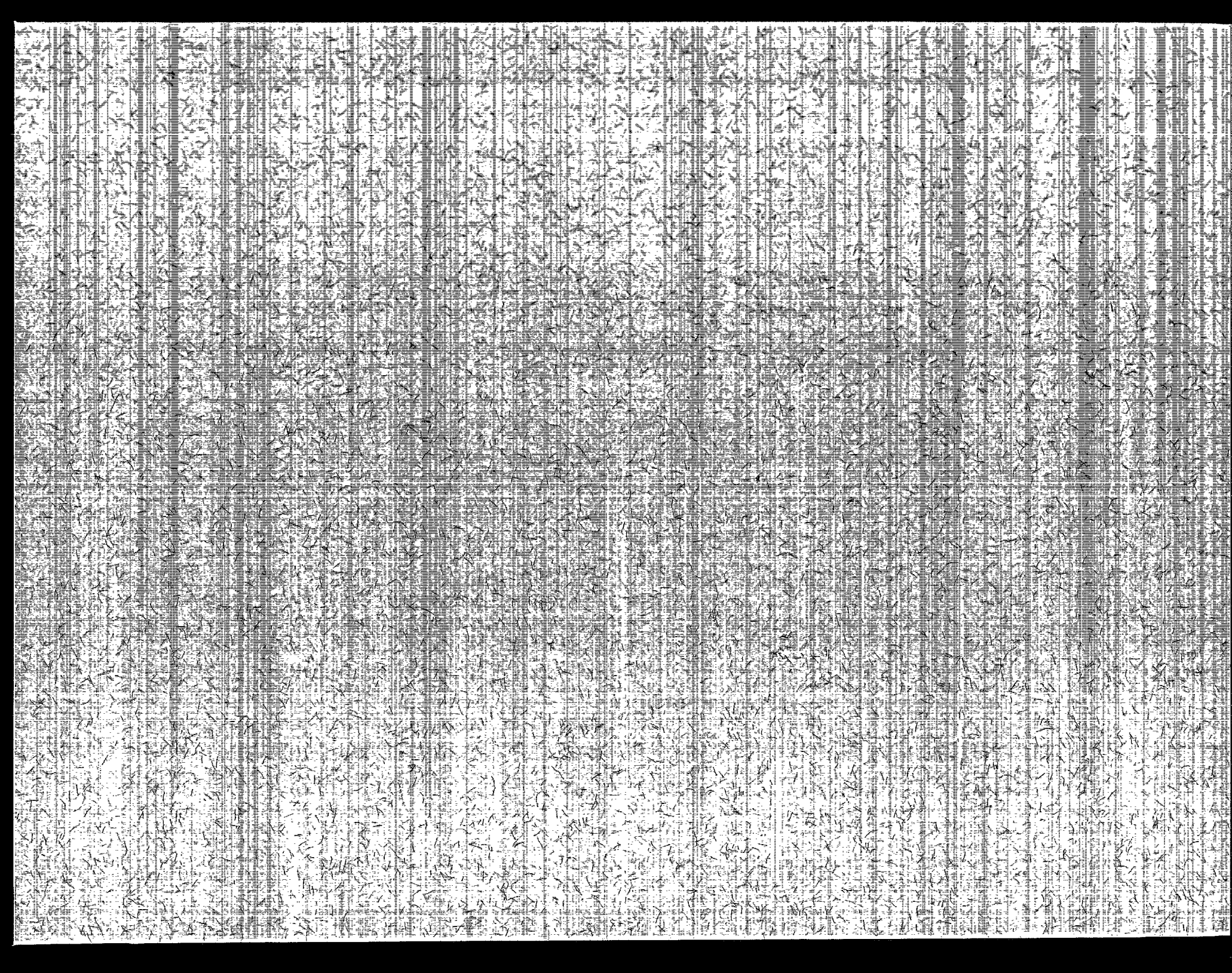




Report To Congress

Underground Heating Oil and Motor Fuel Tanks Exempt From Regulation Under Subtitle I of the Resource Conservation and Recovery Act



Report to Congress

***Underground Heating Oil and
Motor Fuel Tanks
Exempt from Regulation
Under Subtitle I of The Resource
Conservation and Recovery Act***

Prepared by:

**U.S. Environmental Protection Agency
Office of Underground Storage Tanks
Washington, D.C.**

May 1990

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Executive Summary	ii
1. Study Approach	2
2. Characteristics of the Population of Exempt Heating Oil and Motor Fuel Tank Systems	3
3. Extent of Known Releases	7
4. Potential Number and Volume of Releases	11
5. Potential Environmental and Human Health Effects from Releases	14
6. State Regulation of Exempt Heating Oil and Motor Fuel Tank Systems	15
7. Major Technical Findings	16
8. Nontechnical Considerations in Developing Recommendations	18
9. Recommendations	19
10. Summary	21

EXECUTIVE SUMMARY

This report has been prepared by the U.S. Environmental Protection Agency (EPA) in response to a request by Congress for additional information about underground heating oil and motor fuel tank systems exempt from regulation under Subtitle I of the Resource Conservation and Recovery Act (RCRA). Section 9009(d) and (e) of the 1984 Amendments to RCRA require EPA to study certain exempt tank systems and to report to the President and Congress on whether these tanks should be subject to the provisions of Subtitle I. Subtitle I excludes from regulation nine types of tank systems, including the two that are the focus of this report:¹

- Tank systems used for storing heating oil for consumptive use on the premises where stored; and
- Farm or residential tank systems of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes.

This report is submitted in fulfillment of the requirements of RCRA Section 9000(d) and (e). It is accompanied by a background document providing additional detail on the issues and analyses addressed by this report.

Heating oil tank systems are subdivided in this report into tank systems located at (1) farms, (2) residences, and (3) nonresidential facilities. Residential facilities include apartment complexes, condominiums, townhouses, and single-family homes. Nonresidential facilities include commercial, institutional, government, manufacturing, and military facilities. Motor fuel tank systems are subdivided into tank systems located at (1) farms and (2) residences.

The estimated population of exempt heating oil and motor fuel tanks in the United States is about 3.1 million, almost twice the number of USTs currently regulated under Subtitle I (1.7 million). This total population is subdivided by sector as follows:

Heating Oil Tanks (2.7 million)

(1) Residential sector:	1.9 million tanks (61%)
(2) Nonresidential sector:	0.8 million tanks (25%)
(3) Farm sector:	0.04 million tanks (1%)

¹ Unless explicitly specified, hereafter the term "exempt tank systems" refers only to these two types of tank systems.

Motor Fuel Tanks (0.4 million)

- | | | |
|-----|---------------------|-------------------------|
| (1) | Farm sector: | 0.3 million tanks (10%) |
| (2) | Residential sector: | 0.1 million tanks (3%) |

Heating oil tank systems, especially residential heating oil tank systems, are concentrated in the Northeast; relatively few are located in the West. Farm heating oil tank systems are more uniformly distributed throughout the country. Exempt farm motor fuel tank systems are concentrated in the North Central and West; the Northeast contains few of these tank systems.

The technical characteristics of exempt heating oil and motor fuel tank systems are best understood by comparison to regulated underground storage tanks (USTs). Some characteristics of exempt tank systems are similar to those of regulated USTs:

- Most exempt tank systems and regulated USTs are constructed of steel and are not protected against corrosion;
- Existing populations of exempt tank systems and regulated USTs have similar age distributions; and
- Exempt nonresidential heating oil tanks are generally similar to regulated tanks in size and gauge (thickness) of steel.

