MEETING THE RESOURCE CONSERVATION AND RECOVERY ACT'S LIABILITY REQUIREMENTS

by

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The Resource Conservation and Recovery Act mandates that all hazardous waste treatment, storage and disposal facilities maintain insurance and/or meet financial tests. The commercial firms providing disposal services are unable to obtain environmental impairment liability insurance. Municipalities face the same risk exposures from old landfills and underground storage tanks. Newly formed Risk Retention Groups are being capitalized to provide insurance to firms with similar environmental liabilities. The commercial hazardous waste firms are examined for compliance with the requirements. Insurance will ultimately play an important role in the disposal of hazardous wastes. Recommendations are made for a tiered national insurance pool for all entities

needing coverage for gradual and accidental occurrences. Further consideration is given to reviving the post-closure liability trust fund.

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CHAPTER I

INTRODUCTION

Commercial hazardous waste management is a unique industry. Its growth and emerging character are largely a product of growing public concern and environmental regulation. Both commercial disposal firms and businesses with permitted waste facilities for the treatment and disposal of hazardous wastes must maintain liability insurance against sudden and accidental occurrences. Firms must also maintain insurance for gradual pollution liabilities or demonstrate financial responsibility or both, against the possibility of catastrophic losses resulting from environmental liability exposures. Each firm is required to provide for the future monitoring, maintenance and post-closure care of waste disposal sites.

The motivation for this thesis is found in the Superfund Amendments Reauthorization Act Part II, subsection 201, 6(A) "The Comptroller General shall conduct a study for a program for the management of the liabilities associated with hazardous waste treatment, storage, and disposal facilities after their closure. . . ." (see Appendix F).

This thesis focuses on the commercial hazardous waste industry's compliance with the insurance requirements and the industry's ability to pass financial tests as mandated by the Resource Conservation and Recovery Act. Three conclusions are drawn from this study: (1) The most important is that while many firms are technically in compliance with the insurance requirements, they use dubious contractual mechanisms to demonstrate compliance. Thus they fail to comply with the intent of the regulations, albeit in most cases involuntarily. (2) The Environmental Protection Agency shifted the responsibility to the States for the monitoring and compliance with the regulations. This shift has created problematic administrative goals within the ten EPA regions and an inadequate data base for tracking compliance. (3) Newly formed Risk Retention Groups can be viewed as a last ditch effort to privatize the Environmental Impairment Liability insurance market. Depending on the success or failure of this effort, government intervention appears likely. The intervention will be in the form of a national insurance pool for the management of victims' claims and environmental liability exposures.

The importance of insurance in the management of hazardous wastes is conveyed in the remarks of Robert Faron, an expert in environmental, insurance, and administrative law. He writes:

> Insurance is not just a necessary device for effectively managing or transferring the uncertainty of risk in exchange for the certainty of a fixed premium dollar cost. It is also an essential means of protecting officers, corporate capital, and shareholders' profits--not to mention being a way to provide evidence of financial responsibility in order to operate treatment, storage, or disposal facilities. Without this ability to transfer the risk of liability, a company would soon be unable to assure its shareholders, principals, or clients and customers that it could survive losses from pollution liability. This is the motivation for current requirements under RCRA regulations. . . .[1]

Chapter Review

Chapter I provides the regulatory framework for the management of hazardous waste and gives the reader background information about the magnitude of the hazardous waste problem. The Resource Conservation and Recovery Act (RCRA, pronounced rik-ra) is the regulatory framework for the proper management of hazardous and non-hazardous solid waste. Two additional Acts; the Comprehensive Environmental Response and Liability Act (CERCLA) and Superfund Amendment Reauthorization Act (SARA) will be introduced later in the chapter. RCRA is of primary interest. The others provide important regulatory oversights and are relevant for understanding post-closure care, the post-closure liability trust fund, and the relationship between active and abandoned sites.

It is important to know how much waste is generated to estimate how much waste management capacity is needed. Capacity is not merely an academic issue, but is also a management and political issue. Siting new waste management

facilities is one of the most divisive political issues anywhere it is attempted.[2] From a management perspective, the capacity of a technology might mean choosing between landfilling or incinerating wastes, depending on market forces. By examining the needs of our society, the products we use and the generation of wastes in creating those products, we can examine how private enterprise has responded to meet the waste management needs of hazardous waste generators.

In Chapter II, fundamental business ratios are used to analyze the vitality of the hazardous waste industry and individual firms whose primary revenues result from activities related to the management of hazardous waste. Financial requirements were established to assure that funds are available to pay for closing a facility, for rendering post-closure care at disposal facility sites and to compensate third parties for bodily injury and property damage. The financial test ratios are used to demonstrate that the facility's owner/operator (o/o) have the ability to pay estimated costs of providing such care.

Twenty-two commonly used ratios are computed for the major thirty-one commercial firms in the U.S. The ratios are important for investment and for determining compliance with the financial assurance tests as required by RCRA. The ratios also provide a basis for forecasting growth within the

industry. Four distinct industry segments characterize the diversity of firms: consulting, remediation, environmental laboratories and disposal. Average ratios for each segment are provided as a basis for comparison. The spreadsheet is the basis for the financial discussion and evaluation of individual firms. Appendix C details the formulas used in determining the ratios and Appendix D lists the companies analyzed.

Trends in technology and public policy play an important role for the investor and company executive. Public policy is shifting towards "in situ" (or on-site) treatment alternatives such as mobile incineration and bioremediation. The EPA is sponsoring several technologies in an effort to assess their effectiveness in destroying complex toxic compounds. Chapter II concludes with a short discussion of the role small businesses will play in the cleanup of Superfund sites and in the management of active disposal facilities.

Chapter III discusses compliance of existing hazardous waste disposal facilities with insurance and financial test requirements. The analysis was hindered by the sometimes tortured technical prose of hazardous waste regulations, the language of insurance policies, tort liability, and accounting. Combined incestuously, they become an almost incomprehensible blend of sesquipedalian terms and acronyms. This chapter provides condensed versions of many of the

topics but because the emphasis is on clarity,in the grey areas of legal interpretations, regulatory obscurities and fiduciary black holes certain topics are avoided, (e.g., the issue of joint and several liability).

The four goals of the regulatory requirements are: (1) To ensure adequate protection against catastrophic losses (i.e, sudden and accidental and gradual pollution liability exposures), which may force the firms into bankruptcy; (2) To protect the public from unscrupulous business practices associated with making a quick buck and leaving the mess for someone else to clean up; (3) To provide for the long term monitoring and maintenance of the facility after closure; (4) To avoid the mistakes of the past thereby not creating new Superfund sites.

In a separate discussion within Chapter III, the repeal of the Post Closure Liability Trust Fund is reviewed and a new proposal put forth. The fund lost support from the professional community because it was perceived as a subsidy for landfilling operations. This assertion is an oversimplification of the issue, but there is some concern that the fund may impede the development of alternative methods of disposal, presumably more benign, (e.g., incineration technologies). However, the road to hell is paved with good intentions. There is no substitute for the fund, at present. This thesis discusses several ideas about

the future of the post-closure liability trust fund and needed changes in the financial test requirements.

