United States Environmental Protection Agency

Preamble to 40 CFR Part 280

(37082)

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 280

[FRL-63385-3]

Underground Storage Tanks;
Technical Requirements

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) today finalizes regulations for underground storage tanks containing petroleum or substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), except any substance regulated as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act (RCRA). These regulations were first proposed on April 17, 1987 (52 FR 12662) and a subsequent Supplemental Notice was published on December 23, 1987 (52 FR 48638).

Under Section 9003 of RCRA, EPA must establish requirements for leak detection, leak prevention, financial responsibility, and corrective action for all underground storage tanks containing regulated substances as necessary to protect human health and the environment. Today's final rule sets forth requirements satisfying the mandates of section 9003, except that final requirements concerning financial responsibility will be addressed later by EPA in another FEDERAL REGISTER notice.

EFFECTIVE DATE: December 22, 1988, except § 280.22(g) which is effective October 24, 1988.

ADDRESSES: The docket for this rulemaking (Docket No. UST 2-1) is located at the U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. The docket is open from 9:30 a.m. to 3:30 p.m., Monday through Friday, except for federal holidays. You may make an appointment to review docket materials by calling (202) 475-9720. You may copy a maximum of 50 pages of material from any one regulatory docket at no cost. Additional copies cost $0.20 per page.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline at (800) 424-9346 (toll free) or 382-3000 (in Washington, DC).

SUPPLEMENTARY INFORMATION: The contents of today's preamble are listed in the following outline:

I. AUTHORITY

These regulations are issued under the authority of sections 2002, 9001, 9002, 9003, 9004, 9005, and 9006, 9007, and 9009 of the Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6912, 6991, 6991(a), 6991(b), 6991(c), 6991(d), 6991(e), 6991(f) and 6991(h)).

II. BACKGROUND

A. Subtitle I of RCRA

The Hazardous and Solid Waste Amendments of 1984 extended and strengthened the provisions of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) of 1976. One major portion of RCRA as amended, Subtitle I, provides for the development and implementation of a comprehensive regulatory program for "underground storage tanks" containing "regulated substances" and releases of these substances to the environment.

Subtitle I defines "underground storage tank" as a tank system, including its piping, that has at least 10 percent of its volume underground. Throughout this preamble and final rule, the terms "underground storage tanks," "USTs," and "UST systems" include both the underground storage tank vessel and the underground piping connected to it.

"Regulated substances" are defined as substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), except hazardous wastes regulated under Subtitle C of RCRA, and petroleum.

Subtitle I excludes the following from the definition of USTs:

- Farm or residential tanks of 1,100 gallons or less capacity storing motor fuel for noncommercial purposes;
- Tanks storing heating oil for consumptive use on the premises where stored;
- Septic tanks;
- Pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, the Hazardous Liquid Pipeline Act of 1979, or state laws comparable to these Acts;
- Surface impoundments, pits, ponds, and lagoons;
- Storm-water or wastewater collection systems;
- Flow-through process tanks;
- Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; and
- Storage tanks situated on or above the floor of underground areas, such as basements and cellars.

Subtitle I contains several major provisions for the regulation of UST systems. Section 9002 requires UST system owners to notify states of the existence of their UST systems. These notification requirements were addressed in a final rule published by EPA on November 8, 1985 (50 FR 46602). Section 9002, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), also requires that states use the notifications they receive to compile tank inventories. Under federal grant agreements, states are providing EPA with aggregated data from these notifications.

Under section 9003, EPA must promulgate regulations applicable to all owners and operators of UST systems as necessary to protect human health and the environment. In promulgating these regulations, section 9003(b) authorizes the Administrator to distinguish between types, classes, and ages of underground storage tanks. Section 9003 requires EPA to issue design, construction, installation, and compatibility standards for new tanks, as well as requirements applicable to all tank owners and operators concerning leak detection, recordkeeping, reporting, closure, corrective action, and financial responsibility.

Section 9003(h), as amended by SARA, gives EPA--and states under cooperative agreements with EPA--authority to clean up petroleum releases from UST systems or to require their owners and operators to do so. It also establishes a trust fund to finance these activities.

Section 9004 permits EPA to authorize states to implement their own UST programs in place of the federal requirements if the state's requirements are "no less stringent" than EPA's and provide for adequate enforcement. Programs which are less stringent in certain areas may receive approval for an interim period.

Other provisions of Subtitle I pertain to definitions (section 9001); entry, inspection, and information gathering (section 9005); enforcement (section 9006); federal facilities (section 9007); state authorities (section 9008); and studies and reports to Congress required of EPA (section 9009).

This preamble and final rule pertain to the requirements mandated by sections 9003(a), (c), (e) and (g); they also meet the study requirements of sections 9009(a) and (b). Final rules for state program approval requirements, under section 9004, are found elsewhere in today's **Federal Register**. Final rules for financial responsibility requirements for petroleum UST systems, under sections 9003(a) and (d), will be promulgated by EPA at a later date.

Section 9003(c) requires EPA to establish the following minimum technical requirements for all UST systems: to maintain a leak detection system or comparable system designed to identify releases to protect human health and the environment; to maintain records of any such release detection system; to report releases and corrective action taken; to take corrective action in response to a release; and to close tanks to prevent future releases. Under section 9003(e), EPA must also establish performance standards for new UST systems. At a minimum, these standards must include design, construction, installation, release detection, and compatibility standards.

Until the promulgation of today's final rule, section 9003(g) established an "Interim Prohibition" that allowed installation of UST systems after May 8, 1985, only if the UST system is protected from corrosion, prevents releases due to corrosion or structural failure for the operational life of the tank, and is constructed of material compatible with the substance to be stored. The law allowed an exemption from the requirement of corrosion protection if an UST system is located at a site having a soil resistivity measured at 12,000 ohms/cm or greater. An interpretive rule concerning the Interim Prohibition was published on June 4, 1986 (51 FR 20418). These Interim Prohibition requirements are replaced by today's final rule for new tank standards, except in those few cases where the Agency has decided to defer regulatory action on some types of UST systems. For these deferred UST systems, the Interim Prohibition will continue to apply until EPA takes action in the future either to regulate or not regulate them (see §§ 280.10 and 280.11 of the final rule).

B. Operating Principles

Faced with the mandate of Subtitle I, EPA recognized several unusual aspects of the regulated universe that have created special problems in developing an effective regulatory approach. First, the regulated universe is immense, including over 2 million UST systems estimated to be located at over 700,000 facilities nationwide. Second, over 75 percent of the existing systems are made of unprotected steel, a type of tank system proven to be the most likely to leak and thus create the greatest potential for health and environmental damage. Third, most of the facilities to be regulated are owned and operated by very small businesses, essentially "Mom and Pop" enterprises not accustomed to dealing with complex regulatory requirements. Fourth, numerous technological innovations and changes are now underway in various sectors of the UST system service community.

In response to the unique aspects of this regulated community, and the clear need for comprehensive management of USTs during their operating life, EPA has identified and followed several key operating principles, described briefly below, in developing the final regulations for USTs.

- The UST program must be based on sound national standards that protect human health and the environment.
- The UST regulatory program must be designed to be implemented at the state and local levels. State and local governments have been and continue to be the authorities most capable of effective oversight of UST systems and response to releases.
- The regulations must be kept simple, understandable, and easily implemented by the owner and operator in order to facilitate voluntary compliance. Section 9003(b) specifically indicates that technical capability can be considered in developing the Subtitle I rules.
- The regulations must not inhibit new UST technological developments.
- The regulations must be designed to retain the flexibility necessary to accommodate, where possible, the special needs of the UST regulated community, which is largely composed of small businesses with limited resources available for capital improvements.
- In order to encourage the utmost voluntary compliance, the regulations should build upon current industry trends and tie into and utilize ongoing industry initiatives toward more sound UST management. Towards this end, Section 9003(b) specifically authorizes EPA to consider industry practices and consensus codes in developing appropriate UST regulations. The Agency expects the nationwide use of these new management practices to yield direct environmental benefits.

By reflecting these operating principles in the final UST regulations, the Agency believes it has taken the most effective approach toward protecting human health and the environment.

C. Summary of April 17 Proposed Rule

On April 17, 1987, EPA proposed regulations for USTs storing either petroleum or hazardous substances (other than hazardous wastes regulated under Subtitle C of RCRA) (52 FR 12662). These proposed regulatory measures set requirements for both new and existing UST systems to control the major causes of releases from these tank systems and included, among other things, corrosion controls, proper installation requirements, and spill and overfill prevention measures.

Figure 1 illustrates several key aspects of the regulatory program proposed in April 1987; requirements for corrosion protection and monthly release detection at all new UST systems; the phase-in of either monthly release detection or periodic tightness testing combined with inventory control at all existing USTs, within 3 years if unprotected from corrosion and within 5 years if protected; and the upgrading of all existing UST systems to the new tank standards within 10 years. In addition, the proposed new and upgraded tank standards for hazardous substance USTs required secondary containment with interstitial monitoring.

Figure 1. April '87 Proposal: Tank Requirements

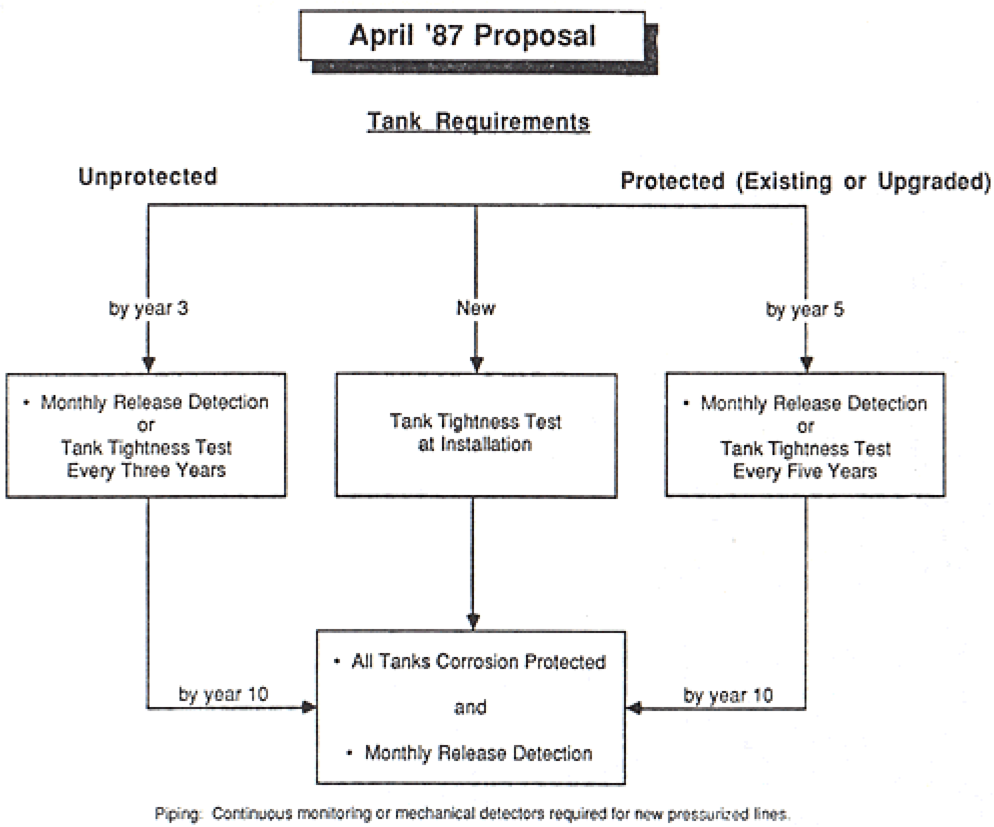

Figure 1

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Figure 1 does not illustrate several other requirements and standards proposed for both new and existing UST systems: the design and installation of new UST systems; spill and overfill prevention; UST system repair; system closure; release detection methods and performance; and release confirmation, reporting, and response (including corrective action requirements). These proposed requirements and the manner in which they may have changed in the final rule are described in detail later in today's preamble. Several major points of departure from the proposal are identified and discussed in section III. below.

D. Public Comment on the Proposal

EPA received over 5,000 individual comments from over 1,100 commenters on the April 17 proposal, including verbal and written comments from the three public hearings. In general, these public comments supported the Agency's overall approach to the proposed regulations and the substantive requirements for new and existing UST systems.

Many comments addressed specific parts of the proposed rule, suggesting changes or calling attention to potential problems. These specific comments are discussed below in today's preamble. In summary, many comments tended to center on three areas: concern for the impact the UST rule would have on small businesses, calls for for EPA to adopt more stringent requirements for certain sensitive areas, and suggestions on the best way to phase in release detection. (See the corresponding sections in today's preamble for a full discussion of these comments.) The financial responsibility requirements generated more public comment than any other single area. Comments on this issue will be addressed in the financial responsibility final rule that will appear in a later **Federal Register**.

E. Summary of the Supplemental Notice and the Notice of Availability of New Information

After the April 17 proposal appeared, EPA realized that some aspects of the technical standards needed to be clarified and that more public comment on these matters was needed. Consequently, EPA published a Supplemental Notice on December 23, 1987 (52 FR 48638). This Supplemental Notice dealt with four areas pertaining to the proposed technical requirements:

(1) Use of "static inventory control" to monitor used oil UST systems;
(2) A listing of substances subject to petroleum UST standards;
(3) Alternatives to release monitoring for piping and tanks protected from external corrosion; and
(4) An alternative definition of "flow-through process tank."

Public response concerning these issues is discussed in later sections of this preamble.

On March 31, 1988, EPA published a Notice of Availability of additional information for public comment. It announced the availability of information pertaining to several technical areas of the proposed rule including general operating requirements, release detection and tank closure. This new information was submitted by commenters, gathered in meetings or conferences and produced by Agency research programs. Few public comments were provided concerning these documents.

F. Influences on the Final Rule

In the preamble to the April 17 proposal, the Agency discussed the scope and nature of the problem posed by UST systems and several important influences on the development of the proposal (52 FR 12665-12671). Today's final rule builds on that earlier information and has benefited from numerous comments provided by the public on the issues highlighted in the proposal. The following section briefly discusses several areas that have received further consideration from EPA in the development of today's final rules.

1. Scope of the Problem

The preamble to the proposed rule (52 FR 12665) presented estimates of the number of leaking UST systems based on EPA studies, local government experiences, and industry estimates. Among the statistics cited were the percentage of systems failing tightness testing, the percentage of systems actually leaking, the correlation of tank age to failure, and the extent and impact of soil and ground-water contamination from USTs. After the proposed rule was issued, EPA completed an additional study of the causes of release from UST systems. This new study was placed into the public docket and announced as available for comment in the December 23, 1987, Supplemental Notice. This study, "Causes of Release from UST Systems," and the public comments on it were important in developing today's preamble and final rule.

a. Current Estimates of "Non-Tight" UST Systems. In the preamble to the proposal (52 FR 12665), EPA cited evidence that numerous UST systems are non-tight and may be leaking. This evidence was based largely on three studies: EPA's "Underground Motor Fuel Tanks: A National Survey" reported tank tightness testing results and found that 35 percent of over 450 tank systems surveyed nationwide failed tightness testing; Suffolk County's UST program data revealed that 26 percent of over 6,000 tank systems tested in this New York county failed; and a Chevron-sponsored testing program found that nearly 10 percent of over 3,000 of their UST systems failed.

Commenters responding to the proposal who had experience with tightness testing provided various claims that between 11 and 48 percent of existing UST systems failed under test conditions. In an EPA-sponsored meeting, a group of experienced, independent installation contractors expressed their expert judgment that increased awareness of the UST problem, use of better tanks, and use of better installation and maintenance procedures have decreased the probability of present-day systems testing non-tight to about 20 percent, in contrast to the 50 percent of UST installations they believed would have tested non-tight several years ago.

After publication of the proposal, EPA studied several additional pieces of information concerning causes of release from UST systems. For example, EPA further reviewed the records of over 10,000 tightness test results from local UST programs (in Suffolk County, New York; Austin, Texas; and San Diego, California). EPA also analyzed an extensive and detailed historical set of records from a Texas tank testing company (the Service Station Testing Company of San Antonio, Texas). The EPA-sponsored report, "Causes of Release from UST Systems," is based on all these data and concludes that approximately 25 percent of existing UST systems are found to be non-tight when tested using current methods and that loose tank fittings or faulty piping causes 84 percent of these tightness test failures. Figure 2 summarizes the Agency's findings concerning the causes-of-release profile as derived from tank testing results and documented follow-up at over 10,000 UST systems conducted nationwide.

Figure 2. Estimate of Tight/Non-Tight UST System

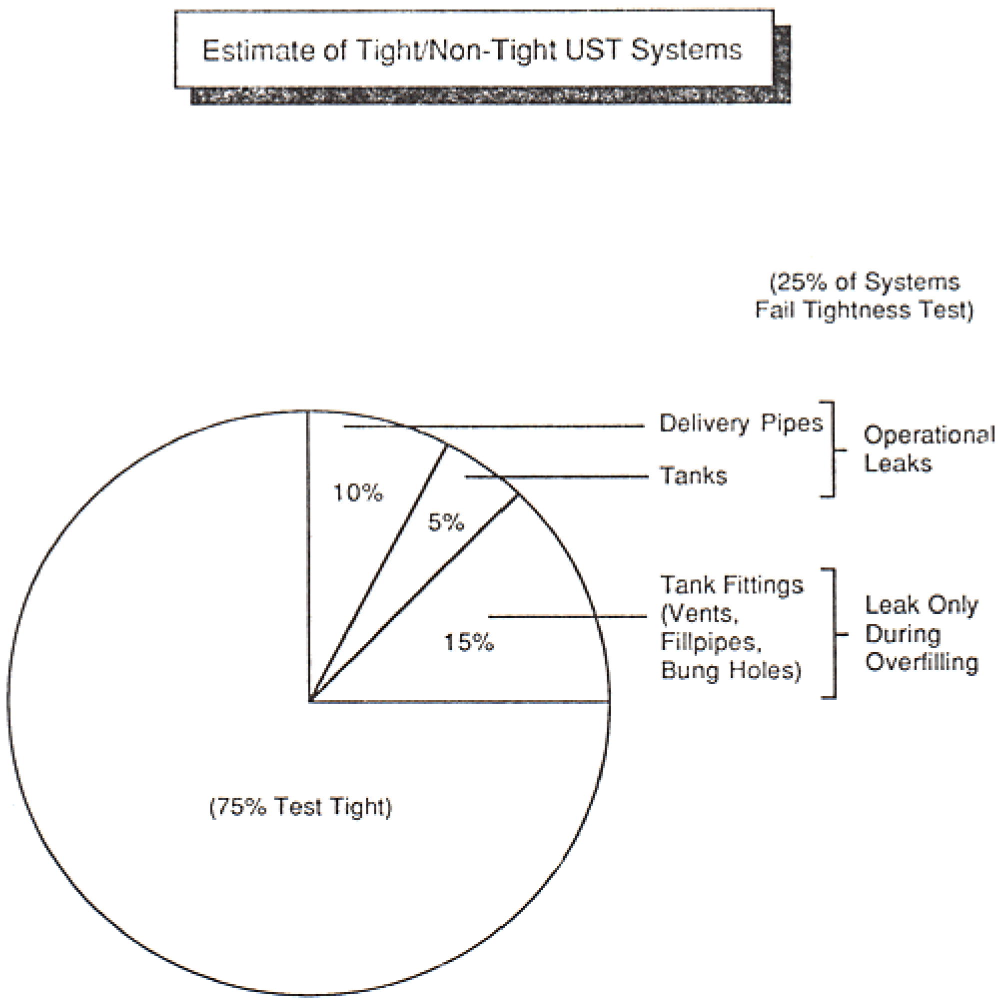

Figure 2

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b. Estimated UST Systems with Releases. Current indications concerning the number of UST systems nationwide that have had releases in the past or are now leaking are less precise than the tank tightness data, but the Agency believes the information that is available is significant nonetheless. As discussed in the preamble to the proposed rule, in many places in the nation that are still without state or local UST regulatory programs today, release detection only takes place when someone sees or smells the release (52 FR 12665). These historical data suggest that only about 10 percent of release incidents in these areas are discovered by inventory controls or mechanical release detection methods. Although the large number of incidents that are known to threaten or have contaminated ground-water wells is significant, it is not an accurate prediction of leaking UST systems because most UST systems are not located near wells.

As the result of aggressive UST monitoring programs in two states, over 5,000 UST sites in California and 3,000 sites in Florida have been identified as having had releases during the past three years. These recent discoveries already exceed 10 percent of the number of UST sites in each of these states, and the number of releases identified in just these two states may soon exceed the cumulative total of releases reported to all the states up until 1985 (see 52 FR 12665). At a more local level, UST system programs in Dade County, Florida, and San Jose, California, have also identified (through required release detection and system closure procedures) that well over 10 percent of their UST facilities have had some noticeable or significant releases into the surrounding soil and groundwater. Thus, the initial findings by state and local UST regulatory programs that are particularly aggressive appear to corroborate an industry-sponsored study (than previously cited Chevron investigation) that found approximately 10 percent of their 1,000 UST facilities located throughout the South and Southwest of the United States have had an adverse impact on nearby ground water in the form of released product floating on top of the ground-water table (see 52 FR 12666).

Public comments received in response to the proposal concerning this subject are not conclusive. Some industry sources provided very low estimates, claiming that from 0 to 3 percent of UST systems have had releases. Others claimed the actual number of leaking tank systems could be as high as 50 percent in some areas. Many estimated that the actual range is somewhere between 8 to 20 percent of UST sites, and the average of all estimates reported by commenters falls into this range. As shown in the previous figure (Figure 2), approximately 25 percent of all systems are now testing as non-tight. About 15 percent of the sites whose systems were tested actually proved to have a leak under normal operating conditions (tank and delivery piping leaks), and this proportion falls within the above-estimated range provided by the commenters.

Some commenters attempted to provide additional insight into the relationship between tank age and failure by indicating that tanks begin to fail tightness tests (and leak) at a much greater frequency after 12 years. In addition, the recent EPA causes-of-release study includes one study that indicated 10 to 13 percent of the tanks that are 12 to 13 years old were non-tight. This is more than double the proportion of non-tight tanks tested in other age groups. In another study, of the tanks actually found to be leaking, 42 percent of the leakers were 15 to 20 years old, and 30 percent of the leakers were 10 to 15 years old. All of the tanks that were leaking were made of bare steel. This demonstrates that the critical age in a typical unprotected steel tank's life is the period between 10 to 20 years of age when breakthrough from corrosion is most likely to begin.

Some commenters disputed the severity of the threat posed to the nation by leaking UST systems, which was discussed in the preamble to the proposed rule. For example, one suggestion was that the data presented in the preamble indicate less than 0.008 percent of the total area of the United States is affected by contamination due to leaking UST systems. In general, EPA finds this line of reasoning unpersuasive. In particular, this argument ignores, (1) that population density in the nation is not uniform (with most areas being sparsely populated or unpopulated); (2) that tank systems are generally located near populated areas to provide the fuel for these centers of human activity and; (3) that there are numerous documented cases of drinking water wells that have been threatened or already destroyed by leaking UST systems nationwide. The dispersal of leaked contaminants within ground-water aquifers can also affect an area many times larger than the soil-contaminated area. Further information gathered over the coming years of UST program implementation will ascertain the full magnitude of the impacts that leaking UST systems pose in terms of contamination to the nation's environment, but EPA concludes that the evidence collected to date, including the information provided by commenters on the proposal, clearly supports the need for today's final rules.

2. New Cause-of-Release Information

EPA's new information concerning releases from UST systems comes primarily from public comment and an EPA-sponsored study ("Causes of Release from UST Systems") that was made available for public comment in the December 23, 1987, Supplemental Notice. Review of this information has resulted in the following findings concerning the major causes of releases today:

- Most releases do not come from the tank portion of UST systems, because piping releases occur twice as often as tank releases;
- Spills and overfills are the most common causes of releases;
- Various nonoperational UST components at the top of USTs are loose and leak in the event of overfills;
- Although the older bare steel tanks fail primarily by corrosion, the "new generation" USTs (i.e., coated and cathodically protected steel, fiberglass-clad steel, and fiberglass tanks) have nearly eliminated failure induced by external corrosion;
- Corrosion, poor installation techniques and workmanship, accidents, and natural events (e.g., frost heaves) are the four major causes of failure for piping; and
- When piping fails, pressurized systems pose a significant added threat of sudden, large releases.

Thus, the major causes of releases from UST systems are due to failures of unprotected tanks, leaks in delivery piping, leaks from vent pipes and fittings on top of the tank, and spill and overfill errors. Comments received on the original proposal (52 FR 12665-12668) and the Supplemental Notice concerning causes of release generally tend to corroborate the above findings. The following information summarizes some of the most relevant findings that are important in guiding today's standard-setting.

a. Tanks. Most existing tanks are made of bare steel. Numerous tank failure histories indicate that when bare steel tanks fail they almost always do so because of external corrosion. Of all of the current causes of release, corrosion of bare steel (tanks and pipes) is by far the most important.

Tank manufacturers have responded to this problem with a "new generation" of tanks. Innovative tanks began to appear about 20 years ago in the United States in three basic forms: fiberglass-reinforced plastic (FRP); steel with a corrosion-resistant coating and cathodic protection; and steel-FRP composite. A dramatic acceleration in the use of new generation tanks occurred with the introduction of the federal law's "Interim Prohibition" three years ago. These protected tanks now are estimated to account for about 20 to 25 percent of existing USTs. Although "new" in terms of protective designs, some of each of the new types of tank systems have been in the ground for over 20 years. Reported failures observed in the field due to corrosion (or other reasons) are very rare.

Failures (leaks) at all existing FRP tanks appear to have occurred at less than a rate of 0.05 percent per year of the total FRP tanks installed nationwide. Many commenters and other sources support the field estimates collected by EPA that less than 0.5 percent of the total number of existing FRP tanks have ever leaked. Although some installation-related failures have occurred in the past, heightened installer awareness of proper practices and techniques appropriate to FRP technology, manufacturer-sponsored contractor education programs, and production quality assurance appear to be responsible for a consistently decreasing failure rate of FRP tanks. The most important reported failure mode for these tanks is improper installation practices.

One new tank type, the STI-P3, is a favorite of corrosion engineers. These steel tanks have an external noncorrodible coating and a factory-applied metal anode that sacrifices itself to protect any bare spots on the tank, and the tank vessel is electrically isolated from any attached piping. Very few failures have ever been reported, and those failures are due to installation damage or improper maintenance, not design. In Ontario, Canada, where STI-P3 tanks have been widely used, the number of tank releases due to corrosion is reported to be declining as old tanks are replaced with STI-P3 tanks.

The steel-FRP composite tanks have not been used as widely as either the FRP or coated and cathodically protected tanks described above. Approximately 65,000 have been installed in this country. No corrosion-related failures have been reported. Many commenters suggested that this type of tank has several advantages over both FRP and coated and cathodically protected steel tanks, such as durability, no need for maintenance, and an added barrier between the tank and the environment should the steel tank be breached by internal corrosion.

As the threat of external corrosion is reduced by new tank designs, internal corrosion may eventually become the primary cause of failure for steel tanks. Internal corrosion, however, occurs far less frequently and takes longer to manifest itself than external corrosion. Many commenters have reported problems with internal corrosion under the drop tube (i.e., fill pipe located within the tank) of steel tanks. Data submitted from the tank lining industry confirm these reports. The tank manufacturing industry, however, began to respond to this problem several years ago by including "striker plates" under all openings of their new tanks.

Lining tank interiors is another way to prevent releases due to internal and external corrosion. Tank interior lining has been employed by major corporations and small businesses both as a short-term solution for potentially leaking tanks and as a preventive measure for temporarily giving structurally sound, non-leaking existing tanks the same protection from corrosion-induced releases that "new generation" tanks have. Data indicate this to be a successful procedure for extending an existing tank's operational life. Even when employed in the absence of external cathodic protection, failure rates are reported to be very low, apparently because current industry consensus codes only recommend the use of lining when the tank shell is assessed to be able to withstand the expected rate of corrosion at the site (determined by assessing the tank's existing condition).

b. Piping. Most commenters rated delivery piping the most significant source of releases and reported releases occurring twice as frequently from piping as from bare steel tank releases. Two types of piping systems are commonly used: suction piping, which is used in low-volume applications where only a few dispensers are needed; and pressurized piping, which is used in high-volume applications where many dispensers are fed from one tank. Each piping system has unique advantages and disadvantages, discussed below.

Suction piping is considered by commenters to be safer than pressurized piping because it operates at less than atmospheric pressure. If the pipe develops a leak, air or ground water is usually drawn into the pipe instead of product leaking out. Commenters suggested, however, that suction piping systems do not operate efficiently in a number of settings, such as at high altitudes, in hot climates, or in high-volume delivery situations.

Pressurized piping systems reportedly are used at about 95 percent of new retail motor fuel system installations. If the delivery line is breached, free product is released until the pressure in the pipe equals the pressure outside the pipe. Without add-on instrumentation or devices, large volumes of product can be pushed out of breaches in the piping when product is delivered to the pump. Pressurized piping simply pushes more volume to meet this increase in demand, releasing large amounts of product quickly into the environment.

Comments received by EPA indicate that the releases from pressurized piping systems can be catastrophic in the absence of monitoring and automated pump flow restriction devices. Incidents involving releases of thousands of gallons have been reported to EPA by experienced installers. It is estimated that at least 70 percent of the volume of product lost through pressurized pipe releases could be avoided by retrofitting each line with a simple, inexpensive, continuous in-line pressure monitor that automatically restricts product flow in the presence of a significant line leak.

Both suction and pressurized piping are often damaged by external corrosion. Cathodic protection of steel piping would significantly reduce corrosion failures. Presently, most steel piping is protected by galvanizing and coating, or coating and wrapping. The threaded portions at joints are the most common failure points because the protection is removed from them while threading and is never replaced. In these cases, cathodic protection would reduce joint failures. Other joint failures result from untightened joints, cross-threaded joints, or improperly made joints. Improving the installer's education and skills in the complex task of pipe installation would reduce these piping failures.

Also, installers and others have estimated that piping is damaged 10 percent of the time at new installations between the installation of equipment and completion of paving. They strongly recommend that a test of new equipment before start-up is essential as a sound practice, particularly with pressurized piping.

Natural forces and accidents also cause piping failures. The piping is near the surface of the ground and, thus, subject to frost heaves and overloading. In addition, the starting and stopping of product delivery causes the piping to move and shift. This eventually causes joint failure in many piping systems. "New generation" piping systems comparable to the "new generation" of tanks are under development but not widely used.

c. Nonoperational Components. Nonoperational components consist of tank bung holes, tank manholes, vent and fill lines, vapor recovery lines, and manifold piping (the piping used in connecting tanks together). These components, all located above the top of the tank, are called nonoperational because releases from these sources do not occur under normal operating conditions. Releases from them are usually unseen because they are underground. These releases are episodic and usually of small volume, because they only occur when the tank is overfilled or when manifolded tanks are filled through the piping connecting the tanks together. Generally, when an overfill occurs, the volume of product contained in the fill tube above the loose nonoperational component will be forced out into the environment until the product level in the UST drops below the leaking component. These leaking, nonoperational components are reported to be most often caused by improper installation practices, such as loose bung hole plugs not being tightened at installation or vent lines being handtightened on top of the tank.

Two solutions are available to stop this type of release: either ensure proper installation of these different types of fittings or eliminate overfills. Elimination of overfilling of the tank is the surest remedy and is probably the easiest to accomplish with overfill shutoff devices now widely available. Most releases associated with nonoperational components would be prevented if overfills were successfully eliminated.

d. Spills and Overfills. In addition to episodic releases from nonoperational components, there is an even more prevalent source of release that takes place at the tank fill port during tank filling. Although usually small in volume, spill and overfill releases are probably the most common causes of release from UST systems. These releases usually occur at the surface of the ground around the top of the fill pipe when the delivery truck's hose is disconnected from the fill pipe. Most of these releases go unreported due to the typically small volume of product lost (generally, less than the volume of the delivery truck's hose). Most excavated bare steel tanks, however, show evidence of spilled material, such as dissolved asphalt coating near the fill pipe. Regulatory officials in Dade County (Florida) cite spills and overfills as the primary cause of release--45 percent of reported releases. These surface releases are at least twice as numerous as tank or piping releases.

Spills most often occur at the fill pipe opening when the delivery truck's hose is disconnected, usually releasing only a few gallons. Overfills occur far less frequently but usually release much larger volumes. Overfills generally result in a release from loose, nonoperational components located above the tanks (as discussed in the previous section), or from the top of the tank's vent pipe as product is forced out during overfilling of the system. Experienced installation contractors emphasize to EPA that the control of spills and control of overfills are two different problems and equipment that controls one may not control the other.

3. Industry Codes and Practices

In the preamble to the proposed rule (52 FR 12670), EPA identified numerous industry consensus codes and recommended practices that influenced the development of the proposed regulatory program. A table was provided listing several codes and practices concerning the proper management of UST systems that have been developed, mostly in the past decade, by industry associations, nationally recognized professional organizations, and independent testing laboratories. Since the proposal of the federal rule over a year ago, these consensus code-making groups and industry standard-setting activities have continued at an increased rate. (Refer to section IV.H.1. for a more detailed discussion clarifying the use of codes developed by nationally recognized organizations or independent testing laboratories.)

Table 1 reflects a sampling of the current status of this national consensus code-making network. The codes and standards marked with an asterisk have been reviewed, updated, or revised over the past year. For example, last summer, the American Petroleum Institute reviewed several of its recommended practices (e.g., API 1631 and 1615) and improved the guidance provided in these documents. In addition, several new codes are now under development or have been recently added. For example, the National Leak Prevention Association was formed and developed an industry consensus code for the interior lining of tanks (NLPA 631).

Table 1. Selected National Consensus Codes and Recommended Practices for UST Management

	Document Number	Design and Construction	Corrosion Protection	Installation	UST System Repair and Retrofit	Operating Requirement	Release Detection	Release Reporting and Corrective Action	Closure
				Major Technical Topics of the Final EPA UST Rule					
American National Standards Institute (ANSI)									
	ANSI B31.4	X	X	X	X	X	X	X	X
American Petroleum Institute (API)									
*	API 5L	X							
*	API 12F	X							
	API 650	X							
	API 1604								X
*	API 1615		X	X		X	X		
	API 1628						X	X	
*	API 1631		X		X	X	X		
	API 1632	X	X		X	X			
	API 2202								X
American Society for Testing and Materials (ASTM)									
	ASTM (Steel Piping, Tubing, and Fittings)	X							
*	ASTM A 53-87b	X							
*	ASTM A182/A182M-87	X			X				
*	ASTM D 4021-86	X							
				Major Technical Topics of the Final EPA UST Rule					
	Document Number	**Design and Construction**	**Corrosion Protection**	**Installation**	**UST System Repair and Retrofit**	**Operating Requirement**	**Release Detection**	**Release Reporting and Corrective Action**	**Closure**
Association of Composite Tanks (ACT)									
*	ACT 100	X	X	X		X			
Factory Mutual (FM)									
	FM 1920	X		X					
National Association of Corrosion Engineers (NACE)									
	NACE RP-0169-83	X	X	X	X	X			
	NACE RP-0172-72	X	X		X				
	NACE RP-0184-84		X		X				

Major Technical Topics of the Final EPA UST Rule									
	Document Number	**Design and Construction**	**Corrosion Protection**	**Installation**	**UST System Repair and Retrofit**	**Operating Requirement**	**Release Detection**	**Release Reporting and Corrective Action**	**Closure**
	NACE RP-0275-75	X	X						
	NACE RP-0285-85	X	X	X	X	X			
	NACE RP-0572-85	X	X	X	X		X		
National Fire Protection Association (NFPA)									
*	NFPA 30	X	X	X		X	X		X
*	NFPA 321	X						X	X
*	NFPA 327					X			
*	NFPA 328							X	X
*	NFPA 329					X	X	X	X
*	NFPA 385					X			
National Leak Prevention Association (NLPA)									
**	NLPA 631	X	X	X	X				X

Major Technical Topics of the Final EPA UST Rule									
	Document Number	**Design and Construction**	**Corrosion Protection**	**Installation**	**UST System Repair and Retrofit**	**Operating Requirement**	**Release Detection**	**Release Reporting and Corrective Action**	**Closure**
Owens Corning (OC)									
	OC 3-PE-9632-A	X		X					
Petroleum Equipment Institute (PEI)									
*	PEI/RP100	X	X	X	X		X	X	X
Steel Tank Institute (STI)									
	STI (Installation of STI-P3)		X	X					
	STI (Interior Corrosion Control)	X	X	X	X				
	STI (Exterior Corrosion Protection)	X	X	X					
	STI (Dual Wall USTs)	X	X	X					
Underwriters Laboratories (UL)									

Major Technical Topics of the Final EPA UST Rule									
	Document Number	**Design and Construction**	**Corrosion Protection**	**Installation**	**UST System Repair and Retrofit**	**Operating Requirement**	**Release Detection**	**Release Reporting and Corrective Action**	**Closure**
	UL 58	X							
	UL 567	X	X						
	UL 1316	X		X					
Western Fire Chiefs Association									
*	UFC 1985	X	X	X	X	X	X	X	X

* Revised in 1987

** Drafted in 1987

*- There is a code or recommended practice.

Table 1 provides a snapshot of the depth and scope of the collective wisdom that has developed over the past several years in the United States concerning the proper standards for UST systems. The recent updates and additions to this list of industry consensus codes and recommended practices reflect what appears to be a resurgence of interest in several areas of sound UST management practices. Numerous commenters on the proposal cited specific developments in these consensus codes and provided copies of some of the most recent codes that were added or updated and revised. In general, they provided a reminder to EPA that this improving body of knowledge should be understood and considered during the development of today's final rule.

4. Industry Trends

The nature and extent of the public response to the proposal has generally confirmed that a significant level of voluntary industry upgrading and replacement programs is already underway. The closure and replacement trends briefly discussed in the preamble to the proposal (52 FR 12671) were confirmed by some commenters. Numerous major oil companies, independent marketers of retail motor fuel, transportation fleet operators (government and private), and various manufacturers with USTs have clearly embarked on their own UST system management programs before promulgation of today's final rule.

One of the most encouraging trends has been the increasing use of protected UST systems nationwide. EPA estimates that there are currently over 450,000 UST systems in use today that are protected from external corrosion. This expanding use of an important and necessary approach to the prevention of releases has increased rapidly over the past three years, particularly after the Interim Prohibition went into effect in May 1985 (section 9003(g) of RCRA), making illegal the installation of bare steel UST systems. EPA estimates that, during the past three years over 50,000 new protected tanks were installed annually. To date, over 210,000 FRP tanks, 120,000 coated and cathodically protected tanks, and 65,000 steel-FRP composite tanks have been installed. In addition, an estimated 70,000 tanks have had their interiors lined to prevent releases, and another 50,000 UST systems are estimated to have been provided with field-installed corrosion protection systems. According to tank manufacturers, the number of new bare steel tanks installed over the past three years has dropped precipitously.

Early findings from several local UST programs visited by EPA staff since the proposal have confirmed the beginnings of an accelerated rate of closure of old, substandard UST systems (for example, in Suffolk County, New York; Austin, Texas; Dade County, Florida; and Sunnyvale, California). A rapid rate of closure appears to manifest itself when each of these, and several other, local UST programs initiate their release detection requirements. Thus, EPA's earlier projections that as much as three-fourths of the existing UST universe will be closed, upgraded, or replaced to the requirements of the Interim Prohibition within 10 years appears to be realistic (52 FR 12671). Today's final rule will further ensure that these positive changes are accomplished and increased.

EPA believes these are important developments because the successful implementation of this program depends a great deal on the regulated community's voluntary compliance. The Agency is convinced that the most wide-spread compliance will be facilitated by technically sound standards that are capable of easy implementation by a highly varied regulated community. Thus, as much as possible, the federal technical requirements must rely on familiar industry codes and build on recognized and effective trends occurring in the field of UST management that are consistent with protection of human health and the environment.

5. UST System Technology Development

As discussed in the preamble to the proposal, the array of technical control options available to address causes of releases, as well as response to releases that occur, also appears to be growing. Numerous commenters provided technical information to EPA about newly available equipment being marketed for use in the prevention, detection, and correction of releases from UST systems. New equipment for use either inside or outside of the UST system to detect releases from the underground tank or attached piping is being introduced for sale at many trade shows and industry fairs nationwide, including less expensive methods for providing secondary containment with interstitial monitoring for both existing and new UST systems.

Several new types of equipment capable of preventing spills and overfills appear to be less costly and more easily retrofitted to existing tanks than earlier models. For example, several new models of line leak detectors have recently been introduced to the UST market that are more sophisticated and sensitive than older types of equipment. In addition, numerous companies have contacted EPA about their development efforts in the area of retrofitting preventive devices onto existing tanks or refurbishing old tanks. Makers of nylon tanks are in the process of soliciting the approval of Underwriters Laboratories of Canada in that country. Finally, vapor gas vacuum extraction techniques for use in the subsurface cleanup of volatile substances are also under accelerated development and investigative use in several places nationwide. This cleanup technique has reportedly had widespread use in West Germany for a number of years.

In summary, business in the UST control technology sector appears to be booming, and invention is proceeding at a rapid pace. All this activity is a good indication that in the future, simpler, cheaper, and more dependable equipment will be produced to aid in the prevention, detection, and correction of releases. Experienced persons in UST management in the public and private sectors have told EPA staff that the current level of control technology development by far exceeds any previous efforts within this industry. In order to avoid interfering with this ongoing development of innovative and more environmentally protective new technologies, the Agency has chosen to write regulations that allow room for these new developments.

6. Leaking USTs Present a Unique Regulatory Challenge

EPA believes its approach to setting standards for UST systems on a national scale will have to be different from most national environmental programs because the UST problem is significantly different. This difference is mainly due to three factors: the large number of facilities to be regulated, the comprehensive scope of the regulations, and the nature of the regulated community.

The most significant problem is the sheer size of the regulated community. Nationally, over 700,000 UST facilities account for about 2 million UST systems, an average per state of about 14,000 UST facilities and 40,000 UST systems. Estimates indicate that roughly 75 percent of existing UST systems are unprotected from corrosion. In addition, because a relatively high proportion of UST facilities (10 to 30 percent) already have had a leak, or will soon leak unless measures are taken to upgrade them, the average number of leaking UST systems may range from 1,400 to 4,200 per state in the near future.

The large number of tank owners and tank systems has also led EPA to conclude that the final federal UST standards must include a phase-in period for certain requirements that apply to existing tank systems. Although all federal requirements are in effect immediately for new tanks, owners and operators will have additional time to upgrade existing tank systems to the corrosion protection standard for new UST systems, and to install release detection equipment for existing UST systems. This phased-in approach is needed to establish a reasonable schedule that recognizes the limited capability of 700,000 UST owners and supporting service and manufacturing industries to respond immediately to new national regulations, and provides sufficient flexibility for implementing agencies. The experience of states that have already been operating UST regulatory programs is that it takes several years for most owners or operators of existing UST systems to understand, plan, and arrange for the purchase, scheduling, and installation of necessary services and equipment required by the regulations. The phase-in approach also has the added benefit of allowing time for continued development and improvement of available technologies in the marketplace for prevention and detection of releases from UST systems (as discussed previously in this section of the preamble).

In addition, today's final rule establishes comprehensive requirements for the management of a wide range of UST systems. These final standards for UST systems are designed to reduce the number of releases of petroleum and hazardous substances, increase the ability to quickly detect and minimize the contamination of soil and ground water by such releases, and ensure adequate cleanup of contamination. To do this, the standards in some way must affect every phase of the life cycle of a storage tank system: selection of the tank system; installation, operation and maintenance; closure and disposal; and cleanup of the site in cases of product release. As a result, these standards must be technically adequate to ensure the wide array and needed level of improved performance when implemented. At the same time, these wide ranging requirements must be straightforward enough to be understood and to be carried out successfully hundred of thousands of times nationwide.

A third problem is the nature of the regulated community. A large proportion of USTs are owned by small businesses with $500,000 or less in total assets. For example, 72 percent of all retail motor fuel outlets are owned by small businesses. An important influence in the making of today's technical standards has been EPA's attempt to minimize the regulatory impact on small businesses without compromising the statutory requirements to protect human health and the environment. EPA's efforts to minimize the regulatory impact are discussed in a Regulatory Flexibility Analysis conducted for this rule, as specified by the Regulatory Flexibility Act of 1980, and a summary of that analysis is presented later in this preamble.

Specifically, the Agency is convinced that the national UST standards must be kept simple and implementable by state and local officials because many UST facilities are owned and operated as small local businesses, such as "Mom and Pop" gasoline service stations and convenience stores. These small entrepreneurs, who are used to operating their business with minimal regulation, will be significantly affected by environmental regulations for UST systems. The experience of state and local agencies with UST programs is that large national businesses that own tanks are generally willing and have already begun to comply with UST requirements. Owners of small businesses, however, generally need constant reminders and technical assistance to bring them into compliance. Given the nature of this regulated community, a regulatory program often will be most effectively carried out by the level of government closest to the problem, and thus able to respond quickly and to create a visible presence.

7. Emerging State and Local UST Programs and EPA's Approach to Regulation

Many states and localities have adopted requirements applicable to UST systems. Although these state and local requirements are diverse and vary in stringency, EPA believes that the formulation of federal standards should build upon the many effective state and local programs now in operation or about to begin operating in order to utilize this reservoir of accumulated UST experience in a way that can rapidly develop into a strong federal-state partnership for addressing this national concern. Section 9004 also indicates Congressional intent that states with effective programs are to play a major role in implementing the program.

At least 18 states and hundreds of local programs are currently addressing the ground-water contamination and cleanup problems posed by leaking UST systems through established regulatory programs. Several states, such as California, New York, and Florida, and local UST programs such as those in Suffolk County (New York), Dade County (Florida), and Austin (Texas), have established specific UST system regulations that include standards for design, construction, and installation of new UST systems; closure, retrofitting, and repair of existing UST systems; and release detection and corrective action requirements for all UST systems. EPA believes this type of state and local UST program activity nationwide will increase significantly with today's promulgation of EPA's technical standards. Similar to the experiences in the three lead states identified above, other states will begin to wrestle for the first time with the reality of how to implement their UST programs. As the dangers posed by existing UST systems become more widely known, local UST programs and involvement should increase significantly over current levels.

Given the large number of UST facilities, tank systems, and potential cleanups needed, EPA is convinced that many aspects of this regulatory program will be most effectively carried out at the state level of government. Local government involvement in this regulatory program will be important. For example, a small city with about 700 facilities and 2,000 tank systems within its jurisdiction should be able to implement a manageable regulatory program. If each of those 700 facilities installs one new tank during the next five years, that would be about three installations per week. If that small city requires a city inspector to be present at each installation, an inspector must be in the field three times a week for this task alone. In addition, the inspector could be required to be present for periodic tank testings, closures, upgrading or retrofit, and cleanups.

Confronted with the above implementation realities, EPA has developed a more decentralized approach for addressing the realities of the national UST regulatory program. This approach is based on several critical factors. First, as more and more state and local governments become involved, the work of the UST program must be routinely carried out in thousands of jurisdictions nationwide. Several operating state and local UST programs already report that they are very busy "running the store," expressing surprise at the size of the regulated community, and that fairly simple tasks must be routinely repeated numerous times for the implementing agency to be successful in bringing UST systems into, and maintaining, compliance.

Second, visits to several state and local UST programs have shown that they have often developed their own unique requirements and methods of implementation, adapted to the types of tanks, physical environment, and regulated community with which they are concerned while they are, at the same time, all geared towards solving similar technical problems. They need the flexibility to continue and to improve upon approaches which address the specific environmental needs of their communities. They have common implementation problems, however, and have expressed the need for better technical aids, such as data management tools.

Third, many state and local governments that already implement UST programs report a significant level of visible on-site monitoring, requiring a constant "regulatory presence" to effectively ensure this regulated community's compliance with UST requirements. A significant environmental gain is achieved through implementation at the local level by these individual UST programs. Thus, improving their performance will produce maximum environmental benefits and best ensure the success of the UST program nationwide. As the head of the "distribution system" of UST-related technical information and implementation tools, EPA believes that its implementation efforts should be focused on serving the network of state and local programs through listening to their concerns and helping them solve implementation problems with tools that improve the effectiveness of their programs.

Finally, EPA believes that a more decentralized approach to the federal implementation of the UST program is needed to ensure real gains in protection of human health and the environment. Because there are so many UST sites nationwide, 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 regulators that can be used to improve their programs' compliance performance.

In adopting this role, the Agency has recognized that it must not only establish sound national standards but, more importantly, must focus on improving the performance of the state and local implementing agencies. Approval of state programs to operate "in lieu of" the federal program takes on a new meaning under this approach because it becomes a basic soundness test to ensure that the work associated with implementation of these state or local requirements will, in fact, cause the needed level of improvement in UST system management when carried out by the regulated community. The requisite state enforcement authority and technical standards must be ensured and will be the focus for approval by EPA. Thus, overall successful performance and implementation of this new national program is less focused on implementing detailed, national technical standards than it is on establishing the national UST program in a way that ensures effective, environmentally protective programs at the grassroots level and improving the performance of these programs over time. EPA's final requirements for state program approval are presented in detail elsewhere in today's **Federal Register**.

Thus, in recognition of its approach to UST implementation, EPA has attempted to establish final technical standards that are protective of health and the environment but, at the same time, are simple, understandable and implementable by state and local officials. EPA also recognizes that there is often more than one proper way to address specific technical problems that are the focus of the final regulations. Therefore, the Agency has attempted to identify and offer as many effective alternative technical approaches as possible particularly where this flexibility can be applied in the future by the implementing agencies. In this way, the final technical requirements remain focused on the key environmental problems which the implementing agencies face. Promoting the network of state and local implementation is the best way to ensure that significant protection of human health and the environment will be achieved by today's final requirements.

G. Conclusions Since Proposal

EPA has drawn several conclusions from the influences discussed above and in the background sections of the preamble to the proposed rule (52 FR 12663-12671). Some of these conclusions support the direction and emphasis set forth in the proposal, and others indicate a need for change in the final rule.

Given the large size of the existing regulated universe and the proportion of these UST systems that have leaked or are presently leaking, there is a need to finalize today's rules as an important step resources. The number of sites needing significant cleanup due to a number of poor past UST management practices is expected to be in the tens of thousands nationwide.

Cause-of-release information related to unprotected tanks supports EPA's proposed approach for upgrading of unprotected tanks. The new information, however, indicates a need for more frequent monitoring of unprotected tanks than was proposed. By contrast, protected tanks appear to need less frequent monitoring than proposed. Also, pressurized piping systems need more stringent monitoring than was proposed.

Increased activity in the review and improvement of national consensus codes supports EPA's proposed reliance on these codes as providing the most up-to-date consensus practices and expertise concerning what constitutes proper UST system management. The nationwide increase in the use of protected systems, the recent number of tank closures, and the development of new prevention, detection, and corrective action technologies are encouraging. The final rules must be designed to foster and take advantage of these trends. They must be simple and easily implementable by the regulated community to ensure the maximum level of voluntary participation by tank system owners and operators. The Agency continues to believe that the size and nature of this regulated universe presents several unique regulatory challenges that necessitate the phase-in of some of the requirements for existing UST systems to ensure that genuine implementation is accomplished.

The continuing and rapid emergence of numerous state and local UST programs is expected and will be encouraged by EPA because this is where the "real work" of this new national program must actually take place. The Agency's approach to UST program implementation must start with a technically sound set of national standards. These requirements, however, must be kept simple and implementable because most improvements in actual UST performance (and protection of human health and the environment) are expected to be achieved by working closely with state and local governments over time to increase the level of the effectiveness of their UST programs.

III. TODAY'S FINAL RULE

This section provides a summary of EPA's final rule. It also identifies and describes several major points of departure from the proposed rule, several alternative strategies, public comments on them, and the Agency's rationale for the direction of the final rule in several other key areas. More detailed summaries of all the public comments and the Agency's responses to them can be found in the "Comment and

Response Summaries Background Document" that has been placed into the public docket in support of today's final rule.

A. Summary of Today's Final Rule

EPA is today promulgating regulations for underground tanks storing either petroleum or hazardous substances other than hazardous wastes regulated under Subtitle C of RCRA. These requirements establish measures for both new and existing UST systems to prevent, detect, and clean up releases from these systems. These final requirements of Part 280 fulfill the mandates of RCRA sections 9003(a), (c), and (e), and sections 9009 (a) and (b). The major elements of today's final rule are noted below.

- New UST systems must be designed and constructed to retain their structural integrity for their operating life, in accordance with national consensus codes of practice (see Table 1 provided earlier in this preamble). All tanks and attached piping used to deliver the stored product must be protected from external corrosion. Cathodic protection must be monitored and maintained to ensure that UST systems remain free of corrosion.
- Nationally recognized industry installation standards must be followed in placing new UST systems in service (see Table 1). Owners and operators of new USTs must certify that proper installation procedures were followed and identify how the installation was accomplished.
- Owners and operators of both new and existing UST systems must follow proper tank filling practices to prevent releases due to spills and overfills. In addition, owners and operators of either new or upgraded UST systems must use devices that prevent overfills and control or contain spills.
- Tanks must be repaired in accordance with nationally recognized industry codes (see Table 1). These national codes include several tests that must be conducted to ensure quality repairs.
- To close UST systems, industry-recommended practices must be followed: the UST system can be removed from the ground or left in place after removing all regulated substances and cleaning the tank, filling it with an inert substance, and closing it to all future outside access (see Table 1). In addition, owners and operators must perform an assessment at the time of UST closure to ensure that a release has not occurred at the site. If a release has occurred, then corrective action must be taken.
- Release detection must be instituted at all UST systems. For petroleum UST systems, several methods will be allowed, although tank owners and operators must adhere to requirements concerning their use. In addition, owners and operators must follow special requirements for pressurized delivery lines. Petroleum UST systems are not required to have secondary containment with interstitial monitoring. All new or upgraded UST systems storing hazardous substances, however, are required to have secondary containment with interstitial monitoring, unless an alternate release detection method is approved by the implementing agency. The owners and operators must demonstrate to the implementing agency that a release detection method will detect releases of the stored substance in a manner no less stringent than the release detection methods allowed for petroleum USTs and that a method of corrective action is available to clean up a release of the hazardous substance should one occur.
- Generally, release detection at existing UST systems must be phased in over a 5-year period based on the age of the tank. The oldest UST systems (usually unprotected from corrosion) are required to phase in release detection within 1 year, and the newest tank systems (usually

protected from corrosion) by the end of the 5-year period. Release detection for all pressurized delivery lines must be retrofitted within 2 years.

- Periodic tank tightness testing (every 5 years) combined with monthly inventory control is allowed at new or upgraded UST systems for 10 years after new tank installation or existing tank upgrade. After 10 years, monthly release detection is required.
- Either monthly release detection or a combination of annual tank tightness testing with monthly inventory control is required of substandard existing USTs until they are upgraded. Existing UST systems must be upgraded or closed within 10 years of the effective date of the final rule, or within 1 to 5 years if a release detection method is not available that can be applied during the required phase-in period for release detection. Upgrading of petroleum UST systems includes retrofitting of corrosion protection and both spill and overfill controls at all tanks. Upgrading of hazardous substance UST systems also includes secondary containment and interstitial monitoring or an alternate release detection method approved by the implementing agency.
- Tank owners and operators must report suspected releases. Indications of a release must be reported to the implementing agency, including positive results from release detection methods, unless the initial cause of the alarm has been immediately investigated and the alarm is found to be false. After reporting suspected releases, owners and operators must perform release investigation and confirmation tests and, where a release is confirmed must begin corrective action.
- Owners and operators of leaking UST systems must follow measures for corrective action. Immediate corrective action measures include mitigation of safety and fire hazards; removal of saturated soils and floating free product; and an assessment of the extent of further corrective action needed. A corrective action plan would be required for long-term cleanups addressing ground-water contamination, although these cleanups could begin upon notification of the implementing agency by the owner and operator. Cleanup levels would be established on a site-by-site basis as approved by the implementing agency.

B. Major Points of Departure from April 17 Proposal

Today's final rule includes four release detection requirements that represent significant changes to the proposed rule:

(1) More frequent tank tightness testing (annual) of unprotected tanks during the initial 10-year upgrading period;
(2) Less frequent monitoring of new and upgraded tanks until age 10;
(3) Phase-in of release detection over 5 years at existing tanks based on age; and
(4) More stringent release detection for all pressurized piping systems.

The final requirements in each of these areas, and EPA's rationale for revising the proposal, are summarized below and shown graphically in Figure 3. The shaded areas indicate the major changes from the proposed approach. More detailed discussions of these major points of departure are also provided in later sections of today's preamble.

Figure 3. Final Approach: Tank Requirements

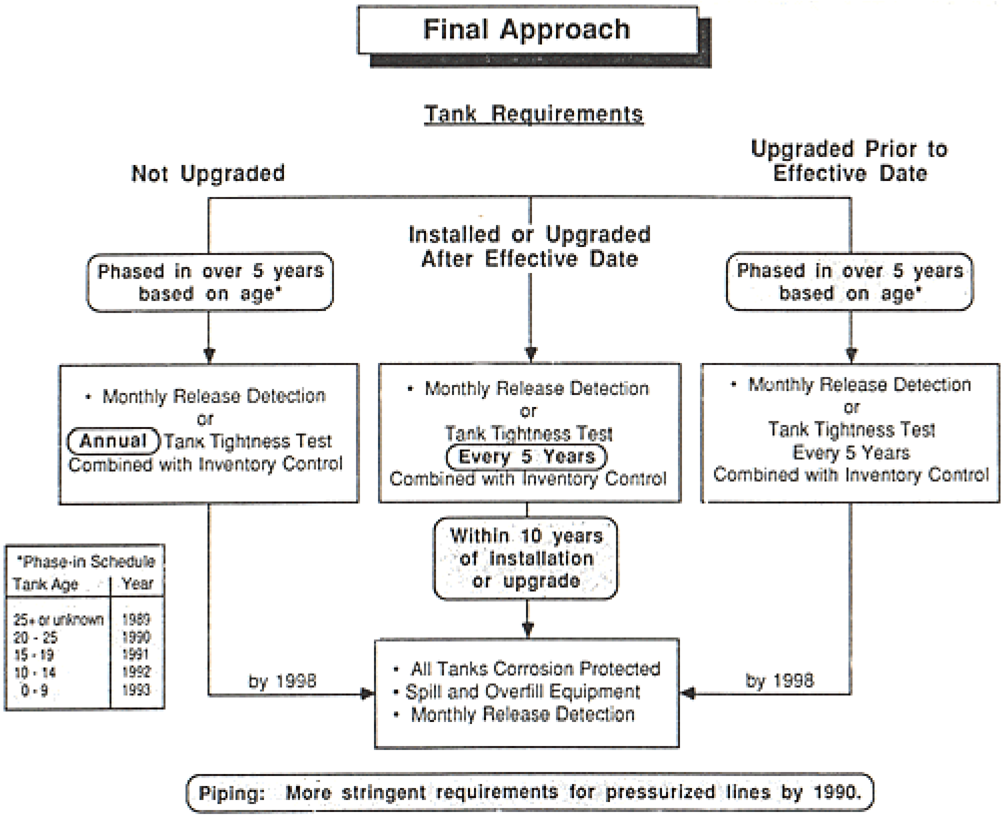

Figure 3

1. More Frequent Tank Tightness Testing of Existing Unprotected Tanks During the 10-Year Upgrade Period

In the proposed rule (§§ 280.40 and 280.41), EPA provided owners and operators of existing UST systems without corrosion protection with two options for release detection, but only during the proposed 10-year upgrade period. The two options were: 1) to perform monthly release detection monitoring or, 2) to conduct monthly inventory control combined with a tank tightness test every 3 years. The option of tank tightness testing (in combination with inventory control) was proposed because tightness testing is already widely practiced. The proposed frequency of testing every 3 years was based on the Agency's belief that the industry could not accomplish testing of such a large universe of existing tanks on a more frequent basis because the supply of testing services could not respond to such a large demand.

Several commenters suggested that the proposed tank tightness testing alternative be allowed in the final rule but only if the testing were required more frequently. EPA now shares the concerns of those commenters. The Agency is particularly concerned about unprotected existing tanks, which have the greatest probability of leaking. New information on causes of release has prompted the Agency to believe that tightness testing conducted once every 3 years leaves too much time between tests during which an unprotected steel tank may develop corrosion holes and release product. Therefore, in the final rule the

Agency requires that tank testing be performed every year during the 10-year upgrade period, instead of every third year as was proposed. Because unprotected steel tank systems pose the greatest threat to the environment and public health, EPA believes that increasing the frequency of tightness testing will provide better environmental protection and is therefore warranted.

With regard to EPA's initial concern that such a frequency would be impractical or difficult to achieve, numerous public comments were received from the release detection industry indicating their belief that more frequent tank tightness testing is feasible. Commenters also verified that tank tightness testing is already a commonly used release detection method, and its technology and resources are currently widely available.

2. Less Frequent Monitoring of New and Upgraded Tanks Until Age 10

EPA's proposed approach for new USTs required either frequent-to-continuous (at least monthly) release detection monitoring or semiannual tank tightness testing in combination with monthly inventory control. The Agency proposed frequent-to-continuous monitoring at new tanks because, the more frequently release detection is applied, the more likely an actual release will be detected when it occurs, as explained in detail in the proposal (52 FR 12720), and thus it was believed to be needed to ensure adequate protection of the environment and public health.

Several commenters questioned the proposal to require more frequent release detection at new protected tanks than at existing (older) unprotected tanks. New information on causes of release (see section II.F. of the preamble) confirms that new tanks are the least likely to leak. The probability of new or upgraded tanks leaking, particularly early in their operational lifetime, is extremely low. Therefore, the Agency agrees with commenters who suggested that new tanks should be allowed to be monitored less often than proposed.

Today's final rule replaces the proposed semiannual tank testing with a requirement to conduct tank testing at least every fifth year during the first 10 years of the UST's operational life at a new or upgraded UST. As proposed, however, tank testing must be used in combination with monthly inventory control to be considered an approved release detection method. Because long-term experience with tank corrosion protection technology is not yet extensive, and because existing bare steel tanks rarely fail before 10 years of age, today's final rule requires monthly release detection at protected and upgraded tanks only after they pass their tenth year of operation.

3. Gradual Phase-in of Release Detection Based on Age

EPA proposed to phase in release detection at existing UST systems over a 3-year period for USTs unprotected from corrosion and a 5-year period for USTs protected from corrosion. This approach was proposed because it was believed to be the fastest schedule reasonably implementable and would require unprotected tanks (which have the greatest potential to leak) to have release detection in place sooner than protected tanks. In the preamble to the proposal (52 FR 12677), the Agency identified three approaches towards phasing in of release detection: (1) a rapid phase-in (over 1 to 2 years), (2) a gradual phase-in (over 3 to 5 years), and (3) a class approach requiring a rapid phase-in at the most sensitive UST locations and more gradual phase-in elsewhere. After considering public comments received on this issue, the

Agency has decided in today's final rule to retain the gradual phase-in approach but to base the phase-in on the age of the UST system, with the oldest tanks being required to have release detection first.

The preamble to the proposal solicited public comment on the appropriateness of considering tank age, vulnerability of hydrogeology, distance to drinking water wells, distance to vital ecological systems, and any other factors in the selection of a phase-in approach for release detection. Most commenters supported the gradual phase-in to take place over time periods ranging from 3 to 10 years, but recommended that it be based on age. A few recommended the rapid phase-in approach, and most of those recommended that the phase-in be based on age.

Today's final rule requires the oldest tanks, with or without corrosion protection, to apply release detection within the first year and the newest tanks no later than 5 years after the effective date of today's rule. This approach is believed to offer several advantages: (1) EPA has concluded that the phasing in of release detection at all existing UST systems in the large universe is implementable within 5 years; (2) the age-based sequencing schedule ensures that implementation of the requirements will take place in an orderly fashion that will spread out the demand for release detection services and avoid bottlenecks; (3) it gives higher priority to older, unprotected tanks, which have been found to have the greatest potential to leak; and (4) it still allows the newer, protected tanks, which are the least likely to be leaking, to wait until the fifth year, as did the proposed rule. In choosing the gradual approach, the Agency agrees with those commenters who cited the rapid approach as being impossible to implement with such a large universe of UST systems. In addition, the gradual approach is supported by numerous existing industry, state, and local management programs which utilize the gradual approach as the most feasible phase-in approach. The reasons the Agency is taking this gradual phase-in approach are discussed in more detail later in this preamble (section IV.D.2.). The class approach was deemed unimplementable for other reasons discussed in more detail later in this section of the preamble.

4. More Stringent Requirements for Pressurized Piping

The proposed rule contained release detection requirements for pressurized piping in addition to those requirements for new tank systems. Specifically, automatic release detection and shutoff devices were proposed for the pressurized piping at new tank systems unless continuous release detection or interstitial monitoring was installed. Suction piping systems were exempt from the proposed requirements if other minimum construction requirements were met (see 52 FR 12774). Information obtained by the Agency at the time of the proposal indicated that 20 to 30 percent of all reported releases are due to piping failures. EPA also suspected that pressurized piping systems, which are reportedly the most commonly used withdrawal system at new retail motor fuel installations, were responsible for the larger releases.

Information obtained by EPA after publication of the proposal (see section II.F. of today's preamble) indicates that piping system failures are responsible for a much greater percentage (80 to 85 percent) of release incidents than previously thought. Public comments received by EPA confirmed the Agency's belief that failure of pressurized piping systems frequently results in large releases.

In today's rule, EPA has set forth more stringent release detection requirements for pressurized piping systems. Systems must be: (1) Equipped with automatic shutoff devices or automatic flow restrictors and use either annual line testing or monthly release detection monitoring; or (2) have continuous interstitial or vapor monitoring combined with either shutoff devices or alarms. These requirements will ensure that product releases from the most vulnerable portion of the UST systems are minimized. (Today's preamble section IV.D.3.b. discusses these requirements more fully.)

C. Alternative Approaches Considered

1. New UST Systems Containing Petroleum

In the preamble to the proposed rule (52 FR 12673-12675), EPA described three basic regulatory options that were considered for new petroleum tanks: (1) Protected single-walled tanks with release detection; (2) secondary containment with interstitial monitoring; and (3) a class approach under which more protective requirements would apply to UST systems located where a release could pose a particularly high risk. The Agency solicited comments on each of these general approaches to regulate new petroleum tanks, and announced that, based on comments received and on any additional data gathered prior to promulgation, it would give further consideration to each of them before finalizing today's rules. Numerous comments were received concerning these options, and EPA developed additional information after the proposal that is relevant to this issue. (EPA solicited comment on this new information in the December 23, 1987, Supplemental Notice and in the March 31, 1988, Notice of Availability.)

