Editors’ Summary: Congress first addressed the problem of leaking underground storage tanks (USTs) in 1984, by enacting Subtitle I of RCRA. The UST regulatory program addresses, inter alia, corrosion protection, reporting, corrective action, and financial responsibility. In this Article, the author provides an overview of the federal UST program. The author outlines the program’s significant elements and explores specific regulations in the context of the technical problems they are intended to address, giving particular attention to how, to what, and to whom the regulations apply. The author concludes that UST owners and operators can avert unnecessary exposures to liability and expense by developing compliance strategies that fit their particular situation and make sense within the context of the applicable regulations.

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I. Introduction

Until the mid-1980s, underground storage tanks (USTs)—other than those containing hazardous wastes—went largely unregulated. In 1984, Congress amended the Resource Conservation and Recovery Act (RCRA) to add Subtitle I, creating the federal UST regulatory program, which Congress expanded in 1986. RCRA Subtitle I, and the U.S. Environmental Protection Agency’s (EPA’s or the Agency’s) implementing regulations, impose new obligations and potential liabilities on a large number of diverse entities. For example, businesses that use USTs include service stations, petroleum bulk plants, municipal warehouses, shopping centers, school bus yards, farms, factories, automobile dealerships, and delivery services. Many potentially regulated parties, unaccustomed to environmental regulations, may perceive the UST program as a constantly expanding, almost overwhelming collection of onerous and technical requirements. Close attention to the program’s statutory mandates and regulatory requirements, however, reveals a tightly knit, relatively comprehensible approach to regulation that, with some study, may be readily implemented.

This Article is intended to provide a basic overview of the federal UST regulatory program to assist UST owners and operators, and their representatives, in improving compliance strategies. After providing some background, the Article reviews the regulatory framework of the program, pointing out generally its three significant aspects. It then explores specific regulations and explains how and to what they apply. The Article explains the federal UST program by discussing the regulations within the context of the technical problems they are intended to address. It concludes that with proper management, an owner or operator can significantly reduce the potential liability associated with USTs.

II. Background

There are about 2 million USTs nationwide. Most are constructed of bare steel. As a result, corrosion is the most frequent cause of leaks. In addition, releases may be caused by spills, overfilling, and leaks in delivery piping, vent pipes, and fittings on top of tanks. Even small leaks, over time, may result in significant product loss and contamination. Breaches in pressurized piping systems can result in devastating contaminations. In 1988, EPA estimated that one-third of the nation’s USTs were leaking.

It was not until catastrophic UST failures and large-scale groundwater contamination occurred in Provincetown, Massachusetts, Northglenn, Colorado, and Dover-Walpole, Massachusetts, that Congress recognized the need for UST regulation. Because nearly one-half of the United States relies on groundwater as a source of drinking water, the need for UST regulation was considered immediate.

By enacting RCRA Subtitle I in November 1984, Congress required EPA to set operational standards for USTs and response standards that would protect human health and the environment from potential UST releases. On April 17, 1987, EPA proposed the first implementing regulations for USTs that store either petroleum or hazardous substances. On September 23, 1988, EPA published final regulations setting the minimum technical standards for new and existing USTs and outlining the corrective action needed to be taken in the event of an UST release. At the same time, EPA published final regulations that allow the Agency to
delegate enforcement authority to state agencies by setting standards for EPA approval of individual state UST programs.18 These regulations became effective on December 22, 1988.19

In 1986, Congress amended §9003(c) and (d) of RCRA Subtitle I to mandate that EPA establish financial responsibility requirements for UST owners and operators to assure coverage for the costs of corrective action and third-party liability for accidental releases from USTs.20 EPA’s final financial responsibility rule, promulgated on October 26, 1988, sets forth the requirements and mechanisms by which different categories of UST owners and operators may demonstrate their ability to pay for the cleanup of UST releases.21 The rule, which went into effect January 24, 1989, applies to petroleum tanks only.

III. The UST Program

The UST program has several aspects. Importantly, the program is designed to be implemented at the state level and authorizes states to adopt and implement programs “no less stringent” than the federal UST program. In substance, the federal program’s regulatory framework has three fundamental segments: (1) technical standards for system design, installation, operation, upgrades, release detection and closure; (2) reporting and corrective action requirements for UST releases; and (3) financial responsibility requirements. In admirable contrast to the expense associated with RCRA Subtitle C compliance and the draconian fiscal impact of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),22 the UST program was designed to reduce the financial burden of the regulations on UST owners and operators by gradually phasing in the regulatory requirements.23

A. Delegation to the States

Any state may submit to EPA an UST release detection, prevention, and correction program for review and approval by the Agency.24 The state program may cover hazardous substances, petroleum, or both.25 In order to obtain EPA approval, the state must demonstrate that its program will be adequately enforced and be no less stringent than the federal requirements for release detection, recordkeeping, release reporting, corrective action, tank closure, financial responsibility, new tank performance standards, and notification for operational and nonoperational tanks.26 EPA has reserved the authority to administer UST regulations on Native American lands.27

Congress intended to expedite EPA approval of state programs. Congress directed EPA to determine after notice and public comment, but within 180 days of the date of receipt of a state’s application, whether the state’s program complies with federal standards.28 Once EPA approves the state program in lieu of the federal program, the state has primary enforcement authority.29

Although EPA retains the right to conduct inspections and take enforcement actions in states for which it has delegated authority,30 EPA’s technical standards31 strongly emphasize the need for state regulation of tanks.32 To date, almost every state has enacted legislation regulating USTs, but only 13 states have requested EPA to delegate enforcement authority, and only 12 of these states have received final approval.33 Usually, state UST legislation closely parallels the federal standards, however, 13 states have adopted more stringent programs.34 Twelve states have adopted earlier UST-upgrade deadlines.35 While some states impose more rigorous
upgrade, removal, and closure standards, others extend their reach beyond the federal program by regulating heating oil tanks or prohibiting the abandonment of existing tanks.\textsuperscript{36}

As indicated by the fact that states have enacted legislation but not sought approval, EPA approval of the programs has not proven to be necessary. In fact, budgetary constraints have led EPA to allow states to assume primary responsibility for administration and enforcement of their UST programs before receiving formal delegation of authority.\textsuperscript{37} Although EPA retains the right to administer the federal program in states that have not received final approval, it has done so only sparingly.\textsuperscript{38}

\textbf{B. The Program's Standards and Requirements}

\textbf{1. The Tanks to Which They Apply}

Whether or not an UST system\textsuperscript{39} is regulated by RCRA’s Subtitle I program depends on the system’s contents, location, purpose, and date of last use. Generally, the regulations apply to tanks storing “regulated substances” that, including their connected piping, have greater than 10 percent of their volume underground.\textsuperscript{40} Regulated substances include any CERCLA hazardous substance and any petroleum or petroleum-based substance, including motor fuels, jet fuels, fuel oils, lubricants, petroleum solvents, and used oil.\textsuperscript{41} Hazardous wastes regulated under RCRA Subtitle C are exempt from Subtitle I regulation.\textsuperscript{42}

The universe of USTs that contain regulated substances is vast and, not surprisingly, many types of tanks are either exempt or deferred from the definition of an UST or from some or all of the regulations. Many tanks that are now deferred from most of Subtitle I’s regulations may be regulated in the future and are subject to some of the current regulations.\textsuperscript{43}

Nine kinds of tanks are statutorily excluded from the definition of an UST based on size, contents, or place of use. Excluded tanks are: (1) farm or residential tanks of 1,100 gallon or less capacity; (2) tanks storing heating oil for consumptive use on the premises where stored; (3) septic tanks; (4) pipeline facilities regulated under the Natural Gas Pipeline Safety Act,\textsuperscript{44} the Hazardous Liquid Pipeline Safety Act,\textsuperscript{45} or their state counterpart statutes; (5) surface impoundments, pits, ponds, or lagoons; (6) storm- or wastewater collection systems; (7) flow-through process tanks; (8) liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; and (9) storage tanks situated above the floor in an underground area, such as a basement, cellar, or mine.\textsuperscript{46}

