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GAO

Report to Congressional Requesters

November 2005

ENVIRONMENTAL PROTECTION

More Complete Data and Continued Emphasis on Leak Prevention Could Improve EPA's Underground Storage Tank Program

GAO-06-45

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Highlights

Highlights of GAO-06-45, a report to congressional requesters

Why GAO Did This Study

Leaking underground storage tanks that contain hazardous products, primarily gasoline, can contaminate soil and groundwater. To address this problem, the Environmental Protection Agency (EPA), under its Underground Storage Tank (UST) Program, required tank owners to install leak detection equipment and take measures to prevent leaks. In 1986, the Congress created a federal trust fund to assist states with cleanups. Cleanup progress has been made, but, as of early 2005, cleanup efforts had not yet begun for over 32,000 tanks, many of which may require state and/or federal resources to address.

GAO identified (1) data on the number and cleanup status of leaking tanks, (2) funding sources for tank cleanups, and (3) processes used by five states with large numbers of leaking tanks—California, Maryland, Michigan, North Carolina, and Pennsylvania—to identify, assess, and clean up sites.

What GAO Recommends

GAO recommends that EPA require states to report to the agency information on all known abandoned tanks. EPA agreed that the UST program could benefit from more specific data on abandoned tanks, but had concerns about the potential burden on states. GAO clarified its recommendation to indicate that EPA should obtain data that states currently compile.

www.gao.gov/cgi-bin/getrpt?GAO-06-45.

To view the full product, including the scope and methodology, click on the link above. For more information, contact John Stephenson at (202) 512-3841 or stephensonj@gao.gov.

What GAO Found

Data submitted to EPA by the states show that, as of March 31, 2005, more than 660,000 tanks were in use and about 1.6 million were no longer in use. In addition, states identified about 449,000 tank releases (leaks) and about 416,000 initiated cleanups, with almost 324,000 of those cleanups completed. States also compile limited data on abandoned tanks—tanks whose owners are unknown, or unwilling or unable to pay for their cleanup—but EPA does not require states to provide separate data on all of their known abandoned tanks. Without this separate data, EPA cannot effectively determine the number and cleanup status of these tanks, or how to most efficiently and effectively allocate federal cleanup funds to the states.

Tank owners and operators are primarily responsible for paying to clean up their own sites, but abandoned tanks are cleaned up using state resources, that may be limited, and federal trust funds. EPA estimates that the average remediation costs per site have been about $125,000, but costs sometimes have exceeded $1 million. Officials from two of the five states we contacted reported that their state funds may be inadequate to address contamination at abandoned tank sites. In this regard, Michigan and North Carolina officials told GAO that, because of resource constraints, they let contamination at abandoned tank sites attenuate (diminish) naturally once immediate threats are addressed. Furthermore, due to limited resources, states must sometimes find other options for cleaning up sites. For example, Pennsylvania officials asked EPA to take over the cleanup work at the abandoned Tranguch site in 1996 because the owner was bankrupt and the state could not pay the expected cleanup costs.

The five states that GAO contacted identify, assess, and clean up leaking tank sites using similar processes. Generally, owners and operators are responsible for conducting these activities under state oversight. Leaking tanks are identified when tank owners report leaks; land redevelopment activities uncover unknown tanks; or state agencies investigate contamination complaints or inspect tanks for regulatory compliance. While regular tank inspections can detect new leaks and potentially prevent future ones, as of early 2005, only two of the five states GAO contacted—California and Maryland—consistently inspected all the state's tanks at least once every 3 years, the minimum rate of inspection that EPA considers adequate. The Energy Policy Act, enacted in August 2005, among other things, requires inspections at least once every 3 years and provides federal trust funds for this and other leak prevention purposes. EPA and some state officials told GAO that increasing inspection frequency could require additional resources. Being able to use trust fund allocations for this purpose will help in this regard. The five states GAO contacted, once they become aware of leaking tanks, identify responsible parties and require them to hire consultants to conduct site assessments and plan and implement cleanup work. The states generally prioritize sites for cleanup according to the immediate threat they pose to human health, safety, and/or the environment.

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Abbreviations

ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	benzene, toluene, ethyl-benzene, xylenes
DEHNR	North Carolina Department of Environment, Health, and Natural Resources
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GAG	Group Against Gas
LUST	Leaking Underground Storage Tank
MDNR	Michigan Department of Natural Resources
MTBE	methyl tertiary butyl ether
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OSC	On-Scene Coordinator
PADER	Pennsylvania Department of Environmental Resources
PADEP	Pennsylvania Department of Environmental Protection
PEMA	Pennsylvania Emergency Management Agency
RCRA	Resource Conservation and Recovery Act
TPHG	total petroleum hydrocarbons as gasoline
USACE	U.S Army Corps of Engineers
$\mu g/m^3$	micrograms per cubic meter
UST	Underground Storage Tank
TPHG	total petroleum hydrocarbons as gasoline

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, D.C. 20548

November 30, 2005

Congressional Requesters:

Leaking underground tanks that store potentially hazardous products, primarily gasoline at service stations, can contaminate soil as well as groundwater, the source of drinking water for nearly half of all Americans. Some components of gasoline can pose serious health risks to the individuals exposed to them. For example, one gasoline additive—methyl tertiary butyl ether (MTBE)—is a potential carcinogen that can migrate quickly through the soil into groundwater. Even in small amounts, MTBE can render groundwater undrinkable and is difficult and costly to clean up. According to Environmental Protection Agency (EPA) data, as of March 31, 2005, about 449,000 fuel releases (leaks) had occurred from the more than 2.2 million active (currently in use) and closed (no longer in use) federally regulated underground storage tanks nationwide. While progress has been made in cleaning up releases, cleanup efforts had not yet begun to address over 32,000 of them.

To address this problem, in 1984, the Congress created the Underground Storage Tank (UST) Program within EPA, which subsequently established the Office of Underground Storage Tanks to manage the program. Under the Resource Conservation and Recovery Act (RCRA), tank owners and operators must register with a designated state or local agency underground tanks that store petroleum or hazardous substances. EPA and the states then track and regulate these tanks. Furthermore, EPA required tank owners to install new leak detection equipment by the end of 1993 and new spill-, overfill-, and corrosion-prevention equipment by the end of 1998. If these conditions were not met, owners had to close or remove their tanks.

Tank owners and operators are ultimately responsible for cleaning up contamination from their leaking tanks. However, in 1986, the Congress established the Leaking Underground Storage Tank (LUST) Trust Fund to provide money for (1) overseeing and enforcing cleanup actions taken by a tank owner or operator, and (2) cleaning up leaks at tank sites where the owner or operator is unknown, or unwilling or unable to take action—which we refer to in this report as "abandoned"—or which require emergency action. EPA or a state can proceed with cleanup using the LUST Trust Fund, and can subsequently seek reimbursement from the owners or operators. The fund is capitalized through a $0.001/gallon tax on gasoline and other motor fuels and the interest that accrues to the fund balance

annually. As of September 2004, the fund balance was about $2.2 billion. The Congress annually appropriates amounts from the LUST Trust Fund to the federal UST Program that EPA uses to negotiate and oversee cooperative agreements with states, implement programs on Indian lands, and support regional offices and state programs. Appropriations from the fund have been about $70 million to $76 million annually. The majority of these funds go to states to implement their underground storage tank programs. As of September 2004, EPA had approved 34 states, the District of Columbia, and Puerto Rico, to operate and enforce their own underground storage tank programs with EPA oversight and monitoring.[1] Fourteen other states operate and enforce their own tank programs under state laws with limited EPA oversight. States receiving LUST Trust Fund money can spend it on cleanup and related activities. In addition, the Energy Policy Act, enacted in August 2005, authorizes states to use a portion of their federal trust funds for inspections and other leak prevention purposes and generally requires that states inspect their underground storage tanks at least once every 3 years. EPA also awards states annual grants to help them fund a portion of their inspection and enforcement costs.

In this context, we identified (1) information available on the number and cleanup status of leaking underground storage tanks, (2) existing sources of funding for cleanups at contaminated tank sites, and (3) processes used to identify, assess, and clean up sites in 5 states with large numbers of leaking tanks—California, Maryland, Michigan, North Carolina, and Pennsylvania. In addition, to provide some perspective on how leaking underground storage tank sites are identified and cleaned up, we are providing information on the history and cleanup status of one leaking tank site in each of these 5 states. This information is included in appendix I.

To address these issues, we reviewed and evaluated program data from EPA and interviewed program officials in EPA's Office of Underground Storage Tanks and EPA Regions 3 (Philadelphia), 4 (Atlanta), 5 (Chicago), and 9 (San Francisco). We also reviewed and evaluated data from and conducted interviews with state program officials in California, Maryland,

[1]EPA retains primary implementation and enforcement authority for more than 2,600 tanks on Indian lands and for approximately 3,500 tanks in Idaho, which does not have the necessary state laws in place. In addition, while New York is responsible under state law for tank inspections, EPA retains enforcement authority over noncompliant tanks in the state because New York lacks the necessary laws regarding leak, overfill, and corrosion protection.

Michigan, North Carolina, and Pennsylvania. In addition, we selected one leaking tank site in each of these 5 states for comparison of cleanup status, costs, and other factors. We included the Tranguch Tire Service, Incorporated, facility in Luzerne County, Pennsylvania, among the sites in our review due to congressional interest. We selected the remaining 4 sites primarily on the basis of their high cleanup costs, cleanup status, and other similarities with the Tranguch site for comparison. We interviewed site project or incident managers and reviewed case files for each site. Additional information regarding our objectives, scope, and methodology is included in appendix II. We conducted our review between August 2004 and November 2005 in accordance with generally accepted government auditing standards, including assessing the reliability of the data we obtained.

Results in Brief

EPA requires states to submit data on their tanks to the agency, including the number of active and closed tanks, the number of confirmed tank leaks (referred to as releases), cleanups initiated and completed, and emergency responses. State data show that, as of March 31, 2005, more than 660,000 tanks were active and about 1.6 million had been closed since the inception of the UST Program in 1986. In addition, the states identified about 449,000 confirmed releases and about 416,000 initiated cleanups, with almost 324,000 of these completed. While states also compile some data on abandoned tanks—tanks whose owner or operator is unknown, or unwilling or unable to clean up leaks—EPA does not require them to separately report to the agency information on the number and cleanup status of all of the states' known abandoned tanks. EPA officials believe that the data the agency currently obtains from states are sufficient for general program oversight, identifying program trends, and determining the progress of individual states' programs. However, without separate data on all known abandoned sites, EPA cannot assess whether these sites are being cleaned up or deferred because of a lack of funding. In addition, because one of the purposes of the federal LUST Trust Fund is to provide money for cleaning up abandoned tank sites, the lack of separate and more complete data on abandoned tanks limits EPA's ability to determine how to most efficiently and effectively allocate trust fund dollars to the states. We are recommending that EPA require states to separately report to the agency information on the number and cleanup status of all of their known abandoned underground storage tanks.

Tank owners and operators are primarily responsible for paying to clean up their own sites, but abandoned tanks are cleaned up using available state

resources—which in some cases may be limited—and the LUST Trust Fund. EPA estimates that the average remediation costs per site have been about $125,000, but costs sometimes have exceeded $1 million. RCRA requires tank owners and operators to provide assurance that, if a release occurs, they can pay the costs of cleaning up a site and compensating third parties for injury and property damage. For example, an owner might purchase commercial insurance or participate in the state's financial assurance or indemnification fund. While each state's fund differs, in most cases, states capitalize their funds with tank registration and petroleum fees. However, abandoned tanks generally do not qualify for funding from commercial insurers and may not qualify for a state's assurance fund. As a result, addressing contamination from abandoned tanks depends largely on the availability of funds from other sources, such as state appropriations and the federal LUST Trust Fund. Environmental officials of 2 of the 5 states we contacted told us that their states' funds are inadequate to address contamination at some abandoned tank sites and, therefore, must rely on LUST funding. For example, Michigan officials told us that the state has insufficient resources to address the backlog of about 4,200 confirmed releases from abandoned leaking underground storage tanks, which will require about $1.7 billion in public funds to remediate. Furthermore, both Michigan and North Carolina officials said that their states defer cleanup or let contamination at abandoned tank sites attenuate (diminish) naturally over a number of years once immediate threats are addressed because resource constraints preclude complete remediation. In addition, when emergency cleanup work was required at an abandoned site in a third state—Pennsylvania—in 1996, state officials asked EPA to take over the cleanup because the owner was bankrupt and the state could not pay the expected cleanup costs. Future workload increases due to as yet undiscovered abandoned sites could place additional demands on state and federal trust fund resources and exacerbate this situation. While EPA and states are undertaking initiatives to make cleanup efforts less expensive and more effective, including using contracts that tie payment to the accomplishment of site cleanup goals, officials from all 5 states agreed that additional federal funds would enhance their states' ability to respond to releases from abandoned tanks.

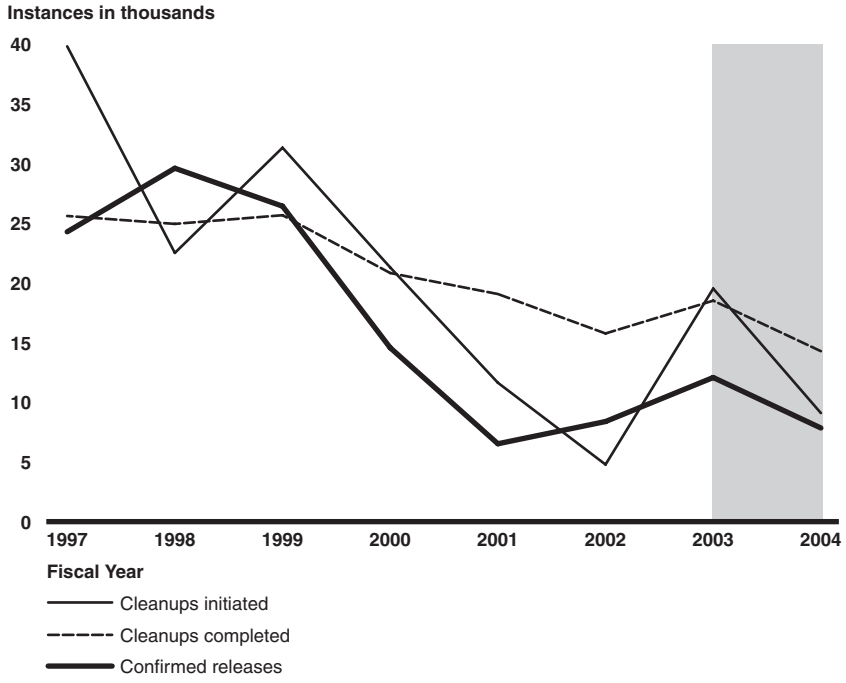
The 5 states that we contacted identify, assess, and clean up leaking tank sites using similar processes. For the most part, owners and operators are responsible for these activities under state oversight. Generally, the 5 states identify leaking tanks when (1) tank owners or operators report to the state that they have confirmed a release after leak detection equipment was activated, after they discovered a loss of product, or after they found leaks

when upgrading, replacing, or closing their tanks; (2) land redevelopment activities uncover unknown tanks; or (3) state environmental or health agencies investigate contamination complaints. Furthermore, while regular tank inspections provide the opportunity to detect new leaks and potentially prevent future ones, as of mid-2005, only 2 of the 5 states—California and Maryland—consistently inspected all of the state's tanks at least once every 3 years, the minimum inspection frequency that EPA considers necessary for effective tank monitoring. However, the Energy Policy Act, enacted in August 2005, among other things, generally requires inspections at least once every 3 years and authorizes federal trust funds to be available for this and other leak prevention purposes. These provisions should allow states to place greater emphasis on their leak detection and prevention efforts. In the 5 states we contacted, once the state environmental agency becomes aware of leaking tanks, it then identifies responsible parties and requires them to hire qualified environmental consultants to perform site assessments or characterizations and develop and implement remedial action plans to effectively clean up the site. All 5 state agencies prioritize most sites for cleanup generally according to the immediate threat they pose to human health, safety, and/or the environment. While states normally oversee cleanups, they may ask EPA to lead or support the cleanup at sites that present an imminent threat, that have no viable responsible party, that do not qualify for funding under a state plan, or for which the magnitude of the cost and cleanup work is beyond state resources.

Background

Data collected from the states and reported by EPA indicate that EPA and states have made progress in cleaning up releases from underground storage tanks over the past decade and a half. According to EPA, of the more than 447,000 releases confirmed as of the end of 2004, cleanups had been initiated for about 92 percent, and about 71 percent of these cleanups had been completed. Figure 1 shows confirmed releases from underground storage tanks, cleanups initiated, and cleanups completed annually from fiscal years 1997 through 2004.

Figure 1: Annual Confirmed Releases from Underground Storage Tanks, Cleanups Initiated, and Cleanups Completed, Fiscal Years 1997 Through 2004



Source: GAO analysis of data collected by EPA from states.