Other technical characteristics show differences:

- Most exempt residential and farm tank systems are smaller and made of lighter-gauge steel than most regulated USTs;
- Most exempt tank systems (87 percent) store heating oils, but most regulated USTs store motor fuels;
- Although most exempt tank systems use suction pumps, about one-half of the regulated USTs use pressurized pumps that force product out of the tank system; and
- Effective methods of leak prevention and detection are less commonly an integral part of exempt nonresidential tank systems compared with regulated USTs and are seldom a part of small exempt residential or farm tank systems.

The annual rate of reported releases from exempt tank systems increased substantially between 1970 and 1985, and the rate continues to increase. Reports of releases from exempt tank systems occur most frequently from nonresidential heating oil facilities in the Northeast and involve releases of fuel oil No. 2. The documented data, case histories, and other information collected during this study indicate that exempt tank systems and regulated USTs tend to be made of similar material (steel), have similar age distributions, and experience releases from similar causes. The potential for

exempt tank systems to leak (if they are not protected against corrosion), therefore, is likely to be similar to the potential for unprotected regulated USTs to leak.

Most releases from exempt heating oil or motor fuel tank systems travel through the same routes as releases from regulated USTs and can result in contamination of air, soil, surface water and, most significantly, ground water. The extent of soil and ground-water contamination is likely to be less from sudden releases of heating oils over a short period of time than from sudden releases of gasoline, because heating oils have a higher resistance to flow and lower solubility than gasoline. The greatest concern with releases from exempt heating oil tank systems is not from sudden releases over a short period of time, but from slow, protracted releases of unknown volume that go unnoticed and undetected over a long period of time. As with regulated USTs, all of the products stored in exempt tank systems contain substances that can cause adverse health effects.

In making recommendations, EPA considered not only the technical information regarding exempt tank systems, but also other factors that could influence the appropriateness of federal regulations. First, EPA considered the burden that federal regulation of exempt tank systems would add to the states' existing resources to implement EPA's current UST regulations. Second, EPA considered the diversity of exempt tank owners, including their knowledge of and ability to comply with federal environmental regulations. Third, EPA considered the economic efficiency of targeting resources through educational and technical assistance programs to those areas of the nation where the problems with exempt tank systems are the greatest versus establishing a uniform national program.

Based upon the above considerations, EPA concluded that the solution to the problems with exempt tank systems does not lie in uniform federal regulation of these systems at this time. Instead, a feasible long-term solution, based on banning the installation of new unprotected tank systems, educating owners and operators on the risks posed by exempt tank systems, and helping states build on their existing UST programs by providing technical support, should be pursued.

Recommendations

EPA recommends that the heating oil and motor fuel tanks exempted in Sections 9001(A) and (B) of RCRA be addressed by the following actions:

- Subject all exempt heating oil and motor fuel tank sectors studied in this investigation to a ban on the installation of new unprotected tank systems similar to the Interim Prohibition of Section 9003(g). The ban would apply to all owners, operators, and installers of exempt heating oil and motor fuel tank systems.
- Except for the above ban on the installation of new unprotected tank systems, continue the Subtitle I exemption for those heating oil and motor fuel tank systems that are currently exempt.

- Authorize EPA to develop educational and technical assistance programs specifically targeted to exempt heating oil and motor fuel tank systems designed to:

- Educate owners and operators (as well as industry groups such as fuel distributors) on proper tank management and the risks posed by exempt tank systems; and
- Assist state and local governments in developing and implementing their own regulatory programs as needed.

EPA believes that the problem posed by exempt heating oil and motor fuel tank systems will best be addressed by the three recommendations above. If these recommendations are accepted and established, EPA will monitor their effectiveness and evaluate the necessity for undertaking further actions.

REPORT TO CONGRESS:

UNDERGROUND HEATING OIL AND MOTOR FUEL TANKS EXEMPT FROM REGULATION UNDER SUBTITLE I OF THE RESOURCE CONSERVATION AND RECOVERY ACT

This report has been prepared by the U.S. Environmental Protection Agency (EPA) in response to a requirement by Congress for additional information about underground heating oil and motor fuel tank systems that are exempt from regulation under Subtitle I of the Resource Conservation and Recovery Act (RCRA). Section 9009(d) and (e) of the 1984 Amendments to RCRA require EPA to study certain exempt tank systems and report to the President and Congress on whether these tanks should be subject to the provisions of Subtitle I. Subtitle I excludes from regulation nine types of tank systems, including the two that are the focus of this report:

- Tank systems used for storing heating oil for consumptive use on the premises where stored; and
- Farm or residential tank systems of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes.²

In response to the above requirement, EPA has prepared this report to Congress. A supporting background document, "Underground Heating Oil and Motor Fuel Tanks Exempt from Regulation Under Subtitle I of RCRA: Background Document for a Report to Congress," provides additional detail on exempt tank characteristics; size and geographic location of the population of tank systems; the known extent and assessed potential for tank systems to leak; the potential health risks associated with exposures to released products; and the current extent of state and local regulation of exempt tank systems. In addressing these issues, the background document compares exempt tank systems to USTs regulated under Subtitle I.

This report to Congress is organized into the following ten sections:

1. Study Approach;

² The following structures or tank systems are also excluded from regulation under Subtitle I, but are not addressed in this study: septic tanks; pipeline facilities regulated under certain other federal and state laws; surface impoundments, pits, ponds, or 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 surface of the floor in underground areas. Subtitle I exempts all of these tank systems by excluding them from the definition of an underground storage tank (UST). When used in this report, the term "exempt tank system" refers only to exempt heating oil and motor fuel tanks, while the term "regulated UST" refers only to underground storage tanks regulated under Subtitle I.

2. Characteristics of the Population of Exempt Heating Oil and Motor Fuel Tank Systems;
3. Extent of Known Releases;
4. Potential Number and Volume of Releases;
5. Potential Environmental and Human Health Effects from Releases;
6. State Regulation of Exempt Heating Oil and Motor Fuel Tank Systems;
7. Major Technical Findings
8. Nontechnical Considerations Used for Developing Recommendations;
9. Recommendations; and
10. Summary.

The source and derivation of the findings provided in Sections 1 through 7 are explained in the background document and its appendices.

1. STUDY APPROACH

The background study leading to this report was conducted in three stages. First, EPA assessed the size, geographic location, and other characteristics of the population of exempt tank systems, including the extent of known releases from exempt tank systems, using standard survey research techniques. Second, this assessment was reviewed by federal and state government officials and underground tank systems industry representatives. Finally, additional analyses, using supplemental data provided by these representatives, were thereafter conducted to address comments received from this review. The findings of this report are based on the background study.

The exempt tank systems reported here are divided into two major types: motor fuel tank systems and heating oil tank systems. Exempt motor fuel tank systems are subdivided into tank systems located at (1) farms and (2) residences. Exempt heating oil tank systems are subdivided into tank systems used at (1) farms, (2) residences, and (3) nonresidential facilities. Residential facilities include apartment complexes, condominiums, townhouses, and single-family homes. Nonresidential facilities include commercial, institutional, government, and manufacturing facilities. The distinction between motor fuels and heating oils and the breakdown of sectors among farms, residences, and nonresidential facilities in this report correspond generally to the language of the statutory exemption.