Most of the statutory UST exclusions are fairly straight-forward in application, although some are a bit less apparent. For example, it may not be immediately evident that exempt farm tanks include tanks located at fish hatcheries but not those located on land used to grow timber.\textsuperscript{47} Moreover, heating oil tanks are defined to include many tanks in addition to those used for heating purposes.\textsuperscript{48} The exclusion for flow-through process tanks covers any UST that forms “an integral part of the production process,” such as holding tanks, pulse tanks, feed tanks, mixing tanks, and tanks that hold material being diluted.\textsuperscript{49} However, the exclusion does not apply to oil-water separators, which are used following the production process, or tanks that store regulated substances before their introduction into a production process, such as a dry cleaning machine.\textsuperscript{50}
Six types of tanks are excluded from all applicable UST regulations but are nevertheless included within the definition of an UST.51 These exclusions range from the very obvious—tanks storing Subtitle C wastes that would not be regulated in the first instance because they do not contain regulated substances—to the somewhat ambiguous—tanks containing de minimis concentrations of regulated substances. The de minimis tank exclusion is not intended to cover tanks that contain diluted gasoline or contaminated water. Rather, it is specifically, and appropriately, intended to narrow the statutory definition of an UST, which is so broad that it otherwise would include in-ground swimming pools filled with chlorine-treated water.52

Five types of tanks are exempt from all UST regulations except those regulations pertaining to release response and corrective actions.53 These systems are: (1) wastewater treatment tank systems not regulated under §§402 or 307(b) of the Federal Water Pollution Control Act; (2) UST systems containing radioactive materials; (3) UST systems storing fuel for emergency generators at nuclear power generation facilities; (4) airport hydrant fuel distribution systems; and (5) UST systems with field constructed tanks.54

Tanks that were permanently closed55 prior to December 22, 1988, need not be automatically reexamined and closed in accordance with UST regulations.56 However, when directed by EPA or a state implementing agency, the owner or operator of a previously closed UST system must assess the excavation zone and close the UST in accordance with the regulations57 if releases from the UST may, in the judgment of the implementing agency, pose a current or potential threat to human health and the environment.58 In addition, certain tanks taken out of service prior to the effective date of the regulations are subject to notification requirements.59

2. The Persons to Whom They Apply

The UST regulations apply to owners and operators of regulated UST systems. An “operator” is defined as any person in control of, or having responsibility for, the daily operation of an UST system.60 The definition includes current operators only, and implies that one must actively manage a tank system to be considered an “operator.”

An “owner” is any person who owns an UST system, unless that system was taken out of service prior to November 8, 1984. For systems no longer in use at that date, the owner is the person who owned the system immediately prior to its discontinuation.61 “Person” is defined broadly to include an individual, trust, firm, joint stock company, federal agency, corporation, state, municipality, commission, state political subdivision, any interstate body, or the U.S. government.62 The definition of owner does not include any person who, without participating in the management of an UST and otherwise not engaging in petroleum production, refining, and marketing, holds indicia of ownership primarily to protect a security interest in the tank.63

The federal regulations impose joint and several liability on tank owners and operators and do not place primary responsibility on one over the other.64 Generally, owners and operators may jointly or individually decide on a compliance plan. That one party agreed to comply with the regulations but failed to comply, however, is no defense in an EPA enforcement action for violation of an EPA technical standard or other requirement, or any EPA-approved state program requirement.65
When tanks are currently being operated, it is not difficult to identify at least one person responsible for compliance with the UST regulations. For example, operators of service stations will often own the tanks and lease the property on which the tanks are located. In such cases, the lessee is the owner and operator of the UST system. Moreover, it is also common for the owner of the property on which tanks are situated to own and operate the system, as is the case with private automobile dealerships, bus and taxi companies, public fire and police departments, and local governments.

By definition, there is no “operator” of an abandoned or out-of-service system. If a tank was in use after November 8, 1984, and the tank (or any portion of the tank, such as underground vents or connective piping) remains in the ground, the current property owner may fall within the statutory definition of an owner. If the tank was abandoned prior to November 8, 1984, by a previous property owner, however, it may be impossible to locate records identifying the owner of the tank “immediately prior to discontinuation of their use,” because tank registration was not historically required and tank closures were performed on an ad hoc, unreported basis. In cases where the identity of an owner or an operator cannot be determined, EPA or an authorized state agency may undertake corrective action to respond to a release if necessary to protect human health and the environment.

3. How to Comply

a. Notification Requirements. In amending RCRA Subtitle I in 1984, Congress required every owner of an operating UST to notify the designated state or local agency of the existence of the tank, specifying the age, size, type, location, and uses of each tank. The initial notification forms were due by May 8, 1986. In addition to the reporting requirements for operating tanks, owners of tanks taken out of operation after January 1, 1974, but still in the ground were required to notify a designated state agency of the existence of the tank by May 8, 1986. This notice, a form for which was published on November 8, 1985, also required an UST owner to specify, to the extent known, the date the tank was taken out of operation, the size, type, and location of the tank, and the type and quantity of substances left stored in the tank.

RCRA specifies that owners or operators of tanks brought into use after this initial notification period must notify the designated state agency within 30 days of the existence of the tank. Neither the statute nor the regulations explicitly require property owners to report abandoned tanks discovered after the expiration of the initial reporting period on May 8, 1986. Nonetheless, EPA recommends that owners and operators of tanks still in the ground on or after May 6, 1986, and taken out of service after January 1, 1974, who have not complied with the notification requirements, should use parts I through VI of the 1988 notification form to comply with their reporting obligations. EPA interprets this language to impose a continuing obligation on owners and operators to report newly discovered abandoned tanks. As a practical matter, many owners do not report the discovery of abandoned tanks because they are unable to determine when the tank was taken out of service and, hence, if a reporting obligation even exists. In addition, an owner of property containing a tank taken out of service prior to November 8, 1984, would not have a reporting obligation if he or she did not own the tank immediately prior to discontinuation of its use, because he or she would not fall within the statutory definition of an UST owner.
The RCRA statute and the federal regulations require both owners and operators of new UST systems to certify in the notification form compliance with the following requirements: (1) proper installation of tanks and piping; (2) cathodic protection of steel tanks and piping; (3) compliance with federal financial responsibility requirements; and (4) compliance with release detection standards. In addition, owners and operators must ensure that the installer signs the notification form certifying proper installation of both tanks and piping, and any person who sells a tank intended for use as an underground tank must notify the purchaser of its obligation to notify.

b. New Tank Performance Standards. Any regulated UST system installed after December 22, 1988, must meet design and construction requirements. Any underground portion of the system that “routinely” contains a regulated substance, such as tanks and piping but not vent pipes, must be protected from corrosion in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory. Unless the tank is determined to be in extremely noncorrosive soil or an alternate tank system is approved by the state implementing agency, the tank must be constructed of one of the following materials: fiberglass-reinforced plastic, cathodically protected steel, or steel fiberglass-reinforced plastic composite.

Any piping that routinely contains regulated substances, which is in contact with the ground, generally must be constructed of either fiberglass-reinforced plastic or cathodically protected steel. Alternate materials may be used, however, if the implementing agency determines that an alternate design is adequate or the soil is found to be noncorrosive by a corrosion expert.

New tanks must be equipped with a spill prevention device, such as a catchment basin, that prevents release of product to the environment when the transfer hose is detached from the fill pipe. The tank also must have one of three types of overfill prevention equipment that will either (1) automatically shut off flow into the tank when the tank is no more than 95 percent full; (2) alert the transfer operator when the tank is no more than 90 percent full by restricting the flow in the tank or triggering a loud alarm; or (3) restricting the flow 30 minutes prior to overfilling, triggering a loud alarm one minute before overfilling, or automatically shutting off flow into the tank so that none of the fittings located on top of the tank are exposed to product due to overfilling.