As this figure indicates, the number of new releases confirmed annually declined, from about 12,000 in 2003 to less than 8,000 in 2004—about 35 percent. However, while figure 1 shows a decline in the number of releases confirmed annually over the period, it also shows a decrease in the number of cleanups initiated and completed. According to EPA, the number of cleanups completed each year has generally decreased over recent years and fell by 23 percent—from more than 18,000 in fiscal year 2003 to just over 14,000—in fiscal year 2004. Furthermore, there still remains a national backlog of almost 130,000 cleanups yet to be completed.

EPA's UST Program is primarily implemented by the states. EPA has become directly involved in program implementation only in Indian country and when states have been unwilling or unable to establish effective underground storage tank programs or to address contamination at specific sites. Instead, EPA's primary role has been to establish standards and regulations to assist the states in implementing their programs. While all EPA-approved underground storage tank programs must be no less

stringent than the federal program, individual aspects of each state program differ. For example, state time frames for conducting inspections vary widely. Also, while some states use only state environmental personnel to conduct inspections, others use state-certified private inspectors, or both. Furthermore, state program requirements and standards are sometimes more stringent and inclusive than those under the federal program. For example, states often regulate home heating fuel tanks, tanks on farms, and above-ground tanks that RCRA generally excludes from the federal program.[2]

EPA's UST Program receives approximately $70 million each year from the LUST Trust Fund, about 80 percent of which is used for administering, overseeing, and cleaning up sites. The remaining money has been used by EPA for negotiating and overseeing cooperative agreements, implementing programs on Indian lands, and supporting regional and state offices. EPA spends about $6 million annually from the LUST Trust Fund on the agency's program implementation, management, and oversight activities. Amounts distributed to the states from the fund each year vary depending primarily on whether they have an EPA-approved program, the total number of each state's tanks, and the number of releases from those tanks. Until recently, states could use these funds only for cleanup and related administrative and enforcement activities, and EPA awarded each state about $187,000 annually from the agency's State and Tribal Assistance Grant account to help administer their programs and cover inspection and enforcement costs. Historically, states have used about one-third of their LUST Trust Fund money for administration, one-third for oversight and state-lead enforcement activities, and one-third for cleanups, according to EPA.

The Energy Policy Act of 2005, enacted in August 2005, includes a number of provisions addressing issues relating to training, tank inspections, prohibitions on fuel deliveries to problem tanks, and funding tank inspections and enforcement, among others. With regard to training, the act requires EPA to publish guidelines specifying training requirements for tank operation and maintenance personnel and authorized EPA to award up to $200,000 to states that develop and implement training programs consistent with these guidelines.

[2]RCRA excludes several categories of tanks from regulation under the underground storage tank program, including farm and residential motor fuel tanks with a capacity of 1,100 gallons or less, tanks for storing home heating oil, and septic tanks.

In addition, the act requires EPA and any state receiving federal UST funding to inspect all regulated tanks not inspected since December 22, 1998, within 2 years of the date of enactment. After these inspections are completed, EPA or the state must generally inspect regulated tanks once every 3 years. The act allows EPA to extend the first 3-year period for up to 1 additional year if an authorized state demonstrates that it has insufficient resources to complete all inspections within the first 3-year period. Furthermore, beginning in 2007, the act prohibits deliveries to underground storage tanks that are not in compliance with applicable regulations and requires EPA and states to publish guidelines for implementing the delivery prohibition that would, among other things, identify the criteria for determining which tanks are ineligible for delivery. Finally, the act authorizes substantial appropriations from the trust fund during fiscal years 2005 through 2009 for a variety of activities, including release prevention, compliance, training, inspections, and enforcement.

States Provide EPA with Some Tank and Cleanup Data, but Do Not Provide Separate Information on All Known Abandoned Tanks

EPA collects data on the total number of underground storage tanks and the status of cleanup activities relating to these tanks from all states, and reports this information semiannually.[3] Table 1 shows key tank-related data reported by EPA as of March 31, 2005.

[3]The activity reports also include tank information for the District of Columbia and 5 territories.

Table 1: Key Data on Underground Storage Tanks, as of March 31, 2005

Tank-related data element	Number
Tanks	
Active tanks	660,274
Closed tanks	1,605,711
Total Tanks	**2,265,985**
Leaks (releases)	
Confirmed releases	448,807
Cleanups	
Cleanups initiated	416,246
Cleanups completed	323,586
Cleanups ongoing	92,660
Cleanup backlog	125,221

Source: GAO analysis of EPA data.

EPA's semiannual reports also include, among other data, the number of emergency response actions taken by an implementing agency, such as the state, to mitigate imminent threats to human health and the environment from an underground storage tank system.

EPA, however, does not require states to provide specific data on all known abandoned underground storage tanks. While abandoned tanks are included in the data reported to EPA, they are generally aggregated with the other data and cannot be separately identified. However, all 5 states we contacted compile some limited data on abandoned tanks and report this information separately to the EPA regional office that manages each state's LUST Trust Fund cooperative agreement. In this regard, all 5 states separately report the number of initiated and completed cleanups of abandoned tanks using trust fund money. However, these data do not include separate information on cleanups of known abandoned tanks using state funds or any known abandoned tanks where cleanup has not yet been initiated. EPA officials believe that the data the agency currently obtains from states are sufficient for general program oversight, identifying program trends, and determining the progress of individual states' programs. However, because states generally do not provide separate data on all abandoned tanks, EPA has limited ability to assess and track states'

progress in cleaning up contamination from these tanks. In addition, although one of the primary purposes of the LUST Trust Fund is to provide money for cleaning up abandoned tank sites, EPA lacks information—such as the number of releases from known abandoned tanks in each state and how many of these releases have been or are being cleaned up—to help it determine how to most efficiently and effectively allocate funds to the states for this purpose. EPA allocates amounts from the fund to each state based, in part, on the data each currently provides, but these allocation decisions do not now take into account the specific number of the state's abandoned sites that may require cleanup funds.[4]

Several Funding Sources Exist For Cleaning Up Tank Releases, but Some States' Resources for Remediating Abandoned Tank Sites Are Limited

While tank owners and operators are primarily responsible for cleaning up contamination from leaks in their underground storage tanks, some states assist them through financial assurance or indemnification funds. These funds also sometimes pay for cleanups of abandoned tank sites. However, not all states have indemnification funds and, in 10 of the 40 states that have such funds, claims for cleanup cost reimbursements exceeded fund balances in fiscal year 2004. Consequently, EPA is monitoring the states' funds to determine their viability as financial assurance mechanisms.

EPA, through the LUST Trust Fund, provides some limited support to states for cleaning up abandoned sites as well as for administering, overseeing, and enforcing their cleanup programs. The 5 states we contacted—California, Maryland, Michigan, North Carolina, and Pennsylvania—use differing approaches to ensure funding to clean up contamination from tank leaks. Three of these states—Maryland, Michigan, and North Carolina—are experiencing difficulties in funding cleanups of abandoned tank sites and officials of 2 of these states told us that available resources will be insufficient to clean up all of the abandoned tanks in their state.

[4]EPA allocates LUST trust funds to states primarily on the basis of (1) whether the state has an EPA-approved program and (2) each state's need, as measured by three weighted factors: the total number of tanks, the number of cumulative confirmed releases, and the percentage of the population using groundwater for drinking water. However, while the number of cumulative confirmed releases includes releases from abandoned tanks, the actual number of these releases is not separately taken into account in allocation decisions.

Tank Owners or Operators and State Indemnification Funds Generally Pay for Cleanups

Owners and operators are primarily responsible for cleaning up contamination from leaks in their underground storage tanks. However, according to the director of EPA's UST Program, many of these owners/operators, most of which are small, independent businesses, do not have the financial capacity to pay for expensive cleanups. EPA estimates that the average remediation cost per site has been about $125,000, but costs sometimes have exceeded $1 million. Under RCRA, tank owners and operators must maintain evidence of financial responsibility for carrying out cleanup actions, using one or more of a variety of mechanisms, including commercial insurance, corporate guarantee, letter of credit, qualification as a self-insurer, or an EPA-approved state financial assurance fund. For commercial insurance, the owner/operator usually pays premiums as well as a deductible amount and/or co-payments before the policy begins to cover remediation costs up to some limit of coverage per leak incident. To assist owners/operators in funding cleanups, as of November 2004, 40 states had established state assurance or indemnification funds. State indemnification funds typically have deductible and co-payment requirements similar to those for commercial insurance, but these funds are managed by the state. Indemnification funds are usually capitalized through gasoline and diesel fuel taxes or fees paid by owners/operators registering or obtaining permits for underground storage tanks, as required. Any cleanup costs above the maximum coverage provided by insurance or the indemnification fund are borne by the tank owner/operator. A state fund qualifies as a financial assurance mechanism if EPA has approved it for that purpose. In deciding whether to approve a fund, EPA considers the certainty of the availability of funds for cleanup, the amount of funds that will be made available, the types of costs covered, and other relevant factors.

The 5 states we contacted vary in their approaches to ensuring that contaminated tank sites are cleaned up and that tank owners/operators, to the extent possible, pay the remediation costs. Three of the 5 states—California, North Carolina, and Pennsylvania—currently have financial assurance funds that reimburse owners/operators for cleanup costs under varying conditions. Maryland and Michigan have no such funds, and, instead, tank owners/operators rely primarily on commercial insurance to pay cleanup costs.

California: California's Underground Storage Tank program includes a state financial assurance program—the Underground Storage Tank Cleanup Fund—to assist tank owners/operators in funding site cleanups. The fund, established in 1989, is the state's primary mechanism for

reimbursing owners/operators for their costs of cleaning up leaking underground storage tanks incurred after January 1, 1988. The fund is available to most owners/operators of tanks subject to EPA's Underground Storage Tank Program, as well as owners of certain small home heating oil tanks. The California State Water Resources Control Board administers the fund, which is primarily capitalized through a storage fee—paid by owners of regulated and permitted underground storage tanks—for each gallon of petroleum placed in the tanks. According to board officials, the fund collects about $240 million annually and, except for $200,000 per year that is used for enforcement, monies from the fund are all used for tank cleanups, including such activities as direct cleanup by responsible parties, agency oversight, and replacement of drinking water wells. In fiscal year 2004, California spent approximately $208 million to reimburse responsible parties for direct expenses incurred in cleaning up leaking underground storage tanks.

The fund reimburses tank owners/operators for cleanup costs up to $1.5 million per incident for "reasonable and necessary" remediation costs.[5] Claimants are divided into four classes: class "A" claimants do not have to pay a deductible before costs are reimbursed by the fund; class "B" and "C" claimants must pay the first $5,000 in eligible corrective action costs; and class "D" claimants are responsible for the first $10,000. An Underground Storage Tank Petroleum Contamination Orphan Site Cleanup subaccount was established as part of the fund in September 2004, capitalized with $30 million ($10 million per year for 2005 through 2007) transferred from the fund to reimburse cleanup costs incurred in cleaning up abandoned contaminated urban brownfield sites. In addition to reimbursing owners/operators, state officials said that $5 million a year is transferred from the fund to a subaccount to address emergency, abandoned, and recalcitrant tank site cleanups.

Board officials we interviewed told us that the fund is adequately capitalized and that they do not always spend all available funds each year. Nevertheless, these officials also said that the state is interested in ways to minimize program costs and is experimenting with pay-for-performance remediation contracts, which are now being used at 20 cleanup sites in the state.

[5]The fund also reimburses third-party compensation claims for amounts awarded under a court-approved settlement, final judgment, or arbitration award for bodily injury or property damage.

Maryland: Although Maryland has 2 trust funds that have financed certain cleanup activities, it does not have a fund that EPA has approved for use as a financial assurance mechanism. According to state officials, owners and operators primarily use commercial insurance to demonstrate financial responsibility. The state's Oil Contaminated Site Environmental Cleanup Fund has provided limited cleanup assistance to owners/operators of federally-regulated underground storage tanks, among others. The fund provides funding of up to $125,000 per leak occurrence from underground storage tanks—subject to deductibles from $7,500 to $20,000—and is primarily capitalized by a fee of 1.75 cents per barrel of oil imposed at the first point of transfer into the state. However, the program stopped accepting applications for reimbursement from owners and operators of federally-regulated underground storage tanks on June 30, 2005. In addition, the Maryland Oil Disaster Containment, Cleanup, and Contingency Fund finances, among other things, state cleanup costs for abandoned sites.[6] Revenues for this fund, according to the fund's fiscal year 2004 annual report, are generated by a fee of 2 cents per barrel of oil transferred into the state. From July 1, 2003 to June 30, 2004, this fund paid out about $3.5 million.

Michigan: Michigan's state financial indemnification program for underground storage tanks was terminated in June 1995, because it had insufficient funds to pay existing and future claims. Since that time, tank owners/operators have been required to annually show proof of financial assurance to cover cleanup costs in order to operate in Michigan. Small owners/operators usually provide this proof by obtaining commercial insurance. The state has used a number of sources to fund limited cleanup work at underground storage tank sites, including the Cleanup and Redevelopment Fund, the Clean Michigan Initiative Bond Fund, the Environmental Protection Fund; State General Funds, and the Environmental Protection Bond Fund. Appropriations from these funds address soil, groundwater, and sediment contamination from all sources, including leaking tanks. Most of these funds are no longer available for new projects. According to state officials, in the fall of 2004, state legislators voted to establish a Refined Petroleum Fund that will be capitalized by a 7/8 cent-per-gallon fee on refined petroleum products to be collected through 2010. This fund is expected to accrue approximately $60 million

[6]For releases occurring from improperly abandoned storage systems, the current landowner, and any person who owned, leased, or was otherwise responsible for a system at the time it was abandoned are responsible for cleanup costs.

each year, a portion of which is expected to be used to clean up underground storage tank sites. A Refined Petroleum Cleanup Advisory Council was also established to provide the governor and legislature with recommendations on how to spend the fund's revenues. State officials told us that the council is expected to recommend an increase in the 7/8 cent fee to implement its other recommendations.

North Carolina: North Carolina has a state fund that acts as a financial assurance mechanism and that reimburses owners/operators for most of the costs for site assessments, cleanups, and damages related to leaking underground storage tanks.[7] This fund applies to leaks discovered after June 30, 1988, from commercial underground tanks containing petroleum. The fund is primarily capitalized by a 0.297 cent-per-gallon excise tax on motor fuel sales; a small part of the state inspection tax on motor fuel and kerosene; and annual tank operating fees. Under provisions of the fund, owners/operators of tanks that have upgraded corrosion, leak, and overfill protection pay the first $20,000 of assessment and cleanup costs and the first $100,000 in third party liability costs. The fund then pays all other cleanup costs deemed reasonable and necessary, up to $1 million, and an additional $500,000, with a 20 percent co-payment by the owner/operator, after which any remaining amount is paid by the owner/operator. The state paid approximately $21 million in reimbursements for tank assessment and cleanup costs from this fund in fiscal year 2004.

Because the balance of the fund was not sufficient to cover all obligations, in June 2002, the fund began operating from month to month, paying out funds on a first-come, first-paid basis. This action resulted in a significant backlog of claims with pending payments, according to the fund's annual report. Consequently, EPA is currently monitoring North Carolina's fund to determine its viability as a financial assurance mechanism. To address concerns about the viability of the trust fund, North Carolina officials are considering requiring tank owners/operators to use other forms of financial assurance, such as commercial insurance.

Pennsylvania: Pennsylvania's Underground Storage Tank Indemnification Fund was created by the state Storage Tank and Spill Prevention Act of 1989, as amended, and is administered by the State Insurance Department, according to the fund's 2004 annual report. The fund reimburses tank

[7]The state also has a second fund to pay for, among other things, the cleanup of noncommericial tanks, such as home heating oil tanks.

owners/operators for reasonable and necessary cleanup costs for leaks that occur in regulated tanks on or after February 1, 1994, the date it began operation. The maximum amount of coverage under the fund is currently $1.5 million; however, for claims reported prior to January 1, 2002, the limit was $1 million, according to state officials. The aggregate limit is $1.5 million for owners of 100 or less tanks and $3 million for owners of 101 or more tanks. The fund also covers bodily injury and property damage claims that arise from a leak, indemnifies certified tank installers, and provides loans to owners/operators for upgrading their facilities. According to the fund's 2004 annual report, a claimant for reimbursement from the fund must be an owner or operator of a tank registered with the Pennsylvania Department of Environmental Protection, and must report the claim to the fund within 60 days of the discovery of the release. Claimants must also pay the first $5,000 per tank of allowable cleanup costs and $5,000 per tank of third-party liability claims. State program officials told us that Pennsylvania law requires that the fund be managed on an actuarial basis and that the fee structure be reviewed yearly to maintain solvency. They also said that the fund's objective is to have positive cash flow and invested assets for a projected period of at least 5 years. The fund is primarily capitalized by (1) a 1.1 cents-per-gallon fee (for 2004) on substances such as gasoline, new motor oil, and aviation fuel, (2) investment income generated from fund balances, and (3) a capacity fee of 8.25 cents-per-gallon for substances such as diesel, kerosene, and used motor oil.