Chapter IV explores financial options available to municipal risk managers facing environmental liability exposures. Whether a municipality should self-insure or purchase insurance, when available, is a decision many communities face. This chapter examines the financial mechanisms used in funding risk management options. The pending rules for underground storage tanks (USTs) present considerable problems for cities with respect to budgeting, site assessments, risk to the public, and compliance with the regulations. Excerpts from the National League of Cities' response to the regulations are included to provide a balanced presentation of the problems municipalities face.

The concluding chapter, Chapter V, examines the private industry's effort to fill the insurance needs of treatment and disposal facilities. The Insurance Industry's response is in the form of Risk Retention Groups (RRGs) and subscribers to these insurance groups share homogeneous liability exposures. These insurance carriers began emerging in 1987 after the passage of the 1986 Risk Retention Amendments. As of December of 1987, none of the RRGs had achieved the initial capitalization level necessary to provide coverage.

In conclusion, this thesis lays the foundation for the formation of a financial information data base. This service

could compute the financial test ratios for compliance requirements of governments and provide actuarial risk/loss data for insurance firms. This new enterprize could provide the financial information described herein, at a profit, to insurance companies, governments, corporations and analysts which require this information.

The appendices play an important part in understanding the chapter material. Appendix A contains a glossary of terms commonly used in the profession for easy reference. The spreadsheet in Appendix B complements the discussion of financial ratios in Chapter II and can be used to examine a specific company. Appendix C lists the formulas used in the spreadsheet in the exact computational order in which they are entered into the computer. Appendix D is a list of the firms analyzed in this thesis. The financial test requirements are included in Appendix E which provides very important information that is relevant to the discussion in all the chapters. Appendix F provides the exact wording of Section 201 of the Superfund Amendments Reauthorization Act (SARA).

Hazardous Waste Disposal

It is important to know which industries are generating toxic wastes and how these firms are disposing of them. The chemical industry is the largest source of hazardous wastes. It generates approximately 218 million wet metric tons

annually from 700 facilities nationwide. Petroleum refineries generate another 20 million tons, and metals industries, both primary and finishing, generate 8 million tons. Altogether, U.S.industries generate approximately 265-280 million metric tons of waste per year.[3] A survey prepared for the Environmental Protection Agency (EPA) found that while most generators (84%) shipped some or all of their hazardous wastes off site for treatment, storage, and disposal during 1981, the overwhelming majority of hazardous waste (96%) was "managed" on site. The report attributes this phenomenon to large generators who tend to manage their hazardous wastes on site, while the more numerous smaller generators, for various reasons, ship their wastes to commercial facilities for treatment, storage, and disposal.[4]

Because the disposal practices of the industries shape the market, i.e, waste to one company is a resource to another, it is important to get a picture of how wastes are being disposed of within the chemical industry. The following list, prepared by the Chemical Manufacturers Association (CMA), shows the various disposal practices. It is compiled from a 1985 survey of 77 CMA listed companies (681 facilities) which responded to the survey. This was approximately 47 percent of the CMA member companies. An estimated 213.2 million tons of hazardous waste were generated by 681 plants.[5]

Of the hazardous wastewater treated and disposed:

- 164.1 million tons (78.1%) were treated in National Pollution Discharge Elimination Systems, permitted treatment facilities.
- 23.7 million tons (1.3%) were pretreated prior to discharge to Publicly Owned Treatment Works.
- 17.5 million tons (8.3%) of wastewater were disposed via underground injection.
- 4.9 million tons (2.3%) were treated and disposed by other methods including physical/chemical, biological, incineration, and zero discharge.[6]

Of the hazardous solid wastes treated and disposed:

- 35.4% were treated by incineration.
- 21.4% were disposed by landfill.
- 14.9% were disposed in surface impoundments.
- 23.9% were treated by other methods including physical, chemical, biological, recovery, and thermal treatment other than incineration.[7]

Based on five years of these surveys, at least three trends can be determined within the chemical industry: (1) There has been a five-year decrease of 50 percent in hazardous solid waste generation. The major decrease occurred between 1981 and 1983. From 1983 to 1985, the generation rate remained essentially constant. (2) Landfilling of hazardous waste has decreased steadily since 1981. The quantity landfilled by the 301 trend plants in 1981 decreased by 58.2 percent in 1985. (3) A clear trend indicates that treatment by incineration is on the increase. In 1981, the relative percentage of total solid waste treated and disposed by incineration was 17.1 percent. In 1985, 32.4 percent of the solid waste treated and disposed was incinerated.[8]

Another survey, done by the EPA, estimates that 326 commercial treatment, storage and disposal (TSD) facilities operated during 1981, accounting for 1.3 billion gallons of hazardous waste. While small in comparison to the total quantity generated, shipments by generators to commercial TSD facilities represented 82 percent of the total quantity of hazardous waste shipped off-site in 1981. This survey's definition of a commercial facility is one that is privately owned and operated, where more than 50 percent of the hazardous waste managed during the year was received from firms under different ownership. If this definition is expanded to include any facility that manages hazardous waste for a fee (the definition of "commercial" employed by the Office of Solid Waste), the survey estimates that 509 such facilities were operational during 1981[9] and, in total, there are approximately 4,800 treatment, storage, or disposal facilities handling hazardous wastes.[10] The total number of treatment, storage and disposal facilities (TDSFs) is diminishing every day. Most of the closures are of private facilities that were improperly sited and are not in compliance with the technical requirement of RCRA and are therefore unable get a final operating permit. Capitalization to build a facility is very high; it takes approximately three years to get a class B permit, which is an interim status

permit. Public opposition is formidable, and the long term liability exposures can be catastrophic.

The EPA estimates there are approximately 650,000 generators of hazardous wastes, 2 percent of which generate 99.6 percent of the waste.[11] More than half of all waste is managed in surface impoundments which are generally unlined pits or lagoons that place no barrier other than soil between the waste and groundwater.[12]

Municipal landfills contain many hidden hazards. In the past, many landfills permitted the disposal of almost everything. Consequently, in addition to the typical household and industrial refuse, these sites have buried within them many unknown substances. Many of these substances are now beginning to leach into the groundwater. The Office of Technology Assessment's (OTA) estimate of waste sites that will find their way onto the National Priorities List for cleanup includes 5,000 sites from the more than 621,000 open and closed solid waste facilities. The two most common problems at solid waste sites are leachate migration, or groundwater pollution (at 89% of the 5,000 sites), and drinking water contamination (at 49% of those sites). OTA's estimate of the total number of sites that might be placed on the NPL is approximately 10,000. This includes Superfund sites, surface impoundments, industrial landfills, and all other waste sites.[13]

The number of leaking underground storage tanks (USTs) further increases the number of problem sites. Petroleum and hazardous substances from leaking underground storage tanks present potentially significant health problems. Many of these tanks are located in urban communities, for example the corner gas station. The leaking tanks, buried out of sight, can expose the surrounding population to risk from ignitable vapors and soil and groundwater contamination. It is currently estimated that there are between 1.5 to 3.5 million underground storage tanks in the nation. Estimates of leaking tanks range from 75,000 to 100,000, and 350,000 may develop leaks over the next 5 years. The EPA estimates that 695,000 USTs are used for storing motor fuel. Of that number 62,000 tanks in 29,000 facilities are operated by local governments.[14]

Regulatory Framework

Three important pieces of legislation provide the regulatory framework for issues discussed in this thesis, including: the Resource Conservation and Recovery Act of 1976 (RCRA) which provides the framework for permitting, maintenance, and compliance with insurance and financial test requirements for TDSFs; the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), often called Superfund; and the more recent, Superfund

Amendments Reauthorization Act, affectionately known as SARA, signed by President Reagan in 1986.

