**The Economic Impacts of Alternative Underground Storage Tank Regulations on the Vulnerable Segments of the Retail Motor Fuel Market in Virginia**

by

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(ABSTRACT)

The passage of the Hazardous and Solid Waste Amendments of 1984 (HSWA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) amended subtitle I of the Resource Conservation and Recovery Act (RCRA). RCRA now requires the Environmental Protection Agency (EPA) to promulgate regulations applicable to all owners and operators of underground storage tanks (USTs) containing petroleum products, and substances listed as hazardous in the Comprehensive Environmental Response Compensation and Liability Act, but not regulated as hazardous waste under RCRA subtitle C. On 17 April 1987, EPA issued proposed regulations for leak detection, leak prevention, financial responsibility and corrective action for USTs containing regulated substances.

Concern over potential adverse economic impacts caused by UST regulation has centered on the retail motor fuel market, due primarily to its large size and relatively large number of small businesses. While public and private studies have been conducted concerning the economic impact of UST regulation on the retail motor fuel market, a need for additional research is indicated.

This thesis presents the findings to date of a study examining the economic impacts that alternative UST regulatory programs would have on the retail motor fuel market in the United States, with emphasis, where possible, on this market in Virginia. The market is broken into five segments based on similar economic and management characteristics. The segment most likely to contain significant numbers of firms that could be forced out of business due to

UST regulation is identified. Proposed minimum federal UST regulations are described and relevant regulatory costs are presented. Three additional UST regulatory programs are developed representing varying degrees of stringency relative to the proposed minimum federal regulations. Case studies of firms located in the vulnerable segment of the retail motor fuel market identified earlier are analyzed in terms of the effect that alternative UST regulations would have on yearly owner remuneration (which is defined to include both the return to the owner as a factor of production and the profit remaining after all returns to land, capital, and labor have been paid). Hypothetical firms with profit levels determined by EPA as average for two segments of the regulated community are analyzed in a similar fashion to reflect the effect of alternative UST regulations on profits.

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# Table of Contents

# List of Tables

# Introduction

The regulation of underground storage tanks (USTs) containing petroleum, initiated by the enactment of subtitle I of the Resource Conservation and Recovery Act (RCRA), will affect the financial and management characteristics of many business firms located in many economic sectors. These include retail motor fuel, mining, agriculture, construction, and manufacturing, as well as many others (52 FR 12664). While the environmental and economic impacts of alternative regulatory approaches have been explored by both the public and private sectors, there is a need (described in the next chapter of this study) for further data regarding the potential economic impacts of alternative sets of regulations on many of the firms under the regulatory authority of RCRA subtitle I.

The most vulnerable sector under the regulatory authority of RCRA subtitle I is the retail motor fuel market (Sobotka and Company, Inc., 1987, pp.1-8). The composition of the retail motor fuel market is often broken into the following categories: refiners, "jobbers", convenience stores, independent chain marketers and "open dealers" (Meridian Research, Inc., 1987, pp.2-4). These market segments are discussed in more detail in chapter 4 of this study. Within this sector, small businesses consisting of "lessee dealerships" (retail motor fuel outlets that are leased from a refiner, "jobber", or independent marketer acting a the "lessor") and "open dealerships" (firms retailing motor fuel consisting of one or two stations that are owned and

operated by the same person) have been identified as the most likely to leave the market due to the compliance costs associated with RCRA subtitle I regulations (Sobotka, p.E-28). The "open dealer" segment of the retail motor fuel market has been described as the most likely to suffer severe financial impacts from UST regulation (Meridian Research, 1987, p.ES-13).

"Open dealers" will probably be forced to bear the full economic impact of UST regulation if they own their USTs. The USTs of some "open dealers" are owned by their petroleum product suppliers but this situation is changing (Catterton, 28 May 1987)

Virginia has currently passed legislation authorizing the Virginia State Water Control Board (VSWCB) to take actions toward developing the regulations required for U.S. EPA (Environmental Protection Agency) state program approval under RCRA subtitle I. State officials, as well as the small businesses mentioned above which are located in the Commonwealth need information concerning the potential economic impacts of RCRA subtitle I regulation on the "open dealers" in Virginia.

The purpose of this study is to contribute information regarding:

- the economic impacts of UST regulation of the various segments of the retail motor fuel market in Virginia and;
- the effects of alternative UST regulatory approaches on the likelihood that these vulnerable segments (e.g., "open dealers") will remain in business.

This information will also be relevant to "lessee dealers". However, given the case-by-case nature of how, or even if, "lessors" will pass costs on to "lessees", the information developed will be relevant only in providing "lessees" a general sense of what cost increases (in whatever way they may be manifested) could potentially be forthcoming.

The objective of this research is to assist Virginia UST regulatory officials and other decision-makers in developing an UST regulatory program that is responsive to the environmental protection needs of the Commonwealth while avoiding undesired adverse economic impacts (to the greatest degree possible) on a major portion of the regulated community. This

research is also intended to inform representatives and members of the regulated community about potential UST regulatory costs.

It should be noted that this study is not a form of cost-benefit analysis. It does not attempt to identify social costs, and benefits are not considered at all. Rather, this study focuses on the financial burdens imposed on a certain portion of the regulated community.

This study is composed of the research components contained in the following chapters. Chapter 2 of this study describes the methods used in conducting the research effort. Chapter 3 presents the environmental basis for concern over leaking underground storage tanks (LUSTs) and the legislative and regulatory framework for UST regulation. Chapter 4 presents an evaluation of the various segments of the retail motor fuel market in terms of market strengths and weaknesses, relative size, profitability, and management characteristics. Alternative UST regulatory programs are presented in Chapter 5, along with the various costs associated with each. Case studies of "open dealers" are presented in Chapter 6. They are evaluated in terms of the impact of the various alternatives on the profitability of these firms given the compliance costs associated with each alternative. Concluding remarks are presented in Chapter 7.

## *Methodology*

This section briefly describes the methodologies used to obtain the information needed to: describe the LUST issue in environmental and regulatory terms; evaluate the various segments of the retail motor fuel market; develop alternative UST regulatory programs; and conduct case studies of "open dealers".

- The collection of background information, the description of the retail motor fuel market, and the development of UST regulatory options and associated costs were made possible through:

  1. a literature search;

  2. telephone and on-site interviews with local, state and federal UST regulatory officials in Washington, D.C., Richmond, Virginia, and approximately 20 other states and localities; and

  3. telephone and on-site interviews with:

     - officials in relevant trade associations;
     - lawyers and legislators involved in drafting relevant UST-related legislation;
     - private consultants involved in performing the collection and analysis of relevant data and the preparation of UST regulatory options; and
     - private parties and industry officials involved in all phases of the UST regulatory process and with businessmen who sell the goods and services associated with the UST management industry.

- Data concerning the case studies presented in this study were developed from personal contacts with insurance representatives and with the owners of the service stations represented in the case studies. The analysis of the impact of alternative UST regulations on the continued viability of the firms examined in the case studies was performed with information and techniques used in similar private and public studies (e.g., percent annual profit and the ratio of net income to total assets) and by an analysis of the station owners and operators themselves.

## *Background*

Leaking underground storage tanks have become an important environmental management concern for local, state, and federal governmental agencies involved in environmental protection and regulation. This rise to prominence has occurred even as a U.S. EPA analysis of current important environmental policy areas claims that groundwater quality protection is of relatively low importance compared with other policy areas and with the public's perception of its significance (EPA, 1987, pp.xv, 93). Regardless of EPA's assessment of the significance of groundwater contamination, there are indications that petroleum leaking from USTs (par-

ticularly USTs owned and operated by the retail motor fuel sector) is a significant source of groundwater contamination in Virginia and the rest of the nation.

- The EPA estimates that the total UST universe in the U.S. is composed of approximately 1.4 million tanks owned and operated at over 500,000 facilities. 96 percent of these tanks are used to store petroleum, and over half of the USTs containing petroleum are owned and operated by the retail motor fuel business sector (52 FR 12664).
- Approximately 89 percent of the part of the petroleum containing tank universe consists of bare steel tanks that are unprotected from corrosion (Sobotka, 1987, p.ES-2). Within the motor fuel segment of this universe, approximately one-third of the USTs are over twenty years old (an age approaching the end of the operational life for unprotected steel tanks) (52 FR 12664).
- An EPA study has indicated that 35 percent of non-farm USTs storing motor fuel would fail a "tank-tightness" test (which does not necessarily indicate that a tank is leaking under non-test conditions) (U.S. EPA, May 1986, p.2-5). However, this study has been criticized by petroleum product industry representatives as misleading and inaccurate (Petroleum Marketers Association of America, 3 June 1986, memorandum).
- Another EPA study, *Summary of State Reports on Releases from Underground Storage Tanks* (August 1986), found a steadily increasing number of release incidents reported over time (52 FR 12665). Reported releases, however, may constitute only a fraction of total releases since many releases may go unreported or simply unnoticed (Ibid., p.12666).
- In Virginia, information obtained by the VSWCB, through the UST notification process (required under the reporting requirements of the RCRA subtitle I) indicates that a majority of the approximately forty-seven thousand regulated USTs in Virginia are unprotected steel and that approximately 42 percent of these tanks are over sixteen years old (28 percent are over twenty years old) (VGARA, May-June 1987, p.7).
- Examination of the files of the VSWCB's Pollution Response Program (PReP) indicates that LUSTs containing motor fuel constituted a significant part of the total reports of groundwater contamination in fiscal year 1985. Of 129 groundwater pollution incidents documented by the PReP office, ninety-seven were associated with petroleum contamination (VSWCB PReP Office, summary). Almost all of these incidents involved LUSTs and a majority were traced to operating or abandoned gas retailing facilities.

While the data described above were primarily developed after federal UST legislation (described below) had been passed, similar, but less detailed and empirically valid information was introduced toward the end of the congressional hearings that led to the passage of the Hazardous and Solid Waste Amendments of 1984 (HSWA). This act amended RCRA subtitle I (52 FR 12787). Partially as a result of this information, the HSWA of 1984, which address many hazardous waste related issues, include Title VI which directs the EPA to "promulgate final standards for underground storage tanks containing petroleum, and to establish a comprehensive regulatory program for underground tanks containing hazardous wastes (Congres-

sional Information Services, p.670). It should be noted that besides the information provided in the hearings, some actors involved in the development of the UST legislative and regulatory framework regard Title VI as a compromise brought about by the lobbying efforts of the petroleum refining interests to avoid regulation under the complex and stringent Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (Leiter, 1987 and Clay, 7 May 1987).

The HSWA of 1984 amended RCRA in such a way as to require owners and operators of new, existing and abandoned (if taken out of operation after 1 January 1974) USTs containing petroleum products or hazardous chemicals not regulated under the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA) to notify state or local agencies of the existence of such tanks and to provide information regarding certain tank characteristics (e.g., age, size, location) (RCRA, Section 9002). The administrator of the EPA is required to promulgate release detection, prevention and correction regulations for new and existing tanks as well as new tank performance standards for tanks brought into operation after the effective date of regulation (RCRA, Section 9003). Under Section 9003, as originally enacted, the administrator also is given discretionary authority to establish financial responsibility requirements for owners of new and existing USTs for taking corrective action and for compensating injured third parties. Finally, an interim prohibition is provided in Section 9003 establishing minimum tank standards that must be met by those installing USTs before final EPA regulations are promulgated. Other sections address state program approval (9004) and inspections, monitoring and testing (9005), as well as other aspects of the regulatory program.

The Superfund Amendments and Reauthorization Act of 1986 (SARA), signed into law in November 1986 (Public Law 99-499), also amended RCRA in ways affecting the regulation of USTs containing petroleum (U.S Congress, p.262). Section 205 of SARA amends Sections 9003(c) and (d) of Subtitle I of RCRA so that EPA is **required** to "promulgate regulations requiring that owners and operators maintain evidence of financial responsibility for taking corrective action and compensating third parties for bodily injury and property damage caused by sudden and

nonsudden accidental releases arising from operating an underground storage tank" (52 FR 12788). Section 9003(d) of RCRA was amended to allow the EPA administrator to "suspend enforcement of the financial responsibility requirements for a particular class or category of USTs in a particular State, if the administrator determines that methods of demonstrating financial responsibility 'are not generally available' to owners or operators in those classes, categories or states (52 FR 12788). The suspension of enforcement can last up to 180 days if it is determined by the Administrator that similar conditions continue to exist (Ibid.). Finally, SARA added Subsection (h) to Section 9003 which establishes a $500 million Leaking Underground Storage Tank Trust Fund to be used to pay for the corrective action costs associated with releases from USTs under certain conditions (the relevance here is that it cannot be used by owners and operators who have not complied with applicable financial responsibility requirements) (Ibid.).

On 17 April 1987, the EPA published proposals for 40 CFR Part 280 in the Federal Register. These consists of the proposed rules for Section 9003 of RCRA (design, installation, release detection, general operating, corrective action, closure and notification requirements for any UST containing regulated substances and financial responsibility requirements for USTs containing petroleum) (52 FR 12786).

Given the time since the initial legislation established by the HSWA of 1984 and the point in the regulatory development process reached by EPA, economic impact studies have been performed by both the private and public sectors. A Regulatory Impact Analysis (RIA) has been performed by private consultants under contract to EPA for both the technical standards and financial responsibility requirements proposed by EPA. The Regulatory Impact Analysis was performed under the authority of Executive Order 12291 (published in 46 FR 13193, February 19, 1981) which requires that such an analysis be conducted upon a federal governmental agency determination that a new regulation will be "major" (Meridian Research, 1987, p.ES-3). One of the criteria establishing a new regulation as "major" is a determination by the agency that the resulting annual effect on the economy is $100 million or more (Ibid.). This

determination was made for both the technical standards and the financial responsibility requirements and, hence, two separate RIAs were conducted. Within each RIA is a Regulatory Flexibility Analysis, as required under the Regulatory Flexibility Act of 1980 (52 FR 12767). This analysis must "describe the potential impact of the rule on small entities...to ensure that regulations do not impose unnecessary costs or other burdens on such entities" (Ibid.).

The financial responsibility RIA focused on the "open dealer", the petroleum jobber, and small independent marketing chains. The technical standards RIA focused on the "open dealer" and the "lessee dealer". While the effects of the proposed financial responsibility requirements on the small petroleum jobber and the independent chain marketer were found to be negligible, the impact on "open dealers" was determined to be variable depending on the profitability of the station (Meridian Research, 1987, p.5-13, 5-17). The effects of the proposed technical standards on "open" and "lessee" dealers were expected to cause many of these firms to exit the market, but mainly through corrective action costs (under the assumption that no insurance would be available) and not through tank upgrading expenditures (Sobotka, p.6-34).

The main private sector study addressed the costs and associated economic impacts of alternative UST regulations and was performed under the authority of the Petroleum Marketers Association of America (PMAA). It centered on the cost-effectiveness of optional UST regulations and the economic impacts of such regulations on the independent petroleum marketers in the nation (many of these "marketers" are actually "jobbers" who also own motor fuel retailing outlets). The typical PMAA member owns an average of four stations and has an annual net profit (e.g., the surplus revenue available after all returns to land, capital and labor, including returns to the owner of the firm, have been made) of $53,000 (PMAA, 2-1). This study concluded by describing the UST regulatory components that were most cost-effective in providing protection from releases from USTs.

While the studies described above are useful in estimating the economic impacts associated with alternative UST regulations, there is a need for further research, particularly more research applicable to Virginia.

