for their own use.

HOW EPA CAN HELP UST IMPLEMENTING AGENCIES

EPA'S Office of Underground Storage Tanks (OUST) and Regional Offices (ROs) will play an active role in promoting the development and implementation of risk-based decision-making processes through information sharing and technical assistance. EPA expects to offer support by funding peer matches through the Association of State and Territorial Solid Waste Management Officials (ASTSWMO); coordinating training programs with ASTM and the American Petroleum Institute (API); preparing and circulating write-ups of State and local experiences with risk-based decision-making; providing forums for

discussions of risk-based decision-making at our national conferences; and providing targeted assistance similar to that being provided for corrective action streamlining. Regional Offices will playa role in this effort by negotiating State Improvement Projects; coordinating and participating in training programs and targeted assistance projects. State and local UST managers should contact EP A Regional Office UST program staff for answers to specific questions about risk-based decision-making or to determine who to contact for the answers.

In implementing the UST program on Indian Lands, the Regional Offices will move toward incorporating risk-based decision-making into their corrective action processes. Doing so will enable the Regional Offices to use their resources more efficiently and gain experience that will improve their ability to help other UST implementing agencies design and implement risk-based decision-making processes.

CONCLUSION

Cleaning up contamination from leaking UST systems poses tremendous administrative, financial, and technical challenges for UST regulators. To cope with these challenges and succeed in protecting human health and the environment, UST implementing agencies, including EP A, will have to employ a broad range of traditional and innovative approaches. This policy statement builds on our experience with corrective action at leaking UST sites and continues EP A's support of innovative approaches by encouraging regulators to adopt risk-based decision-making as an integral part of the corrective action process. EP A believes that risk-based decision-making will enable UST implementing agencies to simplify and expedite their corrective action programs.

ATTACHMENT A

EXAMPLES OF STATES' USE OF RISK-BASED DECISION-MAKING IN UST CORRECTIVE ACTION PROGRAMS

Texas

Texas recently modified its corrective action program; its now risk-based in its approach to prioritizing and remediating leaking UST tank sites. In Texas, risk-based corrective action refers to a case-by-case consideration of the actual or reasonable potential for public and environmental exposure to contaminants in the determination of the timing, type, and degree of site remediation. To implement the new risk-based corrective action program, the Texas Natural Resource Conservation Commission created a new site classification system and site assessment protocol, and adopted new procedures for developing risk-based cleanup levels. In addition, the Commission contracted for the development of a guidance document on fate and transport modeling to support its review of risk assessments reports.

Texas began the transition to a risk-based program by developing a new site classification system. Site classification is based upon site similarity to specific exposure scenarios. Sites fall into one of four classes. Class 1 sites represent an actual or probable impact to public health and safety and may require emergency abatement action or interim containment measures. Class 4 sites pose no threat to the public or the environment. Class 2 and 3 sites pose intermediate threats to public health and safety and the environment. Site classification is determined by using the new Limited Site Assessment (LSA) protocol. The purpose of the LSA is not to define the full lateral and vertical extent of the contaminant-affected area but to evaluate the degree of contamination at the site, identify the media affected, determine critical hydrogeologic properties, and identify receptors potentially affected by the release. Decisions on the urgency of subsequent corrective actions are based on site classification.

Site cleanup levels are determined by the responsible party using one of two established procedures. Plan A is a conservative approach based on established default exposure assumptions and risk management considerations. Plan A generally requires less rigorous assessment and regulatory review; UST owners and operators therefore may be able to start site cleanup quicker. Plan B is a site-specific risk assessment procedure which incorporates less default conservatism and allows for more site-specific considerations. Plan B typically involves more rigorous assessment and regulatory review than Plan A, but it may result in a more focused cleanup effort. However, proceeding under Plan B may require institutional controls (e.g. , land use restrictions, deed certifications) to ensure that exposure conditions do not change. Plan A and Plan B are analogous to Tier I and Tier II in ASTM ES-38.

Ohio

Ohio has developed corrective action roles that include a Site Feature Scoring System (SFSS) and risk-based action levels to assess corrective action sites. Ohio developed a risk-based approach which uses four tiers of risk assessment. The complexity of risk assessment increases from Tier I through Tier IV. The process initially uses conservative scenarios and assumptions; less conservative assumptions are introduced as additional site-specific data are provided to justify them.

Based on data collected during an initial site check or assessment, the responsible party completes an SFSS form, which determines whether or not additional corrective actions are necessary .If contamination is present at or below the action level, further remediation is not required at that time. If the action levels are exceeded, additional corrective actions are necessary.