Based on EPA's information and on public comment, the Agency has decided to proceed with the proposed approach of protected single-walled tanks with release detection for new petroleum UST systems. The Agency's basic rationale for this choice as explained in the preamble of the proposal remains unchanged. The following discussion briefly highlights some of the concerns raised by commenters and the influences that the new information had on this final decision.

a. Option 1: Protected Single-Walled Tanks With Release Detection. Several commenters supported EPA's proposed approach of allowing protected single-walled tanks with release detection to be used at all new petroleum UST systems. They agreed that this approach is protective of human health and the environment, confirmed that it is already widely in use by industry and in numerous state programs, and that it is available as a viable and effective alternative to interstitial monitoring.

Some commenters, however, suggested that the approach of protected single-walled UST system with leak detection approach is not as implementable as secondary containment. They stated that secondary containment is a more straightforward technical approach because, in the long run, it simplifies implementation by allowing relatively easy determination of the UST's compliance status. Another disagreement with this option is the belief expressed by some commenters that the probability of releases to the environment occurring at single-walled tanks with release detection is much greater compared to UST systems with secondary containment and interstitial monitoring.

EPA agrees with those commenters who suggested that there will probably be more releases to the environment from protected single-walled UST systems with release detection than from systems equipped with interstitial monitoring. One of the advantages of secondary containment is the potential for detecting a leak before a release to the environment actually occurs. Secondary containment thus provides a second barrier against release.

Although there are several reasons why EPA has not mandated secondary containment with interstitial monitoring at new petroleum UST systems, the most important reason is that it is not believed to be necessary to protect human health and the environment at such systems (in contrast to hazardous substance UST systems, discussed in section III.C.3. below). The new causes of release information (discussed previously in today's preamble) shows that the use of new, protected, single-walled USTs has, so far, resulted in the virtual disappearance of failures, because these new USTs have preventive controls for the main cause of past tank failures: corrosion of unprotected, bare steel. This new information also revealed that protected UST piping that is carefully installed and immediately tested is expected to significantly reduce the occurrence of release incidents from this other major component of the UST system (a reduction of at least two-thirds according to experienced installer estimates). Piping failures will not, however, be prevented to the same degree as tank failures.

Thus, the Agency has concluded that petroleum releases will be dramatically reduced using protected UST systems. This fact must also be considered with the knowledge that numerous effective methods of release detection are available and are being used at petroleum UST systems nationwide. These methods of detection will enable actions to be taken that will minimize the extent of the few releases that do occur. Also, the nature of petroleum products and the widely available technologies for their clean up provides the means to ensure that adverse impacts from such releases (when they occur) can be managed and remediated.

In consideration of all of the above factors, the Agency has concluded that single-walled protected UST systems combined with the release detection required today will adequately protect human health and the environment.

NOTE: As discussed earlier in this section of the preamble, today's final approach to new petroleum UST systems has been further tailored to allow infrequent tightness testing of protected or upgraded tanks (combined with inventory control) for the first 10 years of their operating life, with more release monitoring required of the UST system piping--including continuous monitoring of pressurized lines.

b. Option 2: Secondary Containment With Interstitial Monitoring. Several commenters supported the use of secondary containment with interstitial monitoring for various reasons, including: product releases would be completely contained and prevented from adversely impacting the environment and public health; it is a more rapid and reliable form of release detection; the cost is comparable to single-walled UST systems with release detection; and the need for conducting site assessments and corrective action would be avoided. Others, however, opposed its required use with new petroleum tanks for reasons such as: the greater capital and installation costs do not justify the environmental gains that would be achieved (in comparison to the single-walled approach); and this approach is not compatible with current trends in industry that are well underway in upgrading existing UST systems.

As previously stated, EPA agrees that secondary containment with interstitial monitoring would most likely result in fewer releases to the environment compared to protected single-walled UST systems with release detection. UST systems having secondary containment and interstitial monitoring are not perfect, however, and failures of these systems will also occur and result in some releases into the environment that will have to be remediated. Although protected single-walled systems would result in more releases, the Agency has concluded that this increase is not a significant added threat to human health and the environment given that release detection will minimize the extent of these additional releases, and the availability of petroleum cleanup technologies is widespread and capable of alleviating any resultant adverse impacts. In addition, the Agency is concerned that many owners and operators would delay upgrading their existing petroleum UST systems to the extent allowed by law or even to the point of noncompliance, because of the perception on the part of many commenters of the significance of higher capital and installation costs that would result from requiring secondary containment and interstitial monitoring (compared to protected single-walled USTs with release monitoring).

c. Option 3: Classification Approach. EPA recognized from the outset that releases from petroleum UST systems located in certain sensitive areas pose a greater risk of harming human health and the environment than others. As a consequence, one of the regulatory options the Agency considered extensively in developing the final rule was a federal classification approach based upon the potential impact of a release. Under this approach, a class or classes of UST systems located in high-risk areas would be subject to more protective requirements than UST systems located in less sensitive areas.

Although the proposed baseline standards for prevention and detection of releases made no differentiation based on class, the Agency requested comment in the April 17 proposal on the general desirability and feasibility of a classification approach to regulating UST systems. EPA also sought comment on a specific, two-tiered classification scheme. Under this scheme, owners and operators of UST systems located in high-risk areas, defined as the area within a specified distance of a public drinking-water well, would be required to use secondary containment. The baseline standard of protected, single-walled tanks with release detection would be allowed in low-risk areas.

EPA received several comments that favored or opposed inclusion of a federal classification approach in the final rule. Several commenters in favor of a class approach suggested, and the Agency has considered since proposal, alternative regulatory schemes with respect to how requirements should differ among UST systems in different classes. The schemes examined included accelerating the schedule for upgrading of existing UST systems to new tank standards or for compliance of existing UST systems with release detection requirements in high-risk areas; imposing more stringent design requirements (e.g., secondary containment) in high-risk areas; and imposing more stringent design requirements in all areas except those designated as low risk by the implementing agency. The Agency also explored several potential criteria proposed by commenters for differentiating among classes. Hydrogeologic criteria, such as proximity to ground water used for drinking water, were considered most extensively. The criterion EPA selected for detailed analysis was distance to a public water well. (For discussion of the results of the analysis see the Regulatory Impact Analysis for the Technical Regulations.)

As pointed out by several commenters, the concept of a classification approach to regulating UST systems is appealing for many reasons. Because the potential impact of a release is greater in more sensitive areas, a classification approach tailors the level of protection to the risk posed in a particular area. EPA's analyses of various classification schemes indicated that, without considering the costs of implementation, the benefits of a classification approach, primarily in terms of corrective action costs avoided, could be significant. Cleanup of contamination is especially difficult and expensive in sensitive areas, such as where ground water used for drinking water is affected. Classification could also provide a priority-setting scheme for enforcement and corrective action.

Despite the advantages, EPA has not included a classification approach in the final rule. Commenters' arguments against a federal classification approach influenced the Agency's decision. EPA agrees with commenters that the baseline requirements set by the final rule will adequately protect the environment in all areas while also encouraging timely voluntary compliance by avoiding unnecessary additional complexity and providing reasonable flexibility for UST system owners and operators. Although EPA supports the concept of differential protection based on the potential impact of a release, the Agency believes that, for this program, classification at the federal level is neither feasible nor practical. EPA is particularly concerned about the potential hindrance to state program approval and the difficulties of implementing a classification approach at the federal level.

Due to the size and nature of the community to be regulated, the success of this program depends largely upon implementation at the state and local levels. Most states, however, have not developed classification systems. Development of appropriate and workable classification schemes could take significant time and resources given the number of environmental and other factors that must be considered. The Agency is concerned that the steps necessary to define criteria and then identify high-risk and low-risk areas in states that have not yet done so could delay implementation of the program and divert scarce resources from efforts to achieve the improvements of the baseline UST regulatory requirements, which will provide most of the benefits. This additional complication may discourage states from seeking approval altogether. The Agency has concluded that the potential reluctance of states to implement this program as a consequence of requiring a classification approach could result in less successful protection of the environment and human health.

In addition, even without implementation delays, a federal classification scheme is not likely to provide significant real additional protection. Several commenters stated (and the Agency has concluded) that, at the federal level, any criteria used to classify would have to be simple (such as specified distance to a water well) because implementation of a classification scheme based on more complex criteria would not be feasible. Yet, given the diverse hydrogeologic conditions that exist in the United States, no single, simple classification criterion would be appropriate everywhere. For example, a distance to drinking-water well criterion, as presented in the preamble to the proposal, is meaningless in locations such as Phoenix, Arizona, where the depth to ground water is so great that releases from UST systems will rarely contaminate drinking-water wells; or in places like Dade County, Florida, where ground water may move so fast that a release could travel the standard distance within a short period of time. Because defining and identifying high-risk areas is so highly dependent on local (site-specific) hydrogeologic and other factors, EPA believes that state and local implementing agencies can make the most meaningful determinations of classes.

Although the Agency has concluded that a classification approach at the federal level is neither feasible nor desirable, EPA believes that a classification approach to regulating UST systems at the state or local levels, where local environmental conditions are better known, may be both feasible and appropriate. Under today's approach, the Agency allows but does not require states to use a classification approach if it is appropriate for the conditions in the state. For example, states that have already developed a classification scheme may decide to use it to regulate USTs. For such states, the potential difficulties associated with implementing a classification approach to regulating UST systems may be significantly reduced.

2. Existing UST Systems Containing Petroleum

a. Mandatory Upgrading or Replacement of Substandard UST Systems. In the preamble to the proposal, the Agency identified four regulatory approaches to scheduling the upgrade or replacement of substandard existing UST systems: (1) Rapid upgrade or replacement (within 3 to 5 years of final rule promulgation), (2) gradual upgrade or replacement (within 6 to 12 years of final rule promulgation), (3) no required upgrade or replacement, and (4) scheduling of upgrade/replacement based on a class approach (upgrade or replace tanks located in environmentally vulnerable areas first). EPA proposed to implement scheduling of mandatory upgrade/replacement using the gradual approach (within 10 years after the effective date of the final rule) and has retained this requirement in today's final rule.

Many commenters supported the proposed 10-year compliance period for the reasons identified in the preamble to the proposal (52 FR 12676). However, some recommended a shorter time period, stating their belief that industry resources could meet the demand and that a faster upgrading schedule would prevent a significant number of future product releases. In contrast, other commenters suggested a longer compliance period than proposed and argued that more time was needed to become familiar with the UST regulations, that owners of multiple tank systems would not be able to finance upgrades/replacements in 10 years or less, and that the service industry would need more time to implement upgrades for this large universe of existing tank systems.

As stated in the proposal, the Agency agrees that if upgrading could be completed in the shorter compliance period (3 to 5 years) it would decrease the number of product releases and thereby provide greater protection of human health and the environment. However, the Agency also agrees with those commenters who believe that the large number of existing UST systems essentially precludes industry from implementing upgrade requirements faster than the proposed 10-year period. Furthermore, EPA is in agreement with many of these same industry commenters who indicated that a 10-year compliance period is a reasonable time period and would not be overly burdensome. EPA is aware of numerous industry upgrading programs that have already started and will be completed within this time frame.

EPA continues to believe that the alternative of not requiring upgrade/replacement of substandard systems is simply unacceptable because the Agency has concluded that UST owners probably would not upgrade if it is not required. The universe of 1.4 to 2 million UST systems largely consists of unprotected, bare steel tanks. The new causes of release information summarized previously in this preamble (and derived from the "Causes of Release from UST Systems" report) confirms that the unprotected segment of the UST universe is very likely to leak due to corrosion and piping failures and, therefore, presents a significant threat to the public health and environment. Historical tank replacement rates, established trends in the closure of existing retail motor fuel businesses over time, and the imposition of this new regulatory program are expected together to result in rapid decrease in these substandard UST systems nationwide. However, a totally voluntary program of UST system upgrading is not expected by EPA to result in the timely upgrade or replacement of UST systems on a nationwide basis, particularly given the large number and heterogeneous nature of this universe of existing UST systems. In order to ensure human health and the environment are protected, the Agency has established a clear national goal of upgrading all substandard UST systems within 10 years that rejects a purely voluntary approach as inadequate. This goal is intended to prompt all UST owners and operators to plan for and undertake the upgrading steps that are needed to protect human health and the environment.

Another option considered by the Agency in development of the proposal was to further require upgrade and replacement based on the use of a class approach that scheduled more rapid UST system upgrades/replacements in the most vulnerable areas (e.g., ecologically sensitive sites or sites in close proximity to drinking water sources) while allowing other UST systems to be phased in on a more gradual basis. Many commenters recommended staggering the implementation schedule for upgrade/replacement based on other factors (besides class) such as tank age, tank size and type, proximity to human populations, and the measured corrosivity of a site. The common concern among these commenters was that a staggered schedule would prevent all owners from being allowed to wait until the last minute to bring their existing substandard tank systems into compliance and would, thereby, ensure a more even, implementable, and serviceable demand for tank upgrade/replacement over the 10-year period.

The Agency has decided not to require the phase-in of upgrading based on the class approach strategy, or on the basis of any other factor, for several reasons. Although many factors on which to base tank upgrade/replacement have been identified, because of the serious ramifications to the owner and operator associated with the technical requirements for upgrading, EPA believes no single risk-based factor is appropriate or applicable to mandate nationwide for all existing UST systems. Today's general 10-year requirement in the final rule also allows implementing agencies in approved states, or under State law, the opportunity to decide the staggered schedule on which upgrades should be conducted and what factor(s) are most applicable to their tank population. Regardless of what type of state action is taken, upgrading is already rapidly taking place through numerous industry programs. Today's final approach allows them to continue to use the numerous different phase-in approaches that are already successfully underway. EPA believes this flexibility should also encourage others to upgrade because they can set their own schedules to meet the 10-year deadline. Thus, EPA has concluded that much of this regulated community will have completed these voluntary programs of closure and upgrading within the mandated 10-year period, and, therefore, the number of existing USTs that otherwise will have to be upgraded by the end of this upgrading period is expected to be relatively small. The implementation of today's final requirements for release detection (and the financial responsibility requirements to be provided later) are also expected to prompt rapid upgrading and should work to ensure that the implementation difficulties at the end of the 10-year period that were cited by some commenters are not encountered due to a backlog of upgrading demand.

In summary, EPA believes that the 10-year upgrade requirement will not present an undue burden on industry and is implementable, but is needed to prompt a significant portion of this regulated community into making the upgrades and improvements necessary to protect human health and the environment. It will also provide industry and the states with some flexibility that will allow (and thereby encourage) them to determine their own approaches and schedules for ensuring tank upgrade/replacement programs are implemented expeditiously within the nationally mandated timeframe.

b. Methods of Release Detection. The majority of existing UST systems are not currently being monitored for releases to the environment. Therefore, EPA continues to believe that a fundamental goal of today's regulatory approach must include the establishment of reliable release detection at all UST systems. In the proposal (52 FR 12676), the Agency required all existing substandard UST systems to comply with one of the six release detection methods proposed for new USTs (52 FR 12713). The dual objective of this proposed approach was to allow for the continued development of release detection technologies and also to ensure that only sound and reliable release detection methods were used. Particularly for petroleum UST systems, the Agency believed many releases would be detected if an appropriate method was selected and properly used.

In the preamble to the proposal (52 FR 12676), EPA identified that a wide variety of release detection methods (applied either internally or externally to the tank) were currently on the market but with limited data available concerning their performance. This lack of performance data and field experience was corroborated by many commenters. Although numerous comments were received regarding the release detection methods proposed (see section IV.D. of today's preamble for a summary and discussion of these comments), the Agency did not receive any comments that opposed the general approach of mandating the use of at least one of the allowed methods at existing UST systems. Other commenters noted their successful use of different types of methods.

Performance data obtained from commenters and from EPA-sponsored research since proposal support the Agency's decision to retain the proposed approach in the final rule. (EPA solicited public comment concerning this new information on March 31, 1988; 52 FR 10403.) The Agency is convinced that the proposed release detection methods, when properly applied and performed as specified in the final rule, will successfully detect the large number of leaks believed to already have occurred. For example, over the past year in California and Florida, several thousand UST system releases have been identified using these methods of release detection, and there appear to be few instances where releases have been later discovered through other means (e.g., off-site impacts) when release detection was being properly conducted at a site.

3. Hazardous Substance UST Systems

UST systems containing hazardous substances were proposed to have secondary containment with interstitial monitoring unless the owner or operator obtained a variance by demonstrating that another release detection method would be effective in detecting releases of that substance from a single-walled UST (see 52 FR 12677, April 17, 1987). The reasons for selecting this proposed approach were: (1) information is not available on the applicability and demonstrated reliability of release detection methods at most hazardous substance USTs, and (2) few industry and state and local agency UST programs yet apply to hazardous substance USTs and, thus, there is little collective experience on management of such USTs. The Agency recognized that some release detection methods for petroleum UST systems might also perform well at some hazardous substance USTs. Hazardous substance USTs, however, store an array of individual chemical compounds that vary widely in their physical and chemical characteristics and that may not be readily or reliably detected using release detection methods developed for single-walled UST systems storing petroleum products. They also may not be able to be as readily addressed by corrective action technologies that are already widely available for petroleum releases. Therefore, the proposed approach required secondary containment at all new hazardous substance UST systems, unless owners and operators could demonstrate that an alternative release detection method could be reliably applied and operated.

Several commenters were opposed to the proposed secondary containment approach at new hazardous substances UST systems because: (1) they do not believe that chemicals designated as hazardous substances are any more hazardous than petroleum products (and, therefore, should not have to meet more stringent requirements), and (2) EPA has not provided a technically valid explanation of why single-walled USTs are appropriate for petroleum products but not for hazardous substances. It was also suggested that, instead of having a lengthy and costly variance procedure on a case-by-case basis, the Agency should incorporate a variance in the final rule for certain classes of hazardous substances.

The Agency has decided to retain secondary containment for all new hazardous substance USTs in today's final rule because EPA has not received any additional information or data since proposal to convince the Agency that reliable and appropriate release detection methods are generally available for hazardous substance USTs. The Agency continues to believe that under certain conditions, hazardous substances will pose a greater risk to human health or the environment than petroleum products. Furthermore, there are proven, reliable and available release detection methods and cleanup technologies for petroleum, whereas the applications of these same release detection methods and cleanup technologies are neither proven nor available for hazardous substances.

Also retained in the final rule is the proposed exception for those owners and operators who, by means of a variance, can demonstrate that a release detection method (other than interstitial monitoring) can be successfully installed and operated at a specific hazardous substance UST system to detect releases of the stored substance. An additional requirement in the final rule is that an owner and operator must also demonstrate that a corrective action method is available to clean up the release. The Agency decided not to structure the variance procedure by classes of hazardous substances because physical properties of chemicals within a class can be quite variable (for example, wide ranges in solubility and volatility) and require different corrective action approaches, and one release detection method would not reliably detect all of the chemicals within that class. (A more detailed discussion on the final rule regarding hazardous substance USTs is presented in section IV.D. of today's preamble.)

A detailed discussion of the methods of release detection allowed for existing petroleum UST systems is also presented in section IV.D. of today's preamble.

4. Corrective Action

An important facet of today's final strategy for regulating underground storage tanks is to ensure that public and private drinking water supplies are protected, and that necessary steps are taken to abate other health and safety threats (such as fires and explosions) due to present and future releases from UST systems. As described previously in this preamble, tens of thousands of UST systems are believed to have already leaked substantial quantities of regulated substances into the environment and numerous public and private wells have already been threatened or destroyed. As discussed in the preamble to the proposal (52 FR 12678), the development of a regulatory program for corrective action started with three assumptions: (1) The need to implement the requirements through the extensive participation of state and local UST programs; (2) the approach taken must be able to work as the nature of the UST corrective action problem changes over time; and (3) a process must be set up that ensures owners and operators get quickly to the task of cleaning up all releases, although the completion of corrective action may take a long period of time at any one site.

The proposal provided for separate but very similar corrective action processes for UST systems that contain petroleum and those that contain hazardous substances. In the proposal, the Agency solicited comment on whether the proposed requirements should be integrated into one subpart. The proposal also divided the regulatory requirements for corrective action into two stages: (1) Immediate abatement actions that all owners and operators must take in response to a release; and (2) long-term investigation and remedial action measures that may be taken on a site-specific basis to protect human health and the environment. The Agency solicited public comment on the approach taken to these immediate abatement (Stage I), and long-term remedial action (Stage II) issues in the proposal. These and numerous other corrective action issues are discussed in more detail in the following section of this preamble that addresses the section-by-section analysis of the final corrective action rules (see section IV.F.). The following discussion briefly highlights the major decisions and influences (including public comment) that went into the development of the Agency's final approach to corrective action for UST systems storing regulated substances.

a. Corrective Action for Regulated Substances. The proposal provided separate corrective action processes for UST systems storing petroleum and those storing hazardous substances (proposed Subparts F and G). The stated purposes of this approach were: (1) To avoid confusion over which procedures must be followed at a release site; and (2) to construct an approach towards hazardous substances corrective action that was very similar to the one for petroleum, except that it was intended to move the owners and operators more quickly to collect, array, and assess the information needed to determine the nature, extent, and hazard of the corrective action release (52 FR 12682). The dividing line between Stage I and Stage II of the process was intended to occur earlier in the response to a hazardous substance release, thus following more closely the RCRA Subtitle C hazardous waste tank approach to corrective action. This proposed approach was an attempt to provide a response process for hazardous substances that recognized the relatively greater hazards that could be posed by hazardous substances releases, and that ensured that there was consistency with the corrective action approach required for hazardous waste tanks. EPA solicited comments on whether the petroleum and hazardous substance requirements for corrective action should be merged in the final rule.

In response to public comments received, and several other revisions made in the final corrective action rules, the Agency has decided to consolidate the requirements for UST corrective action into Subpart F for all regulated substances (both petroleum and hazardous substances) for the reasons discussed below. All of the comments received by EPA concerning the merging of the two proposed subparts were in favor of it, although they made different suggestions on how to accomplish this consolidation (discussed in more detail later in the section-by-section analysis of this preamble).

Although the preamble to the proposal described the Agency's intention to foster quicker investigatory and cleanup actions at hazardous substances release sites, as was pointed out by some commenters, the few differences in the actual regulatory language between the two separate subparts was not likely to attain this end. In fact, most of the requirements within the two proposed subparts were the same. The most significant differences were that a free product investigation was not a required step for hazardous substance responses, and a more rapid (within 30 days) and detailed reporting of certain information was required by owners and operators with hazardous substance releases (see proposed § 280.74(b)) than for those with petroleum releases. Prompted by these public comments, additional review of these proposed differences has led the Agency to agree that they do not necessarily lead to faster corrective actions at hazardous substance release sites. Furthermore, even if this end was achieved somewhat for hazardous substance releases, the Agency does not believe it would protect human health and the environment to move less quickly towards the remedial actions required with petroleum releases. Thus, in the merger of the two subparts in today's final rules, the Agency has developed a process that ensures the most rapid reporting, investigation, and corrective action at all UST release sites that is believed to be attainable (the details of today's consolidation are discussed in more detail later in section IV.F. of today's preamble).

Because the requirements of the two proposed subparts were largely the same, EPA also believes that today's merger of them into one consolidated Subpart F for all regulated substances avoids a significant source of potential confusion within the regulated community. Despite the slight procedural differences between the two subparts, the Agency is now convinced that the work involved in investigating petroleum and hazardous substance releases will be very similar. Also, given that the similarities in the characteristics of different petroleum products are expected to lead to more rapid and widespread understanding of how to respond routinely to petroleum releases (mostly gasoline), the actual investigation, initial abatement of hazards, and the availability of corrective action technology for petroleum releases may result in more rapid and effective release responses at sites with petroleum releases than those with a hazardous substance release.

The Agency continues to believe that under certain conditions, hazardous substance releases can pose a greater hazard to human health and the environment than petroleum releases. However, the consolidated requirements in today's final rules have been designed to allow the implementing agency to cause the owner and operator to move as rapidly as is necessary to identify and control any such additional potential threats. For example, under the final rules, the identification and recovery of free product now must be considered at both petroleum and hazardous substance release sites. This required consideration of free product recovery, however, does not hinder the progress of corrective action at sites with releases of hazardous substances because the presence and recovery of free product is already something that must be commonly considered at all release sites (whether petroleum or hazardous substances). The final rule allows enough flexibility to ensure that this type of action is tailored, under the direction of the implementing agency, to site conditions and the type of substance released.

b. Stage I: Investigation of Releases and Immediate Corrective Action. EPA proposed requirements for the first stage of the corrective action process (Stage I) by establishing immediate steps that must be taken to abate imminent health and safety hazards whenever a release is confirmed. The basic approach assured that the following activities were undertaken by the owner and operator at all sites with a confirmed release: (1) Immediate notification of the implementing agency; (2) actions needed to stop further releases; (3) mitigation of safety hazards due to fire and explosion; (4) removal of contaminated soils; (5) investigation of the existence and extent of floating free product; and (6) initiation of the removal of free product and submittal of free product recovery plan unless directed to do otherwise by the implementing agency.

Numerous public comments on issues related to these proposed requirements are discussed in more detail later in this preamble. In general, many commenters believed the proposal was unclear as to what exactly had to be done, and by whom, to comply with the requirements. EPA, in response to these commenters, has revised the language in the final rule to clarify which elements of the initial response actions are mandatory and which are discretionary. The mandatory requirements are intended to ensure three goals are accomplished:

- To bring leaking UST sites under control with respect to immediate health and safety hazards;
- To stabilize the site so that contamination will not worsen as investigation and potentially long-term remedial actions are considered; and
- To be self-implementing in that these measures emphasize the responsibility of the owner and operator to take immediate action without awaiting approval of the implementing agency.

All sites with releases of regulated substances must investigate the area around the UST system to be able to characterize the size and nature of the release (e.g., a small spill or a large, continuing slow release). The findings of this initial investigation must be reported to the implementing agency, which has the discretion to require a more extensive site characterization based on these initial findings. The proposal has also been revised to make this more extensive examination of ground-water and soil contamination mandatory when the initial investigation reveals that a significant release has occurred (e.g., free product floating on the ground water or saturated soils in the subsurface), even in the absence of direction from the implementing agency. Thus, today's final rule requires all releases that seriously threaten or impact ground water to be automatically investigated by the owner and operator to characterize the extent of ground-water contamination and any soil contamination remaining at the site.

c. Stage II: Long-Term Corrective Action Options. EPA also proposed requirements for the second stage of the corrective action process (Stage II) addressing long-term remediation of contaminated soils and ground water. The Agency solicited public comment on three regulatory options for establishing long-term cleanup requirements: (1) national cleanup standards, with a variance provision; (2) site-specific standards to match the risk presented; and (3) a predetermined class approach. The proposal emphasized the second approach, with its site-specific cleanup targets based on (1) the data from the detailed site investigation of soil and ground-water contamination performed by the owner and operator and (2) the site-specific risk present as determined by the implementing agency using exposure and risk assessment techniques.

EPA received public comments for and against each of the three options for establishing cleanup levels. The majority of commenters preferred the proposed site-specific approach as the best way to accommodate the diversity of UST releases nationwide. Those in favor of establishing national cleanup standards in the regulations expressed the opinion that this would expedite cleanups and provide greater national consistency in cleanup results. Supporters of the class approach cited the wisdom of tailoring cleanup efforts to a predetermined assessment of risk based on prospective classifications tied to ground-water vulnerability. EPA has decided to retain the site-specific approach in the final rules.

For the same reasons that were cited in the preamble to the proposal (52 FR 12680-12682) and supported by most commenters, EPA continues to believe that the site-specific approach is the most appropriate because it allows implementing agencies the necessary flexibility to address corrective action based on the unique circumstances of the site. It also enables state and local governments to build upon their own experiences when assessing the need for and extent of corrective action. EPA is not convinced that a national standards approach will result in more rapid and consistent levels of corrective action. No data were provided that demonstrate this position. In fact, the information available to the Agency about UST cleanup technologies indicates that the level of actual cleanup achieved is much more dependent on the limitations associated with current corrective action equipment and the problems posed by individual site conditions, than it is on the cleanup levels established in a corrective action plan (or by regulation). In selecting the site-specific approach, the Agency notes that it does not preclude the use of the other two approaches by implementing agencies. Some states already are using a statewide standards approach.

The Agency continues to believe that the site-specific risk assessment process can be streamlined to ensure that the corrective action needed at a site can be identified rapidly and initiated quickly. EPA maintains the position expressed in the proposal's preamble (52 FR 12681) that site-specific cleanup levels will have to account for potential exposure of the public to contamination at the site. If a drinking water supply, public or private, is affected or threatened by the release, then the cleanup levels in the corrective action plan should be established using health-based levels as the target for cleanup of the release, unless an alternative source of drinking water can be provided to the potentially affected public. The Agency is developing further guidance concerning the use of risk assessment and exposure assessment techniques for releases at UST sites. These efforts are expected to further streamline the site-specific approach to regulation promulgated today. (Further discussions of the site-specific approach to standard setting and corrective action plans are provided later in the section-by-section analysis in section IV.F. of today's preamble.)

IV. ANALYSIS OF TODAY'S RULE

A. Program Scope

1. Applicability

As described previously, this rule generally applies to all owners and operators of UST systems containing regulated substances. Regulated substances consist of either petroleum or any substance defined in section 101(14) of CERCLA (but not including any substance regulated as a hazardous waste under Subtitle C). The following sections discuss the tank systems subject to exclusions from today's requirements and the deferral of regulation for other UST systems.

2. Regulatory Exclusions

The regulatory exclusions in today's final rule are based on a number of statutory provisions and regulatory considerations. Section 9003(a) of RCRA requires the Administrator to establish an UST program "as may be necessary to protect human health and the environment." In addition, Section 9003(b) allows the administrator to consider such factors as tank size and quantity of substances stored when establishing necessary requirements. The Agency believes that this statutory language allows some flexibility for EPA to concentrate its resources on tanks that pose the greatest potential environmental threat. Section 9001 defines the universe of the UST program and indicates that EPA should regulate tanks containing an "accumulation" of regulated substances. Section 9001 also excludes tanks regulated under Subtitle C from the jurisdiction of Subtitle I. Finally, section 1006 of RCRA generally requires integration of RCRA with the Federal Water Pollution Control Act; the Safe Drinking Water Act; the Marine Protection, Research, and Sanctuaries Act; and the Atomic Energy Act.

Based on these provisions, the Agency is today excluding from regulation several types of tank systems. These exclusions will decrease the regulatory burden on implementing agencies so they can focus their resources on types and classes of tanks that pose a significant threat to human health or the environment. Unlike statutory exclusions, regulatory exclusions may be modified by the Agency in the future should new information show that regulation of such an excluded tank type is necessary.

Four classes of tanks are excluded from regulation in the final rule: UST systems containing mixtures of hazardous waste and regulated substances; equipment and machinery that contain regulated substances for operational purposes; wastewater treatment tanks regulated under the Clean Water Act; and UST systems excluded via one of three de minimus exclusions. A specific regulatory exclusion for UST systems containing mixtures of hazardous waste and regulated substances was included in the proposed rule (52 FR 12687). The preamble of the proposal also discussed de minimus exclusions. The other two regulatory exclusions were regulatory deferrals in the proposal. The rationale for these exclusions is discussed below.

a. Tanks Regulated Under Subtitle C of RCRA. Because USTs containing a mixture of hazardous wastes (regulated under Subtitle C of RCRA) and regulated substances (regulated under Subtitle I) are subject to dual jurisdiction from Subtitle C and Subtitle I, EPA is today excluding these tanks from Subtitle I regulation. As evidenced by the exclusion of substances covered under Subtitle C within the statutory definition of "regulated substance," the Agency believes that this exemption is consistent with Congressional intent not to have redundant requirements under these two programs. Because of the continued coverage of these tanks by Subtitle C, the exclusion of these tanks from Subtitle I regulations will not present a risk to human health and the environment, and, thus, Subtitle I regulation is not "necessary to protect human health and the environment."

Several commenters pointed out that in the proposed rule this exclusion applied only to mixtures of hazardous wastes and hazardous substances. This wording would subject tanks that contain mixtures of hazardous wastes and petroleum to regulation under both Subtitle C and Subtitle I. The commenters requested that the wording be changed so that all mixtures with hazardous wastes regulated under Subtitle C would be excluded from these regulations.

The original wording in the proposal was based upon the statutory jurisdiction of the program. Under section 9001(2)(A), the exclusion of tanks regulated under Subtitle C pertains only to tanks containing hazardous substances, not to tanks containing petroleum. EPA, however, agrees with the commenters that dual regulation of tanks containing hazardous wastes and petroleum is not necessary and has changed the wording of this exclusion appropriately. This exclusion now applies to all tanks subject to regulation under Subtitle C that contain mixtures of hazardous wastes and either petroleum or non-petroleum regulated substances.

b. Equipment and Machinery that Contain Regulated Substances for Operational Purposes. Equipment and machinery that contain regulated substances for operational purposes, such as hydraulic lift tanks and electrical equipment, are excluded from today's regulations. These specific tank categories were deferred from regulation in the proposal, and the Agency requested comments on whether, and to what extent, these tanks should be subject to regulation under the UST program. Several commenters responded to this request and gave several reasons why these tanks should not be regulated as USTs. Their comments included three main points: the tanks are self-monitoring; the tanks pose a minimal risk to human health and the environment; and there have been few leaks.

Because these tanks contain regulated substances solely for operational purposes, the commenters argued that the loss of regulated substance would be accompanied by faulty operation of the equipment or machinery and thus the equipment is "self-monitoring." Second, the threat to human health and the environment was judged to be minimal because the tanks contain small amounts of regulated substances. Also, the commenters said that these devices rarely leak. Data submitted for leaks from electrical equipment, for example, show a leak incidence much lower than that for other types of tanks such as those at service stations.

This category of tanks includes hydraulic lifts and electrical equipment. Although commenters did not suggest other specific types of tanks that would fall within this class, EPA believes that other tanks of this type would also be included, provided that the tanks meet two major criteria: the equipment or machinery contains small amounts of regulated substances solely for operational purposes; and a loss of regulated substance is accompanied by faulty operation of the equipment or machinery, such that a loss of fluid causes knowledge of the loss.

In excluding this category of tanks, the Agency agrees with the commenters that these types of tank systems pose a relatively low level of risk compared to other types of storage tanks for the reasons given above. Moreover, the Agency recognizes that these tanks, although within Subtitle I jurisdiction, are not central to the Congressional concerns that created this program. Thus, regulation of these tank systems appears at this time to be unnecessary under section 9003(a).

EPA also believes that this potentially overwhelming large universe would require considerable effort on the part of implementing agencies even for just notification, with very little discernable environmental benefit. For example, the universe of hydraulic lift tanks alone has been estimated at 350,000 to 600,000 lifts. These figures do not include elevator lifts. Regulation of these types of tanks would unnecessarily divert implementing agency resources from other, more serious health threats. Therefore, today's final rule excludes such tanks.

c. Wastewater Treatment Tanks Regulated Under the Clean Water Act. The Agency is today excluding all wastewater treatment tanks, including any oil-water separators, that are subject to regulation under either section 402 or 307(b) of the Clean Water Act (CWA) (33 USC 1151 and following). These tanks, including tanks at most publicly owned treatment works and many private treatment facilities, would otherwise be subject to dual regulation. Because these tanks are subject to regulation under the CWA, further regulation under Subtitle I is unnecessary to protect human health and the environment and would be inconsistent with section 1006(b) of RCRA. This exclusion is analogous to the "wastewater treatment unit" exclusion under the RCRA Subtitle C program (see 40 CFR 260.10, 264.1, and 265.1).

In addition, tanks that treat wastewater or storm water, but which are not covered by the applicable sections of the CWA, are being deferred from today's final regulations. Such tanks might include many oil-water separators found at various facilities. Further discussion of these tanks can be found under the deferral section of this preamble.

d. De Minimis Exclusions. Today's final rule has been modified to exclude the following tanks: (1) those that have a capacity of less than 110 gallons; (2) those holding a very low concentration of regulated substances; and (3) those that serve as emergency backup tanks, hold regulated substances for only a short period of time, and are expeditiously emptied after use.

The statutory definition of tank includes all devices that "contain an accumulation of regulated substances." Although legislative history provides no guidance on the meaning of the phrase "accumulation of regulated substances," the Agency believes the statutory language provides some flexibility to define the universe of regulated facilities in a manner that focuses regulatory resources on the tanks posing substantial risk from storage of regulated substances and, thereby, fosters development of a program that most effectively protects human health and the environment. Thus, sections 9001 and

9003(a) authorize EPA to exclude from its regulations tanks containing de minimis amounts of regulated substances. EPA requested comment in the proposed rule concerning de minimis exclusion criteria.

A number of comments addressed the issue of including a de minimis exclusion in the rule for tanks that hold a small quantity of regulated substances. The overwhelming majority of the commenters believed that such an exclusion should be part of the final rule. Some commenters suggested that a small-capacity exclusion would reduce the regulatory burden on the implementing agencies and, thus, result in a more effective program. Some commenters believed that a small-capacity exclusion was justified because small quantities of regulated substances pose less of a health risk than do larger quantities.

In deciding to include a regulatory exclusion for tanks that contain small quantities of regulated substances in today's rule, the Agency had to balance the benefits and drawbacks of such an exclusion. The Agency agrees with the commenters who thought that without an exclusion such as this, the regulated universe could be overwhelmingly large. Such a large universe would require considerable efforts by the implementing authorities even for notification, diverting their attention away from other, more potentially environmentally hazardous classes of tanks. The Agency agrees that small tanks pose less danger to the environment than larger tanks, generally, due to the smaller quantity of regulated substances available to leak. In certain cases, however, the mismanagement of even small quantities of regulated substances could pose serious danger to human health and the environment. Nevertheless, the Agency has decided that the detriments of attempting to regulate these small tanks greatly outweigh any potential benefits from regulation of this class of tank and has, therefore, adopted this exclusion.

Several comments were received with suggested sizes for a de minimis cutoff. These sizes ranged from 100 gallons to 5,000 gallons. State and local agencies with de minimis exclusions use cutoffs that range from 60 to 2,100 gallons. Because it was apparent that there was no standard size for the de minimis exclusion, the Agency chose the size limit of 110 gallons capacity. According to one commenter, this size is below the smallest petroleum product tank routinely mass produced (275 gallons), and a 110-gallon level coincides with the Department of Transportation definition for minimum portable tank for the transportation of hazardous materials. Tanks likely to be exempted under this exclusion include many small sumps and other atypical tanks.

The Agency is also today excluding tanks that contain de minimis concentrations of regulated substances. Because "an accumulation of regulated substances" could include within the regulated universe USTs holding regulated substances in any amount, no matter how small, the regulated universe could include a vast number of tanks that contain regulated substances only in small concentrations. These very small concentrations could occur accidentally (through contamination) or by design (for example, underground tanks storing food that contains a preservative that is a regulated substance). The Agency has not included a specific percentage threshold as the de minimis cutoff because of the many difficulties with measuring tank contents for low concentrations. Instead, on a case-by-case basis, the implementing agencies will determine if tanks that hold very low concentrations of regulated substances are excluded via the de minimis concentration rationale. Tanks that are likely to meet this criteria include those that are used to treat storm water and municipal wastewater, tanks that store potable water that has been treated with chlorine, and in-ground swimming pools. EPA believes that such tanks pose a minimal threat to human health and the environment, and the inclusion of such tanks in the regulated universe would impose an undue burden on the implementing agencies because of the potentially large numbers of such tanks. Other types of tanks with very low concentrations of regulated substances may also be excluded.

The third de minimis exclusion included in today's rule pertains to tanks that are emergency spill protection tanks or overflow tanks, and are emptied expeditiously following use. This exclusion is analogous to the exclusion for emergency response treatment and containment under the RCRA Subtitle C program (see 40 CFR 264.1 and 265.1). Included in this category are many types of sumps and secondary barrier tanks. This exclusion does not specify a maximum time a tank may hold material, but applies only to tanks that are rarely used and are emptied shortly after use. The purpose of this exemption is to allow appropriate immediate response to emergency situations. These tanks are used for temporary storage of substances in response to a leak, spill, or other unplanned occurrences. Regulation of such tanks is unnecessary because they are rarely used and expeditiously emptied and, therefore, are unlikely to have any long-term leaks. Many of these tanks may also be able to be visually inspected because they rarely hold regulated substances. Several commenters expressed concern that the way the proposed rule was written, the Agency may have been requiring infinite layers of secondary containment. For example, in the proposal, an UST system was defined to include a secondary containment system, but there were references to requiring secondary containment for a hazardous substance UST system. Thus, it appeared that secondary containment was required to surround secondary containment. By including this exclusion in the final rule, the Agency believes that any potential confusion regarding the need for secondary barriers (containment) for secondary barrier (containment) systems has now been eliminated.

Sumps designed to store petroleum or hazardous substances during periodic cleaning or maintenance of machinery or equipment are not included in this exclusion. An example of this type of sump is turbine oil sumps that are used during maintenance of electric power generation turbines.

3. Deferral of Regulations

In the proposal preamble (52 FR 12687), EPA discussed its proposed deferral of requirements for the following categories of UST systems: wastewater treatment tanks, sumps, systems containing used oil, systems containing radioactive waste, systems containing electrical equipment, underground bulk storage tanks, and hydraulic lift tanks. The Agency requested comments on whether the deferrals were appropriate for each category and, if not, what regulations would be necessary.

In today's final rule, the Agency has revised the proposal in several ways. As a result of these revisions, tanks in some of these categories will fall within the scope of the regulatory exclusions described above, some will be subject to full regulation, and some will continue to be deferred from regulation. Tanks that are deferred rather than excluded are subject to interim UST requirements, but excluded tanks are not subject to any regulatory requirements. These revisions are briefly summarized below:

- Wastewater treatment tanks now fall under two parts of today's final rule. Wastewater treatment tanks, including oil-water separators, that fall under the jurisdiction of sections 402 or 307(b) of the CWA are excluded from today's regulatory requirements (as discussed above in IV.A.2.). The remaining wastewater treatment tanks continue to be deferred from Subparts B, C, D, E and G of today's regulations, but are subject to interim requirements under Subpart A and corrective action under Subpart F.

- Many sumps are excluded from regulation under the CWA-regulated wastewater treatment exclusion, and others via one or more of the de minimis exclusions; others may be excluded as part of the statutory exclusion for storm-water and wastewater collection systems. Many of those that are not excluded continue to be deferred from Subparts B, C, D, E and G under the "field-constructed tank" deferral. Such UST systems are subject to the interim prohibition under Subpart A and corrective action under Subpart F. Sumps that are neither excluded nor deferred from regulation are subject to today's regulation.
- Field-constructed tanks, which include many tanks classified as underground bulk storage tanks in the proposal, are deferred from Subparts B, C, D, E and G but are subject to interim requirements under Subpart A and corrective action under Subpart F.
- UST systems that contain radioactive wastes and other radioactive materials have been deferred from Subparts B, C, D, E and G but are subject to interim requirements under Subpart A and corrective action under Subpart F.
- UST systems containing electrical equipment and hydraulic lift tanks, which had been deferred in the proposal, are both examples of equipment or machinery using regulated substances for operational purposes. As discussed above in IV.A.2., both types of tanks have been excluded from regulation under Subtitle I.
- Tanks containing used oil are no longer deferred but are subject to full regulation under today's final rule.

Today's final rule also includes deferral of some subparts of the regulations for the following additional categories of tanks:

- Airport hydrant fueling systems and tanks storing diesel fuel for emergency power generation at plants regulated by the Nuclear Regulatory Commission are deferred from the technical standards set forth in Subparts B, C, D, E and G but are subject to interim requirements under Subpart A and corrective action under Subpart F.
- UST systems that store fuel solely for use by emergency power generators are deferred from the release detection requirements under Subtitle D. All other regulatory requirements apply to these tanks.

EPA's decision making on these various tank types is discussed in more detail in the sections below.

a. Wastewater Treatment Tanks. In the proposal, EPA deferred wastewater treatment tanks from UST regulation in order to gather more information on the need to regulate these tanks and the appropriate type of regulation. EPA included oil-water separators (which are considered treatment tanks) within the scope of wastewater treatment tanks.

In the proposal preamble, EPA specifically requested comments on whether wastewater treatment tanks should be regulated under Subtitle I (52 FR 12687). Almost all comments submitted were opposed to regulating wastewater treatment tanks under UST regulations. The commenters stated that wastewater treatment tanks are process devices and flow-through process tanks, not storage tanks; thus, they should not be regulated under the UST program. Several commenters also stated that wastewater treatment tanks contain large volumes of water and only small amounts of oil or hazardous materials and, thus, pose no major threat to human health or the environment. It was also stated that wastewater treatment tanks that are currently excluded by RCRA are, however, currently covered by the CWA. They should not, therefore, be regulated under UST regulations. In addition, several commenters pointed out that if wastewater treatment tanks were to be included in the final rule, there is presently no practical method of performing a tightness test on these tanks because the tanks are typically open to the atmosphere. Inventory reconciliation is not feasible because the very high throughput would require more accurate metering than is currently available.

EPA does not agree with the commenters who argued that wastewater treatment tanks are outside the scope of Subtitle I as "flow-through process tanks" or part of a storm-water or wastewater collection system, which are excluded from the jurisdiction of this program under section 9001(1). Wastewater treatment tanks are not part of a production process, nor are they part of a collection system. See section IV.A.2. for further discussion of the scope of the flow-through process tank and storm-water and wastewater collection system exclusions. EPA does, however, agree with commenters that the universe of treatment tanks could add a large administrative burden that could reduce the ability of the implementing agencies to regulate more serious threats to the environment.

After review of all available information, EPA now believes that wastewater treatment tanks that are currently covered by sections 402 and 307(b) of the CWA should be excluded from UST regulations as discussed in the previous section. In addition, some of these treatment devices, such as those treating municipal sewage, typically contain de minimis concentrations of regulated substances and are therefore excluded under today's rule.

Wastewater treatment tanks not covered by the CWA or otherwise excluded will continue to be deferred under these regulations. Oil-water separators and other similar treatment devices fall under the definition of "wastewater treatment tank" under today's rule. The deferral for those wastewater treatment tanks not regulated by the CWA reflects the Agency's uncertainty regarding the nature of this tank population and the appropriateness of some of the UST regulations for these tanks. For example, some types of leak detection (such as tightness testing) and inventory reconciliation would not appear to apply to treatment tanks.

b. Sumps. In the preamble of the proposal (52 FR 12687), the Agency requested that commenters submit information on the number, location, and substances stored in sumps; how sumps are protected to prevent releases from occurring; leak history; and whether the proposed UST regulations would be appropriate for sumps. Most of the commenters who responded believed that regulations for sumps should continue to be deferred because sumps are small, temporary storage facilities that are frequently visually monitored and that contain mostly water and only small amounts of petroleum or hazardous substances. Also, commenters stated that regulation of sumps would pose an unmanageable regulatory burden for the implementing agencies and would require an individualized approach for each location. Some commenters suggested that de minimis size, time, and throughput exclusions be developed to prevent sumps from becoming subject to the regulations. The only commenters who supported regulation of sumps did not believe that Subtitle I was the appropriate regulatory authority.

Although commenters did not submit data that would enable EPA to determine the total number of sumps nationwide, the Agency realizes that that the number of sumps potentially subject to Subtitle I is very large and could pose an unmanageable regulatory burden. In addition, the Agency agrees with the commenters that many sumps are small, temporary storage facilities that contain only small amounts of petroleum or hazardous substances. No information was submitted concerning whether sumps pose a significant threat to human health or the environment.

As discussed above, today's final rule contains de minimis size, time, and concentration exclusions that are expected to apply to many sumps. Also, sumps that are part of a storm-water or wastewater collection system are excluded by statute from UST regulations. These exclusions will allow the implementing agencies to focus their resources on UST systems that are a more significant threat to the environment and human health. The Agency believes, however, that large sumps that contain significant quantities of regulated substances over a period of time do not warrant such exclusion, because they are indistinguishable from other regulated tanks. Therefore, factory-built sumps are subject to all requirements under today's final rule if they are not subject to any other exclusion. Field-constructed tanks, including field-constructed sumps, are deferred until information can be obtained on what regulations (if any) are appropriate for these systems as discussed in the following section. Therefore, the final rule no longer contains a deferral for sumps.

c. Field-Constructed Tanks. In the proposal preamble, EPA specifically requested comments concerning the applicability of Subtitle I (52 FR 12688) to underground bulk storage tanks (UBSTs). In the proposal preamble, EPA considered UBSTs as those tanks whose total capacity was 20,000 gallons or greater. Several commenters stated their belief that because UBSTs pose a major environmental concern and are closely related to other USTs, they should be regulated under Subtitle I in the final rule. It was also stated by some commenters that secondary containment of UBSTs is feasible and other existing leak detection methods are applicable to UBSTs. On the other hand, there were some commenters who opposed the inclusion of UBSTs in the regulation stating that the differences between UBSTs and normal USTs are too great and that many leak detection and leak prevention methods are not applicable to UBSTs. There were also requests by some commenters that the definition of UBST be clarified and included not only in the preamble but also in the final regulation.

After reviewing the comments, EPA has modified the deferral of UBSTs to a deferral for tanks that are field-constructed. Although many bulk tanks are expected to be deferred because they are field-constructed, the capacity of these tanks no longer determines their regulatory status.

Field-constructed tanks are usually constructed of steel or concrete, shaped like flat vertical cylinders, and have a capacity of greater than 50,000 gallons. In contrast, factory-constructed bulk tanks are typically long, horizontal cylinders and are less than 12 feet in diameter. Tanks that are principally factory-built but are assembled in the field are considered factory-built tanks. For example, welding two halves of a factory-constructed tank together in the field does not qualify the tank as a field-constructed tank.

The deferral of regulation for field-constructed tanks is largely based on the fact that design and construction methods for field-constructed tanks are different from those for factory-built tanks. EPA has not had sufficient time to develop appropriate regulations related to design and construction for such tanks.

Comment was divided on the applicability of present leak detection and leak prevention methods to bulk tanks. Some commenters argued that existing leak detection methods are applicable to UBSTs, while others stated that the differences between UBSTs and normal USTs are too great to use most presently available leak detection and prevention methods for such tanks. EPA believes that the division of bulk tanks into field-constructed and factory-built tanks simplifies this issue.

EPA believes that because of the different design and construction methods used for field-constructed tanks, as well as the very large size of some field-constructed tanks, the majority of the leak detection methods presently available do not work for such tanks. Leak prevention methods may also differ for such tanks. The deferral for these tanks is due in part to this restricted availability of appropriate leak detection methods.

By contrast, EPA believes that currently available leak detection methods are applicable to factory-built tanks. Factory-built tanks, even those that are very large, generally conform to standard design and construction methods that allow the use of widely available leak detection methods.

EPA agrees with commenters that tanks that hold large amounts of regulated substances do pose a relatively larger potential danger to human health and the environment than other, smaller tanks. However, until regulations are developed to govern design and construction of field-constructed tanks, they will be deferred.

d. Systems Containing Radioactive Materials. At proposal, the Agency requested comment on the issue of whether tanks containing radioactive materials, including high-level radioactive waste and tanks containing mixtures of low-level radioactive waste and other materials, should meet the proposed standards or whether separate standards should be developed. No commenters supported regulation of these USTs under Subtitle I. The commenters stated that radioactive waste and materials tanks at nuclear facilities are regulated by the Nuclear Regulatory Commission (10 CFR 50.34a) and that further regulation of these tanks under Subtitle I would be duplicative and possibly inconsistent. One commenter noted that these tanks are typically made of stainless steel and have a capacity of approximately 1,000 gallons. The tanks are pressure tested before the nuclear facility is licensed to operate and are retested every 10 years. In addition, they are constantly monitored for loss of pressure and radiation leakage. Commenters also noted that the current Department of Energy management program for tanks containing high-level radioactive waste is as stringent as, and in some cases exceeds, the proposed UST rule.

Because tanks containing radioactive wastes and other radioactive materials at nuclear facilities are regulated by the Nuclear Regulatory Commission, these tanks could be subject to overlapping jurisdiction under Subtitle I and the Atomic Energy Act of 1954 (42 U.S.C. 2011 and following). The Agency, however, lacks complete information on whether these regulations fully cover all appropriate areas addressed under Subtitle I. The Agency, therefore, is deferring regulation of these tank systems until more information can be gathered.

e. Systems Containing Electrical Equipment. Under the proposed definition of "tank," large numbers of utility units in urban and residential areas (e.g., underground transmission cables and vaulted transformers for large trunk lines) could be subject to regulation. At the time of the proposal, the Agency deferred regulation of these structures based on its belief that inclusion of these structures in the UST program would be impractical and unnecessary. EPA requested that commenters submit information on the number, location, and substances stored in these units; how they are protected to prevent releases; leak history; and whether the proposed regulations would be appropriate for these units.

All of the commenters in this area were opposed to inclusion of electrical equipment structures in the UST program. The commenters stated that these units are not primarily used for storage and that the utilities industry already takes many precautions to prevent releases. Dielectric fluids, typically naphthenic mineral oil and synthetic fluids such as polybutene or alkylbenzene, are used in underground cable piping and vaulted transformers to prevent the cables and transformers from overheating. Underground cable piping is cathodically protected and is coated to prevent corrosion. The piping is subjected to pressure tests both before and after insertion of the cable and addition of the dielectric fluid. Electronic monitors at the utility's control center indicate potential releases of fluid (i.e., when the required oil pressure cannot be supplied by the associated pumping station). In addition, transmission line routes are routinely inspected to identify potential sources of piping damage, such as the misuse of construction equipment. Information submitted by commenters showed that from 1978 to 1985, utilities nationwide reported an average of less than 1 leak per 100 circuit miles of cable. In 1985, there were 23 reported leaks involving low-pressure systems and 6 reported leaks involving high-pressure systems. Of the low pressure system leaks, only one occurred belowground.

The Agency believes that there are already strong incentives for the utilities industry to prevent releases from underground equipment because these leaks could result in system malfunctions and widespread power outages. The industry has developed release response procedures for notification, containment, and cleanup in the event of a release. In addition, despite its widespread use, underground electrical equipment appears to pose a minimal threat to the environment because of the low leak incidence for such UST systems. Moreover, many of these systems also fall within the statutory exclusion for storage tanks situated on or above the floor of underground areas, such as basements and cellars. Therefore, to allow the implementing agencies to focus their limited resources on more significant potential threats, the Agency has decided to exclude underground electrical equipment from the final rule as equipment and machinery that contain regulated substances solely for operational purposes.

f. Hydraulic Lift Tanks. In the proposal preamble, EPA deferred the application of the proposed technical standards to hydraulic lift tanks; however, these tanks would have been subject to Subparts F and G of the proposed rule (i.e., corrective action). "Hydraulic lift tanks" are those tanks used to store fluid used in hydraulic lifts at service stations and similar devices such as lubrication oil reservoirs for elevators. After review of all available information, EPA has now decided that, like the electrical equipment tanks discussed above, hydraulic lift tanks will be excluded in the final rule as equipment or machinery that contain regulated substances solely for operational purposes.

In the proposal preamble, EPA specifically requested comments on whether hydraulic lift tanks should be regulated, and if regulated, to what extent (52 FR 12689). In response, several commenters stated that hydraulic lift tanks should not be regulated under the final rule because they are not used for storage and many of them are almost completely aboveground. It was suggested by several other commenters that hydraulic lift tanks not be regulated because they pose either minimal or no threat to human health or the environment and are self-monitoring. If problems do arise, the lifts cease to operate when they lose fluid. It was also mentioned by several commenters that due to the location of hydraulic lift tanks (e.g., under buildings), the cost impact involved in bringing these tanks under regulation would be substantial. Finally, several commenters stated that the inclusion of hydraulic lift tanks in the regulation would cause severe impacts on the implementing agency; the number of hydraulic lifts has been estimated at over 800,000. Several commenters suggested, however, that special standards be developed specifically for hydraulic lift tanks. It was also suggested that only those hydraulic lift tanks that exceed 100 gallons be regulated under the final rule.

EPA deferred regulation of hydraulic lift tanks at proposal to allow time to gather additional information on the subject. In the preamble to the proposal, however, EPA identified several reasons why, based on preliminary information, the Agency felt that regulation of such tanks would be unnecessary. After reviewing all comments submitted, EPA believes that it is appropriate to exclude all hydraulic lift tanks from regulation. EPA agrees with those commenters who stated that hydraulic lift tanks pose a minimal threat to the environment and are self-monitoring. The Agency is today excluding these types of tanks as equipment that contains regulated substances solely for operational purposes (see section IV.A.2.b. above).

g. Used Oil USTs. The Agency proposed to defer regulation of used oil USTs. The Agency indicated, however, that it might apply the proposed technical standards to used oil USTs in the final rule following public comment on the appropriateness of the technical standards for used oil USTs. EPA considered the many comments received on this issue and has decided to include used oil USTs in the final regulation. Public comments received by EPA and proposed revisions to the final rule as they relate to the appropriateness of the technical standards for used oil USTs are discussed below.

In the preamble to the proposed regulations, EPA requested comments on the following issues relating to used oil:

- Are the petroleum UST requirements appropriate for recycled used oil and/or used oil bound for disposal?
- Do the minor constituents found in used oil (such as water and metals) alter the appropriateness of the requirements?
- Is it appropriate to have different standards for relatively smaller tanks, such as those used by used oil generators and burners, than for larger tanks, such as those used by used oil processors?

In addition, EPA also requested comment on the impact of the proposed regulations on the recycling of used oil.

In a supplemental **Federal Register** Notice (52 FR 48638, December 23, 1987), EPA requested comment on the appropriateness of using alternative methods of release detection for used oil USTs, to supplement those listed in § 280.41 of the proposed rule. The Agency specifically requested comments on the use of static inventory control as a method of release detection for smaller used oil USTs. This request was prompted by the Agency's belief that some of the release detection methods proposed in § 280.41 may not be practical or effective for used oil USTs due to the physical characteristics of used oil. On the other hand, the Agency believes that the static inventory method of release detection may be very effective and practical for use with small used oil USTs. "Static inventory control" has been renamed as "manual tank gauging" in the final rule and in the rest of this preamble's discussion of this method of release detection.

The Agency believes that the risks associated with releases from used oil USTs may be different from those of other USTs, but the overall level of risk is similar to that of other petroleum products. Releases from used oil USTs may be less likely to occur than from petroleum USTs, but the health risks posed may potentially be greater because of the possibility of contaminants in the used oil. The appropriateness of further regulation, under RCRA Subtitle C, will be determined by results of studies currently in progress. At this time, the Agency has determined that used oil USTs should be regulated under Subtitle I because there is evidence of leaks that indicates a significant threat to human health and the environment.

In reply to EPA's request for comments about the appropriateness of the proposed regulation for used oil USTs, public comment was divided. Several commenters stated that used oil USTs should be covered by Subtitle I regulations because the risk to ground water was essentially the same as for other petroleum products, and that management of all underground tanks at a facility that had both used oil tanks and other Subtitle I regulated tanks (e.g., a service station) would be facilitated by a single, inclusive regulation (Subtitle I). In contrast, some commenters stated that the risk from used oil USTs was insignificant and, thus, used oil USTs should permanently be exempted from regulation. Others stated that used oil USTs should be regulated under RCRA Subtitle C because the hazardous constituents in used oil make it more dangerous than other petroleum products.

The Agency agrees with those commenters who noted that used oil presents risks similar to other petroleum products and that Subtitle I regulations are appropriate. Today's final rule reflects this by applying the petroleum UST requirements to used oil USTs, with limited exceptions discussed below. Releases from both used oil USTs or other petroleum USTs can be prevented, or at least limited, by sound management practices. As a result, the Agency has decided to require used oil USTs to meet the same upgrading, operation and maintenance, corrosion protection, corrective action, and closure requirements that are applicable to other petroleum USTs.

The Agency received comments requesting an exemption from Subtitle I regulations for small tanks. Recommended cutoff sizes ranged from 100 to 3,000 gallons. In addition, several commenters also requested regulatory exemptions for small vessels used to trap used oil, as well as tanks holding regulated substances for short time periods. As discussed above, in today's final rule EPA is exempting from the regulations USTs that are 110 gallons or less. Thus, small traps are excluded from regulation. With respect to tanks that hold regulated substances for short periods of time, today's rule includes an exemption for emergency spill collection tanks. The regulations do, however, apply to any other used oil USTs, the majority of which are the 500- and 550-gallon tanks often found at gasoline service stations. Most of these USTs are old and are believed to be a common source of releases of used oil. USTs that contain used oil that is used as substitute for heating oil are excluded.

The Agency received several comments noting particular characteristics associated with used oil or used oil USTs that make some of the proposed technical standards in Part 280 inappropriate for used oil USTs holding less than 1,100 gallons. In response to these comments, today's final rule contains different requirements for small used oil USTs in two areas: release detection and overfill/spill protection. First, with respect to release detection, many commenters noted their support for manual tank gauging (formerly called "static inventory control") by itself as an alternative leak detection method for used oil USTs. Today's final rule allows the use of this alternative release detection method as the sole method of release detection for any petroleum UST with a capacity of 550 gallons or less. Manual tank gauging may be used in combination with periodic tank tightness testing on petroleum tanks with a capacity between 55 and 1,000 gallons. (These provisions are discussed in more detail in section IV.D. of this preamble.)

Today's final rule also provides an exemption from the rule's spill and overfill protection controls for USTs that are filled in small increments. (This is also discussed in more detail later in this preamble under spill and overfill prevention for new USTs.) The Agency agrees with the commenters that used oil USTs that are filled manually in small increments do not pose the same risk to human health and the environment from spills and overfills as other USTs.

The Agency received additional comments related to design standards and agrees with those who requested cathodic protection for new used oil tanks. In addition, EPA is requiring that owners and operators upgrade or replace their used oil USTs according to the time period of today's final rule (10 years). EPA disagrees, however, with the commenters who argued that these tanks should be subject to secondary containment. Because the physical and chemical characteristics of used oil are similar to petroleum products, the release detection and corrective action technologies should be similarly applicable to used oil. Thus, the final rule subjects used oil USTs to the release detection requirements applicable to petroleum UST systems rather than secondary contaminant required for hazardous substance UST systems.

h. Airport Hydrant Fueling Systems. A number of commercial airports and airports at Department of Defense bases use hydrant fueling systems. These systems generally consist of one or more bulk storage tanks that may be either below or aboveground and that are connected by underground piping to various aircraft fueling locations on the airport. Hydrants, otherwise known as fuel dispensers, are connected to the pipe networks and dispense fuel into aircraft. These systems are, in some cases, very large in size and contain great volumes of fuel. Many airports have miles of piping, which is typically 8 to 24 inches in diameter, and the total capacity of the systems can be many millions of gallons.

Through a brief investigation of these systems, the Agency believes that some of these systems do not meet the statutory definition of an UST system, and are thus outside of the jurisdiction of Subtitle I. Hydrant systems that have aboveground storage tanks are not regulated tank systems unless 10 percent or more of the capacity of the system is in the belowground pipelines.

However, hydrant systems with belowground storage tanks and those with aboveground storage tanks but whose pipelines account for 10 percent or more of the system's capacity are within to Subtitle I jurisdiction as UST systems. The special problems posed by requiring hydrant systems to meet many of the requirements in today's final rule have motivated the Agency to look further at these systems, and have led to today's deferral of regulations for these systems.

The Agency continues to examine questions regarding the construction, operation, maintenance, and monitoring of hydrant systems. Preliminary information indicates that hydrant systems typically have cathodic protection, and are monitored for leaks on a daily, monthly, and annual basis. Inventory monitoring is often used, but the sensitivity of this technique is very limited due to the large volume these systems typically handle. No single leak test, however, appears to be an industry standard.

Since proposal, the Agency has become aware of several leak incidents from hydrant systems that resulted in environmental damage. Because of limited information on this subject, however, the Agency is unclear about the extent of this problem. In addition, to the nature of these systems, especially the typically large amount of piping, certain requirements in today's rule (such as leak detection for piping systems) may not be feasible for hydrant systems. For these reasons, the Agency is deferring regulation of Subparts B, C, D, E and G for all airport hydrant systems, including the underground tank portions of those systems, to allow more time to gather information.

i. Backup Diesel Tanks at Nuclear Facilities. Following publication of the proposed regulations, a commenter raised the issue of the applicability of the UST regulations to tanks at nuclear power plants that store diesel fuel for use in emergency situations. According to the commenter, these tanks are already extensively regulated by the Nuclear Regulatory Commission (NRC), and further regulation by EPA could result in an overly burdensome program if the regulations were inconsistent. Not only would these nuclear facilities be required to meet dual regulatory programs, but structural changes to the systems as a result of the UST regulations could result in an amendment to the plant's license, according to a commenter. The commenter also pointed out that any shutdown of the backup fuel system (e.g., for retrofitting) could result in the entire nuclear power plant being shut down.

The Agency is today deferring the requirements of Subparts B, C, D, E and G for these tanks pending completion of a review of the NRC regulations (10 CFR 50 Appendix A) governing these tanks to determine whether further regulation is necessary to protect human health and the environment or would be inconsistent with NRC regulations for proposes of section 1006. If this research indicates that the NRC regulations are not adequate or are not as complete as the UST regulations, EPA may require these tanks to be subject to Subtitle I regulations, or it may develop a separate set of standards applicable to this class of tank.

j. UST Systems Associated with Emergency Generators. In today's rule, EPA is deferring Subpart D requirements for UST systems associated with emergency power generators. Such tanks are common in the telephone industry and the electric utility industry. These tanks often store diesel fuel which serves as a source of backup power in remote locations (for example, at telephone switching locations). This is a deferral of the release detection requirements only; owners and operators of these systems must comply with all other subparts of this rule.

Several commenters argued that these tanks should not be regulated at all for the following reasons: they are generally small in size (typically under 500 gallons); most are less than 5 years old; they are often at unmanned stations in remote locations; they contain diesel fuel, which is less mobile than gasoline due to its higher viscosity; and many are filled only annually.

The Agency does not agree that these reasons merit an exclusion from the UST regulations. The requirement that these tanks be monitored each month is unworkable, however, because they are often located in remote areas and are visited very infrequently. Therefore, EPA is deferring Subpart D requirements for these tanks to allow time to develop workable release detection requirements for these tank systems.

4. Definitions

The following sections address many of the terms that are used in the statutory language and elsewhere in the final regulations. Since proposal, many terms have been redefined or clarified as a result of comments. The following sections contain the revised definitions, the rationale for the changes, and the Agency's interpretation of these terms.

a. Definitions of Terms in the Statute. (1) Underground Storage Tank. Underground storage tank is defined in the statute as any one or a combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of the underground pipes connected thereto) is 10 percent or more beneath the surface of the ground.

Today's rule sets forth the following definitions for terms used in the statutory definition of underground storage tank:

(a) Tank is a stationary device designed to contain an accumulation of regulated substances and constructed of non-earthen materials (e.g., concrete, steel, plastic) that provide structural support.