- The RIAs were not conducted in a coordinated fashion so that the effects of one set of regulations are not examined in combination with the effects of the other set of regulations.

- Both RIAs are replete with assumptions, many of them questionable. An example of such questionable assumptions is found in the technical standards RIA which assumes that insurance will not be available to small, independently owned and operated stations (Sobotka, p.6-19). This assumption is probably not valid (Clay, 20 May 1987). Loans are assumed to be unavailable to the "median open dealer". This is also not necessarily the case (Bromberg, 1987). In addition, the RIAs were conducted assuming that "the terms of the traditional lease arrangements will prevail, and the analysis therefore does not assess the impacts of any changes in lease terms on lessee dealers (Sobotka, p.6-13). Increased costs are passed on not only by "lessors" altering lease arrangements but also by tank owners (when they are supplying the petroleum product and are not the outlet property owner) altering the price of the product or the sales contract (Osina, 27 May 1987). Therefore, this assumption is not necessarily valid.

- In each RIA, regulatory impacts are calculated based on the probabilities of:

  1. the natural exits from the industry (unrelated to UST regulation);

  2. future levels of releases from USTs and associated costs (based on a non-regulated community unable to obtain insurance) and;

  3. the costs associated with tank upgrading and closure.

  These predictions, based on many assumptions, are used to provide a composite statistical picture (based on probabilities) for the industry as a whole and do not provide a concrete analysis for a single firm under actual operating conditions.

- Many alternative UST regulatory approaches and mechanisms for mitigating economic impacts (e.g., state funded low interest loan guarantees) are not considered in the RIAs.

- The EPA analysis of the economic impact of UST regulation on certain segments within the retail motor fuel market is based only on the impact on the estimated average **profit**[1] of the median firm within these segments. An analysis based solely on profits may not fully describe potential economic impacts since, in periods of financial distress (in the short term, if not for several years), additional funds for meeting UST regulatory costs may also come from the savings of a firm's owner or from the return normally paid by the owner to himself as compensation for his input into the business (which is excluded from the economic definition of profit). A sum including an owner's compensation to himself will be larger than the firm's profit. This sum (defined to include all yearly revenues left over once all of the returns to the factors of production **other than return to the owner**, have been made) is referred to in this study as *owner remuneration*. While it cannot be expected that all funds from an owner's yearly return to himself will be used to finance

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[1] note- As defined in the field of economics, profit is the surplus revenue remaining after all returns to capital, labor and other production factors have been made. These include the return paid by the owner of the firm to himself as compensation for his input into the business, which is typically manifested as a wage or salary used for living expenses, although, strictly speaking, the form and use of this return need not be related to the compensation.

UST regulatory expenses, it also cannot be assumed that **none** of these returns will be used for such costs. In reality, what is important is the money available for meeting UST regulatory costs, whether it comes from a firm's profits or from the firm's owner's savings and/or compensation. Therefore, the money available for meeting UST regulatory expenses depends on the ability and willingness of the owner of a firm to spend profits and/or savings (if available) and compensation on these expenses, and can be said to range between the first dollar of profit and the last dollar of savings and compensation.

- The PMAA study:
  1. concentrates on petroleum marketers and jobbers, not "open dealers";
  2. does not address financial responsibility costs and;
  3. conflicts in some areas with the Federal RIAs.
- Virginia UST regulatory officials need additional information in deciding whether:
  1. to make State regulations more stringent than federal ones in order to provide additional environmental protection, if deemed desirable; and
  2. to consider options for funding loan provisions, requests for suspension of enforcement, etc., to reduce possible adverse economic impacts caused by UST regulation in the State.
- Open dealers, as well as others within the regulated community in Virginia, need practical information in deciding whether and how to participate in the State regulatory process and to choose UST options that are the least costly, but which still meet minimum State requirements. These regulated parties may be in a position to provide useful information to State officials that is more accurate and/or more relevant than that provided at the national level.

Given the need for additional research in this area, it is important to understand the relative positions of those within the regulated community in terms of financial strengths and weaknesses, size, and available technical assistance, as well as other information useful in identifying firms that may suffer significant adverse economic impacts from UST regulation. This information is presented in the following chapter.

# Identifying Economic Vulnerability in the Regulated Community

This chapter describes the various sectors of the retail motor fuel market nationally and in Virginia. While some of the information is approximate and even controversial, it can be asserted that certain sectors within the market, identified in this chapter, are generally vulnerable to adverse economic impacts from RCRA subtitle I regulation.

RCRA subtitle I Section 9001 defines an underground storage tank as "any one or combination of tanks (including underground pipes connected thereto) which 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 per centum or more beneath the surface of the ground". Of the nine types of facilities exempted from regulation under RCRA subtile I, the one most relevant to this study includes any "farm or residential tank 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 stored" (RCRA, Subtitle I, Section 9001). In Virginia, the VSWCB has eliminated, from notification requirements only, the exemptions for residential tanks storing heating oil if they have a capacity that is greater than 5,000 gallons

(technical standards and financial responsibility requirements still do not apply) (VSWCB, October, 1986).

Regulated substances include: "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 petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure..." (RCRA subtitle I, Section 9001).

Of the number of USTs regulated under RCRA subtitle I, it is estimated that approximately 1,340,000 UST systems contain petroleum products whereas only 54,000 are said to contain a regulated hazardous substance (52 FR 12664, 12793). A total of 491,000 facilities are thought to maintain UST systems for storing petroleum products and 21,000 facilities are thought to maintain UST systems for storing regulated hazardous substances.

The potential for adverse economic impacts on facilities storing regulated hazardous substances is thought to be small compared to those storing petroleum. This is because: there are substitutes for chemical USTs (above ground tanks, drums and process changes); firms owning USTs containing regulated substances will typically be larger than the smallest firms in the retail motor fuel market; and small firms owning USTs containing regulated substances typically own fewer USTs per facility than small firms in the retail motor fuel market (Sobotka, p.6-65).

The segments of the regulated community with USTs containing petroleum products and not involved in retailing petroleum products (consisting of firms found in all sectors of American business) are thought to be less vulnerable to adverse economic impacts from UST regulation than those involved in retailing petroleum products. This is because:

- in many affected industries, the costs of tank ownership are small compared to the other costs for an average firm or facility;

- in many affected industries, only a small percentage of firms have USTs and those that do only own one or two tanks (as opposed to three or more for petroleum retailing facilities);
- in many affected industries, owning USTs is not an integral part of the business itself; and
- in many affected industries, small businesses are not the dominant type, as they are in the retail motor fuel market (Sobotka pp.6-51, 6-52 and 52 FR 12767).

It is also relevant that "firms owning non-retail petroleum and hazardous substance USTs fall into hundreds of Standard Industrial Classifications (SICs) and range in size from one-person non-profit organizations to small governmental jurisdictions to major corporations (52 FR 12767). The lack of data available to help identify these facilities tended to push the emphasis of the Regulatory Flexibility Analysis conducted by EPA (described above) toward the retail motor fuel marketing sector (Ibid.). It was hoped that this emphasis would be the most helpful in identifying those impacts "with the greatest potential of significantly affecting a substantial number of small entities", which is one of the purposes of the Regulatory Flexibility Act, described in Chapter 3 of this study (Ibid.).

# *The Retail Motor Fuel Market*

## General

The retail motor fuel market, which owns more than half of the USTs coming under the authority of subtitle I of RCRA, consists of approximately 193,000 retail outlets nationwide (52 FR 12793). This is approximately 40 percent of the facilities identified as having USTs containing petroleum (including the USTs in the agricultural and governmental sectors) (Ibid.). Within the retail motor fuel market there is wide diversity in terms of firm size, profitability, marketing approaches, as well as in many management and economic aspects. Using a net income to

total assets ratio (often called the rate of return on assets) to classify the financial health and profitability of the firms in this sector, EPA found, on average, that firms in the retail motor fuel marketing sector are "neither more nor less profitable than firms engaged in most other lines of businesses" (Meridian Research, 1987, pp.2-6, 2-7).

Some of the largest and smallest (and most and least profitable) businesses in the country belong in this market (Ibid., p.2-2). Many firms are "lessors" while many more are "lessees". Many are involved in wholesaling petroleum (sometimes owning the outlets retailing their petroleum product, or just the USTs containing the product), as well as producing and refining petroleum and producing and selling steel and chemical products (Ibid.). Through various marketing approaches, many firms retailing petroleum products also provide other goods and services ranging from automotive maintenance to grocery sales (Ibid.). Generally, firms owning more than one retail outlet engage in other business activities besides retailing petroleum products (Sobotka, p.6-5).

Overall, the market is dominated by small businesses as defined by the Small Business Administration's definition for this industry sector (firms with less than $4.6 million in annual sales) (Meridian Research, 1987, p.2-9). In 1984 these small firms owned and operated more than 75 percent of the 193,000 retail outlets in the United States (Ibid.). Including "lessee dealers" as small businesses raises this figure to 95 percent (Ibid.). Firms owning only one retail outlet constitute 80 percent of all the firms in the retail motor fuel market (Meridian Research, 1986, p.36).

The retail petroleum product market has been described as extremely competitive, with demand at any one outlet being very elastic and profit margins very small (Heizer, 1987). For example, raising gasoline prices as little as two or three cents a gallon can be large enough to curtail sales to the point of non-profitability (Ibid.). Partially because of this, EPA's technical standards RIA focused on firms fully absorbing the compliance costs associated with RCRA subtitle I (Sobotka, p.6-2).

General marketing trends indicate that the total number of retail motor fuel outlets is declining (Sobotka, p.6-14). This can largely be attributed to refiners closing marginal lessee operations (a net of 45,879 refiner owned retail outlets were closed between 1974 and 1984- this "represents 72 percent of the total decline in service stations reported by the Bureau of Census...") (Ibid.). The market is also characterized by a trend towards increasing gasoline sales per outlet and by large growth in the number of convenience stores selling gasoline (from 1974 to 1984 the number has risen from 3,520 to 22,475) (Ibid., p.6-4 and Heizer,1987). Other environmental regulations, affecting used oil and vapor emissions controls, are expected to be implemented in the near future which might also affect the economic health of the motor fuel retailing industry (52 FR 12760).

### *The Retail Motor Fuel Market in Virginia*

In Virginia, there is no official estimate of the total number of business establishments involved in retailing gasoline. The Dept. of Agriculture, Bureau of Weights and Measures, maintains a list of businesses (organized by county) that are to be inspected to verify that any scale or liquid measuring devices are properly calibrated (Lyles, 1987). However, one would need to go through the files for each county and count each individual business that has gasoline measuring devices (as opposed to those with other types of measuring devices) to arrive at a total. This procedure would probably still produce a low estimate since there is no assurance that all firms are inspected due to lack of public knowledge of the requirement to register with the Bureau (Anderson, 15 May 1987).

The number of service stations as defined by the Department of Commerce (those firms deriving 50 percent or more of their sales dollars through the sale of gasoline and oil products) has declined in Virginia from approximately 2600 in 1982 to 2200 in 1986 (National Petroleum News, p.114). Of this total population of **service stations**, approximately 10 percent are "open dealers" (Heizer and Osina, 15 May 1987). Approximately 14,600 people were involved in re-

tailing gasoline at service stations in Virginia as of 1 January 1985 (National Petroleum News, p.48). However, this does not include convenience stores and independently owned and operated low gasoline sales, and low profit "mom and pop operations", which constitute the large majority of rural locations (and a significant part of all gasoline retailing outlets) providing gasoline (Anderson, 27 May 1987). Identifying the size of this "mom and pop" population, as well as any other segment in the market except "service stations" has been described as "impossible" (Catterton, 27 May 1987). Determining the nature of the tank ownership relationship is even more difficult (Ibid.). This problem will be discussed later in this chapter.

A total of at least 6,000 to 7,000 business establishments retailing gasoline in Virginia has been estimated by independent parties (Anderson, 15 May 1987 and Bedell, 1987). These estimates were based on the data gathered by the Dept. of Agriculture from the inspections of liquid measuring devices described earlier. This information was not retained by the department and is no longer being recorded (Lyles, 1987).

Therefore, given:

- the population of service stations described above;
- the approximate population of convenience stores in Virginia based on national figures; and
- and the estimates, by knowledgeable parties, of the total outlets in the State retailing gasoline (and the opinions of those parties regarding the significance of the independently owned and operated gasoline retailing segment in the State);

one can infer that gasoline retailing in the Virginia includes all of the segments described in EPA's RIAs, and that Virginia has a significant population of "open dealers" as defined by EPA (including "mom and pop" operations), as well as many "lessee dealers". For this reason, a description of the gasoline retailing categories used by EPA is useful in illustrating the retail motor fuel market in Virginia.

As mentioned previously, the Department of Commerce compiles data on service stations but EPA could not use this data to indicate the total size and the characteristics of the regulated community since it would exclude many UST owning firms (Meridian Research, 1987, p.2-4). In fact, "there is no one data source that provides financial and operational information for firms or facilities engaged in retail motor fuel marketing, as EPA define it" (Ibid.). What follows is a description of the various segments of the retail motor fuel market that EPA developed in its UST RIAs. Since many different categorizations and even definitions of market segments exist, the use of EPA categories provides simplicity as well as comparability with the major source of economic impact analysis currently available. Some modification and elaboration of the EPA established categories is necessary since data has been gathered from other sources besides EPA, particularly those data concerning Virginia. This is noted where appropriate. The categories discussed are refiners, jobbers, convenience store chains, independent chain marketers and open dealers.

## *Refiners*

Generally, refiners fit into the following two categories:

- the "majors"- "large, vertically integrated oil companies owning refineries that produce petroleum products distributed through thousands of their wholesale and retail 'branded outlets'" (Sobotka, p.6-8). Examples include Amoco, Exxon, Chevron and Mobil (Ibid.).
- the "semi-majors"- "large, integrated oil companies that may own fewer refineries or supply fewer wholesale or retail outlets than the majors" (Ibid.).

The refiner category also includes a small number of firms "solely in the business of refining crude oil and selling motor fuel at the wholesale and retail levels" (Meridian Research, 1986, p.23).

The twenty-seven firms that EPA defined as refiners in its RIAs directly own almost 10,000 retail motor fuel outlets and lease almost 37,000 others (Meridian Research, 1987, p.2-5). "Lessee dealers" will be discussed further in the section of this chapter describing "open dealers" because of the ability of refiners to pass added costs on these operators. Refiners are the most economically stable firms that will come under RCRA subtitle I regulation in terms of being able to meet compliance costs without adverse economic impacts (Meridian Research, 1987, p.2-4). All firms in the refiner category have assets of over $1 billion and generate significant levels of income from sources other than retailing petroleum products (Ibid., pp.2-4, 2-6). These firms generally generate high profits and retail the largest volumes of petroleum products. Refiners will not have to expend funds to obtain insurance or other financial assurance mechanisms (described in Chapter Five of this study) since they have the financial wherewithal to qualify as "self-insurers" (Meridian Research, 1987, p.4-8). Compliance costs (described in Chapter 5 of this study) will also generally be lower in this market sector than in others, due to tank upgrading programs (described below) currently underway in the refining industry. Service stations owned by major petroleum companies were judged to have the fewest UST systems unable to pass a tank tightness test, one indication of the integrity of an UST system (U.S. EPA, May 1986, p.2-5). The UST systems of such stations were also judged to be the youngest (12 years) in the retail motor fuel market (U.S. EPA, 1986, p.9-19). Because age has been correlated with UST leak rates, this will also tend to lower the compliance costs associated with UST regulation.