2. CHARACTERISTICS OF THE POPULATION OF EXEMPT HEATING OIL AND MOTOR FUEL TANK SYSTEMS³

Population. The estimated population of exempt tanks in the United States is about 3.1 million, almost twice the number of USTs currently regulated under Subtitle I. The 3.1 million total population of exempt tanks breaks down into the following sectors:

Heating Oil Tanks (2.7 million)

- Residential sector: 1.9 million tanks (61%)
- Nonresidential sector: 0.8 million tanks (25%)
- Farm sector: 0.04 million tanks (1%)

Motor Fuel Tanks (0.4 million)

- Farm sector: 0.3 million tanks (10%)
- Residential sector: 0.1 million tanks (3%)

These estimates are based on information obtained from the U.S. Departments of Commerce (Bureau of Census), Agriculture, and Energy; state UST programs; and underground storage industry officials.⁴

Geographic Concentration. Exhibit 1 illustrates the geographic concentration of exempt tank systems (excluding residential motor fuel tank systems); Exhibit 2 illustrates the distribution by individual use sectors. Heating oil tank systems, in general, are concentrated in the Northeast; relatively few are located in the West. That is especially true of residential heating oil tank systems. Farm heating oil tank systems are more uniformly distributed throughout the country. Exempt farm motor fuel tank systems are concentrated in the North Central and West; the Northeast contains the fewest of these tank systems. The geographic concentration of exempt residential motor fuel tank systems could not be established with available data.

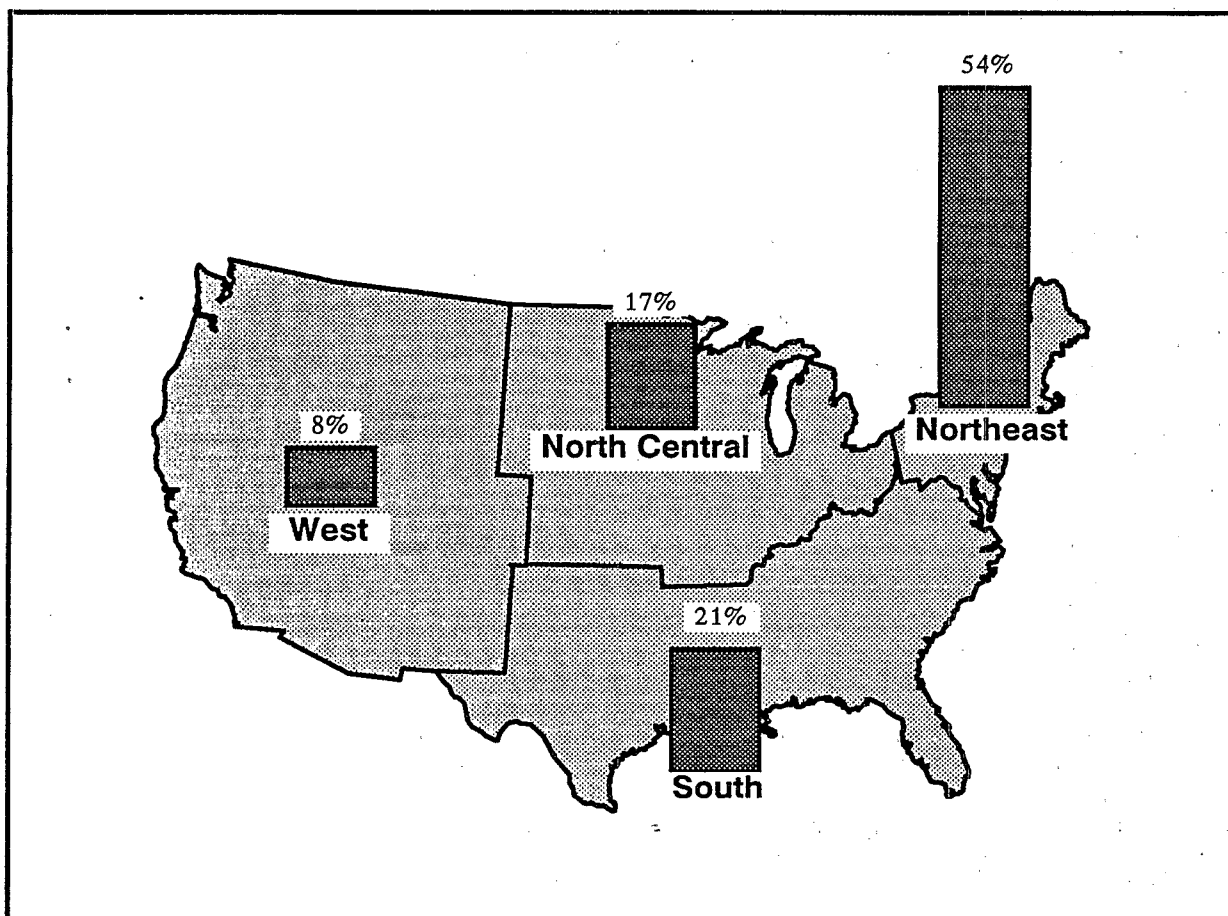
Technical and Operational Characteristics. The technical and operational characteristics of exempt heating oil and motor fuel tank systems are better understood if compared and contrasted to those of regulated USTs, as illustrated in Exhibit 3. The similarities and differences with respect to key technical and operational characteristics for exempt tank systems and regulated USTs are summarized below.

³ A tank system is defined to include the tank and its connected piping, underground ancillary equipment, and containment system, if any.

⁴ A full description of the derivation of these estimates can be found in Appendix A of the Background Document.