Several commenters stated that the definition of tank in the proposed rule was too broad, and included devices that do not store regulated substances but rather use, treat, collect, or capture regulated substances. By expanding the scope of tank beyond just storage tanks, say the commenters, EPA departed from its Congressional mandate and created a program that is overly inclusive and difficult to manage. The commenters also argued that the inclusion of hydraulic lift tanks, electrical equipment, oil-water separators, sumps, treatment tanks, and other devices not normally regarded as storage tanks would overwhelm the Agency's ability to adequately enforce the regulations. Also, the added burden of regulating these devices would be disproportionate to their potential environmental harm. Few of these devices have documented leak histories, according to the commenters.

Throughout the development of the UST regulations, where there has been ambiguity in the terms defining the jurisdiction of the Subtitle I program, it has been the Agency's policy to define the scope of the UST regulations broadly and interpret the exclusions relatively narrowly. By taking this approach, the Agency hoped to avoid prematurely eliminating from its jurisdiction tanks that may pose an environmental threat. This policy has afforded the Agency the opportunity to gather more information on the various classes of tanks in the potential regulated universe. EPA has retained the prerogative to narrow the scope of the program by regulation rather than statutory interpretation, taking into account potential environmental and health risks, implementability, and administrative burden. The Agency decided that this approach would result in a program that provides maximum protection to human health and the environment while taking into account the regulatory burdens associated with the program. Further explanation of these regulatory exclusions is found earlier in this preamble under IV.A.2. Regulatory Exclusions, many of which deal with precisely those tanks about which commenters expressed concern.

Accordingly, EPA disagrees with commenters who argued that EPA's definition of "tank" results in an unauthorized expansion of its regulatory program under Subtitle I. Although EPA acknowledges that this program includes only "storage" tanks, Congress defined "storage" in section 9001 of RCRA as "containing an accumulation of regulated substances." EPA's interpretation of the Subtitle I jurisdiction to encompass any devices holding an accumulation of any regulated substances (unless subject to a statutory exclusion) is thus not inconsistent with the statute. Moreover, this definition is the same as that which has been used in the Subtitle C tank program for years.

(b) Underground pipes connected thereto means all underground piping, including valves, elbows, joints, flanges, and flexible connectors attached to a tank system through which regulated substances flow. For the purpose of determining how much piping is connected to any individual UST system, the piping that joins two UST systems should be allocated equally between the systems. Tanks that are simply manifolded together are considered as one UST system. However, if an exempt tank is connected by piping to a regulated tank, half of the piping is allocated to each tank system. This allocation of connected piping is an attempt to reconcile two conflicting statutory provisions: section 9001(1) states that an UST system includes the tank and all underground pipes connected thereto but also states that a statutorily excluded UST system also includes all of the piping connected to it. As a result, half of the piping is allocated to the regulated tank system and half to the excluded tank system if two are connected.

In the RCRA Subtitle C tank rules, the starting point of the "connected piping" is the point at which the contained substance is initially considered to be a hazardous waste. It should be noted that the above terms as they apply here, while similar, are different than the Subtitle C definition.

(c) Regulated Substance. Today's definition of "regulated substance" in the final rule codifies the statutory definitions of "regulated substance" and "petroleum" and provides additional clarification concerning the coverage of certain substances and mixtures of these substances under the regulations.

(i) Overview. In the April 17 proposal, the Agency codified the statutory definition of regulated substance. Thus, "regulated substance" was defined to include: (1) any substance listed under section 101(14) of CERCLA, except those regulated as hazardous waste under Subtitle C of RCRA; and (2) petroleum, including crude oil or any fraction of crude oil that is liquid at standard conditions of temperature and pressure. The term "petroleum" was also separately defined as crude oil, crude oil fractions, and refined petroleum fractions including gasoline, kerosene, heating oils, and diesel fuels. The proposal addressed mixtures of petroleum and any hazardous substance with a "50 percent rule," and under which, for example, an UST system containing a mixture that was 50 percent or more petroleum was proposed to be a "petroleum UST system."

In the Supplemental Notice of December 23, 1987, the Agency proposed further clarification of these definitions by requesting public comment on a specific list of substances and blends that would be subject to the petroleum UST requirements. This list was intended to be comparable to the list of CERCLA hazardous substances (not including hazardous wastes). Thus, an owner or operator would have to comply with the UST regulations only if one or more of the stored substances were on either of the two lists of regulated substances. The proposed list of petroleum substances would also be used to determine, for purposes of release detection requirements, if a substance would be regulated as a petroleum UST system.

The few comments the Agency received about the proposed definition of regulated substance asked for further clarification of the term petroleum. The commenters' concern was whether the release detection requirements for new hazardous substance USTs (i.e., secondary containment), or those for new petroleum USTs, applied to particular substances. EPA also received numerous comments on the proposed list of petroleum substances contained in this Supplemental Notice. In general, most commenters expressed preference for this proposed list because it was more specific and clarified which substances had to meet the release detection requirements for petroleum USTs. However, some other commenters questioned this approach because of the difficulty in preparing a complete list and the loss of flexibility such a specific list would entail as the composition of petroleum products changed over time. Numerous commenters provided suggestions for adding or deleting specific substances from the list.

In today's final rule, the proposed list of petroleum substances in the Supplemental Notice is not used, although the general categories from the list have been included in the final definition of regulated substance. Thus, the definition of regulated substance retains the statutory language that was originally proposed, except that it has been revised to reference the petroleum refining process and include a list of seven basic categories of petroleum or petroleum-based substances considered by EPA to be "regulated substances." This addition to the federal definition is intended to respond to those commenters who requested more clarity about the scope of petroleum substances included within Subtitle I jurisdiction. The final rule also includes definitions for hazardous substances UST systems and petroleum UST systems for the purpose of clarifying, as requested by some commenters, which regulated substances are subject to the secondary containment requirements for new USTs storing hazardous substances and which are subject to the release detection requirements for new USTs storing petroleum or petroleum products. (These terms and their use to discern how mixtures are treated are discussed in section IV.A.4.b.)

(ii) Revisions in the final rule and public comments on the proposal. In the final rule regulated substance is defined as: "(a) any substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under Subtitle C), and (b) petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute). The 'regulated substance' includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils." In summary, the proposal's codification of the statutory definition of "regulated substance" has been retained in sections (a) and (b) of the final definition (see above). Also, the proposal's elaboration of the meaning of petroleum in a separate definition of the term has been deleted (see section (iii) below), but several general categories in that proposed definition have been listed in the final definition of regulated substance to respond to some commenters' requests for clarification of the scope of the substances covered by the regulations.

The first part of today's final definition of regulated substance (section (a)) refers to the specific list of substances (both chemicals and discarded chemical products) that are defined by regulation under CERCLA (see 40 CFR Part 302). The Subtitle I program covers all hazardous substances except those that are hazardous wastes. Few comments were submitted concerning this list or section (b) of the proposed definition (the statutory definition of petroleum). The two questions raised in most public comments were (1) whether the storage of a particular substance was regulated under Subtitle I, and (2) what release detection was required for new UST systems storing a particular substance (see section (iii) below).

EPA originally proposed to define petroleum as crude oil, any fractions of crude oil and refined petroleum fractions, such as gasoline, kerosene, heating oils, and diesel fuels. In the Supplemental Notice to the proposal, EPA requested comment on the appropriateness of adding to the definition a specific list of substances that was based on the fundamental petroleum refinery process. Many commenters agreed with the proposed use of the crude oil separation processes as the basis for determining which substances should be subject to petroleum UST standards. However, others believed that basing the definition of petroleum strictly on the steps in the separation process was inappropriate. These commenters pointed out that this approach could result in similar substances being regulated differently, such as unleaded motor gasoline being considered a petroleum substance and leaded motor gasoline a hazardous substance because lead is added in steps subsequent to basic separation processes. Other commenters pointed out the difficulty in determining the exact point in the refinery process at which a substance is considered petroleum and at which point it becomes a chemical product distinct from petroleum.

In the refinery process, separation involves two steps: atmospheric and vacuum distillation. Heat is applied to crude oil, which separates into individual fractions because of differences in boiling points or boiling ranges. Some of these fractions can be used directly from a distillation tower; however, many of the products must go through further treatment. This treatment is known as conversion, which includes such processes as hydrocracking, catalytic cracking, coking, and alkylation. These processes are used to change the molecular weight and boiling ranges of the fractions. Upgrading is the process of improving the quality of the petroleum fraction by removing sulfur, nitrogen, and oxygen. The heating involved with this process adds stability and removes waxes, allowing lower pour points. Finishing does not mean distillation to pure chemical products, but is the final step before a petroleum product is sold at retail. An example of finishing is the addition of certain chemicals to motor gasoline. Additives may include octane enhancers, which either raise or lower octane ratings, dyes for product identification by color, and detergents that remove deposits from engines. These additives may be listed hazardous substances. The complexity of this process, the variety of chemical products produced, and the variety of chemical additives mixed with petroleum products in the refinery process has led to some confusion about which substances are "petroleum" or "hazardous substance" under Subtitle I.

To overcome this confusion and respond to comments received on the proposal, the final rule does not include a separate definition of petroleum. Instead, the final rule language for "regulated substance" has been amended to clarify what petroleum and petroleum-based substances, hazardous substances, and mixtures are within the regulated universe.

The final definition of regulated substance has been revised to refer to products from the refinery process, and it lists seven general categories of petroleum and petroleum-based substances so that the breadth of the coverage of the regulations is clear. Each of these general categories in fact consists of many specific individual products or substances. By not individually listing these different products and grades, EPA intends that any future adjustments in specific product composition (for example, changes made to respond to market demands) will not affect the product's classification as a "regulated substance." These seven categories correspond to the major categories in the list of petroleum substances and mixtures proposed in the Supplemental Notice. Nearly all petroleum products in use today are included in the seven categories listed in the definition. The general reference in the definition to the products from the refining process (discussed above) will aid in identifying the remaining unlisted regulated substances. Under this approach, EPA will not need to continually update the list (for example, motor gasolines is a category of regulated substance now and in the future, although new blends of motor gasoline, such as "mid-grade," may be developed or new additives may be used).

The Agency believes that this approach will make it easier to determine the regulatory status of an individual substance or blend under Subtitle I and ease the implementation burdens on the UST owner and operator, and the implementing agency. Any owner or operator trying to determine whether a tank system contains "regulated substances" and is subject to Subtitle I requirements must first determine if the substance belongs to one of the seven general categories of regulated petroleum substances. If not, then the owner or operator next must determine whether the stored material is included within the production process and physical properties description for petroleum products. If not, then the owner or operator must finally determine whether the substance is listed as a hazardous substance under section 101(14) of CERCLA (see 40 CFR Table 302.4), except for those listed as "hazardous wastes" under Subtitle C of RCRA. If the substance has not met one of these three definitions, then it is not a regulated substance.

(iii) Petroleum. The proposed definition of petroleum has been deleted from the final rule. A separate definition of petroleum was not included in the final rule because now no regulatory distinctions are based solely on whether the stored substance is "petroleum" or a "hazardous substance." However, regulatory distinctions concerning the selection of release detection equipment are based on whether a new tank system is a "petroleum UST system" or a "hazardous substance UST system." All other technical requirements are the same for all UST systems storing regulated substances.

In response to commenters' concerns about how to determine what type of release detection is applicable to a new UST system, the final rules include definitions that distinguish between "petroleum UST systems" and "hazardous substance UST systems." Owners and operators of new petroleum UST systems may utilize a variety of release detection methods because petroleum or petroleum-based substance releases are more predictable in their fate and transport underground, create relatively well-known exposure risks, and are subject to more widely available release detection and corrective action technologies. For regulatory purposes, petroleum UST systems may store petroleum or petroleum-based substances, petroleum and de minimis hazardous substance mixtures (e.g., used oil), or hazardous substances with properties similar to petroleum products. Thus, the types of stored substances subject to the release detection requirements for new petroleum UST systems are somewhat broader in scope than what constitutes simply "petroleum." This is reflected in a revised definition of "petroleum UST system," which includes a replacement of the proposal's 50-percent rule for petroleum-hazardous substance mixtures with a de minimis rule. (See the discussion in section IV.A.4.b. concerning the definitions of "hazardous substance UST system" and "petroleum UST system.")

The Agency will continue to use the statutory definition of "petroleum" for purposes of the LUST Trust response program under section 9003(h). Except for the requirement that petroleum must be a liquid at standard conditions of temperature and pressure, the term has the same definition as the term "petroleum" defined under CERCLA sections 101(14) and 101(33). The Agency interprets these terms to include the same substances, i.e., crude oil and refined fractions of petroleum, including gasoline and diesel fuels. The term "petroleum" includes the inherent "hazardous substance" constituents in crude or refined oil but does not include contaminants present in or mixed with the petroleum. Under section 9003(h), the Agency may undertake or order corrective action with respect to a release of petroleum from an UST system. The response program, however, is not limited to UST systems containing solely petroleum but, rather, requires only that the release from the UST contain petroleum. Thus, petroleum-hazardous substance mixtures would also be subject to the section 9003(h) corrective action authorities. This is consistent with Congressional statements concerning the jurisdiction of the section 9003(h) program. (See H.R. Conf. Rep. No. 962, 99th Congress, 2d. Sess., p. 228 (1986).)

(d) A tank is 10 percent or more beneath the surface of the ground if its volume (including the volume of its connected underground piping) is 10 percent or more beneath the ground surface or otherwise covered with earthen materials.

This definition reflects the intent of the UST regulations to govern underground tanks that could leak directly into the ground undetected. Thus, the following types of tanks are included within UST jurisdiction: tanks that are underground; in-ground open-top tanks; and tanks that are above grade but are covered with earthen materials (for example, to comply with fire codes). Tanks that are above the ground surface and are covered with non-earthen materials are not included within the scope of this definition.

The phrase "so that physical inspection is precluded" has been removed from this definition since proposal. One commenter argued that this phrase could be construed to bring under the jurisdiction of the UST program any totally aboveground tank that is permanently covered or shielded from view (e.g., by insulation). EPA agrees with this commenter that such tanks, as long as their volume, including the volume of connected underground piping, is not 10 percent or more beneath the surface of the ground, are not the focus of this program and should not be subject to UST regulations. These tanks are not subject to the same corrosive forces as are underground tanks and may be more easily inspected visually than other belowground tanks.

Other commenters referred to aboveground tanks that are enclosed in concrete vaults and are surrounded by inert material such as sand or vermiculite. The commenters believed that these tanks should not be defined as USTs. Under the changes to this definition in today's rule, aboveground tanks surrounded by sand would be within the scope of these regulations, because sand is an earthen material and has the potential to create corrosion. Vermiculite is not considered an earthen material and would not promote corrosion, and, therefore, tanks that are covered by this material are not considered USTs.

The statute excludes nine types of tanks from the definition of underground storage tank. Eight of these nine types of exclusions are described below. The ninth, on septic tanks, is not discussed because no changes have been made to the proposal and no comments were submitted to EPA on this exclusion.

(2) Farm or Residential Motor Fuel Tank Exclusion. The first group of tanks excluded by the statute is "farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes." Following are definitions for the key terms of this exemption.

(a) A farm tank is a tank located on a tract of land devoted to the production of crops or raising of animals, including fish. To be exempt from UST jurisdiction, a farm tank must be located on the farm property. "Farm" includes fish hatcheries, rangeland, and nurseries with growing operations.

"Farm" does not include laboratories where animals are raised, land used to grow timber, and pesticide aviation operations. Moreover, this definition does not include retail stores or garden centers where the product of nursery farms is marketed, but not produced. This definition, as promulgated, is unchanged from the proposal.

One commenter argued that tanks at golf courses are essentially the same as tanks at sod farms; both types are used to hold fuel in support of sod and turf development. For these reasons, the commenter contended, these tanks deserve to be included under the farm exemption. The Agency does not agree that the similarities between sod farms and golf courses merit inclusion of tanks at golf courses within the farm tank exclusion. The Agency does not believe the term "farm" under section 9001 of RCRA, reasonably interpreted, includes golf courses or other places dedicated primarily to recreational, aesthetic, or other non-agricutural activities.

(b) Motor Fuel in today's rule means petroleum or a petroleum-based substance that is motor gasoline, aviation gasoline, No. 1 or No.2 diesel fuel, or any grade of gasohol, and is typically used in the operation of a motor engine.

As originally proposed, motor fuel was defined as petroleum-based fuel used in the operation of an engine that propels a vehicle for transportation of people or cargo. In the general interpretation of this phrase, motor fuel was limited to motor gasoline and diesel fuel used in automobiles, trucks, and buses. Many commenters felt that gasohols should be added to the list of motor fuels, because alcohol-type fuels are an alternative energy source encouraged by many states such as California. Commenters also felt that the term motor fuel should not be restricted to vehicles used for transportation purposes because some motors are stationary engines. The Agency agrees that the proposed definition was unnecessarily restrictive.

The final rule lists five types of motor fuel that are typically used to operate motor engines. Gasohols are included as motor fuels because EPA agrees with public comment that these are commonly used as and understood to be motor fuels. The proposed language restricting "motor fuel" to fuels used in transportation has been deleted from the definition because the term "motor fuel" does not in itself describes a use of the fuel, but rather describes a type of fuel. The statutory exclusion already contains a "use" limitation by restricting the exclusion to motor fuels stored for "noncommercial" purposes.

Accordingly, today's final rule defines motor fuel in terms of specific types of fuel. The definition lists typical uses to give descriptive, not restrictive, information about these substances. The final rule thus includes fuels used in stationary motors. The structure of this definition parallels that of heating oils.

(3) Heating Oil Tanks Exclusion. The second group of tanks excluded from UST jurisdiction by statute are tanks used for storing "heating oil for consumptive use on the premises where stored." Following are definitions for key terms of this exclusion:

(a) Heating Oil means petroleum that is No. 1, No.2 , No. 4-light, No. 4-heavy, No. 5-light, No. 5-heavy and No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); and other fuels when used as substitutes for one of these fuel oils. Heating oil is typically used in the operation of heating equipment, boilers, or furnaces.

The proposed rule defined heating oil as either one of eight technical grades of fuel oil (No. 1; No. 2; No. 4-light; No. 4-heavy; No. 5-light; No. 5-heavy; No. 6; and residual) or fuel oil substitutes such as kerosene or diesel when used for heating purposes. This definition has been revised in the final rule to clarify which technical grades of fuel oil the Agency believes are heating oil. In addition, the definition has been revised in response to comments on the use of heating oil substitutes.

The list of grades of fuel oils has been reworded because, since proposal, the Agency has discovered that "residual" is not a specific technical grade of fuel oil, but refers to several grades of fuel derived from certain operations in the refinery p rocess. Also, Navy Special Fuel Oil and Bunker C are included in the final definition as examples of residual fuels.

Several commenters suggested changes to the definition to modify the applicability of the heating oil exclusion to tanks storing fuel oil substitutes. Several commenters stated that both No. 2 diesel fuel and kerosene should be included as heating oil because their chemical makeup is similar to each other and No. 2 fuel oil. Additional commenters thought that the exclusion should not be limited to oil used for heating purposes. The Agency agrees that the heating limitation is inconsistent with the statutory language of the exclusion that limits "use" only by requiring "consumptive" use. The final rule definition, therefore, includes heating as a typical use of the fuels but does not limit the exclusion to fuels so used. The exclusion does, however, limit the use of substitutes to those situations where the substitute is actually used in place of one of the technical grades of fuel oil. For example, tanks that contain used oil at a typical retail gas station are not excluded unless the used oil is consumed on-site as a substitute for fuel oil (burned in an on-site space heater, for example). Tanks that store used oil awaiting recycling pickup are not heating oil tanks. Another example of a tank that is not a heating oil tank is one that stores diesel fuel for an on-site motor generator. Even though diesel fuel is sometimes burned in boilers as a substitute for heating oil, it is the fuel of choice for internal combustion engines. It is, thus, not a substitute for one of the technical grades of heating oil in this situation.

Thus, heating oil is defined in the final rule in terms of specific grades of oil or their substitutes. A sentence has been added to the definition listing typical uses of heating oil. This list provides descriptive, not restrictive, information about these substances and parallels the definition of motor fuel.

(b) Consumptive use means used on the premises. Accordingly, this exclusion applies to tanks at residential, commercial and industrial facilities storing heating oil that is used at the same site. The heating oil exclusion does not apply to the storage of heating oil for resale, marketing, or distribution.

In the preamble to the proposed rule, EPA stated that "consumptive use" was not intended to be limited to only space heating purposes, and described other uses of heating oil that would qualify for this exclusion. This definition has been modified since the proposed rule to clarify that tanks holding heating oil for any on-site use, such as heating or to power a generator, are exempt from regulation.

Several commenters supported this interpretation of consumptive use. Heating oil used to produce steam, process heat, electricity, and emergency power were among the consumptive uses that the commenters thought should be included in the heating oil exclusion. Today's definition clarifies that these uses are within the scope of this exclusion.

Several commenters argued that tanks storing diesel fuel for use in emergency generators should be exempt as tanks storing heating oil. As explained above, no restrictions are being placed on the use of the heating oil under this exclusion, except that it be used consumptively on-site.

(c) On the premises where stored means tanks located on the same property where the stored heating oil is used. Tanks are excluded as long as the oil is stored anywhere on the same property. "On the premises" is not limited to the building where the heating oil is stored. Thus, centralized heating units using heating oil that serve more than one building on the same property would be excluded.

In addition, several commenters provided suggestions that would result in narrower interpretations of this exclusion by regulating one of the following segments: all residential and commercial tanks; all commercial tanks; all tanks at commercial and government buildings; all residential buildings of six or more units; or all tanks above a certain size. The Agency recognizes the concerns expressed by these comments but believes that the statutory language prevents adoption of such suggestions. Under the statute, the exclusion of heating oil tanks is not limited to certain categories of heating oil tanks (e.g., only residential or only tanks less than 1,100 gallons). Congress did recognize, however, that heating oil tanks may require some regulation and required that EPA study this universe of exempt tanks and make recommendations concerning regulation (section 9009).

(4) Pipeline Facilities Exclusion. The fourth exclusion covers "any pipeline facility (including gathering lines) (1) regulated under the Natural Gas Pipeline Safety Act of 1968 (49 USC App. 1671, et seq.), (2) regulated under the Hazardous Liquid Pipeline Safety Act of 1979 (49 USC App. 2001, et seq.), or (3) which is an intrastate pipeline facility regulated under state laws comparable to the provisions of the laws referred to above.

"Pipeline facilities (including gathering lines)" include new and existing pipe rights-of-way and any equipment, facilities, or buildings used in the transportation of gas (or hazardous liquids, which include petroleum and any other liquid designated by the Secretary of Transportation) or the treatment of gas or designated hazardous liquids during the course of transportation.

The definition of pipeline facilities was adapted from the definition of that term as used in the Natural Gas Pipeline Safety Act of 1968 (NGPSA) and the Hazardous Liquid Pipeline Safety Act of 1979. "Pipeline facility" may also include any such intrastate facility as defined and regulated under state laws comparable to these two federal statutes. This definition includes sumps, drip tanks, skimmer pits, lubrication oil collection devices, and any other containers that are directly connected to regulated oil or gas pipelines or gas plants. This equipment would qualify as equipment used in the transportation of gas or hazardous liquid or the treatment of gas or hazardous liquids during the course of transportation.

One commenter pointed out that the definition of pipeline facilities in this rule differs from the definition which appears in the NGPSA. This commenter believed the Agency was mandated by Congress to adopt the definition from the NGPSA. The Agency intended that the definition that appears in these regulations mean the same as that definition that appears in NGPSA; the word changes were only for abbreviation. The Agency has retained the wording from the proposed rule.

(5) Surface Impoundments, Pits, Ponds and Lagoons Exclusion. The fifth exclusion covers any "surface impoundment, pit, pond or lagoon." A surface impoundment is defined as a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is not an injection well.

Since the proposed regulations, this definition has been changed and no longer stipulates that the surface impoundment be designed to hold an accumulation of regulated substances. This phrase created confusion among commenters and was considered unnecessary.

(6) Storm-Water or Wastewater Collection Systems Exclusion. The sixth exclusion covers a "storm-water or wastewater collection system." A storm-water or wastewater collection system is defined as all piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water runoff resulting from precipitation, or domestic, commercial, and industrial waste water to and from detention areas or areas where treatment is designated to occur. The collection of storm water and wastewater does not include treatment except where incidental to conveyance.

This definition is substantially the same as the proposed definition, with one addition to clarify that treatment is not included as part of a collection system.

The Agency received several comments on the definition of a collection system and also on the applicability of the UST regulations to wastewater treatment tanks. In general, the commenters were critical of any attempt by the Agency to define collection system so that treatment tanks, including oil-water separators, would be regulated. The various reasons and arguments used by commenters are discussed below.

Several commenters stated that treatment tanks are logically included as part of the collection system, and that Congress intended to exclude the tanks from these regulations. The word "system" implies that everything related to the collection of storm water and wastewater, including piping and tanks, should be excluded, according to commenters.

Two commenters stated that it is illogical to exclude the pipes and pumps of a collection system but not the treatment tanks. The sole purpose of these tanks, one commenter pointed out, is to reduce the degree of contamination of the water and lessen the threat of environmental harm. Another commenter stated that regulation of wastewater treatment tanks would penalize those who pretreat at the request of a POTW, and regulation may discourage on-site treatment. Both comments disagreed with any attempt to regulate these tanks. Several commenters argued that treatment tanks, and in particular oil-water separators, should be excluded because they are flow-through process tanks. Several commenters believe that treatment tanks are already regulated under other federal laws, including the Clean Water Act and the Safe Drinking Water Act. Further regulation under Subtitle I would be unwarranted and unnecessary, according to the commenters.

EPA does not agree with commenters who argued that a collection system includes tanks where treatment is designated to occur. Collection and treatment are separate and distinct functions. The Agency continues to believe that the collection system includes all piping, pumps, and conduits that extend to and from areas where treatment is designated to occur.

The Agency does not believe that it is illogical to regulate wastewater treatment tanks, although their purpose is to lessen the concentration of regulated substances in the water. Such tanks serve as receptacles for regulated substances, and may leak as any other tanks may leak, with adverse results. To categorically exclude all such tanks from regulation may risk environmental damage.

EPA also does not agree with commenters who argued that treatment tanks, particularly oil-water separators, should be classified as flow-through process tanks and therefore excluded. Treatment tanks do not form part of a production process, so they cannot be classified as flow-through process tanks.

EPA does agree, however, with the commenters who argued that some wastewater treatment tanks are adequately regulated by other federal regulations. After reviewing the comments, EPA has decided not to regulate any wastewater treatment tanks that are part of a wastewater treatment facility that is subject to regulation under either section 402 or 307(b) of the Clean Water Act. The primary reason for this decision is that, because such tanks are already subject to regulation under the CWA, additional regulation under Subtitle I is unnecessary to protect human health and the environment. Other wastewater treatment tanks may be excluded because they contain only de minimis concentrations of regulated substances. Wastewater treatment tanks that are not subject to regulation by the CWA sections 402 or 307(b) and that contain greater than de minimis concentrations of regulated substances will continue to be deferred from regulation. This deferral reflects the Agency's uncertainty regarding the nature of these tanks and the appropriateness of the UST regulations to wastewater treatment tanks. More discussion on wastewater treatment tanks is provided under that heading in section IV.A.3.

(7) Flow-Through Process Tank Exclusion. The seventh exclusion covers any flow-through process tank. Under today's final rule, a flow-through process tank is a tank that forms an integral part of a production process through which there is a steady, variable, recurring, or intermittent flow of materials during the operation of the process. Flow-through process tanks do not include tanks used for the storage of materials prior to their introduction to the process or for the storage of finished products or by-products from the production process.

Today's definition differs from the proposed definition in several respects. This exclusion now applies to tanks that are a part of a production process, rather than to tanks that are part of an industrial or commercial process. It now applies not only to tanks with steady or uninterrupted flow, but also to tanks with variable, recurring, or intermittent flow. The exclusion also now applies to tanks that hold intermediates.

The scope of the flow-through process tank exclusion has been one of the most difficult to define and most controversial interpretative issues, due to the lack of legislative guidance and a commonly understood technical meaning, as well as the potential for the exclusions, broadly interpreted, to encompass nearly all of the UST universe.

Although the definition of the terms "flow-through" and "process" have undergone several changes since EPA's first interpretation in the April 1986 guidance, these changes have been intended to clarify the Agency's interpretation of the scope of the exclusion and not to fundamentally alter that interpretation. EPA believes that this exclusion encompasses tanks that are an integral part of a production process and through which materials flow during the operation of that process. Application of leak detection or other tank standards to such tanks would generally be difficult to implement and potentially disruptive to vital production processes. The changes to this definition since the April 1986 guidance have resulted from comments on the April guidance, on the proposed definition, and on the Supplemental Notice. These comments are discussed below.

The original definition of this term that appeared in the April 1986 guidance document defined flow-through process tank to include any tank that was part of a "manufacturing" process that had "steady or uninterrupted flow." The original definition did not refer to tanks that held intermediates. This definition was thought by many commenters to be too restrictive in two respects: they stated that not only manufacturing tanks but also other industrial and commercial tanks should qualify; and that the requirement that the flow be steady would mean many tanks that operate in a batch fashion outside the scope of this exclusion.

The Agency agreed to some degree with these early commenters and, thus, included in the 1987 proposal a different definition than the one that appeared in the 1986 guidance. The proposed definition applied to "industrial and commercial" tanks, rather than to "manufacturing" tanks. The definition continued to restrict this exclusion, however, to tanks with a "steady or uninterrupted" flow of materials but added "during the operation of the process" in an attempt to accommodate commenters' concerns regarding batch processes. The proposed definition also stipulated that tanks that stored intermediates were not flow-through process tanks.

In the proposal preamble, the Agency expressed concern over what types of tanks would qualify as "flow-through process tanks" if the definition were expanded to include non-steady flow. Specifically, EPA was concerned that tanks at gasoline stations, airports, rental car agencies, and other such "commercial" locations could be construed to be flow-through process tanks if the flow of materials was allowed to be recurring. Thus, such an interpretation could exclude most tanks from the regulated UST universe. These concerns, in part, led to the issuance of a supplemental notice requesting comments on clarifying "process" to mean "production process" rather than "industrial and commercial process" as proposed in April 1987.

Several commenters addressed the issue of the types of facilities where flow-through process tanks may be located, in response to requests for comments in both the proposed rule and the supplemental notice. Comments in response to the proposed definition showed general agreement with the change (since the April guidance) to "industrial and commercial" from "manufacturing." One commenter stated that no qualifiers should be included on the term "process." Examples of non-manufacturing processes given by one commenter included oil and gas production, gas processing, wastewater collection and treatment, and recycling tanks. Other commenters suggested that hydraulic lifts, oil-water separators, and electrical equipment should be flow-through process tanks.

Several commenters supported the change proposed in the Supplemental Notice to "production process" from an "industrial or commercial process." According to commenters, this change "makes sense," "is in accordance with Congressional intent," and "clarifies that storage tanks are not flow-through process tanks." Several commenters, however, argued that the change to "production process" would be a narrowing of the exclusion that is not supported by Congressional intent. This change would also not be easier to implement, according to one commenter. One commenter suggested that flow-through process tanks used in the distribution of electric power were an example of a flow-through process tank that is clearly "industrial or commercial process," but is not necessarily "production." Another commenter stated that "production" implies a tangible good is produced, and thus a "production process" is no different than a "manufacturing process." Specifically, this commenter referred to tanks in the dry cleaning industry, which would be outside the scope of this exemption if a tangible good was required to be produced.

With respect to the interpretation of the term "flow-through," several commenters believed that the requirement that the flow be steady or uninterrupted (during the operation of the process) was too restrictive, and would result in the regulation of many tanks that the commenters believed qualify for this exclusion. For example, these commenters pointed out that many tanks in a process stream are batch tanks, where the flow of materials is recurring or interrupted. Such tanks are common in the chemical industry. The commenters also cited process tanks with variable flows, for which there is no flow some or most of the time, as examples of the type of tank that should be included in this exclusion.

The preamble to the proposed rule discussed allowing tanks that have an interruption in steady flow due to periodic maintenance or emergency shutdown to remain within the scope of this exclusion. The proposal preamble also stated that if a flow-through process tank regularly stores materials during period of interruption, it is a storage tank and not a flow-through process tank. Several commenters stated that tanks that "store" substances under these circumstances should still qualify for this exclusion because it may not be possible to remove all the material from the tank, and that this requirement seemed to imply that these tanks must be completely empty when the process was not in operation.

In the proposal preamble, the Agency also asked for comments on whether "integral to the process" would include governmentally required wastewater treatment tanks that are a necessary part of the industrial or commercial process. Several commenters stated that wastewater treatment tanks, including oil-water separators, should be considered flow-through process tanks because treatment of wastes is a process and is an integral part of any facility. One commenter stated that oil-water separators should not be considered flow-through process tanks because they are covered in UL 1316.

The discussion of flow-through process in the proposal preamble stated that tanks that store intermediates were not flow-through process tanks. Several commenters argued that tanks storing intermediates are a necessary part of the process in order for the process to be conducted safely and to allow for an adequate supply of raw materials to be used in batch-operated processes. They further stated that intermediate tanks store materials on a very temporary basis and consequently do not pose the same hazards as a tank that is in use at all times.

EPA also requested factual information, in particular process diagrams, indicating what tanks should be excluded as flow-through process tanks, given the nature of the specific process and function of the tank. One commenter provided the following examples: holding tanks; feed tanks; mixing tanks; tanks that hold materials being cut in concentration; and other tanks in the process train.

As discussed above, the definition of flow-through process tank as promulgated today is different in several respects from the proposed definition. The major differences are: the substitution of the phrase "production process" for "industrial or commercial process"; the change to "steady, variable, recurring, or intermittent" flow from "steady or uninterrupted" flow; and that tanks storing intermediates are now included as flow-through process tanks.

With respect to the interpretation of the term "process," the Agency agrees with those commenters who supported the change to "production process" from "industrial and commercial process," and is incorporating that phrase into the definition of flow-through process tank. EPA does not agree with commenters who argued that this wording is an unauthorized narrowing of the interpretation of this term. In response to the commenter who stated that the word "production" implies "making" or "manufacturing," and that the phrase "production process" would then be interpreted as "manufacturing process," the Agency does not intend to limit this exclusion only to manufacturing processes. Rather, any process at manufacturing, commercial, or industrial facilities where a tangible good or service is produced or performed may be considered a production process. Production processes include a wide variety of facilities and processes, including many at petroleum refineries, chemical manufacturing facilities, and automobile assembly plants. EPA does not agree, however, that "process" should be unqualified. Allowing the interpretation of this term to be unrestricted could result in an unreasonable interpretation of this exclusion, which, in effect, removes virtually all tanks from UST regulation since a tank related to any process through which there is a periodic flow of materials describes most storage tanks.

The Agency has changed its previous definition to allow steady, variable, recurring, or intermittent flow. Based on comments received on the proposed rule, the Agency realized that the revised definition did not effectively include batch process tanks, contrary to the Agency's intention, because batch processing can involve flows that are other than steady or uninterrupted during the operation of the process. In addition, EPA limited "flow-through" to steady or uninterrupted flow, rather than "recurring" flow to avoid eliminating jurisdiction over tanks with periodic inflow and outflow, including UST systems at gasoline filling stations. The Agency now believes, however, that by allowing variable or recurring flow, but limiting this exclusion to production processes, this concern is no longer relevant. Tanks that do form a part of a production process are often operated in a batch fashion, where inflow and outflow are periodic rather than steady or uninterrupted. EPA believes that the inclusion of such tanks is consistent with the intent of this exclusion, which is to preclude regulation of tanks that form an integral part of a production process.

Under the same rationale, EPA agrees with commenters that tanks that hold intermediates may be an integral part of a production process. Accordingly, tanks that store intermediates as part of a production process are flow-through process tanks. Similarly, the Agency agrees with the commenter who suggested that holding tanks, pulse tanks, feed tanks, mixing tanks, tanks that hold material being cut in concentration, and other tanks in the process stream are flow-through process tanks.

The Agency does not agree, however, that wastewater treatment tanks, including oil-water separators, are flow-through process tanks. These tanks do not form an integral part of a production process. Wastewater treatment tanks typically follow the production process, and in no way contribute to the production itself. Many of these treatment tanks, however, fall within the regulatory exclusion for tanks that are subject to CWA requirements or are excluded because they contain de minimis concentrations of regulated substances; wastewater treatment tanks that are not excluded are deferred from these regulations (see section IV.A.3.). For the same reasons, hydraulic lifts and electrical equipment, which commenters suggested should be defined as flow-through process tanks, are not. Hydraulic lift tanks and electrical equipment do not form part of a production process.

One commenter requested clarification on whether processes in service industries, specifically the dry cleaning industry, would qualify as "production processes." In the dry cleaning industry, the main "product," the cleaning of garments, is really a service. As stated above, EPA does not intend to restrict the phrase "production process" solely to industries where a tangible good is produced. Tanks that contain regulated substances that are integral to the dry cleaning process are eligible for consideration as flow-through process tanks. The tanks in dry cleaning machines, however, store regulated substances prior to their introduction to the cleaning process. Thus, these tanks are not flow-through process tanks.

(8) Liquid Traps or Gathering Lines Related to Oil or Gas Production and Gathering Operations. The eighth exclusion covers "liquid traps or associated gathering lines directly related to oil or gas production and gathering operations." The liquid trap exclusion refers to sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), for the purpose of collecting oil, water and other liquids. Such liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

This exclusion applies only to traps and gathering lines, and does not include other storage tanks at oil and gas production sites. Similarly, although liquid traps are often used in activities other than oil and gas production, the only liquid traps excluded from UST jurisdiction under this provision are liquid traps used for the purpose of separating oil and gas liquids from water at oil and gas production facilities. Liquid traps used in conjunction with landfill methane gas production facilities are within this exclusion and would not be subject to UST jurisdiction. Liquid traps such as grease and oil traps at gas stations, however, are not within this exclusion.

Gathering lines are defined as any pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations.

Several commenters argued that EPA misinterpreted Congressional intent because the proposal preamble implied that this exclusion was limited to unused oil. The commenters suggested it should apply to both used and unused oil at oil and gas production sites. The Agency agrees with these commenters because this exemption is aimed generally at collection traps and gathering lines at oil and gas production facilities and does not distinguish between produced oil, used oil, or unused oil at those facilities.

Although many petroleum pipeline facilities are regulated under the Hazardous Liquid Pipeline Safety Act of 1979, and thus excluded from Subtitle I jurisdiction, tanks associated with gathering lines in rural areas are statutorily exempt from Department of Transportation regulations. Tanks associated with rural oil and gas pipelines, however, are exempted as "gathering lines" under this exclusion. Thus, tanks associated with rural pipelines that are not excluded from Subtitle I jurisdiction via the exclusion for pipeline facilities would be subject to this exclusion.

(9) Underground Areas Exclusion. The ninth exclusion covers "storage tanks situated in an underground area (such as a basement, cellar, mine working, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor."

This exclusion applies to "underground rooms" in which tanks are located on or above the floor surface. The purpose of this exclusion is to remove from UST jurisdiction tanks that are technically underground but that also are, in a practical sense, no different from aboveground tanks. They are situated so that, to the same extent as tanks aboveground, physical inspection for leaks is possible. Thus, the requirement to be able to physically inspect the tank for leaks is consistent with the purpose of this exclusion.

Tanks located in a below-grade structural vault, cellar, basement, mine or other underground room would be included in this exclusion if the tanks sit upon or above the surface of the floor and there is sufficient space to enable physical inspection of the tank, but not necessarily the tank bottom. An underground tank that has a secondary containment system that allows physical inspection of the tank would also qualify for this exclusion.

b. Definition of Terms Used in the Regulations. In addition to the preceding definitions of terms that clarify the statutory exclusions in section 9001 of Subtitle I, the Agency is setting forth the following definitions of terms used in the rule. This section today contains several terms that were not defined in the proposed rule. These terms have been included today in response to requests from commenters or to clarify other terms used in today's rule. These terms include cathodic protection tester, dielectric material, maintenance, pipe or piping, repair, and upgrading. Several terms that appeared in the proposed rule do not appear in this section of the preamble because they are no longer defined in the final rule. These terms are discussed (along with comment summaries and responses) in section IV.D. of today's preamble and include interstitial monitoring, inventory control, secondary barrier, and tank tightness testing. Also, liquid trap is now defined and discussed in the statutory exclusion section in IV.A.1.

Finally, several terms have not changed, did not receive public comments since proposal, and thus are not included here: electrical equipment; operational life; overfill release; positive sampling, test, or monitoring results; release detection; and underground release. Explanations of these terms are found in the preamble to the April 1987 proposal.

(1) Aboveground Release. "Aboveground release" means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the aboveground portion of an underground storage tank system and aboveground releases associated with overfills and transfer operations as the regulated substance moves to or from an UST system.

Two commenters asked if the applicability of this term is determined by where the material escapes the UST or where it is eventually found. Commenters stated that a release from below the ground may eventually migrate to the surface, and a spill to the ground could infiltrate into the subsurface. The Agency has interpreted this term to apply to all leaks from the aboveground portion of an UST, including spills and overfills. The source of a leak, rather than its ultimate destination, is the determinant in assigning a leak to this category.

(2) Ancillary Equipment. "Ancillary equipment" means any devices including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps, that are used to distribute, meter, or control the flow of petroleum or hazardous substances to and from an underground storage tank.

This definition has not changed since the proposed rule. Some commenters asked if certain equipment, such as aboveground meters and pumps, was considered to be ancillary equipment, and to what extent such equipment would be regulated. EPA has clarified the discussion of ancillary equipment in the section on release detection to address the commenters' concerns.

(3) Belowground Release. "Belowground release" means any release to the subsurface of the land and to ground water. This includes, but is not limited to, releases from the belowground portions of an underground storage tank system and belowground releases associated with overfills and transfer operations as the regulated substance moves to or from an underground storage tank.

This definition is slightly different from the proposed rule, which contained different definitions for this term in the preamble and the rule. EPA has adopted the more general definition set forth in the proposal preamble. The definition in the final rule has also been clarified by substituting the term "regulated substance" for "petroleum" to include all regulated UST systems.

(4) Cathodic Protection. "Cathodic protection" is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.

The phrase "for example" has been added to this definition since the proposed rule to emphasize that cathodic protection may be provided by either galvanic anodes or impressed current, but is not required to be one of the two. Any other technique that provides cathodic protection may also be used.

(5) Cathodic Protection Tester. "Cathodic protection tester" means a person who can demonstrate an understanding of the principles and measurement of all common types of cathodic protection systems as applied to buried or submerged metal piping and tank systems. This person must have education and experience in the measurement of cathodic protection of buried metal piping and tank systems. This

definition was also added to the final rule in response to comments on the qualifications necessary for corrosion protection test personnel and is discussed in more detail in section IV.C.2. of this preamble.

(6) Compatible. "Compatible" means the ability of two or more substances to maintain their respective physical properties upon contact with one another for the design life of the tank system under conditions likely to be encountered in the UST.

One commenter suggested that the proposed definition, which based compatibility upon whether substances could maintain physical and chemical properties "upon contact with one another for extended periods of time and under varied environmental conditions (i.e., at different temperatures)," was ambiguous due to the phrases "extended periods of time" and "varied environmental conditions (i.e., at different temperatures)." The Agency agrees that these terms were vague and has replaced the phrase with "for the design life of the tank system under conditions likely to be encountered in the UST."

(7) Corrosion Expert. A "corrosion expert" is a person who, by reason of thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. This person must be accredited as being qualified by the National Association of Corrosion Engineers (NACE) 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.

As proposed, this definition required NACE certification. One commenter pointed out that NACE provides accreditation, not certification of corrosion expertise. NACE does in fact accredit and certify corrosion expertise. The final definition has been modified to take this into account. NACE also has recently introduced a certification program for cathodic protection specialists and cathodic protection testers.

Several commenters argued that the requirements for a corrosion expert were unnecessarily strict, and that their use would exclude many qualified people from work on UST systems. Many people, the commenters argued, did not have NACE certification or a professional engineering degree but were highly qualified based on their experience. The requirements of the definition (specifically, that a corrosion expert be accredited by NACE or have other types of licensing or certification) are not expected by EPA to exclude such qualified persons from work as corrosion experts unless they cannot satisfy the tests for accreditation. Thus, they are intended to provide some type of assurance to tank owners and operators, as well as implementing agencies, that a corrosion expert actually has achieved a minimum degree of expertise and experience needed to ensure corrosion is managed in a way that prevents leaks from UST systems and hereby protects human health and the environment. People who have attained the necessary qualifications through experience should be able to easily become NACE accredited.

(8) Dielectric Material. A "dielectric material" is one that does not conduct direct electric current. Dielectric coatings are used to electrically isolate UST systems from the surrounding soils. Dielectric bushings are used to electrically isolate portions of the UST system (i.e., tank from piping). This definition was added to the final rule in response to comments; see section IV.B.3.b. of today's preamble for further discussion of this issue.

(9) Excavation Zone. "Excavation zone" is defined as the volume containing the tank system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the UST system is placed at the time of installation.

The Agency has changed this term in the final rule from excavation "area" to excavation "zone" to indicate measurement in three dimensions.

(10) Existing Tank System. "Existing tank system" means a tank system used to contain an accumulation of regulated substance or for which installation has commenced on or before the effective date of this regulation. Installation is considered to have commenced if: (1) the owner or operator has obtained all federal, state, and local approvals or permits necessary to begin physical construction of the site or installation of the tank system; and (2) if either: (a) a continuous on-site physical construction or installation program has begun, or (b) the owner or operator has entered into contractual obligations--which cannot be canceled or modified without substantial loss--for physical construction at the site, or installation of the tank system, to be completed within a reasonable time.

Existing tanks that are converted from tanks storing non-regulated substances to tanks storing regulated substances after the effective date of the rules are considered "new tank systems" and are required to meet new tank standards.

One commenter stated that the language in the preamble to the proposed rule implied that UST systems that were permanently taken out of service or decommissioned before the effective date of the regulations are "existing tank systems." Tanks that have been taken out of service would not meet the definition of "existing tank system" if they contained no regulated substances. However, the definition of "existing tank system" is only relevant to the determination of when certain requirements must be met, not which requirements apply. Certain regulatory requirements apply to out-of-service tanks that were used in the past for the storage of regulated substances. Subpart G (§ 280.70) addresses out-of-service tanks, and this issue is addressed in section IV.G. of this preamble.

(11) Free Product. "Free product" refers to a regulated substance that is present as a non-aqueous-phase liquid (e.g., liquid not dissolved in water).

The proposal defined free product as "regulated substance in the non-aqueous phase (e.g., liquid not dissolved in water) that is beneath the surface of the ground." One commenter suggested that this phrase should include a non-aqueous phase regulated substance that is on surface water. The Agency agrees that this is free product and has modified the definition accordingly. Other commenters suggested that EPA clarify the definition to clearly exclude vapors from this definition. The Agency agrees that vapors are not free product and has added the term 'liquid' to the definition. Another commenter suggested a lower thickness limit of one-eighth of an inch be used as a cutoff; any layer of product with thickness lower than this should not be considered free product. The Agency does not agree with this concept because in some instances very thin layers may still be retrievable. The regulations require that free product must be removed to the maximum extent practicable as a part of the total site cleanup.

Other commenters suggested that the definition be modified to include a field criteria for use in corrective action. The Agency has chosen to not include this type of criteria because determining the presence of free product and the extent to which it can be removed depends on site conditions and the technology employed. EPA believes that it is preferable to leave this determination to the discretion of the implementing agency. This issue is discussed in more detail in section IV.F. of this preamble.

(12) Hazardous Substance UST System. "Hazardous substance UST system" means an UST system containing either (a) hazardous substances defined in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under Subtitle C) or (b) any mixture of such substances and petroleum that is not regulated as a petroleum UST system. Thus, the final rule, in effect, defines a hazardous substance UST system as any UST system storing regulated substances which is not a petroleum UST system. It is essentially a catchall for any UST system for which the effectiveness of petroleum release detection and corrective action technology is uncertain. By contrast, in the proposed rule, a hazardous substance tank system was defined as a system containing an accumulation of hazardous substances or a mixture of such substances and petroleum in which hazardous substances comprise greater than 50 percent of the weight or volume of the mixture. The change from the proposed to the final definition eliminates the proposed 50-percent mixture rule for distinguishing tanks subject to the petroleum release detection requirements.

Many commenters agreed with the Agency's proposal in the Supplemental Notice that a substance not found on the petroleum list but listed under CERCLA should be regulated as a hazardous substance. Other commenters felt that if a hazardous substance was a constituent in petroleum, then that substance should be regulated like petroleum when it is stored in its pure form. Other commenters stated the converse argument: that because some hazardous substances are constituents in petroleum, then petroleum should be regulated as a hazardous substance.

The final rules distinguish petroleum and petroleum-based substances from other hazardous substances or mixtures for the purposes of determining which type of release detection requirements apply to new UST systems. UST systems storing petroleum, including its natural or refinery-added "hazardous substance" constituents (and stored materials with petroleum-like characteristics), are allowed to use a wide range of release detection methods in today's rule because petroleum has chemical and physical properties that make it highly detectable and amenable to a wide array of available corrective action technologies. A hazardous substance in its pure form, however, does not necessarily retain the same characteristics when it is a constituent in petroleum. Thus, the storage of such hazardous substances in new UST systems is governed by the release detection requirements for non-petroleum regulated substances, i.e., secondary containment. In the final rule, the determination of which type of release detection requirement is appropriate at an UST storing a regulated substance is not based on the Agency's interpretation of the definition of "petroleum" or "hazardous substance." (For further discussions of the differences between petroleum and hazardous substance USTs and their associated release detection requirements, see also section IV.D.2. on hazardous substance release detection, and section III.C.3. on alternative approaches to hazardous substance UST systems.)

In the proposed rule, an UST system was regulated as either a petroleum or hazardous substance UST system based on whether "petroleum" or "hazardous substances" were stored in the system. The problem of how to regulate a mixture of petroleum and hazardous substance was addressed in the proposed definitions of hazardous substance UST and petroleum UST by the "50-percent rule." A mixture of regulated substances was subject to either the petroleum UST system requirements or hazardous substance UST system requirements depending on which of these substances comprised more than 50 percent of the mixture. At proposal, the Agency thought this was a straightforward way to decide which release detection requirements for new UST systems were applicable to a mixture or blend of petroleum and hazardous substances. After proposal, however, the Agency became concerned that this approach would prove to be unworkable because of the difficulty of measuring constituent concentrations and the uncertainty of how to address constituents of petroleum that are also hazardous substances. In addition, there is not a single percentage value that is applicable to all mixtures and blends for determining when the substance will no longer be reliably detected by one of the release detection technologies allowed under the rule for petroleum USTs, and there is a wide variation in the degree of "hazardousness" among the many substances listed in section 101(14) of CERCLA.

For these reasons, in the Supplemental Notice, the Agency considered replacing the 50-percent rule with a specific list of all substances and blends of regulated substances that would be regulated under petroleum UST requirements. Any other blend or mixture of regulated substances would be subject to hazardous substance UST requirements. Many commenters supported the proposed 50-percent rule because it was clear and because it would be difficult to list all petroleum substances. Others supported the 50-percent rule approach but recommended alternative percent values ranging from 1 percent to 50 percent. Many commenters, particularly state agencies, supported the idea of a list because it would lessen the need for determining how to regulate a particular stored mixture, and thereby decrease the burden on the implementing agencies. It was also believed to give the owner and operator clear guidelines in determining the status of blends and, therefore, which release detection method to use. These commenters said that any percentage method would be cumbersome and difficult to enforce because it would be difficult to measure concentrations in the UST system.

After consideration of all of these comments, EPA concluded that neither a percentage rule nor a comprehensive list of petroleum or petroleum-based substances is a practical solution to the problem of how to determine which blends and mixtures of regulated substances must meet the release detection standards for new UST systems storing hazardous substances. (See the discussion concerning "regulated substance" in section IV.A.4.a. earlier in this preamble for the reasons why the Agency rejected the proposed comprehensive list approach.) The main drawback to the percent approach is the variability of a meaningful value. For example, 5-percent pesticide mixed in oil or 5-percent pentachlorophenol mixed in mineral spirits for application purposes should be stored in USTs with secondary containment and interstitial monitoring because of the high toxicity of these substances and the unavailability of highly effective corrective action technologies and release detection. In contrast, a hazardous substance such as methanol that is highly flammable as a pure product can be blended in relatively high proportions with motor gasoline and not change the flammable nature of the motor gasoline. It can be safely stored in a protected single-walled tank because release detection and corrective action technology are available for the petroleum-methanol mixture; and these methods are the same or very similar to those used for petroleum products. Thus, the appropriate percentage value to use in determining the release detection requirements that must be used at a new UST storing a mixture of regulated substances should be determined by the implementing agency based on a consideration of the following factors: the availability of reliable and sensitive release detection, the availability of effective corrective action technologies, and the inherent toxicity of the substance stored.

The final rule, therefore, does not contain a "50-percent rule" to determine how mixtures of petroleum and hazardous substances should be regulated. Rather, the final rule lists specific substances subject to the petroleum UST system requirements and uses a de minimis standard to determined when other mixtures of petroleum and hazardous substances are subject to petroleum UST system standards. A "petroleum UST system" is, thus, one which contains petroleum or petroleum and de minimis amounts of other regulated substances. Any other UST system is a hazardous substance UST system and must be provided with secondary containment or obtain a variance. The de minimis amount of hazardous substance mixed with a petroleum product is that amount in which the additional hazardous substance does not alter the detectability, effectiveness of corrective action, or toxicity of the petroleum to any significant degree.

(13) Hydraulic Lift Tank. "Hydraulic lift tank" means a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air or hydraulic fluid to operate lifts, elevators, and other similar devices.

One commenter stated that the definition of this term in the proposal did not include elevator lifts. In response, the Agency changed this definition to include lifts that operate by compressed air or hydraulic fluid. This change properly includes all elevator lifts within the hydraulic lift definition.

(14) Implementing Agency. "Implementing agency" means EPA, or, in the case of a state with a program approved under section 9004 (or pursuant to a memorandum of agreement with EPA), the designated state or local agency responsible for carrying out an approved UST program.

As the definition states, section 9004 empowers the Agency to approve a state program to operate in lieu of the federal program. The state agency responsible for carrying out an approved program is the lead implementing agency for the UST program. A state may decide to work through designated local agencies to carry out the approved program. It is important to note that the local or state agency responsible for the enforcement of the UST regulations, particularly once the state program is approved, is expected to be an owner and operator's first contact in any situation involving a leaking UST system. The state and local agencies could then contact EPA if necessary.

(15) Maintenance. "Maintenance" is the normal operational upkeep to prevent an UST from releasing product. This definition has been added since proposal in response to requests by several commenters for clarification of this term. The comments and the use of this term are discussed further in section IV.C.2. of this preamble.

(16) New Tank System. "New tank system" means a tank system that will be used to contain an accumulation of regulated substance and for which installation has commenced after the effective date of this regulation.

Existing tanks that are converted after the effective date of this regulation from tanks storing non-regulated substances to tanks storing regulated substances are considered new UST systems and are required to meet new tank standards.

(17) Petroleum UST System. "Petroleum UST system" means an UST system containing petroleum or mixtures of petroleum with de minimis quantities of other regulated substances. Such systems include those containing motor fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, or used oils.

In the proposed rule, a petroleum UST system was defined as a system that contained an accumulation of petroleum or a mixture of regulated substances and petroleum in which petroleum comprised greater than 50 percent of the weight or volume of the mixture. In the Supplemental Notice, the Agency proposed the development of a list of petroleum or petroleum-based substances subject to the petroleum UST system requirements. Based on public comment, however, the Agency has decided that it would be unworkable, time consuming, and largely unnecessary to specifically identify all possible petroleum products, petroleum-based substances, and mixtures of these substances with hazardous substances that should be subject to petroleum UST standards.

The definition for petroleum UST systems has been revised in two ways in the final regulation. The 50-percent rule for mixtures has been deleted and replaced with a limitation of non-petroleum regulated substances to de minimis levels. Use of this approach is intended to better determine if an UST system qualifies for the new petroleum UST release detection methods (see also definition of hazardous substance UST system). In addition, a list consisting of seven general categories of substances has been added to the petroleum UST system definition to more clearly identify the major types of petroleum and petroleum-based substances that may be stored in new protected single-walled tanks with release detection rather than only in UST systems that meet the secondary containment requirements. These categories are not substances that necessarily must be defined as petroleum under CERCLA, but instead are substances for which the Agency has determined single-walled tanks with cathodic protection and monthly release detection are adequate to protect human health and the environment. Other mixtures of regulated substances (for example, petroleum products mixed with non-indigenous hazardous substances or contaminated petroleum products) will have to be considered on a case-by-case basis by the implementing agency, using the de minimis rule. The EPA anticipates that few blends and mixtures will present interpretation difficulties. See part (12) of this section for an explanation of the application of the de minimis rule.

(18) Pipe or Piping. A "pipe" or "piping" is any hollow cylinder or tubular conduit that is constructed of non-earthen materials. This definition has been added since the proposed rule at the suggestion of a commenter (see sections IV.B.1. and IV.C.5. of this preamble for further discussion).

(19) Repair. "Repair" means to restore a tank or UST system component that has caused a release of product from the UST system.

This term has been added since proposal in response to public comments requesting additional clarification concerning the differences between repair, upgrading and maintenance. Refer to section IV.C.5. of today's preamble for further discussion of this issue.

(20) SARA. "SARA" means the Superfund Amendments and Reauthorization Act of 1986.

(21) Sump. This term has been deleted from the final rule.

Several commenters stated that this definition was ambiguous due to the inclusion of the term "temporarily." They suggested it be removed or that an actual time be substituted. The Agency agrees and has eliminated the definition from the final rule. This definition is no longer needed because the final rule no longer contains any requirements or provisions specific to sumps.

(22) Upgrade. An "upgrade" is the addition or retrofit of some portion of an UST systems, such as cathodic protection, lining, and spill and overfill controls, to improve the ability of the UST to prevent the release of product in accordance with § 280.21.

Although this term was not defined in the proposal, it has been added at the recommendation of commenters. Further discussion of upgrading is presented in section IV.B.3. of today's preamble.

(23) UST System or Tank System. "UST system" or "tank system" means an underground storage tank, connected underground piping, underground ancillary equipment, and containment system, if any. This definition has been changed to include within the UST system only underground ancillary equipment.

Two commenters suggested that the phrase "underground piping" be defined to exclude any non-wetted piping such as vent lines. EPA does not agree with the commenters. Because such "non-wetted" piping can contain regulated substances, particularly when the tank is overfilled, EPA believes that certain requirements in this rule are applicable to this type of piping. Clarification has been added in today's rule regarding which requirements are applicable to "non-wetted" piping.

(24) Wastewater Treatment Tank. "Wastewater treatment tank" means a tank that is designed to receive and treat an influent wastewater through physical, chemical, or biological methods.

This definition has been changed since the proposal so that it no longer includes only tanks regulated under the Clean Water Act. This term now refers to any tanks that are designed to treat wastewater. Of these, only some are regulated under the CWA. This change was required due to the different regulations for CWA-regulated and non-CWA-regulated wastewater treatment tanks.

B. UST Systems: Design, Construction, Installation, and Notification

The following sections present major issues raised by public comments and new information gathered since proposal concerning the design, construction, installation, and notification of UST systems. Also, these sections discuss changes in the final rule based on these public comments and this new information.

1. Design and Construction Requirements (§ 280.20)

As discussed in the preamble to the April 17 proposal (52 FR 12695), EPA concluded that national design and construction requirements are needed for new UST systems, especially with regard to corrosion protection. In discussing general approaches to design and construction standards, EPA concluded that industry codes of practice adequately address proper design. EPA invited comments on the methods that should be used to recognize development of future codes of practice that meet the intent of the requirements of the proposed rule concerning the design, construction, and protection from corrosion of UST systems. Many comments were received by EPA on this issue.

Many commenters suggested that EPA set detailed design standards in the final rule. Some new or alternate methods for tank design, fabrication, or protection techniques were suggested. For example, a few commenters suggested that concrete tanks should be more explicitly allowed. One suggested adding unbonded polyethylene wrap as an option for corrosion protection. EPA still believes, however, that the general approach taken at proposal of relying on industry codes of practice, rather than specifying detailed regulatory standards, is more appropriate because this approach allows new and effective technologies to be developed and put into use.

In today's final rule, EPA simply requires that all new tanks be designed and manufactured according to standards of a nationally recognized organization or an independent testing laboratory. These requirements also allow the use of concrete or stainless steel tanks if the implementing agency determines that the design, construction method, and corrosion protection system would prevent the release of any stored regulated substances in a manner that is no less protective of human health and environment than tanks allowed by the requirements of § 280.20(a)(1)-(4). Specific design and construction issues are discussed in detail below.

a. Tank Requirements (§ 280.20(a)). (1) Fabrication. As discussed in the preamble to the April 17 proposal (52 FR 12696), EPA proposed to require one of three fabrication techniques for tanks: fiberglass-reinforced plastic (FRP), coated and cathodically protected steel, and steel-fiberglass-reinforced plastic composite. The allowed fabrication techniques were chosen to provide protection of buried structures from galvanic corrosion by using either a cathodic protection system or noncorrodible materials. Although comments were submitted suggesting flaws in each of the UST types listed in the proposal, the data submitted indicate excellent performance of all these protected tanks. Recent studies sponsored by EPA have yet to identify a documented case of failure by corrosion of these protected, "new generation" tanks having in-service ages of up to 30 years. Therefore, today's rule is unchanged with respect to these new tank fabrication requirements.

Information obtained by the Agency since proposal on performance of each of the three fabrication techniques specifically allowed in the final rule is briefly summarized below. Additional discussion is presented earlier in the Causes of UST Releases section of today's preamble.

FRP Tanks. Nearly 200,000 FRP tanks have been installed nationwide, with some as old as 22 years old. There were some failures of these tanks when first introduced; however, modification of installation practices and tank design has reduced the annual failure rate to less than 0.05 percent. If the tank fails, failure usually occurs soon after installation and is due to improper installation.

Coated and Cathodically Protected Tanks. Approximately 100,000 of these tanks have been installed at UST sites. Though some of the tanks are over 20 years old, the majority have been installed within the last 5 years. There have been very few failures of these systems to date. None of the failures have resulted in a warranty claim. The few failures that did occur were due either to improper installation practices or to not following monitoring procedures correctly. Cathodic protection technology has been widely applied to pipelines and other buried metal structures for over 30 years. A dramatic reduction in failures has resulted from the use of cathodic protection on pipelines.

Composite Tanks. This tank type is not as popular in this country as the other types of protected tanks, but has been widely used in Europe. Approximately 65,000 composite tanks have been installed in the U.S. and have been in use for about 25 years without a single reported corrosion-related failure. The current manufacturing standards for these tanks are much more stringent than they were in the past. Even though there is not as much historical performance data on composite tanks as there is for FRP or coated and cathodically protected tanks, EPA has confidence in their future performance because of the fault-free performance of the older tanks of this type and the more stringent manufacturing standards that are now in use.

(2) Corrosion Protection -- Corrosion Experts. EPA proposed in § 280.20(a) that field-installed cathodic protection systems should be designed by an independent corrosion expert. The Agency requested comments on the merits of this approach, and several comments were received by EPA on this issue. Most of the comments strongly opposed the requirement of an "independent" corrosion expert because they felt that this requirement would place an unnecessary financial burden on owners. In addition, they pointed out that the term "independent" should not be required because very few independent corrosion experts are available. Some suggested that the term "independent" should be replaced with "certified" or "qualified." Others suggested the use of "in-house" expert because an "in-house" corrosion expert would have better working knowledge of the systems to be protected, condition of use, and the surrounding environmental condition.

Although no clear evidence was submitted to indicate that corrosion protection systems that are designed by independent experts would perform better or worse than systems designed by non-independent experts, information obtained from public comments indicates that relatively few independent corrosion experts are available to fulfill the large demand for system designs. In the final rule, EPA has, therefore, deleted the requirement that the corrosion expert must be independent. Thus, the use of in-house personnel is acceptable provided that they meet the definition of "corrosion expert."

Composite Tanks. In the preamble to the proposal (52 FR 12698), EPA invited comments, standards, and documented performance data for FRP-steel composite tanks (also called "clad" tanks). Several comments were received by EPA on the issue of whether or not cathodic protection is needed for composite tanks.

EPA believes that cathodic protection for this type of tank is not needed because the exterior of the steel tank is bonded to a thick fiberglass shell that has inherent corrosion resistance properties. EPA was unable to identify one case where this type of tank has failed due to corrosion and also noted that one major manufacturer of this type of tank recently began to offer lifetime guarantees from failure for its tanks. Thus, in the final rule, EPA has retained the provision that, as long as these tanks are designed and manufactured according to a recognized national standard of practice, FRP-steel composite tanks do not require cathodic protection.

At proposal, industry codes for composite tanks were still in draft form. Commenters suggested that composite tanks should be excluded from the final rule until UL 1746 is final. EPA disagrees with this comment because manufacturers are now being approved under this standard in its draft form. Moreover, EPA has amended the rule to reference a new industry consensus design standard, ACT-100, "for the fabrication of FRP clad or composite underground storage tanks" submitted by a commenter. Accordingly, EPA has concluded that it is unwarranted to delay allowing the use of composite tanks given their outstanding performance to date and the availability of the ACT-100 design standard and the draft UL 1746 performance standard.

No 12,000 ohm/cm Exclusion. As discussed in the preamble to the April 17, 1987, proposal (52 FR 12698), EPA had proposed dropping the 12,000 ohm/cm exclusion for underground tanks contained in the Interim Prohibition (see section 9003(g)(2) of RCRA). As stated in the proposal, this measurement alone does not adequately define a soil's propensity to corrode. Soil resistivity varies with depth and moisture content, and corrosivity has been demonstrated in soil with a 30,000 ohm/cm reading.

Many comments were received by EPA on this issue. Some requested that EPA retain the 12,000 ohm/cm exclusion in the final rule. Others agreed with the proposed approach stating there is no technical basis to establish a single number by which the corrosivity of all soils can be measured. EPA continues to believe that use of a single resistivity variable is inadequate to measure the propensity to corrode. Therefore, EPA has decided not to include the 12,000 ohm/cm exclusion in the final rule.