In fact, refiner owned outlets were excluded from EPA's technical standards economic impact analysis since EPA "assumed that the costs of the regulations would only play a minor role in the decisions of refiners to close their outlets" (Sobotka, p.6-15). The impacts on "lessee dealerships" will be discussed in the section on open dealers, as previously mentioned.

A study focusing on 188,798 USTs owned by member companies on the General Marketing Committee of the American Petroleum Institute (an oil company dominated industry association) that over $650 million had been spent between 1975 and 1984 on tank upgrading and

replacement (Swanson, 1986). Annual expenditures on these programs increased continuously over this period (Ibid.). A related study indicated that 62 percent of more than one-hundred thousand USTs owned by nine companies were to be upgraded by the end of 1986 (Ibid.). A survey conducted by the API (reported in December 1984) indicated that "83 percent of the major and semi-major oil companies (which include a total of approximately 175,000 UST systems) have formal plans for scheduling tank replacements and upgrading (52 FR 12665). A trend in voluntary upgrading and replacing USTs might accelerate as the major oil companies (as well as other tank owners) respond to: aging tank systems; increasing public awareness of groundwater contamination sources and consequences; and the publicity of spectacular contamination events caused by releases from USTs and involving large court suits with increasingly large settlements (Ibid., p.12671).

## Refiners in Virginia

In Virginia, it is estimated that of the 2200 service stations in the State, 400 are owned and operated by large oil companies (Heizer, 1987). The remaining 1800 service stations are either independently owned and operated (approximately 10 percent), leased by oil companies (the majority), owned and operated by small independent chain marketers or jobbers, or leased by jobbers. While the Petroleum Marketing Practices Act of 1975 makes it illegal for refiners to build new company owned and operated stations if there are lessee operations nearby, their strength in the market has grown from 330 to 400 while the total number of stations has declined (Ibid.).

Refiner owned and operated stations usually have available the most modern service and maintenance equipment and generally sell larger volumes of gasoline than other station (Ibid.). High volume "pumpers" are currently a popular industry marketing approach for both company owned and leased stations (Ibid.). In one study, "pumpers", which are more likely to

be owned by refiners than by open dealers, sold an average of 110,000 gallons per month, as opposed to 61,000 gallons per month for conventional service stations. (Meridian Research, 1986, pp.15, 16). These stations, with their more limited car maintenance and servicing capacities, could lead to a shortage of service stations providing repair work, especially as the total number of stations continues to decline (Heizer, 11 May 1987).

## The Ability of Refiners to Pass Costs On

Oil companies have been described as experts in making profits and in passing increased costs on to both customers and their "lessee dealers" (Osina, 12 May 1987). While currently oil companies are responsible for maintaining the USTs located at both the company operated and "lessee" operators stations, there are ways in which the costs associated with these tanks can be passed on.

One way is to charge "economic rent" based on the "highest and best use" of the property (Heizer, 11 May 1987). This tactic has become available since the federal government stopped regulating the rents charged at these businesses (Ibid.). One informed source has stated that, in recent years, the rent paid by "lessee dealers" has been increasing by approximately 33% a year (Dudley, 12 May 1987). Also, the cost of the gasoline supplied by the oil company can also be increased which would have to absorbed mostly by the "lessee dealer" given the elasticity of demand for gasoline at the pump (Osina, 12 May 1987).

There is a trend toward making the "lessee dealer" more likely to be responsible for maintaining evidence of financial assurance that releases from USTs will be cleaned up. It is not clear, however, if oil companies will attempt to make "lessee dealers" directly responsible for UST maintenance, repair and replacement of USTs through altering lease arrangements, although this is a possibility (Anderson, 15 May 1987 and Osina, 12 May 1987). Informed sources

have stated, however, that large oil companies are trying to delegate as much responsibility as possible to the "lessee dealer" through the use of indemnity agreements that remove the responsibility of the oil company for various aspects of UST management (Rasheed, 1987).

## Summary

In short, of the market segments defined by EPA as belonging in the retail motor fuel market, refiners have the highest profits, generate the largest annual sales and have the lowest compliance costs per outlet associated with regulation under RCRA subtitle I. From the preceding description, it is obvious that, while gasoline sales continue to increase and the economic health of the oil companies is strong in comparison to the costs associated with RCRA subtitle I regulations, the "lessee dealer" is already under pressure from these business entities (as well as others) that has contributed to a significant decline in the number of service stations. Also, the marketing and financial advantages that the oil companies have over the open dealer segment of the market have led some observers to suggest that, given the compliance costs associated with RCRA subtitle I, a trend could emerge whereby there would be fewer independently owned businesses retailing gasoline, as opposed to outlets owned and operated and/or leased by refiners and jobbers (Heizer, 1987). One informed source has stated that, over time, all open dealers will eventually disappear (Clay, 7 May 1987). Cars may be repaired by speciality shops given the trend toward "pumpers" (described previously in this chapter) in the oil industry (Ibid.). Given the steady decline in the number of service stations in Virginia and the nation (nationally, from 196,000 in 1974 to 132,000 in 1984, [Sobotka, p.6-13]), and the possible vulnerability of the open dealer segment of the market, a significantly smaller retail motor fuel market could emerge in the near future.

## *Petroleum Jobbers*

Petroleum jobbers "are primarily wholesalers of petroleum products who also may own retail service stations or convenience store outlets" (Meridian Research, 1987, p.2-4). Some jobbers contract with oil companies to supply petroleum products to service stations owned and operated or leased by companies (National Petroleum News, p.30). In addition, jobbers often supply petroleum products to service stations that they own or lease themselves (Meridian Research, p.2-4). Finally, jobbers also supply gasoline to the open dealer segment of the market which consists of service stations and "mom and pop operations" (which retail gasoline in addition to other substantial business activities such as grocery sales) (Anderson, 15 May 1987).

Jobbers vary substantially as to total assets, outlets owned and leased, net income, revenues, etc. (Meridian Research, 1986, p.26). Nationally, jobbers and refiners own approximately equal numbers of retail outlets (46,000 and 47,000 respectively) (Ibid., p.17). However, EPA has determined that the jobber category comprises 9,000 firms as opposed to only 28 firms in the refiner category (Ibid.). Of these 9,000 jobber firms, approximately 3300 (operating and leasing approximately 6500 outlets) are thought to be small businesses while the rest (5700 firms operating and leasing approximately 40,000 outlets) are thought to be large businesses (Ibid.). Jobbers operate most of the outlets they own (55 percent) while most outlets owned by refiners are leased (80 percent) (Ibid., p.18).

Approximately 60 percent (5600) of the firms in the jobber segment own four or more outlets and have total assets over $500,000 and profits over $44,000 per year (Ibid., p.20). Each firm in this jobber category sold between 1.7 and 144.7 million gallons of product in 1984 (Ibid., p.B-5). These 60 percent of the jobber firms own approximately 40,000 of the 46,000 outlets within the whole jobber segment (Ibid.). The smallest jobbers (those owning only one or two

stations) generally have assets of less than $500,000 and revenues of less than $1,000,000 (Ibid., p.39). In 1984, these smaller firms sold between 369,000 and 6.6 million gallons of product (Ibid., p.B-5).

## Discussion

It is very difficult to fully describe and make generalizations regarding the jobber segment because of the variety of ways that jobbers do business and because of uncertainty about future business trends. While jobbers often own and operate and/or own and lease stations, one of their primary business activities is to wholesale petroleum products to open dealers (Meridian Research, p.2-4). While these wholesaling operations do not constitute ownership of the retail outlet, they may, in many situations, own and maintain the UST system (Dudley, 15 May 1987). In the past, jobbers contracted to own and maintain the USTs of open dealerships as part of the normal business relationship carried out at the time (Catterton, 27 May 1987). This relationship, however, has been changing, although it is difficult to know how much and in what way. If they do not own the USTs of those to whom they supply gasoline, jobbers can pass on compliance costs by raising the costs of the gasoline (Ibid.). If they do own the USTs, jobbers can pass on compliance costs by contracting to sell the USTs to the open dealer or by altering the contractual arrangement for maintaining the tank (Ibid.). If they lease the station, costs can be passed on in ways similar to those available to refiners (Ibid.). Most large jobbers generate sufficient sales, revenues and profits to absorb the costs associated with reasonable UST regulation, but a significant number of jobbers are not large businesses (Sobotka, p.6-47).

Thus, while all jobbers have available means of passing costs on to their "lessee dealers", and to those stations they supply gasoline to, they cannot do so for stations they own and operate themselves. The smallest jobbers may be in a situation similar to the open dealer in

trying to meet the costs associated with RCRA subtitle I compliance given low sales, revenue, and profit. However, jobbers owning only one or two stations also wholesale petroleum products to other outlets (otherwise they would simply be classified as open dealers) (Meridian Research, 1987, p.2-11). This added business activity (and the ability to pass on costs) would tend to help mitigate the impacts associated with the stations they own and operate. Nevertheless, for the smallest, marginal jobbers, adverse economic impacts are possible, and while the case studies focus on open dealer service stations, their similarity to this minority jobber segment is important.

## Jobbers in Virginia

The size of the jobber population in Virginia is unknown, as mentioned previously. One informed source indicated that jobbers own and operate and/or lease an average of four retail outlets while supplying gasoline to between one and over 100 outlets (Catterton, 27 May 1987). The principal recipients of the jobbers' wholesale product are independent, rural "mom and pop operations" (Ibid.). In this market, sources indicate, the volume and profit are low, which has tended to move jobbers out of this market into owning and operating or owning and leasing more outlets (as opposed to merely supplying the petroleum product) in the form of small convenience store chains where the profit is higher (Ibid.).

There are different accounts as to tank ownership patterns in Virginia. Some feel that generally, those supplying motor fuel to retail outlets almost always own the pumps and associated UST systems (Dudley, 15 May 1987). This was certainly the case in the past (Catterton, 27 May 1987). However, from conversations with officials in the VPJA, VPC, VGARA, with petroleum jobbers and with others, there is an indication that there is a trend toward those owning the outlet property generally owning the tanks, regardless of whether it is the supplier or the retailer (Gardner, and Armbrister, 1987). This is a pattern that is expected to accelerate

(Catterton, 27 May 1987). Thus, while jobbers can pass on costs to stations they lease or merely supply motor fuel to, the "lessee" and "open" dealers, being at the bottom level of the retail motor fuel market (where prices are inelastic) are forced to absorb most of the cost increase. This is discussed further in the section of this chapter concerning "open dealers".

## *Convenience Store Chains*

Convenience stores are defined here as chains of publicly and privately held retail establishments (having between one and three thousand square feet of floor space, on-site parking, and a variety of goods) that may sell gasoline as an item to be purchased at the same time that customers purchase other products such as food, newspapers, cigarettes, etc. (Meridian Research, 1987, pp.2-2 and 1986, p.16). Approximately half of the convenience stores in this country sell gasoline (Meridian Research, 1986, p.16).

Convenience stores are owned by refiners, jobbers, companies owning convenience store chains, independent chain marketers and others (Ibid.). Convenience stores were defined in the EPA RIAs to exclude those outlets owned by refiners, jobbers and independent chain marketers and also those outlets not selling gasoline (Ibid., p.17). Using this definition, EPA estimated that there were 516 convenience store firms owning and operating (none were leased) 14,732 retail outlets selling motor fuel (Meridian Research, 1987, p.2-5). There were 402 "small" convenience store firms owning and operating 1608 retail outlets while large convenience store chains consisted of 114 firms owning 13,124 outlets (Ibid., p.2-10).

Convenience stores have experienced very strong growth in recent years (National Association of Convenience Stores, p.14). Whereas in 1976 convenience stores accounted for only 1 percent of the gasoline sales in the United States, in 1985 the share had grown to 20 percent

(Meridian Research, 1986, p.16). A net profit of $33,000 per firm (over $4,000,000 in annual revenues with assets of $430,000) was reported for the smallest chains of convenience stores which averaged four outlets per firm. Both sales and profits were up significantly in 1985 as compared to 1984 levels (NASC, p.16).

Like jobbers, the very smallest convenience store chains may have difficulty in meeting the compliance costs associated with RCRA subtitle I. However, since gasoline sales may not be the main source of revenue for these firms, the result of these costs may be to eliminate gasoline sales only, and not to cause the firms to leave the marketplace. Besides this small minority of very small, very marginal convenience store chains, the profits, sales and assets of the convenience store industry are likely to keep RCRA subtitle I compliance costs from having a significant impact, as will be the case for most other large businesses (Sobotka, p.6-42).

## *Independent Chain Marketers*

Independent chain marketers, defined by EPA to exclude jobbers and convenience store owners, consist of 125 firms owning and operating, or leasing, approximately 5100 retail outlets (Meridian Research, 1987, p.2-10). Most outlets (4000) are owned and operated and not leased (Ibid., p.2-5). Independent chain marketers often sell "unbranded" or private brands of petroleum products (brands not bearing the names of the major oil companies) (Sobotka, p.6-8). All 125 independent chains identified by EPA are classified as large businesses (Meridian Research, 1987, p.2-10). They are more likely to operate high volume "pumpers" than are jobber and open dealers (Meridian Research, 1986, p.16).

EPA defined three asset classes (small, medium and large) of independent chains. Small chains typically consist of firms with $3.3 million in assets and which own fourteen outlets while large chains typically have assets of $21 million and own eighty-one outlets (Ibid., p.30). Revenues ranged from $26 million for small chains to $150 million for large chains. While there are low profit firms in each class, this is not attributed to any fundamental operating characteristic of the market segment in general. In fact, medium and high profit levels of all three classes are over $100,000 per chain (Ibid., p.B-19). Therefore, while the least profitable independent chains may be susceptible to adverse economic impacts caused by RCRA subtitle I regulation, independent chains, as a whole, probably generate enough sales and profits to absorb reasonable compliance costs.

## *Open and Lessee Dealers*

As indicated by the preceding discussion, open and lessee dealers, as a class, are far more vulnerable to adverse economic impacts from UST regulation than the other segments of the retail motor fuel market. For this reason, both EPA RIAs focused on open and lessee dealers. Many points have already been made relevant to these segments of the retail motor fuel market. The following two sections of this study summarize previous data while also presenting additional information.

### Open Dealers

As previously mentioned, open dealers both own and operate their own retail motor fuel outlets. These are often traditional service stations but may also consist of "pumpers" or convenience stores selling motor fuel supplied by refiners, jobbers or independent chains

(Meridian Research, 1986, p.30). Open dealers are often former lessee dealers who have bought the locations from oil companies or jobbers (Sobotka, p.6-8). All are classified as small businesses (Meridian Research, 1987, p.2-10). The vast majority of open dealers operate only one retail outlet (Meridian Research, Inc., 1986, p.30). Of the 89,738 firms in the retail motor fuel market estimated by EPA, over 80,000 are open dealers (Meridian Research, 1987, p.2-3).

While the median motor fuel outlet is owned by a firm with assets between $500,000 and $1,000,000, the median open dealer has $210,000 in assets (Meridian Research, 1986, p.37 and Sobotka, p.6-11). All firms owning assets of less than $200,000 (30,000 firms) are open dealers (Sobotka and Company, Inc., p.6-8). Open dealers also generate the lowest revenues in the retail motor fuel market (Sobotka and Company, Inc., p.6-11). A typical (median) open dealer has $90,000 in net worth and $14,000 in annual after tax profits (Ibid.) As was discussed in the introductory chapter of this study, profit may not be the only source of funds available for meeting UST regulatory expenses. As is explained in the introduction, owner remuneration (defined in this study as the sum which includes all revenues left over after all returns to the factors of production, **other than returns to the owner**, have been made) may also be important.