Exhibit 1

**Geographic Concentration of Exempt Heating Oil and
Motor Fuel Tank Systems^a**

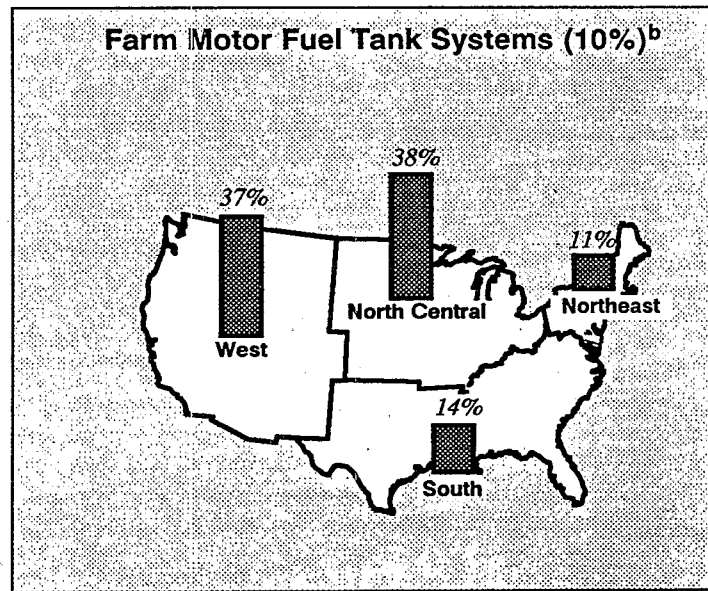
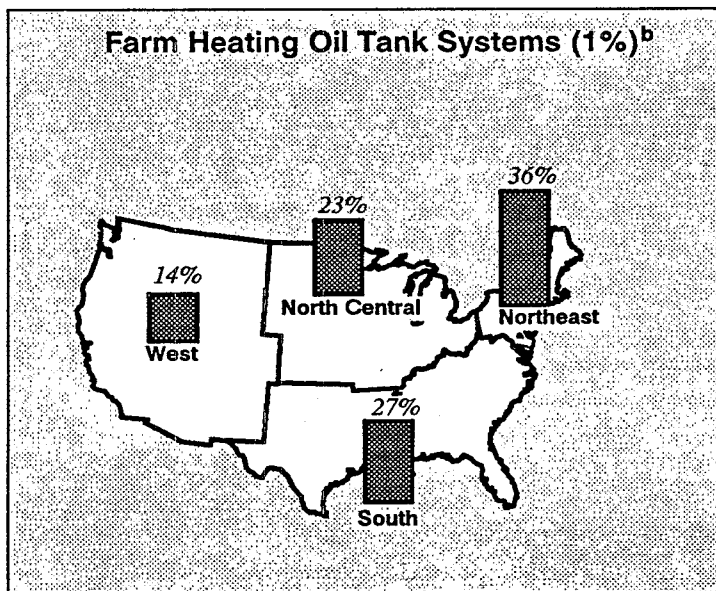
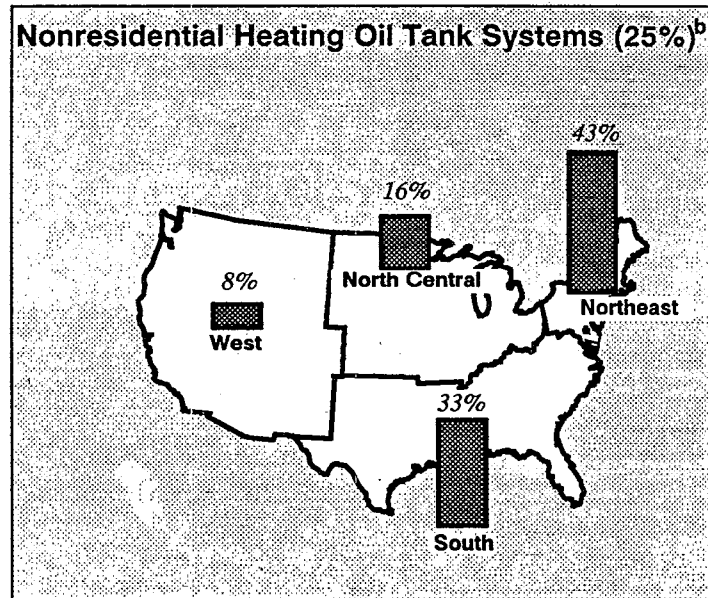
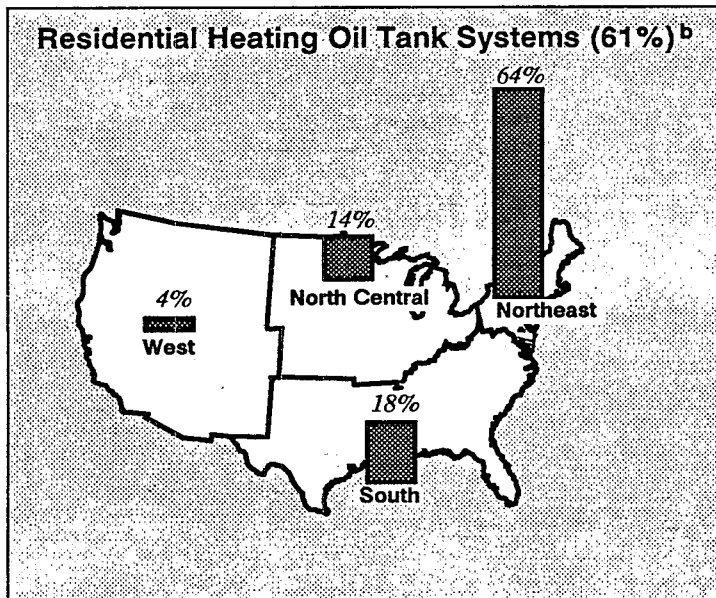


Source: See background document.

^a Totals for the West include Alaska and Hawaii.

Exhibit 2

Geographic Concentration of Exempt Heating Oil and Motor Fuel Tank Systems By Use Sector ^a



Source: See background document

^a Totals for West include Alaska and Hawaii.

^b Numbers in parentheses are the percentage that each use sector contributes to the universe of exempt heating oil and motor fuel tank systems.

Exhibit 3

**Similarities (*) and Differences (-) Between Characteristics
of Exempt Tanks Systems and Regulated USTs**

Heating Oil Tanks	Other Petroleum Tanks
<p align="center"><u>Nonresidential</u></p> <ul style="list-style-type: none"> * mostly bare steel * usually over 15 years old * similar to regulated USTs in size and thickness of steel - usually suction pumping - most frequently fuel oil No. 2; however, fuel oils Nos. 4, 5, or 6 are common 	<p align="center"><u>Regulated USTs</u></p> <ul style="list-style-type: none"> * usually bare steel * usually over 15 years old - 50% pressure pumping
<p align="center"><u>Residential</u></p> <ul style="list-style-type: none"> * mostly bare steel * usually over 15 years old - smaller and thinner steel than most regulated USTs - usually suction pumping - usually fuel oil No. 2 	<p align="center"><u>Exempt Farm and Residential</u></p> <ul style="list-style-type: none"> * mostly bare steel * usually over 15 years old - smaller and thinner steel than most regulated USTs - usually suction pumping

Similarities:

- Most exempt tank systems and regulated USTs are constructed of steel and are not protected against corrosion;
- Existing exempt tank systems and regulated USTs have similar age distributions (usually over 15 years old); and
- Exempt nonresidential heating oil tanks are similar to regulated tanks in size and gauge (thickness) of steel.

Differences:

- Most exempt residential and farm tank systems have a storage capacity of less than 1,100 gallons. These tanks, therefore, tend to be much smaller and made of lighter-gauge steel than most regulated USTs;
- Although most exempt tank systems store heating oils (87 percent, based on our population estimates), most regulated USTs store motor fuels;
- Although most exempt tank systems use suction pumps, about one-half of the regulated USTs (including most of the retail motor fuel facilities) use pressurized pumps. The use of suction pumps results in negative pressure on the feed lines; if a leak occurs, air and water are therefore drawn in, instead of product being pumped out; and
- Effective methods of leak prevention and detection are less commonly an integral part of exempt nonresidential tank systems compared to regulated USTs and are seldom a part of small exempt residential or farm tank systems.

Information regarding technical characteristics of exempt tank systems was obtained from the UST notification/registration data bases in California, Maine, and Montana (these states require notification of exempt tank systems). These data were augmented with information obtained from interviews with representatives from state and local governments, and the underground storage industry.

3. EXTENT OF KNOWN RELEASES

The most comprehensive source of documented information available on releases from exempt heating oil and motor fuel tank systems and regulated USTs is EPA's "State and Local Release Incident Survey" (referred to as the "National Data Base"). This data base provides information on releases from 1,978 exempt heating oil tank systems and 25 exempt motor fuel tank systems that were reported to state and local government agencies between 1970 and 1985.

Reports of releases from regulated USTs are more common than reports of releases from exempt tank systems. The National Data Base includes data on roughly five times as many reported releases from regulated USTs as from exempt tank systems. The disparity in the number of reported releases from regulated USTs and exempt tank systems may, in part, be attributed to the following factors: (1) gasoline, the product stored most frequently in regulated USTs, has greater mobility in the environment and volatility than heating oils, the product stored most frequently in exempt tank systems; (2) state and federal regulations on regulated USTs are more prevalent than regulations concerning exempt tank systems; (3) regulated UST owners are more aware of the need to monitor their tank systems for releases; and (4) the increased use of leak detection devices for regulated USTs.

The annual rate of reported releases from exempt tank systems increased substantially from 1970 to 1984 (Exhibit 4), and the rate continues to increase. For example, the National Data Base includes only 425 reports of releases from exempt tank systems nationwide in 1984, compared with:

- 237 reported releases in Maine during 1986;
- 295 reported releases in Maryland over a 2-year period beginning late 1985; and
- An estimated 1,500 releases of heating oil from exempt tank systems reported in New York over a 2-year period beginning late 1985.