Some commenters suggested that there are situations where the surrounding soils are not corrosive and requested that a mechanism for relief from the corrosion protection requirements be provided for those situations; for example, a soil that is uniform and very dry (low moisture content), where the ground-water table continuously stays several feet below the bottom of the UST installation, and the area above the installation is paved to prevent percolation of rainfall and runoff. EPA agrees with these commenters and is including § 281.20(a)(4), which allows an exemption for metal tanks from the requirement that all UST systems be corrosion protected provided that a corrosion expert determines that the site is not corrosive enough to cause a release during the tank's operating life. In addition, owners and operators must retain records of this determination for the operational life of the tank. These records should include evidence of the corrosion expert's qualifications and the results of the site assessment.

Alternative Designs. In the proposed rule (§ 280.20(a)(4)), other tank designs are allowed if the implementing agency determines them to be no less protective of human health and the environment. In response to the proposal, commenters requested approval for several types of tanks including those constructed of concrete, stainless steel, and steel encased in polyethylene. Several other commenters reported to the Agency other potentially useful designs such as nylon tanks.

As a result of these comments, EPA sought information on several of these alternative designs and continues to believe that, with certain materials of construction and under certain site-specific soil conditions, alternative systems can be designed that will adequately protect human health and the environment. In addition, EPA is aware of new design techniques being researched that appear promising but are not commercially available. The Agency does not desire to restrict or eliminate emerging technologies and recognizes the numerous site-specific factors that may allow for the use of alternative designs. Therefore, today's rule continues to provide that the implementing agency may approve alternatives that are no less protective of human health and the environment than the specified designs.

The Agency has not, however, added any of these alternative designs to the designs specifically allowed by the regulation because there is not enough documented history about the performance of these systems or industry consensus codes governing their fabrication and use. One system, for example, consists of a steel tank surrounded by a thick, high-density polyethylene "jacket." The "jacket" is intended to provide both corrosion protection and secondary containment. It has been reported to EPA that over 1,000 of these tanks have been installed. Some local and state implementing agencies have been approving this design. Sometimes, specific monitoring or demonstrations have been required to ensure that the design provides protection equal to that provided by the other types of protected tanks. It has also been reported that several manufacturers of this type of tank have begun the process of working with independent testing laboratories toward developing testing and evaluation methods for steel tanks encased in noncorrodible secondary containment structures. This process may take several years to complete however. The Agency does not wish to unduly restrict the use of this type of product in the interim and recognizes that the manufacturers need to have continued product sales to be able to fund the needed development and testing of these evaluation methods. Thus, EPA views the type of approval allowed under § 280.20(a)(4) as essential to the continued development of such new tank systems. For example, the long-term performance of a system is difficult to establish in the absence of allowing actual installations in the field. Accordingly, the final rule preserves the proposal's allowance of the use of alternative new designs as long as they are approved by implementing agencies to adequately protect human health and the environment.

Implementing agency approval of alternative new tank designs, or special designs for specific sites, will only be provided if the UST system is determined to be no less protective of human health and the environment than the other types of tanks already listed in today's rule. Accordingly, an alternative design must meet the two basic criteria that all of the other methods meet: (1) It must be designed and constructed to prevent releases due to structural failure for the operating life of the system, and (2) it must be designed to prevent releases due to corrosion for its operating life. For example, the "jacketed" tanks described earlier obviously meet the structural criteria because each inner steel tank is built to the U.L. 58 standard. These types of tanks are also designed to prevent releases due to corrosion because the secondary containment jacket isolates the steel tank from the surrounding soil. However, in the absence of an existing consensus code applicable to the jacket, or a long-term performance record, it is difficult to determine if releases due to corrosion will be prevented for the tanks' operating life. Thus, the implementing agency could allow the use of this type of tank if a national consensus code is eventually developed for the jacket or this outer jacket is determined to be free of holes at least as frequently as cathodically protected tanks are checked (after installation and every 3 years thereafter). The integrity of this outer jacket can be ensured in several ways, including several methods of interstitial monitoring or the periodic performance of a tank structure-to-soil potential measurement by a cathodic protection tester.

b. Piping Requirements (§ 280.20(b)). The proposed rule (52 FR 12698) required the same corrosion protection for piping systems as used for the underground storage tank itself. Two types of protection systems were allowed: fiberglass piping, or coated and cathodically protected steel piping. The same as for the tanks, provisions for approval of alternative piping methods were also proposed. Today's rule remains largely as proposed, although the requirement for an "independent corrosion expert" has been revised to delete the requirement for independence, and an option for approval of alternative designs by a corrosion expert has been added. These issues are discussed below. In addition, the extent of corrosion protection of components and possible alternate materials of construction were highlighted as issues in the proposal for public comment and are discussed in detail below.

(1) Independent Corrosion Expert. EPA proposed in § 280.20(b) that steel piping coated and cathodically protected with a field-installed cathodic protection system must be designed by an independent corrosion expert. The Agency requested comments on the merits of this approach. Several comments were received by EPA regarding the need for an independent corrosion expert concerning the protection of steel tanks. (See section IV.B.1.a.(2). for a discussion of this issue.) In response to these comments, EPA has removed the requirement that the corrosion expert must be independent.

(2) Corrosion Protection of Tank System Components. The Agency invited comments on which tank components, if any, should be cathodically protected and, if cathodic protection is not required, what form

of corrosion protection is appropriate. Several comments were received by EPA on this issue. Some suggested that EPA should require cathodic protection on FRP-steel composite tanks as well as any steel fittings on FRP tanks. Some suggested that all metallic components of the UST system, including metallic connectors, swing joints, flexible connectors, and riser connections should be coated or cathodically protected. Other commenters suggested that cathodic protection on steel fittings on FRP tanks is unnecessary and that components like bung hole plugs and pump housings do not need cathodic protection.

EPA agrees with the commenters who stated that cathodic protection of tank fittings is not needed because these components are located at the top of the tank and rarely contact the stored product. Section 280.20(a) of the final rule has been modified to restrict the applicability of the corrosion protection requirements to "any portion underground that routinely contains product."

EPA's causes of release study indicates that the operational piping portion of UST systems is twice as likely as the tank portion to be the source of the release. Piping failures are caused equally by poor workmanship and corrosion. Threaded metal areas made active by threading have a high propensity to corrode if not coated and cathodically protected. Today's rule specifically requires the corrosion protection of operational underground piping and components that are in contact with the soil and convey product to or from the tank (e.g., flexible connectors, swing joints, pipe fittings, and impact valves), whether in metallic or FRP piping runs. Nonoperational components, such as vent and vapor recovery lines, on the other hand, need not have corrosion protection because these components should never contain free liquid product, particularly under today's requirements for overfill prevention (see § 280.30). Metallic components, such as swing joints, do not need cathodic protection if they are placed in pump housings and are not in contact with the ground.

The Agency also invited suggestions on the use of pipes other than FRP and corrosion-protected steel pipe. One commenter suggested use of copper tubing. Today's rule allows copper tubing under two circumstances. First, copper piping would be allowed if a corrosion expert determines that the site is not corrosive enough to result in a release during the operational life of the piping. Second, copper piping would be allowed if the design and construction methods and corrosion protection are determined by the implementing agency to prevent the release of any stored substances in a manner no less protective of human health and the environment than the requirements in § 280.20(b)(1), (2) and (3).

c. Spill and Overfill Control (§ 280.20(c)). Design and construction requirements for new UST systems include spill and overfill equipment requirements. These additional requirements are discussed below in section IV.C.1., "Spill and Overfill Control."

d. Other Issues. (1) Internal Corrosion. In the preamble to the April 17 proposal (52 FR 12699), EPA solicited comments on whether internal corrosion could become a major source of failure. EPA requested comments based on the industry's field experiences with internal corrosion protection systems in terms of design, installation, efficacy of performance, and problems found. EPA also requested information on the need for internal corrosion protection and whether it should be required, particularly for all new steel UST systems.

The Agency has received several comments on this issue. Many expressed the opinion that internal corrosion is one of the causes of tank leaks. Some suggested mandating internal tank lining to reduce or to eliminate internal corrosion and thereby prevent leaks. Some suggested that EPA require the use of striker plates below fill and gauge fittings. A few suggested requiring the use of soft-tipped inventory dipsticks. Some commenters took the position that internal corrosion is not a problem and should not be regulated.

EPA agrees with the commenters who argued that tank lining will reduce the incidence of failures resulting from internal corrosion. The Agency is not, however, mandating the requirement of tank lining on new tanks because it it has concluded that striker plates, now required under the consensus codes, solve the problem. At present, evidence is limited concerning the potential of internal corrosion to cause newly constructed tanks to fail. Estimates of the incidence of internal corrosion-induced tank failures range from 5 to 60 percent of the total steel tank population. Several tank lining companies submitted data that indicate internal corrosion is a significant cause of release. By contrast, internal corrosion was not found to be a significant cause of release in an EPA-sponsored study of over 400 tank closures carefully investigated by Suffolk County, New York, health department officials. The results of this study and other information lead the Agency to believe that the incidence of steel tank failures due to internal corrosion is probably less than 10 percent of the total tank universe, that it occurs most often in smaller tanks, and that it takes place later in the operational life of these tank systems. The few cases of internal corrosion holes that were witnessed in this study appeared to be generally located at the bottom of the tank fill pipe opening and often could have been prevented if striker plates had been used. These findings are corroborated by numerous tank manufacturers who submitted comments on the proposal, citing their collective experiences that internal corrosion is not a problem on tanks equipped with striker plates. Many of them suggested that the use of striker plates below the fill and gauge fittings will protect the primary location where internal corrosion occasionally breaks through.

EPA agrees with the commenters who believe that striker plates can largely eliminate the internal corrosion problem. The final rule, however, does in effect, require the use of striker plates because they are standard on new steel tanks and included in the referenced codes of practice developed by nationally recognized associations or independent testing laboratories. The Agency agrees with commenters who suggested that the use of soft-tipped dipsticks will also reduce internal corrosion. The final rule does not, however, include this alternative because it is not needed with striker plates now standard on all tanks.

(2) Manways. The Agency requested comments and information about the required use of manways on top of new tanks and whether traditional "bunghole" systems of tank entry would result in a significant reduction in releases. Several comments were received by EPA on this issue. Commenters were divided on the requirements of manways. Some of them felt that manways do not reduce the number of leaks, but may instead add another potential source of release. Some felt that the requirement of manways is necessary because a number of costly release investigations can be avoided by manual inspection from inside a tank. A few commenters supported manways but felt that their use should not be mandated.

EPA agrees with the commenters who recommended manways as a sound practice but believed they should not be required in the final rule. Although manways facilitate the manual inspection of the interior of a tank, other forms of release detection make internal inspections and, thus, the use of manways unnecessary (see discussion in section IV.B.2.g.(2). concerning internal inspections and release detection).

2. Installation (§§ 280.20(d) and (e))

a. Overview. As was discussed in the preamble to the April 17 proposal (52 FR 12700-12702), improper installation is often a cause of release from various components of the UST system. The public comments on the original proposal and on the Supplemental Notice (December 23, 1987) have reinforced the belief that proper installation is critical to preventing releases from the UST system. The new causes of release information obtained by the Agency since proposal (which is discussed in section II.F.2. of this preamble) indicates that improper installation is one of the major causes of underground storage tank and piping failures. Additionally, the majority of industry experts felt that improper installation causes many of the piping failures. Though the reported failure rates of FRP and protected-steel tanks are very low, failures that have occurred are usually related to improper installation.

Some of the installation practices that have been identified as leading to UST system releases include: non-homogeneous backfill, which is often cited as causing localized corrosion of unprotected steel tank system components; improper selection and placement of backfill, which leads to structural failure in FRP tanks; loose fitting in the bungs and vent lines, which leak when the tank is overfilled; and improper layout, fabrication, and installation (backfill placement and inadequate cover) of the delivery piping, which can lead to loose or broken pipe and fittings.

The proposed rule addressed these installation problems in § 280.20(c) and (d). Section 280.20(c) listed the specific requirements for conducting a proper installation. Section 280.20(d) required owners and operators to indicate on the notification form how proper installation was ensured. The comments and revisions for the final rule on both of these sections are discussed in more detail below.

b. Installation Practices. EPA proposed in § 280.20(c) that all tanks and piping be installed in accordance with the manufacturer's instructions and nine specific requirements that were based on the major installation steps outlined in two industry codes: Petroleum Equipment Institute RP100-86 and American Petroleum Institute 1615. The Agency requested comment on this approach, in particular the use of a final system test, after backfill is placed around the storage system but before it is placed into operation, to ensure proper installation.

Comments were received that supported the proposed approach. Many commenters, however, suggested refinements or exceptions to several of the nine specific requirements. In addition, the industry consensus codes from which the nine requirements were derived have been revised and reissued since the proposal. These two codes are now in substantial agreement, and their recommended practices are reported to be widely used by installers. One of the reasons that the Agency included the nine specific installation provisions in the proposal was to emphasize certain important basic points already set forth in the national consensus codes.

EPA now believes that the recently revised codes addressing proper installation practices are even closer in representing a national consensus and provide appropriate guidance for proper installation. The nine specific requirements have, therefore, been deleted from the final rule as unnecessary and are replaced with a more general performance standard (in § 280.20(d) and (e)) that simply requires that owners and operators ensure that the UST systems are installed in accordance with nationally accepted codes of practice and the manufacturers' instructions (if any).

An example of an installation practice that requires the consideration of both the national consensus codes and the manufacturer's instructions is the joining of FRP piping to metallic components. The consensus codes provide general guidance concerning where and how to make such joints, but the two major FRP piping manufacturers provide specific instructions concerning the details of fabricating this type of joint.

c. Ensuring Proper Installation. EPA proposed in § 280.20(d) that owners and operators indicate from a list of methods on the proposed notification form which method they used to ensure proper installation. Also, proposed § 280.20(d) required that owners and operators obtain the installer's signature certifying which method was used to ensure proper installation. EPA requested comment on the advisability of requiring owners and operators to use one or more of these methods and the relative merits of each method.

In general, all comments supported EPA's contention that requirements for ensuring proper installation are warranted. Each approach that EPA had identified to ensure proper installation was favored by at least one commenter. No data were submitted to EPA in response to the proposal that showed any of these methods to be unworkable, ineffective, or preferred over all the others. Therefore, all but one of them have been retained in today's final rule, and they have been renumbered as § 280.20(e).

The one method that has been deleted from the final rule was the testing for leaks during and after installation. This method was deleted because all national consensus codes for installation require such testing during and after installation and thus this testing is part of proper installation under 280.20(d), and not an optional method of certification as required under 280.20(e).

Other methods of ensuring proper installation were suggested by commenters. The first suggestion was to certify owners. Although the certification of owners could improve installation practices, the Agency is concerned that the implementation of an education and testing program of this magnitude would be very difficult to accomplish and not likely to be very effective, because owners do not usually install their own tanks. Some commenters suggested that EPA develop a national installer certification program. EPA believes, however, that implementing such a program at the national level, particularly given the large number of installers necessary, would be unworkable and would delay implementation of this rule. Also, the fact that proper installation can be effectively ensured by a variety of approaches makes a national program for certification of installers unnecessary. EPA believes that state and local governments are in a much better position to develop such programs as they deem necessary.

Some commenters suggested requiring certification of installers by a professional organization. EPA is not aware, however, of any professional association that is in a position currently to certify the large number of installers expected to be needed in the following years and, therefore, has not required such certification in the final rule.

Section 280.20(e) of the final rule requires owners and operators to indicate on the notification form which method for ensuring proper installation was used. Although EPA believes that the use of one or more of the methods allowed (i.e., manufacturer or implementing agency certification of the installer; inspection of the installation by a professional engineer or the implemental agency; completion of manufacturers installation checklist; or another method as approved by the implementing agency) will improve installation practices, today's allowance of a variety of methods will give owners, operators, and implementing agencies flexibility to choose the most appropriate methods.

EPA has also retained the requirement in the final rule that owners and operators obtain the installer's certification that the installation was properly performed. Thus, § 280.22(f) of the final Notification Requirements requires owners and operators to have the installer certify on the notification form that the UST system was installed in accordance with the performance standards of § 280.20(d). A signature block is provided on the notification form for the installer. EPA intends that owners and operators will obtain the signature of the person primarily responsible for the installation of the tank and piping system. In cases where the owner functions as the general contractor, hiring several parties to conduct the tank and piping installation, then the owner could be considered the installer.

In the proposal preamble, comments were requested on the advisability of requiring a site plan and, if it were required, what level of detail was necessary. Most commenters favored the requirement for a site plan but differed on the level of detail required for the plan. Some commenters favored a simple sketch and others favored an engineering drawing that would locate the tanks and the piping, indicate the sizes and routing of the piping, and indicate the location of structures on the site. Information obtained from the "Causes of Release Study" (see section II.F.2. of today's preamble) indicates that site plans are prepared voluntarily by most major corporations and are required in some jurisdictions when applying for building permits.

The Agency has determined that it will not make site plans a required record because it is not necessary to ensure compliance with the technical requirements promulgated today. A site plan is, however, a useful tool for owners and operators. The Agency notes that site plans are recommended in recent updates of national codes addressed to the installation of new UST systems.

3. Upgrading of Existing Systems (§ 280.21)

EPA proposed in § 280.21(a) that, within 10 years after the effective date of the final rule, all existing UST systems comply with the requirements for new UST systems under § 280.20 and have a field-installed cathodic protection system designed by an independent corrosion expert. If these requirements could not be met, these UST systems would have to be closed. The Agency requested comments on these proposed requirements and the need for upgrading UST systems to prevent releases (see 52 FR 12702-12705).

a. Mandatory Upgrading Schedule. (1) Overview. EPA concluded in the proposal (52 FR 12702-12704) that the universe of 1.4 to 2 million existing UST systems presents a significant threat to the public health and environment from product releases due to spills, overfills, and corrosion of unprotected steel tank systems. Presently, the majority of existing UST systems are not equipped with any of the release prevention or detection features that were proposed. The Agency also concluded that if these existing systems were retrofitted with safeguards proposed for new UST systems, a significant number of product releases could be prevented or minimized.

EPA proposed two different schedules for implementing UST system upgrades: one for installation of release prevention (corrosion protection and spill/overfill controls), and another for release detection.

> o Corrosion protection (which would consist of cathodic protection for bare steel tanks, for example), and spill and overfill controls were proposed to be installed at all existing UST systems within 10 years (see 52 FR 12774 and 12779).

o Release detection at unprotected and protected existing UST systems was proposed to be phased in at 3 and 5 years, respectively, with monthly release detection monitoring proposed for all UST systems after 10 years.

o UST systems that could not implement a reliable and effective release detection method, or that did not meet upgrade requirements for corrosion protection and spill and overfill controls, within the required time frames proposed were to be replaced (to meet new tank standards) or permanently closed.

The proposed implementation schedule for release detection has been changed in the final rule to require existing UST systems to phase in release detection based on age over the first 5 years after the rule's effective date. (Further discussion about the Agency's rationale for changing this proposed requirement is presented in section IV.D.3. of today's preamble.) In today's final rule, the Agency has retained the proposed requirement that all substandard existing UST systems be closed, replaced, or retrofitted with corrosion protection and spill and overfill control equipment within 10 years after the rule's effective date. The final requirements concerning the upgrade of corrosion protection and spill and overfill controls (indicating public comments on this issue) are discussed below. The schedule issues are discussed first, followed by the upgrading methods.

(2) Approaches to Today's Rule. During development of the proposed rule, the Agency considered several approaches and requirements for scheduling upgrade and replacement of existing substandard UST systems, including: rapid upgrade and replacement (e.g., within 3 to 5 years), gradual upgrade and replacement (within 6 to 12 years), and no required upgrade and replacement of existing UST systems. EPA selected the gradual approach, proposing that all existing UST systems storing regulated substances be required to either upgrade to new tank standards within 10 years (through retrofitting or replacement) or be permanently closed.

Many commenters, including several segments of the UST service industry, supported the 10-year upgrade period, believing that this is a reasonable time frame to allow their industry to respond to the large universe of existing tanks that will need to be upgraded, replaced, or closed. As discussed in the preamble to the proposal (52 FR 12704), one important advantage of this approach is that it appears to complement current industry trends towards upgrading or replacing voluntarily, while setting a clear target date by which all upgrades and replacements must be completed. This approach provides flexibility to implementing agencies by allowing them to choose from numerous alternative phase-in approaches (e.g., based on tank age, tank type, or environmental vulnerability of the site) the most appropriate and applicable method to achieve an orderly transition in meeting the 10-year compliance deadline. In summary, both EPA and many commenters believe that the proposed 10-year compliance period will provide time that is adequate to implement the required improvements at the 1.4 to 2 million UST systems nationwide.

Other commenters stated that the 10-year mandatory upgrade period is too ambitious and should be relaxed (or lengthened) for those owners and operators with multiple tanks, with financial limitations, or in states where upgrade/ replacement programs have already been implemented. EPA continues to remain unconvinced, however, that extending the proposed compliance period will significantly lessen the burden on multiple tank owners or on owners and operators with limited financial resources because if bare steel tanks are allowed to continue operation after 10 years, many will eventually leak and require corrective action that is much more burdensome than upgrading. EPA also expects that most UST owners and operators will make the decision to upgrade or replace existing UST systems within 10 years anyway (see 52 FR 12671). For example, many owners and operators will choose to conduct their upgrades prior to implementation of release detection (within the first 5 years) because it is more cost effective and practical to implement all required upgrades at a site at the same time, before the tank system leaks.

Many owners and operators are currently upgrading or replacing their existing UST systems in response to pressures other than federal regulatory requirements (for example, voluntary upgrading programs, insurance and liability concerns, and state and local upgrading requirements). For this reason, some commenters suggested that the 10-year mandatory upgrade requirement is unnecessary and should be deleted from the regulations. The Agency agrees that these positive upgrading and replacement trends will probably continue over the next several years, even without a regulatory requirement. EPA is concerned, however, that reliance only on these voluntary activities, without the added incentive of a regulatory deadline, will result in a significant number of UST systems not being upgraded or replaced over the next 10 years. EPA has concluded that this is a situation that would not protect human health and the environment nationwide.

Some commenters supported a phase-in period that is more rapid than the proposed 10 years because the longer it takes to upgrade, the more releases to the environment that will occur, posing additional risk to the public health and environment. More than half of all existing UST systems are over 10 years old and constructed of unprotected, bare steel without any spill and overfill prevention equipment. EPA's information on causes of release (see earlier discussion on causes of release) confirms that these tank systems are the most likely to have releases due to corrosion, piping failures, and spills and overfills. Therefore, the Agency recognizes that a more rapid upgrade schedule will, at least theoretically, prevent a significant number of release incidences that may occur at existing substandard UST systems.

Other information obtained by the Agency during development of the proposal (see 52 FR 12704), however, indicated that not even the most aggressive state, local, or industry UST programs have required upgrading or replacement in as short a time frame as 3 to 5 years because it is universally accepted as unimplementable given the nature and size of the regulated community. The Agency believes that a mandatory, rapid upgrading approach could not be successfully implemented because a large portion of the regulated community consists of small businesses that, if faced with a shorter deadline, would continue their substandard operations resulting in widespread noncompliance. Thus, while a shorter upgrade period appears theoretically advantageous in terms of the environmental and health risks avoided, EPA has concluded that it is unlikely to genuinely achieve more protection of the public health and environment than the proposed approach because it is unimplementable by significant portions of this regulated community.

Many commenters (those supporting the proposed 10-year mandatory upgrade period, as well as the other approaches) recommended that UST system upgrades and replacements be phased in using a staggered approach over the upgrading period. They believe that this would lessen the burden on the UST service industry by preventing numerous owners from waiting until the end of the 10-year compliance period to complete their upgrades or replacements. Tank age was the factor most frequently suggested as the basis for phase-in of UST system upgrades because of the belief that older UST systems have the greatest probability of leaking due to corrosion. Others suggested that the corrosive nature of a site, the presence or absence of corrosion protection, or the environmental vulnerability of an area should be used as the basis for determining the upgrade schedule.

Given the enormous size of the existing UST system universe and the practical implementation difficulties that owners and operators face as they upgrade necessary improvements to prevent future releases, EPA agrees that the implementation of the upgrade/replacement requirements should be phased in. The Agency decided, however, not to require the phase-in of UST system upgrades or replacements based on tank age or any other factor in the final rule for several reasons. First, EPA believes that numerous UST systems will be upgraded or closed over the next 10 years even in the absence of any federal deadline in the regulations. Upgrading programs are already well underway in numerous companies, and more are expected to begin nationwide in response to these regulations. As discussed earlier in the background section of this preamble, numerous system closures will also occur because of this new regulatory program. Thus, EPA has concluded that only a portion of the existing UST system owners and operators are likely to wait until the end of 10-year compliance period to complete their upgrades or replacements. Second, upgrading or replacement represents a significant undertaking for UST system owners and operators and the Agency has identified many appropriate factors (including, for example, tank age, site location, and other business-related reasons) already being successfully used by owners and operators to schedule replacements/upgrades. In an attempt to stimulate scheduled actions and company programs in this area, the Agency does not want to artificially restrict them to phase-in programs based on age. Third, the Agency has concluded that a simple deadline provides a clear national goal, and that this is all that is necessary to prompt the required upgrading/replacement actions over the 10-year period. Finally, today's approach of a 10-year deadline provides implementing agencies with the freedom to decide whether state or local UST programs should have a scheduled phase-in period and, if so, the methods they will use to do it.

Finally, some commenters recommended that EPA provide variance procedures in the final rule that would enable the avoidance (or delay) of implementation of the upgrading requirements for owners and operators who show reasonable progress in upgrading, for those lacking financial resources to upgrade, for protected tanks installed prior to final rule promulgation, and for states where UST upgrade programs have already been implemented. The use of such variances in the final rule was rejected, however, because the Agency believes that where upgrading has been allowed to be phased-in over 10 years, there is no justification for further delay in bringing substandard systems into compliance with requirements necessary to ensure protection of human health and the environment.

b. Tank Upgrading Methods for Corrosion Protection (§ 280.21(b)). Today's final rule allows three methods of tank upgrading for corrosion protection, as suggested by a number of commenters. EPA believes that each of the upgrading methods described below has been demonstrated to be protective of human health and the environment.

(1) Interior Lining. The first of the options for upgrading a tank is to internally line the tank in accordance with the tank repair provisions of § 280.33. To use this technique as as the sole method for meeting the corrosion protection upgrade, the tank must be internally inspected after 10 years and every 5 years thereafter. The inspection must be conducted in accordance with a code of practice developed by a nationally recognized association or independent testing lab to ensure that the lined tank is performing adequately. Interior lining used as the sole method for corrosion protection is not regarded as a permanent

upgrade, but is adequate if it continues to meet original lining design specifications as determined by periodic inspections. If the lined tank does not meet the original design specifications, it no longer meets the upgrading requirements and, if it cannot be repaired in accordance with industry codes, it is subject to the unprotected tank requirements and must be replaced after 1998.

Numerous comments were received suggesting that the use of internal tank lining of existing UST systems should be more clearly allowed as an upgrade option. Data submitted by the commenters and data developed by EPA since proposal indicate that lined tanks rarely cause releases to the environment, even in the absence of external corrosion protection measures. Tank lining has been reported by lining companies as already having been used to repair or prevent releases in over 300,000 heating oil tanks and over 70,000 motor fuel tanks during the last 25 years. Last year, an EPA-sponsored study of UST programs outside the U.S. revealed that internal lining of tanks has been in wide use in Europe and Canada for the past decade. At least one major insurer of USTs in the U.S. requires that unprotected steel tanks over 15 years of age be lined as a preventive measure for internal corrosion.

Several experienced tank operators commented that if steel tanks are properly lined their life can be extended for at least 10 years with leak-free performance. They noted significant economic and operational advantages to lining alone as an upgrade (e.g., it avoids the need to reinstall the tank and can be done relatively quickly), and they suggested that EPA allow tank lining as an upgrade option. EPA now believes that either tank lining alone or tank lining combined with external cathodic protection is a reliable upgrade measure. Accordingly, the final rule has been revised to more clearly indicate that these are acceptable upgrade options under specific guidelines and requirements.

EPA also agrees with commenters that internal corrosion is a potential problem for tanks in the future but does not believe enough evidence is available to suggest that requiring tank lining for all steel tanks is warranted at this time. Although commenters submitted data that demonstrated the existence of internal corrosion, there were conflicting views as to its frequency and causes and the severity of its effects. Some commenters stated that all tanks more than 15 years old should be lined because of the potential for failures due to internal corrosion. Other commenters stated that modern fuels and tank management practices have virtually eliminated internal corrosion.

As previously addressed in the discussion of internal corrosion under the new tank standards (section IV.B.1.d.), EPA believes that most internal corrosion incidents have been due to dip-sticking tanks without striker plates. Now that striker plates are standard equipment on tanks, the problem of internal corrosion for newer tanks has been substantially resolved. In the final rules, tanks over 10 years of age must be either internally inspected or lined to meet the upgrade requirements. If internal corrosion is occurring, the internal inspection will detect it. The lining codes require the installation of striker plates. Although EPA will continue to study this potential problem in the coming years, the final rule does not require internal corrosion protection practices beyond what is now contained in industry codes.

(2) Cathodic Protection. A second option for upgrading a tank is cathodic protection. Section 280.21(b)(2) describes requirements for upgrading an existing UST by cathodic protection. The cathodic protection system must meet the requirements for new tank systems, except that the tank and piping do not need to have an external dielectric coating. These cathodic protection requirements for existing USTs were included in the proposal and were supported by the commenters. Several commenters, however, expressed concern that not all existing USTs are sound enough to be upgraded.

Concern was expressed over allowing cathodic protection retrofits on old tanks that could have one of the following: plugged corrosion holes (see new causes of release information in section II.F.2. of this preamble); severe external pitting corrosion that leaves a lower margin of safety in the event that the cathodic protection system fails; and internal corrosion. The Agency agrees with these commenters that only sound tanks should be upgraded with cathodic protection and is including inspection and testing requirements for upgraded tanks in the final rule. Review of industry standards for internal inspection to assess the need for repair of USTs has convinced EPA that tanks can be safely upgraded if these industry standards are followed.

There are three ways to ensure that tanks are safely and correctly upgraded with cathodic protection. First, tank tightness testing may be used to judge the structural integrity of newer tanks that are upgraded with cathodic protection, because EPA has concluded that newer tanks are much less likely to have corrosion holes than older tanks. This option for tank tightness testing may be used only on tanks under 10 years of age. EPA concluded in "Causes of Release from UST Systems" that corrosion breakthrough is unlikely in unprotected tanks under 10 years of age. For example, in one study less than 2 percent of tanks tested which were under 11 years of age were found to be leaking. Tightness testing will, therefore, adequately identify the few younger tanks that may be currently leaking or have corrosion holes. However, the younger tanks must be tightness tested twice. The first tightness test must be performed before the installation of cathodic protection to ensure that the tank is not currently leaking. The second tightness test must be performed between 3 and 6 months after the initiation of cathodic protection to ensure that the cathodic protection has not opened any holes that were previously plugged with corrosion products. Information obtained from EPA-sponsored expert panels and public comments indicated that corrosion holes often do not leak because the corrosion byproducts plug the holes. This information also indicated that cathodic protection can cause these "rust plugs" to loosen and begin leaking soon after the protection is applied. Although EPA does not have data on how often this loosening occurs, this phenomenon appears to have occurred in a few cases when cathodic protection was applied to gas pipelines. EPA believes that performing a second tank tightness test 3 to 6 months after cathodic protection is applied will usually detect this type of leak before significant releases occur.

A second way to ensure this type of upgrading is successful is to use monthly monitoring. Like the tightness testing option, this method may be used only on tanks under 10 years of age. EPA believes that very few tanks under 10 years of age will leak after cathodic protection has been installed. The Agency believes, however, that some method of assessment is needed to protect human health and the environment in the unlikely event that an unsound tank is retrofitted with cathodic protection. As discussed in section III.D. of this preamble, monthly release detection provides highly reliable indications of tank integrity.

A third method applies to older tanks. For tanks 10 of age and older, these two methods above (either a pair of tank tightness tests or monthly release detection monitoring) are inadequate to ensure structural soundness before the cathodic protection system is installed. These older tanks must instead be internally inspected and assessed. As described above, unprotected tanks often corrode through but do not leak because the corrosion product, backfill, and interior sludge seal the hole. EPA concluded in "Causes of Release from UST Systems" that about 50 percent of the corrosion holes in tanks are plugged and do not leak. The study also showed that approximately 7 percent of the tanks of 12 to 15 years of age leaked. EPA has concluded from these data that as many as 7 percent of existing USTs are corroded through, but not leaking. Many more existing tanks may be heavily corroded and not suitable for cathodic protection alone as an upgrading measure.

EPA understands that several firms that offer cathodic protection upgrade services use other methods to ensure that the tank is structurally sound before this upgrade option is recommended. These procedures appear to vary somewhat from firm to firm. One component of the approach commonly involves a statistical analysis of the likelihood of the tank having corrosion holes based upon the characteristics of the site soils and the age of the tank. The database for this analysis varies, but usually contains large numbers of tank failures from Canada and the United States.

This approach appears to have merit, but it is not included explicitly in the final rule because its effectiveness was not fully demonstrated. The Agency was unable to evaluate its effectiveness for two reasons. First, EPA does not have long-term performance data for a large number of tanks that have been assessed in this way prior to upgrading. Second, these practices vary from firm to firm and are not established in an industry consensus code. Such options for assessment may be used, however, where they have been determined by the implementing agency to prevent releases in a manner that is no less protective of human health and the environment than internal inspection or tightness testing.

EPA proposed that the cathodic protection system for upgraded tanks be designed by an independent corrosion expert. Commenters opposed to the requirement that the corrosion expert be independent were concerned that this was precluding the use of in-house personnel. The issue of independence is discussed earlier in this preamble in relation to the design of field-installed cathodic protection systems for new tank systems (section IV.B.1.). EPA agrees with these commenters that companies should be able to use their own qualified or trained employees. Accordingly, EPA has dropped the requirement that the corrosion expert be "independent."

Commenters also suggested that, because the proposed rule required that a corrosion expert design the retrofit cathodic protection system, the final rule should not dictate a particular cathodic protection system design. EPA agrees with these commenters and has decided not to require a specific retrofit cathodic protection method in the final rule provided that a corrosion expert determines the appropriate method based on the conditions at the site.

(3) Cathodic Protection and Internal Lining. A third option is to both line and cathodically protect the tank. The lining is intended to provide protection from internal corrosion; the cathodic protection prevents exterior corrosion. Because internal corrosion rarely occurs above the bottom third of the tank, a full lining may not be required if an internal inspection shows a sound tank exterior. The cathodic protection system must meet the same requirements as the new tank cathodic protection system except for dielectric coatings. The lining must be installed in accordance with the requirements of § 280.33.

c. Upgrading Piping (§ 280.21(c)). Upgrading of an UST system requires upgrading the system's piping as well. Metal piping must be upgraded in accordance with the requirements for new piping, except that a dielectric coating is not required if the existing piping is not upgraded by replacement. Pipe lining is a developing technology that may eventually become a viable option for upgrading some types of steel pipes; however, the technology requires more development and testing to prove its effectiveness for use on small-diameter pipes and thus is not an option for upgrading in the final rule.

d. Tank Upgrading Methods for Spill and Overfill Control (§ 280.21(d)). To prevent spills and overfills associated with product transfer to the UST system, all existing UST systems must comply with the requirements for new UST system spill and overfill prevention equipment, as specified in § 280.20(c). These additional requirements are discussed below in section IV.C.1.

4. Notification (§ 280.22)

Section 280.22 of the proposed rule included notification requirements for new and existing UST systems. These requirements are substantially the same in today's final rule. Sections 280.22(a), (b), and (g) have been deleted because their effective dates have passed. Section VII of the notification form (certification of compliance) has been revised to reflect changed language in the installation, release detection, and corrosion protection requirements. The five tank columns on this section of the notification form have been deleted to simplify the form. EPA believes that the same installation assurance, release detection, corrosion protection and financial responsibility measures will usually be used at all of the new tank systems at any one location. Any sites where different measures are used for each tank can be certified with copies of this form.

C. General Operating Requirements

1. Spill and Overfill Prevention and Control (§§ 280.20 and 280.30)

a. Introduction. The surface spills and overfills that occur at UST systems are usually the result of human error, not equipment failure. There are two major types of surface releases: (1) Spilling, which results from improper dispensing practices such as disconnecting the delivery hose from the tank's fill pipe before the hose has drained completely, and (2) overfilling, which occurs when the tank liquid level exceeds tank capacity and product escapes through tank bung holes, vent lines, or fill ports. Spills and overfills occur on a relatively frequent basis; however, they are usually not reported because they are typically small in volume--less than 25 gallons--and can be easily contained and cleaned up.

Basically, the proposal required owners and operators to follow procedures and provide equipment to prevent these releases or to immediately contain and clean them up. In the proposed rule, proper transfer procedures had to be followed during all deliveries. For new UST systems, the Agency proposed the installation of alarms in conjunction with liquid level sensors, automatic shutoff devices that halt further delivery of product into the UST at a predetermined level, or the installation of catchment basins to contain overfills or spills (e.g., product left in delivery hoses at the time of disconnect). EPA also proposed requiring the immediate installation of spill and overfill equipment on any UST system that used external leak detection devices. Existing UST systems not using external leak detection devices were allowed up to 10 years to come into compliance with the proposed requirements for spill and overfill equipment.

In the Agency's study of the causes of releases from UST systems completed since proposal, many people contacted and interviewed in the field ranked spills and overfills as the most frequent cause of release rather than the distant third identified in the preamble to the proposal (52 FR 12667). For example, spills and overfills are reported in Dade County, Florida, to be the leading cause of release from UST systems. Experienced installation contractors reported that they repeatedly and frequently observe various indicators of spill and overfill problems, such as discolored soil above and around the tank and the dissolving of the tank's bituminous coating below the drop tube connection to the tank fill opening. Field observations also implicated nonoperational components such as bung hole plugs and vent lines as a frequent cause of release in overfills. In addition, most experienced hands in the field felt that spills and overfills were two separate problems that must be addressed separately.

Based upon public comments and new findings on causes of product release, the Agency has made several changes in today's final rule for spills and overfills: the rule has been reorganized to address apparent confusion voiced by commenters concerning the presentation of requirements for new and existing USTs; an exemption from equipment requirements is provided for UST systems filled with small volume delivery of no more than 25 gallons; and the physical presence of an attendant is not required during the filling of the UST system as long as the transfer operation is otherwise monitored by mechanical or electronic means. Although EPA recognizes that the owner and operator may, through private agreement, ensure that ultimate responsibility for the exercise of proper delivery techniques is borne by the transport carrier, the final rule still holds the owner and operator responsible for preventing damages to human health and the environment due to spills because the Agency does not have jurisdiction over transport carriers.

The specific spill and overfill equipment requirements of the final rule are discussed below. These requirements apply to all new UST systems as of the effective date of this rulemaking, and existing UST systems must meet the requirements within 10 years of that effective date (see section IV.C.1.e. below). In addition, general operating procedures for spill and overfill control are applicable to both new and existing UST systems as of the effective date of the rule (see section IV.C.1.f. below).

b. Spill Prevention (§ 280.20(c)(1)(i)). The Agency has concluded that repeated spills can frequently cause significant environmental damage. Although most surface spills are small in volume, because they are often repeated they can eventually contaminate soil and ground water. Thus, the final rule requires use of spill prevention equipment (such as a small catchment basin around the fill port) at all new and existing UST systems. Catchment basins are the most prevalent form of spill prevention used today.

The proposed rule specified that when catchment basins were used they would be large enough to contain the volume of the hose. In response, several commenters objected to EPA relying on this larger sized catchment basin technology because of concerns about the potential fire or explosion hazard resulting from the buildup of petroleum fumes in the catchment basin area, the cracking of catchment basins due to freezing of accumulated water, or the potential that these containment devices would provide the deliverer with a false sense of security that would prompt carelessness during delivery. However, no commenters provided any data to EPA that indicated the occurrence of any fires or explosions due to vaporization of product in a basin, regardless of its size. In any event, EPA believes that compliance with the proper transfer procedures required in § 280.30(a) will prevent fuel from frequently collecting in the basins, and normal maintenance suggested by the equipment manufacturer will prevent water from accumulating and freezing. Several commenters said that small spill catchment basins are preferred in many circumstances. They also said that if overfill prevention equipment is also used, the problem of emptying a full transfer hose should rarely be encountered. Overfill prevention devices currently available in the United States either allow the transfer hose to drain at a very slow rate into the tank or can be manually overridden to empty the hose contents into the tank. As a consequence, today's final rule deletes the proposed size specification for spill catchment basins, thus leaving the determination of the appropriate volume to the discretion of the owner and operator. The design or size of the catchment basin (combined with the type of overfill prevention equipment also being required today) should be of sufficient size to contain spills and prevent releases to the environment. For example, if the catchment basin has a means for releasing its contents into the tank or another containment structure in order to provide more room in the catchment basin, a smaller volume catchment basin (e.g., the standard 5-gallon size) should be adequate equipment for preventing spills. Catchment basins without any means for drainage and requiring manual unloading may need to be of larger volume.

For those concerned that the use of catchment basins of any size or type may present a safety hazard, EPA allows use of alternative devices to prevent spills if they are approved by the implementing agency as preventing spills in a manner that is no less stringent in protecting human health and the environment. For example, a device that would prevent release from the transfer hose when detached from the fill pipe, such as a dry disconnect coupling, could satisfy this requirement. This provision is intended to provide flexibility in a rapidly developing technological area that will allow continued development of new and improved spill prevention equipment.

c. Overfill Prevention (§ 280.20(c)(l)(ii)). Agency data show that overfill prevention is also very important, not just for the prevention of large overfills released from the top of vent or fill lines, but also overfills that slowly leak out from the fittings at the top of the overfilled tank, such as the bung connections. In today's final rule, therefore, all new UST systems are also required to use overfill prevention equipment.

All new UST systems must be equipped with overfill protection by installing one or more of the following:

- A device that will alert the transfer operator when the tank is no more than 90 percent full by restricting the flow into the tank or triggering a high-level alarm;
- A device that will automatically shut off flow into the tank when the tank is no more than 95 percent full; or
- An equivalent device approved by the implementing agency.

These alternatives are essentially the same as those presented in the proposed rule except for the clarification that flow restrictors (i.e., ball float valves) are also allowed. Although not specifically mentioned in the proposed rule, several commenters felt that flow restrictors were adequate for spill and overfill prevention and are the most widely used method at present. Flow restrictors do not shut off inflow completely but instead significantly reduce the rate at which product enters the tank. The transporter can tell when the flow is reduced and stop delivery. Some commenters emphasized that many USTs are already using flow restrictors successfully. Upon review of these devices, the Agency has concluded that the flow restrictors are protective of human health and the environment, particularly if they are coupled with the requirement of § 280.30 that all transfers be closely monitored. The final rule allows the use of flow restrictors for overfill prevention.

EPA is concerned, however, that this type of overfill prevention may jeopardize the integrity of the tank if a pressurized product delivery system is used. Pressurized transfer of up to 30 psi is sometimes used with heavier fuels. Most tanks can safely withstand pressures of only 5 psi, and flow restrictors may allow a much higher pressure to develop during pressurized delivery, causing tanks to rupture. The Agency has no information to indicate that such failures are common. Almost all of the UST systems addressed in today's rule are not filled by pressurized delivery. The delivery hose connection for this type of delivery usually includes a back-pressure sensor that automatically disconnects the hose if pressure develops in the tank.

EPA has decided that if an owner and operator uses either a high-level alarm or a flow restrictor, the devices must be activated at 90 percent of tank capacity. In the proposal, the high-level alarms were required to be activated at 95 percent of tank capacity. EPA has decided on the stricter standard for both of these devices because neither device is a total shutoff device. Also, both devices are subject to the operator's response to terminate the transfer.

Automatic shutoff devices do not require operator action to prevent overfills. Automatic shutoff devices prevent overfilling by automatically shutting off flow at the fill pipe before the tank fills up to the top. Already in widespread use in Europe, this approach is designed to completely eliminate overfills due to human error. The Agency believes this is the simplest type of overfill device for new and existing UST systems installing overfill prevention equipment. Inexpensive shutoff devices that are easy to install have recently become available to the U.S. market, with the potential for additional innovative technology to enter the market soon. Those who wish to use an overfill prevention device other than those mentioned in the rule may satisfy the overfill prevention requirement with use of alternative devices approved by the implementing agency as being no less stringent in protecting human health and the environment.

d. Exemptions (§ 280.20(c)(2)). Several commenters pointed out that infrequently filled UST systems pose less risk of releases from spilling and overfilling than systems filled on a more regular basis and, therefore, should be exempt from spill and overfill prevention equipment requirements. Other commenters suggested that UST systems filled manually in small increments, such as most used oil tanks, pose significantly less risk than those receiving large-volume deliveries.

The Agency is continuing to require spill and overfill prevention equipment on infrequently filled tanks in the final rule. Though a tank may be filled only occasionally, it is the potential size of overfills that concerns EPA. Although infrequent filling reduces the likelihood of a spill or an overfill release somewhat, it does not guarantee that a spill or an overfill that does occur would be of small quantity. In addition, EPA feels that in the future, as today's requirements are implemented, carriers of product may become accustomed to (and dependent on) devices such as high-level alarms or shutoff devices and would, therefore, be less attentive during product delivery due to reliance on prevention equipment to indicate completion of the delivery. Finally, the implementing agency would often be unable to determine the actual filling frequency for purposes of determining whether a particular UST system should be exempt from spill and overfill requirements, creating compliance monitoring difficulties. Consequently, the Agency has retained the required use of spill and overfill prevention equipment for infrequently filled tanks.

The final rule does not, however, require new UST systems filled through transfers of no more than 25 gallons to use spill or overfill prevention equipment (§ 280.20). The 25-gallon limit was selected because the Agency understands it is a common industry practice at automotive service centers to use containers up to this volume for handling used oil prior to putting it into the UST. EPA has concluded that the likelihood of overfilling the tank is small because the volume of the transfer is much smaller than the volume of the tank. In addition, the maximum size of the spill or overfill that could occur from a 25 gallon transfer is 25 gallons. This quantity is easier to contain and clean up than the maximum size spill or overfill that could occur from a transfer of several thousand gallons. EPA has concluded that proper operating practices and procedures (required under § 280.30), such as checking the available tank volume before each transfer, will adequately protect human health and the environment.

e. Compliance Schedule for Initial Spill and Overfill Equipment (§§ 280.20 and 280.21). In the proposal, the schedule for compliance required use of spill and overfill prevention equipment at the time of installation of all new UST systems. All existing UST systems must be upgraded within 10 years of the effective date of the final regulations. EPA has retained this 10-year requirement as an adequate period of time to retrofit existing UST systems.

EPA has deleted the proposed requirement to partially phase in the use of spill and overfill equipment whenever any external method of detection is installed at an existing tank. Some commenters expressed confusion about when such equipment would have to be retrofitted to tanks that already have installed external monitoring methods. EPA agrees that mandating this phase-in approach does present such implementation problems and unnecessarily hinders owner and operator flexibility in selecting their own schedule for compliance within the 10-year deadline. This proposed approach could unduly discourage the use of external methods of detection. Furthermore, research completed by EPA after proposal (and made available for public comment on March 31, 1988) has convinced the Agency that spills and overfills do not pose insurmountable problems to the use of external methods of detection that require the immediate retrofit of spill and overfill equipment.

As suggested by commenters, EPA considered requiring retrofitting spill and overfill prevention devices earlier, for example, at the time of installation of all release detection equipment or during a scheduled general system upgrade. The Agency decided against such earlier deadlines primarily due to the implementation difficulties this would pose. EPA believes that the limited population of installers precludes the rapid installation of spill and overfill controls at all of the UST sites nationwide. Although EPA has decided to retain the 10-year time period, the Agency expects that many tank owners and operators will retrofit these devices in less than 10 years even though it is not mandatory to do so. In many cases, retrofit of spill and overfill equipment at the time of release detection retrofit or of corrosion protection upgrading will be more cost effective. Finally, the less stringent release detection requirements that are allowed in today's final rules for fully upgraded tanks will actually provide an incentive to initiate earlier retrofitting to meet spill and overfill prevention requirements. The discussion of release detection requirements for upgraded tanks is provided in section V.D. of today's preamble.

f. General Operating Procedures for Spill and Overfill Control (§ 280.30). In addition to installation of release prevention equipment, the Agency has retained in the final rule the general operating procedures for both new and existing UST systems that were proposed to prevent spills and overfills.

Proposed § 280.30(a) stated that the owner and operator must ensure that releases do not occur and must be physically present to observe the transfer of product. Many commenters suggested that the driver of the delivery vehicle should be held responsible for any releases during delivery, and that having someone physically present who represents the owner and operator during all deliveries is impractical and costly. Although EPA agrees that responsible carriers are the primary agents in the field to prevent spills and overfills, for the purpose of complying with today's requirements, the UST system owner and operator is responsible for preventing spills and overfills. The Agency must take this approach because it has no legal authority to regulate transporters under Subtitle I. Thus, regardless of whether the owner and operator decides to share (by contract) responsibility for the monitoring of the transfer with the carrier, under today's final regulations the owner and operator will continue to be responsible in the event that there is a release during delivery. See section IV.E.2.d. of the preamble and § 280.53 of the final rule for the requirements of owners and operators in the event of a spill or overfill.

The proposed rule required that a person be physically present at all times during the transfer of product to be able to respond quickly to a spill or overfill (proposed § 280.30). Some commenters suggested, however, that many UST systems are in large tank farms where it would not be feasible or economical (especially during multiple filling operations) to have someone present at each tank during the time it was being filled. In response to these suggestions, EPA is changing this requirement in the final rule to simply require that all deliveries be monitored constantly. This change allows for a person at the site (but not necessarily at the transfer point) to monitor a transfer using remote sensing equipment that can prevent a spill or an overfill from occurring. This change will continue to meet the intent of the proposed requirement, that delivery be monitored, and will also accommodate operations encountered at large tank farms where it is difficult for a person to be at every tank. Many of these installations have central monitoring stations where all the tanks can be supervised through remote control monitoring and shutoff equipment.

2. Operation and Maintenance of Corrosion Protection (§ 280.31)

As discussed in the preamble to the April 17 proposal (52 FR 12666-12667), corrosion was found to be one of the common causes of release in existing underground tank and piping systems that are unprotected from corrosion. The consensus of experts in the field contacted by EPA indicates that the installation and proper operation and maintenance of corrosion protection systems can significantly reduce the incidence or volume of release due to corrosion. Officials in Ontario, Canada, Denmark, and Sweden have cited the success of such corrosion protection programs initiated in their respective countries during the early to mid-1970s. The proposed rule addressed operation and maintenance of corrosion protection systems in § 280.31 (see preamble discussion in 52 FR 12707).

a. Extent of Corrosion Protection (§ 280.31(a)). EPA proposed in § 280.31(a) that all corrosion protection systems must be operated and maintained to continuously provide corrosion protection to buried metal components of the UST system. Public comments on proposed § 280.31 supported the necessity of routine maintenance of the corrosion protection systems by qualified field personnel.

The Agency also invited comments on which components, if any, should be cathodically protected; whether there are noncorrodible metal alternatives for that component; and what form of corrosion protection is appropriate if cathodic protection is not required (52 FR 12707). Many comments were received in this area. In summary, some commenters suggested that all corrosion-protected metal components of UST systems, including swing joints, flexible connectors, and riser connections, should be monitored regularly. Other commenters suggested that some components, such as bung plugs and the pump housing, do not need cathodic protection and maintenance. (As discussed in more detail earlier in this preamble in the section on new piping design and construction requirements (section IV.B.1.b.(2).) In the final rule, EPA requires protection of delivery piping and that portion of the tank routinely storing regulated substances. Requirements for spill and overfill equipment and practices will prevent releases from the top of the tank and vent piping.

EPA agrees with commenters who found it unnecessary to require protection for portions of the system that would not regularly contain product or are not in contact with the soil, even if situated underground. Bung plugs are inserted into unused openings at the top of a tank and are not subject to releases except in the event of overfills. Delivery piping is defined as that portion of the UST system piping through which product is introduced into the tank or delivered from the tank. Cathodic protection is not required for the fill pipes of tanks that have a drop tube because the drop tube is the part of the tank that routinely contains product. The drop tube is not in contact with the soil and thus does not require cathodic protection. Vent piping is not used for delivery of product and presents a minimum risk for release to the environment. In fact, vent piping would be a potential release source only in the event of overfill conditions. The release potential from bung plugs and vent piping will be eliminated or substantially reduced by the requirements for overfill prevention equipment required in § 280.30 of today's rule and, therefore, the Agency has not required their cathodic protection in today's rule.

Pump housings, when contained in the equipment manway at the top of a tank, do not come in contact with the soil and thus do not require cathodic protection. Other pump housings are often isolated from the soil by being submersed in the product in the tank or situated in the dispenser housing above grade and, therefore, do not require cathodic protection. Only those pump housings that are in contact with the ground and potentially contain product require cathodic protection.

b. Qualifications for Corrosion Personnel (§ 280.31(b)). EPA proposed in § 280.31(b) that all cathodic protection systems be inspected and designed by an "independent" corrosion expert. Most of the comments received by EPA in this area strongly opposed the requirement of an "independent" corrosion expert. EPA agrees that the proposed requirement for the independence of the expert is not needed and has deleted this term from the final rule. (See section IV.B.1.a.(2) above for a discussion of this issue.)

Other commenters pointed out that the maintenance, operation, and inspection of an installed cathodic protection system could be performed by people who have much less training than a corrosion expert. EPA agrees with these comments, recognizing that most of these inspections are now being conducted by trained specialists. Thus, EPA has replaced the term "independent corrosion expert" with "qualified cathodic protection tester" in the final rule. Cathodic protection testers must be able to demonstrate education and experience in the measurement of cathodic protection of buried or submerged metal piping systems and metal tanks. A definition to this effect has been added to the final rule. The National Association of Corrosion Engineers (NACE) has developed an examination that can be used to ensure that cathodic protection testers are qualified.

c. Inspection Schedule (§§ 280.31(b) and (c)). EPA proposed a minimum inspection schedule for cathodic protection systems in § 280.31(b). For field-installed cathodic protection systems, the proposal required that the system be tested within 6 months of installation and at least annually thereafter. For factory-installed cathodic protection systems, it was proposed that each system should be tested within 6 months of installation and at least every 5 years thereafter. For all impressed current systems, the proposed requirement was inspection and/or testing as appropriate, and at least annually. The Agency invited comments on the advantages and disadvantages of allowing less frequent inspections/testings for those tanks that are equipped with premanufactured corrosion protection (52 FR 12707).

Several comments were received in these areas. Some commenters felt that the proposed testing requirements for field installation were excessive and that there is no technical reason to differentiate between field- and factory-installed systems. After consultation with groups of industry experts during the public comment period, EPA now agrees with the commenters who recommended that all cathodic protection systems should be tested at the same frequency and the Agency is now requiring in the final rule that all cathodic protection systems be tested within 6 months of installation and at least every 3 years thereafter. These intervals are sufficient to detect any damage or failure of the system and to take remedial action in time to prevent structural failures due to corrosion. EPA understands that this time interval is consistent with sound practice as is now recommended in the recently revised NACE code and by major tank manufacturers.

EPA proposed in § 280.31(c) that all UST systems with impressed current cathodic protection systems must be inspected every 60 days to ensure that the equipment is running properly. This equipment inspection is required in addition to the testing of the cathodic protection. EPA has received many comments on this section. Several commenters supported the proposed approach, with some further suggesting that impressed current systems must be inspected six times a year with intervals not exceeding 75 days. Some commenters suggested monthly inspection of all systems while others suggested immediate testing after installation for all impressed current systems and annually thereafter. No commenters stated that periodic testing of an impressed current system should not be required.

EPA agrees with the commenters who said that inspection at 60-day intervals is protective of human health and the environment because loss of power to the anodes for 60 days is very unlikely to result in corrosion failure. Thus, the proposed inspection approach has been retained in the final rule. This inspection is conducted to simply ensure that the equipment is running properly and is relatively straightforward for most impressed current systems. Most of these systems include a light on the control panel that indicates proper operation. No special training is required to perform this inspection.

d. Recordkeeping (§ 280.31(d)). EPA proposed in § 280.31(d) that records documenting the proper operation of corrosion protection systems must be maintained. EPA requested comments on this proposed requirement, and none were received. The Agency has made slight changes in the wording of this requirement to make the intent of the final requirement clear. This minor change does not change the substance of the proposed requirement. The records that are maintained must provide the results of testing from the last two service checks required in § 280.31(b) (which must be performed by a corrosion protection tester) and the last three inspections required under § 280.31(c) (which can be performed by the owner and operator). EPA believes that this record will provide sufficient information to demonstrate that the proper operation and maintenance of the cathodic protection system is being carried out.

e. General Performance Standards for Testing. Section 280.31(e) also proposed three criteria to be used while testing cathodic protection systems. EPA received several comments regarding this approach, with most of them suggesting that EPA should include all of the five criteria as defined in NACE RP-02-85. Based on the suggestions of these commenters, EPA now believes that industry codes, such as NACE RP-02-85 and API's "Guide for Inspection of Refinery Equipment," developed by nationally recognized associations provide clearer and more complete guidance about the use of these criteria to determine the adequacy of cathodic protection. These criteria are also better explained in technical documents such as these industry codes. In addition, these criteria are subject to continued review and can be revised to reflect new measurement techniques that result from increased understanding of corrosion phenomena.

Accordingly, § 280.31(e) has been deleted, and there is no explicit listing of the three criteria from the proposed rule. The proposed criteria have been replaced with a more general performance standard (in § 280.31(b)) that requires the service checks be performed in accordance with a nationally accepted code of practice. This approach accommodates the concerns of the commenters who recommended that all five of the NACE criteria should be allowed to be considered. At the same time, this approach encourages the application of the proper standard because these national codes are presented within the context of significant technical guidance as to the proper use of each criteria. Thus, in the final rule, owners and operators are being held to the use of at least these criteria as recommended in these national codes.

f. Notification Requirement. EPA proposed in § 280.31(f) that owners and operators of new UST systems must certify compliance with the corrosion protection requirements on the notification form submitted pursuant to § 280.22. No comments were received by EPA on this requirement. In the final rule, this section has been moved for clarity to § 280.22(e), which identifies notification requirements.

3. Inspection and Maintenance of the Tank System (§ 280.31)

In the preamble to the proposed regulation, the Agency discussed three alternatives for the required maintenance and inspection of the tank system (52 FR 12707). EPA proposed requirements for the maintenance and inspection of corrosion protection systems and requested comments and information on the need for broader requirements. Two alternatives were described that addressed the maintenance and inspection of the entire site or other tank system equipment in addition to the corrosion protection system.

a. Site or System Inspections. Many comments were received by EPA on these alternative inspection requirements. Some commenters felt that inspection of the entire site or of the tank system is of little practical benefit and unnecessary because such an inspection alternative would be duplicative of the leak detection requirements. One commenter suggested conducting inspections of the entire UST site.

EPA agrees with commenters who stated that site inspection is duplicative of leak detection. Institution of release detection systems should provide effective warning of releases from most of the components of the tank system, thereby eliminating the need to require the general inspections. Also, the majority of USTs are completely underground and inaccessible to inspection, rendering total system inspection impractical.

b. Inspections for Tank Deflection. Small distortions of the tank diameter are expected at the installation of USTs, and the tanks are designed with an allowance to withstand them. Improper backfill or failure to install foundation anchors (or failure of the anchoring system) can lead, however, to excessive distortion resulting in rupture of the tank. One way to verify this distortion is by measuring tank deflection (variation from true diameter). EPA had requested comments on periodic tank deflection measurements for steel or FRP tanks as a means of preventing tank failures. Many comments were received by EPA on this inspection method. Some requested EPA to mandate periodic deflection monitoring for FRP tanks in the final rule. Others stated the view that FRP tanks do not require periodic deflection monitoring because virtually all deflection ceases after the first year. Some also recommended vertical diameter measurements for all new tanks to verify initial installation results.

The Agency disagrees with commenters who suggested periodic tank deflection monitoring for FRP tanks. The low incidence of failure in FRP tanks (less than 0.5 percent), which has been declining substantially over the last 10 years, argues against the need for periodic deflection measurements. The Agency has, therefore, chosen not to mandate periodic deflection measurement in the final rule. The Agency believes that excessive deflection in FRP tanks is usually due to improper installation and occurs soon after the installation is complete. Deflection measurements during and immediately following installation are required by the tank manufacturers for purposes of warranty validation. EPA believes that these are sufficient for the protection of human health and the environment.

In addition, investigators conducting a study of deflection monitoring of FRP tanks in Suffolk County (New York) have reported to EPA that the deflection measurement is often difficult to obtain unless special provisions are made for taking this measurement when the tank is installed. Special tools and training are required to prevent damage to the fill pipe tank seal (53 FR 10403) when obtaining access to the tank for conducting the test.

c. Monitoring Corrosion Protection at Composite Tanks. The Agency had also requested comments on requiring corrosion protection inspections for composite tanks. Some commenters stated that composite tanks should be monitored to ensure the integrity of the FRP coating, using the same criteria used for the cathodic protection inspections. Others felt that inspections of composite tanks are unnecessary after installation. The Agency disagrees with the commenters who recommended that composite tanks be periodically monitored to ensure the integrity of the FRP coating. It has been reported to EPA that most composite tanks pass when tested through the measurement of electrical continuity between some structure of the tank and the soil; however, the tanks that have "failed" this test showed no evidence of external corrosion once they were excavated and inspected. This is a point of continuing controversy within the National Association of Corrosion Engineers. Based on the superior performance of composite tanks to date (no documented failures due to external corrosion), EPA has decided not to mandate the corrosion protection monitoring of composite tanks in the final rule.

4. Compatibility (§ 280.32)

In the proposed rule, EPA set forth a general performance standard requiring owners and operators to use an UST system made of or lined with materials compatible with its stored substances. Incompatibility could result in the structural deterioration of the containment vessel or piping and cause releases into the environment (see 52 FR 12708-12710). Because EPA has found no significant evidence that incompatibility is a cause of release from USTs, the final rule contains no additional requirements and thus remains the same as proposed.

a. Compatibility of FRP Tanks with Alcohol-Blended Fuels. Since the proposal appeared, EPA sought additional information on problems reportedly caused by incompatibility of FRP tanks and alcohol-blended fuels. This search included conversations with several groups very familiar with these fuels and the FRP tank industry. In all of the information reviewed, only one release case was suspected to be caused by incompatibility problems. In addition, EPA has been unable to find any demonstrated incompatibility problem with 10-percent alcohol-blended fuels and FRP tank systems.

There are two types of FRP tanks. The standard FRP tank is compatible with up to 10-percent alcohol-blended fuels. The second type of FRP tank is manufactured with a special resin that ensures compatibility with blended fuels containing greater than 10-percent alcohol. Although the higher percentage alcohol-blended fuels (11 to 100 percent) might, over long periods of time, (at least theoretically) pose compatibility problems in standard FRP tanks, the actual threat posed is believed to be very small for two reasons. First, the current and projected use of oxygenated fuels shows a trend that will increase the use of 10-percent alcohol-blended fuels but that will not increase the percentage of alcohol in the fuels. Second, information provided to the Agency indicates that numerous facets of industry (tank manufacturers, tank owners, and distributors) are very aware of and concerned with alcohol-blended fuels and FRP tank and piping compatibility problems. Industry practice is for the tank owner or operator to contact the manufacturer when a different product is to be stored, thus allowing the manufacturer to check its records concerning the compatibility of the stored substance and existing tank system. Numerous tanks have been relined with different resins that are compatible with the new fuels. EPA has added a note to the performance standard which refers to industry codes that can be used as guidance to help owners and operators with alcohol-blended fuels satisfy the compatibility requirement.

5. Repairs (§ 280.33)

In § 280.33 of the proposed rule, EPA proposed conditions under which repairs to an UST would be allowed. As discussed in the preamble to the proposal (52 FR 12710-12711), numerous state UST programs already address this topic in their regulations. Eight state programs refer to industry guidelines that should be followed in making repairs. Since proposal, EPA has continued to investigate the subject of UST system repairs. Numerous commenters on the proposal addressed this subject. It is obvious from the response received and other work undertaken by the Agency that there is a great deal of interest and ongoing activity in the field of UST management concerned with UST system repairs (including the development of new codes and practices). As discussed below, today's final rule incorporates several changes to the proposed requirements concerning UST repairs, including the deletion of, revision of, and addition to several of the conditions in the proposal.

a. Repair and Lining (§ 280.33(a)). Under § 280.33(a), EPA proposed to allow the repair and lining of a tank if four requirements were met: (1) a vacuum test was conducted, (2) the lining material was compatible with the regulated substance stored, (3) the tank was inspected internally and ultrasonically tested, and (4) the tank had not been repaired or relined previously. Today's final rule revises some of these proposed requirements as discussed below.

In § 280.33(a)(1), EPA proposed requiring that a vacuum test be conducted on repaired tanks. This requirement was intended to ensure sound repairs (52 FR 12711). The vacuum test is no longer required for reasons that are discussed in more detail in subsection d. below.

In § 280.33(a)(2), EPA proposed requiring that the lining material applied to the interior of the tank be compatible with the regulated substance stored. All commenters that agreed this provision was necessary and pointed out that it is one that is already being followed in current industry practice. The specific requirement has, therefore, been deleted but the lining material is still required in the final rule to be compatible with the regulated substance stored in the tank because this concern is incorporated into all current codes and practices and one of these must be followed under the final rule.

In § 280.33(a)(3), EPA proposed internal inspection and ultrasonic testing of a tank to determine that it was structurally sound. Under today's final rule, the tank must still be internally inspected and determined to be structurally sound, but the ultrasonic test is no longer required. EPA received comments concerning the methods to test a tank to ensure that it is still structurally sound. These comments indicated that alternative tests were available to determine the structural integrity of the tank. National codes, including API 1631 and NLPA 631, provide alternative methods. Currently available data submitted and developed independently by EPA concerning field performance of tank lining indicate that if these codes are followed, the lined tanks will perform very well (see the discussion of interior lining under the upgrading section presented earlier in this preamble). EPA has learned that Underwriters Laboratories is currently developing a performance test (Subject 1856); however, it is still in the draft stage at this time. Consequently, today's final rule reflects the conclusion that it is not necessary to require a specific test to ensure structural soundness. Thus, EPA has substituted a performance requirement in § 280.33(d)(1) of the final rule that the internal inspection be conducted in accordance with codes of practice developed by a nationally recognized association or independent testing laboratory.

For purposes of assisting implementation of this general requirement, the final rule includes the note that the lining and repair procedures described in API 1631 and NLPA 631 may be used to comply with § 280.33(a). These codes describe test protocols for inspecting tanks to determine the structural soundness. The use of the ball peen hammer test is described, as well as the use of ultrasound. The codes include criteria for minimum allowable remaining thickness and maximum number of perforations per unit area in determining the condition of the tank. The codes also specify tests to ensure that the repair or lining has been performed correctly. EPA intends by this approach to allow other applicable national codes (such as UL 1856) developed in the future to be used in meeting this requirement.