In Virginia, while only 10 percent of traditional service stations are thought to be open dealers (a total of approximately 220, which, informed sources have stated, may generate $30,000 per year in owner remuneration, a figure similar to that given for Virginia lessee dealers operating traditional service stations), this figure does not include "mom and pop" operations, the predominant rural motor fuel retailing facility (Flint, 1987 and Catterton, 15 May 1987). According to informed sources, it is probably reasonable to assume that an open dealer outlet owner would require at least $1,000-$1,500 per month as a return for his labor in order to remain in business (Holt, 1987). If this return were made, one can estimate the economic **profit** for open dealer *service stations* to be between $12,000 and $18,000 per year, which approximates the figures arrived at by EPA.

As mentioned previously, the population of open dealers (and the sub-population of "mom and pop operations") in Virginia is thought to be substantial (Ibid.). These "mom and pop operations" earn low profits and probably sell the smallest amounts of motor fuel of any sector within the retail motor fuel market (Catterton, and Anderson, 15 May 1987). It is difficult to obtain financial and other information concerning "mom and pop operations" because there is no trade organization representing their interest. However, "mom and pop operations" probably represent the most marginal and vulnerable firms in the retail motor fuel market (Flint, 1987). Marginal is defined here using EPA's definition: a retail outlet that is "making a very low return on assets or one that has an aging outlet in which it cannot afford to invest any substantial amount of money" (Meridian Research, 1987, p.2-12). In addition, currently, many "mom and pop operations" are closing because of the competition from convenience stores, and are generally becoming less and less prevalent (Flint, 1987).

The relative position of the open dealer (and the "mom and pop operation") within the retail motor fuel market is summarized by the following points.

- Open dealers are among the firms within the retail motor fuel market with the lowest profits, sales, assets and net worth. Within the open dealer segment, "mom and pop operation" are among the most marginal.
- As previously mentioned, the current tank ownership status of open dealers is uncertain but there is a definite trend towards making open dealers (the owners of the outlet property) responsible for the UST system. While there are several mechanisms to do this, or at least to pass the costs associated with UST management on to the open dealer, the open dealer probably must absorb such cost increases. This is because of the following reasons.

    1. Demand at individual outlets can be highly sensitive to price, although market demand for retail gasoline is relatively inelastic (Sobotka, p.6-2).

    2. Since UST regulatory costs are not dependent on how much gasoline is sold, regulatory costs per gallon are likely to be much less for high volume outlets (typically not open dealer and especially not "mom and pop operations") (Sobotka, p.6-2).

    3. Open dealers are significantly behind refiners and large jobbers in voluntary upgrading programs, "thus, potentially spreading the regulatory burden unevenly and therefore limiting the likelihood of cost pass through" (Ibid.). Open dealers, as a class, probably possess the worst UST systems in the retail motor fuel market, and those with the biggest need to upgrade tanks are probably in the worst financial condition (Clay, 1986).

    4. This means that since costs will not be raised uniformly across the market, the availability of many substitutes for sources of gasoline at any given price will limit the ability of the open dealer to pass costs on to the customer.

5. While compliance costs are small compared to the revenues generated by open dealers, this is not significant since the elastic demand for gasoline at any one station indicates that revenues will not be affected. Instead, net income is important and this is where the open dealer is vulnerable.

- The ability of open dealers to obtain bank loans is also limited.

> "Most single station open dealers (including firms with up to $100,000 in net worth) will be able to obtain a bank loan, only as a personal loan to the proprietor of the business. To obtain such a loan, the proprietor would have to secure the loan with personal assets (typically a residence). This is common practice for loans to small business owners and is even required by the Small Business Administration for their loan guarantees...This practice is especially warranted when the proceeds of a loan are used in a manner which contributes little collateral value to the business" (Holt, 1986).

Considerations for such a loan also include personal assets and business cashflow (Ibid). These are typically lower than necessary for an average open dealer.

1. Business loans are available only to firms of a substantial size (Ibid.). Generally, a firm can qualify for a business loan only if it has a net worth of at least five times the value of the loan and meets the cashflow requirements stated above (Ibid.). This is not the situation of many open dealers given certain UST regulatory costs (especially the costs of new USTs).

2. Loans to cover pollution control expenditures are often not regarded favorably by banks since "they do not add to the income producing potential of a service station" (Ibid.).

3. The SBA currently has a program offering loans to small businesses (Bromberg, 1987). The loans are guaranteed and require less collateral than conventional bank loans (Ibid.). The amount of paperwork involved in the program has been identified as a problem (Ibid). Perhaps more significantly, the program is small and thus, many applications could overwhelm it (Ibid.).

- The ability of open dealers to afford the payments for such loans is also questionable (Clay, 1986).

- "Mom and pop operations", because of their poorer financial performance and UST management practices, are probably the group with the greatest need for bank loans but with the least ability to obtain them or to pay them back (Ibid.).

## Lessee Dealers

Many of the issues raised concerning open dealers are also applicable to lessee dealers. However, there are some significant differences and additional information that should be stated.

- Lessee dealers are thought to operate 59,000 retail motor fuel outlets in this country (Sobotka, p.6-11). While the majority are owned by large refineries many are also owned by jobbers and independent marketers who own between two and one-hundred retail outlets (Ibid., p.6-13).

- The typical (statistical median) single station lessee dealer has $82,000 in assets, $62,000 in net worth and $6,000 in after-tax profits, according to EPA estimates (Ibid.). All are classified as small businesses. However, the data leading to these figures are somewhat unreliable. The report states "...we have less confidence in the accuracy of the profile for this group of dealers" (Meridian Research, 1986, p.33).

- UST systems operated by lessee dealers associated with large refineries could be in better condition than those of other lessee dealers and those of open dealers because of the upgrading programs carried out by these large, profitable firms.

- While lessee dealers are generally not responsible for direct UST regulatory compliance costs, the ability of refiners and jobbers to pass costs on and the trend toward delegating as much responsibility as possible to the lessee dealer (discussed previously) should be kept in mind. This is important given the following conditions.

    1. The UST legislation does not indicate any preference as to whether the owner or the operator of an UST system bears the associated regulatory costs.

    2. Oil companies can and do base rent increases on the increased costs associated with each station (Dudley, 12 May 1987).

    3. Jobbers can and do tie to the prices charged for the gasoline supplied to retail stations increased regulatory costs (Ibid.).

    4. Both jobbers and refiners can seek to alter lease and equipment contracts seeking to indemnify themselves from UST management responsibilities (Ibid.).

- In addition, like the open dealer segment, many lessee dealers operate "mom and pop operations", especially in rural areas (Catterton, 12 May 1987). Given the information presented previously concerning the similarity of the income between open and lessee dealer service stations in Virginia, and the income data provided by EPA for lessee dealers, evidence suggest that lessee "mom and pop operations" are among the most marginal and vulnerable firms in the lessee dealer segment and the retail motor fuel market as a whole.

# UST Regulatory Options

This chapter describes the minimum federal requirements under RCRA subtitle I and develops regulatory options which are at least as stringent as these minimum requirements. Associated costs are provided. Major public and private studies are utilized as well as actual local and state UST regulatory programs and industry cost figures.

## *Background*

Existing state and local requirements applicable to UST systems vary widely in terms of composition as well as stringency. Early state and local UST regulations focused on immediate public safety and were often implemented by fire code authorities since LUSTs have led to fire and explosions (52 FR 12664). However, at least fourteen states currently have comprehensive regulatory programs addressing the groundwater contamination and clean-up problems associated with LUSTs (Ibid.). EPA cited trends in state and local UST regulations as an important influence on the development of the technical requirements Proposed Rule for UST regulation under RCRA subtitle I (along with industry codes and standards, inde-

pendent testing laboratories and the large number of small businesses owning and operating UST systems (52 FR 12670). These independent state and local efforts represent a variety of approaches due to differing regional factors (e.g., Florida's groundwater monitoring requirements reflect "the prevalence of a shallow depth to groundwater") and because of differences in state and local practices and preferences (Ibid., pp.12670-12671).

In preparing regulatory options for UST management it is useful to use the proposed federal requirements as a basis. This is because: the proposed federal regulations, if retained in essentially the same form once final regulations are promulgated, must be a part of any state UST program (or which must incorporate a set of regulations of at least equivalent stringency); and federal minimum requirements represent a firm ground (and context) on which to structure other optional regulatory approaches since, given the several components to any comprehensive UST regulatory approach, there is an almost limitless set of programs and approaches. From this point more meaningful options can be developed and compared. In addition, the regulatory components within each option and the details provided within each component can be "dissected" out of the option and combined with other components and details from other options (as long as minimum federal requirements are maintained). In this sense, the options themselves are not static or discrete.

This chapter focuses on those regulatory options that have costs associated with them and does not attempt to cover administrative requirements (e.g., record keeping) unless a significant amount of man-hours must be expended in carrying out the requirements.

## Proposed Minimum Federal Requirements

Proposed federal requirements for the regulation of USTs under RCRA subtitle I relevant to this study include requirements for: UST design, construction and installation; general oper-

ating requirements; release detection; corrective action requirements; financial responsibility requirements; and out-of-service UST systems and permanent closure (52 FR 12667).

## *Design Construction and Installation (Subpart B)*

Design, construction and installation requirements include: performance standards for new UST systems; schedules for upgrading existing UST systems and notification requirements.

**Performance Standards for New UST Systems**

The design and construction of UST systems should ensure the structural integrity of the tank system when it is installed and throughout the period it is in operation (52 FR 12695). Design and construction should apply to the tank, piping and any "ancillary design features, systems, or equipment that enhance or protect the structural integrity of the tank system (Ibid.). Installation, including excavation, tank system siting, burial depth, tank system assembly, backfilling of the tank system and surface grading is a significant factor in the proper operation of both steel and fiberglass reinforced plastic (FRP) USTs, particularly piping systems (Ibid., p.12700).

***Section 280.20(a)- Tanks***

Each new UST must "be properly designed and constructed and protected from corrosion in accordance with a code of practice developed by a nationally recognized associations or independent testing laboratory" (Ibid., p.12773). The following primary tank types are allowed:

> ***Fiberglass Reinforced Plastic***- assuming three tanks with a capacity of 10,000 gallons each (a typical situation at a service station- Delivery costs are based on $3.00 per load mile; a 300 mile shipping distance and one tank per load. The resulting sum of $2,700 is rounded $3,000. (PMAA, p.9-6, 9-10)

| | |
|---|---|
| purchase cost | $12,000-$15,000 |
| delivery cost | $3,000 |
| Total | $15,000-$18,000 |

***Single Walled Coated Steel and Cathodically Protected-*** same assumptions as above (Ibid.)

| | |
|---|---|
| purchase cost | $12,000-$15,000 |
| delivery cost | $3,000 |
| Total | $15,000-$18,000 |

***Steel-Fiberglass Reinforced Plastic Composite-*** same assumptions as above (Ibid.)

| | |
|---|---|
| purchase cost | $15,000-$18,000 |
| delivery cost | $3,000 |
| Total | $18,000-$21,000 |

***Section 280.20(b)- Piping-*** "The underground piping must be properly designed, constructed and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below" (52 FR 12773)

***Fiberglass Reinforced Plastic-*** assume 300ft of piping (PMAA, p.9-19)

| | |
|---|---|
| Purchase Costs (includes installation) | $3,000 |

***Single Walled Coated Steel and Cathodically Protected-*** same assumption as above (Ibid.)

| | |
|---|---|
| purchase cost (includes installation) | $3,000 |

The costs of UST tanks with secondary containment (including double walled tanks) are not presented here. These UST systems are significantly more expensive than those described above and it is doubtful any regulatory program would require such systems. A review of state and local UST programs indicates that for petroleum products, secondary containment, while an option, is not required except in a very few exceptions.

***Section 280.20(c)- Installation-*** "All tanks and piping must be installed according to manufacturer's instructions and must meet the following requirements..." (Ibid.). These requirements concern: preventing damage to the tank and piping during installation; allowing adequate space in the excavation for proper backfilling; the proper selection, placement and compaction of the backfill material; the use of supports and anchorage for installations in areas subject to high water tables or flooding; the layout of the piping system to minimize crossed lines and interference with other tank components; the cutting of pipe joints to provide liquid-tight seal; the installation of "swing joints" or flexible connectors at the beginning and end of each line as well as where lines change direction; the proper installation of tank tank and piping cathodic protection and; the performance of tank and piping tightness tests after backfill is installed and before the system is put into operation.

The costs presented below are based on the installation practices presented in the American Petroleum Institute's API 1615 and the National Fire Protection Association's NFPA 30 and NFPA 329. They assume the installation of three USTs, each with a capacity of 10,000 gallons. As mentioned previously, the cost of purchasing piping generally includes the cost of installation. However, this does not include the cost of trench construction (presented below based on 300ft of piping situated in a trench 50ft long and 5ft wide) (PMAA, pp.9-19, 9-24, 9-25, 9-29).

***Tank Installation***

| | |
|---|---|
| Fiberglass Reinforced Plastic | |
| cost | $10,000-$13,000 |

| | |
|---|---|
| Single Walled Coated Steel and Cathodically Protected | |
| cost | $10,000-$13,000 |
| Steel Fiberglass Reinforced Plastic Composite | |
| cost | $10,000-$13,000 |
| (installation can cause five to seven days business downtime) (Flint, 1987) | |

***Trench Construction***

| | |
|---|---|
| Fiberglass Reinforced Plastic | |
| cost | $2,000-$4,000 |
| Single Wall Coated Steel and Cathodically Protected | |
| cost | $2,000-$,4000 |
| total | $12,000-$17,000 |

**Upgrading Existing Tanks**

***Section 280.21-Schedules for Upgrading Existing UST Systems***- Since EPA believes that the unprotected condition of so many USTs "provides the greatest and most immediate threat to human health and the environment", it is requiring that all existing USTs be **upgraded** to new tank standards within 10 years or be **closed** (52 FR 12704). This will commonly consist of installing cathodic protection (Ibid.) Release detection must be provided within three years for base steel tanks and within 5 years for protected tanks (cathodically protected or FPR tanks) (Ibid.). However, for the 10 year upgrade period, release detection can consist of manual in-

ventory control and infrequent tank testing (every three and five years for unprotected and protected tanks respectively). The cost is approximately $500 per tank (PMAA, p.12-10). After this period existing tanks must meet new tank standards for release detection (this is described later in the chapter).

***Installing Cathodic Protection***- (both sacrificial anode and impressed current)- assumes three USTs with a capacity of 8,000 gallons and 300 feet of piping (PMAA, p.9-29)

| | |
|---|---|
| cost | $4,000-$8,000 |

***Closing Old USTs and Installing New Ones***- assumes three USTs with 10,000 gallon capacity each and the equivalent installed (PMAA, p.9-25)

| | |
|---|---|
| Tank and Piping Removed | $4,000-$6,000 |
| New Tanks | $25,000-$31,000 |
| Piping Trench Construction | $2,000-$4,000 |
| Piping (includes installation) | $3,000 |
| total | $34,000-$44,000 |

This process can take five to seven working days. (Flint, 1987)

**Notification Requirements**

***Section 280.22- Notification Requirements***- Notification requirements, while an important part of the EPA regulatory program, do not require any substantial expenditures of money or man-hours.