While the fund does not directly cover costs for remediating abandoned tank sites, it is authorized to provide allocations to the Pennsylvania Department of Environmental Protection—which manages the cleanup of contamination from these tanks—up to a maximum of $12 million annually: $5.5 million for general environmental cleanup, $5.5 million for catastrophic release, and $1 million for pollution prevention. Department officials told us that each year it must request funding from the fund's board. The board then allocates funds to the department based on the fund's ability to pay tank owners' claims. State fund officials told us that the department has not requested the maximum allocation amount for the past several years, and in some years they have not spent the full amount of the money they requested. According to state officials, the fund collected $68 million in 2004, and paid out $64 million. These state officials told us that the fund is fully capitalized and is working effectively with a balance of $215 million, as of May 2005.

The Leaking Underground Storage Tank Trust Fund Provides Support for State Programs and Abandoned Tank Site Remediation

In addition to the states' funding sources and mechanisms, the LUST Trust Fund assists states in (1) overseeing and enforcing corrective actions taken by tank owners/operators and (2) cleaning up leaking abandoned tanks or tanks that require an emergency action. EPA allocates amounts from the trust fund to each state based on a number of criteria, such as the total number of tanks in the state, the number of confirmed releases, and whether EPA has approved the state's program, among other factors.[8] However, these criteria do not include the number and cleanup status of a state's abandoned tanks. According to EPA program officials, states historically have used about two-thirds of the federal trust fund money allocated to them each year to oversee and support the cleanups paid for by state funds, tank owners/operators, and other financial assurance mechanisms, while the states have used the remaining one-third to directly pay for cleanups of abandoned tanks that are not covered by the other funding sources.

As Table 2 shows, for the 5 states we contacted, the amount of funds that EPA awards from the fund and the portions of these funds the states allocate for cleaning up tank sites varies, as do the amounts of their own funds that they spend on leak cleanups.

[8]A small portion of the total funds is allocated according to performance-based factors, such as the number of cumulative cleanups initiated and completed by each state. Of the 5 states we contacted for our review, 3—Maryland, North Carolina, and Pennsylvania—have EPA-approved underground storage tank programs and the remaining 2—California and Michigan—do not have EPA-approved programs.

Table 2: Five States' Funding from EPA's LUST Trust Fund, the Amounts and Percentages of These Funds Used To Clean Up Tank Sites, and Estimated Amounts of Each State's Own Funds Spent on Tank Cleanups, Fiscal Year 2004[a]

State	Amounts awarded to state from LUST Trust Fund	Portion of LUST fund allocation used to clean up tank sites[b]		Estimated amount of state's own funds spent to clean up tank sites[c]
		Amount	Percentage	
California	$3,538,351	$2,257,026	64%	$240,000,000
Maryland	1,376,825	1,336,825	97%	1,800,000
Michigan	1,750,000	528,596	30%	12,900,000
North Carolina	3,208,081	990,046	31%	21,300,000
Pennsylvania	1,487,152	0	0%	2,200,000
Total	**$11,360,409**	**$5,112,493**	**45%**	**$278,200,000**

Source: GAO analysis of data obtained from EPA and individual states.

[a]Costs are for the states' fiscal year 2004. Because states' fiscal years differ, for Michigan, costs are for the period October 1, 2003 through September 30, 2004; for the other 4 states, costs are for the period July 1, 2003 through June 30, 2004.

[b]States use the remaining portion of their LUST funds for administrative, enforcement, and related purposes. States do not always spend the entire amount of the funding awarded to them during a given year and may carry some portion of it over into subsequent years.

[c]These estimates may not include, among other things, personnel and regulatory oversight costs.

The LUST Trust Fund's contribution to state cleanup efforts is generally small compared to amounts paid by tank owners/operators, state indemnification programs, and other state mechanisms for cleaning up sites each year.[9] For example, in fiscal year 2004, EPA awarded $61.7 million in trust funds to assist states' leaking tank cleanup efforts.[10] However, according to EPA, states, on average, spend a total of about $1 billion to $1.5 billion each year on tank site cleanups. To illustrate, EPA program officials told us that for every federal dollar spent to clean up tank sites, states spend as much as $18 of their own funds.

If cleanup costs paid by owners/operators were included, the actual ratio of dollars spent by other sources to federal dollars could be significantly

[9]Cleanups at federal facilities, tribal lands, or high priority abandoned sites that exceed the state's remediation abilities and/or resources potentially may involve large amounts of federal trust fund resources relative to the annual amounts provided to states.

[10]This amount excludes the $187,000 in annual grants awarded to each state to assist them in managing their underground storage tank programs.

higher than the 18 to 1 calculation provided by EPA. However, tank owners'/operators' costs to remediate a site are difficult to determine since they are not always captured in state and federal records. While state records may include deductible and co-payment amounts paid by owners/operators under state programs, they do not typically include any costs these parties pay that are disallowed by the state. Furthermore, amounts that owners/operators pay in excess of program limits are not captured in state and federal data. For example, California program officials told us that a leaking tank site in Santa Monica contaminated the public water supply with MTBE, which is typically very expensive to clean up. While the owner/operator estimated that it may require $50 million to clean up the site, the state indemnification fund limits reimbursements for cleanup costs to a maximum of $1.5 million per tank per leak incident. As a result, the approximately $48.5 million in additional non-reimbursable costs paid by the owner would not be reflected in program records.

Some States Believe That Funding From Available Sources Is Inadequate to Address All Sites With Leaking Abandoned Tanks

Some states' indemnification funds and other resources may be insufficient to clean up all of the leaking abandoned tanks in their state. For example, according to a survey of states conducted for the Association of State and Tribal Solid Waste Management Officials in early 2005, claims for the reimbursement of cleanup costs exceeded the fund balances in 10 states.[11] Of the 5 states we contacted, officials of 3—Maryland, Michigan, and North Carolina—told us that the state is experiencing difficulties in funding cleanups at abandoned tank sites. Furthermore, officials of 2 of these states—Maryland and Michigan—said that available resources will be insufficient to clean up all of them and that additional resource allocations

[11]Vermont Department of Environmental Conservation, *A Summary of State Fund Survey Results* (June 2005). In the survey, 10 states reported that they did not have sufficient funds available to cover their current tank cleanup costs. However, according to a Vermont official familiar with the survey, 1 of the 10 state funds that were experiencing shortfalls did not address federally-regulated tanks. Furthermore, he said that while the other 9 state funds may have had excess claims, most if not all, of these funds continued to receive revenue and pay claims. The Vermont Department of Environmental Conservation conducts this survey annually for the Association of State and Tribal Solid Waste Management Officials an organization supporting the environmental agencies of the states and trust territories and, in particular, their hazardous waste programs; non-hazardous municipal solid waste and industrial waste programs; recycling, waste minimization, and reduction programs; Superfund and state cleanup programs; waste management and cleanup activities at federal facilities; and underground storage tank and leaking underground storage tank programs.

from the LUST Trust Fund would help address these funding shortfalls and enhance the states ability to clean up leaking tank sites.[12]

Because of funding constraints, Maryland is now prioritizing and deferring cleanups of its abandoned tank sites. The state requires tank owners/operators to demonstrate financial responsibility to pay for cleanup costs, which they generally do by obtaining commercial insurance to fund cleanups of the state's nonabandoned tank sites. However, state officials are concerned that commercial insurance may not provide a dependable source of funding for tank site cleanups, because insurers have sometimes been reluctant to pay cleanup costs when leaks occur. For example, files for the Henry Fruhling Food Store site in Harford County, Maryland (see app. I), indicated that the site's owner/operator experienced problems in getting the insurance company to pay for cleanup costs because he could not prove that the leak occurred during the period of coverage. The absence of insurance funds to pay cleanup costs may lead to more abandoned sites—sites where the owners/operators are unable to pay the cleanup costs themselves—which will require the state to fund cleanup with its own funds or seek federal resources. State officials told us that, in the absence of increased allocations of federal trust funds, they asked the state legislature to approve an increase in Maryland's special oil transfer fee to fund the state's tank cleanup needs. The state legislature subsequently approved the fee increase.

Since Michigan's indemnification fund was terminated in June 1995, because of insufficient funds to pay existing and future claims, tank owners/operators have been required to show proof of financial assurance to cover cleanup costs in order to operate in Michigan. Small owners/operators usually provide this proof by obtaining commercial insurance. However, state LUST program officials cited anecdotal evidence showing that insurance claims for remediation costs are frequently denied because it is often difficult to prove that the release occurred under the period of coverage. If the owner/operator cannot or is unwilling to pay the costs and these costs are not covered by insurance or some other form of financial assurance, the burden for cleaning up a site will fall on the state.

[12]While Maryland was experiencing a funding shortfall as of February 2005, state officials told us that they expected that current funding would be sufficient for cleaning up abandoned sites.

In addition, Michigan program officials told us that the state's causation standard further exacerbates the funding problem for abandoned tanks because it requires that the state prove that the present owner/operator is responsible for a site's contamination before it can be held responsible for cleanup. Proving responsibility becomes difficult in cases where releases have occurred at some point in the past and ownership of the property has changed. If responsibility cannot be established, the state must then fund any cleanup of the site. In addition, state officials said that underground storage tank owners/operators acquiring properties after March 6, 1996, can limit their liability for pre-existing contamination by performing a baseline environmental assessment of the property—any contamination found at that point becomes the responsibility of the owner/operator who caused the contamination or the state if a responsible party cannot be identified. According to program officials, Michigan now has a backlog of 9,000 confirmed releases from leaking underground storage tanks, an estimated 4,200 of which are at abandoned sites. State program officials estimate that it will require about $1.7 billion in public funds to remediate these 4,200 releases alone. However, according to these officials, resources available from all state sources are not adequate to remediate these releases.

North Carolina's commercial trust fund can be used to assist owners/operators with cleanup costs and to assist landowners in cleaning up abandoned sites where the tank owner/operator cannot be located or is unwilling to perform the cleanup. In recent months, according to program officials, claims against the fund have exceeded revenues, causing timeframes for paying reimbursements to stretch out over a year. As a result, the state is now prioritizing sites based on relative risk and directing work only to emergency releases and those leaks that pose the highest risks that can be funded with available resources.

While neither California nor Pennsylvania are experiencing significant problems funding cleanups of leaking tank sites, officials in both states said that they could use more federal funding for leak prevention initiatives and welcome the flexibility to use federal trust funds for that purpose, as provided by the Energy Policy Act of 2005.

In an ongoing review, we are examining the scope and magnitude of states' workload and funding needs for cleaning up contamination from leaking underground tanks. Specifically, for each of the 50 states, the District of Columbia, and 5 U.S. Territories, we are examining (1) how much funding is currently available for cleaning up contamination from leaking tanks, (2)

the extent to which tank cleanup funds have been used for purposes other than cleanups, if at all, and (3) what future revenues will be available to clean up contamination from leaking tanks.

States Identify, Assess, and Clean Up Leaking Tank Sites Using Similar Means

States become aware of leaking underground storage tanks through a variety of methods, including owner/operator reports, complaints by local residents, incidental discovery during land redevelopment or removal of tanks for upgrading or replacement, and compliance inspections.[13] Regular and frequent tank inspections also can detect new leaks—and potentially prevent future ones—before they can lead to serious environmental or health damage, and lessen or avoid the need for costly cleanups. Once contamination from leaking tanks is detected and confirmed, the 5 states we contacted generally use risk-based systems to prioritize sites for cleanup according to the immediate threat they pose.[14] Whether funded by the tank owners/operators, state indemnification or other funds, or other means, states generally direct and oversee site remediation.[15] However, in circumstances where a site presents an imminent threat, has no viable responsible party, does not qualify for funding under a state plan, or for which the magnitude of the cost and cleanup work is beyond state resources, the state may ask EPA to assume oversight responsibility.

States Identify Leaking Tank Sites Through a Variety of Methods

Tank owners/operators are primarily responsible for identifying, confirming, and reporting any leaks that occur in their underground storage tanks and dispensing systems. EPA and the states have established a number of requirements that tank owners/operators must follow to ensure and facilitate the early detection of possible leaks. In this regard, in 1988, EPA issued regulations governing leak detection, among other things. Under these requirements, tank owners/operators must notify the

[13]Owners/operators might, for example, become aware of leaks when their tanks fail tank system (liquid and vapor) integrity tests and report such findings to the state.

[14]In Michigan, a site's redevelopment potential may also be considered. Furthermore, responsible party-lead sites (those not led by the state) in Pennsylvania receive funding from the state's indemnification fund regardless of risk level.

[15]Of the 5 states we contacted, Michigan does not have direct oversight of owner/operator conducted cleanups. Rather the state requires that the owner/operator retain a consultant from an approved list to conduct the necessary investigations, file the required reports, and conduct the cleanup.

designated state or local authority when they discover a release or when leak detection equipment indicates that a leak may have occurred. This notification must generally occur within 24 hours. Tanks must generally be monitored for leaks at least once every 30 days.

Despite these requirements, leaks can remain undetected and/or unreported. According to state officials, owners/operators sometimes do not conduct proper inventory checks or leak detection procedures and may intentionally disconnect leak detection equipment. Also, tank tightness tests are imprecise and tanks can lose small amounts of pressure or vacuum during the test and still pass. Such small pressure leaks can result in large releases of the tanks contents over time. In some cases, tightness tests have failed to detect significant leaks altogether. For example, during investigation of the Tranguch Tire Service site in Pennsylvania, the state Department of Environmental Protection requested tank tightness test results for that facility as well as 3 nearby tank operating facilities. Even though test results showed that 3 of these facilities had passed their tests, 2 of them were ultimately found to have leaking tanks, including all 6 tanks at the Tranguch facility (see app. I). In addition to problems in detecting leaks, some owners/operators fail to report suspected or actual leaks once they are discovered. For example, the tank owner/operator of the fourth facility in the Tranguch investigation did not provide tightness test results as requested but admitted that a leak had occurred at the site several months earlier that he had not reported.

While owners/operators identify many leaks through established testing and monitoring procedures, EPA and officials of the 5 states we contacted told us that many leaks are discovered only when tanks are removed for replacement or closure. When tanks are replaced or facilities closed, in some states—such as California, Maryland, and Pennsylvania—a state certified or licensed environmental consultant or contractor removes the tanks, sometimes with state or local agency oversight. Other states, such as Michigan and North Carolina, do not require the contractor to be certified. In Michigan, however, any person who removes or installs a tank must have a million dollars in pollution liability insurance, according to state officials. As part of this process, soil samples generally are taken from the excavation and tested to determine whether contamination is present. However, leaks are often readily apparent because of the presence of liquid product (gasoline or diesel fuel) and/or strong fumes; state or local environmental or health agencies may discover leaking tanks when investigating homeowner complaints about such odors in their residences or gasoline contamination in their well-water.

Frequently, unknown and abandoned tanks are discovered when land is being excavated during property redevelopment. In these cases, states generally follow the same process of sampling and testing described above to assess contamination at the site. However, if contamination is found, the responsibility for cleaning up these sites differs from state to state. For example, in Pennsylvania, the new owner of the contaminated property would be responsible for cleaning it up, according to state officials. However, Michigan state officials told us that Michigan law limits the cleanup responsibility to those who actually caused the contamination. Therefore, the state would have to pay for the cleanup unless it could identify the party or parties who caused the contamination, which can be difficult.[16] In general, cleanup costs for abandoned tanks where no owners or operators can be found usually become the state's responsibility.

Some States' Inspection Rates May Have Limited the Timely Detection or Prevention of Leaks

In addition to other methods for discovering leaking tanks, state or local environmental agencies may detect leaking tanks or indications of possible leaks while inspecting facilities for compliance with regulatory requirements. EPA recommended that states conduct tank inspections at least once every 3 years. However, of the 5 states we contacted, as of mid-2005, only 2 regularly inspected their tanks as frequently as EPA recommended, according to state officials. State officials told us that California requires annual inspections of all tanks; Maryland inspected its state's tanks every 3 years; Michigan generally inspected every 3 years, depending upon the location of the tanks and state inspection staffing levels; North Carolina inspected once every 4 or 5 years, due to funding limits; and Pennsylvania inspected at least once every 5 years.[17]

EPA reported that, as of September 2004, about 35 percent of the nation's underground storage tanks were not in "significant operational compliance" with the applicable release detection and prevention requirements, indicating a need for greater emphasis on inspections. EPA and state officials agreed that regular inspections of underground storage

[16]According to state officials, while this law makes it difficult in certain cases to identify liable owners/operators, it has been very successful in promoting redevelopment of brownfield properties—the new owners/operators who did not actually cause the release are not liable for cleanup and have an incentive to develop the property.

[17]According to state officials, Pennsylvania inspects tanks with total secondary containment at least once every 10 years. State officials also told us that Pennsylvania has drafted regulations that would require inspections to be conducted every 3 years.

tanks provide the opportunity to detect new leaks before serious environmental or health damage can occur and potentially prevent future leaks. Even if performed on a regular basis, infrequent inspections may allow violations of leak prevention and other tank requirements to go undetected long enough for leaks to occur and contamination to spread, potentially resulting in environmental and health consequences and the need for costly cleanups.