In § 280.33(a)(4), EPA proposed limiting UST repair to only tanks that had not been previously repaired. In other words, a tank could be repaired only once so as to avoid continued repair of an UST that was fundamentally unsound (52 FR 12711). Some of the commenters suggested that, under this approach, EPA needed to resolve definitional questions concerning what constitutes a repair versus simple preventive maintenance. They expressed concern that the proposed one-time repair provision might preclude the use of preventive maintenance that would otherwise prevent leaks. Other commenters opposed this requirement, stating that structurally sound tanks could be repaired repeatedly; they also provided extensive data showing that repaired tanks had an excellent performance record. Other commenters opposed allowing any repairs to tanks that had leaked.

After study of the comments, review of the submitted performance data on repaired tanks, and further study of the codes, EPA agrees that restricting repair to a single time is unnecessary. The submitted record of repaired tanks was found to be very good and numerous EPA contacts with tank lining users and regulators have generally confirmed the accuracy of this performance record. Therefore, EPA has concluded that the tank repair codes already in existence (and in use for years) provide adequate standards and guidelines for determining if a particular tank qualifies for repair. Consequently, EPA has not included the one-time only repair requirement in the final rule and will allow tanks to be repaired more than once provided that they meet the standards for repairability in the applicable codes and that the repair is completed in compliance with these standards. If a tank has leaked product, however, the requirements for corrective action must be met and will sometimes require removal of the tank in order to complete the appropriate cleanup measures even if it is determined to be structurally sound and repairable.

b. Cathodic Protection (§ 280.33(e)). In § 280.33(b), EPA proposed that all steel tanks with corrosion holes that are subsequently repaired be retrofitted with a cathodic protection system that is designed by an independent corrosion expert and operated and maintained in accordance with § 280.31. Again, comments were received objecting to the requirement of the use of an "independent" corrosion expert on the grounds that many companies employ corrosion experts and that requiring an independent expert would be unnecessary and burdensome. As discussed earlier in this preamble in section IV.B.1.a., EPA is dropping the requirement for an "independent" corrosion expert in the final rule.

Comments were also received indicating that the addition of a cathodic protection system to a tank that was repaired by lining was not necessary and represented a significant additional expense. In view of the excellent performance record to date with relined tanks, EPA agrees with this point to some extent. Accordingly, in the final rule, EPA will allow lining alone as an upgrade alternative for corrosion protection provided that it is done within the confines of one of the national codes. In other words, a tank that is determined to be structurally sound under the criteria in the codes may be upgraded by lining alone for a 10-year period. The interior of the tank must be reinspected at the end of the 10-year period following the lining. If this inspection shows the tank is still sound, again in conformance with the existing codes, the upgrade can be extended for use for another 5 years. Thus, in the final rule, lining alone (without cathodic protection) provides an allowable upgrade for corrosion protection for a 10-year period. This period may be extended in 5-year increments by inspecting the tank according to the codes and demonstrating that the tank is still sound and that the lining can prevent releases for another 5 years.

c. Authorized Repair for FRP Tanks (§ 280.33(b)). In § 280.33(c), EPA proposed that repairs to FRP tanks be made only by the manufacturer's authorized representatives. Many comments were received opposing this proposed requirement.

Commenters argued that qualified in-house personnel should be allowed to perform repairs and that such a restriction would limit the opportunity for private enterprise and small businesses to enter into the FRP repair industry. They also expressed concerns that restricting repairs to the manufacturer's authorized representatives would increase the cost to the owners and operators. Finally, they believed that such a restriction could result in insufficient repair capability and cause delays in repair, particularly in less populated and more remote regions.

Several comments were also received that supported the proposed requirements stating that long-term repair of FRP tanks requires the use of proper repair materials and techniques. Commenters in favor of this position argued that only the manufacturer has the requisite knowledge of the appropriate materials and methods to repair the specific composition of FRP used in its tanks. They pointed out that these manufacturers have already established authorized representatives trained in the proper methods and supplied with the quality-assured and correct materials. They also suggested that, because the manufacturer bears continuance of product liability, only the manufacturer's authorized representatives should be allowed to repair FRP tanks.

After carefully considering the arguments on both sides, EPA has decided to change the proposed requirement to allow not only the manufacturer's authorized representatives to repair FRP tanks but to also allow qualified in-house personnel to conduct repairs if a code of practice developed by a nationally recognized organization or independent testing laboratory is followed.

Information presented by commenters convinced the Agency that there are other qualified and competent individuals who could provide reliable and proper repair services for FRP UST systems. Though there are no currently established industry standard codes for repair of FRP tanks, at least one nationally recognized organization is presently developing such a code. Therefore, the Agency believes it would be imprudent to restrict repair services to only manufacturer's authorized representatives. The Agency also believes that allowing repairs to be conducted by other qualified in-house personnel in accordance with an industry code of practice will help ensure that there are adequate repair personnel available to provide competent repair services in a timely manner.

d. Vacuum Test. In § 280.33(d), EPA proposed requiring that a vacuum test (at 5.3 in. Hg) be performed on the tank following repair. Section 280.33(f) proposed the added requirement of having a tank tightness test performed within one year following the repair of a tank. Comments were received on the technical details of these tests and on whether they were really needed to determine that the repaired tank was sound and would not release product to the environment. Several commenters questioned the technical adequacy and appropriateness of the use of a vacuum test, objecting to this requirement as possibly damaging some types of tanks.

As a result of the technical information supplied by these commenters, EPA agrees that release detection (see § 280.43(d)-(h) of the final rule), and quality control inspections performed according to established industry standards, should provide sufficient ensurance that the repair or lining of the tank was performed correctly, and thus, a vacuum test is not necessary. The current good performance of repaired tanks, most of which were not vacuum tested, points to the validity of these comments. In addition, EPA agrees that the test could be harmful in some cases. Consequently, the Agency has dropped the requirement of a vacuum test from the final rule.

EPA has also decided that the proposed requirement for a tank tightness test within one year following repair is not always necessary because it duplicates the industry practice of internally inspecting lined tanks and the release detection requirements that apply to the repaired tank. The good performance record of repaired tanks makes such an additional requirement unnecessary.

e. Pipes and Fittings (§ 280.33(c)). In § 280.33(e) of the proposal, EPA required replacement of pipes and fittings from which a release had occurred due to corrosion. The proposal did allow the tightening of loose fittings and joints for purposes of repairs. Comments were received indicating that FRP piping could be satisfactorily repaired and that some types of valves could also be repaired adequately without replacement. EPA believes that replacement of metal pipe sections and fittings that released product because of corrosion or other damage is still necessary but, in response to the issues raised by several commenters, will allow repairs of FRP piping in the final rule. The final rule does not prohibit repairs of metal valves provided that these can be done in a manner that provides sufficient protection against releases. To ensure that these allowable repairs are carried out according to sound practice, EPA requires that all of the repaired sections be tested and shown to be tight so that they will not have a release after they are put back into service.

f. Recordkeeping (§ 280.33(f)). In § 280.33(g) of the proposal, EPA required owners and operators of a repaired tank to maintain records, including signed certification, capable of demonstrating compliance with the requirements of this section.

Comments were received suggesting that a log should be required for each tank which would document installation, repairs and maintenance, products, tests, and results. EPA agrees that such a log would be a useful means for owners and operators to document their compliance with UST management requirements and would encourage it. EPA believes, however, that specifically requiring a log as opposed to other methods of recordkeeping is unnecessary.

The final rule retains the general requirement that owners and operators maintain records demonstrating compliance with this section for the operating life of the UST system.

6. Reporting and Recordkeeping (§ 280.34)

a. Introduction. In the preamble to the proposal (52 FR 12711), the Agency identified the importance of the retention by the UST system owner and operator of key records of operation on site, and reporting of significant events to the implementing agency. Because routine reporting would create an overwhelming burden for the implementing agency due to the size of the large regulated universe, records will often be the only way for implementing agencies to determine that certain important regulatory actions actually took place. Such recordkeeping also prompts the owner and operator to carry out regularly scheduled actions that are necessary to protect human health and the environment. Reporting of significant developments (such as leaks and large overfills) provides information to implementing agencies early enough for them to ensure effective action is taken by owners and operators to correct the problem. In general, the proposal consisted of simple but essential recordkeeping and reporting requirements: recordkeeping that is sufficient to ensure each owner and operator can demonstrate the recent compliance status of the facility; and reporting that allows for early involvement of the implementing agency should an UST system failure need to be corrected.

The proposal required owners and operators to report three significant events to the implementing agency: (1) New UST system installation; (2) final closure; and (3) a suspected release from an UST system and any subsequent actions needed to contain, correct, and clean up a release. An UST system owner and operator who experiences no problems in the operation of the UST system would only have minimal reporting requirements, imposed at the installation and closure of the facility. Only in the event of system failure and a confirmed release would the reporting requirements substantially increase, and the level of this increase would be directly related to the significance of the threat posed to the environment. Recordkeeping was proposed that would demonstrate the use of requisite prevention and monitoring equipment as well as the facility's recent compliance status, as displayed through recent release detection, maintenance, and testing results.

Public comments on the proposal generally supported the Agency's proposed approach to recordkeeping and reporting although some concerns were raised about the scattered placement of these requirements throughout the rule. Some commenters stated that this format made it difficult for them to find and made it confusing to determine all of the owner and operator's recordkeeping and reporting responsibilities. In response to this concern, the final rule includes in one section of the rule (§ 280.34) a reference or directory to all of the reporting and recordkeeping requirements found elsewhere in the rule.

Other commenters suggested that additional and, in some cases, more complete records be required in the final rule. As explained below, however, today's recordkeeping and reporting requirements have remained essentially the same as were proposed. A few minor recordkeeping requirements have been added, and a few additional pieces of information must be reported during corrective actions to assist the implementing agency's assessment of the release problem. These few changes to specific recordkeeping and reporting requirements are discussed elsewhere in today's preamble as part of the more detailed analysis of the final rule's technical requirements for closure; release detection; tank system repair, operation and maintenance; and corrective action.

b. Summary of Final Approach. EPA received widespread support for the general notion that at least some recordkeeping and reporting is essential to ensure owners and operators adhere to the technical standards being promulgated today. EPA did not receive any information or comments to persuade it that a significant departure from the proposed approach was necessary or appropriate. Thus, the final rule essentially retains the proposed approach.

As discussed in the preamble to the proposal (52 FR 12712), recordkeeping is necessary to ensure compliance with the technical standards for release detection, closure, operation and maintenance of corrosion protection systems, and UST system repair. The Agency, as well as many commenters, believes, however, that demonstration of compliance of all requirements over the total operating life of the facility is impractical and unnecessary to protect human health and the environment. Today's approach is predicated on the intent to impose the minimum burden on the regulated community while at the same time ensuring that all owners and operators will be able to demonstrate at the request of the implementing agency whether their UST system is being managed in a manner that will protect human health and the environment. For example, the time frames for record retention were established to enable a demonstration of recent facility compliance status prior to an on-site visit. EPA is convinced that today's final recordkeeping requirements are essential and serve both the implementing agency's and regulated community's mutual interest. Many owners and operators may decide to keep more detailed records than are required or retain records for longer than today's minimum time frames. State and local governments may want to require additional recordkeeping.

Today's final reporting and notification requirements are also intended to foster the self-implementation that underlies today's final technical standards. Under today's reporting requirements, an owner and operator do not have any reporting obligations over the entire service life of the facility beyond the initial notification at installation and the final notification of permanent closure unless a suspected release in the environment has occurred. Given the enormous size of this regulated community, the Agency has concluded that it is impractical and unnecessary to overburden implementing agencies with periodic or routine reports from UST facilities that are operated properly and have no adverse environmental impacts. The Agency expects that most UST systems will rapidly improve and move into this category during the coming 10-year upgrade period.

Reporting of releases and corrective actions taken is explicitly required under section 9003(c) of RCRA. Although EPA expects numerous releases will be identified within this large regulated community, the Agency has concluded that reporting them to the implementing agency is a necessary first step to ensure protection of human health and the environment. Today's final approach to the reporting of releases and corrective action is based on the simple assumption that the more serious a release and its impacts are, the greater the necessity for interaction with (and reporting to) the implementing agency. The implementing agency is expected to ensure that the public interest is represented during cleanup decisionmaking and actual corrective action activities. The greater the threat to human health and the environment, the more reporting and governmental oversight that is needed.

Public comment on recordkeeping was generally favorable. Some commenters, however, objected to the differentiation between on-site and off-site record maintenance and availability. Under the proposal, records kept off-site had to be available within 24 hours while on-site records had to be immediately available. Other commenters objected to the requirement for providing off-site records within 24 hours, noting that sometimes important records are retained at corporate headquarters far removed from the UST sites. EPA agrees that there should be no real distinction for availability of records and that the 24-hour allowance may seem inequitable to those who must maintain records that are immediately available on-site. However, the provision in the final rule remains unchanged. Records retained at the site must be available immediately because EPA has concluded that there is no reason that they should not be except that they are not present or up-to-date when requested. When records are maintained at a business office off-site, they must be located at a readily available site and provided upon request (§ 280.32(c)). This change to require off-site records to be provided "upon request" responds to those commenters who pointed out that the proposed 24-hour limit was often impossible to achieve when records are stored at off-site locations. This change is also made to provide some discretion to the on-site inspector who can talk to the owner and operator and determine where the records are stored off-site and decide whether they should be made available for inspection. If the records are easily accessible, the inspector may request that they be made immediately available. This change also responds to the commenter who believed there should be the same time allowed for providing records stored either on- or off-site because off-site records must be provided within the time frame requested by the implementing agency.

EPA believes that, under most circumstances, copies of the originals should be maintained on-site. If copies are not maintained at the sites, the owner and operator will have to take on the added burden of providing the implementing agency with these copies in an expedited fashion when they are requested.

Also, the Agency has determined that it will not make site plans a required record because it is not necessary to ensure compliance with the technical requirements promulgated today. A site plan is, however, a useful tool for owners and operators. The Agency notes that site plans are recommended in recent updates of national codes addressed to the installation of new UST systems.

Finally, as noted above, in response to commenters' confusion over the various recordkeeping and reporting requirements in the proposal, the final rule has been revised to include a directory in § 280.34 that is intended to simply summarize and identify the recordkeeping and reporting requirements. This new section is intended to eliminate the confusion identified by several commenters when trying to locate their recordkeeping and reporting responsibilities in the proposal. Each item of reporting and recordkeeping is identified and listed, including a reference to the section of the final rule in which full details may be found. Requirements with respect to the general availability and maintenance of records are presented along with this directory section and have not changed since proposal, except for the slight extension of the allowable period for making off-site records available to the inspector (see discussion above).

D. Release Detection

This section of today's preamble provides a summary of the Agency's final approach to release detection, the proposed rule, and the major changes from the proposal. A section-by-section analysis of the final rule (IV.D.2.) discusses in detail the final release detection requirements, including highlights of major public comments received.

1. Overview

a. General Approach to Release Detection. As described earlier in this preamble, today's requirements that new and existing UST systems be properly installed, protected from corrosion, and equipped with spill and overfill protection will dramatically reduce UST system releases. Release detection is an essential backup measure to prevention, particularly for unprotected steel UST systems (prior to upgrading or replacement) and pressurized piping because they are more prone to releases. A variety of release detection methods have been successfully applied to USTs. These methods can be grouped into six general categories: tightness or precision tests, tank gauging systems, inventory control methods, ground-water monitoring, vapor monitoring, and interstitial monitoring. Each was discussed in the preamble to the proposal (52 FR 12714). State and local programs have chosen to rely on different combinations of these methods. They all appear to be successfully detecting releases when properly applied. To maintain flexibility in the selection of release detection methods, both for the implementing agencies and for the owners and operators, the proposal allowed the selection of release detection to be tailored to the characteristics of each site and, therefore, avoided unnecessary disruption of successful state and local programs. The most important features of the proposed and final rules are summarized in the sections below.

b. Highlights of the Proposed Rule. In the proposed rule, the release detection strategy relied on the use of either monthly detection methods or a combination of tightness testing (performed semiannually to every 5 years) and monthly inventory control. Frequent testing dramatically increases the probability of detecting a release and reduces the length of time a release can go undetected. A 30-day frequency was selected as a practical monitoring frequency that was sufficient to protect human health and the environment. The proposed rule required only one release detection method at each UST site, because frequent use of one monitoring method was sufficient to discover releases before they could cause significant damage to the environment.

Current industry practices generally do not include frequent release detection and most releases that are discovered are detected through impacts on the surrounding community or large inventory losses. Consequently, substantial time and effort will be required to reach the goal of monthly monitoring for all UST systems. The proposal phased in detection requirements over 5 years to allow the leak detection industry time to expand and to more evenly schedule the demand for detection equipment. The proposed rule also allowed less frequent use of tank testing (every 3 or 5 years when combined with monthly inventory controls) during the first 10 years of the program. The goal of the proposed approach was the installation of release detection as quickly as possible on the tanks most likely to leak.

To ensure flexibility, all proven methods of release detection were allowed in the proposed rule. In the absence of adequate data, the proposed rule did not set one performance standard for all release detection methods. Instead, each method was required to meet performance and design standards specific to that method. These standards were based on the experience of state programs that indicated these methods were effective under the specified conditions.

c. Major Changes in the Final Rule. Although the overall release detection strategy has not changed from the proposal, specific requirements on how and when release detection must be conducted have changed. The four most significant revisions to the proposed regulations include:

- More frequent monitoring of existing unprotected tanks during the 10-year upgrade period;
- Less frequent monitoring of new and upgraded tanks until age 10;
- Gradual phase-in of release detection based on tank age; and
- More stringent requirements for pressurized piping.

These changes, discussed generally in section III.B. of today's preamble, are presented in detail in the appropriate parts of the section-by-section analysis below. Additional revisions made to the release detection requirements are also discussed in the section-by-section analysis.

In addition, three important organizational changes were made in response to commenters' concerns. First, in the proposed rule, the requirements for hazardous substance USTs were in a subsection of the petroleum UST requirements, and several commenters noted that they had difficulty finding and understanding the requirements for these systems. In response to this concern, the release detection requirements for petroleum and hazardous substance USTs have been separated in the final rule and placed in §§ 280.41 and 280.42, respectively.

Second, tanks and associated piping were treated in the proposed rule as a single unit. Each method of release detection applied to the tank was required also to detect leaks from piping. In another section of the proposed rule, there were additional release detection requirements that could only be applied to the piping. Commenters noted that this structure limited flexibility in meeting the release detection requirements by forcing the same method to be used for tanks and piping. They noted that the same method may not work for both tanks and piping and several viable detection methods for piping were excluded. In addition, the information on causes of release indicates that piping is generally a greater release threat than tanks. Thus, today's final rule treats piping separately from and with equal importance to the tank. The release detection methods for tanks and piping have been separated in the final rule into §§ 280.43 and 280.44, respectively.

Third, in the final rule, the release detection requirements for each type of UST system, including allowed methods and required frequencies of testing, have been consolidated into two brief sections (§§ 280.41 and 280.42). The detailed performance standards for each method of detection are now contained in §§ 280.43 and 280.44. The section-by-section analysis of the preamble parallels this structure so that all discussion of the phase-in schedule, the methods and combinations of methods allowed for each type of system, and frequencies of testing are discussed first (sections IV.D.2.a-c.). Discussion of research and public comments on the technical details of each detection method for tanks and piping is reserved for later sections (IV.D.2.d-e.).

2. Section-by-Section Analysis

a. General Requirements (§ 280.40). (1) Use of One Release Detection Method. In the proposed rule, a single release detection method could be used to meet the requirement to detect releases from both the tank and connected piping. As discussed in more detail in the preamble to the proposed rule (52 FR 12718-12719), the use of redundant methods of release detection was not required at each UST site because the Agency was not convinced that the required use of these "backup" methods would provide significant environmental gains in comparison to the adverse impacts on program implementation. Some commenters opposed allowing only one method of release detection primarily because they believe all the methods are unreliable and insufficiently developed, particularly external methods. Other commenters, however, agreed with EPA's position on this issue and cited their own satisfactory experience with the various methods.

The final rule continues to allow the use of a single properly installed and operated release detection method for tanks when testing is performed monthly. When less frequent monitoring is used it must be backed up by use of monthly inventory control. Owners and operators remain free to use multiple methods if they desire, and state and local programs can require redundant systems.

EPA decided against requiring multiple methods because frequent use of a single detection method, when combined with the prevention measures contained in other sections of the rule, is sufficient to protect human health and the environment. The performance standards, design criteria, and limitations on the methods contained in the rule are intended to ensure that the optimum performance of each release detection method is achieved. Repeating the test monthly dramatically reduces the possibility of failing to detect a leak. Each test serves as a separate check of the integrity of the UST system. Field reports confirm the success of single methods in detecting releases from UST systems. For example, Dade County, Florida, has detected over 350 releases using ground-water monitoring wells. EPA's research on the best ways to use some of the different release detection methods is directed towards improving the field performance of various types of methods. For tanks and suction piping systems, one detection method, combined with prevention efforts, should virtually eliminate undetected releases.

The Agency chose not to rely on one method of detection for pressurized piping, however. Even with good efforts at prevention, these systems may still result in significant releases. Consequently, the final rule requires existing and new pressurized lines to use both automatic line leak detectors and another leak detection method (either monthly monitoring or annual line tightness tests).

(2) Scope of Release Detection (§ 280.40(a)(1)). The proposed rule provided a general requirement that the release detection method be "capable of detecting a release from any portion of the UST system." The purpose of this requirement was to ensure detection of both tank and piping leaks. A few commenters objected to the general nature of the wording of the requirement because it includes some portions of the UST system such as vent lines, fill pipes, and bungs on the top of the tank that do not normally contain regulated substances. Some tank tightness test methods do not test the top of the tank and, thus, do not detect the presence of holes in the vents and bungs. These portions of the tank only leak when the tank is overfilled.

EPA shares the concern of commenters that a strict interpretation of the wording in the proposed requirement could result in some release detection methods, particularly non-overfill tightness tests, not being allowed because they cannot detect releases from portions of the UST system that do not normally leak. The final rule's wording that the methods must be able to detect a release from "any portion of the tank and the connected underground piping that routinely contains product" is intended to make clear that tank tightness test methods that do not overfill the tank can be used, as long as they meet the other applicable performance standards and another acceptable method is used to test or monitor the piping.

Furthermore, releases from the top of the tank or vents occur during overfills, which are not a normal operating condition. Prevention of overfills is addressed in § 280.20(c), § 280.21 (d), and § 280.30, which together require that all new and upgraded tanks have overfill prevention equipment and spill catchment devices and that proper filling procedures be followed to prevent these "nonoperational" releases. These requirements are intended to prevent these types of releases; thus, EPA does not believe methods of release detection must be used that will detect them.

The additional information on causes of release that EPA has collected since the proposal (see section II.F. of this preamble) reinforces the fact that piping is a major source of releases. Therefore, the final rule continues to require that the methods of release detection that are used must be capable (either singly or in combination) of detecting a release from both the tank vessel and the piping that conveys product.

(3) Installation, Operation, Calibration, and Maintenance (§ 280.40(a)(2)). To ensure that the release detection method will reliably detect releases once in place, the proposed rule required installation, calibration, operation, and maintenance according to manufacturers' specifications. At proposal, the Agency decided against requiring certification of installers and servicers of release detection equipment because these programs are not currently developed and there are other effective approaches for ensuring proper installation (52 FR 12719). As discussed below, commenters stated that the rule should require certification of installers and servicers of release detection equipment. After consideration of these comments, EPA continues to believe that such a requirement would hinder rapid installation and flexibility in designing effective ways to regulate installers. Today's final rule will remain as proposed for the reasons discussed below.

The UST release detection field is a new and proliferating area of technology, and, because of this, some commenters suggested that a certification program should be required for installers and operators of release detection equipment to ensure high quality work and to assist owners and operators in selecting qualified personnel. Certification by EPA or state agencies was suggested. Other commenters felt that a state or federal certification program would limit the number of installers, would increase the cost of release detection provided by those installers who were already certified, and would delay widespread application of release detection methods. Some of these commenters suggested alternatives to state or federal installer certification.

By including the performance standard in the proposed rule, EPA acknowledged that ensuring proper installation and operation of equipment is important. Although a certification program is a viable approach to achieving this goal, EPA disagrees with commenters who felt that state or federal certification is the only way to ensure quality installations. Existing state programs that lack certification programs have been effective at discovering releases. As commenters noted, there are numerous possible approaches to ensure proper installation. Mandating certification would unnecessarily restrict states from designing alternative effective ways to regulate installers.

EPA agrees with commenters that the time required to conduct a certification program would seriously hinder rapid implementation of release detection. Installing leak detection quickly on existing tanks, which are primarily unprotected steel, will be of significant environmental benefit, even in the absence of certification. For these reasons, no additional requirements have been included in the final rule to ensure release detection installation and operation.

(4) Meeting the Performance Standards (§ 280.40(a)(3)). In the proposal's preamble (52 FR 12714-12718), the Agency described three possible approaches to ensure the quality of release detection equipment used to meet the regulations. EPA solicited comments on a general performance standard, certification of methods, and a method-specific performance standard. The Agency proposed the method-

specific approach because it offered the greatest flexibility and facilitated rapid program implementation. Commenters generally agreed with the advantages and disadvantages ascribed to each approach, and many concluded that the method-specific approach is the best possible at present. The final rule thus retains method-specific standards by requiring each method used meet the standards in § 280.43 or § 280.44.

Commenters generally agreed with both the explanation and the conclusion in the proposal preamble concerning the use of method-specific release detection standards. Many commenters believe that the method-specific approach would be the most realistic approach given our current knowledge and that it would allow the widest range of choices among effective technologies. Some commenters, however, believed a general standard should be formulated based on the standard specified for tank tightness testing (0.1 gallon per hour). Because the method-specific standard would allow varying performance standards, these commenters felt that many owners would simply select the cheapest, least effective method. Other commenters recommended a certification approach, feeling that consistency was less important than ensuring that the regulated community knew exactly what devices met the standards.

The preamble to the proposal contained an extensive discussion of the merits of each of the three approaches to regulating release detection. One approach considered by the Agency was to specify a general standard for the leak rate or quantity which must be detected by a method and not specify individual methods or restrictions on their use. This approach was viewed as providing the most consistent level of performance and the one that best challenged manufacturers to develop defensible performance claims for their equipment. This approach is not used in the final rule for two reasons. First, the Agency does not have sufficient information to relate leak rates to the quantity of product detected by external methods under all possible site conditions. Second, eliminating the specific methods in the rule would slow program implementation by forcing owners and operators to wait for detailed, extensive performance information before conducting release detection. The final rule, however, incorporates the flexibility of a general performance standard by allowing, in addition to specific methods, any method which can detect a 0.2 gallon per hour leak rate with a probability of detection of 0.95 and a probability of false alarm of 0.05 within a month. For a discussion of this addition, see section IV.D.2.a.4. of today's preamble.

A certification approach applied at the federal level would provide the regulated community with the clearest direction concerning which release detection equipment was acceptable. This approach is not used in the final rule because it would slow program implementation and reduce the choices available to owners and operators over the next several years. Further, it was not viewed as necessary because comparable performance information for each method can be generated by private efforts without federal involvement.

Research results and data submitted by commenters after the proposal have reinforced the Agency's belief that all of the methods that were proposed are effective release detection techniques if used within the context of certain constraints (discussed in the section on individual methods). EPA believes that offering a broad selection of methods will make it easier for owners and operators to comply with the regulation. Also, a broad selection is consistent with the encouragement of existing industry trends and state programs, which have utilized a variety of release technologies and which have been proven effective at discovering leaks. Information gathered by EPA suggests, but does not conclusively prove, that all of the methods included in the rule can detect at least a 0.2 gallon per hour release within 30 days when used in accordance with the restrictions on that method. The Agency believes that all methods will eventually be able to prove they reliably detect 0.2 gallon per hour releases and has included that as a standard for approving new methods. This standard is discussed in section IV.D.2.a.4. Allowing a range of methods with specific standards does not mean the cheapest, least effective method will be selected, because cost and effectiveness are not necessarily related. For instance, under some site conditions (e.g., ground water within the excavation zone), manual ground-water sampling may be the cheapest method and will reliably detect releases substantially smaller than 0.2 gallon per hour.

(5) Delay in Detection Probabilities (§ 280.40(a)(3)). As discussed in the proposal preamble (52 FR 12719), a complete release detection performance standard includes not only the leak rate or quantity that a method must detect, but also the probabilities of detection (PD) and false alarm (PFA). In the proposed regulations, complete standards of this type were included for in-tank detection methods in the section on specific methods. Research results and commenters' concerns have caused the Agency to make several important changes in the final rule. The probabilities have been moved to the general requirements section (§ 280.40(a)(3)) and changed slightly, and the effective date has been delayed for two years. These changes are discussed below.

The proposal preamble emphasized the statistical nature of detecting leaks and the large number of variables that add to the uncertainty in declaring a leak. The probability of detecting a leak is dependent on its size. All methods are more likely to discover large leaks than small ones. With regard to detecting the smallest leaks, the Agency recognized that good methods properly operated may mistakenly declare a leak when none exists (false alarm) or fail to discover some leaks (missed detection). Consequently, the standards for tank tightness testing and automatic in-tank monitoring included the requirement that methods detect a specified leak rate with a PD of 0.99 and a PFA of 0.01. The Agency remains convinced that specifying probabilities in this manner better defines the performance standards and should help owners and operators make informed choices about leak detection.

The final rule retains the PD and PFA as part of the leak detection performance standard. The probabilities have been removed from the standards for specific methods and placed in the general requirements section. This change expands the coverage of the probabilities to include automatic line leak detectors and interstitial monitors as well as tank and line tightness tests and automatic in-tank monitors. The Agency made this change to clarify that all leak rates or quantities specified as part of a method-specific standard in § 280.43 or § 280.44 must be detected with the same level of reliability.

The proposed rule set the PD at 0.99 and the PFA at 0.01. In the final rule, the PD has been changed to 0.95, and the PFA has been changed to 0.05. The Agency made this change for several reasons.

First, the Agency is not convinced that the 0.99/0.01 specification was a realistic standard given the wide range of variables affecting leak detection results. EPA's study of tank testing methods has attempted to determine performance at this level of precision and only 2 methods of the 25 studied could meet the standard. No study of this sort has been undertaken for the other methods covered by the probabilities in the final rule. Further, EPA does not plan to conduct studies similar to the one for tank tightness testing for other leak detection methods. Rather, the Agency intends that manufacturers should evaluate their methods to prove they meet the standard in the rule. Thus, the change in the final rule will encourage manufacturers to undertake this research. EPA is developing procedures for testing release detection equipment in a common way to help manufacturers in evaluating their equipment. EPA chose the 0.95/0.05 specification in the final rule because it is a level of performance attained by a modified commercial tank test method in the National Motor Fuel Survey. In addition, several commenters felt that a probability of detection of 0.95 was more realistic and was adequate to protect human health and the environment.

Because the final rule requires frequent-to-continuous monitoring, the change in probabilities will have little environmental impact. For example, a test which detects 0.1 gallon per hour leaks 95 percent of the time in one test will discover 99.9 percent of 0.1 gallon per hour leaks in 3 consecutive tests. Further, tests that meet this standard are virtually certain to detect leaks larger than this threshold and will detect a significant number of leaks below the threshold. Under either standard, large leaks will be caught immediately and small leaks will be discovered before they cause environmental damage.

The final change in this section of the final rule is a delay in the effective date of the probabilities. As discussed above, few methods have been proven to meet the complete standard specified in the proposed rule. However, preliminary results from the EPA's tank testing study (Notice of Availability; 53 FR 10403) indicate that several methods could meet the standard with simple changes in procedures and equipment. The Agency also wanted to allow time for manufacturers of automatic tank gauging systems, automatic line leak detectors, and interstitial monitors to prove that their systems meet the complete standard. The Agency believes manufacturers can make the necessary changes to their methods and evaluate their performance in 2 years. Until the probabilities become effective, methods need only detect the leak rate or quantity specified for that method in § 280.43 and § 280.44. Methods installed or conducted during this 2-year phase-in will not need to be performed again or replaced after the probabilities become effective, but all methods used after that period of time will have to achieve the probability standard.

(6) Reporting of Positive Monitoring Results (§ 280.40(b)). The proposed rule contained a provision in Subpart E that the owner and operator must report all suspected releases indicated by the results of release detection monitoring. Perhaps because this release detection reporting requirement was in a different subpart from the release detection technical requirements, commenters stated that it was unclear when a suspected release needed to be reported. To clarify and strengthen the requirement to report all suspected releases, a provision has been added to Subpart D (§ 280.40(b)) in the final rule explicitly stating that any indication by the release detection method that a release has occurred must be reported in accordance with reporting procedures described in Subpart E.

It is intended that all release detection equipment be operated at least at the level of sensitivity indicated in the performance standard. For example, 2 years after the effective date of the rule, the tightness test threshold (i.e., test result that indicates a suspected release) should be set to detect 0.1 gallon per hour leak rates with a PD of 95 percent and a PFA of 5 percent; this threshold value may differ for various tightness testing devices. Manufacturers of the release detection equipment must determine what this threshold value must be to meet the performance standard and inform operators of their equipment. Until the manufacturer sets such a threshold, tank test operators should continue to use the current 0.05 gallon per hour threshold. For most tank testing methods, this will approximate the threshold level for detecting 0.1 gallon per hour leaks. The owner and operator would report a suspected release when a test result exceeds 0.05 gallons per hour or the threshold value provided by the manufacturer in accordance with § 280.50.

It is important to note that the performance standards such as 0.2 gallons per hour or 1/8 inch of product on top of the ground water are device performance standards set to exclude less effective equipment. The standards are not allowable contamination levels. Owners and operators are still responsible for correcting leaks and cleaning up any product released to the environment. It is in their interest to use the most effective release detection equipment and operate it so the device detects releases as quickly as possible to avoid potentially costly corrective action.

(7) Phase-in of Release Detection (§ 280.40(c)). The proposed rule required a 3- or 5-year phase-in of release detection, with the shorter phase-in period applied to USTs without protection from corrosion and the longer phase-in to those USTs with corrosion protection. These phase-in periods were based, in part, on the experiences of several state and local UST programs in initiating release detection under a phase-in schedule that was typically 3 to 5 years (52 FR 12677, 12703-12704). This phase-in was proposed to ensure that tanks with the greater risk of leaking (those unprotected from corrosion) had release detection installed first. As discussed in the proposal preamble, the total phase-in period covers 5 years to allow enough time for the release detection industry to respond to the demand, owners and operators of existing tanks to plan their needs, and implementing agencies to develop their programs. The proposed rule also required closure of existing USTs that could not meet the phase-in schedule.

Commenters recommended a variety of phase-in periods and generally recommended age as the most appropriate basis for the phase-in. Therefore, § 280.40(c) of the final rule phases in the implementation of release detection over 1 to 5 years based on the age of the system (oldest tanks first). Requiring the oldest tanks to phase in release detection sooner, within 1 year, ensures that those UST systems most likely to leak are addressed first. The final rule also retains the proposed requirement of closure of any USTs that cannot meet the release detection requirements by the phase-in date. A significant addition to the final rule is the requirement that existing systems with pressurized piping must retrofit line leak detectors within 2 years. Comments received regarding the phase-in of release detection are discussed in more detail below.

Commenters recommended a range of time periods from 3 to 10 years for completing the phase-in of release detection. Commenters supporting a longer period believed that the proposed phase-in periods would overburden the release detection industry, resulting in poor quality installations and late compliance, and cause economic hardship to owners and operators. Those commenters recommending shorter phase-in periods believed that a tighter schedule would prevent significant environmental damage. The Agency has decided in the final rule to retain the overall 5-year phase-in time period for the same reasons outlined in the proposal preamble (52 FR 12677, 12703, and 12704). Based on experience at the state and local level, EPA does not believe release detection can be installed and conducted at over 700,000 UST sites nationwide in less than 5 years. Not only will it be difficult to do in less than 5 years, but some of the release detection systems installed on a more expeditious timetable could be lower quality as a result. As discussed above, however, the greatest release potential will be during this interim period. Thus, lengthening the phase-in period would result in unacceptably greater environmental damage. Moreover, even accepting commenters' concerns about economic burdens, lengthening the phase-in would not provide a resolution because retrofitting would still be necessary ultimately and would be coupled with greater corrective action costs brought on by the delay in detection. For these reasons, today's final rule retains the 5-year phase-in period.

During the 5-year phase-in period, it is important to direct release detection efforts at the existing UST systems most likely to leak. Many commenters recommended achieving this goal by phasing in release detection based on the age of the UST system. They pointed out that this approach also has the advantage of stabilizing the demand for release detection, resulting in less burden for both the release detection industry and the owners and operators. It also has the advantage of addressing first the tanks that are most likely to leak. Several commenters pointed out their concerns that if the phase-in is not sequenced in its implementation, the regulated community will collectively wait until the last minute, and unavoidable further delays will ensue. A few commenters opposed an age-based schedule because it was too simplistic or ignored other important factors.

The Agency agrees with commenters suggesting a release detection phase-in schedule based on age. Although age is not the only factor in determining when a tank will leak, it is an important factor that is readily understood and determined and, therefore, easy to implement. This approach is already being used successfully in several state and local programs. The approach in the final rule is not a radical departure from the proposed phase-in schedule. The causes-of-release study indicates that most existing protected USTs are less than 10 years old. Under both the proposed and final phase-in schedules, these tanks must phase in release detection within 5 years after promulgation. EPA believes that the main impact of the revised schedule will be to spread out the phase-in of release detection on unprotected USTs, which represent over 75 percent of UST systems, over years 1 through 4 rather than require it all at year 3, resulting in fewer implementation bottlenecks.

Some commenters recommended a class approach (sensitive areas first) to phasing in release detection. Although the concept of retrofitting release detection in vulnerable areas first is appealing, EPA does not believe it is possible to identify sensitive classes in any meaningful way at the federal level (see section III.C. of this preamble). States can choose to phase in release detection based on a class approach without losing the ability to receive state program approval (see § 281.33) if they complete a phase-in of release detection at all existing tanks within 5 years and pressurized piping in 2 years.

EPA's information on the causes of release clearly indicates that pressurized piping represents a major source of uncontrolled releases. None of the requirements for existing systems in the proposed rule addressed the threat of catastrophic releases from pressurized piping. Consequently, in the supplemental notice (52 FR 48638), the Agency requested comment on the idea of requiring existing systems to retrofit line leak detectors on pressurized piping. Commenters generally felt that it was appropriate to require such a retrofit and recommended a variety of phase-in schedules. EPA agrees with commenters who recommended a short phase-in schedule because this piping is a significant environmental hazard, retrofitting line leak detectors is relatively easy and inexpensive, the devices are highly effective (see section IV.D.2.e.1. of the preamble), and many systems are already equipped with the devices. Consequently, the final rule requires that existing pressurized piping meet the same standards as new piping 2 years after the effective date of the rule (see section IV.D.2.b.2. of the preamble for piping requirements).

(8) Closure if Release Detection Is Not Installed (280.40(d)). In the proposed rule, EPA required closure of an existing UST system if a method of release detection was not installed by the end of the specified phase-in period. Most existing USTs are not protected from corrosion and, thus, are likely to corrode and eventually leak. The selected phase-in schedule discussed above is considered the maximum time that

these systems should be allowed to operate without release detection. Therefore, the final rule continues to require that UST systems be closed if release detection cannot be retrofitted or applied by the phase-in date.

One commenter noted that the closure procedures of the proposed rule required a site assessment of the excavation zone before closure, the results of which might delay closure beyond the allowable time frame. Although the Agency recognizes that closure can be a time-consuming process, it should not require any more time than the selection and installation of release detection equipment. The final rule requires that, by the phase-in date, the owner must remove the tank or fill it with inert material and complete the site assessment. Should a release be discovered, responding to the findings of the site assessment is part of corrective action and need not be completed by the phase-in deadline. Owners and operators are expected to plan ahead to ensure that they complete installation of release detection or the closure procedures by the specified date. This will allow the implementing agency to ensure compliance with both requirements with a single inspection. For these reasons, EPA has retained in the final rule the provision to complete closure by the end of the phase-in period.

(9) Other Changes. One of the general requirements in the proposed rule required a site assessment prior to the installation of any external leak detection system to ensure compliance with the performance standards for the particular method used. To clarify that the site assessment is intended to include only an analysis of selected factors within or beneath the excavation zone, the general requirement has been deleted, and the only assessment requirements are contained in §§ 280.43(e)(6) and (f)(7) of the final rule. These changes are discussed below.

The importance of a site assessment in correctly selecting and applying an external method was discussed in the proposal preamble (52 FR 12720-12722). Although numerous factors were listed in the proposal preamble concerning a site assessment, EPA stressed that the assessment should, at a minimum, ensure compliance with the method-specific restrictions in the proposed rule. EPA requested comment on the proposal to include these or other site variables in the assessment requirement. Some commenters stated their belief that a complete site assessment is too extensive a technique to be required for demonstrating the performance of external release detection and does not provide much useful information because conditions at the site change constantly. Most commenters, however, agreed that a site assessment is appropriate before installation of external release detection systems. In fact, these commenters wanted to extend this provision by requiring site assessments for all release detection methods, thereby requiring a quick national survey of all UST site conditions. Others suggested at least requiring a site assessment periodically at all USTs.

The Agency continues to believe that site assessment of the excavation zone is necessary to ensure the reliability of external methods. The Agency also agrees with comments stating that the site assessment requires no more information beyond checking a site for compliance with the restrictions on the methods. Conditions in and below the excavation zone must be known before an external method is selected or installed because inappropriate excavation conditions can render some external methods ineffective. Internal methods are not typically affected by site conditions, and those methods that are affected (e.g., water table level can affect tightness tests) can account for these conditions without performing a site assessment. The major factors determining the effectiveness of ground-water and vapor monitoring were included in the method-specific performance requirements in the proposed rule, and, for most sites, an adequate assessment will require evaluation of only those factors.

The Agency decided against requiring a more extensive, more frequent, or a more widely applied site assessment because of the unnecessary burden it would place on implementing agencies and the possible delays in release detection compliance it would cause. The Agency believes that the greatest benefit for existing systems, short of upgrade or replacement, will be obtained by conducting release detection as quickly as possible. The site assessment for certain external methods is retained in the final rule in §§ 280.43(e)(6) and (f)(7) because EPA believes it is important to ensure that these methods work properly. The site assessment is not intended to be a general search for contamination at the site. Any contamination found, however, must be reported, and the owner and operator must comply with the corrective action requirements of Subpart F. A more detailed search for contamination is required when tanks close under Subpart G.

b. Requirements for Petroleum UST Systems (§ 280.41). (1) Requirements for Petroleum Tanks (§ 280.41(a)) -- (a) Overview. The proposed rule offered a variety of release detection methods for petroleum UST systems. New or existing UST systems could perform accurate monthly monitoring using automatic tank gauges, vapor monitors, ground-water monitors, interstitial monitors, or other methods approved by the implementing agency. The proposal allowed two exceptions to the monthly monitoring requirement. First, when combined with monthly inventory control, tank tightness tests could be performed semiannually at new UST systems. The proposal allowed semiannual tightness testing and inventory reconciliation for new tanks because the combination was believed to be as accurate as monthly monitoring. Second, when combined with monthly inventory control, tank tightness tests could be performed less frequently at existing USTs during the 10-year upgrade period (every 3 years for bare steel systems or every 5 years for protected tanks). Less infrequent tank tests for existing USTs were permitted during the phase-in period because the Agency believed the release detection industry lacked the capacity to perform monthly monitoring at all existing tanks in 3 to 5 years.

The use of monthly monitoring methods has been retained as an option for all petroleum UST systems in the final rule. The final rule also contains two exceptions for tightness testing similar to those in the proposal. An overview of the release detection requirements is presented in Figure 4. During the 10-year upgrade period at existing tanks that are not adequately protected from corrosion and lack spill and overfill equipment, the rule now requires either (1) annual tank tests and monthly inventory controls or (2) monthly monitoring. Tanks that meet the standards for new or upgraded tanks are required either (1) to conduct tank tests every 5 years combined with monthly inventory controls for a 10-year period following the date of installation or upgrade or until 1998, whichever is later, or (2) to conduct monthly monitoring. Also, in both cases, by the end of the 10-year period, these USTs must be using an approved monthly monitoring method.

Figure 4. Petroleum Tanks: Overview of Release Detection Requirements

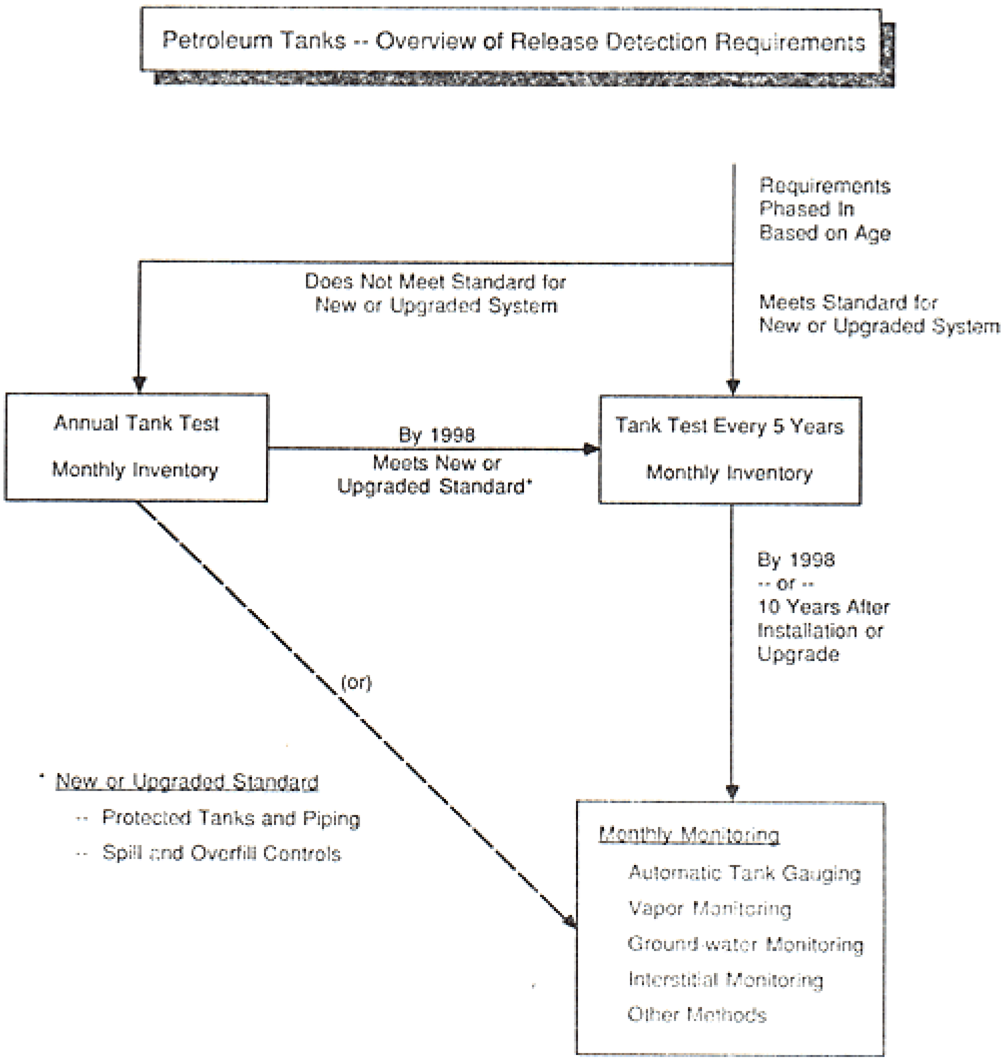

Figure 4

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(b) Monthly monitoring. In the proposal preamble, EPA discussed a variety of possible release detection strategies ranging from continuous monitoring to an infrequent "check" of the tank system (52 FR 12676-12677). "Frequent-to-continuous" detection methods were proposed by the Agency because more frequent sampling improves the chances of finding leaks and limits the length of time over which leaks can progress unchecked. As a result, the proposal required tanks to be monitored at least monthly unless the owner or operator chose an option that included less frequent tank tightness testing in combination with monthly inventory control. (Monthly inventory control does not by itself meet the requirements for "monthly" monitoring and must be combined with periodic tightness testing.)

Commenters were divided over whether monthly monitoring provides adequate environmental protection and whether it was unduly burdensome. EPA continues to believe that the monthly monitoring frequency offers effective environmental protection. Moreover, checking the release detection equipment once a month is not difficult or expensive, according to several commenters and Agency research. More frequent monitoring would necessitate the use of continuous monitors, which are not needed at all sites and which may be less effective at some sites. Thus, the final rule (§ 280.41(a)) requires monthly monitoring as a baseline for all new and existing petroleum UST systems.

(c) Tank Tightness Testing and Inventory Control (§ 280.41(a)(2)). In the preamble to the proposal, EPA noted practical problems with conducting monthly monitoring at all existing tanks over the proposed phase-in period. These methods have not been practiced on a mass scale in the past, and the Agency expressed the concern that the industry did not have sufficient capacity to capably install monthly monitoring at 1.4 million USTs in 5 years. Because tank tightness testing and inventory control are commonly used as effective release detection methods not requiring the installation of permanent equipment, EPA allowed these methods as options for existing USTs during the 10-year phase-in period for upgrading (see section IV.D.2.b.1).

The large number of existing systems to be tested and the limited industry capacity caused the Agency to propose less frequent tank testing for existing systems than for new systems: every 3 years at unprotected existing systems and every 5 years at protected existing systems. The proposed frequencies were selected in recognition of the differing probability of releases at unprotected and protected UST systems. For new tanks, the proposal allowed monthly inventory control combined with semiannual tightness testing because the combination was believed to be as effective as monthly monitoring using the other approved methods.

Many commenters were concerned about the use of tank tightness testing and inventory control as an alternative to the monthly monitoring requirements. Commenters particularly questioned the appropriateness of more frequent monitoring being proposed for new tanks than for existing unprotected tanks. Although there was a variety of opinions on what the proper frequencies were, commenters uniformly felt that new tanks were less likely to leak and should be monitored less often than existing tanks. The new information presented in the "Causes of Release Study" corroborates these concerns that the most serious environmental threat is posed by older, unprotected steel tanks (see section II. F. of the preamble). Available evidence demonstrates that new or upgraded tanks are extremely unlikely to leak over their normal operational lifetimes especially within 10 years of installation or upgrade. EPA solicited comments on this issue and this new information in the supplemental notice published December 23, 1987 (52 FR 48641-48642). Most commenters agreed with the Agency's conclusions on these matters, which are reflected in the final rule.

The Agency continues to believe that monthly monitoring cannot be installed on all UST systems within 5 years and that allowing tightness testing combined with inventory control will ensure that release detection can be provided to all existing USTs as soon as possible. During the phase-in period, EPA believes that priority should be given to requiring application of available release detection resources to older bare steel systems. Accordingly, in § 280.41(a)(2), the final rule requires that if owners and operators of existing unprotected UST systems choose tightness testing, it must be performed yearly rather than every 3 years as proposed. Existing protected systems (with spill and overfill prevention equipment) are required to be tested every 5 years during the 10-year upgrading period, the same as proposed. Because extremely few new or upgraded tanks are expected to leak during the first 10 years of their operational life, under the final rule (§ 280.41(a)(1)), these tanks may also conduct tightness testing every 5 years. This approach has the advantage of encouraging upgrade or replacement of unprotected tanks before the end of the phase-in period, resulting in improved environmental protection. At the end of the 10-year upgrading period or at the end of the 10-year operational life of new or upgraded systems, these tanks must be equipped with a monthly monitoring method.

The proposed rule required tank tightness testing to be combined with inventory control (or another method of equivalent performance) for several reasons. Frequent tank tightness testing is not practical because it requires extensive preparation, including a shutdown of operations. It is, however, a sensitive method that provides very accurate results. Manual inventory control is less sensitive but can provide nearly continuous (daily) release detection that can reliably detect larger releases. The rule proposed the combination of the two techniques to compensate for each component's disadvantages. Several commenters on the proposed rule viewed the combination of techniques as redundant and stated that each method is adequate on its own. Other commenters agreed that, separately, each of these techniques would be an inadequate release detection method.

The Agency evaluated different approaches to tank tightness testing and inventory control since the proposal (Notice of Availability; 53 FR 10403). The results of the studies, which are discussed in more detail in the preamble section on these methods, confirm that monthly inventory control is effective at reliably detecting larger leaks (about 1 gallon per hour) and that tank testing can reliably detect much smaller leaks (0.1 gallon per hour). This research and information submitted by commenters convinced EPA to retain the combination of infrequent tank testing and monthly inventory control in the final rule as an exception to monthly monitoring in certain situations.

The proposed semiannual tightness testing and inventory control for new USTs has been deleted from the final rule, because the Agency does not believe that the combination is as effective as the other monitoring methods. The Agency continues to believe that monthly monitoring is necessary to protect human health and the environment; less frequent monitoring is allowed only as an interim measure. Currently, conducting monthly tank tightness testing is not a practical or economical method. Tank testing methods may be developed in the future, however, that can be performed on a monthly basis to detect leaks of 0.2 gallon per hour. The final rule allows the use of this method without inventory control once the method is proven to meet the performance standard in the section on other methods (§ 280.43(h)).

(d) Manual Tank Gauging (§ 280.41(a)(3)). In addition to the other release detection methods in the proposed rule, the final rule also includes manual tank gauging. The Agency requested comment on the use of this method in the supplement to the proposed rule (52 FR 48641), citing a study submitted by a commenter on the proposal showing that this method was effective for used oil tanks. EPA conducted an analysis of this study (Notice of Availability; 53 FR 10403) and found that weekly tank gauging can detect 0.2 gallon per hour leaks with a PD of 95 percent and a PFA of 5 percent for tanks smaller than 550 gallons.

Because it provides the same level of protection as other monthly monitoring methods, the final rule allows use of this method for any tank with nominal capacity of 550 gallons or less. Detailed discussion of research and comments on the inclusion of this method is provided in Section IV.D.2.d.(2). of today's preamble.

(2) Requirements for Petroleum Piping (§ 280.41(b)) -- (a) Overview. The proposed regulation required that each release detection method chosen for the tank also detect releases from the piping. In addition, new pressurized piping was required to have equipment capable of detecting and shutting off a release of at least 2 gallons per hour unless the piping had continuous or interstitial monitoring. Suction piping that meets certain minimum design specifications was exempt from these release detection requirements.

Commenters agreed that pressurized piping was allowable but that additional release detection requirements were necessary. Some commenters had reservations about automatic shutoff devices and flow restrictors and recommended backup release detection or double-walled piping. New information acquired by the Agency since proposal on causes of release indicates that pressurized piping, along with spills and overfills, is the major source of releases, particularly large-volume catastrophic releases (see section II.F. of this preamble). Because of this new information, the Agency requested additional comment on release detection issues related to underground piping in the supplemental **Federal Register** notice published December 23, 1987 (52 FR 48641-48642).

The final rule has been revised to reflect the importance of preventing and rapidly detecting piping releases by including additional release detection requirements for pressurized piping and further encouraging the use of suction systems. Figure 5 summarizes the requirements for petroleum piping. Pressurized piping must have a release detection device that monitors the line at least hourly and automatically shuts off or restricts product flow or sounds an alarm when there is an indication of a leak. The owner and operator must also conduct either monthly monitoring or an annual line tightness test. The monthly monitoring may include vapor monitoring, ground-water monitoring, interstitial monitoring, or other methods that meet the performance standard or are approved by the implementing agency. The performance standards for the piping release detection methods are contained in a separate section of the rule (§ 280.44) and are discussed in section IV.D.2.e. below.

Figure 5. Petroleum Piping: Overview of Release Detection Requirements

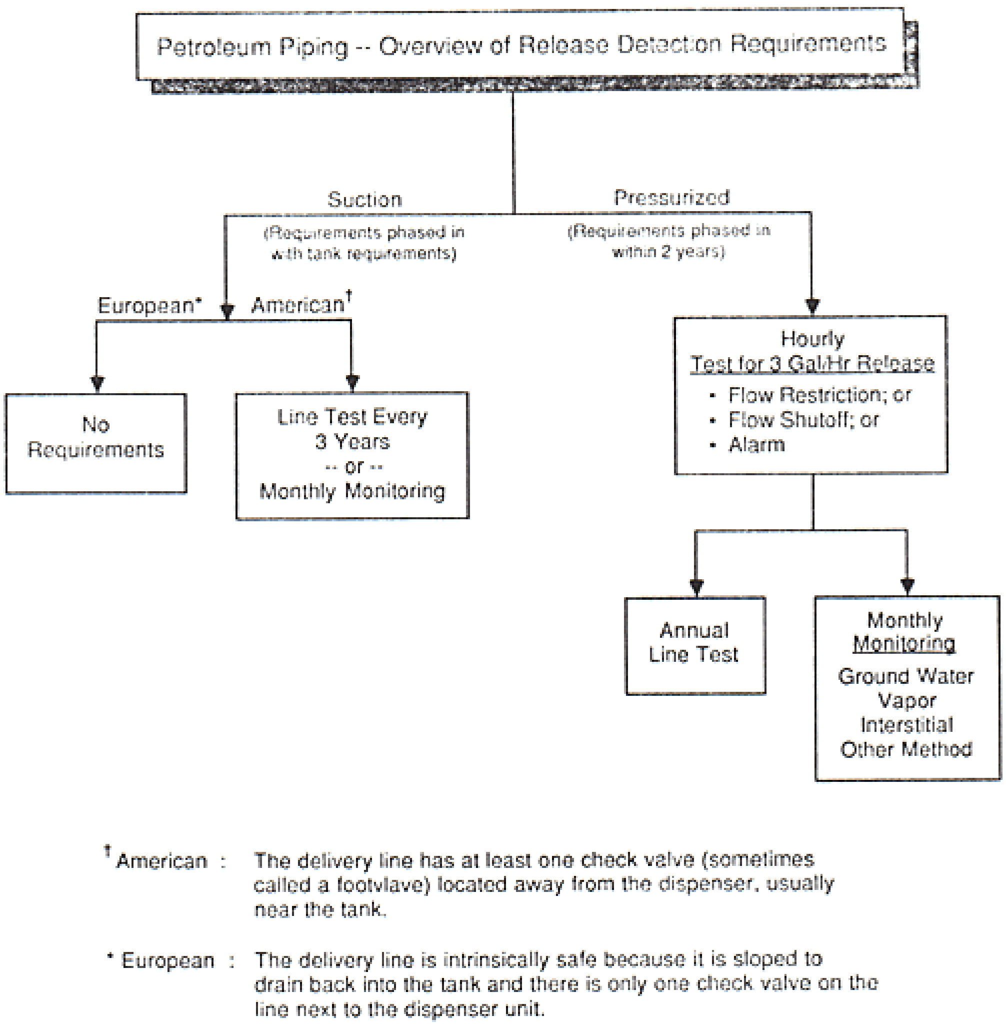

Figure 5

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The Agency notes that one release detection method can be used as the sole method if it can meet both the hourly release detection requirement and the annual or monthly release detection requirements. For example, double-walled piping with continuous interstitial monitoring that meets the performance standard continues to be an acceptable option for pressurized piping and would not require shutoffs, restrictors, or tightness tests. The system must be equipped, however, with an alarm that will indicate when a release into the interstitial space has begun.

Suction piping systems meeting the "no leak" criteria described below in subsection (c) continue to be exempt from release detection. Other suction systems must operate with monthly release detection or a line tightness test every 3 years.

(b) Requirements for Pressurized Piping (§ 280.41(b)(1)). As discussed in the proposal preamble (52 FR 12743-12745), the Agency was concerned that pressurized piping, which uses a pump in the tank to force product through the line to the dispenser, could result in large volumes of product being quickly released to the environment through a hole or crack. In contrast, suction piping appears to be intrinsically much safer because product is transferred at less than atmospheric pressure by a pump near the dispenser drawing product from the tank by suction, and failures will result in air or ground water flowing into the pipe rather than product being released during operation. The Agency considered not allowing pressurized piping at new installations but its widespread use, the availability of release detection technology (see discussion below), and some of the operational limitations of suction piping persuaded EPA to include it in the proposed rule.

Commenters agreed with EPA's position that pressurized piping could result in large-volume releases in the absence of release detection but felt that pressurized piping with release detection should be allowed in the final rule. They noted that pressurized piping is widely used, economical, efficient, dependable, and not susceptible to vapor lock. Commenters also noted that suction piping is more expensive to operate and requires longer times to dispense product and that its use is restricted by elevation above sea level, height differences between storage and delivery, flow rate, temperature, and length of horizontal piping. The Agency has continued to allow the use of both suction and pressurized piping in the final rule subject to the requirements discussed below.

o Immediate Detection of Large Leaks (§ 280.41(b)(1)(i))

At proposal, data received from state agencies indicated that piping was involved in 20 to 35 percent of all releases. Pressurized piping was also identified as the most common petroleum dispensing system at new installations. Documented cases raised the possibility of sudden large releases from these systems. These factors led the Agency to conclude that additional release detection was required for pressurized piping so that large-volume releases could be stopped as quickly as possible. The monthly monitoring frequency required for the tank was considered inadequate given the potential environmental damage due to a release from pressurized piping. At proposal, piping pressure sensing methods were commercially available that manufacturers claimed could detect and shut off a release of at least 2 gal/hr from pressurized piping. Although the performance of these devices had not been evaluated, the magnitude of the problem and the availability of control technology caused the Agency to require shutoff devices in the proposed rule. The proposal preamble requested information on the field performance of pressurized piping release detectors (52 FR 12744).

A variety of approaches are available to rapidly detect large leaks in pressurized lines. Two main types of continuous in-line release detection devices are commercially available for pressurized piping: flow restrictors and flow shutoff devices. Both devices react to pressure behavior in the line. A flow restrictor monitors the increase in line pressure after the dispenser is turned on. If there is a leak in the line preventing the line from reaching operating pressure, the restrictor allows a limited flow of product through the line to the dispenser, and thereby signals a leak to the operator. An automatic shutoff device monitors pressure changes during periods when the dispenser is off. If the line pressure drops enough to indicate a leak, the pump turbine is shut off, and no product can be dispensed. In addition to in-line detectors, continuous interstitial, vapor or ground-water monitors may also give rapid reliable warning when a leak occurs.

Commenters generally agreed with the need for pressurized piping release detection that was conducted more frequently than monthly. Many felt that only flow restrictors should be required because they are widely available and have proven performance. Based on information from UST installers and on causes-of-release data, flow restrictors operating at a 3 gallon per hour detection limit will eliminate 80 to 95 percent of the volume of releases occurring from piping. These devices have been in use for years and can be immediately installed at a large number of existing or new UST installations.

The Agency recognizes that other methods of frequent piping detection can achieve the same level of performance as flow restrictors, however. The proposed rule allowed interstitial monitoring or continuous ground-water or vapor monitoring instead of automatic shutoff devices but did not include a performance standard for these methods. Research conducted since the proposal (Notice of Availability; 53 FR 10403) shows that under certain circumstances ground-water monitoring will not allow immediate detection of a release. To ensure an equivalent minimum level of protection against catastrophic pressurized piping releases, the final rule includes the requirement that all pressurized piping have automatic line leak detectors that provide warning of 3 gallon per hour releases within an hour. EPA expects that this requirement can be met using flow restrictors, automatic shutoff devices, continuous interstitial monitors, and some continuous vapor monitors. Continuous ground-water monitoring may also meet this requirement under certain site conditions (e.g., shallow water table). EPA expects that some of these devices will be sufficiently sensitive to meet the additional monitoring requirements discussed below. If a device meets both standards, no additional monitoring is required. A detailed discussion of the performance of these systems is contained in section IV.D.2.c. of today's preamble.

o Additional Monitoring for Smaller Leaks (§ 280.41(b)(1)(ii))

Commenters suggested the use of inventory control or line tightness testing in conjunction with flow restrictors, shutoff devices, or continuous monitors. The new causes-of-release information acquired since proposal shows even more strongly that piping is a major source of leaks from UST systems. Because of the importance of controlling pressurized piping releases, EPA agrees that additional release detection beyond the immediate detection discussed above is necessary. Flow restrictors may not detect small releases, so additional monitoring is necessary to detect these releases. Therefore, the final rule has been revised to require an annual line tightness test or monthly monitoring using one of the accepted methods for tank monitoring. Line tightness testing is more sensitive than the other methods (see section IV.D.2.e. below) and so can be conducted less frequently for equivalent protection. Further, because of the problems cited by commenters with the reliability of flow restrictors and the ability of operators to override them, the final rule also requires that the operation of the line leak detector be checked annually in accordance with manufacturer's requirements. This system of checks will limit the likelihood that pressurized piping will release large volumes suddenly. This approach, coupled with requirements for corrosion protection and careful installation and testing of piping (which will significantly lower the incidence of piping releases over time), will protect human health and the environment.

o Secondary Containment for Piping

Some commenters recommended that secondary containment with interstitial monitoring be required for all pressurized lines. The Agency feels, however, that the release detection options described above for single-walled pipes are protective of human health and the environment and that the additional stringency gained by double-walled pipes does not need to be required. EPA also notes that secondarily contained piping is a relatively new technology that would require significant new training of installers to "de-bug" the applications of this technology for widespread use. In any event, the monthly or annual tests will detect the small slow leaks from piping while the shutoffs or restrictors will detect the large releases. EPA agrees that secondary containment for piping is environmentally protective, and owners and operators may choose to install continuous interstitial monitors which meet the above standards.

(c) Requirements for Suction Piping (§ 280.41(b)(2)). In the proposed rule, all release detection requirements were waived for suction piping that meets six design and operating standards concerning pressure, slope, run of the piping system, and use of properly located check valves. This piping design, common in Europe, ensures that little, if any, product will be released if a break in the line occurs. The Agency also felt that this exemption would encourage the use of suction piping over pressurized piping wherever possible, which is desirable because suction systems are less likely to leak than pressurized systems. Suction systems which do not meet the criteria for exemption were required to be monitored in the same manner as the tank, because the Agency believed small, continuing releases were possible from these systems. Changes in the requirements for both exempt and non-exempt systems are discussed below.

o Design Criteria Revised

The proposed rule contained design criteria for exempt suction systems concerning the number and placement of check valves and the slope of the piping because small releases can occur in an improperly designed or installed system. Two of these criteria have been deleted and one criterion has been added in the final rule. First, commenters noted that the 2-percent slope mandated in the proposed rule is difficult to meet using current design practices, and the API and PEI codes of practice recommend a 2-percent slope. Commenters also noted that a 2-percent slope decreases the maximum distance between the tank and the pump, thus limiting station design. In the final rule, therefore, the specific value for the slope has been eliminated, and only the general requirement has been retained that the slope be such that product will drain back into the tank when suction is released.