It was clear, in the mid-1970s, to Congress and the nation alike, that action had to be taken to assure that solid wastes are managed properly. This action resulted in the establishment of RCRA. The goals set by RCRA are:

- To protect human health and the environment
- To reduce waste and conserve energy and natural resources
- To reduce or eliminate the generation of hazardous waste as expeditiously as possible.[15]

To achieve these goals, three distinct yet interrelated programs were developed under RCRA. The first program, outlined under Subtitle D of RCRA, encourages States to develop comprehensive plans for the management of solid wastes, primarily non-hazardous, e.g., household waste. The second program, outlined under Subtitle C of the Act, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal, in effect, from "cradle to grave." The objective of the Subtitle C program is to assure that hazardous waste is handled in a manner that protects human health and the environment. To this end, there are regulations regarding the generation, transportation, and treatment, storage, or disposal of hazardous wastes. Subtitle C, subparts G and H, apply to owners and operators of TSDFs. The last program, outlined under Subtitle I of the Act, regulates certain underground

storage tanks. It establishes performance standards for new tanks and requires leak detection, prevention and correction at underground tank sites.[16] For purposes of referencing the regulations it is easier to use the Code of Federal Regulation (CFR) numeric coding, thus subpart G and H are referenced as 40 CFR 264.110 through 264.151.

Financial requirements were established to assure that funds would be available to pay for closing a facility, for rendering post-closure care at disposal facilities, and to compensate third parties for bodily injury and property damage caused by sudden and non-sudden (or gradual pollution) accidents related to the facility's operation (States and the Federal Government are excepted from abiding by these requirements). There are two kinds of financial requirements:

- Financial assurance for closure/post-closure
- Liability coverage for injury and property damage.[17]

Many instances of environmental damage have resulted from abandonment of hazardous waste facilities and other failure or inability of owners and operators to provide adequately for closure and post-closure care. The financial requirements are designed to assure that funds are available for adequate closure and post-closure care just so that businesses cannot continue abandoning these sites. The requirements for liability coverage are intended to assure that funds are available from which people may seek compensation for bodily injury and property damage caused by accidents arising from

operations of hazardous waste facilities. The pollution incidents, fires, explosions, and other accidents that have occurred at hazardous waste facilities and the inherent risks associated with hazardous wastes indicate that such requirements are desirable.[18]

These Federal financial requirements apply only to owners and operators regulated by EPA under RCRA and not to those regulated by State RCRA programs. Over 30 States are now administering at least a portion of the RCRA program in place of EPA. All State RCRA programs will have requirements equivalent to those of the Federal program within the next few years. At present, however, the State RCRA programs vary considerably in their financial requirements, although some States have adopted the Federal regulations with few changes.[19]

Waste sites abound in the United States. One important aspect of abandoned, uncontrolled hazardous waste sites is their dissimilarity; another is their physical and chemical complexity. Plans and procedures for cleanup under CERCLA must be custom tailored to the physical characteristics of each site and the chemicals it contains. Thus, it has proven to be a difficult program to administer.[20]

It is important to note that although RCRA creates a framework for the proper management of hazardous and non-hazardous solid waste, it does not address the problems of

hazardous waste encountered at inactive or abandoned sites. Active hazardous waste facilities are those that are permitted or in the process of seeking a permit to operate. The Resource Conservation and Recovery Act of 1976 regulates future handling of hazardous wastes, whereas inactive or abandoned sites are administered under CERCLA.[21]

CERCLA or Superfund, differs from RCRA (which was amended in 1984) in that it aims at cleaning up existing waste dumps. RCRA's goal is to prevent future dump sites from being created. Superfund was passed in December 1980, after discoveries of such environmental disasters as Love Canal (Niagara Falls, New York) and the so-called Valley of the Drums (Bullitt County, Kentucky) during the late 1970s plus a host of others that are household names (and possibly historic sites).[22]

Superfund and its pertinent regulations contain provisions for short-term emergency cleanups of sites that pose imminent hazards to human health and the environment and for long-term, remedial cleanups for the permanent abatement of health and environmental hazards. To qualify for remedial cleanup, a site must be on the National Priorities List. A site at which an emergency response or cleanup was carried out need not be on the List. On the other hand, a site listed may be subject to both emergency and remedial response.

The amended Superfund, (SARA) was signed into law on October 17, 1986. It is a 5-year extension of the program to clean up hazardous releases at abandoned waste sites. The program currently has $8.5 billion in federal funding, a five-fold increase over the initial CERCLA program. SARA also creates a $500 million fund for the cleanup of leaking underground storage tanks. The funding for SARA will come primarily from four areas:

- $2.75 billion from petroleum companies based on a tax on domestic and imported oil;
- $1.4 billion from a tax on chemical feedstocks;
- $2.5 billion from a new, broad-based tax on corporate income over $2 million; and
- $1.1 billion from a 13-cent-per-gallon federal tax on motor fuels and from interest earned by the fund.

The Office of Technology Assessment (OTA) finds costs to Superfund could easily be $100 billion and it could take 50 years to clean 10,000 sites.[23]

Insurance Availability

Since the mid-1980s, most insurers have generally refrained from offering new insurance policies covering pollution-related damages. Insurers cite several reasons for withdrawing from the pollution market. According to a GAO report:

> Environmental legislation and recent trends in common law and court interpretations of environmental law, have broadened their liability for pollution coverage beyond what was intended under past policies. This has left them exposed to potentially enormous payments for claims presented under these past policies.[24]

Pollution liability insurance continues to be generally unavailable. Few companies that generate, handle, or dispose of hazardous substances have insurance for pollution risks. Companies that do not have such insurance are self-insuring or are attempting to form risk-sharing groups (RRGs).

The Office of Technology Assessment in its examination of the SITE program (discussed in the next chapter) states:

> As technologies evolve and approach commercial application, the need for insurance may become more significant. EPA established the program in 1986 to accelerate the development, demonstration, and use of new or innovative technologies. These technologies are being tested on cleanup activities at Superfund sites, but they may be useful for routine waste reduction as well. In its program plan, EPA states that liability concerns of technology developers and potential commercial users can be an important obstacle to both the development and use of new hazardous substance treatment technologies. The program plan acknowledges that developers of innovative technologies may find that liability insurance to cover their operational risks during development and testing of those technologies is difficult or impossible to obtain.[25]

The OTA concludes that,

> Without clear and well-supported cleanup goals the selection of cleanup technologies and the ultimate evaluation of cleanup performance will remain contentious.[26]

Most transfer, storage, and disposal facilities (TSDFs)claim that they are able to meet RCRA financial responsibility requirements, even with the current general unavailability of pollution insurance.[27] The information obtained from the Hazardous Waste Data Management System, the EPA's initial effort to track financial assurance

requirements, indicates something quite different. Based on the EPA's own information, from a survey requested of the ten regions, compliance with the requirements is between 70-80 percent. However, much of the data used to compile this information are from "data dumps" and are, therefore,of dubious quality. This cumbersome tracking system is supposed to be replaced.in the near future.