While more frequent inspections potentially could enhance preventive efforts, state officials in 4 of the states we contacted told us that increasing the frequency of inspections would require additional resources. Although EPA recommended inspections at least once every 3 years, EPA program officials recognized both the value of increased inspections and some states' need for additional resources to conduct more frequent inspections, and supported providing more flexibility in the use of LUST trust funds for these purposes.

In 2001, after reviewing EPA's and states' efforts to enforce UST Program regulations, we recommended that EPA negotiate with each state to reach a minimum frequency for physical inspections of all its tanks and present to the Congress an estimate of the total additional resources the agency and states would need to conduct the inspection, training, and enforcement actions necessary to ensure tank compliance with federal requirements.[18] In addition, to strengthen EPA's and the states' ability to inspect tanks and enforce federal requirements, we suggested that the Congress consider (1) authorizing EPA to establish a federal requirement for the physical inspections of all tanks on a periodic basis and (2) increasing the resources available to the UST Program, based on a consideration of EPA's estimate of resource needs. We noted that one way to do this would be to increase the amount of funds the Congress provides from the trust fund and to authorize states to spend a limited portion of these amounts on inspection, training, and enforcement activities to detect and prevent leaks, as long as this did not interfere with tank cleanup progress. Generally consistent with

[18]GAO, *Environmental Protection: Improved Inspections and Enforcement Would Better Ensure the Safety of Underground Storage Tanks*, GAO-01-464 (Washington, D.C.: May 4, 2001). Our subsequent work confirmed and updated our 2001 findings: GAO, *Environmental Protection: Improved Inspections and Enforcement Would Ensure Safer Underground Storage Tanks*, GAO-02-176T (Washington, D.C.: November 1, 2001); GAO, *Environmental Protection: Improved Inspections and Enforcement Would Ensure Safer Underground Storage Tanks*, GAO-02-712T (Washington, D.C.: May 8, 2002); and GAO, *Environmental Protection: Recommendations for Improving the Underground Storage Tank Program*, GAO-03-529T (Washington, D.C.: Mar. 5, 2003).

our recommendations, the Energy Policy Act of 2005, among other things, generally requires inspections once every 3 years, increases amounts authorized to be appropriated from the fund, and authorizes these funds to be used for inspections, training, and other enforcement and prevention activities.

States Use Risk-Based Assessments to Determine Cleanup Priorities

The 5 states we contacted all use risk-based systems to prioritize leaking underground storage tank sites for cleanup according to the immediate threat they pose to human health, safety, and/or the environment.

- California prioritizes cleanup sites based on risk, with the highest risk sites remediated first. California uses many of the same procedures employed under the American Society for Testing and Materials' (ASTM) risk-based corrective action process. This process has 3 tiers and tables to determine priority rankings. The highest priority is assigned to sites that pose a threat to human health and the next highest to those posing an environmental threat. Under this system, immediate threats are abated first and then sites with the likelihood of future impact are addressed.

- Maryland uses a risk-based determination to prioritize both abandoned and nonabandoned leaking tank sites. For example, if contaminated well water is the primary threat involved, well samples are drawn and tested and the levels of the various compounds found are compared to EPA safe drinking water standards. Abandoned sites whose cleanup will have to be paid for by the state are remediated if they pose an immediate threat to public health. The cleanup of nonabandoned sites is paid for by the tank owners and operators and begins immediately regardless of threat level.

- Michigan uses a modified ASTM four-tier classification system to prioritize sites according to their threat. The classification system ranges from class 1—an immediate threat to the public or environment—to class 4—no demonstrable long-term threat. Michigan also uses a risk-based assessment and corrective action process, based on the ASTM process, which allows contamination to remain on-site as long as it is possible to demonstrate that human health and the environment are adequately protected.

- North Carolina prioritizes leaking tank sites according to three levels of risk: high, intermediate, and low. High risk sites are those that pose an

immediate threat to human health and the environment because, for example, a leak presents an explosion hazard from petroleum vapors or a release is within 1,000 feet of a drinking water well. Intermediate risk sites include those that contaminate or potentially could contaminate surface water, a wellhead protection area, or an area that recharges drinking water aquifers, or have groundwater contamination levels high enough that natural attenuation may be impeded. Low risk sites involve releases that do not fall into the other 2 categories or that pose no significant risk to human health or the environment. The state is now addressing only the highest risk sites and emergency releases, with the goal of moving them to the intermediate risk level. North Carolina also uses a risk-based assessment and corrective action process wherein more contamination can remain on site as long as adequate protection of human health and the environment can be demonstrated. For instance, the state groundwater standard for benzene is 1 part per billion, but cleanup to 5,000 parts per billion may be allowed if it can be shown that the remaining pollution poses no threat to human health and the environment.

- Pennsylvania Department of Environmental Protection uses a modified ASTM system that classifies abandoned tank sites based on 4 priority levels. Priority 1 sites are those that pose an immediate threat to human health, safety, or sensitive environmental receptors; Priority 2 sites pose short-term (up to 2 years) threats; Priority 3 sites pose long-term (greater than 2 years) threats; and Priority 4 sites present no such demonstrable long-term threats. Pennsylvania does not generally prioritize responsible party lead cleanup sites addressed under the state's indemnification fund—all eligible sites receive funding for cleanup and are required to follow the corrective action regulations, according to state officials.

States Generally Direct and Oversee Remediation, but May Ask EPA to Lead or Support Certain Cleanups

Under RCRA regulations, tank owners/operators must notify the designated state or local authority when they discover a release or when leak detection equipment indicates that a release may have occurred. Owners and operators must then undertake appropriate cleanup action in accordance with the regulations. Environmental consultants, in collaboration with the state or local environmental agency, usually perform the site assessment, determine the technology and approach needed to contain and remediate the contamination, and implement and complete site cleanup. The method of cleanup selected is tailored to the specific characteristics of the site, including the probable pathways the

contamination will follow to threaten the soil, groundwater, and/or the health of surrounding residents. Depending on whether the contamination has reached the local groundwater, treatment methods can range from the removal and on-site treatment of contaminated soil to expensive on-site pump-and-treat and vapor extraction systems, activated carbon filtration systems for municipal water systems, and vapor extraction and water treatment units for nearby impacted or threatened homes and businesses, among others.

EPA seldom becomes directly involved in this process unless the site is located at federal facilities or on Indian reservations. However, states may ask EPA to lead or support the cleanup at sites that present an imminent threat, have no viable responsible party, do not qualify for funding under a state plan, or for which the magnitude of the cost and cleanup work is beyond state resources. For example, state officials asked EPA to assume the lead on cleaning up the Tranguch Tire Service site in Pennsylvania after they determined that site remediation costs would far exceed the state's resources (see app. I). This leak involved the release of an estimated 25,000 to 50,000 gallons of gasoline. The leaking fuel reached the aquifer and the contamination plume migrated off-site into the sewer system of the surrounding residential neighborhood. According to an EPA Region 3 official, gasoline and gasoline fumes seeped into the basements of 20 to 30 homes through the sewer system as well as into a nearby creek. After conducting an environmental investigation of the area, the Pennsylvania Department of Environmental Resources required the owner/operator of Tranguch to begin site characterization and cleanup work. However, in 1995, the owner of the Tranguch facility declared bankruptcy and the state assumed responsibility for characterizing the site and mitigating vapors in area homes. By March 1996, the state had spent $2 million on the site and did not have the funds that were going to be necessary to clean up the site due to its potential magnitude. According to state officials because of the emergency nature of the situation and funding problems, the state asked EPA to take over as the lead agency for remediating the site, which EPA did in late August 1996. To date, in addition to the amounts paid by the owner/operator and the state, the Tranguch site remediation has required

over $25 million in federal funding, primarily from the Oil Spill Liability Trust Fund.[19]

Conclusions

While the data that states report to EPA on underground storage tanks provides the agency with information it can use to determine the overall trends and status of the UST Program, the lack of specific and complete data on known abandoned tanks limits EPA's program oversight and its ability to efficiently and effectively allocate LUST Trust Fund resources. Without such information, neither EPA nor the Congress can readily determine the number of abandoned tanks requiring cleanup nationwide, whether this number is growing, whether states are initiating and completing or deferring work, and what the potential impacts on state resources and, ultimately, the LUST Trust Fund may be. Furthermore, although one of the primary purposes of the fund is to help states clean up releases from abandoned tanks, EPA currently allocates resources to the states without taking into account how many abandoned tanks each state has, how many are leaking, or how many are being cleaned up. All 5 of the states we contacted provide data to EPA on their abandoned tanks aggregated with other tank data and separately identify and report some limited information on abandoned tanks to EPA regional offices. Asking the states to separately identify information on all known abandoned tanks in the reports they currently provide to EPA should not pose an additional burden. In any case, we believe that requiring states to specifically report information on all known abandoned tanks would provide EPA useful data for overseeing the UST Program and more efficiently and effectively allocating LUST Trust Fund resources.

While the extent to which this situation exists nationwide is unknown, officials in 2 of the 5 states told us that the state's present resources are inadequate to cover cleanup efforts. At the same time, the LUST Trust Fund has continued to grow through a continuing inflow of fuel tax revenue and accrued interest—reaching a balance of about $2.2 billion at the end of 2004—with only about $70 million to $76 million (less than 4 percent of the

[19]The Oil Spill Liability Trust Fund is a $1 billion fund authorized by the Oil Pollution Act of 1990 to pay for (1) federal cleanup actions, (2) certain claims for uncompensated removal costs and damages, and (3) natural resource damage and restoration activities resulting from oil spills or the substantial threat of oil spills to the waters or shorelines of the United States. This fund is administered by the National Pollution Funds Center of the U.S. Coast Guard.

total fund balance) allocated annually to support state programs. Furthermore, the EPA and state officials we contacted believed that greater emphasis on leak prevention activities, such as tank inspections, is necessary to detect compliance problems that can lead to future leaks and uncover physical evidence of leaking tanks so that states can respond more quickly, if warranted, to prevent or limit the potential health and environmental impacts on nearby communities. Moreover, the cost of taking measures to prevent a release is generally much less than the cost of cleaning up a release after it occurs. The underground storage tank provisions of the Energy Policy Act of 2005 may lead to increased resources for cleanups of leaking tanks and stronger enforcement efforts that could prevent leaks and lead to the early detection of existing leaks, thereby reducing the need for costly cleanups.

Recommendations for Executive Action

To improve EPA's oversight of the leaking underground storage tank program and its ability to determine how to most efficiently and effectively allocate, LUST Trust Fund dollars to the states, we recommend that the Administrator of EPA require that states separately identify, in their reports to the agency, information on the number and cleanup status of all known abandoned underground storage tanks within their boundaries.

Agency Comments and Our Evaluation

We provided a draft of this report to EPA and the states of California, Maryland, Michigan, North Carolina, and Pennsylvania for their review and comment. In commenting on the draft report, EPA stated that, in general, the agency thinks that the report's findings and conclusions have merit, and that it will assess the feasibility of implementing our recommendation. EPA agrees that the UST Program could benefit from more specific information about abandoned tank sites. However, EPA notes that the process that states must conduct to establish that a tank is abandoned—that its owner is unknown or unwilling or unable to pay for leak cleanups—may involve ownership searches to identify the potentially responsible party and assessment of their financial ability and willingness to pay for cleanup. With this in mind, EPA is concerned about placing an undue burden on states by requiring them to provide specific data on abandoned tanks. Therefore, EPA stated that, in consultation with the states, the agency will consider how best to incorporate our recommendation.

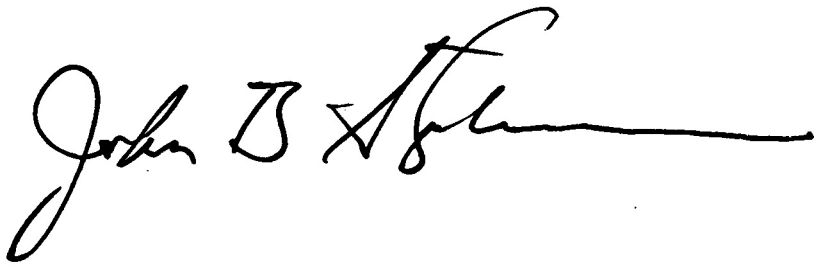
We share EPA's concern about placing an additional burden on states by asking them to determine whether a given tank is abandoned by

undertaking a potentially labor-intensive and costly effort to establish who owns the tank and whether this owner is financially able and/or willing to pay for cleaning up a leak. However, we are not suggesting that states should make an effort to identify unknown abandoned tanks; rather we are recommending that they report to EPA separately the information they currently have on tanks that they know are abandoned, and, as new abandoned tanks are identified in the normal course of program operations, report this information to EPA as well. This should place no additional burden on the states. States currently provide EPA data on known abandoned tanks aggregated with all other tanks in the state. We are simply recommending that the states break out the data on their abandoned tanks from total tank data. Because a limited portion of these data—information on abandoned tanks being cleaned up using LUST Trust Fund resources—is currently broken out and provided to EPA's regions, the UST Program could easily utilize these existing data and EPA would only have to require states to break out the remaining data on the number and cleanup status of their known abandoned sites. Having more complete data on abandoned tanks would allow EPA to better determine the potential scope of the problem and the progress that states are making towards addressing it. It would also permit EPA to take this information specifically into account in allocating LUST Trust Fund resources. Given EPA's concerns, we have clarified our recommendation by explicitly stating that EPA should require states to provide separate data on the number and cleanup status of all their known abandoned tanks. EPA also provided technical comments, which we have incorporated into this report as appropriate. Appendix III contains the full text of the agency's comments in a letter dated November 2, 2005.

Officials from the state of Maryland said that they had no comments on the draft report. California, Michigan, North Carolina, and Pennsylvania officials provided a number of technical comments, which have been incorporated into the report where appropriate. In addition, Pennsylvania officials expressed concerns similar to those raised by EPA relating to the additional burden on states of identifying unknown abandoned tanks. As noted, we have clarified our recommendation to address these concerns.

We will send copies of this report to the appropriate congressional committees and to the Administrator of EPA. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions on this report, please contact me at (202) 512-3841 or at stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who contributed to this report are listed in appendix IV.



John B. Stephenson
Director, Natural Resources
and Environment

List of Congressional Requesters

The Honorable Susan M. Collins
Chairman, Committee on Homeland Security
and Governmental Affairs
United States Senate

The Honorable Rick Santorum
United States Senate

The Honorable Arlen Specter
United States Senate

Information on the History and Status of Cleanup Activities at Five Underground Storage Tank Sites

The following are summaries of the major events surrounding the discovery and cleanup of contamination from leaking underground storage tanks at 5 sites: (1) Coca-Cola Enterprises in Yuba County, California; (2) Henry Fruhling Food Store in Harford County, Maryland; (3) Bob's Marathon in Grand Ledge, Michigan; (4) R.C. Anderson Trust in Nash County, North Carolina; and (5) Tranguch Tire Service, Incorporated, in Luzerne County, Pennsylvania. The summaries include a chronology of significant site occurrences as well as additional information on the amount of leaked fuel, the contaminants involved, the impacts of the leak on the surrounding environment, the costs of remediating the site, the extent, if any, of EPA involvement in the cleanup, communication between state agencies and the affected public, and litigation relating to the site.

Coca-Cola Enterprises, Yuba County, California

The Coca-Cola distribution warehouse on this site was built around 1970, and was originally used by another business to build mobile home units. The 5,000 gallon underground storage tank system from which the leak at the site occurred was reportedly installed on the east side of the building when the facility was first constructed. The property and surrounding area are zoned for commercial use. Yuba County Municipal Airport is located south of the site and a public drinking water supply well operated by the City of Olivehurst is located about 850 feet east of where the tank system was formerly located.

Chronology of Key Site Events from the Case Files

- **June 1989 – August 1989:** Coca-Cola Enterprises had the 5,000 gallon unleaded gasoline underground storage tank, piping, and dispensing system excavated and removed. The tank and piping appeared to be in good condition, but the soil exhibited a slight petroleum odor. According to the case file, soil samples were collected from beneath the system during removal, as required by California law. Field observations and analysis of soil samples determined that gasoline was present in the soil in concentrations that required remediation. The Yuba County Office of Emergency Services filed a report of an unauthorized leak.

- **December 1989 – May 1990:** The site was assessed for contamination, which included a soil gas survey and the drilling and installation of borings, groundwater monitoring wells, and vapor extraction test wells. Groundwater samples were collected as monitoring wells were installed and an analysis indicated that the groundwater at the site was contaminated. A municipal drinking water supply well for the City of

Olivehurst was discovered 850 feet east of the tank system's former location. However, analyses of water samples from that well did not indicate any contamination. While the contaminant plume extended 120 feet east of the release site, it was confined within the south and east boundaries of the property.

- **May 1990 – December 1990:** The Yuba County Air Pollution Control Office authorized the on-site aeration of contaminated soils that had accumulated during drilling activities. The soil aeration began in June 1990 and was successfully completed in September 1990. A quarterly groundwater monitoring and sampling program also began in June 1990. In August, a vapor extraction pilot test was conducted at the site. Petroleum was found in a monitoring well at the site in September and about 7.5 gallons of gasoline were removed from the well from September through November. By December, approximately 0.08 feet of gasoline remained in the well.