Tanks must be installed by a state-certified contractor. The installation must comply with the manufacturer’s instructions. Some important steps during installation include preinstallation tank tightness tests, proper selection and placement of backfill, and use of supplemental anchors to avoid flotation in areas of potentially higher water table. Careful attention should also be given to the installation conditions in the manufacturer’s warranty in order to preserve the warranty.

c. Upgrades of Existing Tanks. By December 22, 1998, all existing UST systems that do not meet the new UST performance standards must be upgraded in accordance with federal regulations or be permanently closed. Upgrades may take various forms, depending on the type of tank. For example, unprotected steel tanks must be upgraded by one of three methods: (1) interior lining; (2) cathodic protection; or (3) interior lining combined with cathodic protection. In addition, spill and overfill prevention equipment must be installed on every tank,
whether constructed of steel or fiberglass, and all metal pipes that routinely contain regulated substances and contact the ground must be cathodically protected.\textsuperscript{91}

- **Interior Lining.** Steel and fiberglass tanks may be lined internally to handle almost any product, including those corrosive to steel. Internal corrosion is generally not as serious a problem as external corrosion, however, microorganisms contained in some products, however, attach to tank walls and form sludges that can eventually corrode tank walls from within.\textsuperscript{92} Data gathered by EPA indicate that lined tanks rarely release substances to the environment, even in the absence of external corrosion protection measures.\textsuperscript{93}

  Internal liners are a relatively inexpensive UST upgrade, typically priced at one-third the cost of tank replacement.\textsuperscript{94} Before lining an existing tank, it must be emptied, cleaned with an ultrasonic cleaner, and sandblasted to white, or almost white, steel. After the tank is inspected, the lining can be applied. Linings usually are sprayed on and cured, bonding to the tank.\textsuperscript{95}

  Interior lining is not regarded as a permanent upgrade, but it is adequate if periodic inspections determine that the lining continues to meet original design specifications.\textsuperscript{96} If an inspection reveals that the lining has eroded and no longer meets original design specifications, the tank no longer meets upgrade requirements. If the lining cannot be repaired in accordance with industry codes, the tank is subject to the unprotected tank requirements and must be replaced after 1998.\textsuperscript{97}

- **Cathodic Protection.** Cathodic protection systems are designed to prevent external corrosion of steel USTs. The corrosion occurs when metal USTs and their underground surroundings act like a battery, with one end becoming negatively charged and the other end positively charged.\textsuperscript{98} As the electrical current exits through the negatively charged part of the UST system (either the tank or its piping), the metal begins to soften. Over time, the system corrodes, holes form, and leaks begin.\textsuperscript{99}

  Cathodic protection systems reverse the electrical current that causes corrosion. The protection systems come in two forms: “sacrificial anodes” and “impressed current” systems. Sacrificial anodes are pieces of metal that are more electrically active than steel and through which the current exits. The system does not eliminate corrosion, but rather transfers it to the anode, which itself becomes corroded and is eventually sacrificed.\textsuperscript{100} Impressed current systems introduce an electrical current into the ground through a series of anodes that are not attached to the UST. The electrical current flowing from these anodes is greater than the current exiting the system, preventing the current from leaving the UST.\textsuperscript{101}

  USTs must be carefully inspected for soundness prior to use of cathodic protection as an upgrade method. If the tank has been installed for less than 10 years, its structural integrity may be checked by a tank tightness test\textsuperscript{102} both prior to installation of the cathodic protection system and once within three to six months after the system has been installed. This will ensure that any corrosion holes that were previously plugged with rust did not become unplugged.\textsuperscript{103} In lieu of tank tightness testing, the tank may be monitored monthly for releases after installation of the cathodic protection system.\textsuperscript{104} Tanks that have been installed for 10 years or longer must be internally inspected to ensure that the tank is structurally sound and free of holes prior to installing a cathodic protection system.\textsuperscript{105}
All cathodic protection systems must be continuously maintained. Moreover, they must be tested within six months of installation and at least every three years thereafter by a “qualified cathodic protection tester.” In addition, USTs with impressed current systems must be inspected every 60 days to ensure the equipment is running properly.

*d. Release Detection Requirements.* Historically, most UST releases were revealed through the discovery of either their impacts on surrounding communities or large losses of inventory. Although the tank performance standards will dramatically reduce problems, UST system releases will still occur. Therefore, to support its preventive measures, EPA requires all new and existing USTs to use a release detection method designed to detect promptly releases of regulated substances from the tank system.

Tanks installed after December 22, 1988, are required to have a release detection method upon installation. The requirements for existing tanks were phased in over a five-year period. The oldest tanks (those installed prior to 1965 or installation date unknown) became subject to the requirements on December 22, 1989. The newest tanks (those installed between 1980 and 1988) were required to have release detection by December 22, 1993. USTs that do not have a release detection system by the required date must be permanently closed.

Generally, there are six approved methods, or combination of methods, of release detection: (1) inventory control and tank tightness tests; (2) manual tank gauging and tank tightness tests; (3) automatic tank gauging systems; (4) vapor monitoring wells; (5) groundwater monitoring wells; and (6) interstitial monitoring. The appropriateness of the chosen method will depend on the age and size of the particular UST, the substance(s) it stores, and the hydro-geological environment surrounding the tank. Two methods—inventory control and manual tank gauging—are approved for temporary use only. The remaining methods are approved for permanent use and must be inspected by the tank owner or operator once every 30 days for evidence of releases over the operational life of the tank.

- *Inventory Control and Tank Tightness Tests.* Inventory control involves daily or periodic inventory measurements and reconciliation to check for loss of product from a tank. The inventory reconciliation is achieved by taking daily dipstick readings of product level and reconciling them with the amounts of dispensed and delivered product. These records are used to perform a statistical analysis of inventory discrepancies. If product cannot be accounted for at month’s end, it may indicate a tank leak. Before the responsible party is required to report and investigate the suspected release, however, a second month of inventory records may be taken to confirm whether an actual inventory discrepancy exists.

Inventory control must be combined with tank tightness tests in order to qualify as an approved leak detection system. Tank tightness tests fall into two categories: volumetric and nonvolumetric. Volumetric methods use sensors to monitor continuously the temperature and level of product in a tank over a period of several hours. A net decrease in product volume (subtracting temperature-induced volume changes) indicates that the UST is non-tight. Nonvolumetric methods involve injection of tracer gases such as helium into the system. Using this method, if sensors placed around the tank detect the tracer gases, the system is nontight.

For USTs that have not been upgraded, it was permissible to use inventory control in combination with *annual* tightness tests until December 22, 1998. Once a system is upgraded,
or if the system is new, inventory control may be used in combination with tank tightness tests performed every five years, but only for the first 10 years of the tank’s operational life. After 10 years, the owner or operator must install a more accurate method of release detection, such as automatic tank gauging, vapor or groundwater monitoring wells, or interstitial monitoring.

- **Manual Tank Gauging and Tank Tightness Tests.** Manual tank gauging consists of taking the tank out of service for a minimum of 36 hours every week and measuring the product level at the beginning and end of each test period. A leak is suspected if the variation between beginning and ending results exceeds weekly or monthly standards. If the product level remains relatively static, it is presumed the system passes the test.

  Manual tank gauging may not be used on tanks with a capacity of over 2,000 gallons. Tanks that can hold between 551 and 2,000 gallons may use manual tank gauging in combination with tank tightness tests performed annually until the system is upgraded or replaced, and every five years thereafter for 10 years. Only tanks of 550 gallons capacity or less may use manual tank gauging as the sole method of release detection.

- **Automatic Tank Gauging Systems.** An automatic tank gauging system continuously measures product level and temperature and feeds this information to a computer, which automatically records and analyzes the data. In the “inventory mode,” the automated system replaces the use of the gauge stick to measure product level and also performs inventory control. This mode records the activities of an in-service tank, including deliveries.

  In the “test mode,” the tank is taken out of service and the product level and temperature are measured for at least one hour. The automated system is an approved method of release detection, provided that the inventory data it generates are reconciled on a monthly basis.

- **Vapor Monitoring Wells.** Vapor monitoring wells are used to measure fumes in the excavation around the tank to determine if the tank is leaking. Fully automated systems have permanently installed equipment that continuously gathers and analyzes vapor samples, signifying a release with a visual or audible alarm. Manually operated equipment ranges from sophisticated photoionization detectors, which yield instant results, to devices that gather samples for laboratory analysis.

  Before installing a vapor monitoring system, a site assessment must be performed to determine whether vapor monitoring is appropriate at that site. A site assessment must include a determination of groundwater level, background contamination, stored product type, and the appropriate number and location of wells.