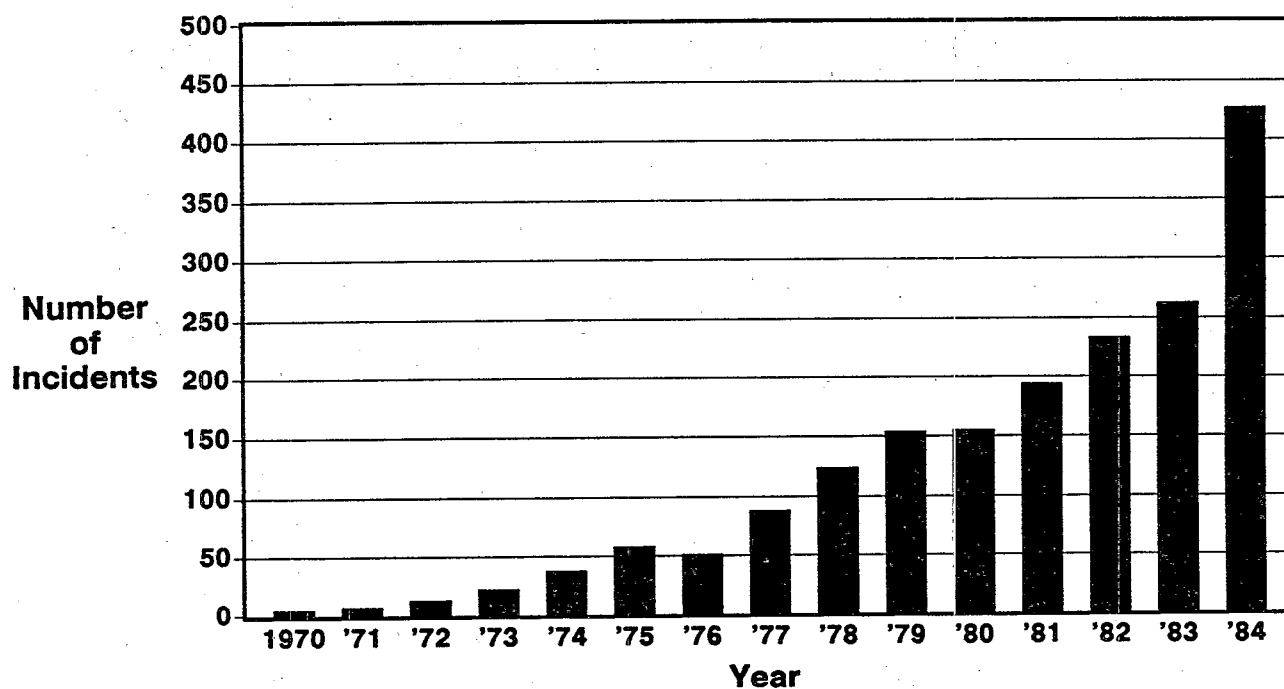
Thus, the number of reported releases in just these three states in 2 years exceeds the number of incidents reported for the entire nation over the previous 15 years.

The increase in the number of reported releases is probably attributable to a combination of factors: (1) the recent increase in the awareness by tank owners and operators that their tanks may leak and possibly threaten public health and safety; (2) the development of new environmental protection programs and the increase in staffing of existing programs at the state and local level during the 1970s and 1980s (in fact, few programs kept track of such problems before 1970); and (3) the large number of underground heating oil tank systems installed during the 1950s and 1960s that have now reached the age at which tank failures are increasingly likely to occur.

Reports of releases from exempt tank systems occur most frequently in the Northeast and most often involve releases of fuel oil No. 2. The National Data Base reveals that 79 percent of the reported releases from exempt tank systems are from nonresidential facilities (Exhibit 5), even though this sector comprises only 25 percent of the total number of exempt tank systems. Most of the remaining reported releases from exempt tank systems are from residential heating oil tank systems; very few releases have been reported from exempt farm or residential motor fuel tank systems. Some of the reasons for the disproportionate number of reported releases from exempt nonresidential heating oil tank systems compared with exempt residential tank

Exhibit 4

Number of Reported Releases from Exempt Tank Systems



Source: EPA State and Local Release Incident Survey. (Data for 1985 are excluded because information is available for only part of the year.)

Exhibit 5.

NUMBER OF REPORTED RELEASES FROM EXEMPT TANK SYSTEMS BY SECTOR

<u>Product</u>	<u>Sector</u>			<u>Total</u>	
	<u>Residential</u>	<u>Farm</u>	<u>Nonresidential</u> ^a	<u>number</u>	<u>(%)</u>
Heating Oils:					
Fuel Oil #1	5	0	67	72	(4)
Fuel Oil #2	222	6	752	980	(49)
Fuel Oil #4	10	0	123	133	(7)
Fuel Oils #5 and #6	5	0	253	258	(13)
Unspecified	155	5	375	535	(27)
Motor Fuels	21	4	-- ^b	25	(1)
TOTALS	418	15	1,570	2,003	(100)
(%)	(21)	(<1)	(79)	(100)	

Source: EPA State and Local Release Incident Survey, 1970 - 1985.

^a This category includes commercial, institutional, government, and manufacturing facilities.

^b These USTs are not exempt from Subtitle I regulation.

systems are that (1) nonresidential systems typically release larger quantities, which makes detection of releases easier; (2) state and local regulation of these tank systems is more extensive than of federally exempt residential or farm tank systems; and (3) nonresidential owners and operators are more familiar with leak detection practices and release reporting requirements.

Releases from exempt tanks do have the potential to cause long-term damage. Most reported releases from both exempt tank systems and regulated USTs amount to 500 gallons or less; releases of less than 100 gallons are common. In some instances, however, large quantities of stored product have been released from tanks in either population. Furthermore, some releases from exempt tank systems have occurred over a protracted period of time, and the contamination from such releases has persisted in the environment for years despite attempts to clean up the site through corrective actions (Exhibit 6). The list of examples provided in Exhibit 6 is not intended to be comprehensive or even representative of documented releases, but illustrates the potential for releases from exempt systems to result in long-term damages.

4. POTENTIAL NUMBER AND VOLUME OF RELEASES

Judging from the documented data, case histories, and other information collected during this study, there is little reason to believe that exempt tank systems are significantly less likely to release their stored products than are regulated USTs. The observed differences between regulated USTs and exempt tank systems in the number of reported releases in the National Data Base reflects differences in the detection and reporting of releases rather than a difference in the actual number of releases.

The most commonly cited causes of releases for both regulated USTs and exempt tank systems are (1) structural failure (including design and fabrication defects, loose fittings, and valve and mechanical failures), (2) corrosion, (3) spills, and (4) overfills. The evidence reveals that external corrosion is a more common cause of tank failure than is internal corrosion. External corrosion is caused primarily by the external soil and site-specific conditions rather than by the contents of the tanks. It has been suggested that regulated USTs are more likely to corrode than exempt tank systems because stray electrical currents are a significant cause of tank corrosion and there are more stray electrical currents in urban areas where regulated USTs tend to be concentrated. Others have suggested that small exempt residential and farm tank systems are more likely to fail as a result of corrosion because these systems typically have thinner-walled tanks made of lighter-gauge steel. The data concerning the age of tanks when releases are reported, however, do not support either of those two hypotheses. Because both populations of underground tanks are made of similar material (steel) and are not commonly protected against corrosion, have similar age distributions,

Exhibit 6

EXAMPLES OF INCIDENTS WHERE LARGE OR PROTRACTED RELEASES FROM EXEMPT TANK SYSTEMS HAVE OCCURRED AND PERSISTED IN THE ENVIRONMENT

Maryland. Department of Environment officials report that cleanup and containment action has continued for one exempt tank system release case for 14 years. The release was first detected when a nursing home switched from fuel oil No. 6 to fuel oil No. 2 and found that consumption greatly increased. The consumption increase was actually due to leakage; an estimated total of 300,000 gallons of product has been released into the soil from the tank system, 280,000 gallons of which has been recovered.