- **February 1991 – August 1991:** The environmental consultant for Coca-Cola Enterprises submitted its contamination assessment report, which assessed the extent of vertical and lateral petroleum contamination at the site during the underground storage tank removal operations. The consultant also completed a remedial action plan that presented a conceptual system design for remediating hydrocarbon contamination in soil and groundwater at the site. The plan proposed an integrated remediation system incorporating (1) a groundwater pump and treat system with an air stripper system to remove volatile compounds from groundwater, (2) a vapor extraction system to remove vapors from contaminated soils in the unsaturated zone, and (3) a thermal oxidizer to burn off the vapors. The consultant estimated that remediating the site would take 3 years, with one additional year for monitoring and closure. Cleanup oversight was transferred from the Yuba County Office of Emergency Services to the Regional Board in February 1991, and in March 1991, the Board approved the contamination assessment report.

- **April 1993 – September 1998:** The recommended remediation system began operation in April 1993. In August 1996, an oxygen release compound was installed in three perimeter vapor extraction wells to increase the dissolved oxygen concentrations in groundwater to enhance the natural bio-attenuation of petroleum hydrocarbons. The pump and treat system was operated intermittently until mid-November 1997, when the system was shut down to prepare for site closure

following approval from the Central Valley Regional Water Quality Control Board. Groundwater monitoring and sampling continued on a quarterly basis. In September 1998, the Board approved initiation of closure activities.

- **October 1998 – Early 2000:** Monitoring indicated that the contamination plume might have migrated southward in late 1999 and early 2000 and that further remediation and changes in the sampling and analysis program were warranted. The remediation system was restarted in December 1999, with upgrades to increase flow rates and optimize efficiency and was completed in January 2000. The revised sampling and analysis program was initiated shortly thereafter. A survey to identify water wells within 2,000 feet of the leak site conducted by the site's environmental contractor identified 2 municipal wells, with the nearest approximately 850 feet east of the former tank location. However, sampling and analysis conducted by the Olivehurst Public Utility District revealed that the closer of the 2 wells had not been affected by the contamination plume.

- **April 2002 – March 2004:** Because monitoring and sampling showed no hydrocarbon concentrations in the groundwater monitoring wells, the system was again shut down in April 2002. Quarterly groundwater monitoring after the system was shut down showed that the contamination plume had stabilized and, in July 2003, the site's owner requested the Central Valley Regional Water Quality Control Board's approval to close the monitoring wells. The wells were abandoned by late December 2003, and the Board closed the remediation case in March 2004.

- **Status as of August 2005:** Cleanup was completed.

Summary of Key Information from the Case Files

- *Contaminants and compounds of concern:* Gasoline (total petroleum hydrocarbons as gasoline—TPHG), benzene, toluene, ethyl-benzene, xylenes (BTEX)

- *Size of leak:* Unknown.

- *Impacts of contamination:* Soil and groundwater contamination occurred at the site but was contained within the property.

- *Remediation cost:* The California underground storage tank fund spent $1,202,745 to reimburse site owners/operators for site remediation costs. Additional amounts that may have been paid by Coca-Cola Enterprises that were not reimbursed are unknown.
- *U.S. Environmental Protection Agency involvement:* None.
- *Communication between responsible agencies and the public:* No evidence of public meetings appears in the case files.
- *Litigation:* Case files show no evidence that any lawsuits were filed relating to this site.

Henry Fruhling Food Store, Harford County, Maryland

The Henry Fruhling Food Store was a single family dwelling with an attached small grocery store. The store had two 1,000 gallon underground storage tanks and distribution systems for gasoline, which were installed around 1966, and a 500 gallon underground tank and distribution system for kerosene. Sometime prior to 1966, 2 similar underground gasoline tanks and distribution systems were located on the site but were removed by the previous owner.

Chronology of Key Site Events from the Case Files

- **1970:** A nearby resident complained to the owners of the store about an odor or taste of gasoline in his well water. The tank maintenance company performed a pressure test on the tanks and distribution systems but found no leaks.
- **June 1980 - September 1980:** Water samples taken by the Harford County Health Department in response to another nearby resident's complaints about gasoline in his well water indicated petroleum contamination. That resident was warned not to consume water from his well and the matter was referred to the Maryland Department of Natural Resources (the predecessor of the Maryland Department of Environment) for action. That resident also filed a complaint with the department concerning the presence of oil in his well, which was referred to the Environmental Health Administration and the Harford County Health Department for follow-up actions.
- **October 1980:** One of the store owners was badly burned—and later died—when gasoline fumes ignited in his basement.

- **November 1980:** Water samples obtained by the Harford County Health Department identified gasoline in the store owner's well and the case was assigned to the Department of Natural Resources for enforcement action.

- **January 1981 – February 1981:** In mid-January, the Department of Natural Resources notified the company that had maintained the tanks and pumps since 1976 of their determination that a pollution violation had occurred. The Department ordered the company to (1) stop discharging petroleum products into state waters, (2) test the tightness of the tanks and supply systems, and (3) initiate actions to recover petroleum from groundwater at the site. In late January, tightness tests were performed on both tanks and supply systems and no leaks were found. In early February, the Department took auger probes at various locations throughout the Fruhling property and found explosive vapors in the soil in the vicinity of the tanks and pumps. In a letter dated February 27, the Department told the owners and the tank maintenance company that (1) they had achieved substantial compliance with their order and that no gasoline was then leaking into the groundwater, (2) based on information they had provided the Department, there was a "strong probability" that, at some time during the past several years, repairs had been made to the gasoline pump that may have eliminated a leak in the system, and (3) the results of the recent boring tests and a survey of the area indicated "a very low probability" that the gasoline in the groundwater was coming from any source other than the system at Fruhling's store. Furthermore, the letter stated that the Department's only concern was the removal of any recoverable gasoline from the groundwater at the site.

- **July 1981 – August 1981:** A gasoline recovery and separator system was installed at the site and well-pumping operations began. The accumulated effluent from the separation process was sampled by the Harford County Health Department on a periodic basis and was spread back on the ground with the knowledge and approval of the County Health Department. This process continued through January 1988, at which time a Department of Environment official ordered the owner to stop the discharge.

- **November 1981 – December 1981:** The Department of Natural Resources notified both the store owner and the tank maintenance company that they had satisfactorily removed the gasoline from the well and complied with their January 1981 order. The Department also

advised them that the remaining unrecoverable gasoline in the groundwater was a pollution problem that would be referred to the Harford County and state health departments for appropriate action. Because laboratory results of samples taken continued to show unacceptable levels of "aromatic hydrocarbons", the County required the owner to continue well pumping until the residuals were reduced to an acceptable level.

- **May 1983:** A nearby resident raised concerns regarding contamination of his well. Water samples taken over approximately the preceding three year period showed minimal contamination from petroleum products.

- **October 1987 - December 1987:** Testing indicated that gasoline contamination was migrating into a new well at the site.

- **January 1988:** In late January, an official from the Maryland Department of the Environment (formerly the Department of Natural Resources) investigated a complaint that effluent runoff from the site was flowing onto a neighbor's property. The investigating official informed the store owner that spreading effluent on the ground was no longer allowed because this process allowed pollution to migrate back into the soil and groundwater. The owner was issued a site complaint and was directed to shut down well pumping operations until further notice. At this point, pumping and effluent discharge on the ground had gone on for over 6 years and the gasoline separation unit had been removed and water had been pumped onto the owner's yard for the last 2 years.

- **June 1988:** The state took over cleanup operations at the site after the LUST Trust Fund was established in 1988. Well-pumping from the old well at the store site continued intermittently until mid-1988.

- **October 1988:** The Maryland Department of the Environment oversaw the removal of the underground gasoline and kerosene tanks and distribution systems, which was funded from the LUST Division account. Inspection revealed no gasoline storage tank perforations, but soil beneath one gasoline storage tank showed explosive readings. According to a state official who visited the site in early December 1987, the store owner stated that the tank maintenance company had pumped the tanks dry prior to going bankrupt, but she did not recall the exact date.

- **January 1989 – April 1989:** The Maryland Department of the Environment contracted with an environmental consulting company to perform 2 soil gas surveys at the site to delineate the extent of subsurface gasoline vapor contamination. Analysis of the samples revealed the presence of elevated gasoline vapor levels at the site, with the highest concentrations detected near the former pump island.

- **Late 1989 to early 1990:** The state installed charcoal filtration units on the store owner's water system and that of a nearby neighbor.

- **March 1993 – November 1993:** The Maryland Department of the Environment retained a consultant to review ongoing remediation activities at the site and determine the adequacy of activities to control and abate contamination. The consultant concluded that the contamination plume appeared to be getting larger and that vapor recovery efforts were inadequate. In November 1993, the Department had the consultant test a combined air sparge and soil vapor extraction system.[1] Test results indicated that this system could significantly enhance the existing recovery system.

- **March 1997:** The Maryland Department of the Environment continued to operate the pump-and-treat system at the Fruhling residence. The system had treated over 2 million gallons of water. The former Fruhling domestic well, shallow monitoring wells, and deep monitoring wells all continued to show elevated levels of dissolved gasoline constituents. As a result, the Department periodically operated a soil venting system to keep the wells within discharge guidelines. Periodic sampling of the surrounding residences identified no additional contaminated domestic wells.

- **1999:** The groundwater recovery system at the site was shut down.

- **September 2001:** The Maryland Department of the Environment maintained a granular activated carbon treatment system at two residences and performed quarterly sampling at six residences. Petroleum contamination was still present at the Fruhling property and MTBE levels were detected at the residence across the street from the

[1]Air sparging involves the injection of air into petroleum-saturated subsurface soil or groundwater to convert dissolved hydrocarbons to vapor, which is then vented.

Fruhling property. Dissolved petroleum contamination levels had decreased at all sampling locations.

- **Status as of August 2005:** The site recovery system remained on site, but was turned off. The site was being monitored in operation and maintenance status, with sampling performed every three months. No significant contamination had been detected in the residential wells from which samples had been taken since July 2001. However, well-monitoring still showed some signs of low-level contamination.

Summary of Key Information from the Case Files

- *Contaminants and compounds of concern:* Benzene, toluene, ethyl benzene, total xylenes, and MTBE.
- *Size of leak:* Unknown; Very little liquid product (gasoline) was recovered.
- *Impacts of contamination:* One death occurred from a leak-related explosion and fire. Groundwater and residential drinking water wells were contaminated with petroleum products. Real estate development and sales were impeded. Residents were granted a reduction in property taxes.
- *Remediation cost:* Maryland spent about $708,595 in state funds to remediate the site. Prior amounts that might have been spent by the company that installed the tanks and the store owner are not included.
- *U.S. Environmental Protection Agency involvement:* None.
- *Communication between responsible agencies and the public:* In December 1989, officials of the Maryland Department of the Environment met with affected parties to discuss contamination at the Fruhling site. In May 1990, the Department held a follow-up public meeting to present the results of its initial investigation of the groundwater contamination.
- *Litigation:* In late July 1981, one of the affected residents filed a lawsuit against the company that installed the tanks on the site, the tank maintenance company, and the store owner. Consequently, the tank maintenance company's insurer retained a consulting company to investigate the alleged contamination of groundwater by the producer's petroleum products. In May 1982, the consultant for the insurance

company concluded that the products of the oil company represented by both the tank installer and the tank maintenance company were not responsible for the groundwater contamination in the affected resident's well. In March 1988, the lawsuit was settled out of court for $25,000, with the defendants expressly denying liability. Prior to the settlement, the insurance company for the store owner settled with the affected resident for $7,500.

In 1990, the owner's insurance company denied responsibility for any claim under the owner's policy. Nevertheless, in early 1991, the state of Maryland sued the owner to recover cleanup costs.

In October 1990, a neighbor in the area of the site sued various parties involved in the purchase of his property, including the real estate company, the real estate agent, and the former owners of his house for not disclosing the groundwater contamination at the time of purchase.

Bob's Marathon, Grand Ledge, Michigan

Bob's Marathon is a gasoline service station and automobile repair shop bordered by mixed-use commercial and residential properties in the city of Grand Ledge, Michigan. Two reported releases occurred at the facility and the released gasoline migrated toward a municipal water supply well located directly down-gradient and very close (approximate 800 feet) to the site. MTBE, benzene, and other gasoline components from this spill potentially impacted the city's water supply for about 8,300 people.

Chronology of Key Site Events from the Case Files

- **April 1986:** Bob's Marathon registered all three of its underground storage tanks with the state.

- **December 1991 – February 1992:** Two of the three tanks failed their tightness tests. One of the owners reported to the Michigan State Police Fire Marshall Division that she had discovered a leak during a routine tank gauging inventory check. The leak involved the loss of approximately 4,500 gallons of gasoline from a 6,000 gallon tank. An environmental consultant retained by the owners sent the Michigan Department of Natural Resources (MDNR) the required 20-day report of initial abatement measures and installed eleven monitoring wells at the site in December. The monitoring wells were used to determine the directional flow of groundwater at the site and intercept the gasoline plume. In January, the consultant installed a product skimming system

in six monitoring wells and a passive recovery system in three wells that reportedly contained product sheen on the water table and additional monitoring wells. Also in January, the consultant submitted a site investigation work plan, site characterization report, free product removal report, and interim corrective action plan to MDNR. MDNR concluded that the interim corrective action plan was unacceptable and provided the consultant with a list of concerns in a deficiency letter. The environmental consultant estimated that, by late February, 280,300 gallons of contaminated groundwater and 1,200 gallons of gasoline were removed by the skimming system.

- **March 1992:** Because the consultant's response to the MDNR deficiency letter was not adequate, MDNR did not approve the work plan. The consultant then recommended that a second consulting firm with a greater capacity to more cost-effectively manage long-term projects take over the work at the site. The new consultant submitted an interim corrective action plan and a site investigation work plan to MDNR for approval. MDNR approved the second consultant's interim corrective action plan. In an interoffice communication, a MDNR official recommended that the first consultant be denied payment for work conducted at the site and that MDNR consider the consultant a potentially responsible party because of its failure to take timely action to abate the situation at the site. Three new underground storage tanks were installed on the west side of the service station building—two 6,000 gallon tanks and one 15,000 gallon tank. Approximately 400 cubic yards of soil were removed and disposed of during excavation for these tanks.

- **April 1992:** MDNR tentatively approved the site investigation work plan. The groundwater remediation system began operating.

- **June 1992:** An MDNR official stated that the department approved an interim groundwater treatment system at the site because of the close proximity of municipal wells and that this action was necessary because of the first consultant's failure to take timely action to abate the spread of the contamination.

- **January 1993:** The company operating the groundwater treatment system decided to no longer operate and maintain it because of uncertainty regarding reimbursement from the Michigan Underground Storage Tank Financial Assurance program for future work.

- **February 1993:** The site owner replaced the second consultant with a third after a dispute over the need to purchase the remediation equipment and other issues. This third environmental consultant made modifications to the existing groundwater treatment system.

- **May 1993:** MDNR informed the owners of Bob's Marathon that they had failed to define the full nature and extent of the groundwater contamination. While the groundwater plume was advancing toward the Grand Ledge municipal well field, the leading edge of the plume had not yet been defined. Furthermore, MDNR said that the groundwater system was ineffective and the contamination plume continued to migrate, impacting additional groundwater. As a result, MDNR requested that the owners provide all information on the releases and investigations of the releases including all soil and groundwater response actions and investigations. MDNR conditionally approved the amended third consultant's site investigation work plan. Approximately $850,000 of state financial assurance program funding had been spent at the site.

- **June 1993:** An oil/water separator was added to the groundwater treatment system.

- **July 1993 – August 1993:** The site's third environmental consultant informed MDNR that, due to delays in payment from the state financial assurance program, it was unable to continue site investigation activities at the site. In light of this development, MDNR reminded the site owners of their obligation to conduct all appropriate corrective actions to remedy the environmental problems caused by the release of contamination at the site including eliminating any impacts to the Grand Ledge municipal well field. The owners' attorney informed MDNR that the owners were unable to proceed with site investigation and remediation activities without the assurance of funding. In response, MDNR said that if all current claims were approved and paid by the state financial assurance program, the one million dollar limit for reimbursement under the program would have been reached at the site and the owners would be responsible for financing the remaining corrective actions including a final remedy. The Michigan Department of Public Health notified the city of Grand Ledge of MTBE contamination of a municipal water supply well.

- **October 1993:** MDNR notified the owners that the site would be listed in the "Proposed List of Michigan Sites of Contamination" for fiscal year 1995.

- **November 1993:** A second leak of 400 to 800 gallons of gasoline was discovered and reported to the Michigan State Police.

- **December 1993:** According to the third consultant's initial abatement report, the second leak was discovered by the owner/operator when he noticed a strong petroleum odor in the site treatment building. When he opened the cover of equipment used as part of the cleanup system, he observed approximately one foot of gasoline. The owner then inspected the underground storage tank system and found a mixture of water and gasoline in the area of one tank, due to a pin-hole leak in a gasoline supply line. The leak detection equipment installed on the system—that should have detected the leak, sounded an alarm, and automatically shut off the system—was not functioning. The tank system was taken out of service until the perforated line could be replaced.