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CHAPTER II

THE INDUSTRY OF HAZARDOUS WASTE MANAGEMENT

There is nothing appealing about the business of treating hazardous wastes. It deals with dangerous and repulsive sludges and solutions. It reeks with economic, legal, political, and technological perils. Engineers are finding that decontaminating toxic sites is a lot harder than originally thought. Citizens are screaming and politicians, although trying to be responsive, can't provide the immediate solutions the public demands. Companies must contend with confusing laws and a sluggish bureaucracy at the EPA. They must work virtually without any insurance protection against almost unlimited liability.[1] The goals of the commercial firms are the same as those of any profit seeking firm: to maximize profit--the difference between total revenue and cost. The degree of uncertainty created by the current litigious climate with unlimited environmental liability exposures can spell bankruptcy for these firms. Insurance and financial requirements are intended to prevent today's disposal site from becoming tomorrow's Superfund sites.

This chapter is an examination of the firms that make up the industry of hazardous wastes. Twenty-two important

accounting ratios typically used in investment analysis are calculated. Three of these ratios for determining compliance with RCRA's financial test requirements are used in lieu of insurance. (The spreadsheet, Appendix B, is the first attempt to provide baseline data for this industry and it allows the reader to compare companies relative to the industry average ratios. Most of the information came directly from the 1986 annual reports and 10-K's of the various companies.) The EPA's efforts to develop and support emerging technologies are discussed, and an industry forecast is provided.

This analysis of the hazardous waste industry comprises 30 of the largest publicly traded companies, 26 of which derive their primary source of revenue from activities related to consulting, disposal, remediation, and analysis of hazardous wastes. The remaining four are conglomerates whose activities include the construction of municipal incineration facilities. As with any analysis of companies involved in a specific market, it is often difficult to determine what is included and excluded from the analysis. Not included in the analysis are companies that manufacture pollution control devices e.g., scrubbers for smokestacks, waste water pollution control equipment, etc., and solid waste disposal firms.

The firms are grouped according to related activities: 3 environmental consulting firms, 11 firms engaged in remediation, 8 firms engaged primarily in disposal or thermal

destruction, 4 laboratories, and 4 conglomerates. The treatment, storage and disposal firms are the only segment required to comply with financial test requirements. The remedial contractors have a separate indemnity agreement with the EPA acting as the guarantor, and do not have to meet the financial test for closure and post-closure care. The laboratories and the consultants have different liability exposures. The conglomerates are also of little interest to this study but some characteristics are worth mentioning. One company, Ogden, is primarily engaged in municipal incineration of solid waste/waste-to-energy projects as are divisions of both Blount and Combustion Engineering. Foster Wheeler is involved in waste-to-energy, real estate and city planning ventures. These firms are almost always cited in the literature as part of the hazardous waste industry. The ratios for these firms are calculated in the spreadsheet, but the firms are not part of the analysis.

An investment tool commonly used to determine the finances of a firm is to analyze the firm's financial ratios and compare them with industry averages. Basic accounting ratios however, make certain assumptions. When these assumptions are applied to individual companies they sometimes create misleading results. For those familiar with this sort of blanket analysis, it is understood that you can't change the assumption to fit each individual firm. Where the result of a

calculation is clearly dubious and it is relevant to the general discussion, more background information is included. For example, when computing the Price/Earnings ratio, price is the average value of a share during December of 1986. This value was used so that the computations reflected business ratios for the year when the information was available. The reader is advised not to purchase stock solely on the basis of this analysis; in fact, he or she is discouraged from doing so.

The Industry

Perhaps predictably, the first firms to make the move into managing hazardous waste were already in the waste business. They were the garbage haulers, most notably Waste Management Inc. In 1985, the company created from its various divisions Chemical Waste Management Inc., the largest commercial disposal firm, of which it retains an 80% equity position. The garbage haulers called themselves specialists in the proper transportation, storage, treatment, and disposal of hazardous wastes. But their methods were relatively simple; whether it was deepwell injection, lagoon placement or landfilling, they were basically burying the "stuff." Today, the industry is as diverse and technically complex as the chemical manufacturers. Even the interpretation of the regulations is becoming an industry.

A number of characteristics apply to the field of hazardous waste management:

- The industry is relatively new; many of the public firms weren't around two years ago. However, most participants didn't enter it directly, but were in some related operations and diversified into it.
- Market growth is entirely dependent on government legislation and regulation. Industry is more environmentally sensitive because of public attitudes.
- Participants in the market face high liabilities and risk extensive litigation fees and penalties.
- Entry is difficult, usually requiring large capital investments, special technologies, and legal expertise in complying with governmental regulations and controls. As a result, few new companies are emerging in the disposal of hazardous wastes, but consulting and advanced technology firms are sprouting up everywhere despite a shortage of technically skilled personnel.[2]

Figure 1 illustrates the diversity of industrial and hazardous waste management firms: thermal destruction, soil boring/well drilling, resource recovery services, consulting, treatment storage and disposal, laboratories, PCB cleanup, emergency response and low level nuclear services.[3] The graph was compiled from the companies listed in the appendices of the Industrial and Hazardous Waste Management Firms published by Environmental Information Ltd. Approximately 2600 firms are listed, many in different segments of the industry. The publicly traded firms in this analysis account for less than 1% of the total.

The dollar size of the hazardous waste treatment business

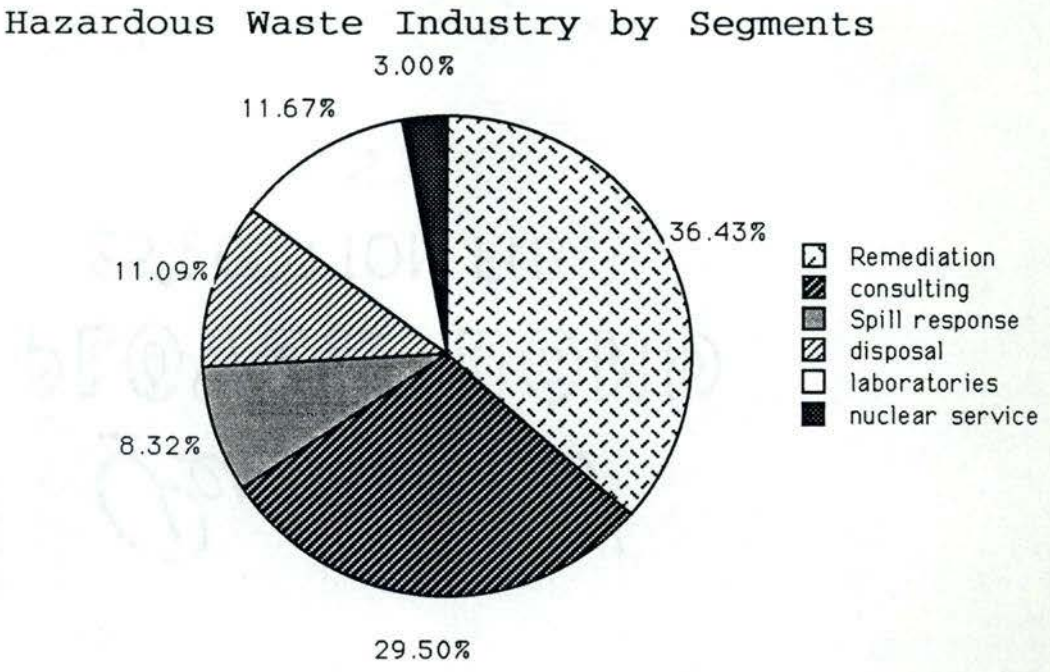

FIGURE 1. Hazardous waste industry by segments.