## *General Operating Requirements (Subpart C)*

In EPA's Proposed Rule, General Operating requirements consists of regulations concerning spill and overfill control, operation and maintenance of corrosion protection and allowable repairs. Other sections are not relevant to this study.

### Spill and Overfill Control

***Section 280.30-Spill and Overfill Control-*** Devices in UST systems for spill and overfill control (to minimize the risk of releases when an UST is being filled) are not priced here. Such items are usually part of the UST systems approved for use by the "nationally recognized associations" (such as the NFPA) mentioned in EPA's Proposed Rule (PMAA, p.C-23). The cost of these devices, if not included in the costs of the UST, are not expected to be significant relevant to other costs.

### Operation and Maintenance of Corrosion Protection

***Section 280.31-Operation and Maintenance of Corrosion Protection-*** Since corrosion was found by EPA to be the most common cause of releases in existing UST systems, the inspection and maintenance of cathodic protection systems is required under Subpart C of the regulations (52 FR 12706). Field installed cathodic protection systems must be tested within six months of installation and at least annually thereafter. Factory installed systems must be inspected and/or tested within six months and at least every five years thereafter (Ibid., p.12779). The costs associated with these options is not expected to be significant compared to other costs (Flint, 1987).

**Allowable Repairs**

***Section 280.33- Repairs Allowed-*** Repairing bare steel USTs usually involves the correction of tank deficiencies by repairing broken seems and welds, plugging corrosion related holes, and applying an interior lining (52 FR 12710). FRP tanks can be repaired by patching holes and seem breaks with fiberglass matting and resin (Ibid.). In addition to the costs of repairing and relining an UST, there are additional costs associated with the requirements under this section. Unprotected steel tanks that are repaired must be retrofitted with cathodic protection and maintained as required in the previous section (Ibid., p.12780). A vacuum test must be performed after the repair/relining is completed and before the UST systems is placed in operation (Ibid.). Piping must be replaced as repair of this UST system component is not allowed (Ibid.). UST systems without interstitial monitoring or other release detection (described below) that is sampled at least every thirty days and have a tank-tightness test performed within one year of the repair (Ibid.). UST systems can only be repaired once before the system must be replaced or permanently closed (Ibid.).

Assume three tanks with 10,000 gallon capacity each (includes total installed costs) (PMAA, p.9-30).

| Total Tank Repair Costs | |
|---|---|
| repair/relining | $13,500-$18,000 |
| cathodic protection | $4,000-$8,000 |
| tank tightness tests | $500x3 = $1500 |
| total | $19,000-$27,500 |

## *Release Detection (Subpart D)*

Because any UST system, no matter how well protected, is subject to leaks, some form of release detection for new and existing tanks is required under RCRA subtitle I. In order to provide flexibility, EPA is proposing to allow a variety of release detection methods, many of which can only be used given certain environmental conditions. Existing UST systems must have release detection installed **three years** after the effective date of the regulations if the UST system is not protected from corrosion (cathodically protected or constructed of corrosion resistant material) and within five years if the UST system is protected.

### Inventory Reconciliation and Tank Tightness Testing

***Section 280.41(c)- Inventory Reconciliation and Tank Tightness Testing-*** Under this option, in addition to manual inventory reconciliation, tank tightness tests must be performed every six months except in the case of existing USTs (52 FR 12781). For existing UST systems, tank tightness tests must be performed at least every three years for unprotected tanks and every five years for protected tanks (Ibid.). Tanks must be closed for three to twelve hours for the tests to be performed (PMAA, p.6-4). Inventory reconciliation (manual) does not require significant expenditures of money or man-hours. Assume three tanks and a one year period (Ibid.).

Total Costs

| | |
|---|---|
| Tank Tightness Tests | |
| (3 tanks x 2 tests x 1yr) | $3,000 |

### Vapor Monitoring

***Section 280.41(d)- Vapor Monitoring-*** Vapors within the soil gas of the excavation area may be monitored under certain conditions (mainly in shallow groundwater). The costs of vapor

wells are typically lowest when installed at the same time as the tanks (PMAA, p.8-7). Assume two wells sampled monthly by an outside contractor (as required under the EPA Proposed Rule) at a cost of $25 per visit (PMAA, p.8-7 and Sobotka, p.4-11).

Total Costs

| | |
|---|---|
| Vapor Wells (2) | $400 |
| Vapor Detectors | $1,000-$36,000 |
| sampling | $300 |
| total (initial) | $1400-$36,400 |
| total (annual) | $300 |

**Monitoring Liquid on the Groundwater**

***Section 280.41(e)-Testing and Monitoring Liquids on the Groundwater-*** This method can only be used under certain conditions. Assume two wells, four inches in diameter, fifteen feet deep (PMAA, p.8-7 and Sobotka, p.4-11).

Total Costs

| | |
|---|---|
| Observation Wells (existing system) | $500-$2,000 |
| Observation Wells (new system) | $250-$700 |
| Liquid Hydrocarbon Detector | $20 per/yr[2] |
| total (initial) | $250-$2000 |
| total (annual) | $20 |

[2] the cost of a year supply of "hydrocarbon finding paste" (PMAA, p.8-8)

**Automatic Inventory Control**

***Section 280.41(g)- Automatic Monitoring of Product Level and Automatic Inventory Reconciliation***-EPA's Proposed Rule allows the use of these two release detection methods as long as they meet certain technical requirements (52 FR 12736). Devices exist that both automatically measure changes in inventory and the product level of the UST system (PMAA, p.6-4). Assume three tanks with a capacity of 10,000 gallons each (Ibid.).

| Total Costs | |
|---|---|
| Automatic Tank Gauging | |
| Systems | $3,000-$12,000 |
| Installation | $400-$2,000 |
| total | $3,400-$14,000 |

In addition, installation of this system can take up to four days (Ibid., p.6-4).

Another release detection method allowed by EPA but whose costs are not estimated in this study, is interstitial monitoring between an UST system and a secondary barrier (for UST systems with secondary containment, including double walled tanks). As mentioned in the section of this chapter addressing tank costs, these UST systems are not considered a realistic **requirement** for owner/operators of petroleum containing USTs, and therefore, related release detection methods are not addressed here.

## *Release Reporting and Corrective Action (Subparts E and F)*

The costs of release investigations are corrective action are not estimated in this study. These costs can be very large compared to the income of an independent motor fuel retailing firm. However, as part of the UST regulatory program, EPA is proposing that all owners or opera-

tors of UST systems maintain evidence of financial responsibility so that money will be available to undertake any corrective action or third party compensation that may result from an unauthorized release from an UST (52 FR 12786). The financial assurance will primarily be in the form of insurance for "open dealers" (Clay, 20 May 1987). Some costs associated with the requirements requirements for release investigation and corrective action (such as tank tightness testing and business downtime) will be borne by the business owner. However, since the majority of expenses associated with corrective actions will be covered by the insurer, and since the costs to the business are conditioned by the actual occurrence or suspected occurrence of a release, these costs are not described in this report.

## *Out of Service UST Systems and Closure (Subpart H)*

***Section 280.80-Closure Requirements-*** Because of the large number of contamination events resulting from USTs improperly taken out of operation, EPA is proposing requirements for UST systems taken out of operation both temporarily (between three and twenty-four months) and permanently (greater than twenty-four months). Temporary closure costs are not estimated in this study because such closure is an unlikely event for most businesses and because the costs associated with temporary closure are minimal. Permanent closure, however, has significant costs associated with it and is a distinct possibility for businesses that decide to discontinue the sale of retail motor fuels, for businesses deciding to shut down a portion of their USTs to avoid certain compliance costs, and for businesses that are closing down old tanks for replacement purposes. EPA is proposing to allow both closure by leaving the tank in place and closure by removing the tank (52 FR 12786). Assume three tanks closed with 10,000 gallons capacity each (PMAA, p.10-6).

Costs

| | |
|---|---|
| Tank Removal | $9,540-$13,590 |

| | |
|---|---|
| Closure in Place | $3,450-$11,400 |

## *Financial Responsibility Requirements*

EPA is proposing that the owners and/or operators of UST systems consisting of between one and twelve tanks used for storing petroleum products maintain $1 million worth of coverage for "taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from operating petroleum underground storage tanks..." (52 FR 12842). While several mechanisms are available that qualify under EPA's proposed requirements (such as letters of credit, self-insurance and risk retention groups), the only one available (or affordable) for use by owners and operators of small, independent motor fuel retailing establishments is insurance (Clay, 20 May 1987). Insurance is currently not available to the "open dealer" but it probably will be in the near future (Ibid.). The approximate cost of such insurance is given below.

| | |
|---|---|
| One Year Policy for $1 million per occurrence and $1 million annual aggregate | $2500 |

## *Sources of Error and Uncertainty*

Major sources of error and uncertainty in the cost estimates provided above include the following:

- ***Generalizations***-Many costs associated with UST systems and their installations are, to a large degree, affected by site specific characteristics and by differences in the prices charged throughout the UST equipment and installation market. Examples include the

costs of a completed groundwater observation well and the cost of purchasing and installing automated inventory devices (PMAA, p.8-7). This, in part, explains the range of costs provided for most regulatory components. Actual regulatory costs for case studies could not be provided without professional estimates.

- ***Assumptions***- Many of the costs provided above assume UST systems consisting of three USTs, each with a capacity of 10,000 gallons. Assumptions were necessary for cost estimates of tanks, piping, release detection and closure costs. The assumptions generally describe a typical service station, however, as has been demonstrated previously, many regulated firms are not service stations. In particular, many "mom and pop operations" have relatively small UST systems of one or two tanks (Catterton, 12 May 1987). In this case, the assumptions made above do not accurately reflect the regulatory costs that will be incurred. Where possible, this is taken into account in the following chapter of this study.

- ***EPA Regulatory Details***- While costs provided above probably include most of the "details" of all of the requirements contained in EPA's Proposed Rule, it is difficult to be certain because they have not been "operationalized" or applied to real situations. Many requirements not only include regulations for certain equipment and procedures, but also indicate specific criteria that these equipment and procedures must meet. Examples include: site inspections before determining whether certain kinds of release detection equipment can be installed and; performance standards for release detection equipment (probability of detecting a leak must be .99) that are not part of the manufacturer's specifications for certain equipment (52 FR 12781-12782). It will be difficult to accurately measure the total costs associated with meeting **all** all of EPA's proposed requirements until one can observe the specific way in which EPA (and other implementing agencies) implements and enforces these requirements and the reaction of the manufacturers, dealers, installers and inspectors of the relevant regulatory components that have costs associated with them.

- ***Lack of Information***- A final source of error and uncertainty, related to the previous source, is a general lack of information available as to the costs and other aspects associated with maintaining and operating certain equipment related to UST system management. The costs of operating and maintaining automatic tank gauging systems is an example (PMAA, p.6-4). Specifications and other information provided by manufacturers of tank equipment (particularly release detection mechanisms) have not been well documented and reliability has not been tested through long term operation (52 FR 12714).

## *Summary of Minimum Federal Standards*

Given these sources of error and uncertainty, it is still useful to have a general idea of the costs associated with UST regulation. Tables 1 though 3 provide a summary of these costs and their relevance to open dealers. Except where noted, the same assumptions apply as were stated in the previous section of this chapter. Business downtime is calculated in Chapter Six of this study.

| Table 1. Option F- Minimum Federal Requirements- Part One | | |
|---|---|---|
| **Scenario One- Old Tanks Removed and Replaced** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Three tanks (includes delivery and installation) | $25,000-$34,000 | ------ |
| Piping (installed) | $5,000-$7,000 | ------ |
| Old tanks and piping removed | $4,000-$6,000 | ------ |
| Release detection | | |
| Vapor monitoring | $1,400-$36,400 | $300 |
| Liquid monitoring | $250-$700 | $20 |
| Automatic inventory reconciliation | $3,400-$14,000 | ------ |
| Manual inventory reconciliation | ------ | $3,000 |
| | | |
| Financial responsibility | ------ | $2,500 |
| | | |
| **total** | **$34,250-$83,400** | **$2,520-$5,500** |

| Table 2. Option F- Minimum Federal Requirements- Part Two | | |
|---|---|---|
| **Scenario Two- Old Tanks Upgraded** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Cathodic protection (installed) | $4,000-$8,000 | ------ |
| Release detection (within 3 or 5 years) | | |
| Vapor monitoring | $1,400-$36,400 | $300 |
| Liquid monitoring | $500-$2,000 | $20 |
| Automatic inventory reconciliation | $3,400-$14,000 | ------ |
| Manual inventory reconciliation | ------ | $1,500 (only once every 3 or 5 years |
| | | |
| Financial responsibility | ------ | $2,500 |
| | | |
| **total** | **$4,500-$44,400** | **$2,520-$4,300** |
| | | |

| Table 3. Option F- Federal Minimum Requirements- Part Three | | |
|---|---|---|
| **Other Regulatory Costs** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Tank Repair and Relining | | |
| Repair and relining | $13,500-$18,000 | ------ |
| Cathodic protection | $4,000-$8,000 | ------ |
| Tank testing | $1,500 | ------ |
| | | |
| **total** | **$19,000-$27,000** | ------ |
| | | |
| Tank closure (three tanks) | $3,450-$13,590 | ------ |
| | | |

Tables 1 through 3 indicate that the most economic approach to complying with federal UST regulations is to upgrade existing tanks by installing cathodic protection and performing infrequent tank testing and inventory reconciliation for the ten year upgrade period. After this, economic release detection methods include monitoring wells or automatic tank gauging. However, these are not the only requirements relevant to open dealers. Before any UST regulatory program was contemplated, slow leaks in USTs could go undetected for years. After the federal minimum requirements are enacted, inventory reconciliation, tank testing and release reporting requirements will cause many owners and operators to discover and (hopefully) report non-tight tanks. These tanks will have to be repaired and relined at a substantial cost (see Table 3) or replaced (see Table 1). Since tanks can be repaired only once, many UST system owners will have to decide whether to make the expenditure to reline a tank (and hope that it extends the operating life of the UST significantly) or to simply replace the tank and thus eliminate the risk of having to make two expenditures in a relatively short time span.

Additionally, owners/operators deciding to shut down an UST system will be faced with substantial UST closure costs. Finally, owner/operators are not only faced with meeting federal minimum requirements, since states seeking regulatory supremacy have the option of enacting more stringent regulations. The regulatory options presented below contain differing components (which reflect differing compliance costs) that might be considered by the VSWCB when developing an UST regulatory program.

## Optional Regulatory Components

There are three primary approaches available to develop regulatory options for UST management which all meet federal requirements. These are:

- adding additional requirements for tank owners and/or operators and making existing requirements more stringent;
- tightening time tables for various aspects related to upgrading existing USTs and;

- including governmental assistance programs such as low interest loans and loan guarantees designed specifically to assist members of the regulated community in meeting program requirements.

In this study, program components were designed to be realistic and to include areas which are of importance to the UST owner/operator in terms of financial outlays. Also, changes from the federal minimum requirements were made only if they had some basis for providing increased environmental protection or could assist in mitigating adverse economic impacts. They are discussed below.

### *Added Requirements and Stringency*

Added requirements and stringency are limited to program elements that have been incorporated by state and local UST programs and to program elements considered by VSWCB personnel. The following additional requirements and stringency (and associated additional costs) are presented to be used in developing a regulatory options.