- **January 1994:** The groundwater treatment building was damaged by fire. According to the fourth consultant's investigation report, the owner had discovered gasoline in the equipment and a fire started, damaging the equipment, before he could remove it. (As of June 2005, the equipment had not been restored to service).

- **March 1994:** MDNR advised the owners of their responsibility to repair the fire damaged system and conduct hydrogeological studies related to both leaks at the site. The owners responded that they could not continue the remediation work required to clean up the site and they terminated the services of the consultant at the site. MDNR assumed control of the investigation and cleanup of the leak at the site.

- **April 1994:** MDNR obtained emergency funds to complete the groundwater investigation and develop a corrective action plan. MDNR hired a consultant to update and collect additional information for the site with the overall goal of protecting the Grand Ledge municipal water supply from contamination originating from the site.

- **December 1994:** The city of Grand Ledge expressed concern that levels of benzene in a municipal well continued to increase, indicating continuing migration of contamination. The city asked MDNR for

monitoring well test results and a report on the current status of the remediation by the end of the month.

- **February 1995:** The mayor of Grand Ledge asked a state representative to intercede with state agencies to facilitate the issuance of all permits and release of state funds needed to allow the design and construction of soil vapor extraction and groundwater extraction and treatment systems to proceed immediately.

- **July 1995:** Grand Ledge allowed access to the city well field to construct and maintain a water treatment system for the contaminated municipal well and a groundwater blocking well.

- **December 1995:** The system to treat well water contaminated with volatile organic compounds began operating and a barrier well was installed to prevent the plume from continuing to reach the municipal well.

- **Status as of August 2005:** Treatment facilities were operating and cleanup was ongoing. Michigan Department of Environmental Quality officials told us that the air sparge and soil vapor extraction systems were recently turned off to conduct performance monitoring but carbon treatment of the impacted municipal well was ongoing. According to these officials, they expected to complete site cleanup between 2007 and 2010.

Summary of Key Information from the Case Files

- *Contaminants and compounds of concern:* Benzene, toluene, ethyl benzene, xylenes, and MTBE.

- *Size of leak:* The first release was approximately 4,500 gallons of gasoline; a second release was 400 to 800 gallons of gasoline.

- *Impacts of contamination:* The leak impacted the water supply for the city of Grand Ledge and the city had to provide potable water to about 8,300 residents.

- *Remediation cost:* As of about March 2005, approximately $2,150,000 had been spent to clean up contamination from the site. Approximately $950,000 of this amount came from the Michigan Underground Storage Financial Assistance Fund to reimburse costs incurred by the owner prior to the state taking over site remediation. According to Michigan

Department of Environmental Quality officials, continuing efforts to clean up the site through 2007 to 2010 will involve additional costs of up to approximately $500,000.

- *U.S. Environmental Protection Agency involvement:* None.
- *Communication between responsible agencies and the public:* None identified.
- *Litigation:* A number of lawsuits have been filed relating to the leak at Bob's Marathon, according to Michigan environmental officials. An apartment complex east of Bob's Marathon filed a lawsuit against the facility's owners. In addition, the owners are involved in litigation with the first two consultants and have filed a lawsuit against the facility's gasoline supplier, which is, in turn, suing the manufacturer of the hose that caused the site's second leak.

R.C. Anderson Trust, Nash County, North Carolina

The R.C. Anderson Trust site was owned by R.C. Anderson from 1949 to his death in 1984, when the property was passed on to his heirs and was managed as a trust by a bank. Three businesses were located on the site—a gasoline station (abandoned), a tractor dealership (subsequently a furniture store), and an automobile repair garage. Contamination was first reported to the North Carolina Department of Environment, Health, and Natural Resources (DEHNR) in July 1992, during removal and closure of the underground and above ground storage tanks and excavation of the soil around the tanks and pump island. Land uses in the vicinity are commercial, agricultural, and single family residential.

Chronology of Key Site Events from the Case Files

- **July 1992 – September 1992:** In July 1992, three underground gasoline storage tanks and one above ground diesel tank were removed. Evidence of a gasoline release from a 3,000 gallon tank was discovered and reported to DEHNR. An August 1992 closure report also concluded that there was "high potential" of petroleum contamination on-site. Accordingly, in September 1992, DEHNR notified the bank that was acting as trustee for the R.C. Anderson property, that it was in violation of pollution control rules and regulations and must take action to comply with corrective action rules.

- **December 1992:** The environmental consulting company completed a Comprehensive Site Assessment/Corrective Action Plan to assess the surrounding conditions and risks to area populations from the remaining contamination at the site. This report was filed to satisfy the requirements of the North Carolina law pertaining to investigations for soil and water cleanup.

- **May 1993:** DEHNR reviewed the Comprehensive Site Assessment report, determined it to be inadequate and required the bank to submit (1) a more complete report which adequately identified the full vertical and horizontal extent of the contamination plume(s) and (2) a corrective action plan. Both reports were to be submitted by July 15, 1993.

- **October 1993:** The environmental consultant resubmitted the Comprehensive Site Assessment report to DEHNR for review. The report identified several sources of pollution affecting soils and groundwater at the site. One was a 3,000 gallon underground storage tank that had two large rust holes. Another source was the fuel pump island where stained soil was found when it was removed. In addition, the soil below the 10,000 gallon above ground storage tank (which had held diesel oil) was stained at the fill area from apparent spills during filling operations. The above ground tank itself, however, showed no evidence of leaks. Last, used motor oil was drained onto the ground near the gasoline station building when it was being used as a truck repair center. The area surrounding the site was surveyed for water wells, public water supply intakes, and off-site monitoring wells for potential receptors and migration pathways. Sixteen private water supply wells and another 32 "suspected" water wells were observed within a 1,500 feet radius of the site. There were no public water supply intakes identified within one-half mile of the site and no off-site monitoring wells were found within 1,000 feet of the site.

- **November – December 1993:** Excavation and treatment began in 1993. A smaller (530 gallon) underground gasoline storage tank was discovered during excavation of contaminated soil and removed. While the tank was located in an already contaminated area of the site and was rusted, it showed no sign of leaks, according to the consultant. A closure report on this tank dated the end of December was filed with the Raleigh Office of DEHNR.

- **January – December 1994:** A second round of soil excavation with on-site bioremediation procedures was performed in 1994. In early March, the environmental consultant completed a Corrective Action Plan that included the excavation and treatment of contaminated soils and an air sparging and pump and treat facility for groundwater remediation. Under the plan (1) soil treatment was to be completed by August 1994; (2) a groundwater treatment system was to be installed by January 1995, and operated for 5 to 15 years; and (3) system shut-down and project completion dates would be based upon monitoring test results and state approvals. In late March, DEHNR approved the Comprehensive Site Assessment. In July, the Raleigh Office of DEHNR issued a soil contaminant and treatment permit. During 1994, soil excavation and on-site bioremediation procedures were performed on approximately 6,400 tons of contaminated soil at the site. An estimated total of 11,792 tons of soil were excavated and treated on-site

- **January – December 1995:** Following completion of the soil treatment, the environmental consultant monitored groundwater quality at the site and reported results on an approximate quarterly basis. The samples taken in October continue to show groundwater contamination. The contamination plume was estimated at approximately 230 feet by 210 feet and expected to migrate slowly to the northeast. The reports continued to recommend the design and installation of a groundwater remediation system to remove the contamination present.

- **January 1996 – January 2003:** Groundwater monitoring continued on a semi-annual basis. In 1996, North Carolina enacted a law temporarily suspending remediation work for low-priority underground storage tank release sites. The R.C. Anderson Trust site was initially given a low-priority ranking and, therefore, remediation work at the site stopped. However, primarily because of the site's threat to uncontaminated private domestic water supply wells, its ranking was changed to high priority in July 1997 and remediation activities resumed. The Containment and Treatment of Contaminated Soil permit originally issued In July 1994 by the Raleigh Office of DEHNR was renewed in 1998. A groundwater remediation system using pump and treat with air sparge technologies was installed and began operation in late May 2002. Groundwater at the site was sampled 10 times through January 2003. According to the consultant's Groundwater Monitoring Report dated September 12, 2003, as of January 2003, benzene, lead, MTBE, and 1,2-dichloroethane were still present at on- and off-site monitoring wells in concentrations above North Carolina groundwater quality standards.

However, according to DEHNR officials, benzene was not detected in any off-site monitoring well during that monitoring event and lead was detected in an off-site monitoring well but not above the NC groundwater standards.

- **Status as of August 2005:** According to state officials, North Carolina State Session Law 2004-124 suspended further work on most high risk sites due to constrained state funds. As a result, the state is now prioritizing sites based on relative risk and directing work only to emergency releases and those releases that pose the highest risks that can be funded with available resources. Initial treatment work was completed at the Anderson Trust site and the recovery system remains on-site but is currently shut down.

Summary of Key Information from the Case Files

- *Contaminants and compounds of concern:* Benzene, toluene, ethyl benzene, xylenes, MTBE, Naphthalene, and lead.
- *Size of leak:* Unknown.
- *Impact of contamination:* One residential drinking water well adjacent to the site was contaminated and abandoned. A potential threat of contamination exists for 17 additional residential wells within 1,500 feet of the site.
- *Remediation cost:* According to state officials, the North Carolina Commercial Fund has reimbursed the owner (including consultants) for $943,407.93 of reasonable and necessary expenses performed to remediate the site. In addition, total reimbursable expenses to complete cleanup and close the site are estimated by these officials at $1.1 million. However, this estimate does not include deductible amounts and other expenses not approved by the fund or otherwise deemed ineligible for reimbursement, such as contamination from the above ground tank or used motor oil paid by the R.C. Anderson Trust.
- *U.S. Environmental Protection Agency involvement:* None.
- *Communication between responsible agencies and the public:* No evidence of formal public meetings was identified.
- *Litigation:* No information on lawsuits was found in the case files.

Tranguch Tire Service, Inc., Luzerne County, Pennsylvania

The Tranguch site was a gasoline and tire retreading service station in a mixed commercial and residential area of northeastern Pennsylvania that was abandoned in 1995. Several operating gasoline service stations as well as numerous abandoned or removed underground storage tank systems lie within the vicinity of the site. A residential neighborhood, part of which is built over an abandoned coal mine, surrounds the site. While it is unknown exactly when the underground storage tanks at the site began to leak, residents' complaints of gasoline odors in their homes suggest that leaks may have begun sometime in the late 1980s to early 1990s. By 1993, the Pennsylvania Department of Environmental Resources (PADER) determined that gasoline vapors from the sewer system were affecting homes. Although PADER found contamination at four other facilities in the vicinity of the Tranguch site, the department determined that the Tranguch facility was primarily responsible for the leak impacting the residential area. EPA estimated that the facility had released an estimated 25,000 to 50,000 gallons of gasoline. The resulting gasoline plume contaminated soil and groundwater, and spread generally northeastward through the adjoining community to encompass about a 70-acre area, including 11 businesses, two doctor's offices, two churches, two parks, 26 vacant lots, and 359 residential properties and impacted the lives of up to a reported 1,500 neighborhood residents.

Chronology of Key Site Events from the Case Files

- **Prior to 1990:** Neighborhood residents near the Tranguch facility had complained of an odor from the facility that smelled like automobile or truck emissions as early as August 1976. However, an investigation conducted at the Tranguch facility at that time did not reveal any problems. Case files do not contain any additional complaints about this site until February 1990.

- **February 1990 – April 1993:** Over the three-year period, PADER investigated complaints of gasoline or other odors in residences in the area of the Tranguch facility, including one home on three separate occasions. In March 1993, a local Department of Public Safety environmental protection specialist performed an investigation at this residence and verified the presence of strong gasoline odors. Because of the saturated condition of the soil, he was able to trace gasoline residue to a nearby abandoned underground storage tank facility. The environmental specialist referred the matter to PADER for follow-up. In April 1993, PADER took a water sample from the basement sump of this residence that tested positive for the presence of gasoline, and began

efforts to determine whether nearby underground gasoline storage tanks were the source of the contamination. Out of eleven commercial locations in the vicinity, PADER identified four operating facilities—including the Tranguch facility—and one abandoned underground storage tank facility as potential contamination sources.

- **May 1993 – June 1993:** PADER directed the owner of the abandoned facility to register and either properly close (remove) or upgrade the tanks at that site. At this time, PADER also asked the owners of the Tranguch facility and the other two operating facilities to either provide the department with proof that their tanks passed tank tightness tests or conduct the tests.[2] The abandoned site owner notified PADER that he intended to close the site and PADER directed him to submit and implement a site characterization plan. Because none of the three operating facilities responded to the PADER request, it asked for this information a second time.

- **July 1993:** The owner of one of the three operating facilities submitted a report to PADER showing that, in June 1993, tanks at the site had passed a tightness test. However, PADER discovered that the owner had installed this facility's current tanks in 1991 to replace older tanks and, at that time, 1,042 tons of fuel-contaminated soil had been removed from the site. The older unregistered tanks remained in operation until they were replaced in 1991. The owner filed a closure report for these tanks in October 1993. PADER documentation indicates that the report lacked some of the required sampling and soil analysis information.

  Also in July 1993, the owner of another of the three operating facilities admitted to having had an unreported release in April 1993. Tanks at this site were subsequently removed. Three of these tanks had never been registered. Soil contamination was evident during excavation, and during the removal process an abandoned heating oil underground storage tank was also discovered at the site. Also, when the owner of the facility removed his tanks, PADER observed contamination at the site and the owner arranged for a site investigation/characterization.

[2]At the time, many tanks were required to undergo annual tank tightness tests.

- **August 1993:** PADER requested a third time that the owner of the Tranguch facility provide tank tightness test information and submit and implement site assessment and remedial action plans. PADER surveyed leak detection methods used at the Tranguch site and the owner stated that the facility was performing these methods. These methods were required to be performed under the state's applicable rules and regulations in force at that time. PADER also requested that the owners of the other two operating facilities and the abandoned facility submit and implement site assessment and remedial action plans.

- **September 1993:** The owner of the Tranguch facility submitted information to PADER indicating that tanks at the site had passed a tightness test. PADER again requested that the Tranguch owner perform a site characterization and report the results to the department within 14 days. Also, the local fire department received two additional complaints of gasoline-like fumes in area residences. PADER Emergency Response Program personnel also began regularly monitoring vapor levels in area homes.

- **October - November 1993:** Beginning in October, the PADER Emergency Response Program started to install interim remedial systems designed to prevent gasoline vapors from entering affected homes and, by mid-May 1994, had installed thirteen.[3] Also in October, PADER identified a fourth operating facility as a potential contributor to the area's contamination and asked the owner of that facility to perform a site characterization. Through late November 1993, the owner of this fourth facility took no action in this regard, but requested to review any PADER documentation indicating that this facility had contributed to pollution in the area, as well as files regarding the other facilities in the area. Although PADER arranged for access to these files, the owner never reviewed them.

  PADER confirmed the presence of gasoline-like fumes in six area residences and arranged to have a preliminary subsurface investigation performed on the area impacted by the contamination. The investigation revealed that gasoline had contaminated the groundwater at several locations down-slope from the Tranguch site and that gasoline contamination had spread to the neighborhood sewer system. The

[3]In commenting on our draft report, PADEP officials referred to these installations as remedial ventilation systems.

gasoline contamination was also found to stop up-slope of the location of the Tranguch tanks, within the property boundary. PADER officials, representatives of the city of Hazleton, and the city fire chief met with the owner of the Tranguch site and requested that he immediately remove all gasoline from his tanks. The following day, the owner informed PADER that he had discovered that 375 gallons of gasoline had been lost from his tanks early in November. The owner admitted to PADER officials that—contrary to what he had told PADER in August 1993—he had just started to comply with the required leak detection methods the previous day. Accordingly, PADER issued a second compliance order to the Tranguch site owner, requiring him to, within 24 hours, remove all gasoline from the underground storage tanks on-site, begin cleaning up the leaked gasoline, and take steps to monitor and mitigate vapors in area homes. Although the owner appealed this order, he had his tanks and lines drained and began monitoring wells to recover gasoline. Furthermore, although the Tranguch site owner made inquiries regarding homes impacted by vapors, he took no action to monitor or mitigate vapors in area homes.

City personnel began venting the neighborhood sewer system.

- **December 1993 – February 1994:** PADER held a public meeting with area residents, city and township representatives, and state legislators regarding the spill. School district officials, city and township representatives, and a state legislator were also contacted during subsequent site activities.

  In December, PADER issued a compliance order to the owner of the fourth operating facility suspected of contributing to the contamination. The order required a complete site investigation, including tank system tightness testing, a review of leak detection and inventory records, and sub-surface sampling and analysis of soil and groundwater at the site. The owner's attorney responded with a letter stating his client's intent to appeal the order, and included attachments with information in defense of his decision. From the information presented in the attachments, PADER determined that the owner had not employed any type of automatic leak detection devices on the two underground gasoline storage tanks installed at his site in 1962, and that he might not have

complied with applicable federal and state leak detection regulations.[4] In January 1994, the legal counsel for PADER informed the owner that the information he had submitted was incomplete and did not satisfy the compliance order's requirements. Later in January, the owner formally appealed the December compliance order.