is difficult to estimate with any degree of certainty. The current market for hazardous waste management and disposal is estimated at $10.9 billion per year, including private and public firms, and forecasts indicate the total market will reach $17.4 billion by the end of 1992.[4] Four major types of hazardous waste are included in this market forecast: liquid, solid and chemical waste; air pollution; wastewater and water pollution; and nuclear wastes. Chemical Week estimates the market at more than $15 billion/year counting off-site and on-

site operations, consulting houses, and sundries, such as instrumentation.[5] Growth rate estimates during the next several years range from 20% to 35%/year for selected firms. The revenues from the publicly traded firms in this analysis, excluding the conglomerates, total $1.7 billion, about 15% of the estimated market. The computations in this study show an average 8.5% sustainable growth throughout the four industry segments with the largest growth in revenues coming from environmental consulting.

Publicly traded environmental consulting firms are the newest entry into the hazardous waste field. These firms conduct site assessments, Remedial Investigation/Feasibility Studies (RI/FS--see Glossary). They are also involved in policy issues and engineering projects. The three listed firms became publicly traded within the last two years. Total revenues were $173 million for 1986 and the average growth rate of 14% makes it the fastest growing segmentof the market. None of these firms has yet paid dividends; therefore, from an investment perspective, appreciation of the stock is the only means of realizing a gain. These stocks took a tumble in October of 1987 and fell below their value at the time of issue. The average debt/equity ratio of 1.34:1 is quite high compared with the rest of the industry; because they are newly capitalized, you would expect to see a large initial debt. Roy Weston Inc., is more diversified than other firms in this

segment and has the largest market share and the lowest Price/Earnings ratio.

Environmental laboratories represent the smallest of the four segments with total revenues of approximately $74 million. These laboratories are also the slowest growing segment. They are very capital intensive and rely on a limited pool of skilled analytical personnel. The Contract Laboratory Program is designed to provide legally defensible analytical results. The EPA had to develop a program with a high level of quality assurance, extensive documentation, maintenance of chain-of-custody information on samples, and a high degree of intra- and interlaboratory consistency. Laboratories must pass proficiency tests before they can bid on contracts.[6] Last year, the market for environmental service laboratories (private and public) in the United States was estimated to be $250 million. It is predicted that environmental service laboratories should be an active market in the next five years. The EPA estimates that 100,000 samples will be analyzed by laboratories in fiscal 1987. In addition, state and local governments accounted for 150,000 to 200,000 environmental samples and private industry for another 250,000 to 300,000 samples.

The growth of this segment is disappointing. This is because the annual reports of 1986 did not reflect the upturn of Superfund activity that was reauthorized in October of

1986. Average annual growth is computed at 3%, the price/earnings ratio is approximately 45:1, and dividends were not paid. These firms have a high asset to sales ratio, 1.5:1, and high liquidity.

Enseco is a good example of environmental service laboratories. The company's business embraces the full range of analytical and consulting services related to hazardous waste disposal. Clients include EPA, state and other federal regulators, engineering companies, and major corporations such as Allied, Du Pont, and General Electric.[7] William Ruckelshaus, former administrator of EPA, is Chairman of Enseco.

Remediation services are also relatively new to the market. Its beginnings can be traced to Love Canal and the first efforts at cleaning up that site. This segment is almost entirely driven by state and federal Superfund cleanup efforts. However, as industry moves to prevent sites from being listed on the National Priorities List, they are motivated to contract for these services.

Remediation Services is the most diverse group of firms. For Example, Calgon Carbon sells activated carbon used in many stripping processes of volatile and semi-volatile organic compounds. In addition the firm performs on-site remediation services. Riedel Environmental located in Portland, Oregon (local interest) has the western states emergency response

contract for the EPA. The firms in this segment have a very high liquidity ratio of 3.5:1 and the second lowest average debt/equity ratio of 0.4:1. Average P/E ratios are the highest of the segments with 55:1. With the exception of Ecology and Environment, Inc., the companies are not paying dividends.

The next segment, commercial hazardous waste disposal firms, is the focus of this analysis. These firms dispose of hazardous waste by chemical treatment, landfilling and incineration. The controversial issues surrounding the availability of Environmental Impairment Liability Insurance (EIL), the financial test requirements-in the absence of insurance, and the repeal of the post-closure liability trust are all focused on this segment of the hazardous waste industry.

Apart from the imposing hurdles of regulatory requirements and public opposition, this segment of the industry is healthy. Average growth is 8%, total revenues exceed $1 billion, and average return on equity is 20%. Three of the 7 firms pay dividends. Chemical Waste Management, Inc., dominates this market with an 18% share. It is 80% owned by Waste Management Inc.and was formed in 1985 as a consolidation of their activities in hazardous waste disposal. Chemical Waste owns several disposal sites across the nation including the famous Emelle, Alabama, site, the largest hazardous waste

operation in the U.S. The firm is the most diverse, offering a full range of services from incineration, laboratory analysis, transportation, and disposal. In contrast, Rollins Environmental specializes in providing only incineration services.

Browning Ferris Industries (BFI), second to Waste Management Inc., in total revenues, mostly from solid waste disposal, has a subdivision, named CECOS, that is engaged in the disposal of hazardous waste. This division is wholly owned by BFI and accounts for approximately 7% of BFI's revenues. The annual report makes it difficult to extract all the information that is used in the computation of the ratios, so in this one instance, the parent firm's figures were used with a note indicating CECOS's revenues.

The Council on Economic Priorities (CEP) has rated the performance of the publicly traded hazardous waste disposal companies. The seven areas of comparison include: corporate financial viability; potential hazardous waste liabilities; corporate and public relations; compliance with government regulations; ground-water monitoring; technology; and CEP facility evaluations.[8] The average of all rankings for each company was placed on a scale of 1 to 8. The scale was divided into 13 grades, F to A+. USPCI, Inc., the company with the highest average rank, achieved a B. It ranked at the top (rank 7 or 8) in 12 of the 21 parameters and lowest (rank

1 or 2) in only two. Low ranks in some parameters kept USPCI's average grade below an A. IU, Inc., the company with the lowest average rank, achieved a D. IU ranked lowest (rank 1 or 2) in 12 of the 21 parameters and highest (rank 7 or 8) in only two. Most of the eight companies ranked near the top of some categories but near the bottom of others; thus, their average rank fell in the C to C+ range.

The Financial Test

The financial requirements of RCRA are designed to assure that funds are available for adequate closure and post-closure care. RCRA requirements apply to both interim status facilities, which are waiting for permits, and to facilities with permits (see Code of Federal Regulation #40, part 265 subpart H). The regulations became effective on July 6, 1982. The requirements are listed in Appendix E as they pertain to closure, post-closure, and the underground storage tanks' financial mechanisms for assurance.