As an alternative to Tier I (the SFSS action levels), Ohio also allows owners and operators to conduct risk assessments to determine whether clean-ups are necessary and to develop site-specific target cleanup levels. Tier ll, a baseline risk assessment, uses conservative assumptions about pathways and chemicals. Tier ill is a more detailed risk assessment and, if sufficient data exist, specific pathways (e.g. , groundwater ingestion) may be eliminated in this tier. Tier IV consists of a risk assessment with Monte Carlo Sensitivity Analysis. This tier requires additional site-specific information to justify less conservative assumptions about pathways and chemicals.

Illinois

On September 13, 1993, Illinois enacted new legislation governing UST corrective actions. The goals of the legislation are to protect human health and the environment at the lowest possible cost, lower cleanup cost and reduce delays in reimbursement, provide for timely review and response, and eliminate delay in remediation due to lack of funds. Illinois' revised program incorporates risk in the site prioritization and review processes and in the development of site-specific cleanup levels.

Site classification follows early corrective action activities; data obtained as part of early action can be used to classify sites. Sites are classified as high priority , low priority, or no further action based on five "triggering" criteria: 1. physical soil classification; 2. setback zone distance; 3. migratory pathways; 4. Class ill groundwater distance; and, 5. surface water impact. If a site passes on all five criteria, it is classified a no further action site. If a site fails on criteria #2 through #5, it is classified a high priority site. If a site fails on criteria #1, it can be classified as either a high or low priority site depending on the results of groundwater monitoring.

A licensed professional engineer must evaluate all five criteria. UST owners and operators can bypass site classification by performing complete cleanup during the early action phase; however, cleanup costs beyond the early action minimum are not reimbursable

unless approved by the illinois EP A. Based on an early sampling of site classification approvals, the lllinois EP A expects that 15-20 percent of reported incidents will be high priority sites, 65- 70 percent will be no further action sites, and the remainder will be low priority sites.

Regulations implementing the new legislation were effective September 23, 1994. These new regulations include remediation objectives for groundwater and soil. Groundwater objectives apply to potable resource groundwater and are equal to Federal Maximum Contaminant Levels (MCLs). Soil cleanup objectives are based on a three-tier system with the goal of protecting groundwater. Tier I includes a Look-up Table that contains baseline numerical cleanup levels for six indicator contaminants. Tier II cleanup levels are determined based on equations using site-specific parameters. Tier ill cleanup levels are based on performance of risk assessments using formal methodologies (like the ASTM methodology set forth in ES-38) or common sense methods for situations where there are physical limitations (such as permanent buildings and/or highways).

Hawaii

Hawaii offers owners and operators three options for cleaning up contaminated soil and groundwater to levels that are protective of human health and the environment. Option 1 allows owners and operators to clean up soil and groundwater to levels established by the Department of Health. Option 2 allows owners and operators to propose alternative cleanup levels based on risk assessment. Option 3 allows owners and operators to select exposure prevention management to eliminate existing exposure pathways.

Of the three available cleanup options, Option 1 is the simplest and most direct. The Department of Health has established cleanup levels for soil and groundwater with protection of human health and the environment as the ultimate goal. The Department has attempted to establish protective levels that can be practically achieved by owners and operators at many UST release sites. In cases where these criteria are impractical, the risk assessment option and the exposure management option are available to owners and operators.

Where owners and operators propose to leave contamination in soil and water above the recommended cleanup criteria and where complete exposure pathways do exist, the levels of the contaminants left in-place must be supported by a site-specific, quantitative risk assessment. The risk assessment must conclusively demonstrate that the levels of contaminant left in place do not pose a threat to human health and the environment. Because the preparation of a risk assessment involves numerous complex and time-consuming tasks, the Department recommends that owners and operators not enter into this process without fully considering all alternatives, including application of alternative types of technology to meet the recommended cleanup standards.

The Department offers owners and operators a third option, exposure prevention management, which relies on recognition of the lack of exposure pathways inherent to a site, or alternatively, recognizes and relies upon the construction of man-made barriers (such as

asphalt or concrete pavements) to effectively eliminate existing exposure pathways. This option is viewed as a temporary (non-permanent) cleanup option since the potential does exist for the evolution of exposure pathways in the future and because barriers to exposure pathways are not permanent.

Massachusetts

Massachusetts redesigned its Waste Site Cleanup Program to streamline and accelerate cleanup of releases of oil and hazardous material to the environment. The previous program relied heavily on direct oversight of privately-funded assessment and cleanup actions. The redesigned program allows the private sector to take more responsibility for timely site assessment and cleanup and allows the Department of Environmental Protection to focus its resources on responding to emergency spills and on fmding the worst hazardous waste sites and getting them cleaned up.

A cornerstone of the new program is reliance on Licensed Site Professionals (LSPs) , experts in assessment and cleanup, who are licensed by an independent state regulatory board. LSPs are employed by UST owners and operators to oversee site assessment and remediation and to ensure that such actions are performed in compliance with the Massachusetts Contingency Plan (MCP) .By hiring an LSP, UST owners and operators can proceed at most sites on their own and at their own pace.