Massachusetts. The Barnstable County Health and Environmental Department (HED) has documented a large release of fuel oil No. 2 from a 275-gallon exempt heating oil tank system serving a private residence. The leak contaminated 15 cubic yards of soil, an on-site well, and a nearby pond. The extent of damage led HED officials to believe product was released over an extended period, possibly as long as 10 years. Corrective action is expected to cost \$80,000 and will include removing the underground tank and contaminated soil and installing monitoring wells and a product recovery system.

Minnesota. In 1975 the Pollution Control Agency received a complaint of oil seepage into a basement, but the source of the release could not be determined at that time. Later, when the source (a creamery) was found, product recovery wells recovered 4,000 gallons of fuel oil No. 5, and the source -- a leaking 14,000-gallon underground heating oil tank (which had a hole) -- was removed. Twelve years later, oil seeping into nearby basements is still being reported, and the state has determined that the recovery efforts need to continue.

A second case, also requiring ongoing remedial action, involved a commercial heating oil tank system that released 10,000 gallons of fuel oils No. 2 and No. 5 and caused extensive contamination of soil and ground water. Fuel oil No. 5 had not been used for several years before the leak was detected, indicating the release and ground-water contamination persisted over a long period of time. The state has conducted site remediation, but does not believe the problem has been fully resolved, even 10 years after the initial report of the spill.

Source: See Section 3 of Background Document.

and experience releases at about the same age, their potential to leak appears to be similar.⁵

Even though the potential to release stored substances appears to be similar for exempt tank systems and regulated USTs, it is difficult to ascertain whether the total amount released would be greater for regulated USTs or the exempt tank systems. The total amount of product released is a function of total amount stored (including tank capacity and the number of refills), the rate of release, and the duration of the release. The combined effect of these different factors is difficult to ascertain; their individual effects are briefly discussed below.

The storage capacity of exempt residential and farm tank systems is typically less than 1,100 gallons, which is much less than that of many exempt nonresidential heating oil facilities. The storage capacity of exempt nonresidential tank systems is quite similar to that of regulated USTs. In the case of a sudden catastrophic release, the potential amount released is expected to be similar for exempt nonresidential tank systems and regulated USTs, but much less for most exempt residential and farm USTs.

The rate of release of a stored substance from exempt tank systems is expected to be slower than the rate of release from regulated USTs for two reasons. First, exempt tank systems typically store heating oils while regulated USTs typically store gasoline. Heating oils have a higher viscosity (resistance to flow) than gasoline and, all else being equal, would typically drain more slowly. Second, exempt tank systems typically use suction pumps to deliver the stored substance from the tank to the delivery point; but regulated USTs more frequently use pressure pumps. When a leak occurs in the piping, a frequent location of releases, the products stored in exempt tank systems, typically under negative pressure in the supply line, would not be forced out. Instead, air and/or water would be sucked in. In contrast, the products stored in regulated USTs, typically under much higher positive pressure, are forced out with pressure once a leak develops. Because of the viscosity and pressure differences, therefore, the rate at which product is released from regulated USTs is greater than that from exempt tank systems.

The duration of releases typically can be expected to be shorter for gasoline than for heating oils because gasoline is (1) more volatile (thus fumes are more readily noticed); (2) released faster (thus making decreases in volume stored more readily apparent for leak detection methods such as

⁵ There has been an increase in the use of noncorrodible tanks and an improvement in the leak prevention and detection practices of regulated USTs since 1985, presumably as a result of voluntary compliance with the Interim Prohibition and the implementation of the federal UST rule. The similarities between exempt tank systems and regulated USTs discussed in this report, therefore, may well decrease each year if exempt tank systems continue to be exempt from regulation.

inventory monitoring); and (3) more mobile in the environment (thus increasing the number of sites that contamination may reach where it is easily detected).

Although the first two factors -- the amount and rate of product released -- favor a potentially greater volume of released product from regulated USTs than from exempt heating oil tank systems, these two factors are offset by the higher likelihood of protracted releases from exempt tank systems. Protracted releases may go undetected over a long period of time, during which significant amounts of product may be released. It is difficult, therefore, to draw conclusions regarding differences between these two populations in terms of the potential volume released.

5. POTENTIAL ENVIRONMENTAL AND HUMAN HEALTH EFFECTS FROM RELEASES

The products stored in both regulated USTs and exempt tank systems contain substances that can cause adverse health effects. Releases of heating oil and motor fuels from exempt tank systems can lead to adverse human health impacts as a result of exposure to contaminated air, soil, surface water, and, most significantly, ground water. As discussed above, the extent of soil and ground-water contamination is likely to be less from sudden releases of heating oils from exempt tank systems than from sudden releases of gasoline from regulated USTs.

Most releases from exempt tank systems travel through many of the same routes as releases from regulated USTs. Releases can saturate soils and dissolve in ground water. Volatile components of stored products can also vaporize and contaminate the air. The most likely routes of human exposure to the water-soluble components of petroleum products stored in exempt tank systems are through drinking, bathing, and other direct contact with contaminated water, and by breathing vaporized contaminants during showering. Releases can also seep into basements, forming pools that can produce additional points where humans can come into direct contact with the released products. Humans can also be exposed through contact with contaminated soil. This exposure can occur when fluctuations in the water table cause released petroleum products to rise to the surface, during construction operations, and during the cleanup of a release.

Releases from exempt tank systems can lead to human exposures to a number of different substances, including gasoline, diesel fuel, and several grades of heating oils. The range of known harmful effects from the three basic categories of petroleum product stored in exempt tank systems is summarized below. Prolonged exposure to low levels of contamination is likely to be of the most concern, because high levels of contamination are likely to be detected more quickly through bad taste or smell enabling precautionary measures to prevent exposure to be taken promptly.

Gasoline. Gasoline is the most mobile of all the fuels and, thus, is likely to be transported to places where humans, animals, and property can be exposed to health and safety risks. For example, releases of gasoline commonly reach ground water, and vapors commonly accumulate in basements and other areas where they create a safety hazard from fire and explosion.

Gasoline has been the subject of extensive study under EPA's Subtitle I regulatory program, and is classified as a probable human carcinogen. As a result, the study that led to this report and the accompanying background document focus primarily on heating oils, the petroleum products stored most frequently in exempt tank systems.

Middle Distillates. Diesel fuel, kerosene, fuel oil Nos. 1 and 2, and some blends of fuel oil No. 4 are broadly classified as middle distillates. (Kerosene is not classified as an exempt heating oil, but its technical specifications and constituents are very similar to those of fuel oil No. 1.) These products are stored more frequently in exempt tank systems than are gasoline or residual fuels, and although middle distillates are slightly less mobile than gasoline, they are still likely to contaminate ground water. Diesel fuel and fuel oil No. 2 have been reported to be weak to moderate carcinogens in skin painting studies with laboratory animals. In addition, several components of the middle distillates are known to cause other adverse health effects. The constituents of middle distillates, however, have not been well studied, and the toxicities of the constituents identified may not be representative of the true toxicity of the middle distillates.