In the first set of criteria outlined, two of the following three ratios must be met: (1) Leverage ratio.-.total liabilities/net worth < than 2; (2) Net income + depreciation, depletion and amortization/total liabilities > than 0.1; and (3) Current assets/current liabilities > than 1.5.

The first ratio, leverage, expresses the relationship between capital contributed by creditors and that contributed by owners. It provides a basis for interpreting the degree of protection provided by the owners for the creditors. The higher the ratio the higher the risk being assumed by the creditors. A lower ratio generally indicates longer term financial safety. However, as a general rule, the ratio shouldn't exceed tangible assets, that is, 100 percent since in such cases the creditors have more at stake than do the owners. All of the firms in the analysis are < 2 for this ratio. It may be that the value set by the EPA is too high and allows for too much margin, the margin being the difference between when a firm is in financial difficulty and when the EPA says that it fails the financial test.

The second ratio is called a coverage ratio and measures a firm's ability to service long term debt. The ratio expresses the coverage of current maturities by cash flow from operations. Since cash flow is the primary source of debt retirement, it serves as an indicator of debt capacity. ChemClear fails this test and International Technologies (IT) approaches the test value > 0.1.

The third ratio is called the current ratio. This ratio reveals the protection afforded short term creditors in cash or near cash assets. Generally the higher the current ratio, the greater the cushion between current obligations and a

firm's ability to pay them. Four firms fail the current ratio test > 1.5. The analysis average is 1.44.

ChemClear fails two of the three financial tests and IT is very close to failing two. The other firms appear to be well within the test requirements. Part B of the financial test requires that the net working capital and tangible net worth each be at least 6 times the sum of closure and post-closure cost estimates. There is no way of evaluating the estimated cost of closure and post-closure care for each firm with any degree of certainty. However, many firms appear unable to meet this requirement and therefore, it should be studied further in another report.[9]

Two subtle but important changes in the ratios will make these ratios more useful in the examination of the firms. The first compares the leverage ratio with the quick ratio. While this comparison doesn't reveal anything dramatic, it points to a possible financial difficulty with Envirosafe which has a 0.3 leverage ratio and 0.74 current ratio. A more stable firm is USPCI with a leverage ratio of 0.3 and a current ratio of 2.74. ChemClear again appears to be a very risky investment using this analysis.

The second change is a refinement of the current ratio and is a more conservative measure of liquidity. The quick ratio is (cash & equivalents + trade receivables)/ total current liabilities. This ratio is also known as the "acid test"

ratio. Generally, any value of less than 1 implies a dependency on inventory or other current assets to liquidate short term debt. Four firms fail to meet the current ratio test; a more conservative measure might mean more failure. One more piece of information is necessary for this computation, trade receivables (revenue owed the firm for services), which are not typically reported.

Trends and Forecasts

The capacity of land disposal facilities (landfill, land treatment, deep-well injection and surface impoundment) seems adequate for a while. On the one hand, land disposal restrictions and waste minimization could extend the life of some operations. On the other hand, stabilization treatment of inorganic wastes prior to disposal (which increases the volume by 20-100%), contaminated earth and waste from Superfund sites, RCRA corrective action, and leaking underground storage tank (UST) cleanups could cause landfill capacity to be used up more rapidly. Moreover, changes in the criteria for determining what is RCRA waste also may erode capacity. The 60 commercial, public and private, land disposal sites that handled 5 million metric tons of waste in 1985 have an estimated 10-15 years of capacity remaining at current fill rates. The available capacity of 375 private

commercial facilities that treated hazardous waste in 1985 is unknown.

In the first quarter of 1987, reasonably established firms showed increased earning growth of 15 to 40 percent. These profits are coming from more waste--especially from small generators--which is going off-site to commercial facilities. Implementation of RCRA will increase the commercial share of hazardous waste disposal from roughly 5 percent to 15-20 percent within the next five years. While commercial volume has grown, there has not been a concomitant expansion in landfill capacity, which has led to a relative scarcity of disposal facilities.[10]

Mobile incinerators continue to attract the most corporate interest. Some companies are concentrating mobile treatment in the area of decontaminating, rebuilding and recycling electrical transformers and storage units that contain polychlorinated biphenyls (PCBs). At least a half dozen different incineration technologies have already been turned to mobile use on a demonstration or commercial basis.

Despite myriad problems in obtaining Part B operating permits under RCRA, the hottest hazardous waste technologies in the coming years are likely to be those on wheels. The appeal of mobile treatment stems from several factors. A major incentive is the 1984 RCRA mandated move away from land disposal. Within four years, as various provisions of the Act

are initiated, many types of hazardous waste will be banned from land disposal altogether. This will force an increase in disposal fees and transportation costs, making mobile treatment an increasingly attractive alternative. Mobile waste treatment units can reduce cost and risks of transporting toxic waste.

SARA mandates that alternative on-site disposal technology be given every consideration before physically removing the contaminated earth to another site for disposal. Indeed, the contamination at a lot of the older facilities--typified by some of the Superfund sites--is so extensive that on-site disposal is the only real option.[11] SARA makes it somewhat easier to get permits for the mobile incineration units, but state regulations and public opposition can remain formidable.

Still another appeal of mobile treatment that is attractive to small companies, producing small volumes of hazardous waste, is because they may not have the capital to invest in their own on-site treatment technology, or cannot afford to ship their waste to distant land treatment or alternative treatment facilities.[12] The group which perhaps havs the most trouble handling disposal costs is the 175,000 small-quantity generators of hazardous waste, who, as of March 31, came under the RCRA umbrella for the first time. EPA defines these generators as any waste generator that produces less than 100 kg/month of hazardous waste. These

small operations can't afford the high disposal costs associated with having their waste taken away every month.[13] In the effort to minimize wastes, companies are disposing of select wastes and fewer mixtures or slurries. These wastes are easier to destroy thermally than sludges and mixtures.

Depending on who is counting, 20-30 incineration projects are in the works. Du Pont, for example, recently upgraded a modern incinerator in Louisiana, and two more are approved or in planning stages. American Cyanamid plans to build a 40,000-tons/year, $50 million incinerator at Bridgewater, N.J. About one-third of the capacity would be used captively. The 35,000-tons/year Du Pont unit at Deepwater also would handle merchant waste. Nearly 1,000 industrial boilers and furnaces burn more than 350 million gal/year of hazardous waste.[14]

Some mobile incineration units rely on fluidized-bed technology. Rather than simply injecting waste into a hot area and tumbling it, as with a conventional rotary kiln, a 'boiling' sandlike medium is used to get good mixing and turbulence. Another mobile incineration technology that is under development comes from Westinghouse Plasma Systems (WPS), a joint venture of Westinghouse Electric and Pyrolysis Systems of Canada. This system imploys a plasma arc torch to destroy liquid organic waste. The torch contains two water-cooled copper electrodes which generate a 36,000° F electric arc. The plasma is generated by pumping outside air through

the electric arc, heating the air to 5,000-10,000° F, ionizing it to form a plasma. The plasma is then exhausted into a cylindrical reaction chamber; liquid waste is sprayed into the hot gas as the gas enters the chamber. The high temperature of the gas breaks apart the liquid waste molecules, and when they cool they recombine into components such as carbon monoxide and nitrogen. Westinghouse is putting together its first commercial plasma torch--a 3-gal/minute unit mounted on a 48-ft trailer.[15]

Another technology of increasing interest is biodecontamination. There are three basic in situ biodecontamination techniques:

- pumping water from the aquifer to form a cone of depression in the water table, from which free, insoluble contaminants can be pumped;
- adding nutrients and oxygen to groundwater and, through infiltration galleries, to the layers of soil that contain contaminants but are not saturated with them--the "unsaturated zone";
- hydraulically moving the water table up or down to wash or biodegrade contaminants from the unsaturated zone.