In the redesigned program, the Department receives notification of releases and threats of releases that exceed specific thresholds. Releases that have not been cleaned up within one year of notification must be scored using the Numerical Ranking System (NRS). The NRS ranks sites using specific criteria and a scoring system based on the existing and potential risks posed by the site to public health, natural resources, and environmental receptors. Generally, sites that score below 350 are Tier II sites. Assessment and cleanup actions can proceed at these sites under the oversight of an LSP and without a Waste Site Cleanup permit or approval. Sites that score 350 or above, as well as sites that are located within certain groundwater resource areas, are Tier I disposal sites. These sites require a permit to proceed with further response actions.

Response actions are complete when a condition of “no significant risk” of harm to health, safety, public welfare, or the environment exists or has been achieved. This standard requires consideration of both current and reasonably foreseeable uses of a site and its surrounding area. The MCP provides three options for defining a level of “no significant riskl” or “how clean is clean enough.” Method 1 uses clear numeric standards for more than 100 common chemicals in soil and groundwater. Method 2 allow for some adjustments in these standards to reflect site-specific conditions. Method 3 allows cleanup requirement goals to be defined on the basis of a site-specific risk assessment. With some limits, UST owners and operators can choose among these methods.

At the conclusion of response activities, a Response Action Outcome Statement must be filed with the Department to document the achievement of a permanent or temporary

solution. Where it is not feasible to achieve a permanent solution, the MCP recognizes where a temporary solution--a major milestone indicating that risks have been reduced, but a "no significant risk" level cannot be maintained--can be achieved. The MCP also establishes an " activity and use limitation" requiring deed restrictions or deed notices to inform future property owners and users of certain limits on activities at a site, unless additional response actions are conducted.

New Jersey

New Jersey applies risk-based decision-making--based on assessments of current and potential future risk--at sites where discharges of hazardous substances have occurred. The process allows UST owners and operators to move forward in an expeditious manner with minimal State oversight.

After the State receives the results of an initial site investigation or remedial investigation, sites are ranked using the Remedial Priority Scoring (RPS) system. The RPS takes into account actual and potential exposure through air , surface water, ground water , and direct contact, as well as fire and explosion hazards, biothreat, and subsurface migration of contaminants. It reflects consideration of receptor distances, population density, contaminant levels, toxicity , waste quantity , soil type, and aquifer usage. UST cases are assigned priority rankings based on RPS scores.

The State's technical regulations specify the minimum requirements for conducting investigations and remedial actions; they also prescribe reporting formats. UST owners and operators are allowed to use field screening methods for soil and groundwater and to undertake single-phased remedial actions (i.e. , UST removals) at non-complex sites--instead of sequentially performing a preliminary assessment, site investigation, remedial investigation, and remedial action. By following the technical regulations, UST owners and operators receive a level of assurance that the work conducted without State oversight will be accepted.

Combining the technical regulations with the State's cleanup criteria and Groundwater Quality Standards (GWQS) allows UST owners and operators to complete a consistent baseline delineation of contamination to appropriate levels without having to develop site-specific cleanup numbers. Soil Cleanup Criteria have been developed for 107 compounds; most have residential and non-residential direct contact and impact-to-groundwater numbers. The soil cleanup criteria were derived from Superfund risk assessment guidance and other State and EP A data. Soil with contamination below residential levels is considered acceptable for unrestricted direct contact use.

Since most groundwater in New Jersey is classified as potable aquifers, groundwater delineation to the GWQS is required. In areas not classified as "potable aquifers, " delineation has to be conducted only to check for possible impairment of existing groundwater uses, violations of surface water quality standards, releases of pollutants to ground surface or buildings, and contaminant migration to potable aquifers.

Once soil and groundwater delineation are completed, a risk-based decision is made on the need for active or passive remediation. This decision is based on the extent of contamination, proximity of receptors, and nature of exposure pathways. In many instances, natural remediation of petroleum-contaminated groundwater is acceptable following source removal (including any free product), where no receptors are at risk and conditions are conducive to natural attenuation. Where soil contamination exceeds residential and non-residential direct contact cleanup criteria, contaminants may remain if appropriate institutional and engineering controls are applied to prevent current and future direct contact. The levels of contaminants that can remain are determined on a site-by-site basis.

UST owners and operators have the option of conducting a risk assessment in accordance with EP A guidance. UST owners and operators conducting cleanups with their own funds have the option of completing cleanups to unrestricted levels to avoid the use of institutional controls.

Reference Documents

Risk-Based Corrective Action for Leaking Storage Tank Sites. RG-36, Texas Natural Resource Conservation Commission, January 1994.

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New Jersey Technical Requirements for Site Remediation. NJAC 7:26E (Technical Regulations) .

New Jersey Soil Cleanup Criteria. In the April 1994 Site Remediation News.

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