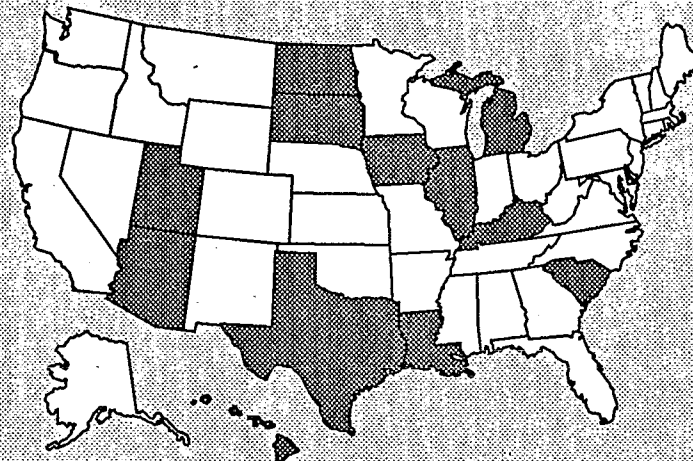
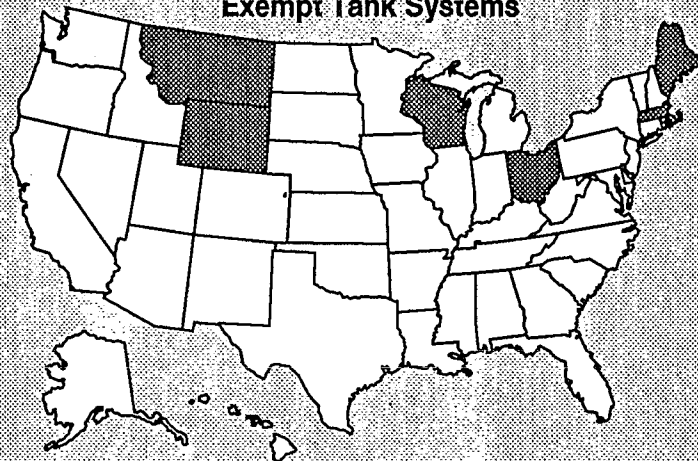
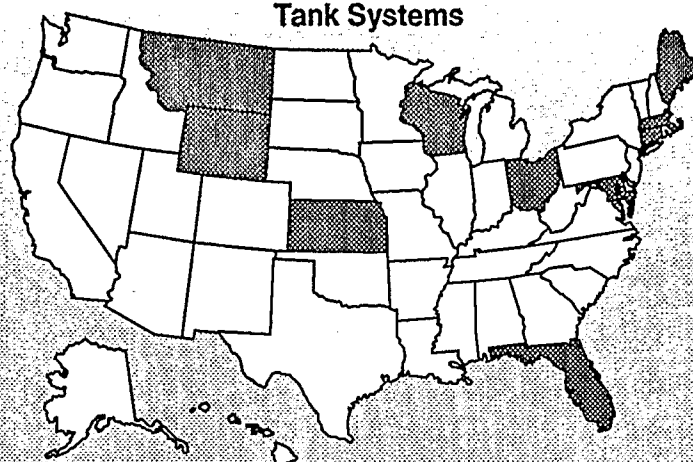
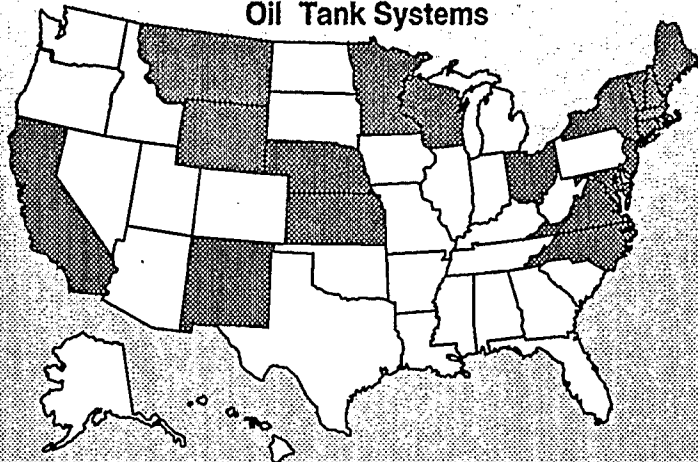
Residual Fuels. These stored products include fuel oil Nos. 5 and 6, and most blends of fuel oil No. 4. Although residual fuels contain significant amounts of two probable human carcinogens and they often contain blending agents that have been shown to be potent carcinogens in laboratory animals, the higher viscosity (resistance to flow) reduces the chance that releases of residual fuels will reach ground water in large concentrations. The low water solubilities of most constituents of residual fuels also make it more likely that the extent of dissolved ground-water contamination from residual fuel would be less than that from gasoline and middle distillate releases. Therefore, releases of residual fuels probably pose less of a threat to human health than gasoline or middle distillates. The potential for residual fuels to contaminate ground water does exist, however, especially if releases occur near a sewer line or in fractured bedrock. In addition, residual fuels are difficult to clean up after a release and are likely to persist in the environment longer than other fuels.

6. STATE REGULATION OF EXEMPT HEATING OIL AND MOTOR FUEL TANK SYSTEMS

During February 1988 EPA examined statutes and regulations from 34 states to determine the current level of regulation of exempt heating oil and motor fuel tank systems by states (the remaining 16 states did not have UST statutes available for review). This review revealed that at least 21 states currently consider exempt tank systems to be a problem and have included them to some extent in their regulatory framework. Of the 34 states reviewed:

- Twenty states have some regulations for exempt heating oil tank systems (panel 1 of Exhibit 7);
- Ten states have some regulations for exempt motor fuel tank systems (panel 2 of Exhibit 7);

State Regulation of Exempt Heating Oil and Motor Fuel Tank Systems^a



^aThis information pertains to the 34 states reviewed. The following states did not have an UST statute available for review and do not appear in any of the categories of this exhibit: AL, AK, AR, CO, GA, ID, IN, MS, MO, NV, OK, OR, PA, TN, WA, and WV.

Source: See background study for this report.

- Six states have some regulations for all exempt tank systems (panel 3 of Exhibit 7); and
- Thirteen states have no regulations for exempt heating oil and motor fuel tank systems (panel 4 of Exhibit 7).

Although some states require only that owners and operators of exempt tank systems report and clean up releases, others impose a variety of technical standards (such as material of construction and leak detection) for new and existing tank systems. Many of the state regulations governing exempt heating oil tank systems, however, cover only those tank systems with a capacity equal to or greater than a specified size, most commonly 1,100 gallons.

State regulation of exempt tank systems is generally more extensive in those states where the greatest number of exempt tank systems are located. For example, all of the states in the Northeast, except Pennsylvania and Delaware, have some regulations regarding exempt heating oil tank systems (exempt heating oil tank systems located in the Northeast comprise almost 50 percent of all exempt tank systems).

7. MAJOR TECHNICAL FINDINGS

A large number of heating oil and motor fuel tank systems are exempt from regulation under Subtitle I of RCRA (about 3.1 million), and the majority of these (2.7 million) are used for storing heating oil. The exempt heating oil tank sector consists largely of 1.9 million residential tanks, which are geographically concentrated in the Northeast, and 0.8 million nonresidential tanks, which are more evenly distributed throughout the nation. Farm and residential motor fuel tank systems account for most of the remaining exempt tanks included within the scope of this study (0.4 million).

Exempt residential heating oil tanks range in size from small 275-gallon tanks at single family dwellings to very large tanks at apartment buildings; however, the vast majority of tanks are small, with capacities less than 1,100 gallons. Although exempt nonresidential tank systems may also vary in size, they tend to be much larger than exempt residential tank systems and are similar in size to regulated USTs. Both residential and nonresidential exempt tank systems tend to be constructed with unprotected bare steel, are similar in age to regulated USTs, and are likely to corrode and fail, just as are regulated USTs.