  Vapor monitoring wells are appropriate only when the regulated substance stored in the UST is sufficiently volatile to result in vapors that are detectable by monitoring devices inside the well. Background levels of contamination must be low enough so as not to interfere with detection of new product releases. In addition, the water table must be deep enough that the groundwater will not prevent movement of vapors in the backfill. Vapor wells must be placed in the backfill of the tank excavation, and the backfill must be sufficiently porous to allow diffusion of the vapors. An adequate number of wells must be placed in locations that will allow detection of releases within the excavation zone from any portion of the tank that routinely contains product.
- Groundwater Monitoring Wells. Groundwater monitoring systems are an approved method of leak detection for tanks containing regulated substances that are immiscible in water and light enough to float on the water table. Groundwater levels must never drop below 20 feet and the soils beneath the excavation zone must have a rate of hydraulic conductivity of 0.1 cm/sec or greater. The wells must be placed within the excavation zone, or as near to the zone as possible. A site assessment must be performed to ensure that the wells are sufficient in number and location to detect any release. The obvious drawback to groundwater monitoring systems is that once the release has reached the groundwater table, it is difficult and expensive to remediate.

- Interstitial Monitoring. Interstitial monitoring requires installation of a secondary barrier designed to contain a leak so that it will be detected. EPA recognizes double-walled tanks, leakproof excavation liners, and leakproof liners installed on the interior of the tank, or “bladders,” as methods of secondary containment. Additional methods include leakproof liners that closely surround a tank, or “jackets,” and concrete vaults.

If a double-walled tank is used, the regulations require monitoring of the interstitial space between the walls to detect a failure in the tank’s inner wall. Interstitial monitoring systems are available to monitor continuously for either the presence or absence of water or product. Detection may be active (designed to signal the presence of specific compounds) or passive (designed to activate a signal when a current is interrupted).

Excavation liners may be used instead of double-walled tanks, but not in a 25-year floodplain, and only if a site assessment verifies that the secondary barrier will always be above the groundwater table. If excavation liners are used, liners must be installed in both the tank excavation and in piping trenches. The entire excavation must be sloped toward a sump to facilitate monitoring and recovery of spilled product.

e. Piping. There are two types of piping systems—suction and pressurized. Due to the potential for high volume releases from pressurized pipes, EPA required owners and operators of petroleum UST systems using pressurized piping to install automatic line-leak detectors by December 22, 1990. In addition, owners and operators must conduct annual line tightness tests or begin monthly monitoring of a permanently approved release detection system.

Suction piping systems are less common than pressurized systems and much less likely to result in a high-volume release of product. Therefore, less stringent release detection methods apply. If the system is designed so that product drains back into the tank once suction is released, no release detection equipment is required. An other suction pipe systems must be monitored monthly for releases or have a line tightness test conducted on them every three years.

f. Detection Method Performance Standards. Release detection methods must meet EPA’s applicable performance standards, which phased in on December 22, 1990, and September 22, 1991. Tank and line tightness tests must be capable of detecting a 0.10 gallon/hour leak rate. Automatic tank gauging systems must detect a 0.2 gallon/hour leak rate. Automatic line-leak detectors must be able to detect a leak of 3 gallons/hour. Groundwater monitoring well sampling devices must be capable of detecting at least one-eighth of an inch of free product on top of the groundwater. Statistical inventory reconciliation must
be conducted to detect a release of at least one percent of the system’s flow-through plus 130 gallons per month. Manual tank gauging must meet weekly standards of between 10 to 26 gallons and monthly standards of between 5 to 13 gallons, depending on the size of the tank. All other release detection methods must be capable of detecting a leak of 0.2 gallons per hour or 150 gallons per month. An methods must demonstrate a probability of detection of at least 95 percent and a probability of false alarm of no more than 5 percent.

EPA will not test, certify, or approve specific brands of commercial leak detection equipment, claiming that “the large number of commercial available leak detection methods makes it impossible for the Agency to test all the equipment or review all the performance claims.” Thus, it is the responsibility of tank owners and operators to select a method of leak detection that has been shown to meet the relevant performance standards.

EPA recognizes three distinct ways to prove that a particular brand of leak detection equipment meets the federal performance standards: (1) evaluate the method using one of EPA’s standard test procedures for leak detection methods; (2) evaluate the method using a national voluntary consensus code or standard developed by a nationally recognized association or independent testing laboratory; or (3) evaluate the method using a procedure deemed equivalent to an EPA procedure by a nationally recognized association or independent testing laboratory.

In 1990 and 1991, EPA issued seven standard test procedures that cover volumetric and nonvolumetric tank tightness testing, automatic tank gauging systems, statistical inventory reconciliation, vapor phase out-of-tank product detectors, liquid phase out-of-tank product detectors, and pipeline leak detection systems. Due to the technical complexity of these test procedures, it is unrealistic to expect owners and operators to evaluate independently the effectiveness of the release detection device. Therefore, tank owners and operators should obtain a copy of the manufacturer’s report certifying that their leak detection equipment meets the applicable EPA performance standards. Any written performance claims pertaining to a release detection device must be kept on file for at least five years from the date of installation of the release detection system.

g. Responsibility Upon Detection of a Release. If any leak detection method, unusual operating condition, or discovery of a regulated substance in the surrounding environment indicates that an UST system may be leaking, the owner or operator must report the suspected release within 24 hours to the state implementing agency. Within seven days, the owner or operator must confirm whether a leak exists by conducting tank and line tightness tests. If the system passes the test and environmental contamination is not the basis for suspecting the release, further investigation is not necessary. If environmental contamination is the basis for suspecting a release, however, the owner and operator must conduct a site check, even if the system passes a tightness test. If the site check indicates there is contamination, corrective action must begin. Systems that fail tank tightness tests must be repaired, replaced, or upgraded, and corrective action must be initiated.

h. Corrective Action Requirements. EPA’s corrective action requirements present a broad outline of the steps that must be taken once a suspected release from an UST system is confirmed. The general approach is to promote a rapid response to UST releases, to involve state agencies in the cleanup process at the very beginning, and to allow cleanup standards to be selected on a site-specific basis. Within 24 hours of confirmation of a release from an UST
system, owners and operators must report the release to the state implementing agency, take immediate action to prevent any further release of regulated substances, and identify and mitigate fire, explosion, and vapor hazards. Within 20 days of release confirmation, the owner and operator must take initial abatement steps and submit a report to the state summarizing the abatement measures taken and any resulting information or data. Initial abatement measures include continued monitoring for fire and safety hazards posed by vapors or free product and investigations to determine the presence of free product.

Owners and operators must investigate the area around the UST system to characterize the size and nature of the release. The findings must be reported to the implementing agency within 45 days of release confirmation. The implementing agency then has the discretion to require a more extensive site characterization based on the initial characterization. A more extensive investigation is mandatory when the initial investigation reveals (1) free product; (2) that groundwater wells have been affected; or (3) that contaminated soils may be in contact with groundwater.

Corrective action plans for responding to contaminated soil and groundwater may be requested at any time by the implementing agency. Owners and operators may begin cleanup before the corrective action plan is submitted or approved, as long as they notify the implementing agency of their intention to begin cleanup, comply with any conditions imposed by the implementing agency, and incorporate their self-initiated cleanup measures in the corrective action plan that is eventually submitted for approval.

Although EPA considered imposing national cleanup standards, it decided to implement a site-specific approach that allows owners and operators to reduce the time and money needed for cleanup and implementing agencies to address corrective action based on the unique circumstances of each site. Thus state approaches to UST cleanups vary dramatically. For example, some states define petroleum-contaminated soils as hazardous wastes that must be treated and disposed of under RCRA Subtitle C standards. Other states allow landfarming (aeration) of petroleum-contaminated soils at the site of the release to reduce contamination to designated levels. Once aerated, soils may eventually be backfilled into the excavation zone.