Second, the proposed rule also required that suction systems have only one check valve as close to the pump as possible and not have a foot valve. These criteria overlap, however, and the foot valve restriction has been deleted from the final rule. This change does not weaken the final rule because the requirement for only one check valve near the pump will prevent a large volume of product being held in the portion of the pipe from which a leak could occur.

Finally, today's rule contains an additional provision that exempt suction systems must have a means of verifying compliance with the design requirements. In the preamble to the proposal, the Agency noted that suction systems in West Germany are equipped with a means of ensuring that the contents of the line are under less than atmospheric pressure (52 FR 12745). This serves to ensure that if a hole in the line develops the liquid drains back into the tank and is not released to the environment. Although the Agency received no comments directly related to this issue, commenters did note that service contractors frequently correct operational problems with suction systems by adding additional check valves to the line. An inspector could not easily discover this alteration and the system could begin to leak. Consequently, the Agency decided to require that exempt suction systems be equipped with a means for an inspector to readily determine that the system continues to meet the design requirements.

o Non-Exempt Suction Systems

Under the proposed rule, American-design suction systems, which commonly have a check valve near the tank or at piping unions, were required to have release detection conducted as frequently as for the tank. Commenters on the proposal noted that eliminating check valves at piping unions or near the tank is not practical in some applications and requested that these systems also be exempt from release detection requirements. The causes of release information acquired by EPA clearly indicates that both types of suction piping are dramatically less likely to have large leaks than pressurized systems. Based on this information, EPA requested comment on the use of less frequent testing (every 1 or 3 years) for suction systems in the supplement to the proposed rules (52 FR 48642). Commenters disagreed on an acceptable testing frequency but generally agreed that all forms of suction line pose a limited environmental threat. EPA agrees with commenters who noted that non-exempt suction systems can have small continuing releases under some conditions and, therefore, should not be exempt from detection requirements. Because the leaks from these systems are limited and will usually be signaled by operating problems, EPA believes that a 3-year frequency, in conjunction with required prevention measures, is protective of human health and the environment. The reduced frequency of testing for these systems should further encourage the use of suction systems should further encourage the use of suction systems over pressurized systems, even for applications where the exempt design requirements are impractical. These incentives add to the environmental protection provided by the piping release detection standards.

c. Requirements for Hazardous Substance UST Systems (§ 280.42). The proposed rule required the use of secondary barriers with interstitial monitoring at all new or upgraded UST systems storing hazardous substances, unless the owner and operator: (1) demonstrated that an alternative method of release detection would accurately and reliably detect a release of the hazardous substance from the UST system and (2) obtained approval to use another method from the implementing agency. Also, in the proposal, owners and operators of existing hazardous substance USTs were allowed during the 10-year upgrade period to use any of the methods of detection allowed for petroleum USTs, if the performance requirements for that method could be met. At the end of the proposed 10-year upgrade period, owners and operators would have to upgrade or replace this release detection with secondary containment and interstitial monitoring unless a variance was approved.

After consideration of numerous public comments submitted on these issues and additional research, EPA continues to believe that release detection and corrective action technologies are not as readily understood or widely used for the broad range of hazardous substances as they are for petroleum. EPA believes that secondary containment continues to be the most effective demonstrated method of release detection for new UST systems containing hazardous substances. Thus, EPA has retained the proposed approach in the final rule but has revised (1) the performance standards for the secondary containment and (2) the procedures for receiving a variance. In the final rule, in applying for variance, owners and operators of new or upgraded UST systems must provide (in addition to the demonstration of the effectiveness of a release detection method) information about applicable corrective action technologies, the inherent health risks, the chemical and physical properties of the stored substance, and any relevant characteristics of the particular UST site that would impact a future clean-up. These factors will be used by the implementing agency to guide its decision on whether to allow the alternate release detection method for the hazardous substance.

(1) Release Detection Requirements (§ 280.42(a) and (b)). Commenters took a variety of positions regarding the necessity of secondary containment for hazardous substance USTs. Many felt that the approach in the proposal was appropriate while others thought that specific chemicals, or all regulated substances, should be treated in a manner similar to petroleum. Many of these arguments centered on the similarities or differences between certain hazardous substances and components of petroleum. Commenters also disagreed about the most effective form of secondary containment, some favoring double-walled tanks, and others advocating excavation liners. Commenters generally were opposed to allowing soils as an excavation liner due to the difficulty of ensuring that the soils were properly treated and compacted.

The final rule has retained the proposed secondary containment requirement for new and upgraded hazardous substance UST systems with some significant revisions. The final secondary containment requirement is based on both technical and implementation considerations. From the technical perspective, secondary containment is believed desirable because it ensures that all hazardous substance USTs will be provided with effective detection methods, and, if a leak occurs from the primary containment structure into the interstitial space, corrective action will be simplified because it is very unlikely to impact the surrounding environment. As discussed in later sections of today's preamble, EPA has extensive information on the performance of various release detection methods and corrective action technologies already being applied to petroleum tanks. (The Agency allowed single-walled tanks and release detection for storage of petroleum substances because of the detectability of these substances and the belief that small releases could be cleaned up relatively easily.) Information about the performance of release detection and corrective action methods for hazardous substances, however, is not as readily available. Most importantly, there is very limited field experience with detection methods for hazardous substance tanks. This is made more significant by the fact that numerous hazardous substances are more toxic than petroleum and are less likely than petroleum to be detected by smell or taste. It is also important to note that, when replacing these hazardous substance tanks, industry has generally chosen to put them aboveground, in vaults, or in double-walled tanks. This lack of information and experience with effective single-walled tank strategies for hazardous substance USTs has caused the Agency to conclude that secondary containment is the most technically prudent approach to protecting human health and the environment.

In today's final rule, the Agency has given important consideration to both technical and implementation concerns. From an implementation standpoint, the secondary containment requirement is considered feasible by EPA because there are significantly fewer hazardous substance systems subject to regulation than there are petroleum tanks. In addition, secondary containment appears to be consistent with existing industry practices and state regulations for storage of these substances. As noted in the preamble to the proposal, state and local programs have adopted a variety of requirements for hazardous substance USTs that tend to emphasize secondary containment. In addition, these regulatory programs are generally not as widespread or well established as petroleum tank programs, which makes adoption of the secondary containment standard less disruptive to ongoing implementation. Although EPA recognizes that some hazardous substances can be both detected and cleaned up as easily as petroleum, there are many chemicals that cannot, and specific criteria for distinguishing them for UST release detection purposes are difficult to establish, especially in a rule to be applied nationwide. Commenters did not provide any workable approaches on new information upon which EPA could develop such criteria. Owners and operators are eligible for a variance if they can demonstrate that effective detection and cleanup technologies exist for the specific hazardous substances being stored (see the next section of the preamble).

The specific requirements for secondary containment of hazardous substance UST systems have been revised based on public comment and new information. Many commenters assumed that the proposal's alternative for secondary containment with interstitial monitoring required full secondary containment that would prevent the release of chemicals to the environment even in the event of a catastrophic tank failure. The proposal, however, was intended only to ensure detection of releases and not necessarily to contain them. For example, it allowed both excavation zone liners and double-walled tanks that did not have 360E coverage of the inner wall. Based on commenters' concerns and the preceding discussion, the final rule requires for new or upgraded UST systems storing hazardous substances that the outer barrier be capable of containing a release until it is detected and cleaned up. The effect of this requirement is to require both double-walled tanks and liners to completely surround the inner tank and be checked for releases as frequently as necessary to prevent the release of hazardous substances to the environment should a leak occur. This monitoring would, at a minimum, need to be conducted at least monthly.

In the final rule, the Agency has taken an approach that is based on the one followed for hazardous waste tanks under Subtitle C of RCRA (40 CFR 264, 265; Subpart J). It is the Agency's belief that many of the hazardous substances covered in today's rule have properties that are very similar to those of hazardous waste. Consequently, both rules require that a leak at any time during the operational life of the facility will be contained until it is detected and removed from the containment system. Because there are significantly more hazardous substance UST systems than hazardous waste tank systems, and because Subtitle I UST systems are not part of a permitting program, the Agency has retained the performance-oriented approach that was proposed. (It is the same general approach used for petroleum tanks.) This performance-oriented monitoring approach is intended to provide enough flexibility to control the greater number and variety of hazardous substance tanks, without the use of permits, while at the same time providing the same level of protection as provided by the tank requirements under Subtitle C of RCRA.

(2) Variance to Release Detection (§ 280.42(b)). As stated in the proposal preamble, EPA recognizes that secondary barriers with interstitial monitoring may not be necessary for all hazardous substance UST systems because there may be alternate release detection methods that, based on the tank system characteristics, location, and the nature of the substance stored (52 FR 12741), adequately protect human health and the environment. The Agency, therefore, proposed to allow the use of other release detection methods if the owner or operator demonstrated that an alternate method reliably detects the release of the hazardous substance from the UST system and obtains the approval of the implementing agency (see proposed § 280.41(b)).

A number of commenters supported the variance provision, while others opposed allowing a variance in any situation. The Agency has concluded that the risks posed by the use of an alternate method will be minimized by requiring the owner and operator to apply for a variance, and by stipulating that an alternate release detection method can be substituted only if it is as reliable as those used for petroleum and petroleum-based substances, and all performance criteria for the release detection method are satisfied at the site. In addition, information about available corrective action technologies, and the inherent health risks and chemical properties of the substance stored, will also need to be provided by the owner and operator to the implementing agency for review. These other factors may override the detectability criteria. For example, if a given vapor monitoring device detects a hazardous substance with better sensitivity, accuracy, and response time than it detects petroleum, and if all the other criteria for the operation of the method are met at the site, then the owner and operator is eligible to apply for a variance from the secondary barrier requirement. However, the implementing agency will approve the alternate method only after considering the additional information about the characteristics of the substance stored and the availability of corrective action methods for that substance if a release occurs at the site. Thus, although an effective and accurate vapor monitoring method is available, the implementing agency may decide not to approve the variance request if the UST is located near a drinking water well or there is no corrective action technology that can be applied to remove the release before this resource is adversely impacted.

For existing hazardous substance USTs, the Agency allows the use of alternate release detection for up to 10 years, at which time owners and operators must have applied for and received a variance and must have upgraded the existing system to new tank standards. Although the application for a variance can be made any time within the 10-year upgrade period for existing USTs, the owner and operator must meet the appropriate performance standards in §§ 280.43 and 280.44 for an alternate release detection methods at all times during the 10-year interim period.

(a) Application Process. In the preamble to the proposal, the Agency requested comments on procedures that could be used by owners and operators to apply for a variance (52 FR 12743). Commenters provided a number of suggestions on how the variance application process could be implemented. These suggestions included a variance application procedure similar to the one promulgated in the final rules for hazardous waste tanks (40 CFR Parts 264 and 265), a "nationwide" variance application procedure for single companies storing similar products in tank systems located in several states, or a joint petitioning procedure for different companies in the same state that have similar characteristics of tanks, substances, and release detection methods.

The Agency evaluated all the suggested application procedures and decided to defer the specific implementation details to the implementing agencies. Numerous factors, such as differences among the traditional procedures already followed by implementing agencies, variability of site conditions, and the number and configuration of tanks at each site, suggest that administrative details for dealing with this variation should be left to the specific agency reviewing the request. The Agency plans to develop information about a number of variance application options that can be used by the implementing agencies in designing a variance process in their jurisdiction. The final rule contains only the baseline requirements that the owner and operator must satisfy in order to use a substitute method of detection at new or upgraded hazardous substances USTs; these requirements are to: (1) demonstrate the detectability of the substance using the alternative release detection method; (2) provide data about the corrective action technology that will clean up a release within the constraints of the UST site characteristics and the inherent chemical, physical and health-risk properties of the substance; and (3) obtain variance approval before the installation and operation of the alternate release detection method.

(b) Evaluation Criteria. In response to EPA's requests for public comment on the type of information and criteria that could be used by the implementing agencies to grant variances (52 FR 12742), commenters recommended that EPA develop a list of hazardous substances that would qualify for variances on a class basis. They also recommended that EPA develop a list of hazardous substances that are petroleum-like substances as well as identify physical properties for hazardous substances that could be considered for variances. No commenters provided a workable set of criteria for doing this, however. Significant new information was not provided by commenters concerning the characteristics of hazardous substances. The Agency proposed to compile a similar list of the specific petroleum substances but rejected this approach in the final rule. (See section IV.A.4. for a discussion of the definition of "petroleum" and "petroleum UST systems.") After considering the different evaluation criteria in a variance program, the Agency decided that a specific set of national evaluation criteria is not workable given the diversity of the of the chemical properties of the hazardous substances, the USTs in which they are stored, and the variability of site characteristics. The Agency believes that specific variance program implementation details (for example, the use of "class" variances) are best left to the implementing agencies. The Agency does, however, intend to assist the implementing agencies in their variance program development by providing alternative procedures for simplifying the application and approval process and by providing more information about the general criteria that must be satisfied at a minimum nationally in each variance application.

(c) Specific Changes to the Rule. The final variance requirements only differ in minor ways from those in the proposed rule. The requirement to notify the implementing agency of the intent to conduct a demonstration for a variance has been removed. Instead, owners and operators will be required "to demonstrate that an alternate method can detect a release" before it is used at a new or upgraded UST system. Thus, prior notification is simply an item of administrative convenience that can be required by implementing agencies at their discretion. The final requirements make clear that it is advantageous for the owner and operator to apply as early as possible, because an alternative method cannot be used to meet the new or upgraded hazardous substance UST system release detection requirements without approval of a variance by the implementing agency.

In the final rule, owners and operators are also required to submit to the implementing agency information about the availability of corrective action technologies that could be used should there be a release of the stored hazardous substance at that site, including a consideration of any unusual health risks that are posed by a release of the stored substance. The Agency believes that this additional type of information is needed by the implementing agency to be able to evaluate variance applications. This change is in response to those commenters who believed that the proposed approach was not stringent enough and could result in adverse impacts to human health and the environment. Also, these new criteria provide the further clarification of evaluation criteria that was suggested as needed by other commenters. EPA believes these general criteria will more adequately (than the proposed approach) ensure that only variances will be applied for that, if approved, will protect human health and the environment.

(d) Methods of Release Detection for Tanks (§ 280.43). The proposed rule presented in one section the release detection options that addressed the complete UST system (both tanks and piping). It also specified in one section the methods that need to be combined, the frequency of testing, and the applicable performance standards. The final rule has been reorganized in response to several commenters who stated that this format was unclear and that it was confusing in the way it combined tank and piping detection methods and petroleum and hazardous substance requirements. All of the general requirements, such as combinations and testing frequencies, are now contained in § 280.41 for petroleum and § 280.42 for hazardous substances. Any substantive changes in these areas are discussed in previous sections of the preamble (IV.D.2.b. and c.). The final rule in § 280.43 now simply lists the methods that can be used for detecting leaks in tanks and the conditions under which they can be used to meet the requirements of § 280.41 and § 280.42. The methods applicable to underground piping are listed separately in § 280.44 and are discussed in a later section of this preamble (IV.D.2.e.)

(1) Inventory Control (§ 280.43(a)). The proposed rule allowed the use of monthly inventory control in combination with periodic tank tightness testing as a method of release detection. Although listed as a separate method in the final rule, inventory controls still must be combined with another method of detection (see section IV.D.2.b.1. above). The Agency acknowledged that inventory control is affected by many variables but maintained that the technique is effective when correctly performed by trained personnel. The proposed rule contained weekly and monthly performance standards and procedural requirements to optimize the effectiveness of inventory control.

Commenters generally felt that the performance standards and the procedures were too stringent, and that the method was unreliable because the variables were essentially uncontrollable. EPA's research since proposal demonstrates that the proposed rule would in fact result in an unacceptable rate of false alarms; consequently, the final rule has been revised to eliminate the proposed weekly performance standard and to change the monthly performance standard to 1 percent of monthly product throughput plus 130 gallons. In addition, the proposed requirement that only tanks partially within the ground water perform a monthly test for water within the tank has been expanded to apply to all tanks. Also, the proposed limitation on the accuracy of the dispensing meter has been revised to make it consistent with local weights and measures standards. These changes are discussed in more detail below.

(a) Performance Standard. EPA proposed that inventory control be conducted to detect a release of at least 5 percent of flow-through on a weekly basis and 0.5 percent of flow-through on a monthly basis; the latter standard was based on an API recommended practice. The Agency was concerned that having only a monthly inventory control requirement would lead to large releases occurring for a month before detection. Therefore, the proposal included a weekly loss standard that was intended to provide early warning of major losses.

Several commenters stated that the proposed 5 percent weekly and 0.5 percent monthly flow-through requirements were too stringent and too difficult to achieve, particularly the weekly requirement. They also felt that the weekly requirement would result in many false alarms, thus unnecessarily burdening owners and operators and the implementing agencies. They suggested that detection of such small leaks from tanks with low flow-through of product was difficult, that the temperature influences on volume were too great to obtain accurate data, and that the technology was not sufficiently developed to detect small releases and, at the same time, ensure against false alarms. Other commenters supported the monthly flow-through requirement.

In response to commenters' concerns, the Agency has since proposal evaluated several approaches to inventory control to determine the minimum leak rate that could be reliably detected. The evaluation considered basing inventory leak determinations on the percent of throughput, percent of throughput plus a constant volume, or number of days exceeding a given loss. A data base of actual inventory records consisting of over 20,000 measurements at nearly 600 tanks nationwide was used in a computer simulation of leak rates. The study indicated that the proposed monthly standard would result in a large number of false alarms (approximately 30 percent on a monthly basis). The most sensitive of these inventory control methods would detect a loss of about 1 gallon per hour at a PD of 95 percent and a PFA of 5 percent. This investigation revealed that using sophisticated statistical inventory control or pooling the inventory data for several months would improve the sensitivity of all the methods. Notice of this study was published for comment in the **Federal Register** (53 FR 10403). A commenter submitted a study that confirmed the high false alarm rate of the monthly standard and indicated that the weekly requirement also had an unacceptably high false alarm rate (over 50 percent).

In response to these comments and the studies discussed above, EPA has modified the final rule. The Agency acknowledges that other methods can detect smaller releases, but the final rule allows inventory control combined with tank testing for use during the phase-in period or with new, protected tanks because of its general effectiveness, low implementation costs, and ease of application. As discussed above, however, the proposed 5 percent weekly detection rate produces an unacceptably high false alarm rate, as does the proposed 0.5 percent monthly standard. Consequently, the requirement for weekly inventory control has been omitted from the final rule and the monthly requirement has been changed to 1.0 percent of flow-through plus 130 gallons, which has a false alarm rate of about 5 percent. The Agency believes that owners and operators will take inventory results more seriously when the number of false alarms are reduced. EPA has further concluded that inventory control offers a practical and effective means of detecting releases only when combined with tank testing or automatic tank gauging.

In addition to the performance standard, the proposed rule contained six restrictions that had to be followed when conducting inventory control. The restrictions that received the most comment involved measurement accuracy (to 1/8 inch), the accuracy of the dispensing meters, and the requirement to measure water only when some portion of the tank is below ground water. These restrictions are discussed below.

(b) Dipstick Measurement Accuracy. At proposal, the Agency believed that reading dipsticks to the nearest 1/8 inch could be performed and that reading to this level would reduce major errors involved with the measurement of the stored product's height (52 FR 12727). A number of commenters felt that many factors interfere with precise dipstick measurements, and, therefore, it is not reasonable to require accurate measurements for an imprecise method. Commenters also felt that the 1/8-inch requirement was inconsistent with existing conversion tables, which are usually marked in whole inches. Other commenters suggested reasons why dipstick methods of measurement were inappropriate. The EPA-sponsored research discussed in the previous section indicates that increased stick-reading accuracy down to and including 1/8-inch does improve the performance of inventory control. The Agency also has concluded that existing dipsticks marked to 1 inch can be successfully read to the nearest 1/8 inch to improve accuracy, or that conversion tables can be modified.

(c) Dispensing Meter Accuracy. Accurate metering is essential to inventory control. Therefore, based on the National Conference on Weights and Measures Standard, the Agency proposed that dispensing should be metered to within 5 cubic inches for every 5 gallons of product withdrawn, even if it meant that certain owners and operators would have to install or calibrate dispensing meters. Several commenters preferred the requirement to be 6 cubic inches per 5 gallons, in accordance with the National Bureau of Standards

(NBS) Handbook #44, or that it be the same as the local weights and measures standards. EPA agrees with commenters that local weights and measures calibration standards will be adequate to ensure accurate inventory reconciliation where these standards are applicable. At dispensing meters that are not covered by local weights and measures standards, the nationally recognized NBS standard is appropriate. The final rule has been revised accordingly to allow both calibration standards.

(d) Monthly Water Check. The proposal required the measurement of any water in the tank at least monthly if any portion of the tank is within the water table. Water in a tank could result from ground-water intrusion, indicating that there is a hole in the tank. One commenter suggested more frequent measurement of water under all situations rather than only in those cases where the tank is partially within the water table. The Agency agrees that water could enter the tank even when the water table is deep (e.g., when rain water temporarily collects in the excavation pit). The presence of water in a tank can indicate a hole in the tank, whether the water comes from ground water or rain water. The provision now requires the water measurement monthly at all tanks conducting inventory control. The monthly frequency was retained because it agrees with the frequency of other release detection methods, which was selected as the frequency that is protective of human health and the environment. The measurement of water in the tank is a simple procedure routinely conducted by many operators already, so this requirement should not significantly increase the operator's burden.

(2) Manual Tank Gauging (§ 280.43(b)). In the supplement to the proposed rule (52 FR 48635), EPA requested comments on the use of static inventory control (or manual tank gauging) as a release detection technique for used oil (or other types of) UST systems. Commenters generally supported the use of this detection method, although they differed widely on what tanks should be allowed to use this method, how long the test should be, and how frequently it should be performed. Research submitted by one commenter, and EPA's own analysis, indicates that this method is as effective as inventory control at smaller tanks (below 2,000 gallons) and can reliably detect leaks of 0.2 gallon per hour for tanks of 550 gallons or smaller. Consequently, final rule allows its use as the sole release detection method for tanks 550 gallons or less in capacity. Also, manual tank gauging can be used in the final rule for tanks of 551 to 2,000 gallons as a substitute for the inventory control part of the method (that combines monthly inventory control with periodic tank tightness testing). Manual tank gauging cannot be used to meet the release detection requirements at tanks larger than 2,000 gallons.

Commenters were divided over the applicability and effectiveness of manual tank gauging. Some commenters recommended that manual tank gauging be approved because it is effective and inexpensive and because used oil poses less environmental risk than other regulated substances. They also noted that the lack of piping and small deliveries at these tanks made releases less likely. Some commenters opposed the use of manual tank gauging because they believed the method is not sensitive enough and includes too much room for human error. These commenters also frequently recommended requiring secondary containment for used oil because it contains hazardous constituents and no other detection methods are as effective.

As discussed earlier in today's preamble (section IV.A.3.g.), the Agency believes that used oil does not differ substantially from petroleum products and should be regulated in the same manner. Consequently, today's final rule requires that these tanks conduct accurate monthly monitoring using the methods applicable to other petroleum tanks. The Agency requested comments in the supplement to the proposed rule on the possibility of including manual tank gauging as a monitoring alternative; specifically, for used oil tanks or other types of tanks. Commenters recommended a wide range of specific requirements. Suggested frequencies ranged from daily to every 5 years and suggested test lengths ranged from 6 hours to 72 hours or longer. Some commenters recommended this test should apply to other regulated substances, especially products similar to used oil. Commenters disagreed on the appropriate size limit for tanks allowed to use this method.

In order to determine more precisely the performance of this method, EPA analyzed a report submitted by a commenter. EPA's evaluation (Notice of Availability; 53 FR 10403) indicates that for tanks smaller than 550 gallons, manual tank gauging can detect 0.2 gallon per hour leaks with a PD of 0.95 and a PFA of 0.05 when performed in accordance with today's rule. For tanks between 550 gallons and 2,000 gallons the method achieves the performance of inventory control. For those tanks, the method is capable of detecting leaks of 1 gallon per hour or less with a PD of 95 percent and a PFA of 5 percent, even under extreme temperature conditions. Based on commenters' suggestions and these study results, the final rule includes manual tank gauging as an allowed leak detection method. In today's rule, only tanks of 550 gallons or smaller may use this as the sole method of release detection. Larger tanks (551-2,000 gallons) may use it in place of the inventory control part of the release detection method that combines inventory control with periodic tank tightness testing.

According to the Agency's evaluation, the performance described above can be achieved if the following limitations are met: the test period is at least 36 hours, depth measurements are taken twice and averaged, and the depth is read to the nearest one-eighth of an inch. These criteria have been included in today's final rule.

(3) Tank Tightness Testing (§ 280.43(c)). The proposed rule allowed periodic tightness testing in conjunction with monthly inventory control as a release detection method for all tanks. While acknowledging the uncertain performance of tank testing, the Agency believed that it was a demonstrated and effective method that would be available to meet the large demand for release detection following promulgation. To maximize the performance of tank tightness tests, the proposed rule included a performance standard of 0.1 gallon per hour at a PD of 99 percent and a PFA of 1 percent. Commenters disagreed about whether tightness testing should be included in the rule and what level of performance it should be required to meet. Additional evaluation by EPA indicates that, although few methods can now meet the proposed standard, several methods could make a few changes to equipment and protocol and meet the proposed standards. For these reasons, the final rule retains the proposed tank testing standard of 0.1 gallon per hour.

(a) Performance Standard. At proposal, EPA recognized that many factors such as temperature changes, tank end deflection, and vapor pockets affect the accuracy of tank tightness tests (52 FR 12724-12725). To limit the allowable methods to those that most effectively compensate for these problems, the Agency included a performance standard in the proposed rule. The level of this standard was selected based on the results of the national survey of underground motor fuel storage tanks and the experience of tightness testing practitioners; little evidence was available to support the NFPA 329 criterion of 0.05 gallon per hour. The proposed standard of 0.1 gallon per hour at a PD of 99 percent and a PFA of 1 percent was believed to be the maximum performance achievable on the typical sizes of tanks in use. A high PD was included to adequately protect human health and the environment, and a low PFA was included to prevent a heavy burden on owners and operators and the implementing agencies that is caused by investigating a large number of false alarms.

In the proposal preamble, EPA acknowledged that there was insufficient information on the performance of available tank tightness tests, particularly their ability to meet the NFPA 329 standard of 0.05 gallons per hour with the proposed probabilities of detection and false alarm. It was further stated that the Agency was beginning an investigation to acquire this data (52 FR 12724-12725). Since that time, EPA's research laboratory at Edison, New Jersey, has evaluated 25 tank tightness testing methods representing a wide range of approaches. During each evaluation, blind tests were conducted by company operators, the data were evaluated by EPA, and computer models were used to simulate leak rates and probabilities and compare them to the operational data. The results of these evaluations indicate that, while most of these currently available methods of tank tightness testing are capable of detecting leaks of 0.1 gallon per hour, only a few could presently detect this leak rate at the specified probabilities. Even with the oftentimes simple equipment and procedural changes that are necessary to achieve the needed level of improved performance, some methods probably would not be able to meet the proposed PD and PFA. Notice of the results of this study was published in the **FEDERAL REGISTER** on March 31, 1988 (53 FR 10403).

Some commenters felt that tightness testing is too unreliable to be an allowable release detection method, at least without further evaluation. Several commenters stated that the proposed standard was too stringent to be met with existing technology, particularly for larger tanks. Others recommended a more stringent standard for the release rate, usually citing the NFPA 329 criterion of 0.05 gallon per hour as the way to spur development of the technology. One commenter suggested that the performance standard should become more stringent over time as the methods develop. The proposed standard was supported by some commenters.

Based on the Agency's evaluation of tank tightness test methods and the concerns raised by these commenters, the final performance standard has been revised. Many of the methods evaluated by EPA at its Edison, New Jersey laboratory were able to detect a release of 0.1 gallon per hour so this value was retained in the final rule. The detection probabilities associated with the standard have been moved to the general requirements section (and are discussed earlier in this preamble in section IV.D.2.a.). During the two years before these probabilities are effective, the Agency believes additional standards are needed. Thus, the final rule language has been changed to include the requirement that tank test methods must account for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table. These variables have been identified as important in EPA research (Notice of Availability; 53 FR 10403) and in the NFPA 329 recommended practice.

The Agency's evaluation indicates that many tightness test methods can meet the final performance standard with relatively minor procedural or equipment changes. Such changes, however, have not been developed and instituted by the manufacturers of many of the different devices, tried in the field, or evaluated in laboratory conditions. In addition, manufacturers have not described their performance in terms of probability of detection and probability of false alarm in the past. There will be a large demand for tightness testing for release detection and confirmation following promulgation of the final rule. Tightness testing is the most widely available release detection method and the method that is likely to be used by many UST owners and operators over the next 5 to 10 years. EPA was concerned that, if few or none of the tightness test methods could meet the performance standard, there would be insufficient industry capacity to meet demand for release detection. For these reasons, the final rule has been revised to delay the effective date of the probabilities of detection and false alarm (see discussion of this delay in section IV.D.2.a.5. above).

The Agency decided to give manufacturers 2 years in which to develop and put into operation the necessary procedural and equipment changes or to develop new methods that meet the entire performance standard. Such a delay was recommended by some commenters and will ensure that necessary equipment and procedural changes can be made by method manufacturers. As discussed previously in the preamble, the Agency believes significant environmental benefit can be obtained by conducting release detection quickly. The delay in performance standards should allow more wide spread and rapid testing of tanks.

(b) Relationship of the Final Performance Standard to NFPA 329. As noted above, some commenters felt that the proposed performance standard of 0.1 gallon per hour at a PD of 99 percent and a PFA of 1 percent was too lenient and was a relaxation of the standard currently followed by the industry, which is 0.05 gallon per hour recommended in NFPA 329. However, the Agency has concluded that the final performance standard is not less stringent than NFPA 329. First, the standard in the final rule still requires testers to declare a leak at a threshold value of 0.05 gallon per hour (see section IV.D.2.a.4. above). Second, the NFPA guideline specifies a detectable leak rate but does not specify the probability with which this leak rate must be detected. Most existing volumetric methods will detect 0.05 gallon per hour leaks at least a portion of the time. A relatively poor method that detects a leak of 0.1 gallon per hour with a PD of 50 percent and a PFA of 1 percent could still claim to meet the NFPA criterion because the probability of detecting a leak is not specified. Direct comparison to the Agency's performance standard shows that the NFPA 329 criterion would allow more leaks to go undetected and also cause more false alarms. EPA's final performance standard intended to eliminate the use of poor tightness test methods, ensure that more leaks are detected, and cause fewer false alarms. Thus, it provides for better protection of human health and the environment while ensuring unnecessary or counterproductive burdens on owners, operators, and implementing agencies are minimized.

(c) Large Tanks. In the preamble to the proposed rule, EPA stated its doubts that the performance standard was attainable for large tanks (52 FR 12725). Some commenters agreed and some disagreed. Research at EPA's Edison facility suggests that the 0.1 gallon per hour standard cannot be met for large tanks using current test methods. Rather than allowing less stringent test methods for large tanks, which would create the potential for ignoring large releases, EPA believes that owners and operators of large tanks will have to select other release detection methods besides tank tightness testing unless improved or new methods are developed that allow the standard to be met for the larger tanks. (See section IV.A.3. of this preamble on bulk underground storage tanks.)

(4) Automatic Tank Gauging Systems (§ 280.43(d)). Automatic tank gauging systems (ATGS) were included in the proposed rule as one of the options for release detection (although the name of this option as proposed was "automatic monitoring of product level and inventory control"). These monitors generally have two modes of operation: leak detection mode (product level monitoring) and inventory control mode. The proposed rule required that the leak detection mode be used at a minimum once a month and meet a performance standard of 0.2 gallon per hour with a PD of 99 percent and a PFA of 1 percent and that the automatic inventory control be conducted to meet the performance requirements for

manual inventory control. Some commenters stated their belief that ATGS are unreliable, unproven, and too costly. Other commenters felt that the proposed performance standards were too stringent. Many commenters favored the use of ATGS but suggested changes to the requirements in the proposed rule. As discussed below, the Agency has retained ATGS in § 280.43(d) of the final rule. The proposed leak rate standard has been retained but the probabilities have been revised and their effective date delayed 2 years. The proposed requirement that the tank be 80 percent full at the time of the test has been deleted. These changes and comments are discussed in more detail below.

(a) Performance Standard. At proposal, the Agency recognized there were limited performance data on ATGS, and that there was still significant opportunity for human error. However, ATGS were a relatively commonly used release detection method with the potential to be very sensitive in detecting leaks, and EPA wanted to include as many effective release detection options as possible in the rule to provide flexibility (52 FR 12736-12737). To limit the allowable ATGS to those that effectively control the possible sources of error, the proposed rule included a performance standard of 0.2 gallon per hour with a PD of 99 percent and a PFA of 1 percent. The 0.2 gallon per hour value was based on the equipment manufacturers' claims. This performance standard was intended to challenge manufacturers to prove that their systems could meet the standard.

Some commenters felt that ATGS were unproven and unreliable as a release detection method primarily because of their sophisticated electronic components. Other commenters felt that the PD was too stringent, while others agreed with this part of the proposed performance standard. A commenter provided a study conducted over several months at an operating service station equipped with several ATGS. One of the devices already clearly achieved the proposed performance standard. This study confirmed the Agency's conclusion that ATGS can be effective in field situations; thus, this release detection method has been retained in the final rule.

EPA's own research and the results of the field evaluation of ATGS demonstrate that 0.2 gallon per hour leaks can be reliably detected by several of the difficult types of available devices, and the proposed leak rate of 0.2 gallon per hour has been retained in the final rule, but the PD has been changed to 95 percent and the PFA to 5 percent. In addition, the final rule schedules the PD and the PFA standards to take effect 2 years after the effective date of today's rules (see discussion of this delay in section IV.D.2.a.5. above). Any owner or operator installing an ATGS in the intervening 2 years will not have to replace it after 2 years, unless it does not meet the performance standard. EPA's review of the systems now available indicates that they should be able to meet the standards with only minor adjustments.

Some commenters felt that the Agency should set a detectable leak rate for ATGS of 0.1 gallon per hour rather than the 0.2 gallon per hour requirement in the proposed rule. EPA, however, does not agree because current equipment as presently used cannot meet such a standard, and the suggested approach would effectively eliminate ATGS as a release detection method. Furthermore, since the product level test is conducted monthly, the performance of this method can statistically equal or exceed the sensitivity achieved by periodic tank testing, even though the monthly performance standard is less stringent. The Agency intends to keep as many effective methods available to the owners and operators so that they will have flexibility in selecting a release detection method that best suits their needs.

(b) 80-Percent-Full Requirement. The proposed rule required that the tank be 80 percent full during the monthly test. This requirement was intended to ensure that a large portion of the tank's surface was checked for releases (52 FR 12737).

Many commenters opposed this requirement because it would be difficult for tanks with low monthly flow-through to implement, and it would also be an impediment to businesses with UST systems that are in use continuously. New information now indicates that this limit on conducting the test is unwarranted. Information from experienced UST field personnel, a study in Suffolk County, NY, and comments received by EPA demonstrate that most corrosion holes occur in the sides and bottom of tanks, not the top, so there is little need to always test the top of the tank for releases.

In the absence of a specific requirement, release detection tests conducted every 30 days are expected to include tests over the range of levels to which the tank is typically filled, so those areas of the tank routinely in contact with product will be tested. The inventory control requirement will also ensure that releases from the top of the tank are detected if they occur. Also, many owners and operators do not keep their tanks 80 percent full during normal operation; if tanks are rarely filled above a certain point, testing above that point is simply unnecessary. Also, the overfill prevention requirements in § 280.20 and § 280.30 of today's rule will prevent product from reaching the very top of the tank. Therefore, the Agency has deleted this requirement from today's final rule.

Although testing at 80 percent of capacity is no longer required, the testing procedure should be conducted when the tank is near its highest level and the testing should be conducted after waiting a sufficient time after the delivery of the product. This waiting period is necessary because, after product is added to the tank, it takes time for the product to mix and achieve the nearly static condition necessary to conduct meaningful product level monitoring (52 FR 12725). EPA anticipates that this waiting period will become a part of the manufacturer's recommended procedures as they attempt to meet today's standard concerning detection probabilities.

(c) Combination with Inventory Control. In combination with ATGS, the proposed rule required inventory control that meets the same performance standards required for manual inventory control. Inventory control was required in addition to product level monitoring because it was believed that product level monitoring was not as accurate as tank tightness testing or external methods and, therefore, a backup release detection method was needed. This requirement is not burdensome because ATGS routinely collect the information needed to conduct inventory control. No comments were received on this issue. Therefore, inventory control is still required in conjunction with ATGS in the final rule. Some of the performance standards for inventory control have been revised in today's final rule and are discussed in section IV.D.2.d.1. above.

(d) Effectiveness with Piping. A commenter was concerned about the effectiveness of ATGS in detecting releases from piping. EPA agrees that, in the leak detect mode, this method will not detect piping leaks, and the inventory mode will detect piping leaks but not with sufficient sensitivity to detect small leaks. The causes-of-release information collected by EPA since the proposal (see section II.F. of this preamble) indicates that piping is a major source of releases. Therefore, the final rule has added several requirements for piping (see section IV.D.2.b.2. of this preamble). The owners and operators of UST systems using ATGS as a release detection method for the tank will have to select an additional means of release detection for the piping, such as line tightness testing.

(5) Vapor Monitoring (§ 280.43(e)). The proposed rule allowed the use of vapor monitoring in the excavation zone as a method of release detection as long as certain conditions and limitations were met that maximize performance. The information available to the Agency at the time of proposal indicated that vapor monitoring was, under optimum conditions, a sensitive and reliable release detection method. Research conducted by the Agency since the proposal, as well as information submitted by commenters, has confirmed that vapor monitoring is capable of detecting extremely small leaks (0.003 gallon per hour) under certain conditions. Some of the proposed conditions concerning the use of this method, however, now appear unnecessary. In summary, the final rule includes vapor monitoring, omits the 500-ppm background restriction, and allows monitoring for selective components of the stored regulated substance, including tracers mixed in the substance.

(a) Effectiveness of Method. Some commenters expressed concern that vapor monitoring was not developed enough to be relied upon as a sole method of release detection. The Agency solicited comments and additional data on the effectiveness of vapor monitoring in the proposal preamble (52 FR 12728). EPA included it as a method of release detection in the proposal because existing data indicated that it should be an extremely sensitive monitoring tool and it has already been used successfully in some state and local UST programs. The Agency has received no research results or data from commenters that would cause it to alter its earlier conclusions. In fact, several commenters submitted detailed field and experimental data verifying the effectiveness of vapor monitoring. A theoretical computer modeling study done by EPA confirms these results (Notice of Availability; 53 FR 10403). Although there are still not enough data to specify a more complete performance standard for this method (in terms of probability of detection, false alarm, and leak rate), the Agency believes this method will provide effective release detection, and has retained it as an option in the final rule, as long as it meets the limitations discussed below.

In response to concerns raised by some commenters, the Agency wishes to note that in the final rule, a vapor monitoring well does not necessarily mean a typical ground-water well. Instead, a vapor monitoring well means any sampling point from which vapors are collected and brought to the monitor by any means.

(b) Background Concentration. In the proposed rule, EPA limited the use of vapor monitoring to those areas with less than 500-ppm background concentration of total organic hydrocarbons in the soil gas of the excavation zone. Many commenters felt that the 500-ppm restriction was too stringent, stating that natural background concentrations of methane, for example, are higher than 500-ppm in some areas of the country. Other commenters wanted a restriction based on site-by-site evaluations. The 500-ppm background level was originally set as an attempt to recognize that background effects can interfere with effective vapor monitoring (52 FR 12729-12731). Commenters described research and field experience, however, that indicate vapor monitoring should work well at several thousand ppm levels in the soil gas if a volatile substance (such as gasoline) is being stored in the tank. In addition, EPA research has shown that at many sites having no recorded release from the UST system, the total background concentration exceeds the 500-ppm level. This type of background level is probably due to an accumulation of spills and overfills.

To avoid precluding the use of vapor monitoring at many sites where it is potentially applicable, no specific numerical restrictions on background levels is included in today's final rule. Instead, there is now a more general performance requirement that the background concentration must not interfere with the ability of the method used to detect releases. For example, at a site with too high a background level (e.g., over 10,000 ppm for gasoline), leaks may not produce a detectable concentration increase over background. Determining if the background levels are too high depends on the resolution of the sensor, the volatility of the product being monitored, and other site conditions.

(c) Measurable Component. Several commenters expressed concern that the proposal did not allow monitoring for specific components of the stored substance and, instead, appeared to be focusing only on total organic hydrocarbons as the detection criterion. EPA's research indicates that monitoring for specific components or tracer compounds may be very advantageous under certain site conditions because it eliminates some of the difficulties with background interference levels and false alarms. For example, sensors that detect only the lightest components of gasoline (e.g., butanes and pentanes) may suffer fewer problems with high background levels because these constituents vaporize so rapidly that the potentially confounding effects of past spills at the site are minimized.

Monitoring for these components might also allow spills to be more easily distinguished from equipment leaks, because the level of the light chemical components would return to background levels more quickly if it was suddenly elevated due to an episodic event like a spill. Similarly, if a carefully selected tracer compound that is not already present at the site is placed in the tank, background interference problems can be eliminated. Some of the advantages of tracer methods were also discussed in the proposal preamble (52 FR 12730).

For the above reasons, EPA believes that effective vapor monitoring systems can be designed to monitor for specific components, tracer compounds, or total organic hydrocarbons. Consequently, the Agency explicitly allows these additional methods in § 280.43(e) of the final rule.

(d) Sensitivity of the Vapor Monitor. The proposed rule stated that the threshold of the vapor monitor must be preset specifically for the type of regulated substance stored in the UST. This requirement was included in an attempt to increase the sensitivity of the monitor to detect releases in areas with background hydrocarbon levels. Since proposal, however, changes have been made to the vapor monitoring requirements based on public comment and new EPA analysis that make this requirement unnecessary or even undesirable. Tracer compounds may now be used for vapor monitoring, so specificity of the monitor to the regulated substance is undesirable. The EPA-sponsored computer modeling that was conducted on vapor monitoring performance indicated that, in some circumstances, a monitor would be more effective if it monitored for a single component of the stored substance than the complete stored substance because it would be able to differentiate more distinctly between a leak of that component and existing background hydrocarbon levels. Again, specificity of the monitor to the complete regulated substance would be undesirable. The final rule now simply requires that the monitor be capable of detecting a significant increase above background of the regulated substance, a component or components of the substance, or a tracer compound. This change will allow the use of existing sensitive monitors such as those measuring BTX (benzene, toluene, xylene) or "total hydrocarbons" because they can detect components of many regulated substances.

(6) Ground-Water Monitoring (§ 280.43(f)). The proposed rule allowed the use of monitoring for free product on top of the ground-water table to determine the presence of a release from an UST system. Many commenters agreed with this approach to release detection but wanted EPA to ease some of the limitations placed on the use of the method. The final rule still allows monitoring on top of the water table

for free product but with several changes: well placement is no longer limited to the excavation zone; the well screen must be designed to prevent clogging and intercept the water table at both high and low ground-water conditions; and the well must be sealed from the ground to the top of the filter pack.

(a) Effectiveness. In the proposal the Agency recognized that there are several concerns about the use of ground-water monitoring, primarily the fact that the resource being protected (i.e., ground water) is the medium in which the release is detected. The Agency included this release detection method in the proposed rule, however, because this method has been demonstrated to successfully detect small petroleum releases and it is currently in widespread use in several state UST programs, such as that in Florida. EPA proposed limiting ground-water monitoring only to floating free product because its presence can be detected more quickly and reliably following a release than can dissolved product. The proposed rule also contained several limitations on well design, well placement, and equipment performance that together were intended to limit the use of this method to those conditions under which rapid detection could be ensured.

Most commenters supported ground-water monitoring as a release detection method in common use that has successfully detected leaks. One commenter expressed reservations about the method, saying that released product can migrate away from monitoring wells around an UST system and claimed some problems with Florida's program. EPA continues to acknowledge that the method is not completely risk-free and also believes that it provides a level of protection equivalent to the other allowed release detection methods. In addition, not allowing ground-water monitoring in the rule would force states like Florida that depend primarily on ground-water monitoring to completely revamp their programs, thus disrupting established and effective programs, delaying implementation, and unnecessarily increasing expenditures because of the replacement of all the existing wells with other equipment. Therefore, in consideration of the limitations discussed below, EPA has retained ground-water monitoring as an option in the final rule.

(b) Limitations. The limits on well placement in the proposal restricted this method to areas with the water table 20 feet or less below the surface and with soils having a hydraulic conductivity of at least 0.01 cm/sec. Also, the wells had to be placed within the excavation zone. These restrictions were intended to ensure rapid detection by minimizing the distance that a release must move between the UST and the monitoring point and minimizing the time taken to move that distance. Ground-water monitoring was also limited to use with products that are immiscible in water and lighter than water so the product can be detected by the monitors.

o Depth to Ground Water

Many commenters believed that the proposed 20-foot maximum depth-to-ground-water restriction was too stringent and requested that this maximum value be increased or even deleted entirely from the final rule. Others agreed with the proposed rule. The Agency still believes, however, that increasing the allowable maximum depth would increase the volume of the release that could occur before detection. Detection of releases is also slower and less certain with deeper wells because subsurface geology can inadvertently direct product away from the monitoring wells, even if they are located close to the UST system. EPA research conducted since the proposal suggests that 20 feet is the maximum depth to ground water that will permit detection in 30 days when the hydraulic conductivity is 0.01 cm/sec (Notice of Availability; 53 FR 10403). Also, once a release is detected by a deeper well, corrective action will be more difficult and costly because more product has been released. Therefore, EPA has retained in the final rule the 20-foot depth-to-ground-water restriction when ground-water monitoring is used as the sole release detection method. If this method is used as a supplemental device to another approved form of leak detection or as a release investigation method, EPA encourages the use of these wells at greater depths or in less permeable soils.

o Placement of Monitoring Wells

Commenters also objected to the proposed requirement that the monitoring wells intercept the excavation zone. One commenter noted that this requirement could result in existing tanks being punctured during drilling of the well. Another commenter said such a requirement violates some existing state laws intended to prevent contamination. The Agency shares this concern as one expressed by numerous regulators in the field. Apparently, not all owners and operators of existing USTs know the orientation and dimensions of their UST system, not all well drillers have the equipment to find the exact location of their UST, and errors in well installation can occur even when the placement of the UST is known.

Although a slight increase in the allowable distance between the UST and the well may result in slightly larger releases before detection, EPA decided that this was preferable to the catastrophic release that would occur if a tank were punctured. Today's final rule has been revised to require that the monitoring wells or devices be placed within the excavation zone or as close to the excavation zone as is technically feasible. This change also applies to new tanks although placing the wells in the excavation zone should rarely be technically infeasible.

The soil hydraulic conductivity limitation is retained in the final rule and will have to be met whether the well is placed outside or inside the excavation zone. Thus, the revision on well placement is not a major change because wells are allowed outside the excavation zone only when the well is in close proximity to the UST system, the soil is very porous, and released product can move quickly to the well. If the soil outside the excavation zone cannot meet the conductivity requirement, the well must be placed inside the zone.

o Immiscible in Water

The proposed rule required that the regulated substance be immiscible in water and have a specific gravity less than one in order to use ground-water monitoring. These requirements were needed to ensure that released product would float on top of the water table, where it could be detected by the monitors. The Agency has retained these requirements in the final rule but notes that ground-water monitoring is intended for use with gasoline and other substances that are, in fact, slightly soluble in water. Thus, the immiscibility requirement does not exclude substances which are in fact slightly soluble. The slight solubility will not interfere with rapid detection because most of the product is still floating on top of the water table where the monitor can sense it. For example, gasoline has been successfully detected by ground-water monitoring in state programs such as Florida's.

(c) Design Specifications. In the proposed rule, EPA did not include any design specifications for the monitoring wells and networks because site conditions vary widely throughout the U.S., and the Agency wanted to allow the implementing agencies and owners and operators as much flexibility as possible in designing the wells and monitoring network to fit the site. Commenters suggested that the rule should contain more specific requirements and restrictions. EPA continues to believe that tailoring the wells and the network to the specific conditions will result in better release detection, so few specific requirements can (or should) be included at the national level. In addition, most states, such as Florida, that are relying on ground-water monitoring as the preferred release detection method have already included detailed design specifications in their UST programs.

However, upon further review of the proposed limitations and capabilities on ground-water monitoring and the experience using this method in Florida, and other areas, the Agency did decide that three well-design criteria should be added to the final rule to prevent common problems. First, if the top of the water table is above or below the screened interval of the well, then the free product floating on top of the water table will not be able to enter the well and be detected by the monitor. For this reason, today's final rule requires that the monitoring well screen must allow entry of regulated substance into the well under both high and low ground-water conditions. Second, the final rule requires that screening be designed to prevent migration of soil or filter pack into the well, which would clog the screen and prevent product from entering and being detected. The third criterion added to the final rule is the requirement that the wells be sealed from the surface to the top of the filter pack, which will prevent possible contamination by hydrocarbons washed from the surface by rain water that might cause a false alarm or mask a future release.

(d) Sensitivity of Monitor. The last limitation included in the proposed rule to ensure rapid detection using ground-water monitoring was a performance standard requiring that the monitoring equipment be capable of detecting the presence of at least one-eighth of an inch of free product on top of the ground water. This value was selected because it is the maximum performance that manufacturers continue to claim can be achieved by existing automated monitoring equipment. This requirement was intended to apply both to automated and manual monitoring techniques. Some commenters wanted to make the standard more stringent by reducing the criterion of one-eighth of an inch of free product in the well to one-sixteenth of an inch or by replacing it with nonquantitative terms such as detection by "sheen" or by human sight or smell. The commenters felt that the Agency did not give enough justification for selecting the 1/8-inch value and that it is essentially defining the volume of an acceptable release.

The Agency reiterates that the 1/8-inch requirement was selected as the performance standard because it is the sensitivity of existing automated equipment, not because it is an acceptable release. A preliminary EPA analysis indicates that several commercial devices can detect 1/8 inch of product on top of a water table (Notice of Availability; 53 FR 10403). To set a performance standard that is more stringent than can be met by existing technology would eliminate use of this method, which has proven effective in several local UST programs. The Agency considered allowing only manual methods of collecting and analyzing ground-water samples, which may be more sensitive than automated monitors; however, manual methods are very subjective and can only be conducted intermittently, whereas automated methods can be continuous and are less subjective. Therefore, today's final rule retains the 1/8-inch performance standard, and both manual and automated monitoring are acceptable.

(7) Interstitial Monitoring (§ 280.43(g)). Interception barriers and interstitial monitoring were two methods of release detection allowed in the proposed rule. Because they are two distinct methods used to detect releases, they were treated separately. These methods and the requirements that were proposed for them were discussed in detail in the preamble to the proposed rule (52 FR 12735-12739). Commenters

were in favor of allowing these methods but suggested changes to some of the requirements. In response to comments on several technical issues raised in the proposal concerning both methods, EPA has changed some of the technical requirements. Based on these comments, the final rule has consolidated the requirements for both methods into one section, eliminated the use of soil/clay liners, and added a requirement to prevent interference with effective cathodic protection.

Section 280.41 of the proposed rule allowed monitoring between an UST and two types of impermeable barriers as two separate release detection methods. The first method, proposed in § 280.41(f), allowed monitoring for liquids in the unsaturated zone between an UST and an interception barrier immediately below it. Interception barriers are basically partial excavation zone liners: they are located immediately below the UST and come only part of the way up the sides of the excavation pit. The second method, proposed in § 280.41(h), allowed interstitial monitoring between an UST and a secondary barrier that surrounds the entire UST system. These barriers are not the partial, catch basin-type of barriers allowed under the first method. These barriers are either integral to the tank system design itself (e.g., double-walled tanks or pipes) or they are located within the UST excavation area along the bottom and sides of the pit and present a barrier between all parts of the UST system and the environment (e.g., flexible membrane pit liners).

Using either of the above barrier-type methods, the interstitial space between the tanks and the barrier can be monitored by a variety of devices designed to detect a variety of changes in operating conditions (e.g., pressure changes with double-walled tanks or presence of liquid or gaseous product in the interstitial space between the barrier and the UST system). Because improper design can make these systems ineffective, the proposed rule included a number of design criteria to ensure effectiveness as a release detection method.

(a) Consolidation of Sections. The proposed rule included a set of general performance standards and design limitations for each method to ensure effective detection of released product. The requirements for the two methods were essentially the same. Despite their similarity, they were included separately in the proposed rule to make it clear that they are two distinct proposed methods and that both are acceptable means of detecting releases. These two methods were not intended to prevent releases, but were intended to contain releases long enough to direct the regulated substance to a monitor for detection; EPA intended that release prevention be covered in the UST design and installation sections of the rule (52 FR 12735-12739).

Today's final rule has been reorganized so that the performance requirements for both of these methods are discussed in a single section (§ 280.43(g)). The Agency has decided to eliminate the separate and duplicative sections in the proposed rule on interception barriers and interstitial monitoring because this appeared to be a source of confusion to some commenters. This is only an organizational change, not a deletion of a possible release detection method, and does not change the substantive intent of the proposal. The consolidated design and performance limitations for both methods remain as proposed with the exception of the changes noted below.

(b) Performance Standard. The proposed rule required that the interstitial monitor between an UST and a secondary barrier be capable of detecting any release from the UST into the interstitial area. One commenter objected to this wording because it requires that the interstitial monitor would be capable of detecting any release, no matter how small. The Agency disagrees with the commenter and believes that interstitial monitors should be capable of detecting a release into the interstitial area. The available data on monitor performance indicates that they are very sensitive and will, in fact, be able to detect the type and size of release that is likely to occur from a secondarily contained UST system. Ideally, EPA agrees with the commenter that a performance standard should be included in the rule to define the sensitivity of interstitial monitors. The data are insufficient, however, to determine a performance standard. Secondary containment with interstitial monitoring is a very sensitive release detection method and is believed to provide maximum protection of human health and the environment, and the Agency did not want to eliminate it from the rule for lack of a specific performance standard. Therefore, the final rule continues to require that interstitial monitors be capable of detecting a leak from any portion of the tank that routinely contains product.

(c) Soil/Clay Liners. The Agency solicited comments on the performance of barriers for purposes of UST release detection (52 FR 12736, 12739). The subject the Agency received the most comment on was the question of the use of soil/clay liners. Some commenters approved of the use of soil/clay liners but suggested that these liners needed more stringent limitations. Other commenters recommended that these liners not be allowed in the final rule because they are not impermeable to all gasoline constituents. Recently completed studies by EPA's Office of Solid Waste on the effectiveness of soil/clay liners compared to synthetic liners (Notice of Availability, 53 FR 10403), as well as information submitted by commenters on the proposal, have caused the Agency to delete this proposed technical option from today's final rule. This means that barriers constructed from native soils or artificially treated soils (for example, bentonite-sealed soils) are excluded from use under the revised performance requirements for barriers. In general, soil/clay barriers are not being allowed because there is enough evidence about the inadequate performance of these materials as reliable barriers to question their reliability for release detection purposes.

(d) Interference with Cathodic Protection. Several other commenters noted that barriers that completely line the excavation might interfere with the cathodic protection system. For example, flexible membrane barriers are usually non-conductive and could electrically isolate the anodes from the tank system, preventing the flow of protective current. The Agency agrees that this could be a problem although no failures of this type have been reported. A general requirement has, therefore, been added to the rule, stipulating that barriers must not interfere with cathodic protection (§ 280.43(g)). EPA believes this can be met in most cases simply by ensuring that the components of the protection system are placed inside the barrier system.

(e) Compatibility of Liner with Product. The proposed rule contained a requirement that the secondary barrier be compatible with the regulated substance to prevent the product from eroding the integrity of the liner over time, causing holes and possible releases to the environment (52 FR 12735, 12736, 12739). The Agency agrees with commenters who noted that a small amount of liner deterioration is inevitable. Accordingly, the wording of the proposed compatibility performance requirement in § 280.43(g) has been changed to indicate that some deterioration is permissible as long as it does not prevent the detection of a release. This requirement was revised to ensure that a basic level of compatibility is achieved and to make the owners and operators responsible for ensuring barrier materials (e.g., flexible membrane liners) are compatible with the product stored (see also § 280.32).

(8) Other Methods of Release Detection (§ 280.43(h)). As discussed in the preamble to the proposal (52 FR 12739-12740), EPA has identified over 250 commercially available release detection devices. The Agency continues to believe that methods of detection other than the seven general methods listed in the rule may also be able to successfully detect releases under certain circumstances. Thus, the proposed rule allowed the use of other methods of release detection if they were approved by the implementing agency as no less stringent than one of the other methods listed in the rule. Commenters generally preferred that any mechanism for approval of a new method be at the federal level (discussed in more detail below). The final rule, however, retains the approval mechanism as proposed but provides an additional mechanism for allowance of other methods. A new method may be used if it can detect a release of 0.2 gallon per hour or 150 gallons within a month with a PD of 95 percent and a PFA of 5 percent. The Agency felt that adding the second alternative mechanism, one which is self-implementing, will provide consistency among methods, offer additional flexibility for owners and operators to choose new or improved technologies of equivalent protection to those specifically allowed in the rule, and spur innovation.

(a) Other Methods Approved by Implementing Agencies. The specific methods EPA proposed have demonstrated effectiveness in the field and are already in extensive use. An important purpose for including these methods was to make it clear that their use was allowed for meeting the proposed release detection requirements and under what conditions they could be used. The Agency intends to continue to develop and provide information helpful to the implementing agencies in evaluating new methods. EPA will also continue to foster identification and development of new methods. Although the Agency wants to allow new methods, it was also concerned that, to protect human health and the environment, they be limited to the methods that are at least as stringent as the methods proposed. Therefore, the proposed rule included a mechanism to allow the use of a new release detection method if the owner or operator could demonstrate to the implementing agency that the method could detect releases before they migrated beyond the excavation zone as effectively as one of the methods already in the rule.

Generally, commenters agreed with the need for allowing new methods but most felt it should be a federal approval process conducted by EPA, not by the implementing agency as proposed. The commenters were opposed to delegating approval authority to the implementing agencies because the lengthy and repeated (for each state or local agency) approvals would discourage method development and because state and local officials do not have the knowledge to make these evaluations. All of the commenters felt that the approval mechanism would be more efficient at the federal level, where approval could be granted one time, rather than 50 times, by means of an approved list or a revised regulation.

As stated in the proposal, the Agency wants to foster innovation and development of new release detection methods and to allow them to be implemented quickly (52 FR 12739). Therefore, the Agency is concerned that the development and publication of a federal list of approved methods or a revised regulation, as suggested by some commenters, would take too long. The Agency could decide, at some future time, to revise the final regulation to add new general methods. The Agency is convinced, however, that allowing approval by the implementing agency, including those at the state and local level, will enable a new method to be used more quickly because the implementing agencies would not have to wait for a federal approval before a method could be implemented. In addition, the precedent set when a new method passes an evaluation in one implementing agency should facilitate succeeding reviews by other agencies.

Implementing agencies are developing UST programs quickly, and the Agency's primary concern is to meet their needs as rapidly as possible. The Agency's research on release detection methods will provide important information to state and local agencies for use in their decisions on which release detection methods to allow. The Agency will continue to encourage private sector evaluation of new release detection methods and the exchange of this information with the implementing agencies. In addition, as discussed below, the Agency is providing another, self-implementing alternative for use of methods not explicitly included in the rule.

In addition to the reasons given above, a federal approval listing process or a revised regulation would not ease some of the problems that commenters foresee with delegating approval to the implementing agencies. EPA's inclusion of methods in the final rule, or its subsequent endorsement of a new method, does not automatically make the method acceptable in a state because states or local governments may, under their own authority, impose release detection requirements more stringent than EPA's. Each state can review each method and decide whether or not to allow it. In fact, a number of state and local agencies are already implementing their own UST programs, and some of these programs have more restricted lists of approved methods than the federal rule. Thus, the final rule retains the proposed option of approval of other methods by implementing agencies.

The standard for implementing agency approval has been changed in the final rule to make it consistent with other changes in the rule. The revised ground-water monitoring standard no longer requires that the monitoring wells pass through the excavation zone. As discussed in section IV.D.2.d.6. above, the Agency did not believe that this requirement was necessary to protect human health and the environment. The revised method can no longer detect a release before it migrates beyond the excavation zone, making the standard for implementing agency approval meaningless. To retain the consistency between this section and the method requirements, the standard for comparing new and existing methods in the final rule has been revised. The standard now specifies that methods approved by the implementing agency must be as effective as one of the other methods allowed in the rule. Methods are considered to be equivalently protective if they can detect a small release as quickly and reliably as other methods included in the rule. This change is consistent with changes in § 280.42(b)(5)(i) (see section IV.D.2.c.2. of the preamble).

(b) Other Methods That Meet a Performance Standard. The Agency included in the final rule a second mechanism by which a new release detection method can become approved. A new method may be used to meet the release detection requirements if it can be demonstrated to detect a leak rate of 0.2 gallon per hour or 150 gallons within a month with a PD of 95 percent and a PFA of 5 percent. This performance standard for alternative release detection methods contains two equivalent leak rates, and the owner or operator may demonstrate compliance with either format. Although external monitoring methods are capable of detecting very small releases, it is more difficult to demonstrate that they meet a small hourly release rate than a larger, though equivalent, volume. The Agency was concerned that, if only the 0.2 gallon per hour release rate was included in this performance standard, manufacturers of new and effective external monitoring equipment or experimental methods would be discouraged from developing the methods or would be unable to demonstrate compliance to the satisfaction of the implementing agency. As discussed previously, EPA wishes to encourage development of new release detection methods.

Unlike the performance standards for the specific allowable release detection methods, the PD and PFA values for the performance standard for new alternative methods are effective immediately. As discussed above in section IV.D.2.a.5., compliance with the probabilities applicable to all methods is delayed for two years. This delay was included in the final rule to allow manufacturers time to modify existing methods, which are already in wide use, and develop the required documentation of performance while still providing the immediate release detection needs required in the rule. These allowable methods were identified in the rule because they are widely used and expected to work well, often without significant improvements. New alternative methods, however, should be developed from the beginning to meet the most stringent performance requirements. In addition, the Agency was concerned that only requiring a leak detection capability of 0.2 gallon per hour could be interpreted to allow imprecise methods such as inventory control to be used alone for the first 2 years of the program. Methods such as ATGS can already operate almost to the required probabilities of detection and false alarm, whereas inventory control cannot come close to these levels, and to allow its use alone even for 2 years would be harmful to human health and the environment.

The evidence gathered by EPA from laboratory evaluations and field experience indicates that the methods specifically proposed (except inventory control) should be able to meet this performance standard now or in the near future (see discussions above for each method). As new methods use this mechanism to become approved, this will ensure consistency of performance among new methods. The net effect of including this alternative in the final rule is to move closer to the general performance standard for all methods considered desirable by many commenters (see discussion in section IV.D.2.a.4. above).

The addition of this alternative will have the effect desired by commenters and EPA of spurring innovation and development of new technology for release detection because there is now a specific and measurable goal for manufacturers to work towards. In particular, this approach will provide flexibility to develop new release detection methods for unusual UST systems such as bulk tanks, for which current methods are inappropriate or expensive. This approval mechanism will have the additional advantage of allowing a new method proven to meet the standard to be used without any approvals in states which allow this approval mechanism.

This approach also clarifies what minimum equivalent performance must be demonstrated to the implementing agency under the other approval procedure for new methods (see preceding section). EPA did not, however, want to make this performance standard the only means by which a new method could become approved because it may not be possible to easily determine a leak rate for some methods within the next few years, particularly external ones. Such methods can still be very effective at detecting releases and the Agency wants to encourage the development of sensitive methods. If method developers can demonstrate to the implementing agencies the sensitivity of their methods in ways other than leak rates, then they should be able to do so. For these reasons, the performance standard approach to approving new methods is included in the final rule in addition to, not in place of, the proposed mechanism requiring review by the implementing agency.

e. Methods of Release Detection for Piping (§ 280.44). The general release detection requirements for pressure and suction lines are discussed in section IV.D.2.b.2. of this preamble. This section discusses the performance standards for those required release detection methods.

One commenter noted that piping and tank release detection methods should be separated because not all tank methods apply to piping and vice versa. A separate section addressing piping release detection methods has been added to the final rule to address these concerns. Separating the methods for tanks and piping allows owners and operators greater flexibility in designing a system. For example, at a station with extensive piping, installing flow restrictors and conducting an annual tightness test for the piping and using vapor monitoring for the tanks may better protect the environment and cost less than installing vapor monitoring for both the tanks and piping.

The proposed rule required either continuous monitoring devices or automatic shutoff devices on all pressurized lines as well as a line tightness test in conjunction with scheduled tank tightness tests. The proposed rule established a leak rate for the automatic shutoff device and indirectly required line tests to meet the tank test standard (0.1 gallon per hour with a PD of 99 percent and a PFA of 1 percent) but set no other performance standards. The Agency requested comment regarding the field performance of pressurized piping release detection methods (52 FR 12744). Commenters noted that additional performance parameters should be provided in the rule, such as detection limits and line operating characteristics. The Agency agrees and has accordingly added further specifications to the piping release detection methods allowed in the final rule to ensure that they meet these minimum performance standards. Thus, probabilities of detection and false alarm have been added for the automatic line leak detectors and line tightness tests; and (for reasons explained earlier) the effective date of these probabilities is delayed for 2 years. Because leak rates depend on the pressure in the line, the Agency agreed with commenters suggesting that the minimum performance standards for line leak detectors, which operate by detecting changes in line pressure, should be specified in terms of the line operating pressure. Each of the piping release detection methods is discussed below.

(1) Automatic Line Leak Detector (§ 280.44(a)). The proposed rule required that the automatic shutoff device be capable of detecting and shutting off a release of at least 2 gallons per hour. This value was selected based on manufacturers' claims. Most commenters felt that the performance standard suggested in the supplemental notice (52 FR 48638) of 0.1 gallon per hour with a PD of 99 percent and a PFA of 1 percent was too stringent, and that 2 gallons per hour was below the detection level of flow restrictors.

The performance standard in the final rule for automatic piping release detection methods (including flow restrictors, shutoff devices, and interstitial or external monitors) has been set at 3 gallons per hour at 10 psi with a PD of 95 percent and a PFA of 5 percent. The 3 gallons per hour value and the probabilities were selected based on a study conducted by EPA's Office of Research and Development of the behavior of pressurized lines, an evaluation performed and submitted by a commenter, and manufacturers' written claims. The value of 10 psi was also selected because it is the pressure at which a typical line leak detector operates. A manufacturer can test a device at any convenient operating pressure and mathematically convert the results to 10 psi to determine if the device meets the performance standard. As discussed elsewhere in today's preamble (section IV.D.2.a.5.), the effective date of the PD and PFA is delayed for 2 years following promulgation.