PADER documents indicate that problems with gasoline-like vapors entering neighborhood homes and commercial establishments grew progressively worse through the end of 1993 and, by early 1994, 28 residences and 1 commercial building had been impacted. The Hazleton City Health Officer determined that a neighborhood home was unfit for human habitation and the owner temporarily relocated because of the presence of potentially harmful gasoline vapors and the explosion potential from the collected gasoline vapors in the basement of his home. (This homeowner had previously reported gasoline-like odors in his residence in February 1990, March 1992, August 1992, and March 1993).

In January 1994, all product recovery efforts at the Tranguch site ceased because of the owner's failure to pay his environmental consultant, but resumed after he was able to secure a loan.

- **March – April 1994:** Local residents formed an organization called the Group Against Gas (GAG) at about this time and announced plans for a class action lawsuit against parties responsible for the contamination. PADER received from the owner's consultant a proposed Tranguch site characterization plan that included monitoring well locations. Upon review, PADER requested that the consultant perform additional site characterization work, including the installation of additional monitoring wells. Also, PADER notified the owner of the fourth operating facility of a June 1994 hearing date and the owner wrote to his state senator in an unsuccessful attempt to stay the PADER compliance order.

- **May – August 1994:** In May, PADER held a second public meeting with area residents, city and township representatives, and state legislators regarding the spill. Also in May, to avoid compliance proceedings, the owner of the fourth operating facility conducted a site investigation and

[4]Pennsylvania Department of Environmental Resources, *Preliminary Status Report of the Hazleton LUST Case, Area of 22nd and Church Streets*, (October 1994), pages 71-72.

found gasoline in the groundwater near his underground storage tank systems. He withdrew his appeal of the compliance order, voluntarily removed all fuel from his underground gasoline storage tank systems, and sent a summary report of the investigation to PADER. In August, this owner notified PADER of his intent to conduct and complete a site characterization by the end of September 1994.

An August court order required the Tranguch facility owner to take interim remedial actions to recover leaked fuel, monitor and mitigate vapors in area homes, and complete and report on site characterization by mid-October 1994.

PADER obtained funds from the state Leaking Underground Storage Tank fund to conduct an extensive characterization study of the impacted area.

- **February 1995 – September 1995:** The owner had all six tanks at the Tranguch facility removed. Tanks were found to be perforated with "fist-sized holes," and gasoline contamination was evident at the site. The owner of the Tranguch facility declared bankruptcy. In addition, in May, the owner of the fourth operating facility had two tanks removed. Both tanks were found to be deeply pitted and the fill end of one tank had pinholes and corrosion that extended through the steel. Evidence of gasoline contamination was observed during the excavation.

- **November 1995 - December 1995:** The Pennsylvania Department of Environmental Protection (PADEP, formerly PADER) issued another compliance order to the owner of the Tranguch facility, who again appealed it.

- **March – July 1996:** PADEP's environmental consultant issued a report on, among other things, the sources of contamination in the area. While the consultant found contamination at all 5 of the sites, it found that the Tranguch facility was primarily responsible for the leak impacting the residential area. According to the consultant's report, the contamination at the other four facilities did not significantly contribute to the contamination plume that was affecting the area residences.

  Although PADEP continued to monitor conditions in the area, it no longer had the funds necessary to mitigate the contamination threat. Therefore, PADEP asked EPA to lead the remediation of the Tranguch site and the impacted area. EPA took over as lead agency for the site,

while PADEP continued to work with EPA by providing technical support.

EPA entered into an Interagency Agreement with the U.S. Army Corps of Engineers (USACE) for contracting services for the site. The first phase of a two-phase remedial action plan developed for the site, included soil vapor extraction of the source area and passive oil skimmers for collection of petroleum products.

- **August – October 1996:** EPA confirmed PADEP's findings regarding the contamination plume. The EPA On-Scene Coordinator (OSC) determined that (1) gasoline contamination at the Tranguch site impacted surface waterways as well as groundwater at the site, (2) site conditions met or exceeded removal criteria described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and (3) the site posed an imminent and substantial threat to the public health of residents in the area of the plume because of the threat of fire, explosion, and direct inhalation of benzene. The OSC estimated that over 900,000 gallons of gasoline leaked from the tanks. EPA requested remediation funds under the Oil Pollution Act of 1990 and received an initial $180,000 to begin removal actions, including installation and maintenance of two underflow dams on Black Creek to reduce the gasoline contamination which was entering the creek.[5]

  EPA sampled and tested air quality in 53 of 362 homes in the area. The gasoline vapors detected in 52 of the 53 homes were below EPA's benzene action level of 21.5 $\mu g/m^3$ (micrograms per cubic meter). (The state action level at that time was 32 $\mu g/m^3$). The 53rd home while above 21.5 $\mu g/m^3$ was below 32 $\mu g/m^3$. In addition, not all of the 52 homes had elevated benzene levels. Furthermore, in the residence where benzene level was detected above EPA's action level, EPA's contractor had observed open cans of paint, stains, and glue to which they attributed these elevated levels . On this basis, EPA determined that remediation of these homes was not needed.

  In addition, EPA sent the owners of several facilities identified as "potentially responsible parties"—including the Tranguch facility—a "Legal Notice to Suspected Discharger" requesting remedial action.

[5]Oil Pollution Act funding is administered by the U.S. Coast Guard.

- **January – February 1997:** A passive basement air filtration system in a home was changed to an active system because of a health threat.

- **October 1997:** EPA received approval to discharge treated groundwater from the Tranguch site remediation plant into the Hazelton sewer system.

- **November - December 1999:** USACE constructed a soil vapor extraction system on the Tranguch site.

  EPA identified the Tranguch facility and three other businesses as parties responsible for the contamination based on a USACE groundwater flow model developed to predict the flow of spilled gasoline. According to the model, while much of the spilled material would have come from the Tranguch facility, some material from three other operating facilities would have mingled with the plume from the Tranguch leak and subsequently be transported to Black Creek. Furthermore, for part of the year, spilled material from one of the operating facilities would flow directly to the creek. However, EPA's Region 3 General Counsel recommended that the agency not issue removal enforcement orders to these parties because it considered them to be "de minimis" (small volume) contributors to the contamination. In addition, since the Tranguch facility was in bankruptcy, EPA believed that Tranguch would not be able to comply with the order and, therefore, did not issue one. Consequently, Oil Pollution Act funds continued to be used to clean up the site.

- **February 2000 - September 2000:** The Pennsylvania Department of Health, concerned over air sample results, asked EPA to install ventilation and continue testing air quality in 9 homes. EPA began installing sewer vents at homes.

  EPA, USACE, state agencies and a state Representative held public meetings with area residents in July and August to discuss what corrective actions EPA would take at the Tranguch facility. An additional 72 residents (32 in July and 40 in August) requested sampling of the air in their homes.

- **October 2000:** A public meeting was held to discuss site sampling, health issues, and site history for the Tranguch site and affected area. Officials from the (1) Agency for Toxic Substances and Disease Registry (ATSDR), (2) PADEP, (3) Pennsylvania Department of Health, (4) U.S.

Coast Guard, (5) USACE, and (6) EPA were present, among others. More than 150 Tranguch area residents were also present. The USACE official stated that the site was complex because of the existence of an underground coal mine. During the meeting, residents voiced concerns about health and property values, ATSDR stated that long-term exposure to benzene (a gasoline component) had been connected to cases of leukemia, and officials agreed to look into the impacts of the contamination on property values in the area and the EPA representative noted that potential buyers of homes in the immediate area had to be informed about the contamination. Also, based on leak data from Tranguch's tank tightness tests, he stated that 50,000 gallons or less of gasoline had leaked at the Tranguch site rather than the 900,000 gallons originally estimated.

- **December 2000:** The EPA Office of Inspector General received a hotline complaint alleging EPA mismanagement of the Tranguch site cleanup.

- **January 2001:** Throughout Pennsylvania, the action level for benzene is 32 $\mu g/m^3$. However, according to EPA Region 3 officials, citing concerns over the limited information on the extent of the contamination, PADOH set a more conservative level for the Tranguch site of "non-detect". In response, EPA identified 8.3 $\mu g/m^3$ as a reliable detection limit for benzene. After consultation with ATSDR, PADOH accepted this site-specific benzene level as being protective of human health.

  In an interview with a local newspaper, a GAG representative said that she hoped homeowners living within the affected area would be "bought out". A city councilman proposed several resolutions for area residents, including a resolution to reduce temporarily the real estate assessments of affected homes to zero, relieving the affected homeowners from property tax payments.

- **February 2001:** State and local elected officials held a public meeting to update residents affected by the Tranguch leak. According to a newspaper article, a local councilman told those in attendance that they had no alternative but to leave the area and that they should force federal officials to buy their properties and move them out of the area.

  The Hazle Township Supervisors commissioned a University of Pittsburgh health study using Township funds.

EPA continued to sample air in area homes and, as of February 2001, had sampled 308 of approximately 350 homes within the contaminated area.

Luzerne County Commissioners adopted a resolution urging the Board of Assessment Appeals to eliminate property taxes for two years for properties determined by the federal government and appropriate agencies to be eligible for relief.

According to a local newspaper article, one of the state's U.S. senators wrote to the EPA Administrator and asked the agency to buy the homes of the area's residents and the other U.S. Senator agreed to meet with the Administrator about the spill.

- **March 2001:** EPA implemented weekly "Unified Command" meetings to keep all interested parties up to date and to provide EPA an opportunity to address issues and/or questions any of the attending representatives might have. While the primary members of these meetings were federal, state, and local officials, representatives from the Group Against Gas participated in the meetings as ex officio members.

  EPA requested and received an additional $11,500,000 in funding from the U.S. Coast Guard to install groundwater collection and soil gas extraction systems, as well as groundwater and soil gas treatment systems. This funding brought the Tranguch site cleanup ceiling to $25,698,188.

  The mayor of Hazelton, Pennsylvania declared the area affected by the Tranguch leak a local disaster emergency and Luzerne County Commissioners declared the area in a state of emergency. In addition, the Pennsylvania Emergency Management Agency was asked to determine if the area met criteria for being declared a disaster area.

- **April 2001:** On behalf of EPA, the USACE completed a remediation plan for the area sewer system and began work on a groundwater collection system, a soil vapor extraction/biovent system, and new storm and sanitary sewer lines.

  A public meeting was held with affected Tranguch site residents. Officials from EPA, ATSDR, Pennsylvania Department of Health, and PADEP attended the meeting.

A state elected official introduced a resolution in the state House of Representatives to declare the affected area a national disaster area and to purchase the homes of citizens within the affected area. The resolution was unanimously approved.

In a letter to the Governor of Pennsylvania, the Pennsylvania Emergency Management Agency (PEMA) stated that the impacted area did not meet the eligibility criteria to obtain disaster assistance from the Federal Emergency Management Agency (FEMA). PEMA recommended that the Governor not certify that a major disaster or emergency existed in order to request assistance from FEMA. Further, PEMA determined that the hazard-mitigation funding needed to "buy-out" (purchase the homes of) affected residents would be inadequate, based on eligible costs, to address this situation. Based on PEMA's review, the governor denied a state buy-out for residents.

- **May 2001:** The local board of supervisors again declared a state of emergency for the area affected by the leak and granted property tax relief for the affected property owners.

  PADEP approved EPA's permit to discharge treated contaminated groundwater into Black Creek. However, some residents questioned EPA's remediation strategy. EPA and city, township, and school district attorneys met concerning Tranguch site cleanup.

  The Pennsylvania Department of Health began conducting a health study of area residents impacted by the leak.

- **June 2001:** An environmental consulting company retained by EPA completed a report on subsurface airflow modeling for the soil vapor extraction/biovent system.

  EPA saw to the installation of 288 sewer vents in area homes and allowed residents to use a suite and hotel amenities, such as the pool, at a local lodge to get away from the site construction noise.

- **August 2001:** EPA's Inspector General reported that (1) EPA managed the cleanup of contamination from the Tranguch leak adequately, but the agency could have better communicated with the local community and the Pennsylvania Department of Health; (2) a federal buyout was not warranted and that residents' desire for a buy-out was based on an

inaccurate perception of the threat posed by the leak; and (3) about $2.8 million in remediation costs might not have been warranted.

The University of Pittsburgh Graduate School of Public Health completed a "Preliminary Findings" report that examined whether Hazle Township residents were at increased risk for cancer compared to that of Luzerne County residents and residents of Pennsylvania as a whole.[6] The authors of the study stated that "these findings suggest that the incidence of leukemia and prostate cancer in the Hazle Township is increased compared to Luzerne County and the state of Pennsylvania". While prostate cancer has been linked to such factors as age, race, family history and high intake of dietary fat, research literature has linked leukemia—in particular, acute myelogenous leukemia—to benzene exposure. However, the study authors could not definitively identify the gasoline leak as the source of the excess leukemia.

- **December 2001:** EPA completed replacement/repair of the sewer lines in and around the plume of contamination. PADOH issued its health study report, which provided its recommendations for determining when indoor air monitoring would no longer be necessary. In effect, it reset the site-specific action level for benzene of 8.3 $\mu g/m^3$ back to the statewide action level of 32$\mu g/m^3$.

- **January 2002:** After EPA repaired the sewer lines, installed the vapor recovery system, and sampled indoor air in area homes, the agency determined that the air filters in homes were no longer needed. EPA transferred ownership of the carbon air filtration units to PADEP. PADEP provided these filters, plus additional ones, to residents requesting them, as well as electricity to run the filters, at no cost for one year.

- **June 2002:** EPA held a public meeting regarding the Tranguch site cleanup. Also attending the meeting were representatives from a U. S. Congressman's office and PADEP. The focus of the meeting was to answer questions about the property reports EPA had mailed or hand-delivered to affected residents. However, EPA also answered questioned on plans to restore streets, ongoing health studies, and other

[6]*Hazle Township Health Effects Study 1990-2000 Preliminary Findings, University of Pittsburgh, Graduate School of Public Health, Department of Environmental and Occupational Health and Epidemiology,* August 29, 2001.

investigations of the spill and its potential impacts. In response to a question on how long residents with carbon filters in their homes to purify their indoor air should run them, the EPA representative said "…based on the sampling that we've done throughout the community, there's no reason to run those filters". Following the meeting, according to a newspaper account, the EPA representative said that as long as environmental officials are capable of eliminating potential chemical exposure for residents, federal officials would not consider options to relocate affected area residents.

The University of Pittsburgh completed data collection efforts for its health study, which was funded by a $100,000 grant from the Pennsylvania Department of Community and Economic Development.

- **August 2002:** The Luzerne County Board of Commissioners unanimously approved a resolution requesting the Luzerne County Board of Assessment Appeals to approve requests to reduce to zero value, for January 1, 2003 to December 31, 2003, the real estate assessments of those properties that were adversely affected by the Tranguch gasoline leak, as determined by the federal government.

- **September 2002:** EPA requested and received an additional $600,000 in funding from the U.S. Coast Guard. This funding brought the Tranguch site cleanup cost ceiling to $26,298,188.

- **November 2002:** A PADEP report on an evaluation of the abandoned mine under the area concluded that it had no significant environmental impact on the community.

- **January 2003:** Under contract with EPA, USACE found small amounts of petroleum contamination in one tunnel of the abandoned coal mine.

PADEP discontinued support for the air filters in residences.

The local school district sent a letter to EPA asking for $44,000 in compensation for the economic loss resulting from not having use of the athletic field.

The University of Pittsburgh Graduate School of Public Health staff presented their preliminary findings of the Hazleton Health Effects study to the mayor of the city and the community at a public meeting. According to a local newspaper article, this study (1) included more

individuals (451 compared to 207) and more households (190 compared to 84) than in the earlier "Preliminary Findings" study; and (2) found no statistically significant increase in overall cancer or leukemia incidence for the Laurel Gardens community of Hazleton residents in the area of the Tranguch site compared to the county and state populations. The study team, however, did stress that further investigation was warranted for both thyroid and brain cancer, according to the newspaper account.

- **February 2003 – March 2003:** The local Board of Supervisors extended the state of emergency for the area impacted by the leak through March 10, 2003, and supported a "buyout" of affected homes by the federal government. The Luzerne County Board of Commissioners also declared that a state of emergency continued to exist.

  GAG wrote to the governor asking that PEMA reevaluate the designation of the area as a disaster area, which had been denied earlier.

- **April 2003:** Local and national elected officials representing the area sent letters to the new governor, requesting a reevaluation of the previous governor's determination on the area's eligibility for being declared a disaster area.

  The Hazelton city council gave a property tax break to area residents impacted by the leak for the third consecutive year.