- a $100 per year tank permitting fee for new and existing USTs to be used as a source of funds for the administration of a state UST management program
- a requirement for a moderately sophisticated groundwater or soil vapor monitoring well system (instead of the use of "hydrogen finding paste" or "bailers" for groundwater monitoring and "combustible gas indicators" for soil vapor monitoring)-

| Regulatory Component | Cost |
|---|---|
| groundwater monitoring | $8,000[3] |
| soil vapor monitoring | $5,000[4] |

- a requirement for an impermeable plastic pit liner for tank excavation-

| Regulatory Component | Cost |
|---|---|
| impermeable plastic pit liner | $5,000[5] |

---

[3] (PMAA, p.12-9)

[4] (Ibid.)

[5] (Ibid., p.12-6)

- a requirement for an automatic tank gauging system if inventory control is chosen as a release detection method (in addition to federal tank testing requirements)-

| Regulatory Component | Cost |
|---|---|
| automatic tank gauging system (including installation) | $7,000[6] |

- a requirement that tanks must be closed by removal-

| Regulatory component | Cost |
|---|---|
| tank closure by removal | $9,540-$13,590[7] |

### *Alternate Time Table for Upgrading USTs*

Like the section above which describes additional requirements and stringency to federal minimum requirements, this section is limited to **reasonable** assumptions of what **might** be considered as well as what **has** been considered in Virginia and elsewhere.

- requiring existing tank owners or operators to install cathodic protection and/or release detection within three years of the effective date of the UST regulations instead of ten-
- for existing UST owners or operators, requiring tank testing every year for three years (or within three years) after the effective date of UST regulation, at which time federal or state release detection requirements for new tanks must be met (this is contrasted with the minimum federal requirements of tank testing once every three or five years respectively for protected and unprotected tanks for the entire upgrading period of ten years).

### *Governmental Assistance*

The primary forms of governmental assistance that have been considered in the area of UST management consist of some form of loan program and some form of UST Fund to be used as evidence of financial assurance, in place of insurance. New Jersey has established a loan

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[6] (Ibid., p.12-6)

[7] assume three 10,000 tanks (Ibid., p.10-6)

program for owners and operators of UST systems while Virginia is in the process of establishing an UST Fund (although this particular fund will probably have little impact on the insurance costs of open dealers, at least in the short run) (Clay, 20 May 1987). However, UST funds can be used to demonstrate financial responsibility for tank owners and operators (U.S. Congress, p.272).

There are many problems associated with both of these forms of government assistance (e.g., under what circumstances and to whom should loans be provided; what would be the effects of removing financial responsibility from owners and operators of USTs and how is it justified in light of the "polluter pays" principle which states that the costs associated with a polluting activity should be borne by the polluter). While the U.S. has tended to adopt the "polluter pays" principle in recent decades, high "social costs" associated with making the polluter pay (e.g., significant adverse economic impacts or changes in accepted social and economic "norms" and relationships) have often been viewed as justification for deviating from this principle. The presence of such unacceptable economic impacts and/or changes in traditional social and economic patterns can be seen as a reason why state officials might choose to incorporate some kind of governmental assistance component into a state UST regulatory program. However, it is not the purpose of this study to design actual UST regulatory programs with the details of how such programs would be implemented, so that they would function in a way acceptable to those involved. Rather, this study indicates the effects, on a vulnerable segment of the regulated community, of various regulations and general program aspects that have been considered by others. The details and ultimate virtues of such programs are not the focus of this study while their economic impact on the open dealer is.

The following two governmental assistance programs are used in the development of the regulatory options presented below.

- A low interest loan program (New York Prime Rate- 7 3/4 percent), guaranteed by the state, would be established, where qualified owner/operators of UST systems wishing to either upgrade or replace their UST system could do so. Those qualifying for the loan would have ten years to pay it back. As is discussed in the following chapter of this study, many of the more marginal open dealers could not realistically be expected to qualify for

any loan program. However, postulating the existence of such a loan program can point out the differences that such financial assistance might make to an UST owner/operator.

- an UST Fund of sufficient size and scope to fully remove financial responsibility requirements from the open dealer segment of the regulated community-

## *Three Regulatory Options*

Given the hypothetical program elements described above, three regulatory programs of varying composition and stringency are presented in Tables 4-8 below. Each table is broken into three columns which describe the regulatory component being considered, and the one-time and annual costs associated with the component. By using the costs associated with the minimum federal UST management requirements contained in Tables 1-3, the following four options are used in analyzing the case studies: Option F- federal minimum requirements; Option A- the most economically stringent option; Option B- an option of moderate economic stringency and; Option C- this option consists of federal minimum requirements but includes the governmental assistance programs described above. Each option indicates the costs associated with removing and replacing old tanks and with upgrading existing tanks.

New tank requirements under **Option A** include: installing an impermeable plastic barrier when new tanks are installed or old tanks replaced; installing a moderately expensive vapor or groundwater monitoring system (at least $5,000) if one of these release detection options are chosen; automatic tank gauging (as well as tank testing twice a year) if inventory control is chosen as a release detection method; and a $100 tank permit. Upgrading requirements under Option A include a three year limit for existing tanks to meet new tank release detection (as required under Option A) and cathodic protection requirements (instead of a ten year limit as required under federal minimum requirements). Additionally, tank testing must be performed every year for the entire three year upgrading period (or until tanks are upgraded, whichever is sooner). Finally, under this option, tanks must be closed by removal.

Under **Option B**, existing tanks must meet federal minimum release detection requirements within three years while cathodic protection requirements must be met within ten years (as required under federal minimum requirements). Tank testing must take place within three years. This option also includes a $100 tank permit fee.

As mentioned above, **Option C** consists of federal minimum requirements with the addition of the governmental loan program and UST Fund described previously.

The analysis of the case studies referred to earlier is presented in the following chapter. Except where noted, the assumptions used in these options are the same as those used in the cost estimates for the minimum federal requirements.

| Table 4. Option A- Most Stringent- Part One | | |
|---|---|---|
| **Scenario One- Old Tanks Removed and Replaced** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Three tanks (installed) | $25,000-$34,000 | ------ |
| Piping (installed) | $5,000-$7,000 | ------ |
| Old tanks removed | $4,000-$6,000 | ------ |
| Impermeable plastic barrier | $5,000 | ------ |
| Release detection | | |
| Vapor monitoring | $5,000 | ------ |
| Groundwater monitoring | $8,000 | ------ |
| Automatic tank gauging | $7,000 | $3,000 |
| | | |
| Financial responsibility | ----- | $2500 |
| Permit fee | ------ | $100 |
| | | |
| **total** | **$44,000-$60,000** | **$2,600-$5,600** |
| | | |

| Table 5. Option A- Most Stringent- Part Two | | |
|---|---|---|
| **Scenario Two- Old Tanks Upgraded** | | |
| Regulatory component | Initial Costs | Annual Costs |
| Cathodic protection (Installed within 3 years) | $4,000-$8,000 | ------ |
| Release detection | | |
| Annual tank testing (years 1 through 3) | ------ | $1,500 |
| Vapor monitoring (after year 3) | $5,000 | ------ |
| Groundwater monitoring (after year 3) | $8,000 | ------ |
| Automatic tank gauging (after year 3) | $7,000 | $3,000 |
| | | |
| Financial responsibility | ------ | $2,500 |
| Permit fee | ------ | $100 |
| | | |
| **total** (after 3 years) | **$9,000-$16,000** | **$2,600-$5,600** |
| **total** (years 1 through 3) | ------ | **$2,600-5,600** |
| | | |

| Table 6. Option B- Moderate Stringency- Part One | | |
|---|---|---|
| **Scenario One- Old Tanks Removed and Replaced** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Three tanks (installed) | $25,000-$34,000 | ------ |
| Piping (installed) | $5,000-$7,000 | ------ |
| Old tanks removed | $4,000-$6,000 | ------ |
| Release detection | | |
| Vapor monitoring | $1,400-$36,400 | $300 |
| Groundwater monitoring | $250-$750 | $20 |
| Manual inventory reconciliation | ------ | $3,000 |
| Automatic tank gauging | $3,400-$14,000 | |
| | | |
| Financial responsibility | ------ | $2,500 |
| Permit Fee | ------ | $100 |
| | | |
| **total** | **$34,000-$47,250** | **$2,620-5,600** |

| Table 7. Option B- Moderate Stringency- Part Two | | |
|---|---|---|
| **Scenario Two- Old Tanks Upgraded** | | |
| Regulatory Component | Initial Costs | Annual Costs |
| Cathodic protection (installed in 10 years) | $4,000-$8,000 | ------ |
| Release detection | | |
| Tank testing (within 3 years) | $1,500 | ------ |
| Vapor monitoring (after 3 years) | $1,400-$36,400 | $300 |
| Groundwater monitoring (after 3 years) | $500-$2,000 | $20 |
| Manual inventory reconciliation (after 3 years) | ------ | $3,000 |
| Automatic inventory reconciliation (after 3 years) | $3,400-$14,000 | ------ |
| | | |
| Financial responsibility | ------ | $2,500 |
| Permit fee | ------ | $100 |
| | | |
| Total (within 3 years) | ------ | $1,500 (tank tests within 3 years)<br>$2,600 (every year) |
| Total (after 3 years) | $500-$36,400 | $2,620-$5,600 |
| **Total (within 10 years)** | **$4,500-$45,900** | **$2,620-$5,600** |
| | | |

| Table 8. Option C- Governmental Assistance |
| --- |
| This regulatory option consists of federal minimum requirements with the addition of the state loan program and UST Fund which were described earlier. |
| |

# Case Studies

This chapter presents the results of three case studies analyzed in light of each regulatory option presented above (including minimum federal requirements). The following information was obtained (much of it was approximated by the owners):

- gasoline sales
- total revenues
- percent of revenue from motor fuel sales
- before tax and after tax (net) profits
- profits attributed to motor fuel sales
- level of owner remuneration (as previously defined)
- total assets
- UST information

This information is used to:

- compute ratios of net profit to total assets (rate of return on assets- ROROA) with and without the various regulatory options and governmental assistance programs. This ratio was used by EPA to characterize the financial health and profitability of firms (Sobotka, p.6-8).

    1. Rate of return on assets cannot be correlated to firm size (Ibid.).

    2. The median net profit to total assets ratio for firms in the retail motor fuel market is between .06 and .08 (Ibid., p.6-11). This is fairly typical for U.S. firms not engaged in banking or financial services (Ibid.).

3. Firms whose rate of return on assets falls below -.30 almost always fail and those with ratios between -.04 and -.30 almost always experience severe financial distress (Sobotka, p.6-19).

- Compliance costs are also measured as a percentage of annual owner remuneration (OR). The owners of the firms analyzed in the case studies had available only a figure representing owner remuneration. Based on figures quoted by knowledgeable sources, returns paid by an owner to himself as compensation for his input into the business might be expected to range between $1,000 and $1,500 per month. For the purposes of this study, a figure of $1,250 per month ($15,000 a year) is used. Therefore, the profit of the case studies analyzed in this study equals the owner remuneration minus $15,000.

For the purposes of this study, owner remuneration levels were held constant for each case study in the analysis since the owners of the firms analyzed in the case studies indicated that, while these levels alter significantly over time, they are typical for their firms. Average (mean) costs are chosen within the regulatory options for tank replacement and repair. Minimum release detection costs are chosen within an option since the owner or operator can choose the least costly method.

This chapter concludes with a discussion of the major sources of financial difficulty for the firms examined in the case studies stemming from these options. Also, an analysis similar to the one done with the case studies is performed on EPA's estimates of the profit of median open and lessee dealers. This analysis differs from the one performed on the case studies, in that it is not applied to estimates of owner remuneration, only profit. Therefore, the analysis consists of the effect that the UST regulatory options would have on the percent annual profit and the rate of return on assets (ROROA) of these hypothetical firms. Finally, a summary table (Table 9) is provided to indicate the costs of the various regulatory options and components in terms of the percent of funds available for such expenditures (these funds are owner remuneration in the case studies and annual profit for the EPA estimates for median open and lessee dealers).

# *Case Study One*

Firm Type: Open Dealer Service Station

Revenues (1986): $850,000

Motor Fuel Sales (1986): 500,000 gallons/yr.

Percentage of Total Revenues From Motor Fuel Sales: 50

Percentage of Total Profits From Motor Fuel Sales: 33

Total Assets: $200,000

Before Tax Profit (1986): Not Available

After Tax Profits (1986): $20,000

Owner Remuneration (1986- estimated): Over $30,000 (assume $35,000)

USTs: four FRP tanks and piping, three years old, bought from Exxon when the station was purchased- manual inventory control

The owner of this station pointed out that, because of personal reasons, he paid significantly less than the approximately $60,000 the tanks and installation were worth. He is also paying for the tanks on a twenty year business loan since they were purchased with the station property (as opposed to paying for the tanks separately, which would probably be financed through a five year amortized bank loan, if available). The price of motor fuel was almost entirely dictated by the competition and could be changed only slightly to pass compliance costs on.

rate of return on assets .10

## Option F (Minimum Federal Requirements)

This firm has new tanks that probably will meet federal minimum requirements without much expenditure for modification (tank testing will have to be conducted in five years at an average cost of $500 a year (4 tanks x $500 per tank).

**Tank Repair**

However, for purposes of illustration, if we assume the tank tests revealed a small leak (which might not have been discovered using manual inventory control) in three of his tanks, a one-time cost of between $19,000 and $27,500 would be incurred, if he chose to repair and reline the tanks. In addition, any situation will involve a yearly cost of $2,500 for insurance. The rate of return on assets, if he could not get a loan or wanted to pay for the tanks to be repaired, would be (includes $2,500 insurance premium):

| | |
|---|---|
| ROROA | -.01 to -.05 |
| Percent of OR | 61 to 86 |

Here, while the costs could be absorbed, the effect on the rate of return on assets is largely influenced by whether or not tank relining and repairing costs are low or high and by the cost of insurance.

**Tank Replacement**

If the tanks failed another tightness test and were found to be leaking they would have to be replaced or closed. Using the figure of $60,000 supplied by the station owner, plus the loss of five days worth of motor fuel sales (approximately $500) and $2,500 for UST insurance, the rate of return on assets would be:

| | |
|---|---|
| ROROA | -.22 |
| Percent of OR | 180 |

While there is no guarantee that this firm would fail, the owner of the firm analyzed in the case study indicated that it probably would (or at least stop selling motor fuel). This is because the rate of return on assets figures for firms failing and not failing is a generalization that assumes the availability of savings or other liquid assets. But in an extremely competitive business environment (such as a service station), profits may be directed back into the business (Flint, 1987).

Two kinds of loans **might** be available for use. These are: a standard five year amortized bank loan with interest set at the utility rate of 12.2 percent (approximately) ; and a Small Business Administration loan set at approximately 2.5 percent above the New York Prime lending rate (7.75 percent). Assuming these loans (for $60,000) could be obtained, and assuming $2,500 per year for insurance payments, the yearly payments and associated financial payments would be as follows:

**Standard Bank Loan** (years 1 through 5)

| | |
|---|---|
| Annual Payment (includes insurance) | $18,892 |
| ROROA | .00 |
| Percent of OR | 54 |

**SBA Five Year Loan** (years 1 through 5)

| | |
|---|---|
| Annual Payment (includes insurance) | $18,190 |
| ROROA | .01 |
| Percent of OR | 52 |

The small difference in the total payments associated with these two loans would probably make little difference to the owner of the station in this case study, who indicated that such payments would be very difficult to make and might persuade him to stop selling gasoline.