There is some disagreement on the technology's effectiveness for several reasons. One is the effect of soil hydrology on biodecontamination. Ideal geologic conditions to set up a flow pattern to disperse microorganisms, oxygen and nutrients throughout a hydrogeologic formation are very important. Microbiologists respond that nutrients and oxygen will follow paths taken by contaminants. If a formation is

impermeable to remedial fluids, it is also likely to be impermeable to contaminants.

Another shortcoming of bioreclamation is that only the top couple of feet of soil contain enough bacteria to do any good. However, Biosystems' engineer Raymond states that he hasn't, "found any place in the U.S. or Canada--at depths to 400 ft.--where sufficient organisms are not present to be brought up in 72 hours to a proper population."[16] But if the chemical oxygen demand at the site is more than an order of magnitude above the biological oxygen demand, bioreclamation may not be the most cost-effective answer.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) authorized the technology demonstration program through 1991 at a level of up to $20 million per year. The EPA has established a technology research, demonstration, and evaluation program to promote the development and use of innovative technologies to treat Superfund and hazardous wastes. The program will help provide the treatment technologies necessary to implement new cleanup standards that require on-site, permanent remedies for Superfund sites. Technologies chosen must be at pilot or full scale, be innovative, and offer some advantage over existing technologies. Mobile technologies are of particular interest. At the present time, EPA is working with 12 technologies, and several field demonstrations are planned for this year.[17]

The EPA itself is about to give new impetus to small-business participation in the industry. Until now, the agency has contracted with a single company to do emergency cleanups in each of the EPA's four administrative regions. But to increase competition, the agency is adding 18 more contracts to the program. The EPA also plans to increase the number of engineering companies studying contaminated sites. "What I'm trying to do is create a lot more competition," admitted J. Winston Porter, the EPA's assistant administrator for solid waste and emergency response. "Most of the people working in the program will be small businesses."[18]

Small businesses are especially suited to the industry because they can provide the specialization it requires. Each waste site, pollutant and remedial technology is unique. "There are no cure-alls in this business," according to Richard J. Delieux, a general partner in Princeton/Montrose Partners, a venture-capital concern that backs companies in the industry. "There are a bunch of guys running for niches. And the niches are very big."[19]

The nation's hazardous waste problem is turning out to be a boon to many small businesses. Federally mandated efforts to clean up contaminated sites and reduce pollution are spurring the creation of hundreds of companies that provide such services. The companies being created cover a gamut of services. Many are consulting and engineering firms that

identify problem sites and design solutions. Others perform the actual cleanups, using a variety of methods to solidify, destroy or otherwise make the wastes manageable. Still others offer ancillary services such as laboratory analysis, well-drilling, transportation, and training in toxic-waste management.

There are two schools of thought about which direction the commercial waste industry will take and what areas will, consequently, become hot investment opportunities. The big chemical companies that traditionally have handled their own waste will continue to do so. Off-site opportunities lie with large nonchemical companies and small and middle-size chemical companies that generate wastes. These firms will have to hire commercial firms to handle their wastes. Companies that are well-positioned to pick up that new business will be those with a great deal of land disposal capacity and those firms developing mobile treatment technologies. Given this scenario, if the majority of companies begin to go toward putting technologies on their own sites, the companies that benefit are the ones that provide many different services. The winning company would be one that brings technology to the customer.[20]

Congress appropriated $2.8 billion for fiscal year 1987. However, since much of the 1987 Superfund monies will be carried over, actual operating funds available in 1988 will be

closer to $3.0 billion. About $1.6 billion is earmarked for Superfund cleanups at abandoned hazardous waste sites and for the UST program.

The dedication of 55-70 percent of agency operating funds to hazardous-waste programs is the most significant indicator of the reordering of EPA's priorities that has occurred over the past few years. This realignment is largely in response to congressional mandate. Superfund Research and Development is proposed to increase from $40 million to $60 million. Overall, the R&D program has stabilized during the past few years, and its funding priorities reflect the larger agency redirection of focus on hazardous substances rather than traditional air and water pollution concerns.

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13. Ibid., 39.

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CHAPTER III

MEETING RCRA'S LIABILITY REQUIREMENTS

In 1976, the ever growing problem of solid and hazardous wastes and the environmental hazards that their disposal could create led to the enactment of the Resource Conservation and Recovery Act. Congress mandated that regulations be adopted to prevent future problems and imposed new liability requirements on businesses that generate, store, transport and dispose of hazardous materials.

Two events are uninsurable, however, those which will inevitably occur and those which will never come to pass. An example of the latter is the Milkyway constellation contracting. But, toxic waste disposal sites will, in time, leak. According to Mr. Hughes, Counsel for the Clean Water Action Project at the Environmental Protection Agency:

> After all, sooner or later, everything in nature leaks. If you put the stuff in the ground, sooner or later it is going to get out. So there is that concern, as to whether you really want to induce people to go into the business of taking care of hazardous wastes in the land versus other alternatives, such as reduction of the waste produced in the first place, and other methods of neutralizing and disposing, such as incineration.[1]

Because disposal facilities are almost uninsurable, the companies and regulators have created complex risk management schemes in the absence of Environmental Impairment Liability

(EIL) insurance. This and the following chapter discuss the hazardous waste disposal industry's compliance with the insurance and financial test requirements mandated by RCRA. The chapter is divided into two parts. The first will discuss RCRA and CERCLA liability and contractor exemption under SARA. Included is a summary of property transfer liability. The second part of this chapter is a review of the controversy surrounding the Post-Closure Liability Trust Fund. The trust was created by CERCLA and repealed in Part II section 201 of SARA. The chapter concludes with a description of the seeds of a new agency, similar to the Federal Reserve, with regulatory powers, to act as a mutual insurance organization.

In support of the thesis' argument that firms are complying with the letter of the law but not the intent, excerpts from the annual reports of four commercial hazardous waste firms and one consulting firm are quoted.