At the federal level, petroleum-contaminated media and debris generated from UST corrective actions are temporarily and partially exempt from the toxicity characteristic leaching procedure (TCLP) rule. The TCLP method is used to determine if a waste exhibits the toxicity characteristic and is thereby subject to RCRA Subtitle C regulation. Because a significant percentage of UST contaminated soil contains benzene, it would otherwise qualify as toxic under the TCLP test. Asserting that managing petroleum-contaminated media under RCRA Subtitle C would delay UST cleanups and dramatically increase the cost of UST corrective actions, EPA recently proposed to exempt permanently the petroleum-contaminated media that is currently deferred from the TCLP rule. EPA does not expect to issue a final rule on this subject earlier than January 1994.

i. Financial Responsibility Requirements. On October 26, 1988, EPA promulgated financial responsibility requirements applicable to owners and operators of USTs containing petroleum. To meet these requirements, owners and operators must demonstrate that they can pay the costs of cleanups and third-party damages resulting from any leaks that may occur. In the final rule, EPA established a phased compliance schedule to give providers of financial
assurance mechanisms the time necessary to develop new policies and programs or to conform their policies and programs to EPA requirements.\textsuperscript{185}

- Levels of Financial Responsibility. Owners and operators of petroleum USTs located at petroleum marketing facilities or which handle more than 10,000 annual throughput per month are required to maintain per occurrence coverage of $1 million.\textsuperscript{186} All other tank owners and operators are required to maintain $500,000 per occurrence coverage.\textsuperscript{187} Annual aggregate coverage must be maintained at levels of $1 million for owners and operators of less than 100 USTs and $2 million for owners and operators of 101 or more USTs.\textsuperscript{188}

- Demonstrating Financial Responsibility. Several mechanisms can be used, alone or in combination, to demonstrate financial responsibility. Large companies may self-insure if they meet the requirements set forth in a detailed financial test of self-insurance.\textsuperscript{189} Subsidiaries of large companies may obtain guarantees\textsuperscript{190} or letters of credit\textsuperscript{191} from a parent company. Other methods of compliance include surety bonds,\textsuperscript{192} trust agreements,\textsuperscript{193} and EPA-approved state assurance funds.\textsuperscript{194} Local governments may also use a bond rating test, a local government financial test, a governmental guarantee, and maintenance of a fund balance to comply with the requirements.\textsuperscript{195}

Private tank insurance is expensive and difficult to procure, particularly for older tanks. The most common method of demonstrating compliance with the federal financial responsibility requirements is reliance on a state UST fund. By 1993, 43 states had enacted legislation authorizing development of financial assurance funds programs to enable tank owners and operators to demonstrate financial responsibility.\textsuperscript{196} Twenty-nine state assurance funds have been approved by EPA.\textsuperscript{197} Typically, the funds are financed through tank registration fees and a wholesale-level tax on specified petroleum products.\textsuperscript{198} Owners and operators may apply to the state funds for reimbursement, above a stated deductible, of cleanup costs and damages paid to third parties. Most states reject claims or reduce reimbursement awards if the owner or operator has failed to comply with some or all of the applicable technical regulations.\textsuperscript{199}

- Compliance Deadlines. Petroleum marketers owning or operating 1,000 or more USTs and nonmarketers with more than $20 million in tangible net assets comprised the first group required to comply, by January 24, 1989, with the financial responsibility rules. Their ability to qualify for self-insurance was the primary reason this group was the first to be subjected to the financial responsibility regulations.\textsuperscript{200}

Those petroleum marketers that own between 100 and 999 USTs were required to comply with applicable requirements by October 26, 1989.\textsuperscript{201} Petroleum marketers that own 13 to 99 USTs at more than one facility were given until April 26, 1991, to find insurance.\textsuperscript{202} Petroleum marketers that own or operate between one and 12 USTs at all locations or less than 100 USTs at one site, and nonmarketers with a net worth of less than $20 million were required to comply by December 31, 1993.\textsuperscript{203}

Many local governments will be required to demonstrate financial responsibility by February 18, 1994.\textsuperscript{204} However, EPA has proposed extending the compliance deadline to December 31, 1998, for local government entities operating USTs in rural areas and for certain petroleum marketers in rural areas earning annual profits on gasoline of $15,000 or less.\textsuperscript{205}
IV. Enforcement

RCRA authorizes EPA to issue orders assessing civil penalties of up to $10,000 per tank per day of violation of any federal UST regulation or any requirement of an EPA-approved state UST program. The order may require compliance within a reasonable specified time period. In addition, EPA may commence a civil action in federal court for appropriate relief, including a temporary or permanent injunction. If the violator fails to comply with an EPA order within the time specified, he or she may be liable for a civil penalty of up to $25,000 for each day of continued noncompliance. Any order becomes final unless the respondent requests a hearing within 30 days. Criminal sanctions are not authorized under Subtitle I.

On September 27, 1991, EPA published a final rule establishing the administrative procedures it will use when issuing corrective action orders to UST owners and operators. Generally, EPA will follow the same administrative procedures it uses when issuing corrective action orders to clean up certain hazardous waste releases. If the corrective action order is issued in conjunction with an order pursuant to RCRA §9006 to compel compliance with specific technical requirements or to assess civil penalties, EPA will also follow procedures developed for enforcement of RCRA Subtitle C.

RCRA also authorizes private citizen suits to enforce the UST corrective action regulations. Traditionally, RCRA citizen suits have been brought by private parties to compel cleanup of hazardous waste sites. The fact that RCRA established separate response programs for USTs that leak petroleum and USTs that leak hazardous wastes, however, does not preclude citizen suits to prosecute violations stemming from petroleum or other regulated substances released from an UST.

V. Conclusion

The UST program is now in its seventh year. Owner and operator compliance with UST regulations, however, is surprisingly low. Moreover, some owners and operators incur excessive costs attempting to comply with misinterpretations of regulatory requirements. To avoid such unnecessary exposures to liability and expense, UST owners and operators should carefully review their management practices and develop compliance strategies that make sense within the context of the applicable regulations.

Endnotes:

3. Id. §§6991-6991i, ELR Stat. RCRA §§9001-9010.


8. 53 Fed. Reg. at 37088. See also Christopher Harris, Leaking Underground Storage Tanks—The New Federal Requirements, at 2 (PLI Litig. & Admin. Practice Handbook Series No. 138 PLI/Crim. 77, 1985). Corrosion is common because when an iron or steel tank is placed in damp soil, an electric current may run from the soil to the tank, which results in rapid deterioration of the metal surface. See discussion infra accompanying notes 97-98; see also Glenn Waddell, A Practitioner’s Guide to the Recently Promulgated UST Regulations, 41 Ala. L. Rev. 487 (1989) (citing Richard A. Flinn & Paul K. Trojan, Engineering Materials and Their Applications 484-86 (1981)).


10. See, e.g., Theodore S. Reeves & Patti A. Bacon, Preventing and Responding to UST System Leaks, Pollution Eng’r, Apr. 1992, at 54.


12. In 1977, at least 3,000 gallons of gasoline leaked from a service station’s UST near Provincetown. Provincetown lost 60 percent of its public water supply when the South Hollow wells in North Truro were shut down to prevent the wells from pulling contaminated groundwater from the tank site and contaminating the entire well field. Over $1.4 million was spent to clean up the contamination and the well field was taken out of service for several years. Harris, supra note 8, at 1. See also Lust and the Common Law: A Marriage of Necessity, 13 B.C. Envtl. Aff. L. Rev. 521, 527-29 (1986).

13. In 1980, a major gasoline leak that was traced to a Chevron station in a suburb of Denver, Colorado, compelled Chevron to purchase 41 homes in the neighborhood at approximately twice their appraised value. See Harris, supra note 8, at 1.

14. Twenty-three private wells were contaminated with gasoline, requiring Texaco to provide residents with bottled water and to install filters in homes for nonpotable water use. Id.


17. 52 Fed. Reg. 12662 (1987). Tanks containing hazardous wastes were excluded from the UST program because they are regulated under RCRA Subtitle C.
18. By the time EPA’s final technical standards were published, at least 18 states and hundreds of local governments had established regulatory programs to address the groundwater contamination and cleanup problems posed by leaking USTs. 53 Fed. Reg. 37082, 37096 (1988).


21. 53 Fed. Reg. 43322. Tank owners and operators are categorized by the number of tanks they own and operate and by their status as a marketer or nonmarketer.