The final rule also requires that an automatic line leak detector be capable of checking for releases hourly and either restrict or shut off flow of product or be equipped with an audible or visual alarm. The Agency intends the term automatic line leak detector to include a wide variety of devices that meet the standard including automatic shutoff devices, automatic flow restrictors, continuous interstitial monitors, continuous vapor monitors, or continuous ground-water monitors. The hourly detection frequency was selected because pressurized lines can release large volumes of product quickly, so very frequent monitoring is necessary during operation to protect human health and the environment. The equipment currently on the market either operates continuously or conducts a test each time the pump is turned on to dispense product, provided several minutes have elapsed since the previous dispensing, so meeting this requirement should not be difficult. The Agency believes the operators must be alerted immediately to the presence of leaks in pressurized lines. To do this, a clear indication such as flow restriction or shutoff or an alarm is considered necessary.

The final rule also contains the requirement that all automatic line leak detectors be checked annually according to manufacturer's requirements. This requirement was added in response to commenters' concern that line leak detectors can malfunction or be overridden by unwise operators. The possible burden of an annual maintenance check is outweighed by the importance of detecting and stopping pressurized releases.

(2) Line Tightness Test (§ 280.44(b)). The line tightness test that is required in the final rule annually for pressurized piping and every 3 years for American-style suction systems is part of the tightness test option that was proposed for the entire UST system. Work conducted at EPA's test laboratory in Edison, NJ, has demonstrated that line tightness test methods should be able to meet a performance standard of 0.1 gallon per hour with a PD of 95 percent and a PFA of 5 percent with, perhaps, some minor modifications in procedure and equipment (see section IV.D.2.b.2.). Therefore, this performance standard has been adopted in the final rule. As discussed above and in section IV.D.2.a.5., application of the performance standard for line tightness testing has been delayed for 2 years.

As discussed above, the performance standards for line release detection must be stated in terms of the line operating pressure. The value of 1.5 times the operating pressure was selected for the line tightness test because most operators are currently performing tightness tests at this pressure, it is the procedure recommended by NFPA 329 for hydrostatic testing, and it covers the range of line operating pressures, including suction lines. It should be noted that, for safety reasons, all line tightness tests should be performed at positive pressure, not a vacuum, even for suction lines. For example, most suction lines operate at 3 to 5 psi negative pressure; therefore, tightness tests should be conducted at about 7 psi positive pressure.

(3) Applicable Tank Methods (§ 280.44(c)). In the proposed rule, six categories of tank release detection were allowed to meet the monitoring requirement for the "UST system," which included the associated underground piping. As discussed in section IV.D.1.a. above, the final rule now separates the release detection methods for tanks and piping because not all tank release detection methods can be used for piping and vice versa. As noted by commenters, some of the tank monitoring methods are in fact applicable to piping, such as vapor monitoring, groundwater monitoring, and interstitial monitoring, and the Agency wanted to include their use as an option for piping release detection. Therefore, the final rule allows monthly monitoring with one of the applicable tank monitoring methods if it is capable of detecting a release from the portion of the underground piping routinely containing product and meets the restrictions applicable to the use of those methods. This is one of the options for the monthly release detection requirement, in addition to the automatic line leak detector requirement.

f. Recordkeeping (§ 280.45). The proposed rule required that all UST system owners and operators maintain records on the release detection systems required in the rule. The requirement to keep records of performance claims, test results, and equipment maintenance was included because of the importance of each of these activities in the successful detection of releases and in demonstrating compliance to the implementing agency. Commenters generally felt that the requirements were too burdensome and would be particularly difficult to achieve if the testing was done by a service company. The main areas of concern were the requirement to keep performance claims and the components of an adequate performance claim.

Today's final rule retains the recordkeeping requirements as proposed with two revisions. First, only release detection equipment permanently located on-site must have written documentation of calibration, maintenance, and repair on file. Second, manufacturers' schedules of calibration and maintenance for release detection equipment must be retained for 5 years from the date of installation.

The Agency required in the proposed rule that all UST system owners and operators maintain three types of records demonstrating compliance with the applicable release detection requirements: documentation of method performance monitoring results; and general operation, maintenance, and repair. It was felt that these records demonstrate that certain past events important to effective release detection using that method actually took place and could be used by implementing agencies to determine compliance (52 FR 12747). In general, commenters felt that the proposed recordkeeping requirements as a whole were too burdensome. The Agency believes, however, that the requirements are not particularly burdensome because many of the records will be supplied by manufacturers, sales personnel, or service people; not much paperwork is involved and the required records would generally be kept on file anyway; and paperwork will be added infrequently. In general, some records are needed to remind the owners and operators when maintenance is scheduled and to help them keep the equipment under warranty. Finally, properly maintained records are necessary to allow later analysis of the tank systems by either the owners and operators or the implementing agency in the event of a release investigation or system closure. Each of the individual requirements receiving comment or revised in the final rule is discussed below.

The requirement to maintain manufacturers' performance claims and justifications for 5 years was intended to encourage manufacturers to evaluate their equipment and develop documentation of the proof of performance and to cause owners and operators to review this information while selecting an appropriate release detection method. Many commenters expressed confusion over what these performance claims would be and were concerned that the owners and operators were being required to substantiate the claims. It was not the intent of the proposed or final rule to require the owners and operators to provide the proof of performance claims, only for them to ask for and acquire information from the manufacturer. In order to compete and successfully market equipment, the manufacturer will have to develop convincing documentation demonstrating that the release detection method meets the minimum performance requirements.

As discussed in the proposal preamble (52 FR 12719), there are several types of information that the manufacturer should include in this documentation and that the owners and operators should look for. The final rule does not require any specific information, however. EPA recognizes that the level of detail will vary by type of method and that, over time, manufacturers will develop standardized claims that will help guide the owners and operators. This requirement will place owners and operators in the position of having to review the claims and select a system that will meet regulatory requirements. Thus, owners and operators are responsible for achieving the goal of effective release detection and demonstrating to the implementing agency that the owners and operators have made an effort to comply with the regulation. For these reasons, this section of the final rule will remain unchanged from the proposal.

The proposed rule required that all records of calibration, maintenance, and repair be maintained by all owners and operators for at least one year. These are important procedures for the proper functioning of release detection equipment, particularly automated systems, and must be available for inspection to demonstrate that the system is working as well as it can. One commenter noted that the recordkeeping requirements would be difficult to meet for owners and operators who hire release detection services to do the monitoring. EPA agrees with this, and today's final rule states that this requirement applies only to owners and operators of equipment permanently located on-site. Owners and operators who hire release detection services need not retain the servicing records of their contractors. Owners and operators, however, must ensure that the service is performed well and according to specifications and will be responsible for the cleanup of any undetected releases.

Another addition to today's final rule that was not in the proposed rule is the requirement that any schedule of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for 5 years from the date of installation. This information should be provided by most manufacturers in the same brochures as performance claims; thus, this new requirement should not result in much additional paperwork. This requirement was added as a clarification to the final rule to remind owners and operators of the importance of maintaining these data. With this requirement, implementing agencies can verify that required maintenance and calibration were performed. Also, if ownership of a site is transferred, the new owner or operator will be able to understand and ensure that the proper schedule is maintained.

g. Other Release Detection Issues -- (1) Release Detection Variances for Low-Risk Sites. In the Supplemental Notice (52 FR 48641), EPA noted that protected tanks in some areas of the country may not require frequent-to-continuous release detection. EPA requested comments on whether, within these less sensitive areas, variances should be allowed for protected tanks to conduct internal inspections or less frequent monitoring. EPA requested comment on the appropriateness of these alternative release detection approaches and under what conditions they might be used. There was little agreement among commenters on either issue, and no specific recommendations on how low-risk areas could be defined or identified at the federal level. The final rule does not include a release detection variance for low-risk areas because of the difficulty in operationally defining and implementing a variance procedure which adequately protects human health and the environment.

Commenters who supported the use of the variance felt that it would improve environmental protection by focusing resources on UST systems in higher risk areas. Commenters opposed to the variance noted that leaks can pose environmental problems even in low-risk areas. Their experience suggested that impermeable formations may actually have hidden fractures that allow product to reach deep ground water and necessitating expensive cleanup efforts. They further suggested that, under any circumstance, product leaks may pose an explosion hazard. These commenters also noted the difficulty of managing a variance process.

The Agency agrees with commenters who noted significant problems with a variance procedure. No commenters were able to suggest a manageable variance procedure given the size of the UST universe. As noted earlier in the preamble, defining sensitive or low-risk areas at the federal level is problematic (see section III. of today's preamble). Because the Agency could not develop reasonable criteria for granting variances on a case-by-case or prospective basis, no release detection variance is included in the final rule. Consequently, less protective detection options such as infrequent monitoring for protected tanks over 10 years of age will not be permitted in any areas regardless of risk.

(2) Internal Inspection as an Alternative to Release Detection. The Agency also considered the use of internal inspections as a substitute for release detection. EPA solicited comment in the December 23, 1987, supplement to the proposal on the use of internal inspections at low-risk UST sites. The Agency received many comments both for and against this option. In general, supporters of internal inspections believe that this would provide important information on the internal and external corrosion and the structural integrity of tanks. Some commenters specifically recommended allowing internal inspection as a release detection alternative at low-risk sites (e.g., sites that are not in vulnerable ground-water supply areas or in close proximity to surface waters and residential areas) while others supported its use at all UST sites. Schedules for conducting internal inspections, such as at periodic intervals (e.g., every 3 to 5 years; or ever 10 to 15 years) or based on tank age, were recommended by several commenters.

Reasons given by commenters not supporting this option included: (1) not all tanks are constructed with manways, (2) internal inspections are time consuming and would be cost effective only for larger (bulk) tanks, (3) internal inspections do not provide sufficient information on tank integrity, and (4) inspections are a safety risk to the inspector.

The Agency does not have sufficient data on the performance of tanks subject to internal inspection programs that would allow it to determine that such an approach without release detection would be protective of human health and the environment. The Agency is aware that internal inspections are widely used by owners and operators of bulk tanks for evaluating tank integrity. Based on insufficient information on the use of internal inspections with all USTs and the lack of industry consensus codes, however, the Agency has decided not to include this as a release detection alternative in the final rule.

E. Release Reporting, Investigation and Confirmation

1. Overview

Because UST systems are hidden from direct observation, suspected releases must be investigated to identify, or confirm, that an UST system is the source of a release. Monitoring results and other indicators in the environment are the only suggestions of a release. In general, corrective action cannot be started until the UST system and UST site are investigated and a release is confirmed.

The proposed rule required that all suspected releases be reported to the implementing agency (see proposed § 280.50). Suspected releases included: positive monitoring results from testing, monitoring and sampling, unusual operating conditions, and the discovery of regulated substances in the environment. All suspected releases had to be immediately investigated, unless the owner and operator elected to proceed directly to corrective action.

As discussed in the preamble to the proposed rule (52 FR 12747-12751), the development and implementation of criteria and procedures to determine the appropriate circumstances to initiate, conduct and conclude the confirmation process can be technically complex. This situation is further affected by the fact that owners and operators are typically reluctant to begin what they consider to be the costly process of confirmation. Although this testing is inexpensive relative to corrective action costs, owners and operators typically want to avoid all unnecessary costs. The Agency's proposed release reporting and confirmation requirements were established in the belief that nearly all suspected releases must be investigated before conducting even more elaborate and costly abatement procedures. The first step was to quickly establish if the UST system is actually leaking. Prompt reporting of suspected releases also was proposed so that responsible authorities could take action to ensure that investigations are timely, properly designed and performed, and protective of human health and the environment.

The Agency proposed several alternative procedures for investigating suspected releases including: different combinations of tank and line tightness testing, inventory reconciliation review, testing of secondary containment, checking equipment operation, soil coring and analysis, and other methods specified by an implementing agency. Numerous comments were received in response to the proposed requirements. Most commenters took issue with the proposal's attempt to provide specific direction and guidance and suggested that even more details were needed to successfully implement this approach. For example, several commenters questioned how soil sampling results were to be interpreted and when the soil coring analysis and investigations could be accepted as definitive. In addition, commenters pointed out that the actual steps in confirmation are determined on a site-by-site basis. Other commenters were concerned with the discretion provided the implementing agencies in directing owners and operators in the investigation of off-site impacts.

As discussed elsewhere in today's preamble, EPA has received very encouraging information about the general efficacy of tank tightness testing. Also, it has become clear from comments and information received that tank tightness testing is the most prevalent technique now in use to determine if a suspect system is in fact leaking. Thus, tightness testing is a key confirmatory step in the final rule required of all owners and operators, unless they choose to immediately conduct an initial site investigation instead.

The fact that the overwhelming majority of release investigations are presently conducted using either a tightness test (as suggested by several commenters) or a small-scale site investigation has influenced the final rule as presented today. Accordingly, the five proposed investigation alternatives have been replaced with the requirement to use these two prevalent methods. Alternative methods that are no less stringent and are approved by the implementing agency are still allowed. Today's rule has been revised to more clearly establish the end point for investigation and confirmation procedures. These procedures end when a successful tightness test is obtained or when the data from environmental testing do not significantly exceed background levels. (However, these investigations may resume if additional evidence to the contrary is presented or is discovered.)

2. Section-by-Section Analysis

a. Reporting Requirements (§ 280.50). The proposal (§ 280.50) required owners and operators to report to the implementing agency within 24 hours any monitoring results from any release detection methods specified in Subpart D that indicated that a release may have occurred. Also, the observation of any unusual operating conditions at the UST system that could be indicative of a release, as well as any indication of the presence of released substances in the environment surrounding the UST, had to be reported. The proposed requirement for the implementing agency to be informed early in the confirmation process was believed necessary so that the implementing agency would be assured that proper investigation procedures were used. Commenters generally responded that it is not necessary to report all suspected releases. They identified situations in which obvious false alarms would have to be reported, and conditions that would be disruptive to the operation of the facility. They pointed out that the large number of what would prove to be unnecessary reports could overwhelm the implementing agency.

The Agency acknowledges that some of the situations brought to its attention could indeed result in a significant number of false (or unnecessary) reports. For example, the erratic behavior of dispensing equipment may warrant further investigation before reporting because this behavior can be caused by more than just a leak in the line. Accordingly, the final regulation has been revised to allow owners or operators to verify the proper operation of their equipment before reporting a suspected release. If the faulty equipment is immediately repaired or replaced and further inspection fails to confirm the initial result, the incident does not need to be reported. In the case of inventory control, the rule now allows a second month of data to be collected to verify the possibility of a release before reporting. 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 suspected loss depends on the size of the tank, monthly throughput, and other operating practices. The appropriate action level must be worked out in advance of using this method.

Other situations such as the physical presence of the regulated substance or unusual concentrations of vapor still require immediate reporting. (The requirement for reporting soil concentrations of 100 parts per million or more has been removed because specific national action levels cannot be established for each affected medium; a more reportable condition is whether new contamination was found based on a change from earlier conditions at this site, rather than arbitrary numerical standards and levels.) Failure to determine that an operational problem is caused by faulty equipment will also require reporting. In addition, as in the proposal, the Agency requires the owners and operators to report off-site conditions that might indicate a release has occurred and that are brought to their attention by a third party. This is intended to expedite the process of quick identification of release incidents by giving the general public additional avenues to report their observations.

b. Investigations Due to Off-Site Impacts (280.51). Under the proposed rule, the owner and operator had to investigate suspected releases that were indicated by off-site impacts and as required by the implementing agency. The unintended interpretation of this requirement was that the implementing agency could direct the owner and operator to conduct off-site investigations in response to the discovery of off-site impacts. Commenters strongly objected to this proposed requirement because they felt that it was improper to conduct investigations on property not under their control and because of the apparent wide discretion given the implementing agency in deciding what confirmation steps are needed in an off-site investigation.

The final rule includes revised language that restates the requirement so it is clear that owners and operators must investigate their own UST system and site when requested by the implementing agency and based on the discovery of off-site impacts. The potential for environmental damage is too great to allow the source of a release to go unidentified and unchecked. Limiting the investigation to the on-site

UST system should minimize problems suggested by commenters associated with the investigation of releases on property owned by other parties. The Agency did not intend that owners and operators, under these regulations, must conduct investigations on property belonging to others. In the final rule, the investigation has been limited to the determination of whether the owner and operator's UST system is the source of the off-site impact. If regulated substances have been released from an owner and operator's system, as determined by an on-site investigation and confirmation, then they will be responsible for any necessary corrective action, whether on- or off-site.

c. Release Investigation Procedures (§ 280.52(a) and (b)). As discussed in the proposal preamble (52 FR 12748-12751), the Agency considered three approaches to release confirmation: detailed, step-by-step procedures; confirmation directed completely by the implementing agency; and a basic, but not detailed, set of requirements. The first approach was rejected because it is not feasible to identify and address all possible types of releases and site conditions in the regulation. The second approach was rejected because implementation of release investigation would be delayed until implementing agencies had the time and resources to determine the appropriate methods for each individual site and because owners and operators would generally delay action until their responsibilities were determined by the implementing agency. Thus, the Agency selected the third approach as providing sufficient guidance as well as flexibility.

To implement this approach, the proposed rule provided five specific procedures for release investigation. Any one procedure could be used depending on the preference of the owner and operator and the way in which a suspected release was identified. These procedures were: (1) performing a site investigation under the direction of the implementing agency; (2) checking the interstitial area of a secondary containment system; (3) in the case of a failed tightness test, checking inventory records, retesting of each portion of the system, and analyzing soil samples; (4) in the case of an inventory discrepancy, performing tightness tests and analyzing soil samples; and (5) performing any other investigation procedure that is no less stringent than those above if approved by the implementing agency. This selection of release investigation procedures was intended to address all possible situations and allow investigation to begin quickly even in the absence of guidance from the implementing agency (although such an interaction was considered most desirable).

Most commenters disagreed with the proposed approach, particularly the degree of authority given to the implementing agencies. Some of these commenters requested more specific guidance on investigation procedures, particularly what to do given certain findings and when to end an investigation. The specific investigation technique receiving the most comment was the soil coring requirement. Commenters felt it was an expensive and difficult process, the results of which are not definitive in confirming a release as there are many sources of soil hydrocarbons other than a current release. The proposed rule was also unclear about what actions should be taken based on the results of soil sampling. This requirement was proposed to be combined with the tightness test because it was believed that tightness tests might not be determinative and could not detect very small releases. This requirement was deleted in the final rule because it is now apparent (see discussion below) that tightness testing is a reasonably sensitive and reliable method. Soil sampling and analysis may still be part of the site investigations process as discussed in section (3). below.

(1) Timing of Release Investigation and Confirmation. The Agency required in the proposal that all suspected releases be investigated within seven days of initial reporting. Commenters were equally

divided on whether this period was too long or too short. The Agency recognizes that there are some situations, such as the presence of product in the environment, where an immediate response to a suspected release is required. In other cases, such as when relatively small inventory discrepancies appear, greater time intervals may be allowed. The rule has been changed to recognize this: a second month of data collection is allowed for inventory control confirmation; seven days are allowed for testing of the tightness of tanks and lines; and 24 hours are allowed for checking the operation of monitoring and dispensing equipment.

(2) Tightness Test (280.52(a)). Since proposal, the results of three studies have influenced the Agency's thinking on effective release investigation procedures. The evaluation of 25 tightness test methods at the EPA Office of Research and Development's laboratory at Edison, New Jersey, (53 FR 10403) indicates that current equipment, operated with some procedural modifications, should be able to detect leaks as small as 0.10 gal/hr (see section IV.D. of this preamble for further discussion of tightness testing and these results). In California, a state with a large UST population and an active UST program (and in numerous other state and local programs), tightness testing is often the preferred approach to release investigation. The new information on the causes of release from UST systems (discussed earlier in this preamble) demonstrates that the most common sources of releases are pressurized piping and loose fittings and bungs on top of the tank, which only leak during tank overfill. The easiest way to detect releases from piping is a line tightness test, and the overfill-type of tank tightness test will identify bad fittings on top of the tank. For all of these reasons, the Agency has concluded that tightness testing is a much more effective method of release investigation than was known at proposal, is often the most logical test with which to investigate a suspected release, and is currently the most practiced confirmation tool nationwide.

Based on the above conclusion that tightness testing is the most effective first step in release confirmation, the Agency revised the final rule to ensure that the appropriateness of this method is highlighted. Consequently, the sections of the proposed rule presenting the several alternative investigation procedures have been deleted from the final rule. (In doing this, EPA agrees with several commenters that some of these procedures were incomplete and unnecessary on a site-specific basis.) In their place are two alternative investigation steps, the first of which is to conduct tightness tests to determine the integrity of the tank and piping. If the test results indicate there is a leak from a portion of the UST system that routinely contains product, the owner and operator must stop the leak and begin corrective action (releases from other portions of the UST system are addressed in reporting and cleanup of spills and overfills in § 280.53). If the tightness test indicates that the UST system is not leaking and there is not evidence of environmental contamination, the final rule does not require further actions of the owner and operator. However, if evidence of environmental contamination is still present and unexplained, the second alternative investigation step must take place. The second step requires conducting an initial site investigation (see section (3) below).

This revised approach is intended to provide clearer guidance and definitive end points as was requested by several commenters. In addition, tightness testing is a familiar technique for many owners and operators and is the most readily available and inexpensive investigation procedure. Therefore, by emphasizing its use as the primary release investigation procedure, many owners and operators will more likely begin investigation quickly on their own without waiting for the implementing agency to direct them. This capability of quick response, plus the sensitivity of tightness testing and its ability to pinpoint all sources of a leak, will minimize the potential damage to human health and the environment from a suspected release. Moreover, tightness testing is frequently the first step in corrective action to determine what must be done to stop a release. Thus, making it a part of release investigation will be cost effective for owners, operators, and implementing agencies.

(3) Site Check (§ 280.52(b)). The proposed rule (§ 280.51(a)(1)) allowed owners or operators to investigate suspected releases by conducting an initial site investigation of the UST site under the direction of the implementing agency. The final rule retains this option as the second step in the release confirmation process. The site assessment requirements in the original proposal, however, have been significantly modified to provide owners and operators greater flexibility in consideration of different site conditions. The requirements have also been modified to be more consistent with the assessment activities required under the closure and corrective action provisions of the final rule.

The initial site assessment allowed under the proposed release confirmation provisions was intended to be similar to the investigation performed under the closure and corrective action provisions. The objective of each of these assessments is to measure for the presence of released regulated substances and provide a preliminary indication of the need for and scope of further corrective action activities. They are not intended to define the full extent or location of soils contaminated by a release.

Despite this similarity in purpose, however, the proposed rule specified different sampling methods and assessment techniques. As a result, a number of commenters expressed confusion concerning the nature and scope of the assessment and requested more specific guidance on investigative procedures. Therefore, to clarify the rule's objectives and ensure that the results obtained from each type of assessment are comparable, similar site check requirements have been incorporated into the release confirmation, closure, and corrective action subparts of the final rule.

The site investigation allowed under the proposed rule had to be conducted under the direction of the implementing agency. As noted above, a number of comments criticized the degree of authority given to the implementing agency under these provisions. EPA agrees that the proposal did not give owners and operators adequate guidance for determining the objectives and goals of the site investigation. This could have resulted in wide variations in the nature and scope of the site assessments conducted under the proposal and in inconsistencies in the resulting data and their interpretation. The proposal also could have inadvertently required the implementing agencies to commit significant resources to the management of site assessments given the large number of assessments, projected to be conducted over the next 5 to 10 years. Therefore, the final rule allows the owner and operator to plan, select methods, and conduct the initial site check. These changes, however, do not diminish or restrict in any way the authority of the implementing agency to participate in the planning and performance of site investigation activities of the owner and operator. These changes will allow the implementing agency to determine the scope of their involvement in the site investigation program and, at the same time, avoid unnecessary and potentially costly delays in the implementation of each assessment by the owner and operator.

The final rule does not require the owner and operator to use a particular type of measurement method or assessment technique. A number of commenters questioned the applicability and effectiveness of the investigative procedures discussed in the proposed rule, and suggested other methods that may be equally effective in various site-specific situations. EPA agrees that a given sampling method or measurement technique may not provide representative results for all types of regulated substances and site conditions.

For example, soil gas sampling may not be appropriate where the regulated substance contains compounds that are non-volatile or where the local geology and hydrology significantly restrict the movement of the volatilized organic species.

To address this problem, the final rule requires the owner and operator to measure for the presence of regulated substances in the area where contamination is most likely to be present. Any factors that may affect the identification of the source or presence of contamination must be considered in order to ensure that the assessment will provide accurate and reliable results. The rule specifies the factors deemed to be the most important in selecting the measurement method and in conducting the initial site check.

Measurements must be taken in the area surrounding the UST system where contamination is most likely to be present. Samples may be collected from any depth as long as they are taken where contamination is most likely to have migrated or accumulated given the specific characteristics of the site and the regulated substance. Most regulated substances will tend to migrate down and, as a result, the Agency believes that samples taken at depths below the UST system's suspect components will generally satisfy the requirements of this subsection. The contaminants in some regulated substances, however, may float on the water table or dissolve in the ground water. Consequently, the nature of the regulated substance and the depth to ground water around the UST system are important factors to be considered when developing an assessment plan.

The owner and operator may also find it necessary to conduct the initial check in an area that extends outside of the excavation zone of the UST system. Although the Agency believes that sampling in the excavation zone will generally provide the most accurate information about the presence and source of contamination at an UST site, it may not be possible to identify the precise location of the excavation zone or gain reasonable access to the areas adjacent to the tank and piping due to interfering structures. In addition, samples taken from the excavation zone will not give any information concerning the extent of contamination. Where contamination poses an imminent threat to human health and the environment on adjacent property, it may be more appropriate to take samples at or near the site's property line that is adjacent to the off-site point of impact. For example, seepage of liquid or vapors into occupied residences or into drinking water supplies may necessitate sampling at the adjoining property line so that corrective action activities can be expedited. In such cases, the mitigation of contamination in the soil or ground water around the building or well may be more important than first identifying the cause of the contamination, particularly where there are several possible sources of suspected releases.

The specific factors identified in the final rule were selected to ensure that representative assessment information is obtained during release confirmation. Consideration of these factors by the owner or operator is deemed by EPA to be the minimum requirements for adequately evaluating the area surrounding the tank. They are not intended to be exhaustive nor should they be given equal weight at all sites. The importance of each of the factors must be evaluated carefully in view of the regulated substances suspected of being present and the specific conditions at the site.

d. Reporting and Cleanup of Spills and Overfills (§ 280.53). In the proposal, the Agency specified that spills and overfills which resulted in the release of a regulated substance meeting or exceeding the reportable quantity (RQ) under CERCLA (40 CFR 302), or spills and overfills of petroleum exceeding 25 gallons or causing a sheen on surface water, must be reported to the implementing agency with 24 hours. The proposed approach has been maintained in the final rule.

In the preamble to the proposed regulation, the Agency requested comments on the appropriateness of the reporting cutoff of 25 gallons for aboveground releases of petroleum to land and surface water. Commenters were divided on this issue. Many supported the 25-gallon cutoff while some requested that it be raised to much higher levels and a few requested that it be lowered. The Agency has retained the proposed reporting levels while allowing individual state and local implementing agencies the ability to select other amounts under certain conditions. In all cases, the spill or overfill must be immediately contained and cleaned up, and, if it is not, then it must be reported to the implementing agency. The point at which a report must be submitted to the implementing agency is an administrative convenience, and the Agency intends to leave some discretion to the states on this area.

The Agency believes that spills often occur at many of the facilities in this regulated community. In fact, knowledgeable members of the regulated community have reported to EPA that spills and overfills are the second most common source of release to the environment. This conclusion is based in part on observations made during tank removal of obviously contaminated soil around areas of the tank where spills might be expected to occur. This soil contamination can be caused by emptying fill hoses onto the ground after delivery, either by accident when the hose is disconnected from the tank or on purpose when the tank is inadvertently overfilled and the hose cannot be drained into the tank. Although any one incident may or may not result in a significant threat at a particular site, the Agency has concluded that the repeated occurrence of these releases over time does represent a serious threat to human health and the environment.

The concern about spills reporting is that spills appear to occur very frequently, although generally in small quantities. The requirement to report all spills, regardless of their size, could cause the implementing agency to be overwhelmed with reports of numerous small spills that do not represent a significant threat to human health and the environment. The Agency believes very little threat is posed by smaller spills if they are contained and immediately cleaned up, including contaminated surface soils. The installation of catchment basins required in Subpart B in the final rule should reduce the number of releases to the environment, the cost of cleanup for owners and operators and the number of incidents where reporting is necessary.

The Agency has retained the proposed RQ approach to indicate to the owner and operator when reporting is necessary. For petroleum, this approach requires reporting of aboveground releases to land in excess of 25 gallons, and of aboveground releases to water if the result is an oil sheen on the water, in accordance with the requirements of 40 CFR Part 110. The rationale for this was provided in the preamble to the proposal. The Agency also recognizes that, in some cases, it may not be possible to immediately clean up a spill of less than 25 gallons. When this occurs, the owner and operator is required to report the spill to the implementing agency.

A spill or overfill resulting in the release of a hazardous substance to the environment must be reported if the volume equals or exceeds its RQ as defined under CERCLA (40 CFR 302). The RQ for a particular hazardous substance may result in a volume that is less than 25 gallons. The Agency feels it is necessary to place tighter controls on hazardous substances because of their generally greater threat to human health and the environment. An additional discussion of this issue is provided in section VI.A. of this preamble. The release of a hazardous substance equal to or in excess of its RQ must also be reported to the National Response Center immediately (rather than within 24 hours) under sections 102 and 103 of CERCLA and to appropriate state and local emergency response authorities under Title III of SARA. The requirements of today's rule do not change the responsibilities of owners and operators to meet the requirements of these other EPA rules. Thus, in the case of a spill or overfill of a regulated hazardous substance from an UST, the owner and operator is subject to two reporting requirements. The impact of additional reporting, however, is minimal because the goal of The National Response Center is essentially to inform local implementing agencies. This will already have been done when the owner or operator fulfills the requirements in today's rules.

Although reporting triggers have been established for aboveground releases, this does not relieve the owner and operator of the responsibility to undertake all other appropriate elements of the corrective action process under Subpart F for any aboveground release, regardless if it is more or less than the reportable quantity.

F. Release Response and Corrective Action for UST Systems Containing Regulated Substances

1. Background

Release response and corrective action for UST systems include activities to investigate, report, abate, and remedy releases of regulated substances into the environment. To ensure that necessary steps are taken to protect human health and the environment at all sites discovered to have a release, EPA proposed steps that all owners and operators must take quickly to identify and reduce any immediate health and safety threats posed by releases. In addition, proposed requirements mandated the investigation and amelioration of the long-term threats to human health and the environment posed by releases that have migrated beyond the UST system to contaminate surrounding soil and ground water. Long-term actions would begin after an implementing agency determined that additional corrective action was needed to protect human health and the environment. This determination was to be made on the basis of data gathered and submitted by the owner and operator and a site-specific exposure assessment performed by the implementing agency. Finally, the proposal distinguished between releases of petroleum and hazardous substances by establishing separate corrective action requirements for them in different sections of the proposed regulations (Subpart F for petroleum and Subpart G for hazardous substances).

Today's final rule builds upon this proposed approach, but also reflects several important changes that respond to concerns raised by commenters on the proposal:

- The Agency has consolidated the proposed requirements for petroleum and hazardous substances into one section of the final rule in Subpart F. This consolidation deletes the extensive duplication of requirements in the proposal caused by separating them into two sections.
- The proposed basic framework and most of the proposed requirements for the initial abatement steps required at all release sites are retained in the final rule. Changes have been made, however, to some of the proposed requirements in response to public comments. These changes are intended to clarify the owner's and operator's responsibilities for identifying and addressing the initial health and safety threats posed by releases.
- The final rule retains the proposed requirements for long-term corrective actions, which follow a site-specific approach for establishing clean-up target levels. This section of the rule has been amended, however, to clarify that the owner and operator may proceed, under certain conditions,

with corrective action before a corrective action plan has been approved by the implementing agency.

- In response to concerns raised by several commenters, EPA has revised several of the proposed requirements to clarify the responsibilities of owners and operators. Some changes clarify when owners and operators must initiate specific corrective action steps, such as detailed soil and ground-water investigations, particularly in the absence of clear direction from the implementing agency. Other changes more clearly identify what owners or operators must do to carry out their responsibilities in such areas as the initial site investigation, detailed investigations for soil and ground-water contamination, and free-product removal.
- The final rule clarifies the requirements concerning the public participation process for corrective action. The final rule emphasizes the need to ensure public access (primarily through existing state procedures) to information pertaining to specific corrective actions.

In the preamble to the proposed UST corrective action rule, EPA requested comments on several corrective action issues: the general scope of the proposed requirements; how explicitly these requirements should be detailed in the rule; whether the proposed minimum site investigation requirements were appropriate; and the desirability of the proposed site-specific approach to setting cleanup goals for UST sites. EPA also requested comment on the definition of free product, the adequacy of existing state administrative authority for public participation in corrective action, and corrective action requirements for tanks containing a mixture of regulated substances (see 52 FR 12678-12683 and 12751-12757). EPA received comments on all these issues, as well as on other issues not raised specifically by the Agency in the proposal.

Although many commenters believed that the proposed corrective action regulations were essentially sound, EPA received a wide array of responses on key issues. For example, although several commenters disagreed with the Agency's proposed requirements for site-specific cleanup standards, others supported this approach. Several general concerns were repeatedly raised by numerous commenters as they commented on specific proposed requirements: what must be done and by whom, how much discretion should be granted to the implementing agency to change specific requirements, and what minimum objectives must be met during the various steps in the corrective action process. As noted previously, these general concerns have prompted EPA to make several changes in the final rule, and clarifications appear below in the following two subsections of today's preamble.

General concerns raised by commenters are briefly discussed and responded to in the next subsection of this preamble (section IV.F.2.):

- Site-specific approach to corrective action;
- Discretion for implementing agencies;
- Clarification of owner and operator responsibilities; and
- Consolidation of requirements for petroleum and hazardous substances.

Following the discussions of these issues, section IV.F.3. provides a section-by-section analysis that more specifically addresses the changes made to the proposed requirements in the development of today's final corrective action rule, and the highlights of the public response that prompted these revisions.

2. Major Issues Influencing the Final Rule

a. Site-Specific Approach to Corrective Action. In the proposed rule, EPA selected a site-specific approach for setting cleanup target levels for long-term corrective actions. These cleanup levels would be keyed to data obtained from a detailed site investigation of soil and ground-water contamination by the owner and operator, and from a site-specific exposure assessment conducted by the implementing agency. As discussed in the preamble to the proposal (52 FR 12680-12682), EPA believed this approach would allow implementing agencies the necessary flexibility to develop their own programs or implement existing programs. Given the size of the regulated community and the diversity of UST environmental settings, EPA concluded that the site-specific approach was the most effective framework for enabling implementing agencies to assess the extent of necessary corrective action in individual cases.

The final rule retains EPA's selection of the proposed site-specific approach for UST corrective action requirements. A central element of this site-specific approach is the establishment of site-specific cleanup standards that adequately protect human health and the environment. In the preamble to the proposed rule (52 FR 12678-12683), EPA asked for comments on whether the long-term cleanup requirements of the UST corrective action rule should be established: (a) On the basis of national cleanup standards, with a variance provision; (b) to reflect ground-water classification schemes where national standards would apply in some settings, and site-specific cleanup levels in others; or (c) as site-specific standards as proposed.

EPA received comments that supported each of these options, with suggestions on how to implement the preferred option. Most commenters who supported establishing national cleanup standards believed that standards expedite cleanups and provide greater consistency in cleanup goals. They did not provide EPA with information, however, that showed that the use of national cleanup standards would substantially hasten the UST corrective action process or relieve administrative burdens. In addition, EPA is not convinced that the use of a single cleanup standard for UST cleanups will achieve greater consistency in the protection of human health and the environment than a site-by-site exposure assessment approach. At the present time, the Agency's assessment of UST corrective action shows that cleanup results are generally limited by the available technology and particular site conditions rather than by a cleanup standard. EPA also believes that the site-specific exposure assessments for UST releases required in today's final rule can be streamlined so that they will not delay corrective action, as some of these commenters feared. The Agency intends to work with implementing agencies to develop methods to streamline site-specific exposure assessments without diminishing protection of human health and the environment.

Some commenters supported the use of a ground-water classification system for UST corrective action decisions. As discussed earlier in today's preamble, however, EPA has concluded that developing a classification system at the federal level is extremely difficult and unworkable. EPA leaves to the discretion of implementing agencies the choice of whether to establish or incorporate existing ground-water classification systems to assist in their UST corrective action decisions. The Agency notes that the required investigations at UST sites and a site-by-site approach for UST corrective action will likely incorporate many of the same factors used in establishing a ground-water classification system.

In developing today's final rule, EPA noted that the majority of commenters preferred the proposed site-specific approach. The primary reasons cited were that this approach best accommodates the diversity of

UST release situations and also reduces, in the aggregate, the cost of compliance. EPA notes, however, that its decision to promulgate a site-specific approach to long-term UST corrective action does not preclude states from establishing cleanup standards in their own UST corrective action programs. The Agency recognizes that some states already have elected to develop and use statewide cleanup standards, sometimes in conjunction with site-specific exposure assessments as part of a variance procedure.

b. Discretion for Implementing Agencies. The proposed corrective action rule afforded UST implementing agencies considerable discretion and flexibility in developing their own UST corrective action process. For example, EPA proposed language--such as "unless directed to do otherwise by the implementing agency" and "or as directed by the implementing agency"--to indicate that these agencies could add their own requirements or instruct an owner and operator to bypass certain requirements on a case-by-case basis. EPA felt that the diversity of UST settings and release situations required the implementing agency to have flexibility in tailoring many aspects of the corrective action response so that different releases could be cleaned up effectively and efficiently.

EPA received comments regarding the appropriate level of discretion provided to the implementing agencies. Some commenters warned that vague rule language could lead to arbitrary requests by the implementing agency; others suggested that EPA curtail the implementing agency's authority by issuing more detailed requirements. Several commenters were concerned about delays in site cleanups that might ensue because of additional requests by implementing agencies. Another suggestion was to expand the implementing agency's discretion to require the UST owner and operator to start a site cleanup before a corrective action plan is finalized.

In response, EPA has revised the final rule to clarify which elements of the UST corrective action process are mandatory and which are discretionary. As a result, the final rule mandates the response requirements that must be followed for all releases (§ 280.61), the investigation and cleanup requirements that are mandatory unless otherwise directed by the implementing agency (§ 280.62 and 280.63), and the additional site-characterization and cleanup steps that may be required of UST owners and operators if certain site conditions exist or that may be required by the implementing agency (§ 280.64 through 280.66). EPA notes, however, that section 9008 of RCRA enables state and local regulation to be more stringent than the federal UST program. Thus, even if EPA removed discretion from the federal rules, EPA would not have the authority to prevent implementing agencies from imposing more extensive requirements than EPA under state or local law.

Commenters expressed concerns that cleanup of soil and ground water may be delayed due to lengthy reviews of the corrective action plans by the implementing agencies or by uncooperative owners and operators. In response, EPA has made two changes in the final rule. First, EPA has added the phrase "as appropriate" preceding the list of factors that the implementing agency must consider when reviewing a corrective action plan in § 280.66(b). This change makes it clear that the implementing agency need not formally consider all these factors if the agency determines analysis of these factors is not necessary to ensure protection of human health, safety, and the environment. Second, EPA has provided that owners and operators may begin cleanup of soil and ground water before their corrective action plan is approved by the implementing agency subject to conditions described in § 280.66(d).

In addition, under existing law, EPA or authorized UST implementing agencies can intervene to respond to clean up releases from UST systems. Under section 9003(h)(2) of RCRA, EPA and states under cooperative agreement are authorized to step in and take corrective actions for releases of petroleum from USTs in situations including the following: (1) the owner or operator fails to comply with the established cleanup schedule; (2) there is a need to take emergency action; (3) the cost of a corrective action exceeds the resources supplied by the financial responsibility mechanism provided by the owner or operator; or (4) the owner or operator is insolvent. For a release from a hazardous substance UST, EPA has the authority under CERCLA to respond. States are not provided such authority under CERCLA, but may have their own authorities under state law.

c. Clarification of Owner and Operator Responsibilities. Many commenters expressed the opinion that the proposed rule was difficult to interpret with respect to what had to be done and by whom to comply with the federal requirements. EPA agrees with these commenters that the language of the proposed rule was sometimes unclear regarding the specific responsibilities of UST owners and operators. The Agency, therefore, has revised the final rule to make clearer which elements of the corrective action rule are mandatory and which are discretionary.

EPA has concluded that the following basic steps are required to ensure an effective response to every release: rapid notification that a release has occurred; investigation to mitigate fire, explosion, and vapor hazards; preventing further release of the regulated substance from the leaking UST system; and removing free product from the environment. These steps are required of every owner and operator in response to an UST release; implementing agencies may not change these requirements.

Similarly, EPA believes that the following initial site investigation and abatement steps are usually necessary to protect human health and the environment: estimating the nature and quantity of the release; removing as much of the regulated substance from the UST system as necessary to prevent further release to the environment; and gathering information about the locations of wells, subsurface sewer lines, and populations surrounding the release site. Thus, the final rule holds UST owners and operators responsible for these actions unless the implementing agency directs them to do otherwise in response to site-specific considerations.

The baseline requirements for initial release response and corrective action are covered in § 280.61 through 280.63 of the final rule. As noted above, the requirements of § 280.61 in the final rule describe mandatory initial response measures to be taken by UST owners and operators without exception. All UST owners and operators are responsible for meeting the requirements of § 280.62 and 280.63, unless the implementing agency directs them to do otherwise. Sections 280.64 and 280.65 address those requirements for which owners and operators are responsible if certain site conditions exist. Section 280.66 describes soil and ground-water cleanup steps that may be initiated by the owner and operator or required at the direction of the implementing agency.

d. Consolidation of Corrective Action Requirements for Petroleum and Hazardous Substances. In the preamble of the proposed rule, EPA requested comments on whether the corrective action requirements for petroleum USTs (Subpart F) and hazardous substance USTs (Subpart G) should be integrated into one subpart or should remain separate (52 FR 12678). All commenters responding to this request favored the integration of Subparts F and G; they differed only in their suggestions to EPA on how to combine the two rules.

Today's final rule has consolidated into Subpart F all the corrective action requirements for releases from underground storage tank systems storing substances regulated by Subtitle I. The title of this subpart has been revised to make clear that it addresses both release response and corrective action activities. As can be inferred from the new title, an appropriate response to a release, particularly those small in size that were caught quickly and remedied, may not need to include long-term corrective action, if the initial response measures adequately protect human health and the environment.

The general applicability sections of the proposed petroleum and hazardous substance requirements (proposed § 280.60 and § 280.70, respectively) have been replaced with a single new section. This revised section states that where RCRA Subtitle C corrective action requirements apply to UST releases at permitted RCRA facilities, Subtitle I corrective action requirements will not apply. EPA has added this provision to avoid possible duplication of requirements.

The initial abatement requirements have been retained in the final rule. In response to commenters who preferred the more detailed language used in proposed Subpart G, the Agency has carried forward the language emphasizing immediate action to prevent further releases and the containment of visible releases to the environment. The principal change in the initial abatement requirements provides owners and operators and implementing agencies greater discretion for determining the need for and timing of contaminated soil removal and the authority to decide appropriate soil management alternatives on a site-by-site basis.

The proposed rule for hazardous substance USTs had no separate section comparable to the proposed petroleum rule's requirements for free product removal. By merging Subparts F and G, EPA extends the free product removal requirements to all regulated substance releases, including removal requirements detailing precautions and other measures to follow during recovery operations. EPA recognizes that detection and removal of some hazardous substances can be far more difficult than removal of petroleum free product, especially in areas of complex hydrogeology. The Agency believes, however, that the free product removal requirements allow implementing agencies sufficient flexibility to consider factors that complicate the detection and removal of free product and to adjust the pace of actions to remove free product accordingly.

Both proposed rules had requirements governing additional investigations and the cleanup of contaminated soils and ground water at UST release sites. The final rule also contains these requirements in § 280.65 and 280.66, which are discussed in more detail later in the next subsection of this preamble.

Both proposed rules contained reporting requirements. The hazardous substance rule, however, required additional specific reporting items, such as likely migration routes and proximity to population centers. These additional reporting items have not been retained in the initial site investigation requirements of Subpart F because they are largely duplicative of the reporting requirements contained within final § 280.63, which governs initial site characterization. Moreover, implementing agencies continue to have the authority to require the reporting of additional specific information should the need arise.

The public participation requirements of both rules have been combined into a single section of the final rule.

3. Section-by-Section Analysis

In writing the final rule, EPA revised proposed § 280.60 through 280.66 to clarify the release response and corrective action steps. Most of the changes are editorial, prompted by concerns or confusion expressed on the part of commenters. Some substantive changes, however, were also made in response to public comments. The following sections discuss in detail the changes made to the proposal as reflected in today's final rules. Issues raised by commenters on the proposed requirements and the Agency's consideration of these issues are also briefly discussed.

a. General (§ 280.60). Proposed § 280.60 applied the corrective action requirements of Subpart F to all UST systems except those exempted by statute or regulation. Owners and operators of tank systems for which other subparts of the proposed technical standard are deferred were nonetheless required to comply with the Subpart F requirements in response to confirmed releases.

In the final rule, EPA has added language to clarify the applicability of Subtitle C or Subtitle I requirements to USTs at RCRA-permitted facilities and to avoid potential overlap in regulatory authority. Section 280.60 of the final rule reflects the fact that the Subtitle C corrective action requirements under the authority of RCRA 3004(u) will apply to many releases from UST systems located at RCRA-permitted facilities, regardless of the regulated substance stored. For USTs not covered by 3004(u), including facilities without a final RCRA permit, Subtitle I corrective action standards will apply to releases from all petroleum and hazardous substance tanks covered under Subtitle I. UST corrective actions underway at facilities having interim status under RCRA may be subject to review under the RCRA corrective action program during the development of a final permit, and these ongoing corrective action activities may be incorporated into the facility's RCRA permit.

b. Initial Response and Reporting Requirements (§ 280.61). Proposed § 280.61 (initial abatement requirements and procedures) has been separated into three new sections in the final rule: initial response (§ 280.61), initial abatement measures and site check (§ 280.62), and initial site characterization (§ 280.63). These sections, plus free product removal (§ 280.64), encompass the first phase of the UST corrective action process. As with the proposal, EPA intends these final requirements to achieve three goals: (1) to bring UST release sites under control with respect to immediate health and safety hazards; (2) to stabilize the site so that contamination will not worsen as investigations and potentially applicable long-term cleanup plans are considered; and (3) to be self-implementing, in that these measures emphasize the responsibility of the owner and operator to take quick action without awaiting direction from the implementing agency. Thus, §§ 280.62 through 280.64 in the final rule represent the baseline release response and corrective action requirements that are mandatory for all UST owners and operators and all releases, unless the implementing agency directs otherwise. The rule has been reformatted to make this clearer. The initial response requirements of § 280.61 are mandatory for all owners and operators and all releases without exception. In addition, §§ 280.60 through 280.64 have newly added reporting sections. The new placement of these reporting requirements clarifies the owner's and operator's responsibilities with respect to the timing and content of the required reports.

The final requirements of § 280.61 for initial response and reporting are essentially identical to those proposed. The primary difference is that the wording has been changed to make unambiguous the response required within 24 hours. These initial actions include: reporting the confirmed release to the implementing agency; taking immediate steps to prevent further release to the environment; and mitigating fire, explosion, and vapor hazards. EPA recognizes that, in some cases, it may not be possible to complete these steps within 24 hours. For example, it is sometimes easier to confirm that a release has occurred than to identify the precise location of the release from the UST system. Similarly, it may take longer than 24 hours to adequately vent hazardous vapors from building. In revising this section, however, EPA emphasizes the potential urgency of a release and the responsibility of the owner and operator to quickly respond.

c. Initial Abatement Measures and Site Check (§ 280.62). In order to clarify the on-site management steps that EPA believes are necessary to abate hazards and stabilize the site, the Agency has grouped initial abatement requirements into § 280.62. Two of the requirements in this section are carried forward from those in proposed Subpart G. First, § 280.62(a)(1) requires removal of the regulated substance from the tank as "necessary to prevent further release to the environment." EPA has added this phrase to acknowledge--as some commenters pointed out--that some situations may not require complete removal of product from the tank (e.g., if the release is clearly demonstrated to be from one tank that is part of a multiple tank system). Second, § 280.62(a)(2) carries forward the requirement to visually inspect aboveground releases or exposed belowground releases and to prevent further migration of the released substance into surrounding soils and ground water (e.g., by using sorbents and berms to control the flow of product).

Section 280.62(a)(3) has been added to clarify EPA's proposed requirement to "mitigate fire and safety hazards." EPA agrees with commenters who noted that these hazards may persist or reappear beyond the initial response phase and, thus, must be monitored and remedied throughout the cleanup process. The new requirement also emphasizes that, if present, these hazards may require mitigation both within and beyond the boundaries of the UST site (e.g., in subsurface sewer lines or nearby buildings).

The requirement in proposed § 280.62(a)(4) to remove "visibly contaminated soil from the UST excavation zone" has been deleted. EPA received many comments on this proposed requirement. Most commenters expressed confusion regarding the definition of visible soil contamination and other concerns related to the appropriate timing and extent of soil removal. Commenters identified cases where a strict interpretation of the requirement (e.g., removal of slightly discolored soils) would translate into aggressive soil removal that would be unnecessary, technically infeasible, and very costly. Some commenters noted that extensive soil removal at UST sites could exacerbate problems of the nation's limited landfill capacity, if these soils were taken off-site for disposal. Other commenters suggested that soil removal or treatment (beyond that which is needed to address immediate health and safety hazards) should be considered as part of the long-term plan for corrective action. Many commenters suggested that EPA consider various in situ or on-site treatment methods as alternatives to immediate removal and disposal of contaminated soils.

EPA agrees with these commenters. In particular, EPA is concerned that requiring immediate and extensive excavation of contaminated soil may transfer contamination to other media (e.g., air), may transfer risk from one site to another, or may spread contamination at the release site beyond its existing extent. These outcomes are inconsistent with EPA's objective to protect human health and the environment. Further, EPA did not intend to preclude consideration of alternative on-site or in situ treatment methods.

As a result, EPA has created a new § 280.62(a)(4) to clarify the objectives of soil management that must be undertaken during the initial phases of corrective action. The new requirement states that UST owners and operators must remedy hazards posed by contaminated soils that are excavated or exposed as a result of release confirmation, site investigation, abatement, or corrective action measures. These hazards include vapor threats and potential leaching of contaminants. EPA believes this new requirement addresses concerns raised by commenters by more clearly stating the scope and the objectives of initial soil management.

In contrast to the proposed requirement for soil removal, EPA has not prescribed a specific management method. The final rule does, however, require that any exposed soils be managed as necessary to remedy hazards such as those mentioned above. EPA expects there will be UST release situations where prompt soil removal and disposal may be the most effective option (e.g., where there are relatively small quantities of contaminated soil in urban areas having high potential for human exposure to vapors, and where excavation equipment is already on-site for use in investigating the tank system). In such situations, soil removal may be necessary to bring the site under control with respect to immediate threats and might also be adequate to complete cleanup at the site. In response to commenter's concerns that soil management not simply transfer risk, EPA has, however, added a new requirement to the rule. If the owner and operator choose to treat or dispose of contaminated soils, they must comply with applicable state and local requirements. (See also section VI.B. of today's preamble: Relationship to Other Agency Programs.)

EPA received comments regarding the explicitness of the proposed site investigation requirements for corrective action, as well as for release confirmation and tank closure activities. Some commenters requested more specificity; others pointed out the difficulty of prescribing uniform requirements for all sites. In response, EPA has revised the rule (adding new §§ 280.52(b), 280.62(b) and 280.72(a)) to make consistent the site investigation requirements for release confirmation, corrective action, and tank closure and to avoid potential duplication of these requirements within the rule. (See section IV.E.2.c. of this preamble for an explanation of these site investigation requirements.) EPA believes this revised statement of site check responsibilities, in conjunction with the new initial soil management requirements, addresses commenters' request for greater clarity concerning their investigation responsibilities without unduly restricting alternative investigative techniques.

EPA recognizes, however, that the primary hazard posed by contaminated soil at some sites will be as a continuing source of ground-water contamination. EPA addresses this concern through the final requirements for site characterization and for delineating the extent and location of contaminated soils (§§ 280.63 and 280.65). As discussed later in this preamble, these investigation results must be considered by the owners and operators and by the implementing agency with respect to site-specific exposure potential and effects on ground-water resources. EPA believes that, in some cases, it may be preferable to treat contaminated soil on-site or in situ. The Agency is preparing technical information that will help owners and operators and implementing agencies assess the potential hazards posed by contaminated soils and alternative methods to treat or dispose of them.

Section 280.62(b) in the final rule states that owners and operators are required to report their initial abatement steps to the implementing agency within 20 days of release confirmation. Some commenters noted that this time frame, which was proposed in § 280.61(a)(5), could be interpreted to mean that EPA expected all the abatement measures in proposed § 280.61(a) to be completed within 20 days. EPA expects that many of the initial abatement requirements can and should be completed within 20 days, but that some aspects of soil management and free product investigations and removal may require more time to complete. EPA has thus amended the wording to clarify that the objective of this provision is to require owners and operators to report their progress to the implementing agency.

d. Initial Site Characterization (§ 280.63). Proposed as § 280.61(b), this requirement has been amended (and renumbered as § 280.63) to clarify the responsibility of owners and operators to collect and submit site information to the implementing agency. Several commenters noted that the same techniques can be used to confirm a release and to investigate contamination at a site. They expressed concern that important information gained while confirming a release or abating immediate hazards should also be included in the information submitted to the implementing agency. Section 280.63 in the final rule emphasizes this point and requires that owners and operators submit all pertinent information about the site and nature of the release.

In addition, §§ 280.63(a)(1) through (4) in the final rule describe the minimum site investigation requirements that the owner and operator must follow in the absence of other direction provided by the implementing agency. Section 280.63(a)(1) is unchanged from proposal, and it requires information on the nature and estimated quantity of the release.

Section 280.61(a)(2) continues to require owners and operators to submit information from readily available sources or site investigations regarding surrounding populations, subsurface soil conditions, climate, and land use (e.g., from sources such as U.S. Geological Survey maps, Soil conservation Saving maps, and local agencies). UST owners and operators are not automatically required to conduct surveys to collect this information if it is not already available.

In addition, two new requirements have been added to this section. First, information about water quality at all wells potentially affected by the release partially supplants the more general proposed requirement for ground-water and surface water sampling formerly in § 280.61(b)(3). As discussed in more detail in section IV.C.f. of this preamble--investigation for soil and ground-water cleanup--the proposed requirement to delineate the extent and location of dissolved ground-water contamination has been amended. The final rule requires full characterization of dissolved ground-water contamination if certain site conditions are met, or at the direction of the implementing agency. If nearby existing wells are potentially affected, however, EPA requires the owner and operator to immediately characterize their quality and use because they are potential human exposure points and because pumping at these wells can affect contaminant migration. Second, several commenters noted that subsurface sewer lines are often conduits for rapid migration of vapors or liquid product. Thus, EPA now requires owners and operators to submit information on the location of subsurface sewer lines (if any) at the site.

Section 280.63(a)(3) cross-references the site investigation requirements described earlier and requires the owner and operator to submit the results of this investigation as part of the site characterization report. This new section replaces proposed § 280.61(b)(2), which required sampling of surface and subsurface soils. As described earlier, this change clarifies the investigation requirements and eliminates their possible duplication within the rule. The timing and reporting of this investigation is unchanged.

Section 280.63(a)(4) replaces proposed § 280.61(b)(3), which required sampling of surface and ground water at the site. This new section, in conjunction with § 280.65 (described in subsection f., below), reduces the ambiguity noted by some commenters regarding the scope of site investigations. In the final rule, EPA requires characterization of dissolved ground-water contamination when the following conditions exist: there is evidence that drinking water wells have been affected, free product is detected on the water table or within the aquifer; there is evidence that contaminated soil is in contact with ground water; or as directed by the implementing agency. Thus, the presence or absence of free product at an UST release site is one of the factors used to decide whether further investigations of soil and ground-water contamination are necessary. The requirement to investigate for free product is unchanged from the proposed § 280.61(a)(6). The final rule simply requires owners and operators to submit, as part of the initial site report, their findings that establish the presence or absence of free product. EPA believes this action is warranted for several reasons:

- The requirement reinforces for owners and operators the importance of the free product investigation;
- The free product investigation requirement now also applies to releases from hazardous substance USTs, which may contain products that are denser than water and, therefore, may be harder to detect and locate; and
- The conclusion that no free product is found provides another important consideration for the implementing agency as it decides if a corrective action plan will need to be submitted by the owner and operator.

EPA believes this synthesis of information from the initial site investigation is essential for owners and operators to begin to fully assess their cleanup responsibilities, and it provides the implementing agency with information to decide if a corrective action plan is necessary. Section 280.63(b) replaces the proposed requirement for reporting site investigation results. The new section clarifies that the information must be submitted in a manner that is clear and sufficiently detailed to demonstrate its applicability and technical adequacy, or in a format developed by the implementing agency to achieve these same goals.

e. Free Product Removal (§ 280.64). In response to commenters, EPA has made minor revisions to the free product removal requirements. Commenters raised four issues: applicability, the definition of free product, the extent of removal, and the timing of removal. These issues are discussed below.

First, EPA agrees with those commenters who suggested that free product removal requirements similar to those proposed for petroleum releases should also apply to hazardous substance releases. The final rule's Subpart F merges the proposed rule's Subparts F and G to make free product removal requirements applicable to all releases.

Second, EPA has revised the definition of free product to clarify the scope of free product removal. Several commenters noted that, as proposed, the broad definition of free product could be interpreted to mean that removal requirements apply to product bound to soil particles or present as vapors. EPA notes that these forms of product are addressed, as appropriate, in other sections of today's final rule and has revised the definition of free product to more narrowly refer to a regulated substance that is present as a non-aqueous phase liquid (e.g., not dissolved in water). EPA has also deleted the reference to "floating" free product (from proposed § 280.62) to clarify that product more dense than water is also subject to the free product removal requirements.

Third, other commenters requested clarification on how much free product was required to be removed. In the final rule, the Agency has retained the phrase "maximum extent practicable" as the criterion for free product removal operations at UST release sites. EPA has not specifically defined maximum practicable removal because the extent of removal is largely determined by available technologies and site-specific conditions. Consequently, EPA believes that implementing agencies should have the discretion to develop operational criteria for determining the presence of free product and the extent of its removal (e.g., product that flows in response to gravity or a minimum product thickness observed in wells). EPA has, however, added to the final rule a minimum objective for free product removal operations. This new requirement states that, at a minimum, free product removal systems should be designed to abate further migration of free product (i.e., beyond small seasonal or recovery-related fluctuations).

Fourth, several commenters offered their views about the appropriate timing of product removal. Most commenters agreed with EPA's proposal that free product removal operations should begin as quickly as possible, but cautioned that hasty and improperly conducted removal could spread contamination vertically at the site. In the final rule, EPA continues to require that removal begin as quickly as practicable (§ 280.62(a)(6)). Revised § 280.64(a) emphasizes, however, that free product removal must be conducted in a manner that minimizes the spread of contamination and that is appropriate to the hydrogeologic conditions at the site. EPA is aware, for example, of site conditions where trenching or vapor extraction to recover free product would be preferable to drawing down the water table--and the free product plume--in order to collect and remove free product. EPA is preparing technical resource documents to assist implementing agencies in advising owners and operators about potential complications when removing free product. Similarly, in response to commenters concerns, EPA has extended the time period for owners and operators to report to implementing agencies concerning their free product removal from 30 to 45 days. This change will allow owners and operators more time to properly plan for free product removal, especially for removal operations involving dense product or at hydrogeologically complex sites.

In addition, some commenters requested EPA clarify permitting requirements for discharges from the product recovery system. Others suggested that EPA exempt UST cleanups from NPDES requirements or establish numerical limits for emergency permits. In response, EPA has revised § 280.64(a) to clarify that all discharges are to be properly treated, in compliance with applicable federal, state and local regulations. In addition, EPA is investigating methods to expedite, where applicable, the NPDES permitting process for discharges necessitated by UST corrective action.

f. Investigations for Soil and Ground-Water Cleanup (§ 280.65). Proposed § 280.63 has been renumbered § 280.65 in the final rule. As proposed, this section required the owner and operator to investigate the extent of soil and ground-water contamination at an UST release site when the initial site investigation showed that contaminated soil remained at the site, or when the required soil removal showed that the released product or product from contaminated soil may have reached ground water. In addition, the implementing agency could direct the owner and operator to conduct such an investigation.

Several commenters requested that EPA clarify the minimum sampling requirements for these investigations. Other commenters suggested that these more extensive investigations be better coordinated with the soil and ground-water sampling required earlier in the corrective action process. One commenter noted that the phrase "product from contaminated soil" would be difficult to define and might be interpreted to require extensive investigation at virtually all sites. In addition, EPA recognizes that some amount of contaminated soil will be present at most UST release sites, but that the threat posed by this contamination will depend on several factors.

In response to these comments, EPA has revised this section to clarify the situations that trigger more extensive site investigations. EPA notes that the objective of these investigations is to support decisions concerning whether soil and ground-water cleanup or other corrective action measures are necessary at the site. Consequently, EPA has revised the rule to better relate these requirements to site-specific threats to ground-water contamination.

Final § 280.65 describes three specific site circumstances requiring full for characterization of soil and ground-water contamination: (1) When release confirmation or previous corrective action measures indicate that ground-water wells may have been affected by the release, (2) when free product is found on the water table or within the aquifer, and (3) when any other site investigations show that contaminated soil may be in contact with ground water.

EPA recognizes that characterization of soil and ground-water contamination may also be necessary at sites where there are no "automatic triggers." Thus, the final rule retains the authority of the implementing agency to request an investigation. Final § 280.65(a)(4) clarifies that the implementing agency should consider the potential effects of contamination at the site in relation to nearby surface and ground-water resources when deciding whether further investigations are warranted. In particular, EPA expects that information required under § 280.63 will provide implementing agencies with important information for determining if more extensive investigations are required.

In revising the rule, EPA sought to better tailor the investigation requirements to site conditions that pose a potential threat to ground-water resources. EPA believes the final rule clarifies those situations that trigger more extensive site investigations and better coordinates the objectives of the revised corrective action requirements within a site-specific framework.

g. Corrective Action Plan (§ 280.66). In the final rule, proposed § 280.64 has been renumbered as § 280.66 and retitled as "Corrective Action Plan." This revised section responds to commenters' requests for clarification of the owners' and operators' responsibilities for submitting corrective action plans (CAPs) and of the implementing agencies responsibility to request, review, and approve a CAP. Subtitle I of RCRA directs the Agency to promulgate corrective action regulations applicable to owners and operators of UST systems. The corrective action plan approval process, however, integrates the responsibility of owners and operators to ameliorate the adverse effects of UST releases with the responsibility of implementing agencies to determine how they will carry out their established public health policies. EPA's role is to: (1) establish the responsibility of owners and operators to achieve adequate protection of human health, and (2) establish a baseline framework for evaluating and approving corrective action plans.

Several commenters requested clarification of the owners' and operators' responsibilities for corrective action beyond immediate abatement steps and removal of free product. In response, § 280.66(a) of the final rule has been revised to clarify that owners and operators are responsible for submitting, when requested by the implementing agency, a corrective action plan that provides for adequate protection of human health and the environment. Section 280.66(b) of the final rule sets forth the factors that implementing agencies must consider when approving a corrective action plan. Consequently, this section also serves to inform owners and operators of the minimum elements required in the plans they submit.

Some commenters suggested the Agency establish explicit criteria that implementing agencies could use to determine whether a CAP is needed and to evaluate CAPs after they are submitted. As described in the preceding sections, EPA has revised several parts of the proposed rule to clarify the objectives of each step of the corrective action process. Owners and operators are responsible for carrying out and reporting these actions, thus providing the implementing agency with a good basis for determining the necessity for additional cleanup.

EPA believes it would be difficult and unproductive to incorporate more explicit evaluation criteria in today's rule. As described earlier in this preamble, EPA received wide support for the proposed site-specific corrective action goals and has retained this approach in the final rule. Implementing agencies, however, may choose to develop their own site-specific corrective action goals, or they may base cleanup goals on statewide numerical standards or aquifer characteristics. Rather than develop criteria that may conflict with a state or local agency's preferred method, EPA has chosen to identify in the rule those factors that are generally necessary for carrying out corrective actions regardless of the chosen method for setting precise cleanup goals. For example, these factors include the persistence of the released substance and the hydrogeologic conditions at the site. EPA sees its role primarily as providing technical support for interpreting these factors in the context of site-specific application of corrective action technologies. In particular, EPA is developing technical information and supporting materials to assist implementing agencies in relating site assessment results to the feasibility of alternative technologies, and for evaluating how well these technologies are achieving cleanup at a site. In addition, EPA is beginning to develop methods to expedite exposure assessments. Other programs within EPA, such as the Office of Ground-water Protection, may also be called upon to provide support for evaluating ground-water resources.

The overall objective of longer term UST corrective actions is to adequately protect human health, safety, and the environment from contaminants remaining in soils or ground water after initial abatement measures and free product removal. The Agency prefers that this objective be achieved, where practicable, through reducing contaminant concentrations in soil or ground water to levels protective of health and the environment. In some situations, however, the Agency would require--under the standard in § 280.66(a)-- that human health be protected from exposure to contaminants through other appropriate measures, such as providing an alternative water supply.

EPA cannot project the outcome of its site-specific approach to all UST releases because the consideration accorded to some factors, such as aquifer resource value and its current and potential use, is largely left to state and local policy. If an UST release affects a public or private drinking water source, however, the owner and operator must expect that the state's health-based drinking water standards would apply to the cleanup. If the owner and operator cannot meet these standards through cleanup technologies, then they should expect that they will be required to provide an alternate source of drinking water or to provide treatment of the water to the people affected. Similarly, the owner and operator should expect that UST releases that threaten current or potential water supplies will come under close scrutiny by the implementing agency. In these cases, the corrective action requirements will likely be influenced by the mobility of the contaminants at the site and the estimated time and spatial extent over which the remaining contamination may pose a threat. At a minimum, approved CAPs would likely include requirements for long-term monitoring, continued control of ground-water flow at the site, and notice of continuing hazard in the property deed.