In addition, after ten years, this system will have to meet new tank standards for release detection (cathodic protection will not have to be installed since FRP tanks are, by nature, protected from corrosion). This cost is less significant than the ones described above, depending on whether the release detection is installed on the existing facility (assuming it does not have to be replaced or repaired in ten years) or on a new facility, and on the actual cost of installing the protection at that particular facility (see Tables One and Two). If cathodic protection had to be installed at this facility within ten years (that is, if the station was currently equipped with bare steel tanks), the costs would represent between 15 and 30 percent of the yearly owner remuneration. Release detection could represent only a small fraction of yearly OR if groundwater monitoring were chosen. Other methods of release detection could represent a significantly larger percentage (e.g., bi-annual tank testing would represent a yearly expenditure of over 10 percent of the station's yearly owner remuneration and automatic tank gauging could represent a one-time cost of over 40 percent of the station's owner remuneration).

Tank closure could absorb anywhere from 14 to 52 percent of yearly OR.

## Option A (Most Stringent)

### Tank Replacement

Under this option, if tanks need to be replaced, the installation will face the additional costs of an impermeable plastic barrier and a more expensive release detection device (this total cost is approximately equivalent to $10,000). Yearly costs include the permit fee and insurance premiums. If this were paid for directly by the owner/operator in one payment, the effect on ROROA and annual OR would be:

| | |
|---|---|
| ROROA | -.26 |
| Percent of OR | 205 |

Using the bank loans described above (for a $70,000 loan):

**Standard Bank Loan** (years 1 through 5)

| | |
|---|---|
| Annual Payment | $21,624 |
| (includes insurance) | |
| ROROA | -.01 |
| Percent of OR | 62 |

As indicated above, reducing the interest rate to 10.25 percent (for an SBA loan) will not substantially reduce the payments associated with this option.

**Tank Upgrading**

If tank upgrading were necessary for the USTs in this case study, this option would require that cathodic protection and moderately sophisticated release detection be installed within three years. Also, tanks would have to be tested annually (or until tanks are upgraded, whichever comes first), as well as insurance premiums and tank permit fees paid. At this point (beginning year four), all tanks will have to be upgraded.

Assuming that the costs of upgrading the tanks are spread evenly over the three years and in the most efficient fashion, the following costs occur during years one through three.

| **Year One** | **Costs** |
|---|---|
| Insurance, Permit Fee, Tank | $9,600-$13,600 |
| Testing and Cathodic Protection | |
| ROROA | .03 to .05 |
| Percent of OR | 27 to 39 |

| **Year Two** | **Costs** |
|---|---|
| Insurance, Permit Fee, Tank | $10,600 |
| Testing and Release Detection | |

| | |
|---|---|
| ROROA | .05 |
| Percent of OR | 30 |

| **Year Three** | **Costs** |
|---|---|
| Insurance, Permit Fee | $2,600 |
| ROROA | .09 |
| Percent of OR | 7 |

Closure costs (for all four tanks) represent anywhere from 36 to 52 percent of annual OR.

## Option B (Moderately Stringent)

Relevant aspects of this option include allowing an UST owner or operator ten years to install cathodic protection while requiring federal new tank release detection requirements (at an initial cost, for this tank owner, of at least $2,000 or an annual cost of $2,000) to be installed in three years. This primarily changes time frames and not actual costs (see Case Study One, Option F, Upgrading).

## Option C (Least Stringent)

In addition to minimum federal technical requirements, removing the need for the owner/operator to purchase insurance and making available low interest loans would have no substantial effect if the owner/operator chose to cover costs directly. However, if the loan program were utilized to obtain a $60,000 loan, costs would be as follows:

**Ten Year Loan at 7 3/4 Interest** (years 1 through 10)

| | |
|---|---|
| Annual Costs | $8558 |
| ROROA | .06 |
| Percent of OR | 24 |

If the UST Fund were eliminated:

| | |
|---|---|
| Annual Costs | $11,058 |
| ROROA | .04 |
| Percent of OR | 31 |

## *Case Study Two*

Firm Type: Open Dealer Service Station

Revenues (1986): $260,000

Motor Fuel Sales: 225,000 gallons/yr.

Percent of Total Revenue from Motor Fuel Sales: 90

Percent of Net Profit from Motor Fuel Sales: 85

Total Assets: $100,000

After Tax Profit (1987- estimated): $6,000

Owner Remuneration (1987- estimated): $21,000

USTs: Six Coated Steel Tanks not Cathodically Protected- oldest tank ten years- manual inventory control

This case study also indicated very little ability, if any, to pass on UST regulatory costs through raising the price of his product.

rate of return on assets .06

## Option F (Federal Minimum Requirements)

This case study will focus on the tank upgrading requirements of the regulatory options since the tanks are not protected and release detection has not been installed. However, this option will be used to indicate the costs of replacing and repairing tanks since it is possible that the tank tests or inventory control reporting requirements will cause the need for repair or replacement. Within three years the firm will incur a one-time costs of $3,000 to test the tanks. In addition, any situation will involve a yearly cost of $2,500 because of financial responsibility requirements.

### Repair and Relining Costs

If three of the six tanks needed to be relined and repaired because of tank testing or release reporting requirements, the firm would have to absorb one-time UST regulatory costs of $2,500 for insurance premiums and between $19,000 and $27,500 for the repair work. The effects on the business would be as follows:

| | |
|---|---|
| ROROA | -.16 to -.24 |
| Percent of OR | 100 to 143 |

If all six tanks needed to be repaired:

| | |
|---|---|
| ROROA | -.34 to -.52 |
| Percent of OR | 188 to 365 |

### Tank Replacement

If another leak was discovered through a tank tightness test, the tanks would need to be replaced or closed. Since so much business is generated through gas sales, it is assumed that tank closure would cause the business to fail.

If three tanks needed to be replaced and the owner/operator could not obtain a loan or otherwise wanted to pay for the replacement directly, a one-time cost of between $34,250 and $83,400 could be expected. In this case, the following economic impact would be experienced by the firm in the year this payment was made:

| | |
|---|---|
| ROROA | -.28 to -.77 |
| Percent of OR | 163 to 397 |

**Standard Bank Loan** (years 1 through 5)[8]

| | |
|---|---|
| Annual Costs | $14,749 |
| (includes insurance) | |
| ROROA | -.09 |
| Percent of OR | 70 |

An SBA loan, with a lower interest rate, would not make a large difference in the annual payments necessary to amortize the loan.

**Tank Upgrading**

Tank upgrading will have to occur within ten years. At this time, all six USTs will have to have cathodic protection and meet new tank standards for release detection. For the six tank facility, cathodic protection can be expected to cost between $8,000 and $16,000 while release detection can be expected to cost approximately $2,000 (based on the cost of installing groundwater monitoring wells at an existing three tank facility) at least. Annual costs of at least $2,500 (insurance) and as much as $5,500 (after the ten year upgrade period, if tank testing is used as a release detection method) are incurred. While the ten year period allows

---

[8] note- assume three tanks financed by a $45,000 loan

for staggering the upgrade requirements, it is probably most economical to install cathodic protection for at least three tanks at one time (at a cost of $4,000 to $8,000) while paying $2,500 for insurance. In this case, two years with the following UST regulatory costs would be experienced:

| | |
|---|---|
| ROROA | .00 to -.04 |
| Percent of OR | 31 to 50 |

**Tank Closure**

If tank closure procedures are undertaken on three USTs, the following UST regulatory costs would occur:

| | |
|---|---|
| Insurance | $2,500 |
| Closure | $3,450-$11,400 |
| Total | $5,950-$16,090 |

| | |
|---|---|
| ROROA | .00 to -.10 |
| Percent of OR | 28 to 77 |

## Option A (Most Stringent)

Under this option, replacing three tanks would cost approximately $10,000 more than under minimum federal requirements. Additional, annual costs include the permit fee ($100) and insurance ($2,500). Release detection would logically be installed at the time the USTs were installed, and thus, the additional costs associated with release detection (a minimum of $5,000) would be included in a loan request (as would be the $5,000 for an impermeable plastic barrier). Therefore, a loan of $55,000 would be necessary.

**Standard Bank Loan** (years 1 through 5)

| | |
|---|---|
| Annual Costs | $17,626 |
| (includes insurance) | |
| ROROA | -.12 |
| Percent of OR | 84 |

**Tank Upgrading**

Upgrading six USTs under this option would require that cathodic protection and moderately sophisticated release detection be installed at the end of three years. Additionally, annual costs would occur since tanks would have to be tested (at least until the tanks were upgraded), insurance paid for and tank fees paid during years one through three. At the beginning of the fourth year, tanks would have to be upgraded.

Assuming that the costs of upgrading the tanks are spread evenly over the three year period, the following costs could be expected:

| **Years One and Two** | **Costs** |
|---|---|
| Insurance, Permit Fee, Tank | $9,600-$13,600 |
| Testing and Cathodic Protection | |
| ROROA | -.04 to -.08 |
| Percent of OR | 46 to 65 |

| **Year Three** | **Costs** |
|---|---|
| Insurance, Permit Fee, Tank | $10,600 |
| Testing and Release Detection | |
| ROROA | -.05 |
| Percent of OR | 50 |

**Tank Closure**

Option A requires that tank closure occur only through tank removal. Therefore, if the station owner in this case study decided to close three of his tanks (which follows from the scenario

above in which only three tanks were upgraded), the following costs would be expected (within 24 months of taking them out of operation):

| | |
|---|---|
| Closure Costs | $12,040-$16,090 |
| (includes insurance) | |
| ROROA | -.06 to -.10 |
| Percent of OR | 57 to 77 |

## Option B (Moderately Stringent)

Relevant aspects of this option include allowing an UST owner or operator ten years to install cathodic protection while requiring federal new tank release detection requirements (at an initial cost, for this tank owner, of at least $2,000 or an annual costs of $3,000) to be installed in three years. This primarily changes time frames and not actual costs (see Case Study Two, Option F, Upgrading).

## Option C (Least Stringent)

Using the low interest loan program (assuming $45,000 is needed to replace three USTs) and the UST Fund described earlier would have the following effects:

**Ten Year Loan at 7 3/4 Interest** (years 1 through 10)

| | |
|---|---|
| Annual Costs | $6,419 |
| ROROA | .00 |
| Percent of OR | 30 |

If the UST Fund were eliminated:

| | |
|---|---|
| Annual Costs | $8,919 |
| ROROA | -.03 |
| Percent of OR | 42 |

## *Case Study Three*

Firm Type: Open Dealer Service Station

Revenues (1986): $500,000

Motor Fuel Sales: 200,000 gallons/yr

Percent Total Revenues from Motor Fuel Sales: 75

Percent Net Profit from Motor Fuel Sales: 60

Total Assets: $75,000

Before Tax Profit (1986): $10,000

After Tax Profit (1986): $5,000

Owner Remuneration (1986): $20,000

USTs: Two FPR Tanks and Piping, one month old (cost: $27,500)- manual inventory control

The owner of this station does not depend on its income for her livelihood. The station operator (who pays $250 a month for rent) indicated that the UST system probably could not have been purchased or installed given the profits that the station made.

rate of return on assets .07

Without outside sources of income, the owner of this station would not be able to meet the compliance costs of all of the regulatory options presented above, even though there are only two tanks in the station's UST system. It is not necessary to calculate the ROROA and percentage of owner remuneration associated with these options because it is apparent that the total assets and profit of this case closely approximate the total assets and profit of Case Study Two. Because these case studies are not representative of the entire category of open dealers, once the sensitivity of a certain range of profits and assets (i.e., those represented by the case studies in this study) are analyzed, given a certain range of compliance costs, it is no longer necessary to produce additional examples.

It is more significant, at this point, to examine the effect of these regulatory options, in terms of their costs as a percent of the profits (as opposed to owner remuneration), on EPA's economic estimates for median open and lesee dealers. This is because EPA's profit estimates are similar to the profits estimated for the case studies and because it is useful to examine the economic impacts of situatons where an owner's compensation is not available for use in meeting UST regulatory costs. This analysis is presented in the following section of this chapter.

## *Discussion*

From the preceding analysis, several major regulatory components should be considered as possible sources of financial distress and possible business failure for UST owning firms in the same profit and asset class as the case studies presented above. This is particularly the case when these components are wholly or partially combined into one regulatory option.

- tank replacement

- tank repair/relining
- impermeable pit liners
- relatively short periods for tank upgrading
- moderate to expensive release detection requirements, as well as with annual tank testing
- tank closure through removal

However, because of the lack of economic information for the open dealer segment in Virginia, it is not possible to classify these case studies as typical of open dealers in the State. In addition, the young age of most of the tanks in these case studies is probably not representative of the open dealer segment in Virginia. It is also significant to note that, as mentioned previously, one part of the analysis of the case studies presents the percentage of *owner remuneration* (not profit) represented by the various UST regulatory costs. This part of the analysis is useful, but it is limited in what it reveals since, situations might arise where the compensation paid by an owner to himself (i.e., the part of owner remuneration not counted in the concept of profit) is not available for use in meeting UST regulatory costs. While the above regulatory components have a potential for causing business failure in the case studies examined, the degree to which businesses are susceptible to failure will be greater for firms whose owners *must* meet UST regulatory expenses out of yearly business profits and also for smaller, less profitable firms. Thus, regulatory components that might not significantly affect some firms could cause business failures in other enterprises.

"Mom and pop operations" are an example. While these firms typically have fewer USTs than service stations and do not depend on motor fuel sales to the extent that service stations do, they typically have older tanks, lower assets and lower profits (Catterton, 12 May 1987). Thus, besides businesses failures, a possible significant result of UST regulation could be that many firms discontinue the sale of gasoline.

No owners of "mom and pop operations" contacted for this study were willing to disclose financial information and none knew, with any degree of certainty, the age of their USTs. This

inability to obtain financial information can partially be attributed to the author not having a trusted contact to introduce and explain the study to these owners as was the case for owners of service stations. The "mom and pop operations" visited by the author visually appeared to have fewer assets, be located on less valuable property and generate less business than the service stations analyzed in the case studies.

At any rate, it is useful to compare the costs of the preceding regulatory options to the median profit and asset levels estimated by EPA for open dealers and lessee dealers (which is based on the strict economic definition of profit). Besides the reasons given above, this analysis is useful because these levels represent two different financial conditions that can be assumed to represent another portion of the open dealer segment in Virginia. Option B is not included in this analysis since its effect is mainly that of increasing the cathodic protection upgrading time period (to the minimum federal requirements) and to allow federal minimum requirements for release detection (but only within a shorter time span, three years, than allowed under federal requirements). This has the effect of changing only time frames and not costs. Assume two USTs since this better approximates the number of tanks owned by smaller businesses.