23. By design, the program’s implementation is to be phased in over a 10-year period, with different aged tanks and different categories of tank owners becoming subject to varying requirements on successive dates. However, the phased approach has resulted in confusion and misperception. Although EPA attempted to educate the largest segment of the regulated community—petroleum marketers—about the new regulations, information about the program has not reached many nonmarketers such as school districts, banks, shopping center and commercial building owners, and others who own and operate tanks.


25. Id.


27. 40 C.F.R. §281.12(a)(2).


29. Id. §6991c(d)(2), ELR Stat. RCRA §9004(d)(2).


31. See infra notes 80-169 and accompanying text.

32. EPA has stated, “Given the large number of UST facilities, . . . it would be very difficult to establish a credible federal implementation presence through compliance monitoring and enforcement at the federal level. A more realistic and effective approach is for EPA to provide support tools and guidance to state and local governments . . . .” 53 Fed. Reg. 37082, 37096-97 (1988).


35. These state are Connecticut, Delaware, Florida, Iowa, Maine, New Hampshire, New Jersey, Ohio, Rhode Island, South Dakota, and Texas. Id.

36. For example, Florida does not allow upgrading of existing tanks by cathodic protection or tank lining. All new and replacement tanks installed in Florida after January 1, 1992, must have secondary containment. Maine requires all tanks whose manufacturer’s warranty has expired to be removed from the ground. See Underground Storage Tank Guide, supra note 34 (Vol. 2, ¶939 (1992), ¶949 (1992), and ¶910 (1990)) (on file with author).


38. In fact, some EPA regions have taken steps to establish a presence in the enforcement arena. In mid-January 1992, EPA Region X initiated a large-scale enforcement effort at UST facilities in Oregon, conducting inspections and issuing field citations. See Underground Storage Tank Guide, supra, note 34 (Vol. 4, No. 5), at 3 (Mar. 1992) (on file with author). Region VIII has conducted numerous leak detection inspections in Wyoming, during which only 25 percent of the facilities inspected were found to be in compliance. Id., Vol. 4, No. 12, at 2 (Sept. 1992). Region V has conducted compliance inspections in several states, resulting in the filing of several administrative complaints against UST owners. Id., Vol. 4, No. 7, at 2 (Apr. 1992) and Vol. 5, No. 1, at 1 (Oct. 1992).

39. An UST includes “underground pipes” and the definition of an “UST system” includes “underground ancillary equipment” and “ancillary equipment.” 40 C.F.R. §280.20.


42. Since promulgation of RCRA Subtitle I, however, benzene, a volatile constituent of gasoline, has been designated hazardous under RCRA’s toxicity characteristic leaching procedure (TCLP) test. Thus, any contaminated media that fails the RCRA TCLP test for benzene arguably qualifies as a RCRA hazardous waste. EPA has temporarily resolved this problem by deferring regulation of certain petroleum-contaminated media as Subtitle C waste. See infra notes 181-83 and accompanying text.

43. For example, tanks that are deferred from regulation are subject to an interim prohibition on installation or replacement. Between May 5, 1985, and December 22, 1988, no UST system could be installed in any soils not proven to be noncorrosive unless the system was cathodically protected, designed to prevent releases due to corrosion or structural failure for the operational life of the tank, and constructed of material compatible with the substance to be stored. 42 U.S.C. §6991b(g), ELR Stat. RCRA §9003(g). EPA’s interpretation of the Interim Prohibition was published at 51 Fed. Reg. 20418 (June 4, 1986). The Interim Prohibition requirements were replaced by the Technical Standards for new tanks, but continue to apply to all UST systems deferred from regulation until EPA takes action in the future either to regulate or not regulate them. 53 Fed. Reg. 37082, 37083 (1988). See also 40 C.F.R. §§280.10-.11.

44. 49 U.S.C. §§1671-1688.


46. 42 U.S.C. §6991(1)(A), ELR Stat. RCRA §9001(1)(A). See also EPA, OCLC No. 24506619, Underground Heating Oil and Motor Fuel Tanks Exempt from Regulation Under Subtitle I of RCRA: A Study for Report to Congress (1989). An EPA report, mandated by Congress under 42 U.S.C. §6991h(b)-(e), concluded that the exemptions for heating oil and farm/residential tanks—the largest segment of the unregulated tank population with approximately 2.7 million heating oil tanks and 400,000 farm/residential tanks nationwide—should continue due to the limited resources and lack of technical expertise typical of owners of these excluded systems, but recommended a ban on the installation of new, unprotected tanks to be implemented by the states. Id. See also Underground Storage Tank Guide, supra, note 34 (¶120.4 (1990) (summarizing report and its findings)) (on file with author).


48. The “heating oil tanks” exclusion is broader than its name suggests, because heating oil is defined as numerous types of fuel oil being used for any consumptive purpose, not merely space heating, in any residential, commercial, or industrial setting, as long as the oil is not stored for resale, marketing, or distribution. See 40 C.F.R. §280.12; 53 Fed. Reg. at 37117-18.

49. 53 Fed. Reg. at 37122.

50. Id.

51. These are: (1) USTs holding RCRA Subtitle C hazardous wastes or mixtures of hazardous waste and regulated substances; (2) wastewater treatment tanks if part of a facility is regulated under §§402 or 307(b) of the Federal Water Pollution Control Act; (3) equipment or machinery that contains regulated substances for operational purposes, such as hydraulic lift tanks or
electrical equipment tanks; (4) any UST system with 110 gallon or less capacity; (5) any UST system that contains a de minimis concentration of regulated substances; and (6) any emergency spill or overflow containment UST system that is expeditiously emptied after use. 40 C.F.R. §280.10.

52. 53 Fed. Reg. at 37108.

53. For example, tanks storing fuel for use by emergency power generators are subject to all regulations but deferred from release detection requirements. 40 C.F.R. §280.10(d).

54. Id. §280.10(c).

55. See infra note 89.

56. Id. §280.73. The issue here is which tanks were permanently closed. In its 1987 proposed rule, EPA floated the idea that UST systems “not properly closed in accordance with recommended industry practices” before the effective date of the final regulations be revisited and properly closed. However, EPA rejected this proposal when several commentators brought to its attention that previous industry practices were not designed to ensure containment of the material in an abandoned tank and may have actually facilitated early releases due to the practice of punching holes in the bottom of the tank. Because a retroactive application of UST rules would be difficult to enforce and would impose an unnecessary burden on owners of property with abandoned tanks, EPA decided not to enact a broad-brush “improper closure” standard and instead has allowed the implementing agency to enforce selectively the closure provisions. 53 Fed. Reg. at 37184.

57. Specifically, the owner of a recently discovered abandoned tank may be required to comply with the regulations set forth at 40 C.F.R. §§280.71, 280.72, and 280.74, which specifically include the corrective action requirements set forth in 40 C.F.R. pt. 280, subpt. F, when contaminated soil, contaminated groundwater, or free product is discovered around the UST system.

58. 40 C.F.R. §280.73. The regulations are unclear whether release notification or other requirements apply to tanks “permanently closed” prior to December 22, 1988. On the one hand, it makes little sense to give regulators discretionary enforcement authority over these tanks, yet not require the submission of information that will enable them to make enforcement decisions. On the other hand, EPA’s decision not to require automatic reclosure of old tanks, due to the nature of historical closure practices, weighs in favor of concluding that no regulatory requirements apply to previously closed tanks unless regulators discover problems and affirmatively order compliance.

59 See infra notes 68-79 and accompanying text.

60. 40 C.F.R. §280.12.

61. This definition can impose seemingly inequitable results. For example, if Owner A discontinues use of his USTs in 1982, and sells the property to Owner B in 1990, Owner A is responsible for complying with permanent closure and corrective action regulations if requested
by the implementing agency, even if he sold the property with full disclosure to Owner B and
even if the tanks were not leaking at the time of sale. As referenced in note 65, the statute
specifically provides that no conveyance shall be effective to transfer the liability imposed by the
statute from one property owner to another. 42 U.S.C. §6991b(h)(6)(C)(i), ELR Stat. RCRA
§9003(h)(6)(C)(i). The intended lesson from this is that all UST systems should be emptied and
permanently closed, regardless of when they were taken out of service.