The final rule retains the implementing agency's authority to require submission of a CAP based on information received from early corrective action measures. (EPA expects, for example, that implementing agencies might choose this option for UST releases that are of great magnitude or in close proximity to drinking water resources.) Final § 280.66(a), however, has been revised to make clear that the implementing agency must first review the submitted material before requesting the submission of a CAP or additional information. This section also has been revised to enable owners and operators to submit a CAP for soil and ground-water cleanup based on their own initiative and assessment of the severity of the release. They need not wait for the implementing agency to request a CAP.

Several commenters expressed concern that lengthy reviews by the implementing agency might slow the pace of UST cleanups, creating delays that could make implementing the final CAP more difficult, because of the spread of contamination while delays persist. Some commenters also suggested that owners and operators should be allowed--after a specified length of time--to interpret inaction on the part of the implementing agency as approval of the CAP.

Given the number of releases that are expected to be detected in the near future, EPA acknowledges that there is potential for delayed cleanups under the proposed approach if implementing agencies are unable to review all the CAPs in a timely manner. The Agency concluded, however, that the alternatives suggested by commenters were inappropriate. To respond to this issue, however, § 280.66(d) has been added to allow owners and operators to begin cleanup of soil and dissolved contaminants in ground water without CAP approval provided they: (1) first notify the implementing agency of their intention to begin cleanup, (2) comply with modifications imposed by the implementing agency, including halting cleanup activities, and (3) incorporate these initial measures in the CAP to be reviewed and approved by the implementing agency.

EPA has added this provision with the goal of encouraging effective and expedited cleanup of soil and ground water. EPA emphasizes, however, that the implementing agencies remain the final arbiter for approving CAPs. Implementing agencies, therefore, can require the owner and operator to revise their CAPs and to modify the cleanup techniques in use at a site, including mitigating adverse consequences of cleanup activities. Since the implementing agency retains this authority, EPA expects that owners and operators who choose to initiate cleanup prior to approval of this CAP will select cleanup technologies that are widely used and recognized to be effective. EPA believes some cleanup techniques, such as extraction and treatment of petroleum vapors from soils, can be initiated with little risk of worsening contamination at the site. EPA also notes that states need not adopt the policy of owner- and operator-initiated cleanup for state program approval. Moreover, if states choose this option they can tailor its use to best meet their needs. For example, the implementing agency can identify specific cleanup technologies that are widely applicable without prior review or approval and those that always require explicit plan approval. Similarly, implementing agencies can decide to limit this option for use only at releases from certain USTs, such as petroleum USTs.

h. Reporting (Proposed § 280.65). The reporting requirements in this section of the proposed rule have been consolidated with the requirements in § 280.51 of the final rule because they are part of the release confirmation process.

i. Public Participation (§ 280.67). The proposed public participation rule required implementing agencies to provide opportunity for public review and comment on all CAPs and to consider these comments before approving CAPs.

Although commenters agreed that public participation is desirable, many commenters expressed concern that protracted public participation during the development of all CAPs could unnecessarily delay some UST cleanups. For example, cleanup efforts could be delayed while the development of a CAP was submitted to lengthy public review and deliberation. Also, mandating public participation for all CAPs could divert implementing agency resources from other cleanup activities such as oversight of ongoing cleanup operations.

EPA agrees with commenters who urged that implementing agencies strike a balance between the involvement of the public in corrective action decisions and the sometimes competing need to protect human health and the environment through quick and effective responses to an UST release. To acknowledge these sometimes conflicting objectives, the final rule for public participation establishes a flexible approach that ensures public access to available information on UST cleanups, although the public need not be involved, as a matter of routine, in all CAPs.

Implementing agencies continue, however, to have the responsibility and authority to notify the public about CAPs, to provide public access to the site and cleanup files, and to involve the public in meetings if sufficient interest is demonstrated. The final rule's public participation requirements for UST corrective action stress the need for adequate public notice, particularly to those parties who could be directly affected by the release and the planned corrective action. EPA expects that the public will be provided adequate opportunity to participate in and aid the UST cleanup process.

EPA does not agree with those commenters who opposed including any public participation requirements in the UST corrective action rule. In particular, EPA does not agree with the concerns raised that RCRA does not explicitly require public participation under Subtitle I. EPA believes that section 7004 of RCRA specifically mandates that all of the Agency's RCRA programs provide for the opportunity for public participation, including the RCRA Subtitle I program. This statutory mandate, combined with long-standing EPA policies to involve the public in the cleanup of contaminated sites, has prompted EPA's decision to keep the public participation requirements in Subpart F. In meeting this need, however, EPA has intended to require public notice and participation in UST corrective actions in a form that does not unnecessarily disrupt what state UST programs already require and provide.

The final rule requires public notification and public availability of information on CAPs. The implementing agency must notify the public about each confirmed release requiring a CAP. This notification requirement remains as proposed, although the rule no longer mandates implementing agencies to formally consider and respond to public comment before approving a CAP. The implementing agency must also provide public notice if implementation of the CAP does not achieve the established cleanup levels and the implementing agency is considering terminating the CAP. In most states, those affected by the release are often kept well informed through personal contacts with the state response staff. Today's requirements are not intended to change this practice of personal contact as one of the first points of public notice in the existing state UST programs. This method of notice has been added to the rule to make this clear. The list of public notice vehicles contained in the rule, however, is not intended to be exhaustive.

In addition to this notification requirement, the final rule requires the implementing agency to provide public access to site release information and decisions concerning the CAP. By providing public notification and access to information, implementing agencies ensure the opportunity for public participation in specific CAPs of interest to the affected sectors of the public. Because the Agency considers public notification and public access to information to be the key components of public participation for all CAPs, the final rule emphasizes the importance of these two requirements.

The implementing agency may hold a public meeting to consider public comments on a CAP if sufficient public interest is shown concerning a proposed CAP. EPA uses the phrase "public meeting" in the rule to emphasize that a formal public hearing is not required. EPA intends that a public forum be provided, in keeping with the state's administrative procedures, to inform the public and allow public comment on a CAP. The implementing agency will decide when public meetings are warranted on a case-by-case basis. EPA expects that large releases involving extensive corrective action will include correspondingly more extensive public participation because public understanding and acceptance is critical to the success of these CAPs.

In summary, the final rule emphasizes the implementing agency's responsibility to involve the public in a manner that best serves the environmental goals of the CAP.

G. Out-Of-Service UST Systems and Closures

1. Introduction

As discussed in the preamble to the proposed rule, the principal objective of the UST system closure requirements is to identify and contain existing contamination and to prevent future releases from UST systems no longer in service (52 FR 12757). Available information suggested that UST systems improperly closed in the past have had undetected releases that later required corrective action. More of these systems may be found to have leaked and, in the future, require additional corrective action. Because a large number of existing UST systems are expected to close in the next 5 to 10 years, EPA believes that it is particularly important to require proper management procedures for out-of-service UST systems so that contamination due to improperly closed UST systems can be prevented from posing a threat of additional releases in the future and needed corrective action can be identified and taken. The comments on the proposal generally acknowledged that proper closure is an important aspect of sound UST management.

The closure procedures are covered in §§ 280.70 through 280.74 of the final rule. Section 280.70 describes the requirements that must be complied with at all UST systems temporarily closed for less than 12 months. It also requires tanks that do not meet requirements for new or upgraded USTs, and that are taken out of service for 12 months or longer, to permanently close. Those USTs that do meet requirements for new or upgraded USTs can remain indefinitely out of service. Section 280.71 provides requirements for permanently closing or changing the service of an UST system, including identification of alternative methods for permanent closure and procedures for continuing the service life of an UST system when it is to be used for the storage of non-regulated substances. Section 280.72 describes the requirements for assessing the UST system excavation zone at closure. Section 280.73 requires owners and operators to apply the permanent closure and site assessment requirements of the final rules to UST systems taken out of service before the effective date of the regulations, if so directed by the implementing agency. Section 280.74 lists the recordkeeping requirements. These proposed requirements, highlights of public comments on them, and the Agency's approach to the final UST system closure standards are discussed in more detail below.

2. Temporary Closure (§ 280.70)

To prevent owners and operators from improperly closing UST systems in the future, EPA proposed requirements in § 280.80(a)-(b) for tanks temporarily taken out of service for up to 24 months. These provisions only covered UST systems when a regulated substance was left in the tank and did not distinguish between unprotected tanks and protected tanks that met the requirements for new or upgraded UST systems.

The applicability of these requirements depends upon what constitutes temporary closure. Although a number of suggestions were received, generally commenters recommended defining temporarily closed based on both the use of the tank and how frequently regulated substances are typically moved through it. The failure to fill and/or take regulated substances from a tank on a regular basis, however, was not always considered to be a reasonable criterion for determining the tank was temporarily closed. Commenters cited several examples of infrequently used tanks where temporary closure was not appropriate, including emergency generator tanks and backup system tanks from which fuels were not typically dispensed for long periods of time.

The Agency believes that owners and operators will generally pay more attention to tanks that are used frequently than to those that are used only occasionally or are temporarily closed. Thus, the operation and maintenance procedures used to ensure the integrity of a tank and the effectiveness of release detection efforts instituted to identify leaks in and around a tank will be somewhat related to whether the tank is being actively used or not. Other possible factors in determining whether a tank is temporarily closed include adherence to the normal operation and maintenance procedures at the facility, the types and amounts of regulated substances stored at the facility, the likelihood that an undetected leak has occurred or may occur in the future, and the potential that the tank has become a receptacle for illegal dumping. The Agency does not intend that the emergency generator and backup fuel system tanks cited by commenters should be subject to automatic closure requirements merely because regulated substances are not moved through the tanks on a regular or frequent basis. If, however, the infrequent use of such a tank cannot be justified as part of its purpose and/or if the operation, maintenance, or release detection procedures associated with the tank are inadequate or inconsistent with the monitoring procedures required for operating tanks, the tank will be considered temporarily closed and, after 12 months is up, subject to permanent closure requirements in accordance with § 280.70(c) of the final rule.

Several commenters pointed out that proposed § 280.80(a)-(b), which covered temporary removal from use and temporary closure, only applied at tanks where the regulated substances were left in the tank. As a result, if the regulated substances were removed from the tank, the proposed rule appeared to exclude UST systems from the further application of the temporary closure provisions. EPA intended, however, that the closure requirements should be applicable to all UST systems that are taken out of service regardless of the quantity of regulated substance remaining in the tank. The Agency also believes that continuation of release detection is not necessary when the regulated substances and residual material have been adequately removed from the UST system. Therefore, the revisions to § 280.70(a) of the final rule subject tanks from which the regulated substances have been removed to the temporary closure provisions, but allows the owner or operator to discontinue release detection as long as the UST system is completely empty.

The final rule also does not contain a requirement to test the integrity of a temporarily closed tank before refilling, although several commenters suggested that such a test should be conducted before materials are reintroduced into an empty tank. EPA does not agree that such a requirement would provide significant benefits. There is no evidence that empty tanks are more vulnerable to structural failure than filled tanks. In addition, the Agency believes that the release detection standards set forth in the final rule are sufficient to rapidly detect any leaks or structural failures that may occur once the system is brought back into service.

Several commenters requested guidelines for determining when an adequate amount of the regulated substance has been removed from a tank to preclude the tank from the temporary closure requirements. In response to these comments, the final rule makes it clear all tanks that contained a regulated substance are subject to the temporary closure requirements regardless of the amount of material remaining in the tank when it is taken out of service. If the tank is empty, however, the owner and operator are not required to maintain release detection around the tank. The term "empty" is defined by incorporating the definition of "empty container" set forth in EPA regulations under Subtitle C of RCRA. This definition requires all materials to be removed that can be removed using commonly employed practices. No more than 2.5 centimeters (one inch) of residue or 0.3 percent by weight of the total capacity of the tank can remain in the system. EPA believes that this definition is adequate to ensure that the regulated substances remaining in the tank will not pose an unreasonable risk to human health and the environment if a release occurs during the temporary closure period.

To prevent owners and operators from indefinitely postponing permanent closure, EPA proposed in § 280.80(c) that all tanks be closed that had been out of service for more than 24 months. This period was considered a reasonable time for tank owners and operators to decide whether to permanently close or continue the use of a tank a tank. The period recommended to be allowed for temporary closure by commenters varied greatly. Commenters cited numerous cases where mandatory permanent closure after 24 months of temporary closure was neither appropriate nor justified. Most state regulatory authorities commenting on this proposal recommended a shorter temporary closure period.

One of the principal reasons cited by the commenters recommending extending the temporary closure period was that tanks in compliance with the appropriate corrosion protection and leak detection procedures do not pose a significant threat of future releases. The commenters also argued that the permanent closure of such tanks would create an economic hardship without providing any significant environmental benefit. EPA agrees with these commenters that UST systems that are adequately protected from corrosion and equipped with release detection systems pose a significantly lower threat to human health and the environment than unprotected tanks. This conclusion is also consistent with the comments submitted by state regulatory authorities that recommended a reduction of the closure period. Their recommendations are believed to stem primarily from the states' experience with unprotected, bare steel tanks and, consequently, strongly suggest that significant damage to the public health and the environment could occur if unprotected tanks are allowed to temporarily close and are left unattended for long periods of time. Therefore, § 280.70(c) in the final rule reduces the allowed period for temporary closure of unprotected tanks from 24 months to 12 months. Any temporarily closed UST systems that do not comply with the performance standards for new tanks under § 280.20 or the upgrade requirements for existing tanks under § 280.21 must permanently close after the 12 month temporary closure period ends. However, UST systems that comply with the performance standards for new or upgraded UST systems set forth in the final rule may remain out of service indefinitely so long as they remain in compliance with the operation, maintenance, and release detection requirements of the final rule. Since spilling and overfilling associated with product transfer should not be a problem around tanks that have been temporarily closed, UST systems are not required to satisfy the spill and overfill requirements for new and upgraded systems in order to be excluded from the 12 month permanent/closure provisions in the final rule.

Many commenters also believed that owners and operators should have a mechanism for seeking and obtaining an extension of the temporary closure period (to avoid the permanent closure requirements) on a case-by-case basis. These comments pointed out that the automatic permanent closure of certain types of tanks was not appropriate after 12 or 24 months (for example, where nearby road construction has temporarily closed the business using the tanks). In response to these comments, a provision has been incorporated allowing the implementing agency to approve an extension of the temporary closure period to address situations where permanent closure of an unprotected UST system is not appropriate after 12 months. To ensure that the variance process is not used to postpone corrective action activities, however, the owner or operator must complete a site assessment before the extension can be applied for.

3. Permanent Closure (§ 280.71)

The proposed rule required the owner or operator of an UST to notify the implementing agency and assess the excavation zone at least 30 days before permanent closure. Several of the commenters argued that completion of the site assessment at least 30 days prior to permanent closure was not always appropriate, for example, in cases where a tank is to be closed by removal or when closure is part of a corrective action. In response to these valid comments, § 280.71(a) of the final rule has been revised to allow more flexibility by requiring the owner or operator to conduct an excavation zone assessment after notifying the implementing agency but before completion of permanent closure. The final requirements continue to require notification at least 30 days before completion of permanent closure. To avoid any potential conflict between the notification requirements of this section and the response requirements under the corrective action provisions, closures initiated as a result of corrective actions under Subpart F are not subject to the notification requirements in § 280.71(a) because the implementing agency will have already been notified as part of the corrective action activities.

The methods for permanent closure were proposed in § 280.80(f) and the revised methods are set forth in § 280.71(b) in the final rule. Emptying the tank by removal or filling with an inert solid material was a prerequisite for permanent closure under the proposed rule. The term "empty," however, was not defined in the proposed rule. In response to those commenters who argued that the amount of residual materials remaining in the tank system must be defined in order to minimize any future threat to human health or the environment, the final rule requires the tank to be "emptied and cleaned by removing all liquids and accumulated sludges." In accordance with EPA's effort to build upon accepted industry consensus codes, a note following final § 280.71(c) identifies API 1604 and API 1631 as guidance on cleaning and closure procedures that may be used to comply with these requirements. EPA believes that following these codes concerning the removal of regulated substances and cleaning of tanks before permanent closure will ensure human health and the environment are protected. These codes also address the concerns expressed by a number of commenters regarding the disposal and reuse of tanks that have been removed from the ground. Although not mandated in the final rules, adherence to the guidance in these codes concerning these activities will ensure the safe handling of tanks and will minimize the risk of releases during closure.

The note following § 280.71(c) also contains a reference to the criteria issued by the National Institute for Occupational Safety and Health. These criteria provide guidance concerning the prevention of deaths and injuries to workers involved in the assessment, decontamination, and cleanup of spills and leaks around underground storage tanks. EPA suggests this code is particularly important to consider in the closure of hazardous substance tanks.

The final rule continues to allow owners and operators to permanently close tanks by either removing the tank from the ground or filling the tank with an inert solid material. Several commenters recommended that the rule require removal except when the tank is located under or immediately adjacent to other structures. Their concerns focused upon the potential for releases of residual materials remaining in a tank after it is filled with inert fill and left in place. EPA believes, however, that the final requirement concerning the removal of all liquids and accumulated sludges from the tank (required by § 280.71(b)) and use of the procedures outlined in API 1604 and API 1631 will adequately prevent the future release of residual material after a tank is filled. Therefore, the final rule allows either method of permanent closure.

Several commenters recommended further clarification of the meaning of "inert solid material." The Agency believes that permanent closure in-place will adequately minimize the likelihood of future releases only if the inert fill material specifications and fill procedures used at closure are adequate to prevent the tank from surfacing after closure, will support the structural integrity of the tank as it deteriorates over time (to avoid cave-ins), and will completely seal the tank and associated piping from future use as a tank system. However, the Agency has decided to not specify in detail the materials for filling a tank because of the numerous choices available and the special considerations and problems inherent in each. Sand or concrete, for example, may restrict future construction activities on the site, or may complicate future removal and corrective action activities around the tank. EPA believes that such decisions should be left to the owner and operator to make on a site-specific basis.

EPA also agrees with the commenters who argued that the permanent closure requirements set forth in the proposed rule precluded the reuse of UST systems for unregulated substances. As a result, sound tanks could be forceably discarded even though this would serve no environmental purpose. Therefore, final § 280.71(c) gives owners or operators a third method of closing an UST system. This method allows the owner or operator to complete a change-in-service, which will allow the tank to be used to store non-regulated substances. To complete a change-in-service and avoid the other requirements under permanent closure, the implementing agency must be notified at least 30 days before the change-in-service is completed, and the tank must be cleaned and emptied by removing all liquids and accumulated sludges. In addition, the owner and operator must assess the site in accordance with § 280.72.

4. Assessing the Site at Closure (§ 280.72)

The requirements for assessing the excavation zone around an UST system were proposed in § 280.80(d). Several assessment methods were listed for satisfying these requirements, including the use of external monitoring release detection methods allowed under § 280.41. Several commenters questioned the applicability of one or more of these methods in certain site-specific situations. Some commenters suggested that other equally effective, methods may be appropriate, including internal release detection monitoring. It was also suggested that the nature and extent of the excavation zone assessment should take into consideration various site-specific factors, many of which focused upon whether the tank is closed by removal or by closure in place.

The final rule, as set forth in § 280.72, specifies minimum requirements necessary to adequately characterize the presence of contamination where it is most likely to be present at the UST site. All of the methods listed in the proposed rule have been deleted except the use of external monitoring release detection methods, which continue to be allowed if they are operated in accordance with the final 280.43 requirements at the time of closure. Some of the other methods suggested by commenters, such as internal release detection monitoring, were not incorporated into the final rule because they do not monitor the condition of the environment outside the tank. EPA remains convinced that this is an important last step before permanent closure is complete to ensure prior releases are not missed or ignored at closure like they have been in the past.

Minimum assessment standards have been set forth in the final rule to coincide with the requirements set forth in Subparts E and F. These standards are designed to ensure that assessment information is representative of the site's condition and is obtained before closure. In order to be representative, the measurement methodology selected by the owner or operator must take into consideration factors such as the nature of the stored substance, type of backfill used around the tank, and the depth to ground water. Any other factors must be considered that may be appropriate for identifying the presence and source of contamination from the UST system. For example, soil gas sampling could be used if the regulated substance contains compounds that are highly volatile and if the local geology and hydrology do not significantly restrict the movement of the volatilized organic species. However, if the regulated substance consists primarily of heavier hydrocarbons and, as a result, the concentration of vapors in the soil is expected to be very low, soil sampling may be needed to provide the necessary representative analytical results.

The site assessment methodology used by the owner and operator must also consider the method of closure. The two allowed tank closure methods may be treated differently because tanks that are removed from the ground enable the bottom of the excavation to be visually inspected. A visual inspection of the tank and excavation zone should provide sufficient information for determining if and where the substances stored in the tank have leaked into the subsurface soil. Using this information, a variety of sampling methods may be adequate to make an initial determination of the presence of contamination and the need for corrective action.

On the other hand, the presence and size of leaks from tanks that are closed in place cannot be visually determined and, consequently, a more comprehensive assessment is necessary. Therefore, several measurement methods may be required to determine if contamination is present around the tank. For example, soil gas samples may be used to help identify where soil samples should be taken. EPA believes that these changes will give the implementing agency greater flexibility to consider a variety of site-specific factors in defining the nature and extent of an assessment. For example, although EPA believes that samples taken below an UST system will generally provide the most representative results, the final rule would allow samples to be taken at any depth or location. However, a state inspection may determine that soil samples taken from the backfill surrounding a tank or soil gas samples taken at depths where significant volatilization has occurred may not be representative and additional testing could be required.

The proposed rule in § 280.80(e) required the owner and operator to comply with the corrective action requirements if a release was discovered as a result of the activities conducted under any of the closure provisions or by any other manner. As a result of comments that emphasized the interrelationship between the corrective action provisions and the closure requirements, the Agency believes that the criteria for initiating corrective action during closure activities should be the same as the criteria for initiating corrective action at any other time during the operational life of an UST system. The final rule sets forth these criteria in § 280.72(b).

5. Applicability to Previously Closed UST Systems (§ 280.73)

To address contamination threats expected to result from past closure practices, EPA proposed in § 280.80(d) that UST systems not properly closed in accordance with recommended industry practices before the effective date of the final regulation be revisited and properly closed. The closure activities were to include a site assessment of the UST system, and notification to the implementing agency. In addition; EPA proposed in this subsection to exempt tanks that were previously closed in accordance with one of the existing industry consensus codes from these sites assessment requirements. The Agency specifically requested comments on these previsions in the proposal.

EPA proposed to apply the closure rules retroactively, recognizing that significant manpower and cost could be required to locate all previously abandoned tanks and to conduct site assessments. To reduce this burden and focus only upon abandoned tanks that posed the greatest potential of leaking in the future, the proposed provisions were limited to tanks that had not been properly closed pursuant to one of the industry consensus codes in existence at the time. Those consensus codes were believed to require only removal of the product stored in the tank.

Upon review of numerous public comments received on this approach, it appears that the procedures used to close most abandoned tanks have not been well documented in the past, making it difficult to determine what constituted compliance with this requirement and whether a tanks was properly closed. Moreover, several commenters argued that previous industry consensus codes were not designed to ensure containment of the material in the abandoned tank and may have actually facilitated early releases due to the practice of punching holes in the bottom of the tank. Thus, the commenters suggested that tank systems closed by using practices considered state-of-the-art at the time were just as likely to leak as those that were improperly closed. It was also noted by several commenters that the retroactive application of the closure provisions and imposition of site assessment requirements upon owners and operators of abandoned tanks would be costly to implement and would require the commitment of significant resources by the implementing agencies to track down and enforce.

EPA now believes that many of the concerns raised by commenters are probably well founded if the requirements were applied to all USTs closed before the effective date of the regulations. Such a "broad brush" approach would be very difficult, if not impossible, to enforce because of significant problems in locating the large number of tanks abandoned in the past, if not impossible, to enforce because of significant problems in locating the large number of tanks abandoned in the past, in identifying previous owners and operators, and in properly apportioning responsibility for the site assessment and closure activities. As noted earlier, the lack of documentation would also make it difficult for the implementing agencies to determine if a tank had been "properly closed."

EPA continues to believe, however, that a number of previously abandoned UST systems still contain regulated substances or may pose a threat to human health and the environment. As discussed in the preamble of the April 17 proposal, state UST program incident reports examined by EPA revealed approximately 300 releases reported between 1970 and 1984 that implicated abandoned UST systems. In addition, EPA expects more releases from the numerous operating USTs closed before the effective date of the notification requirements (May 8, 1986) and before the effective date of today's regulations. Because there is a reasonable probability that releases from such tanks may pose a threat to human health and the environment, the application of the closure provisions to these tanks, and in particular the site assessment requirements, may be necessary and appropriate.

EPA now believes that for tanks closed or abandoned before the effective date of today's regulations, the closure provisions should only be applied selectively under the discretionary authority of the implementing agency. These agencies are in the best position to identify abandoned tanks that may have been improperly closed, and to gauge the nature and extent of the threat posed by those tanks. They are also better able to identify the responsible owners and define the appropriate site assessment techniques. This approach is intended to enable the implementing agencies to effectively allocate their resources and only focus upon abandoned tanks that are suspected of posing potentially significant problems. This revised approach also reduces the unnecessary burden upon owners and operators of the discovered abandoned tanks by eliminating the requirement for them to revisit and conduct a site assessment at all tanks that have been previously closed, and removes the uncertainty associated with the "improper closure" standard.

Therefore, the final rule deletes the proposed requirement to conduct site assessments at all tanks improperly closed before the effective date of the final regulations. The final rule, however, requires owners and operators of abandoned tanks to comply with the closure provisions if so directed by the implementing agency when it determines there is a reasonable probability that the tank poses a potential threat to human health and the environment either now or in the future.

6. Closure Records (§ 280.74)

The recordkeeping requirements associated with closure were set forth in § 280.80(g) of the proposed rule. These requirements have been reorganized in the final rule in § 280.74 but have not been significantly changed. The principal change was the elimination of the reference to § 280.43 concerning the maintenance of release detection records. Because these requirements are in § 280.70(a) of the final rule through the reference to Subpart D, and are thereby made applicable to all out-of-service and closed UST systems, repetition of the reference is not considered necessary.

H. Analysis of Other Significant Comments

1. Reliance on Codes Developed by Nationally Recognized Organizations

As described in the preamble to the proposed rule (52 FR 12696), the regulations required that all UST systems be designed, constructed, and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory. In today's final regulations, the Agency has also included the use of industry codes for other technical sections of the rule (such as upgrading and repair of existing USTs). The Agency has noted throughout today's final technical regulations specific codes of practice that have or may be developed.

EPA did not receive any comments that were against or critical of the use of industry codes. One commenter did express the need for public input during the development of federal technical regulations. The Agency agrees that public participation is necessary for the development of sound industry codes and practices. In fact, the Agency wants to expand the use of and reliance on industry codes in order to provide a means for improving existing or methods or developing alternative methods of UST system management. EPA does not intend to adopt inadequate codes but wants to provide a flexible approach to codemaking by relying on nationally recognized organizations to develop new and improved codes and practices through a public process.

EPA is today clarifying this issue to alleviate any future misunderstandings. EPA interprets a "nationally recognized organization" to mean a technical or professional organization that has issued standards formed by the consensus of its members. The organization should ensure consideration of all relevant viewpoints and interests, including those of consumers and future or existing and potential industry participants, and the resulting standards should be widely accepted and technically sound. Thus, any code developed by an organization should be based upon a broad range of technical information, and performance criteria should be central elements of the resulting standards. EPA believes that the following organizations, which have codes and standards referenced in today's regulations, are examples of "nationally recognized organizations":

American Petroleum Institute (API)
Association of Composite Tanks (ACT))
National Association of Corrosion Engineers (NACE))
National Fire Protection Association (NFPA))
National Leak Prevention Association (NLPA))
Petroleum Equipment Institute (PEI))
Steel Tank Institute (STI))
Underwriters Laboratory (UL)

Other similar organizations may also be considered "nationally recognized."

The final rule does not require the use of a particular issue of any code. The consensus codes are frequently revised and updated. The Agency believes that requiring the use of "the most recent edition" would cause undue confusion in the regulated community. For example, a facility may be installed in accordance with codes that are current at the time but may not have the equipment that meets the codes that are current 10 years later. EPA has concluded that the industry codes that are in effect at the date of publication of the final rule are protective of human health and the environment. The use of future editions of the codes in place of the editions that are now in effect is not required, but is encouraged as the updated codes will probably provide for newer, more effective technologies and practices. The use of past codes that have been replaced by new editions by the effective date of this rule is not allowed because some past recommended industry practices were not fully protective of human health and the environment.

The Office of Management and Budget has discussed regulatory codes and standards (OMB Circular A119, dated October 26, 1982). OMB encourages the reliance on voluntary standards, commonly referred to as industry standards or consensus codes. The developers of such codes are called voluntary standards bodies, and are defined to by OMB to include private sector, domestic, or multinational organizations--such as nonprofit organizations; industry associations, professional and technical societies, institutions, or groups; and recognized testing laboratories--that plan, develop, establish, or coordinate voluntary standards. EPA interpretation of the phrase "nationally recognized organization" is intended to encourage the development and use of voluntary standards.

2. Additional Decisionmaking Authority for Implementing Agencies

As discussed elsewhere in today's **Federal Register**, EPA is promulgating requirements (in Part 281) for judging the stringency of state programs to be approved to operate in lieu of "the federal program." Under Section 9004 of RCRA, the state program must contain specific program elements that are no less stringent that the corresponding federal technical requirements. Instead of requiring a detailed line-by-line review and comparison of state requirements to federal technical requirements, EPA is today finalizing an approach to program approval that will compare state programs to the attainment of several general federal objectives that underlie the specific technical requirements provided in Part 280.

In support of this approach, on December 23, 1987, EPA proposed to include additional language in the technical requirements that was intended to ensure this approval process is flexibly implemented (52 FR 48647). In order to establish the federal objective for each program element, EPA requested comment on the addition of specific language into several sections of the technical standards that would clarify the Agency's intent to allow state implementing agencies to substitute their own procedural and administrative requirements for those set forth in the federal requirements. Such administrative requirements, while essential for direct implementation of the federal program, do not represent the only possible approach for protection of human health and the environment, and thus are not part of the federal objectives for defining what requirements must be "no less stringent" under section 9004 of RCRA.

Today's final technical standards include several of these wording changes proposed on December 23, 1987. A list of the specific sections and the changes that have been made in the final rules are provided in Table 2.

Table 2. Wording Changes in the Final Rule

Section	Additional language in the final rules
Subpart B -- UST Systems Design, Construction, Installation and Notification: Section 280.20 (a)(2)(iv), (b)(2)(iv).	Adding "or according to guidelines established by the implementing agency" at the end of each paragraph.
Subpart C -- General Operating Requirements: Section 280.31 (b)(1).	Adding "or in another reasonable timeframe established by the implementing agency" to the end of the sentence.
Subpart D -- Release Detection: Section 280.45 (a), (b), (c).	Adding "or for another reasonable period of time determined by the implementing agency" after the terms "for 5 years," and "at least one year".
Subpart E -- Release Reporting, Investigation, and Confirmation: Section 280.50.	Adding "or another reasonable time period specified by the implementing agency" after the term "24 hours".
Section 280.53 (a),(b).	Do.
Section 280.53 (a)(1), (b).	Adding "or another reasonable amount specified by the implementing agency" after the term "25 gallons".
Subpart F -- Release Response and Corrective Action for UST Systems containing Petroleum or Hazardous Substances:	
Section 280.61	Adding "or within another reasonable period of time determined by the implementing agency" after the different reporting periods of 24 hours, 20 days, 45 days, and 25 days, respectively.
Section 280.62(b)	Do.
Section 280.63(b)	Do.
Subpart G -- Out-of-Service UST Systems and Closure: Section 280.71(a).	Adding "or another reasonable period of time determined by the implementing agency" after the comma in the first sentence.

In general, the Agency decided to include this additional language in the final technical requirements to ensure that different state procedural and administrative approaches could be judged no less stringent than the corresponding federal program. As discussed in more detail elsewhere in today's **Federal Register**, EPA has concluded that different state procedural and administrative requirements can be used and still achieve the underlying performance objective being established today for each program element. It is the Agency's intent to allow the states a significant amount of discretion in this matter, as long as they can demonstrate that overall program performance in each program element will not be adversely impacted by their use of differing administrative practices and procedures.

Many commenters were in favor of this more flexible approach to state program approval and most recommended the additional language be provided in the final technical rules to ensure a line-by-line review is avoided. Other commenters exposed concern that additional language in the technical rules would encourage states to ignore the federal model. Finally, one commenter opposed the flexible approach and stressed the Agency should "hold the line" in maintaining that states adhere to national regulatory decisions, even if only in procedural matters.

EPA disagrees with those commenters who opposed the addition of implementing agency administrative discretion in the technical requirements. They appeared to want to hold states to line-by-line comparisons to the federal program as the preferred way to determine if they are no less stringent. Thus, they were generally opposed to the use of federal objectives for purposes of state program approval, as much as to the addition of greater discretion in the technical requirements that would ensure this approach could be implemented.

As is discussed in the preamble to the state program approval regulation elsewhere in today's **Federal Register**, EPA has adopted the federal objectives approach to assessing states programs programs for purposes of state program approval. Thus, the final technical standards rule also includes the proposed language providing additional authority to implementing agencies with respect to certain procedural or administrative requirements.

V. RELATIONSHIP TO OTHER ASPECTS OF THE UST SYSTEM PROGRAM

A. Interim Prohibition

Section 9003(g) of RCRA Subtitle I sets forth requirements for tank systems installed between May 7, 1985, and 90 days after today's promulgation of final new tank performance standards. During this period, UST may be installed unless it is corrosion protected, made of noncorrodible materials, or otherwise designed and constructed to prevent releases during the operating life of the facility due to corrosion or structural failure. The tank material(s) of construction must also be compatible with the substance(s) to be stored.

The final standards for new tank systems in today's rule (as discussed in section IV. of this preamble) are designed to replace the Interim Prohibition requirements. These final performance standards address design, construction, installation, release detection, and compatibility for new tank installations. The Interim Prohibition will, however, remain in effect by regulation for those tanks that have been deferred from coverage under the technical standards in Subpart A (e.g., some sumps, and field-constructed bulk tanks).

B. Notification

On November 8, 1985, EPA published the Final Rule on Notification Requirements for Owners of Underground Storage Tanks (50 FR 46602). A form to be used for the required notification was included as part of the rulemaking.

The UST rules and standards for new tanks promulgated today are not intended to affect these established notification requirements except to add to the information required to be submitted with the notification requirements (see section IV.B.). These existing requirements have been recodified into 280.22 of today's final rule. Owners of existing UST systems were required to notify their designated state agencies by May 8, 1986. Owners of new or replacement UST systems must notify their designated state agencies within 30 days of bringing the tank into use by submission of the November 8, 1985, federal form, or an approved alternate state notification form.

Section 9002(a)(6) of RCRA requires that, beginning 30 days after the issuance of today's final new tank performance standards, any person who sells a tank intended to be used in an UST system must advise the tank purchaser of the owner's notification requirements. This requirement is effective 30 days after publication of the new tank performance standards that are being promulgated today. This requirement is codified in § 280.22(e) of today's rule.

C. Leaking Underground Storage Tank Trust Fund

Amendments to Subtitle I of RCRA enacted as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA) provide for a Leaking Underground Storage Tank Trust Fund. The amendments (Section 9003 (h)) provide funds for cleanup of petroleum spills from UST systems and give EPA, and states that enter into a cooperative agreement with EPA, the authority to respond to releases of petroleum from UST systems. Almost all of the states have entered into these agreements with EPA and are now responding to petroleum releases from UST systems using Trust Fund revenues. These amendments to RCRA were necessary because no other federal environmental program includes specific authority for response to releases of petroleum from UST systems, although releases of petroleum affecting navigable waters can be responded to under section 311 of the Clean Water Act.

Section 9003(h) provides that the Administrator may issue an order requiring corrective action prior to the promulgation of today's final corrective action regulations under Subtitle I. With the promulgation of today's requirements, the Administrator may use this same order authority, as well as the enforcement authority of section 9006, to require owners or operators to undertake corrective action.

The Leaking Underground Storage Tank Trust Fund is being financed by taxes on motor fuels to pay for response costs in a limited set of circumstances. Until the effective date of today's final technical standards (90 days after publication of today's rule), the Administrator, or states under cooperative agreements, may use the Fund to pay for a particular corrective action whenever the action is necessary to protect human health and the environment. After that date, the statute provides for the use of the Fund primarily where the financial resources of the owners or operators are not sufficient to pay for the costs of corrective action, or if the owner or operator is otherwise unidentifiable, unwilling, or incapable of carrying out corrective action properly. In some cases, an identifiable and solvent owner or operator may be in compliance with all UST financial responsibility requirements (to be discussed in a later **Federal Register** Notice) but lack financial resources to pay the entire cost of a response. In those cases, the Administrator or a state with a cooperative agreement is authorized to use the Fund to pay the costs that exceed the level of financial responsibility required of the owner and operator by the financial responsibility regulations.

If the owner and operator has failed to maintain the required level of financial responsibility, the Trust Fund may not be used, unless: (1) there is no solvent owner or operator; (2) there is an imminent and substantial threat to human health or the environment; or (3) there is a need to take corrective action outside the facility including the provision of alternative water supplies or relocation of residents.

Ninety days after publication of today's regulations, cleanups under the Trust Fund must be conducted in accordance with the corrective action requirements (Part 280 Subpart G).

D. Exempted Tank Studies

The regulations finalized today do not apply to certain tank systems that were exempted by statute under section 9001 of Subtitle I. Section 9009(d) and (e) of Subtitle I requires that EPA conduct a study of several of these systems and submit a report to Congress that includes recommendations as to whether these tanks should be regulated in the future. The Report to Congress will be issued later this year.

The Report to Congress will cover the following exempted tanks whose volume, including piping, is at least 10 percent belowground:

- Farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes, and
- Tanks used for storing heating oil for consumptive use on the premises where stored.

VI. RELATIONSHIP TO OTHER AGENCY PROGRAMS

This section discusses the relationship of today's final rules to certain other EPA regulatory programs. This discussion is for informational purposes only.

A. CERCLA

Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA, or Superfund) requires development of a list of national priorities among known sites with releases and threatened releases of hazardous substances, pollutants, and contaminants. The National Contingency Plan (40 CFR Part 300) regulates development of the National Priorities List (of sites with releases) as well as appropriate responses to the most serious releases. These regulations currently apply to releases of CERCLA-designated hazardous substances from underground storage tanks. CERCLA, however, does not apply to releases of petroleum from USTs or other sources.

Releases of hazardous substances from UST systems may require removal or remedial action responses by federal or state agencies, in accordance with 40 CFR Part 300. Some UST releases of hazardous substances are already included in the National Priorities List. When today's final rules become effective (within 90 days), owners and operators of UST systems that release hazardous substances will be subject to the corrective action provisions of the rules and, in selected cases, the removal or remedial action measures of 40 CFR Part 300. It is the responsibility of the owner and operator of a hazardous substance UST system that releases hazardous substances to consult with the implementing agency to determine the applicability of CERCLA requirements and Subtitle I release response and corrective action requirements under Subpart F.

Under sections 102 and 103 of CERCLA, EPA has promulgated regulations (40 CFR Part 302) that identify hazardous substances and quantities of releases of these hazardous substances that must be reported to the National Response Center. Those regulations contain reporting requirements for releases equal to or in excess of the established reportable quantities (RQs). Under CERCLA, owners and operators of all kinds of storage, transportation, and disposal facilities containing hazardous substances must report releases to the National Response Center. Owners and operators of USTs with releases of hazardous substances that exceed the RQs set forth in 40 CFR Part 302 will continue to be subject to those CERCLA reporting requirements.

Under today's rule, owners and operators that store hazardous substances in USTs are also required to report spill or overfill releases of these substances from USTs that exceed the RQ to the implementing agency within 24 hours, or another period specified by the implementing agency, and immediately begin containment and cleanup of the release. Owners and operators with spills or overfills of hazardous substances from USTs that are less than the reportable quantity will not be subject to the release reporting requirements although they will still be responsible to immediately contain and clean them up.

B. Hazardous Waste Tank Program

Under RCRA Subtitle C, EPA promulgated regulations for tank systems containing hazardous wastes (40 CFR Parts 264 and 265, July 14, 1986) including underground tanks. The RCRA Subtitle I rules promulgated today apply to USTs containing "regulated substances." These regulated substances include petroleum and hazardous substances defined in section 101(14) of CERCLA, except for hazardous wastes regulated under Subtitle C. The exclusion of hazardous wastes from the definition of regulated substance avoids most of the overlapping jurisdiction of Subtitle I and Subtitle C. An overlap in jurisdiction does exist, however, for USTs containing petroleum wastes that are subject to the provisions of RCRA 3014. This overlap is discussed in the next section.

There is also a potential overlap in jurisdiction for USTs containing mixtures of petroleum and hazardous wastes. Today's final rules resolve this potential overlap by excluding such USTs from the universe of USTs subject to today's requirements. Unless otherwise exempted, such USTs would be subject to the requirements of Subtitle C. It is intended that today's rules regulate a different set of UST systems from those subject to regulation under Subtitle C.

C. Hazardous Waste Management Regulations

Section 3001 of the Resource Conservation and Recovery Act requires EPA to identify wastes that pose a hazard to human health and the environment if improperly managed. Under the regulatory program established by Subtitle C of RCRA, EPA has developed a process that identifies and publishes lists of hazardous wastes. Generators must determine whether their waste is on one of the lists in 40 CFR Part 261, Subpart D. If a waste is not listed as a hazardous waste, waste generators are required to determine if their waste is hazardous either by testing it to determine if it exhibits any "characteristics," based on knowledge about the physical and chemical composition of the waste. In the latter case, testing of the waste is not necessary if it is believed that it would not exhibit a hazardous waste characteristic. The waste generator, however, remains responsible for making the correct determinations concerning the characteristics of reactivity, corrosivity, ignitability, and extraction procedure (EP) toxicity, as specified in 40 CFR Part 261, Subpart C.

1. Hazardous Substances

Many hazardous substances regulated by the Subtitle I tank rules are currently on EPA's hazardous waste lists of commercial chemical products at 40 CFR Section 261.33(e) and (f). The products become hazardous wastes when discarded, including when spilled and then not cleaned up and used for their intended purpose. Soils, water, or other debris contaminated by these products are subject to regulation as hazardous waste (see 40 CFR 261.33(d)). A person removing such contaminated soil or debris during a cleanup is a hazardous waste generator, subject to Section 261.5 or Part 262.

2. Petroleum and Petroleum-based Substances

Petroleum-contaminated soils are not an EPA-listed hazardous waste. Based on its physical and chemical nature, petroleum-contaminated soil would not exhibit the hazardous characteristics of corrosivity or reactivity under 40 CFR 261. Some state UST programs have reported to the Agency that they require the use of the EPA tests for ignitability and EP toxicity to assist in making decisions about whether to manage the petroleum-contaminated soils on- or off-site. Other states have simply declared that the soils are not a hazardous waste and, therefore, do not require testing or management as a hazardous waste. Other states require management of petroleum-contaminated soils as a "special waste" that must receive special handling to control environmental and human health risks believed to be associated with the volatile organic chemical emissions known to come from such soils.

Although some states require the use of the EPA tests, petroleum-contaminated soils do not satisfy the EPA criteria for an ignitable hazardous waste. A substance is classified as a hazardous waste if it exhibits the characteristic of ignitability according to one of the following four criteria (40 CFR 261.21) as determined by using an ASTM or Administrator-approved testing procedures. The substance must be: (1) a liquid containing less than or equal to 24 percent alcohol having a flashpoint less than 140¯ F; (2) a nonliquid, but capable under standard temperature and pressure of causing fire through friction, absorption of moisture, or spontaneous chemical changes which burns so vigorously and persistently that it creates a hazard; (3) an ignitable compressed gas, as defined in 49 CFR 173.300; or (4) an oxidizer as defined in 40 CFR 173.151. Gasoline-contaminated soils do not satisfy criteria (1), (3), or (4). They do satisfy the nonliquid requirement of criterion (2); however, the Agency has concluded that they are very unlikely to ever be capable of causing fire by friction, absorption of moisture, or spontaneous chemical changes. These soils, therefore, should not be a hazardous waste under Subtitle C of RCRA due to ignitability.

Several states contacted by EPA reported that they have conducted thousands of EP toxicity tests on petroleum-contaminated soils and they have never exhibited the characteristic of EP toxicity at numerous sites nationwide where soils were contaminated by both leaded and unleaded gasolines. This result is expected because the extraction procedure is designed to identify individual wastes that are hazardous due to their potential to leach significant concentrations of eight specific metals, four insecticides, and two herbicides in a municipal landfill scenario. When subjected to the EP toxicity test, the only constituent of concern for soils contaminated by petroleum is lead. The extremely high adsorption coefficient of lead, however, indicates that such soils are unlikely to ever exhibit the characteristic of EP toxicity.

In summary, the evidence collected by or reported to the Agency to-date indicates it is very unlikely that petroleum-contaminated soils will be found to exhibit any of the characteristics of hazardous waste as currently defined by EPA regulations. However, EPA is also aware that there are potential threats that need to be considered in the management of petroleum-contaminated soils. For example, petroleum-contaminated soils (particularly motor fuels) can contribute significant amounts of volatile compounds to the air or be the source of dissolved contaminants (such as benzene) in ground-water resources. Today's final regulations leave the off-site management of these concerns to existing state and local requirements.

EPA believes there are several ways to properly manage petroleum-contaminated soils that are not hazardous wastes, including the following approaches that are already being used in various states:

- Define petroleum-contaminated soils as a non-hazardous waste that requires disposal into permitted solid waste facilities.
- Define it as a special waste that requires special handling (such as land spreading, heat treating, or disposal in designated fill areas) that is tailored to remove the threats posed by the volatile constituents of the petroleum.
- Define petroleum-contaminated soils as a hazardous waste that must be treated or disposed of under the hazardous waste standards.

EPA intends to study this technical issue further and provide more information to the public and the implementing agencies concerning alternative ways to manage petroleum-contaminated soils when they are managed on-site or removed off-site. This information may include, for example, a description of different test methods that could be used to characterize petroleum-contaminated soils in a more meaningful fashion than present methods. EPA is currently investigating techniques to measure and assess the condition of petroleum-contaminated soils, and handling and treatment alternatives that can be used to properly manage the potential risks they pose to human health and the environment.

Finally, EPA notes that under proposed revisions to the toxicity characteristic under the Agency's hazardous waste regulations (40 CFR 261.24), benzene and a number of other compounds would be added to those constituents that, when measured in waste leachate, will determine whether a waste exhibits a hazardous waste characteristic. (See 51 FR 21648; June 13, 1986.) When these rule revisions are issued in final form, a large amount of petroleum-contaminated soils that are currently considered nonhazardous may have to be managed as hazardous waste. For example, all petroleum-saturated soils may be characterized as a hazardous waste under the proposed revisions. EPA is unsure of the impacts of this proposed rule change at this time, and in fact recently requested additional public comments on the levels for benzene and other constituents. (See 53 FR 18024; May 19, 1988.) However, the public comment period is closed on this issue. The Agency will provide further guidance on this issue at a later date.

D. Used Oil Regulations

Underground tanks storing used oil (e.g., automobile and truck used crankcase oil) are under the jurisdiction of Subtitle I. Pursuant to section 9001(2)(B) of RCRA, underground tanks containing "petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure . . ." are within the scope of Subtitle I. Since used oil is primarily composed of petroleum, although it may contain contaminants due to use of the oil, it is subject to Subtitle I requirements. Owners and operators of UST systems containing used oil were required to notify designated state agencies of the presence of such tanks by May 8, 1986. Owners and operators of newly installed used oil UST systems have also been subject to the requirements of the Interim Prohibition, which has been in effect since May 8, 1985.

As discussed above, however, today's regulations exclude any tanks regulated under Subtitle C of RCRA. Under Subtitle C, EPA has the authority to regulate recycled oil, and to regulate used oil that is disposed of under Subtitle C if such oil is identified or listed as a hazardous waste. Under the authority of Subtitle

C of RCRA, EPA proposed to list used oil as hazardous waste (50 FR 49269-49270, November 29, 1985) and has proposed standards for recycled oil (50 FR 49250-49258, November 29, 1985). Since those publications in the FEDERAL REGISTER, several important decisions in terms of these proposed rulemakings have been made, namely:

(1) Storage of used oil (even when recycled) will be regulated, and
(2) Recycled oil will not be listed as a hazardous waste (51 FR 41900, November 19, 1986).

The storage of used oil, however, is not currently regulated as a hazardous waste under Subtitle C. Unless and until the Agency regulates the storage of used oil as a hazardous waste under Subtitle C, it will be subject to Subtitle I. Accordingly, the Agency is today including application of the technical requirements to used oil UST systems. This is discussed in further detail in section IV.A.

E. SPCC

Under section 311 of the Federal Water Pollution Control Act, EPA has promulgated regulations for the prevention of oil spills into navigable waters. These rules (40 CFR Part 112) known as the Spill Prevention Control and Countermeasure (SPCC) regulations are intended to prevent and contain releases of oil into surface waters which are navigable.

Comparatively few UST systems are subject to SPCC regulations. Only those tanks of greater than 42,000 gallons capacity that are located near navigable waters of the U.S. or adjoining shorelines may be affected. UST systems which, due to their location, could reasonably be expected to discharge oil into or upon navigable waters of the United States or adjoining shorelines and which have a storage capacity greater than 42,000 gallons are subject to both today's rules and the SPCC rules.

F. DOE High-Level Radioactive Waste Program

Under the Atomic Energy Act of 1954 (42 U.S.C. 2001 et seq.), the U.S. Department of Energy (DOE) has promulgated rules for the management of high-level radioactive waste resulting from atomic energy defense activity. DOE Orders 5480.1, 5480.2, and 5820.2 regulate the underground storage of these wastes, including corrective actions in the event of a release.

The UST rules include the storage of radioactive waste because any radionuclide is a "hazardous substance" under CERCLA and thus a regulated substance under Subtitle I. However, in view of the differences in high-level radioactive waste from other RCRA Subtitle I regulated substances and the much larger tanks storing this waste, EPA is today deferring regulatory action on these DOE radioactive waste facilities. Until a determination is made as to whether, and how, the UST rules should apply to DOE facilities storing high-level radioactive wastes, today's UST requirements, except corrective action and the Interim Prohibition requirements, do not apply to these facilities. More details are provided on this in section IV.A.

VII. ECONOMIC AND REGULATORY IMPACTS

Section VII.A. discusses the Regulatory Impact Analysis of the final rule required by Executive Order 12291. Section VII.B. discusses the analysis of the effects of the final rule on small businesses required by the Regulatory Flexibility Act. Section VII.C. addresses requirements under the Paperwork Reduction

Act. (A full draft of the Regulatory Impact Analysis for the final rule is available as part of the background documents supporting this rulemaking.)

A. Regulatory Impact Analysis

1. Executive Order 12291

Executive Order 12291 (46 CFR 13193, February 19, 1981) requires regulatory agencies to conduct a Regulatory Impact Analysis (RIA) for any major rule. EPA has conducted an RIA to assess the regulatory impacts of the technical standards rule for USTs based on the guidelines contained in the Office of Management and Budget's "Interim Regulatory Impact Analysis Guidance" and EPA's "Guidelines for Performing Regulatory Impact Analysis." The objective of the analysis is to examine the anticipated costs, benefits, and impacts of the final rule rather than to select a regulatory option. Based on the results of the analysis, the Agency has concluded that the technical standards regulations being promulgated today represent a major rule that produces significant net benefits to society.

As described in today's preamble, these technical standards pertain to tank system design, construction, and installation, leak detection, recordkeeping, reporting, closure, and corrective action. For the proposed rule (52 FR 12761-12769), EPA conducted an RIA to compare several regulatory alternatives. Each of these alternatives is discussed in detail in the "Regulatory Impact Analysis for Proposed Technical Standards for Underground Storage Tanks" (April 1987). (This RIA for the proposed rule is contained in Appendix B of the RIA for the final rule.) The RIA for the final rule does not consider various options. Instead, it concentrates on the impacts of the provisions of the final rule (see sections III. and IV. of today's preamble for a full description of the requirements of the final rule.)

The final rule refines the proposed rule (April 17, 1987) by phasing in requirements for release detection over a period of 5 years for existing tanks (based on the age of the tank) and by establishing more stringent requirements for pressurized piping. Most of the other requirements in the final rule pertaining to corrosion protection and release detection are the same as in the proposed rule.

2. Costs

Compliance with the rule's requirements for release detection, system inspections and upgrading, and corrective action will require large expenditures by most UST owners and operators. In addition, the large population of USTs means that the total costs for all USTs will be substantial from the standpoint of the economy as a whole.

Table 3, column 2, displays the costs of the final rule for the entire UST population, by category of costs. These cost estimates represent costs calculated using the UST Model, a model developed by the Agency to simulate the release and transport of petroleum products. These estimates assume a total of 1.7 million USTs and a total of 30 years of costs after promulgation of the rule, discounted at a rate of 3 percent annually. Based on EPA's analysis and assumptions, the estimated cost of the final rule is expected to be approximately $69 billion over a period of 30 years, or $3.6 billion per year (discounted at a rate of 3 percent).

Table 3. Costs Under the Base Case and Final Rule

Cost component	Total cost, all USTs		Increment cost	
	Base case (millions)	Final rule (millions)	Total (millions)	Per UST
Component repair replacement, upgrade.	$19,890	$32,300	$12,410	$7,300
Leak detection and testing.	440	4,980	4,540	2,670
Corrective action in response to releases.	0[1]	31,970	31,970	18,800
Total	**20,330**	**69,250**	**48,920**	**28,770**

Source: UST Model runs, April 1988.

[1]No cost is ascribed here because no corrective action is required in the base case.

In order to evaluate the incremental costs of the final rule, EPA estimated the costs that would be incurred by UST owners and operators in the absence of any further regulations. These costs are presented in column 1 of Table 3 as base case cost. Subtracting the base case costs from the costs under the final rule yields the incremental cost of the final rule, shown by cost category in Table 3, column 3. This incremental cost is expected to be approximately $48 billion over 30 years, or $2.5 billion on an annual basis (discounted at an annual rate of 3 percent). The administrative costs of implementing the final rule are not included in this analysis.

3. Benefits

The final rule's requirements for leak detection and prevention and corrective action will provide society with a variety of benefits. The benefits are defined as reductions in damages under the rule in comparison to the base case. Two kinds of damages are considered in the RIA: those that occur before a release is detected, such as contamination of private and public wells; and those that occur after a release is detected, such as contamination of soil and ground water.

The pre-detection damages are $2.1 billion under the final rule, and $4.8 billion in the base case. The incremental benefits of regulation resulting from this decrease in pre-detection damages are therefore $2.7 billion. The post-detection damages are estimated to be $52.8 billion under the base case, and negligible under the final rule. (Under the final rule, corrective actions must be performed as soon as a release is detected which accounts for this drastic reduction in post-detection costs.) The incremental benefits of regulation resulting from a decrease in post-detection damages are therefore $52.8 billion. The total incremental benefits of the rule, including the benefits from reduction in both pre- and post-detection damages, are $55.5 billion ($2.7 billion due to reduction of pre-detection damages and $52.8 billion due to reduction of post-detection damages). The yield in benefit for each UST is about $31,000.

EPA believes that, in addition to the benefits summarized above, many additional benefits of release detection and prevention cannot be expressed quantitatively or in purely monetary terms. Examples of these important benefits include the prevention of added risks to human health, the value of preventing damage to the ability of streams to support life, and the basic value of preventing contamination of ground-water resources whether or not they are currently being used.

In an attempt to provide some measure of these benefits, EPA has quantified the health benefits of the release detection, prevention, and corrective action portion of the final rule, but has expressed the benefits in terms of cancer cases avoided and the reduction in numbers of USTs posing cancer risks in excess of a specified threshold (Table 4). Of the two scenarios shown in Table 4, one scenario assumes that people will not use water that smells or tastes badly. The other scenario assumes that people will use water whether it seems contaminated or not.

Table 4. Reduction in Health Risks Due to Release Prevention and Detection in the Final Rule

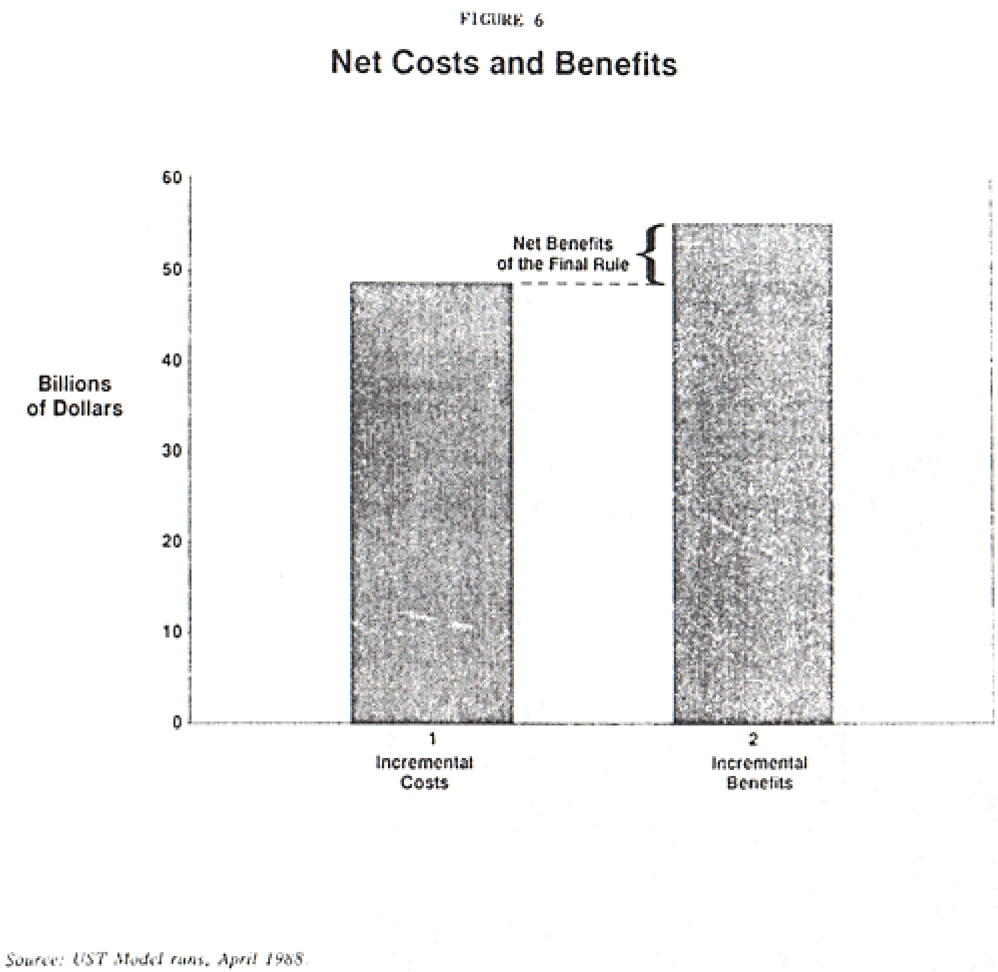
Type of benefit	**Assuming taste and odor threshold limits exposure**	**Assuming no exposure limitation**
Reduction in population risk (total cases of cancer avoided).	20 cases.	87 cases.
Reduction in numbers of USTs posing risks of cancer as high as one chance in 10,000.	8,371 USTs.	13,300 USTs.

Source: UST Model runs, April 1988.

4. Cost Effectiveness of the Final Rule

A comparison of the incremental costs of the final rule to its incremental benefits is shown in Figure 6. The figure shows the incremental costs of the final rule to be $48.9 billion, which include repair, system upgrading and replacement, release detection, and corrective action for the entire population of 1.7 million USTs. In contrast, the incremental benefits of the rule are estimated to be $55.5 billion. These benefits consist largely of reductions in damages occurring after releases are detected, but also include reductions in well and vapor damages and lost product occurring before the detection of releases. By subtracting costs from benefits, the net dollar benefits of the final rule over the next 30 years are estimated to have a present value of $6.6 billion, or $4,000 per UST. In addition to the benefits measured in dollar terms, the rule also significantly reduces damages to human health and the environment.

Figure 6. Net Costs and Benefits



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5. Economic Impacts on Existing Facilities

An economic impact analysis was performed for the general industry and retail marketing sectors having petroleum USTs and for firms having hazardous substance USTs. The results of this analysis indicate that firms in the retail motor fuel marketing sector would be most adversely affected, for several reasons: they have a greater number of small firms that are more vulnerable to significant regulatory expenditures; regulatory expenditures in this sector are likely to be greater because motor fuel retail outlets generally have the greatest number of USTs per outlet; and firms in the retail motor fuel marketing sector do not have the option of closing their USTs and using alternative storage methods. The RIA reaches the following conclusions:

- By year ten, 43 percent more small firms are projected to close under the final rule than in the base case.
- Most economic impacts of the final rule occur in the first 5 years after its imposition.
- Most closures of existing outlets are caused by corrective action expenses.

- Were corrective action to be performed in the base case as well as under the final rule, the model predicts that a higher percentage of outlets would survive under the final rule than in the base case.

6. Integration of Technical Standards and Financial Responsibility Rules

EPA prepared separate RIAs for the proposed technical standards and financial responsibility rules in order to estimate the costs and economic impacts of each proposed rule. As many commenters pointed out, a major weakness of this approach was that the two RIAs could not easily be used to assess the combined impacts of the proposed technical standards and financial responsibility rules to construct an "after regulation" picture of the regulated community. Commenters also noted that certain indirect costs that would be imposed on the regulated community were not included in either RIA. They explained that in order to buy insurance to satisfy the financial responsibility requirements, UST owners and operators would have to upgrade their USTs by installing release detection systems sooner than required by the technical standards rule.

In response to these comments, EPA has revised its approach in preparing the RIAs for the final rules, so that the two RIAs now perform the following functions:

- Account for the indirect costs of having to upgrade tank systems sooner to procure financial assurance; and
- Estimate the combined costs and economic impacts of both sets of requirements.

The RIA for the financial responsibility rule assumes the technical standards rule in its base case in order to estimate its costs and economic impacts. The costs incurred in upgrading, replacing, retrofitting, and corrective action are attributed to the technical standards rule. Costs incurred to upgrade sooner than required by the technical standards rule in order to obtain financial assurance are attributed to the financial responsibility rule. By using the technical standards rule as the base case and computing the incremental costs of the financial responsibility rule, the overall costs to the regulated community can be estimated properly.

B. Regulatory Flexibility Act

Under the Regulatory Flexibility Act of 1980 (5 U.S.C. 601 et seq.), agencies publishing a proposed or final rule must prepare and make available for comment a Regulatory Flexibility Analysis that describes the potential impact of the rule on small entities (i.e., small business, small organizations, and small government jurisdictions). The purpose of the Regulatory Flexibility Act is to ensure that regulations do not impose unnecessary costs or other burdens on such entities. As part of its RIA, EPA has examined the potential impact of today's rule on small entities and has concluded that the rule will have a significant impact on a substantial number of small entities, as described below:

1. Small Entities Potentially Affected by the Rule

The Agency divided the businesses potentially affected by the rule into three categories: firms engaged in retail motor fuel marketing (e.g., gasoline service stations), firms engaged in other businesses (general industry category), and local government entities. EPA focused the emphasis of the Regulatory Flexibility

Analysis on the retail motor fuel marketing sector because (1) all firms in this sector must store their product in underground storage tanks; (2) about three-quarters of all retail motor fuel outlets are owned or operated by small businesses; and (3) the data base for this sector is reasonably accurate and will capture the most severe small-business impacts likely to occur as a result of the rule.

a. Small Businesses in the Retail Motor Fuel Marketing Sector. For this Regulatory Flexibility Analysis, small businesses in the retail motor fuel marketing segment are defined as firms with less than $4.6 million in annual sales and include all firms with only one or two outlets. Firms with $4.6 million in sales will typically have approximately $500,000 in assets and a net worth of about $250,000. EPA estimates that in 1984, small businesses either owned or operated 72 percent of the 193,000 retail motor fuel outlets in the United States.

To examine the rule's potential economic impact on small businesses, EPA estimated the rates at which existing firms in the retail motor fuel marketing sector would leave the industry with and without regulations. For the purposes of this analysis, EPA estimates that these outlets have historically tended to exit the industry at a rate of 3 to 4 percent per year. If releases occur at the level estimated by the RIA and no revenue increases are possible for small businesses, this rate would increase to 6.2 percent per year, assuming average corrective action costs.

b. Small Businesses in the General Industry Sector. An estimated 24 to 41 percent of all USTs in the general industry sector are owned by firms with less than $1 million in assets. A typical small firm in this segment was assumed to have $300,000 in assets and net profits of $21,000 a year. Overall, these firms represent about 12 percent of all UST-owning firms in the general industry sector.

The cost of corrective action for non-plume release (i.e., no ground-water contamination) would leave a small general industry firm in severe financial distress, and the cost of corrective action for a plume release (i.e., contamination of ground water) would lead to the failure of the firm. Replacing a tank would cause a small general industry firm a temporary financial hardship; however, this hardship would not seriously threaten the survival of the firm.

c. Small Local Government Entities. Local government entities of all sizes own USTs. In 1982, the typical municipality with a population less than 50,000 had general revenues of $1.7 million. The costs of replacing even a single UST would represent 2 percent of the revenue of such a municipality, a significant expenditure that would have to be taken into account when planning. A corrective action that required cleaning up a dispersed plume would represent more than 13 percent of the general revenues of such a community, a sum that would probably cause severe financial distress.

In 1982, of the 38,886 local governments classified as counties, municipalities, and townships, 37,581 (approximately 97 percent) had populations of 50,000 or less. Almost all UST-owning local governments would, therefore, be subject to potentially substantial economic impacts under the technical standards rule if an UST release occurred.

C. Paperwork Reduction Act

The information collection requirements in this rule have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, (44 USC 3501 et seq.) and have been assigned OMB Control Number 2050-0068. Reporting and recordkeeping burden on the public for this collection is estimated at 8,265,220 hours for the 1,750,000 respondents, with an average of 4 hours per response. These burden estimates include all aspects of the collection effort and may include time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

If you wish to submit comments regarding any aspect of this collection of information, including suggestions for reducing the burden, or if you would like to a copy of the information collection request (please reference ICR #1360), contact Rick Westlund, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460 (202-382-2745); and Marcus Peacock, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

VIII. LIST OF SUBJECTS IN 40 CFR PART 280

Administration practice and procedures, Confidential business information, Ground water, Hazardous materials, Reporting and recordkeeping requirements, Underground storage tanks, Water pollution control, Water supply.

September 8, 1988

Lee Thomas
Administrator