## EPA Median Open Dealer Analysis

As estimated by EPA, the net income (strict economic profit) and asset levels of the median open dealer is as follows (Sobotka and Company, Inc., p.6-11).

| | |
|---|---|
| Net Income | $14,000 |
| Total Assets | $210,000 |
| ROROA | .07 |

**Option F**

| | |
|---|---|
| Tank Testing Within Three Years (plus insurance) | $3,500 |
| RONOA | .05 |
| Costs as Percent Annual Profit | 25 |
| | |
| Tank Repair and Insurance (one-time cost) | $14,832-$20,833 |
| RONOA | .00 to -.03 |
| Costs as Percent Annual Income | 106 to 149 |
| | |
| Tank Closure for Two Tanks (one-time cost) (includes insurance) | $4,800 to $11,560 |
| RONOA | .01 to .04 |
| Costs as Percent Annual Income | 34 to 82 |
| | |
| Tank Replacement w/out loan (one-time cost) | $32,500[9] |
| RONOA | -.09 |
| Costs as Percent Annual Profit | 232 |
| | |
| Tank Replacement with loan (years 1 through 5)[10] | |
| Annual Costs (includes insurance) | $10,696 |
| RONOA | .02 |
| Costs as Percent Annual Profit | 76 |

---

[9] note- assume a cost of $15,000 per tank and $2,500 for insurance

[10] note- assume a $30,000 loan ($15,000 per tank)

| | |
|---|---|
| Tank Upgrading (within 10 years) | $5,200-$7,800[11] |
| (cathodic protection and insurance) | |
| ROROA | .03 to .04 |
| Costs as Percent Annual Profit | 37 to 55 |
| | |
| Release Detection (with insurance) | $3,500[12] |
| ROROA | .05 |
| Costs as Percent Annual Profit | 25 |

**Option A**

| | |
|---|---|
| Tank Testing (every year | see Option F |
| for three years and | |
| insurance) | |
| | |
| Tank Repair and insurance | see Option F |
| | |
| Tank Closure and Insurance (one-time costs) | $8,860 to $11,560 |
| ROROA | .01 to .02 |
| Costs as Percent Annual Profit | 63 to 82 |
| | |
| Tank Replacement w/out loan (one-time costs) | $42,600 |
| (includes insurance) | |
| ROROA | -.14 |
| Costs as Percent Annual Profit | 304 |

---

[11] note- assume $2,700 to $5,300 (2/3 of $4,000 to $8,000) for installing cathodic protection and $2,500 for insurance

[12] note- assume a $1,000 vapor well system and $2,500 for insurance

| | |
|---|---|
| Tank Replacement with loan (years 1 through 5)[13] | |
| Annual Costs | $13,528 |
| (includes insurance) | |
| ROROA | .00 |
| Costs as Percent Annual Profit | 96 |
| | |
| Tank Upgrading (yrs 1-3) | |
| Year One | $6,300 to $8,900[14] |
| ROROA | .02 |
| Costs as Percent Annual Profit | 63 |
| | |
| Year Two | $3,600[15] |
| ROROA | .05 |
| Costs as Percent Annual Profit | 26 |
| | |
| Year Three | $6,900[16] |
| ROROA | .03 |
| Costs as Percent Annual Profit | 49 |

**Option C**

Using the low interest loan program (assuming a $30,000 loan) and the UST Fund described in the previous chapter, the following costs would be incurred:

---

[13] note- assume a $40,000 loan ($15,000 per tank, $5,000 for release detection, and $5,000 for an impermeable pit liner)

[14] note- this includes: insurance ($2,500); permit fee ($100); tank testing ($1,000) and; the installation of cathodic protection ($2,700 to $5,300 or 2/3 of $4,000 to $8,000)

[15] note- this includes: insurance ($2,500); permit fee ($100) and; tank testing ($1,000))

[16] note- this includes: insurance ($2,500); permit fee ($100); tank testing ($1,000) and; the installation of moderately expensive release detection ($3,300 or 2/3 of $5,000)

| | |
|---|---|
| Ten Year Loan at 7 3/4 Interest (years 1 through 10) | |
| Annual Costs | $4,279 |
| ROROA | .05 |
| Costs as Percent Annual Profit | 31 |
| | |
| Same as above except without UST Fund | |
| Annual Costs | $6,778 |
| ROROA | .03 |
| Costs as Percent Annual Profit | 48 |

## EPA Median Lessee Dealer

EPA estimates the median lessee dealer to have the following income (strict economic profit) and asset levels (Sobotka and Company, Inc., p.6-11)

| | |
|---|---|
| Net Income | $6,000 |
| Total Assets | $82,000 |
| ROROA | .07 |

**Option F**

| | |
|---|---|
| Tank Testing (within three years and insurance) | $3,500 |
| ROROA | .03 |
| Costs as Percent Annual Profit | 58 |
| | |
| Tank Repair and Insurance (one-time cost) | $14,832 to $20,833 |
| ROROA | -.18 to -.11 |

| | |
|---|---|
| Costs as Percent Annual Profit | 247 to 347 |
| Tank Closure for Two Tanks (one-time cost) | $4,800 to $11,560 |
| (includes insurance) | |
| ROROA | -.07 to -.01 |
| Costs as Percent Annual Profit | 80 to 193 |
| Tank Replacement w/out loan (one time cost) | $32,500 |
| ROROA | -.32 |
| Costs as Percent Annual Profit | 542 |
| Tank Replacement with loan (years 1 through 5) | |
| Annual Cost | $10,696 |
| (includes insurance) | |
| ROROA | -.06 |
| Costs as Percent Annual Profit | 178 |
| Tank Upgrading (within 10 years) | $5,200-$7,800 |
| (cathodic Protection and insurance) | |
| ROROA | -.02 to .01 |
| Costs as Percent Annual Profit | 87 to 130 |
| Release Detection (with insurance) | $3,500 |
| ROROA | .03 |
| Costs as Percent Annual Profit | 58 |

**Option A**

| | |
|---|---|
| Tank Testing | see Option F |

| | |
|---|---|
| Tank Repair | see Option F |
| Tank Closure (one-time cost) | $8,860 to $11,560 |
| ROROA | -.07 to -.03 |
| Costs as Percent Annual Profit | 148 to 193 |
| | |
| Tank Replacement w/out loan (one-time cost) | $42,600 |
| ROROA | -.45 |
| Costs as Percent Annual Profit | 710 |
| | |
| Tank Replacement with loan (one-time cost) | |
| Annual Cost | $13,528 |
| (includes insurance) | |
| ROROA | -.09 |
| Costs as Percent Annual Profit | 225 |
| | |
| Tank Upgrading | |
| Year One | $6,300 to $8,900 |
| ROROA | -.04 to .00 |
| Costs as Percent Annual Profit | 105 to 148 |
| | |
| Year Two | $3,600 |
| ROROA | .03 |
| Costs as Percent Annual Profit | 60 |
| | |
| Year Three | $6,900 |
| ROROA | -.01 |
| Costs as Percent Annual Profit | 115 |

**Option C**

| | |
|---|---|
| Ten Year Loan at 7 3/4 % Interest (years 1 through 10) | |
| Annual Payment | $4,279 |
| ROROA | .02 |
| Costs as Percent Annual Profit | 71 |
| | |
| If the UST Fund were eliminated- | |
| Total Cost | $67,786 |
| Annual Cost | $6,778 |
| ROROA | -.01 |
| Costs as Percent Annual Profit | 113 |

Table 9 summarizes the effects that the regulatory options used in this study have on the various levels of income available for meeting UST regulatory costs that were analyzed. The percentages given under the $35,000 and $21,000 **owner remuneration** levels are based on the UST situations of the two open dealers analyzed in the case studies. Those percentages for the $14,000 and $6,000 **profit** levels are based on a hypothetical situation which postulates the presence of two USTs.

**Table 9. Summary- Costs as Percent Annual Owner Remuneration or Profit**

| Summary of Economic Impacts of three UST Regulatory Options | | | | | |
|---|---|---|---|---|---|
| Profit Level<br>Option | UST Replacement<br>w/out loan | UST Replacement<br>with loan | Upgrade | Closure<br>(one time) | Repair<br>(one time) |
| | Percent Annual Owner Remuneration or Profit | | | | |
| $35,000 (OR) | | | | | |
| Option F | 180 | 54 (yrs. 1-5) | 22-38 (1 year) | 20-58 | 50-63 |
| Option A | 205 | 62 (yrs. 1-5) | 27-40 (year 1)<br>27(year 2)<br>7(year 3) | 43-58 | 50-63 |
| Option C | 174 | 24 (yrs. 1-10) | 14-30 (1 year) | 13-52 | 43-56 |
| $21,000 (OR) | | | | | |
| Option F | 176-228 | 70 (yrs. 1-5) | 31-50 (year 1)<br>31-50 (year 2) | 28-77 | 102-143 |
| Option A | 274 | 84 (years 1-5) | 46-65 (year 1)<br>46-65 (year 2)<br>50 (year 3) | 57-77 | 102-143 |
| Option C | 164-216 | 30 (yrs. 1-10) | 19-38 (1 year) | 16-65 | 90-130 |
| $14,000 | | | | | |
| Option F | 232 | 76 (yrs. 1-5) | 37-55 (1 year) | 34-82 | 109-149 |
| Option A | 304 | 96 (yrs. 1-5) | 63 (year 1)<br>26 (year 2)<br>61 (year 3) | 63-82 | 106-149 |
| Option C | 214 | 31 (yrs. 1-10) | 19-39 (1 year) | 16-65 | 88-131 |
| $6,000 | | | | | |
| Option F | 542 | 178 (yrs. 1-5) | 87-130 (1 year) | 80-193 | 247-347 |
| Option A | 710 | 225 (yrs. 1-5) | 105-148 (year 1)<br>60 (year 2)<br>143 (year 3) | 148-193 | 247-347 |
| Option C | 500 | 71 (yrs. 1-10) | 45-88 (year 1)<br>17 (year 2) | 38-151 | 205-305 |

# Conclusions

The results of this study indicate that the parts of the open dealer segment of the retail motor fuel market represented by the case studies in this report, and those open dealers represented by the EPA estimates of median open and lessee dealer profit levels, are vulnerable to adverse economic impacts caused by various UST regulatory options. According to this study, minimum federal requirements could cause the closure of these open dealers under certain circumstances brought about through regulation (e.g., leaks discovered through tank testing requirements). The effects on lessee dealers are difficult to assess without knowing the ability of and the degree to which lessors pass on costs associated with UST regulations. It is also difficult to determine to what extent the findings of this study concur with other findings relevant to UST regulatory impacts. The findings agree with one major (private) study to the extent that the same regulatory components and combinations of components are used. Since the costs of UST financial responsibility requirements were not included in this other study, and since different ranges of regulatory options and profit margins were not considered, the findings are not fully comparable. The other major studies (the EPA RIAs) differs substantially from this study in using discounting techniques, social costs and benefits, and probabilities, and in estimating impacts on entire sectors of the retail motor fuel market (rather than on individual firms).

By looking at different levels of funds available for meeting UST regulatory costs, one can see that even in situations where an open dealer may have available for UST regulatory costs, funds that include his own compensation (illustrated in the case studies), regulatory costs can still be so high as to cause the failure of the business. As illustrated in the median open and lessee dealer analysis, if only profits are available for meeting UST regulatory costs (i.e., in situations where owners do not use, for UST regulatory expenditures, funds paid by an owner to himself as compensation), these lower levels are far less capable of meeting many UST regulatory costs. From Table 9, it is apparent that all of the regulatory options examined have the potential to cause business closures within the part open dealer segment of the retail motor fuel market represented in this study. The one regulatory component that had a significant positive effect on the ability of the firms examined in this study to stay in business is the governmental loan program included in Option C.

It is difficult to project the economic impact of these regulatory options on the open dealer segment as a whole in Virginia. First, the retail motor fuel market is somewhat unstable (making it hard to predict the economic health of open dealers when regulations are promulgated) (Flint, 1987). Second, the open dealer market is very diverse in terms of profitability, sales, UST conditions and other general management and economic conditions. Basic information regarding the size, UST management and economic conditions of large parts of the open dealer segment is currently not available (particularly "mom and pop operations"), making any attempt to create "representative samples" and even descriptions of the various kinds of open dealers impossible. However, this study is useful in describing the degree of economic impact that can be expected from open dealers in the various profit and asset classes analyzed in this report that attempt to comply with various UST regulatory approaches.

Tank replacement, which (at least in the short term) will be increased due to inventory record keeping and inspection, tank testing and other release detection requirements, is a major cost for all of the profit and asset classes considered in this study. Without at least a standard five

year utility loan, costs would probably cause businesses with up to $35,000 to expend on UST regulatory costs to fail. Even with standard loans, these costs could still represent over half of the owner remuneration for businesses with an owner remuneration of $30,000, and over 70 percent of the owner remuneration of businesses with annual owner remunerations of less than $20,000. A low interest ten year loan could make tank replacement more feasible for many businesses with owner remunerations of $20,000 or more but for businesses with owner remunerations less than this (e.g, $14,000, $6,000), tank replacement could still represent more than half of their yearly owner remuneration for the ten year amortization period. This is especially true when financial responsibility requirement costs are taken into account.

The cost of repairing and relining tanks (the frequency of which will be increased due to inventory, record keeping, tank testing and other release detection requirements) also represents a significant portion of the annual owner remuneration of the profit and asset classes examined in this study. This cost could represent 75 percent of the owner remuneration of a firm with a $35,000 profit and up to three times the profit of a firm in the $6,000 profit class.

While tank upgrading can be spread over a ten year period, it can still represent approximately 30 percent of the yearly owner remuneration of firms with an owner remuneration of $30,000, and over 100 percent of the profit of firms with $6,000 in yearly profit. Tank closure costs can also represent significant portions of the profits for the profit and asset classes considered in this study. For firms with $6,000 in income, even tank testing, combined with insurance requirements, can reduce yearly profits by up to 60 percent.

Finally, changes in regulations beyond federal minimum proposed requirements could significantly alter the ability of some firms to comply with UST regulation while remaining in business. Increasing tank testing frequency, shortening upgrading schedules and more expensive release detection requirements could raise compliance costs to over 60 percent of the profits of firms with $14,000 and less in yearly profits and simultaneously provide less time for profits

and financial stability to be regained. Requiring tank closure by removal could also significantly alter the effect of closure requirements on firms with less than $14,000 in profit.

It is clear that if open dealerships cannot obtain long-term, low interest loans for certain UST regulatory costs, many will be forced out of business. Although it is not the central purpose of this study to examine the public policy question of whether or not firms with profit levels insufficient to absorb UST regulatory costs should remain in business, some basic points are apparent. On the one hand, firms that engage in an economic enterprise with public health and property hazards associated with it should be responsible for the damage to the public's health and property. On the other hand, it may be considered unfair for a businessman to invest much time and money engaging in an economic activity with one set of "rules" only to have them changed to such a degree as to force him out of the activity. There may also be public needs served by these firms such as the actual service and convenience of the open dealer, the employment provided, as well as other social and economic benefits. In determining future UST regulatory public policy directions, Virginia UST regulatory officials should keep in mind the potential, described in this report, for adverse economic impact from UST regulations within the open dealer segment of the retail motor fuel market.

***Weaknesses of Study and Recommendations for Future Research***

The case studies examined in this report appear to be similar to the average open dealer, as defined by EPA, in terms of strict economic profit. However, this is difficult to verify since assumptions had to be made concerning the level of returns made to themselves by the outlet owners examined in the case studies, as compensation for their input into the business. Also, information concerning the level of savings, and the level of returns paid to the owner, that might be available for use in meeting UST regulatory costs, were unknown at the time of the analysis. It is obvious that that there is a significant financial difference between profit and owner remuneration, and that the degree to which a retail motor fuel outlet owner uses his own return for meeting UST regulatory costs, can be a determining factor as to whether or not he can comply with a given set of regulations.

Future studies in this area should focus on determining the economic and management characteristics of the various open dealers in Virginia (in particular, the "mom and pop operations"). These characteristics should include (among other things), typical levels and patterns of savings, typical profit fluctuations, and the ability of open dealers to maintain low profit levels over long time periods. Such a study would be complementary to this one, since this study only provides basic parameters in these areas while focusing on UST regulatory costs and associated impacts on particular cases and on hypothetical profit and asset classes.

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