  According to EPA officials, the local school district verbally requested that an athletic field in the affected area be restored. In addition, the local school district sent a letter to EPA requesting a meeting in May with the EPA on-site coordinator and USACE to discuss (1) compensation for loss of use of the athletic field, and (2) a lack of communication between EPA and the school district over the issue.

- **May 2003:** The federal government agreed to pay the local school district $120,000 for the restoration of the athletic field.

  EPA held a public meeting with attendees expressing concerns about the cleanup.

- **July 2003 - September 2003:** Citing health and property concerns, more than 250 Hazleton and Hazle Township residents petitioned for a

congressional hearing into EPA's response to and management of the leak impacting their community.

- **October 2003:** PADOH completed a study showing that, of the twenty-two types of cancers and total cancers considered, only the incidence of leukemia and all cancers was significantly higher in the affected community than would be expected. However, according to the PADOH study, the relationship of leukemia incidence to the environment was unclear, only in rare circumstances can an occurrence be causally linked to a specific agent with certainty, and the mechanisms for the induction of cancer from benzene exposure are not clear.

  The University of Pittsburgh Graduate School of Public Health completed a health study providing its final "Summary of Primary Findings" on area residents' increased risk of developing cancer. This report summarized the university's two previous studies that separately examined residents in the affected area of Hazle Township and the City of Hazelton. In addition, the study examined the total population of affected area residents by combining the Township and the City. The study also examined affected residents living in both locations classified into three potential exposure categories (high, medium, and low) based on the proximity of their residence to the underground gasoline plume. Most notably was the high exposure category of those living directly over or adjacent to the projected contamination plume. The study investigators concluded that while the combined population did not experience an excess of all cancers, a statistically significant excess of leukemia was observed. For the high exposure category, the study investigators concluded that the observed versus expected cases of leukemia was statistically significant, but that, because of the small size in this subgroup, these results should be interpreted with some caution. The study investigators made a number of recommendations including long-term systematic surveillance and screening for members of the potentially higher risk population.

  The University of Pittsburgh Graduate School of Public Health staff completed their final report of the Hazleton Health Effects Study 1990-2000. The study's findings suggest that from 1990 to 2000 no statistically significant increase in overall cancer or leukemia incidence in the affected area of Hazleton with the exception of brain cancer in white males compared to the county and state populations for the period 1990 through 2000.

- **December 2003:** According to a local newspaper article, Laurel Garden residents impacted by the gasoline leak asked the Luzerne County District Attorney to investigate the case. In the request letter, the residents said that they believe they were "needlessly and recklessly endangered" by the owners of fuel stations in the vicinity of the impacted area, EPA, and PADEP.

- **March 2004:** In a letter to local officials, EPA stated that no further action would be taken to address contamination from the abandoned mine based on three factors: (1) the contamination did not appear to be from the Tranguch property, (2) the contamination did not have a pathway to surface waters, and (3) due to the small amount of contamination present, the vapors were not migrating from the mine location and therefore did not threaten nearby residents.

- **July 2004:** EPA remained the lead agency responsible for the Tranguch site, while PADEP agreed to provide operation and maintenance services for the groundwater and soil vapor extraction treatment systems.

- **Status as of September 2005:** All leaking underground storage tanks had been removed from the Tranguch site and only residual contamination required remediation. In addition, cleanup efforts at all affected residential homes had been completed and well over 95 percent of total costs to clean up and monitor the site had been expended. Remediation activities to remove residual contamination are expected to continue for another 4 to 5 years, costing about $100,000 per year. The remediation system will be shut down periodically to monitor its effectiveness and determine whether mitigation goals for groundwater and soil contamination have been reached. This monitoring is expected to cost about $30,000 to $40,000 per year. The remediation system might need to be shut down a few times before the contamination threat can be considered mitigated and the removal project completed. However, once this determination is made, groundwater and soil gas (vapor) monitoring will permanently stop, all remaining monitoring wells (currently approximately 80 but likely will be less because some are expected to close every year depending on sampling results) will be closed (costing about $1,000 per well), the treatment system removed, and the underground piping abandoned in place.

Summary of Key Information From the Case Files

- *Contaminants and compounds of concern:* Benzene, toluene, ethyl benzene, and xylenes (BTEX). According to EPA officials, some methyl-tertiary butyl-ether (MTBE) was identified but was never considered a contaminant of concern.

- *Size of leak:* An estimated 25,000 to 50,000 gallons of gasoline was released into the soil.

- *Impacts of contamination:* The leaking gasoline contaminated soil and groundwater, entered into the sewer system through cracked pipes, and further spread generally northeastward through the adjoining community to encompass an area of about 70-acres, including 11 businesses, two doctor's offices, two churches, two parks, 26 vacant lots, and 359 residential properties.

- *Remediation cost:* According to EPA officials, about $25.2 million of Oil Spill Liability Trust Fund monies have been spent to date to clean up the contamination resulting from the Tranguch leak. In addition, according to state officials, Pennsylvania spent about $2 to $3 million in cleanup funds. The site owner spent an unknown additional—but relatively small amount—on cleanup.

- *U.S. Environmental Protection Agency involvement:* EPA assumed responsibility for cleaning up the site at the request of PADER in 1996.

- *Communication between responsible agencies and the public:* Pennsylvania state agencies and EPA either held or participated in at least nine public meetings and other forums regarding the Tranguch leak from 1993—when the leak was first confirmed—through 2003. In December 1993 and May 1994, PADER held public meetings with area residents, city and township representatives, and state legislators regarding the contamination. According to EPA officials, beginning in July 1996, EPA held meetings with local officials and public meetings with area residents and others to discuss plans for remediating the contamination at and around the Tranguch site and to update the status of the cleanup. Through May 2003, EPA held at least five such meetings and participated in at least one meeting sponsored by GAG. The meetings often included representatives from the state and other federal agencies—such as USACE—involved in cleanup operations, among others.

- *Litigation:* Nearby residents affected by the contamination sued numerous parties, including the owners of the gas stations in the vicinity of the leak as well as certain oil companies, asserting that the contamination had caused personal injury and property damage, among other things. These lawsuits are still pending.

Objectives, Scope, and Methodology

The objectives of this review were to identify (1) information available on the number and cleanup status of leaking underground storage tanks, (2) existing sources of funding for cleanups at contaminated tank sites, and (3) processes used to identify, assess, and clean up sites in 5 states with large numbers of leaking tanks—California, Maryland, Michigan, North Carolina, and Pennsylvania. In addition, to provide some perspective on how leaking underground storage tank sites are identified and cleaned up, we are providing information on the history and cleanup status of one leaking tank site in each of these 5 states.

To identify information available on the number and cleanup status of leaking underground storage tanks, we reviewed and evaluated data from EPA's underground storage tank program semi-annual activity reports for the period from March 31, 2001 through March 31, 2004. Each activity report contains data on the number of active and closed tanks, confirmed releases, cleanups initiated and completed, and cleanup backlog for the 50 states, 5 territories, and the District of Columbia, arranged by EPA region.[1] To assess the reliability of the EPA data, we interviewed EPA program officials at headquarters and in Regions 3, 4, 5, and 9; conducted electronic (logic and other) reliability testing of the data itself; and obtained and reviewed EPA's responses to questions designed to determine the reliability of the data. In addition, we compared the semiannual data reported by EPA

[1]According to EPA, "confirmed releases" are identified by the incident, not the receptors. For example, 10 contaminated residential wells would be considered one release if the contamination was caused by a leaking tank at a single gasoline station, even if more than one tank at the station was leaking. However, if tanks at three different gasoline stations leaked, three confirmed releases would be recorded, regardless of the number of receptors. The number recorded by EPA represents the cumulative number of incidents where an owner/operator has identified a release from a regulated petroleum underground storage tank system, reported the release to the state/local or other designated implementing agency, and that agency has verified the release. "Cleanups initiated" records confirmed releases for which the state or responsible party has evaluated the site and initiated (1) management of petroleum-contaminated soil, (2) removal of free product, (3) management or treatment of dissolved petroleum contamination, or (4) monitoring of the groundwater or soil being remediated by natural attenuation; or for which the state has determined that no further actions are currently necessary to protect human health and the environment. The number reported by EPA represents the cumulative number of releases for which some physical remediation activity has begun, unless the state has determined that no such activity is necessary. "Cleanups completed" represent the number of confirmed releases where cleanups have been initiated and conducted to the point that the state determines that no further actions are needed to protect human health and the environment. The number reported by EPA is the cumulative number of cleanups completed. "Cleanup backlog" is the number of confirmed releases minus the number of cleanups completed. The five territories are (1) American Samoa, (2) the Commonwealth of Northern Mariana Islands, (3) Guam, (4) Puerto Rico, and (5) the U.S. Virgin Islands.

with data provided by the states we visited. In general, we found only minor discrepancies during our reliability testing of the data. For example, the Maine and Massachusetts semi-annual data for the period ending March 31, 2002, were inadvertently switched. Once we brought this to EPA's attention, it was immediately corrected. We also found that EPA reported 1,000 less closed tanks and 1,000 more active tanks than reported by the state of Pennsylvania. The state had initially provided EPA data on the number of closed tanks as of September 30, 2004 but the following day provided EPA a correction to this amount. However, EPA inadvertently did not update its records to reflect this correction. While acknowledging these problems, we have determined that the reliability of the semi-annual data is adequate for the purposes used in this report.

To identify funding options available for cleaning up contaminated tank sites and the processes used for identifying, assessing, and cleaning up leaking tanks by 5 states with large numbers of leaking tanks, we discussed possible funding options with EPA officials, conducted structured interviews with state program officials, and reviewed documents provided by these officials or located on their internet sites. To select which states to include in our review, we used data from EPA's semi-annual activity report and applied it to our selection criteria and picked the five states having the highest combined score. Our selection criteria consisted of the following five quantitative indicators:

- states with the largest average number of active tanks for the last 3 years;
- states with the largest average number of confirmed releases for the last 3 years;
- states with the largest average number of backlogs for the last 3 years;
- states with the largest increase in backlogs during the last year divided by the number of active tanks for that state; and
- states with the largest increase in new tank releases for the last year divided by the number of active tanks for that state.

Three of the five indicators used 3-year average data to minimize the impact of single-year fluctuations and to reduce the effect of state officials' periodic revisions to the data. Two of the five indicators included adjustments for the number of active tanks in the state so as to reduce the

possible selection bias in favor of states that have large numbers of active tanks.

For each indicator, we assigned a numerical score corresponding to its ranking compared to the other states. For example, because EPA data indicated that California averaged the most releases over the last three years, we assigned it a score of 56 out of a possible 56 points; alternatively, because American Samoa averaged the least number of releases over the last three years, we assigned it a score of one.[2] To determine a state's total ranking for all five indicators, we added the scores for each state across all indicators and ranked each from highest to lowest.

As a final step in our state selection process, we reviewed the 5 states with the highest quantitative score to ensure that, taken as whole, these states (1) were geographically diverse, (2) had different EPA regional offices overseeing their LUST programs, (3) included states with and without EPA-approved LUST programs, and (4) included states with and without LUST assurance funds. This process resulted in our including California rather than Ohio. While both states had the same quantitative score, including California, in our opinion, increased geographic diversity and added a different regional office to our selected states.

To provide information on the history and cleanup status of one leaking underground storage tank site in each of the 5 states, we identified the 5 sites—Coca-Cola Enterprises, Yuba County, California; Henry Fruhling Food Store, Harford County, Maryland; Bob's Marathon, Grand Ledge, Michigan; R.C. Anderson Trust, Nash County, North Carolina; and Tranguch Tire Service, Incorporated, Luzerne County, Pennsylvania—interviewed state program officials responsible for overseeing or managing the cleanup at these sites, reviewed case files, and visited each site. In identifying these sites, we first selected the Tranguch site because of congressional interest. For comparison with Tranguch, we selected the remaining 4 sites primarily on the basis of the following similarities to that site:[3]

[2]The total number of possible locations was 56, including the 50 states, 5 territories, and the District of Columbia.

[3]As a secondary factor in selecting sites, we took into account travel costs. This was necessary because remediation site files are not normally maintained on-site, state underground storage tank program managers are usually not co-located with incident case managers responsible for overseeing the cleanup, and the sites themselves can be located at great distances from the underground storage tank program managers.

- Cleanup was either completed in 2004 or is relatively close to completion based on total estimated costs;

- Remediation costs significantly exceeded the average cost of cleanup of about $125,000; and

- The risk priority ranking for remediation was above normal.

Specifically, we selected each of the 4 remaining sites as follows:

- *Coca-Cola Enterprises n Yuba County, California:* From California's GeoTracker database, we obtained a list of about 3,400 closed sites—that is, sites where cleanup has been completed—and identified the 10 most expensive cleanup sites for further investigation. The Coca-Cola site had the highest risk rating among those sites closed since January 2004, and while all of the remaining 9 sites were more costly than the Coca-Cola site, the cost differential was not significant and all had the same or lower risk ratings.

- *Henry Fruhling Food Store in Harford County, Maryland:* For site selection, we obtained a list of 39 sites from Maryland's Oil Control Program, administrating the state's underground storage tank program. Because Maryland does not track cleanup costs for sites being remediated by responsible parties, these were all sites with state-lead cleanups. In addition, they were sites still undergoing remediation, because the state has not closed a site within the last 2 years. From this list we selected the Fruhling Food Store site primarily based on its high cost and high risk. This site was the most costly to clean up and had a high risk ranking, having impacted residential water supplies.

- *Bob's Marathon in Grand Ledge, Michigan:* We obtained a list of 68 sites with remediation costs of at least $250,000 from Michigan's Department of Environmental Quality, administrating the state's underground storage tank program. Because Michigan does not track cleanup costs for sites being remediated by responsible parties, these were all sites with state-lead cleanups. We selected the Bob's Marathon site primarily based on its high cost and high risk. Bob's Marathon was the most costly of sites that were either completed or nearly completed and was high risk because it impacted municipal water supplies and the community.

- *R.C. Anderson Trust in Nash County, North Carolina:* We obtained a list of 108 sites with remediation costs of at least $250,000 from North Carolina's Department of Environment and Natural Resources, administrating the state's underground storage tank program. We selected the 4 sites with the highest remediation costs for further analysis. From these 4, we selected the R.C. Anderson Trust site primarily based on high risk and high cost. This site was the only site ranked high risk because of its potential impact on nearby water wells and on the community. While this site was the least costly of the four high-cost sites, the cost differential between this site and the highest cost one was only about $24,000.

We conducted our review from August 2004 through November 2005 in accordance with generally accepted government auditing standards.

Comments from the Environmental Protection Agency

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

NOV 2 2005

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. John B. Stephenson
Director
Natural Resources and Environment
Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson:

Thank you for the opportunity to review and comment on the Government Accountability Office's (GAO) draft report entitled, "More Complete Data and Continued Emphasis on Leak Prevention Could Improve EPA's Underground Storage Tank Program". In general, we think the report's findings and conclusions have merit, and we will assess the feasibility of implementing the specific recommendations. We had a few editorial comments which are provided in the enclosure.

The draft report recommends that the Environmental Protection Agency (EPA) require states to separately identify information on the number and cleanup status of their abandoned tanks (i.e., those in which the owner is unknown, unwilling, or unable to pay for the cleanup). It also recommends that EPA use this information to improve both the oversight of the leaking underground storage tank (LUST) program and our ability to determine how to most efficiently and effectively allocate LUST Trust Fund dollars to states. As the report correctly indicates, EPA collects data from the states, which include information on abandoned tanks, and factors these data into the allocation of Trust Fund dollars among states.

We agree with GAO's recommendation that the underground storage tank program could benefit from more specific information about abandoned tank sites. However, as you know, obtaining this information is not a simple matter. States may not know up front if an owner is unknown, unwilling, or unable. States would have to search to determine the potentially responsible party before they could report to EPA on the status of ownership. Similarly, states would have to complete a financial assessment to determine an owner's solvency, and would have to issue an enforcement order before an owner could be designated as unwilling to pay for a cleanup. In addition, although some states already collect specific information on abandoned tanks, we would want to be careful not to place an undue burden on states. Therefore, in consultation with states, we will consider how best to incorporate GAO's recommendation of using more specific abandoned tank data to more efficiently and effectively allocate Trust Fund dollars. However, we want to continue to ensure states are able to use these funds to oversee and administer a program that addresses high risk sites and moves all sites forward. We also want to

ensure there are incentives for states to continue to assist in funding cleanups of abandoned tanks.

Thank you again for the opportunity to comment on your draft report and for suggesting areas for additional focus within the abandoned tank universe. We will consider implementing GAO's recommendations.

If you have any questions concerning our response, please contact Judy Barrows in the Office of Underground Storage Tanks at (703) 603-7142.

Sincerely,

for Thomas P. Dunne
Acting Assistant Administrator

Enclosure

GAO Contacts and Staff Acknowledgments

GAO Contacts

John B. Stephenson (202) 512-3841

Staff Acknowledgments

In addition, Vincent P. Price, Michael J. Rahl, and Michael S. Sagalow made key contributions to this report. Important contributions were also made by John W. Delicath, Wilfred B. Holloway, and Richard P. Johnson.

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