63. 42 U.S.C. §6991b(h)(9), ELR Stat. RCRA §9003(h)(9). This statutory exemption is identical
to the secured creditor exemption in CERCLA, and presumably is subject to the same statutory
construction problems. EPA has not issued a lender liability rule for tanks as it has for
construing CERCLA’s secured creditor exemption, though it is expected to issue a proposed rule
protecting banks and other lenders from cleanup liability under RCRA Subtitle I at some time in
(on file with author).

64. The exception to this general rule is that owners, not operators, are subject to the statute’s
notification requirements. See discussion infra accompanying notes 69-79. See also 42 U.S.C.
§§6991a & 6991e(d), ELR Stat. RCRA §§9002 & 9006(d).

65. See id. §6991e(d)(2), ELR Stat. RCRA §9006(d)(2) (providing for civil penalties); Id.
§6991b(h)(6)(C)(i), ELR Stat. RCRA §9003(h)(6)(C)(i) (providing that no indemnification, hold
harmless, or similar agreement or conveyance shall be effective to transfer from the owner or
operator of any UST to any other person the Subtitle I liability).

66. It is possible, though unlikely, that a prior tank owner would have complied with the
notification requirements for out-of-service systems. See id. §6991a(a)(2)(A), ELR Stat. RCRA
§9002(a)(2)(A).

67. Funds for such corrective action may be reimbursed by the Leaking Underground Storage
Tank Trust Fund. Id. §6991b(h)(1)-(2), ELR Stat. RCRA §9003(h)(1)-(2).

68. Id. §6991a(a)(1), ELR Stat. RCRA §9002(a)(1).

69. Id.


73. Id. §6991a(a)(3), ELR Stat. RCRA §9002(a)(3).

74. 40 C.F.R. §280, app. I.

75. EPA bases its recommendation on reporting obligations on a notice in the regulations set
forth at 40 C.F.R. §280.22.
76. This interpretation is not supported by the statutory language, which only imposed an initial notification period on owners of abandoned systems.

77. In addition, because the tank is out of service, by definition it would not have an “operator.”

78. 40 C.F.R. §280.22(e)(1)-(4).

79. Id. §280.22(g).

80. Id. §280.20(a). Compliance with codes developed by nationally recognized organizations is emphasized throughout the technical standards, particularly the regulations pertaining to UST system design, construction, installation, upgrades and repairs. Due to the frequency with which this requirement appears in the regulations, it will not be repeated throughout the text of this Article. The phrase “nationally recognized associations” includes the American Petroleum Institute, the Association of Composite Tanks, the National Association of Corrosion Engineers, the National Fire Protection Association, the National Leak Prevention Association, the Petroleum Equipment Institute, the Steel Tank Institute, and Underwriters Laboratory. 53 Fed. Reg. 37082, 37185 (1988).

81. 40 C.F.R. §280.20(a)(4). Soil with a resistivity of 12,000 ohm/cm or more is generally considered noncorrosive. See 42 U.S.C. §6991b(g)(2), ELR Stat. RCRA §9003(g)(2). EPA decided not to include a 12,000 ohm/cm exclusion in the final technical standards, however, because this measurement alone does not define a soil’s propensity to corrode, and corrosivity has been demonstrated in soils with a 30,000 ohm/cm reading. 53 Fed. Reg. at 37126. The applicable regulations require a determination of noncorrosivity to be made by a corrosion expert. 40 C.F.R. §280.20(a)(4).

82. See 40 C.F.R. §280.20(a)(1)-(4). The state implementing agency may approve additional types of systems that are no less protective of human health and the environment. Id. §280.20(a)(5).

83. Id. §280.20(b)(1)-(4). A “corrosion expert” must be accredited by the National Association of Corrosion Engineers or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks. 53 Fed. Reg. at 37122.

84. 40 C.F.R. §280.20(c)(1)(i).

85. Id. §280.20(c)(1)(ii). Owners and operators are not required to use the spill and overfill prevention equipment if the implementing agency approves alternate equipment or if the system is filled by transfers of no more than 25 gallons at one time. Id. §280.22(c)(2).

86. Id. §280.20(d). Installation requirements vary by state and depend on the type of tank being installed.

87. Id.

89. Id. §280.21(a). Permanent closure requires notifying the state implementing agency of the tank closure at least 30 days in advance, emptying and cleaning the tank, and either removing it from the ground or filling it with inert solid material. Id. §280.71(a)-(b). The site must be assessed for contamination at the time of closure, and a report detailing the site assessment must be permanently maintained or mailed to the state implementing agency. Id. §280.72(a), §280.34(b)(5), and §280.34(c)(3). If contamination is found, corrective action must commence. Id. §280.72(b).

90. Id. §280.21(b)(1)-(3).

91. Id. §280.21(c)-(d).


93. 53 Fed. Reg. 37082, 37132 (1988). An EPA-sponsored study of over 400 tank closures in Suffolk County, New York, concluded that steel tank failures due to internal corrosion occur in less than 10 percent of all tanks, such failures occur most often in smaller tanks, and they generally occur toward the end of the tank’s operational life. Id. at 37082, 37128.

94. Id.

95. Id.

96. The tank interior must be inspected within 10 years after lining and every five years thereafter. 40 C.F.R. §280.21(b)(1)(ii).

97. 53 Fed. Reg. at 37131. Repaired tanks are considered more likely to leak and therefore must be internally inspected or monitored monthly for releases in accordance with a permanent release detection method. Records of the repair must be maintained for the operational life of the tank. 40 C.F.R. §280.33(d).

98. Steel tanks can corrode more quickly in “chemically aggressive” soils, such as clay, as opposed to clean, dry soils, such as sand. Theodore S. Reeves & Patti A. Bacon, Planning Your UST Management Strategy, Pollution Eng’r, Mar. 1992, at 44.


100. Reeves & Bacon, supra note 98, at 45.

101. Id.

102. See infra text accompanying note 119.

103. 40 C.F.R. §280.21(b)(2)(iii).

104. Id. §280.21(b)(2)(ii).

105. Id. §280.21(b)(2)(i).
106. Id. §280.31(a)-(b).

107. Id. §280.31(c). All records pertaining to the operation and maintenance of a cathodic protection system must be maintained indefinitely. Id. §§280.31(d) and 280.34(b)(2).


110. Id.

111. Id.

112. Id.

113. Id. §280.40(d).

114. USTs containing hazardous substances are required to meet the release detection requirements for petroleum USTs until December 22, 1998. By that date, all USTs containing hazardous substances must have secondary containment. Id. §280.42(a). Secondary containment requirements for hazardous substance containing USTs are more stringent than the requirements for tanks storing petroleum. Id. §280.42(b).

115. Id. §380.41(a). Thirty-day inspections are not necessary for a tank that is temporarily taken out of service, as long as the tank is “empty” (containing no more than 2.5 centimeters of residue or 0.3 percent by weight of the total capacity of the UST system). Id. §280.70(a).

116. Id. §280.43(1), §280.43(3).

117. Various factors that might contribute to discrepancies and that should be taken into account before a loss rate is estimated include meter error, delivery shortages, dipstick error, temperature effects, theft, and vapor loss. EPA, EPA 530/UST-90/007, Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Records 2 (1990).

118. 40 C.F.R. §280.50(c)(2). EPA was careful to note that

    this does not mean that all inventory discrepancies must be confirmed by a second month’s data. Under some conditions, it may be necessary for owners and operators to immediately report an inventory discrepancy. What level constitutes a reportable loss [should be worked out in advance] and depends on the size of the tank, monthly throughput, and other operating practices.


119. EPA cautions against the use of tank tightness tests on tanks with over 15,000 gallon capacity or tanks used to store products other than gasoline or diesel fuel, because this method may not meet the applicable performance standard of 0.10 gallon per hour. EPA, EPA 530/UST-90/012, Straight Talk on Tanks 15 (1990). See also discussion infra accompanying notes 150-163.
120. 40 C.F.R. §280.41(a)(1).

121. Id. §280.41(a)(2).

122. For example, 2,000 gallon capacity tanks may show weekly variations of up to 26 gallons and monthly variations of 13 gallons. Smaller tanks are permitted fewer variations. Id. §280.43(b)(4).

123. Id. §280.43(b)(5).

124. Id.

125. Id.

126. This release detection device can be programmed to conduct system tests every 30 days, as required by EPA, or more frequently if desired.