Products released from exempt tank systems can contaminate groundwater resources and cause adverse effects on human health and the environment. Releases of heating oils travel through the same routes in the environment as releases of gasoline from regulated USTs; however, releases of gasoline tend to be transported more quickly and are more easily detected. Although the amount of product potentially released over a short period of time is similar for exempt nonresidential tanks and regulated tanks, the biggest problems with releases from exempt heating oil tank systems are from slow protracted

releases of unknown volume that go unnoticed and undetected for long periods of time.

Some states have already begun to address the problems associated with exempt tank systems. At least 20 states currently have some regulations on exempt heating oil tank systems, and 10 states have some regulations on exempt motor fuel tank systems. Regulation of exempt heating oil tank systems is most prevalent in the Northeast, where the greatest number of these tanks are located.

8. NONTECHNICAL CONSIDERATIONS IN DEVELOPING RECOMMENDATIONS

In making recommendations, EPA considered not only the technical information regarding exempt tank systems, but also other factors that could influence the effectiveness of federal regulations. First, EPA considered the burden that federal regulation of exempt tank systems would add to the states' existing resources to implement EPA's current UST regulations. Second, EPA considered the diversity of exempt tank owners, including their knowledge of and ability to comply with federal environmental regulations. Third, EPA considered the economic efficiency of targeting resources through a nonregulatory program to those areas of the nation where the problems with exempt tank systems are the greatest against establishing a uniform national program.

While developing the Subtitle I regulatory program, EPA concluded that federal regulations must be implemented principally at the state and local level, rather than at the federal level. EPA reached this conclusion because the number of tank systems to be regulated was large, and most of these USTs were owned and operated by small businesses that were not accustomed to dealing with complex regulations. These considerations are even more important for exempt tank systems because of their even larger number and more diverse characteristics. Hence, EPA believes that regulations designed to address the problems associated with exempt tank systems should satisfy the following requirements: (1) the regulations must be implemented at the state and local level; (2) the regulations must be kept simple and understandable in order to facilitate implementation; and (3) the regulations must be perceived as reasonable by the regulated community in order to encourage voluntary compliance.

Using the above criteria, EPA concluded that the problems associated with exempt tank systems should be addressed differently from those associated with USTs currently regulated under Subtitle I for four reasons:

- A majority of the exempt tank systems are owned and operated by homeowners who have limited technical expertise and financial resources to comply with federal regulations.
- There are fewer established channels, such as routine inspections by fire marshals, for ensuring compliance by exempt tank owners. Creation of such channels for ensuring compliance would require enormous expenditures.

- Developing uniform federal regulations for the entire nation may not be warranted because the types of exempt tank systems-- and the associated problems-- vary throughout the U.S. For example, small residential heating oil tank systems are concentrated in the Northeast; farm motor fuel tank systems are concentrated in the North Central and West.
- States and many local governments have established UST regulatory programs that did not exist at the time Subtitle I was developed. These programs now provide states an opportunity to target additional resources to address exempt tanks wherever needed instead of relying on uniform federal regulations. Many of these programs have in fact begun to regulate exempt tank systems (see Section 6).

For the reasons cited above, EPA concluded that the solution to the problems with exempt tank systems does not lie in uniform federal regulation of these systems at this time. Instead, a feasible long-term solution, based on banning the installation of new unprotected tank systems, educating owners and operators on the risks posed by exempt tank systems, and helping states build on the existing UST programs by providing technical support, should be pursued.

The technical and nontechnical considerations discussed in Sections 7 and 8 have prompted EPA to develop a set of three recommendations, which are discussed below in Section 9.

9. RECOMMENDATIONS

EPA recommends that the motor fuel and heating oil tanks exempted in Sections 9001(A) and (B) of RCRA be addressed by the following Congressional actions:

(1) Ban the Installation of New Unprotected Tank Systems

EPA recommends that all exempt heating oil and motor fuel tank sectors studied in this investigation be subject to a ban on the installation of new unprotected tank systems similar to the Interim Prohibition of Section 9003(g) of RCRA. The ban would apply to all owners, operators, and installers of exempt heating oil and motor fuel tank systems and should read:

"No person may install an underground tank system for the purpose of storing heating oil or motor fuel unless the tank system:

- (A) Will prevent releases due to corrosion or structural failure for the operational life of the tank system;
- (B) Is cathodically protected against corrosion, constructed of noncorrodible material, steel clad with a noncorrodible

material, or designed in a manner to prevent the release of heating oil or motor fuel; and

- (C) Is constructed or lined with material that is compatible with the substance to be stored."

Rationale: The majority of currently used exempt tank systems are constructed of unprotected bare steel and, therefore, will eventually corrode and leak. A prohibition on the installation of new unprotected tanks provides a long-term solution to the problem by reducing the potential for new tank systems to fail because of corrosion or structural defect. The positive effects of a ban on the installation of unprotected underground tank systems have already been demonstrated in the case of regulated USTs, where such a ban has led to a documented dramatic increase in the installation of protected tank systems in the last four years. This action would have a minimal impact on owners and operators, would not require significant amount of federal administration, and would not interfere with the opportunity for state and local governments to tailor their regulatory programs to meet their specific needs.

- (2) Except for the Ban on the Installation of New Unprotected Tank Systems, Continue the Subtitle I Exemption for Heating Oil and Motor Fuel Tank Systems

EPA recommends that Congress continue to exempt from Subtitle I regulation those heating oil and motor fuel tank systems that are currently exempt.

Rationale: Exempt tank systems tend to be geographically concentrated; therefore, uniform federal regulations may not be appropriate for all states. Furthermore, establishment of uniform federal regulations may impose a significant burden on state UST programs and direct resources away from the existing Subtitle I regulatory program. Lastly, implementing federal regulations for this very large population would require excessive resources with little assurance that the regulated community would comply with the regulations. EPA believes that these resources would be better spent by providing federal assistance to state and local governments to expand upon their existing programs.

- (3) Establish Educational and Technical Assistance Programs for Exempt Tank Systems

EPA recommends that Congress provide the Agency the authority to develop educational and technical assistance programs specifically targeted to exempt heating oil and motor fuel tank systems. These programs would be designed to:

- Educate owners and operators, as well as industry groups, such as fuel distributors, on the risks posed by exempt tank systems and how these risks can be reduced by adopting proper tank management practices; and

- Assist state and local governments in developing and implementing their own regulatory programs.

Rationale: Because of the sector's unique characteristics, EPA believes resources can most effectively be used by providing information and outreach programs encouraging the proper management of exempt tank systems. States concerned with exempt tank systems can develop their programs to best address their specific needs. EPA could assist states in meeting those needs.

10. SUMMARY

EPA believes that the problems posed by exempt heating oil and motor fuel tank systems can best be addressed by establishing a ban on the installation of new unprotected tank systems and developing federal educational and technical assistance programs tailored to the characteristics of the owners and operators of exempt tank systems and the on-going efforts of state UST programs. Consequently, EPA makes the following three recommendations:

- Establish a ban on installation of new unprotected underground heating oil and motor fuel tank systems to address the major technical problem leading to tank failure;
- Continue the current exemption for heating oil and motor fuel tank systems, because the unique characteristics of these sectors make the implementation of federal regulations inappropriate; and
- Establish educational and technical assistance programs to disseminate information to owners of exempt tank systems regarding proper tank management and to provide technical assistance to state and local governments to develop their regulatory programs, as needed.

If these three recommendations are accepted and established, EPA will monitor their effectiveness and evaluate the necessity for undertaking further actions.