127. 40 C.F.R. §280.43(d)(2). In addition, EPA cautions against the use of the automated systems on tanks having over 15,000 gallon capacity or that store products other than gasoline or diesel, because this method of release detection may not meet the applicable performance standard of 0.2 gallon per hour. EPA, Straight Talk on Tanks, supra note 119, at 12. See also discussion infra accompanying notes 150-163.

128. Id. §280.43(e)(6).

129. Id.

130. For example, gasoline and diesel fuel are sufficiently volatile, whereas motor oil and used oil are not.

131. EPA originally proposed a background concentration limit of 500 parts per million (ppm) total organic hydrocarbons. However, many commentators felt the 500 ppm limit was too stringent because background concentrations of methane, for example, are higher than 500 ppm in some areas of the country. EPA researched the issue and discovered that many sites that have not had a recorded release have background levels of contamination over 500 ppm, due to an accumulation of spills and overfills. To avoid precluding use of vapor monitoring at sites where it is potentially applicable, EPA did not include the numeric restriction in the final rule. EPA noted that sites with high background contaminant levels, for example 10,000 ppm of gasoline, however, were probably not suited for vapor monitoring, because new leaks may not produce a detectable concentration increase over background levels. See 53 Fed. Reg. 37082, 38161-62 (1988).

132. 40 C.F.R. §280.43(e)(1). Because installation standards require use of inert, homogeneous materials as backfill, and because these materials are typically high-porosity substances, such as crushed rock or pea gravel, this is not a major concern.

133. Id. §280.43(e)(6). Thus, the wells do not have to be located to detect releases from vents or fill pipes, which may occur during overfills, because these fittings do not routinely contain product.
134. *Id.* §280.43(f)(1).

135. It is important to take seasonable groundwater fluctuations into account when assessing the appropriateness of groundwater monitoring wells as a release detection device. Groundwater monitoring systems that do not take such fluctuations into account may be completed to an inadequate depth and will not detect contamination that occurs during a dry season.

136. 40 C.F.R. §§280.43(e)(6) and 280.43(f)(5).

137. *Id.* §280.43(f)(7).

138. *Id.* §280.43(g).

139. EPA, Straight Talk on Tanks, *supra* note 119, at 10.

140. 40 C.F.R. §280.43(1).


142. Excavation liners must consist of “artificially constructed material that is sufficiently thick and impermeable (at least 10^{-6} \text{ cm/sec for the regulated substance stored}) to direct a release to the monitoring point and permit its detection.” 40 C.F.R. §280.43(g)(2)(i).

143. 40 C.F.R. §280.43(g)(2)(v).

144. *Id.* §280.43(g)(2)(i).

145. *Id.* §280.44(g)(2)(i).

146. *Id.* §§280.40(c) and 280.41(d)(1). These detectors, which trigger a high level alarm or automatically restrict or shut off product flow in the event of a release, must be annually inspected to ensure they are operating properly. *Id.* §280.44(a).

147. *Id.* §280.41(b)(1)(ii).

148. Additional criteria that must be met are set forth at 40 C.F.R. §280.41(2)(i)-(v).

149. *Id.*

150. *Id.* §280.40(a)(3).

151. *Id.* §§280.43(c) and 280.44(b). Line tests must be conducted at one and one-half standard operating pressure.

152. *Id.* §280.43(d)(1).

153. *Id.* §280.44(a).

154. *Id.* §280.43(f)(6).
155. *Id.* §280.43(a).
156. *Id.* §280.43(b)(4).
157. *Id.* §280.44(h)(1).
158. *Id.* §§280.40(a)(3) and 280.44(h)(1).
163. 40 C.F.R. §280.45(a). In addition, records demonstrating compliance with monthly release detection requirements must be maintained for at least one year along with the most recent tank tightness results, regardless of when the tightness tests were conducted. *Id.* §280.45(b).
164. *Id.* §280.50. Reporting is not required where the monitoring device is found to be defective and is immediately repaired or replaced, as long as additional monitoring does not confirm the initial result. *Id.* §280.50(c)(1). In addition, releases suspected due to unusual operating conditions need not be reported if the defective equipment causing the problem is not leaking and is immediately replaced. *Id.* §280.50(b).
165. *Id.* §§280.50 and 280.52. Reporting is not necessary if the monitoring device is found to be defective. *Id.* §280.50(c).
166. *Id.* §280.52(a)(2).
167. *Id.* §280.52(a)(2). A site check requires measuring for the presence of a release where contamination is most likely to be present, considering the nature of the stored substance, the reason for suspecting a release, the type of backfill, depth to groundwater, and other appropriate factors. *Id.* §280.52(b).
168. *Id.* §280.52(b)(1).
169. *Id.* §280.52(a)(1). All repairs must be conducted in accordance with 40 C.F.R. §280.33.
170. Because corrective action requirements, contaminated media management standards, and required cleanup levels vary dramatically from one state to the next, a practitioner should consult local laws and regulations to determine what cleanup procedures are required in a specific state.
171. *Id.* §280.61. Spins and overfills of under 25 gallons of petroleum or less than the reportable quantity of a hazardous substance do not have to be reported, as long as they are cleaned up within 24 hours and do not cause a sheen on nearby surface water. *Id.* §280.53(b).

172. *Id.* §280.62(b).

173. *Id.* §280.62. Free product removal must begin immediately, in a manner that minimizes the spread of contamination into previously uncontaminated zones and properly treats, discharges, or disposes of recovered byproducts in compliance with applicable federal, state, and local laws. *Id.* §280.64.

174. *Id.* §280.63. In addition, within 45 days of release confirmation, a free product removal report that describes the free product removal measures taken should be submitted to the implementing agency. *Id.* §280.64(d).

175. *Id.* §280.65(a)(4).

176. *Id.* §280.65.

177. *Id.* §280.66(a). These plans should include a detailed description of (1) the physical and chemical characteristics of the regulated substance; (2) the hydrogeologic characteristics of the facility; (3) nearby surface water and groundwater uses and the potential effects of contamination on these uses; and (4) an exposure assessment. *Id.* §280.66(b)(1)-(5).

178. *Id.* §280.66(d). Prior to approval, the plan must be made available for public comment by the implementing agency. *Id.* §280.67.


180. 40 C.F.R. at 37189. However, due to the tougher emissions standards under the Clean Air Act Amendments, some states are discontinuing this practice.

181. 55 Fed. Reg. 11798 (1990). The deferral from regulation for petroleum-contaminated media is limited to the 25 organic chemicals added to the EP toxicity procedure in 1990 and listed in Hazardous Waste Codes D018 through D043. RCRA metals, cresols, and some chlorinated solvents, which may be found in waste oil or other types of regulated substances, are not covered by the exemption. 55 Fed. Reg. 11862, *as amended by* 55 Fed. Reg. 26986. Prior to implementation of the TCLP rule, EPA did not intend petroleum contaminated media to be characteristic wastes, and specifically addressed in the preamble whether such media could be considered to be characteristic wastes due to ignitability. EPA concluded that such wastes are very unlikely ever to be capable of causing fire by friction, adsorption of moisture, or spontaneous chemical changes. See 53 Fed. Reg. at 37188-89.


184. 53 Fed. Reg. 43322. No financial responsibility requirements have been issued for hazardous substance USTs.


186. 40 C.F.R. §280.93(a)(1).

187. Id. §280.93(a)(2).

188. Id. §280.93(b).

189. Id. §280.95.

190. Id. §280.96.

191. Id. §280.99.

192. Id. §280.98.

193. Id. §§280.102 and 280.103.

194. Id. §280.101.


197. Id.


199. Ware, supra note 33, at 1882.

200. Id.

201. Id.


207. Id. §6991e(a)(1), ELR Stat. RCRA §9006(a)(1).
208. Id.

209. Id. §6991e(a)(3), ELR Stat. RCRA §9006(a)(3). Penalties of $10,000 per day may be assessed for knowingly falsifying or failing to submit a notification form. Id. §6991e(d)(1), ELR Stat. RCRA §9006(d)(1).

210. 40 C.F.R. §6991e(b).


216. See supra note 38.

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