An observation that emerges from these murky waters is the lack of any coherent national policy. On the surface, these seemingly comprehensive regulations are designed to protect human health and the environment. In the regulatory framework of liability requirements for permitted facilities, to protect against possible catastrophic loss, only the short term adequacy of these sites is addressed. Benjamin Goldman, a project director at CEP describes the problem:

> Although state and federal governments will, one hopes, improve the quality of their enforcement of hazardous

> waste rules, government regulation simply does not and cannot work unless industry voluntarily complies with the intentions of the law.
>
> The response of companies and investors may ultimately be what improves the standard of hazardous waste management in the United States. If generators begin to select those disposal facilities that they believe pose the least liability, the marketplace itself could force an upgrade in waste management practices. Commercial waste disposers could be forced either into improving their operations or into stagnation or bankruptcy.[2]

The EPA's ad hoc regional monitoring of the compliance with these regulations has obscured the real problem. When the states began to administer programs adopted from the federal regulations, the burden shifted away from the EPA, and therefore,it is even harder today to ascertain the effectiveness of these regulations. Two surveys were conducted of both the EPA's and the states' treatment storage and disposal facilities (TSDF) insurance and financial compliance programs. All of the EPA regions responded. The quality and type of responses were disappointing. In fact, the survey raised questions about the Agency's ability to monitor its program. A spokesperson for Region 2 stated that, "all facilities were in compliance." Region 5 provided the most detailed response with a carefully prepared reply showing compliance was as high as 83% in North Carolina, dropping to 64% in Alabama. One region thought that the information was going to be used in an adverse manner, in spite of my attempts to allay this person's fears (he also consulted the Agency's attorneys). He refused to comply with the Freedom of

Another region charged $44.00 for the information which was free from the other regions.

Part of the confusion within the EPA stems from the ad-hoc regional regulatory manner with which the EPA administers these requirements. Two regions still maintain current information, while several regions have not made any entries into their data bases in two years. This uneven interest in tracking compliance with these requirements is puzzling. Two to three years ago the EPA began shifting the responsibility for monitoring compliance with these regulations to the states. That is, as the states adopted legislation similar to RCRA they became responsible for the administration of their programs. To illustrate the complexity of administering the pending UST program, which will require similar financial requirements, over 100 separate agencies are responsible for the program in California.

The states' responses to the study were no better with only ten respondents to the TSDF survey, and they were equally uneven as to the type and quality of response. In June of 1988, the EPA is expected to promulgate underground storage tank (UST) regulations. In a separate survey, my analysis concludes that many states already have UST programs; however, they lack the regulations for tracking and monitoring the financial requirements. States are not adequately prepared to deal with the enormous volume of information that will be

required for monitoring compliance for similar insurance and financial tests for owners and operators of USTs. In addition, these requirements will place burdens on already tight budgets.

The thesis now shifts in focus to a more technical discussion of the financial requirements. The regulations driving the discussion are found in RCRA, section 265, sub-part H, which stipulates that an owner or operator is financially responsible or liable for bodily injury and property damage to third parties caused by a sudden accidental occurrence or a non-sudden accidental occurrence due to operations of a disposal facility. Financial requirements were also established in sub-part H, to assure that funds are available to pay for closing a facility and for rendering post-closure care at disposal facilities. Separate liability coverage for each of these two types of occurrences must be obtained. The reader is encouraged to review appendix E.

Only owners or operators of surface impoundments, landfills, and land treatment facilities must show coverage for non-sudden, or gradual, accidental occurrences. This coverage amounts to at least $3 million per occurrence and $6 million annual aggregate, exclusive of legal defense costs.[3] Sudden occurrences are usually due to an accident, such as an explosion or fire. Non-sudden occurrences take place over a long period of time and include ground-water and surface-water

contamination. Separate liability coverage for each of these two types of occurrences must be obtained.

These liability coverages may be demonstrated in one of three ways,that is, non-sudden liability may be demonstrated in the same three ways as sudden liability is demonstrated by:[4]

- Obtaining liability insurance
- Passing a financial test
- Using both the financial test and insurance.[5]

For closure and post-closure care there are two kinds of financial requirements:

- Financial assurance for closure/post-closure
- Liability coverage for injury and property damage.

The first step owners and operators must take in meeting the financial assurance requirements is to prepare written cost estimates for closing their facilities. Following the preparation of the cost estimates, the owner or operator must demonstrate to EPA the ability to pay the estimated amounts. This is known as financial assurance. Six mechanisms for guaranteeing financial assurance to EPA that funds are available for closure and post-closure activities are described in appendix E.[6] All six mechanisms are adjusted annually for inflation, or more frequently if cost estimates change. The six mechanisms are:

- Trust Fund
- Surety Bond
- Letter of Credit
- Closure/Post-Closure Insurance
- Corporate Guarantee for Closure

- Financial Test

The first three mechanisms can be used in conjunction with each other to meet the financial assurance requirements. An owner or operator may also use one of the six mechanisms to meet the financial requirements of multiple facilities. If post-closure care is required, a cost estimate for providing this care must also be prepared. These cost estimates must reflect the actual cost of conducting all the activities outlined in the closure and post-closure plans. The cost estimate for closure is based on the point in the facility's operating life when closure would be the most expensive. Cost estimates for post-closure monitoring and maintenance are based on projected costs for the entire post-closure period.[7]

CERCLA Liability

CERCLA created new liabilities. This "Superfund" legislation imposes liability retroactively by holding liable those responsible for the storing transporting and disposing of hazardous waste, even if their actions were in compliance with the law or government requirements at the time they occurred. Some important risk management considerations are:

1) If a firm is responsible for only a small fraction of the waste at a site, the EPA can require it to pay all the costs. This is called joint and several liability.
2) Superfund allows the EPA to hold four categories of persons liable for cleanup:
   a) present owners and operators of a disposal facility

b) persons who owned and operated a facility at any time in the past when hazardous waste was discarded there
c) any person who arranged for the disposal or treatment at the site
d) any person who transported the waste.

3) The act is retroactive without limit.

Under CERCLA and SARA (Remedial Action Contractor (RAC) indemnity), liability for a single incident is limited to $50 million plus all costs of response. However there are no limits to liability when:

- there was willful misconduct or negligence
- the primary cause of the incident was a violation of safety, construction, or operating standards or regulations;
- the responsible party fails to provide assistance requested by a public official under the NCP - National Contingency Plan[8]

CERCLA initially imposed liability for most costs of response incurred by the federal or state governments that were consistent with the National Contingency Plan. These might include, for example, consultants' and attorneys' fees, or damages for injury to natural resources, including the cost of assessing the injury.

SARA adds two other important sources of liability. One is the cost of any health assessment or health effects study done for the Agency for Toxic Substances and Disease Registry (ATSDR). The other added liability is for interest on all recoverable amounts, from the date payment of a specified amount is demanded in writing, or the date of the expenditure, whichever is later.

Under CERCLA and SARA, liability for a single incident is generally limited but if a firm is liable under Superfund, and fails without sufficient cause to provide properly for response action under a formal administrative order, it may be liable for punitive damages up to triple the costs incurred by the fund. Liability for punitive damages is in addition to the liability for actual cleanup costs. Although SARA did not amend CERCLA to impose liability on Principal Responsible Parties (PRPs) for personal injury, it has made it easier for citizens to bring personal injury suits against PRPs for two reasons. First, the information ATSDR will now generate, such as health assessments and health effects studies, may be useful to plaintiffs. Second, SARA has increased the amount of time an individual has to bring an action in state court for personal injury or property damage caused or contributed to by exposure to a hazardous substance. The federally required commencement date is the date the plaintiff knew that the personal injury or property damages were caused or contributed to by the hazardous substance.[9]

Few insurance carriers are currently offering pollution insurance. In the absence of insurance, the requirements ensure that these facilities have at least a minimum level of internal financial resources to cover pollution liabilities, such as those involving third-party bodily injury and property damage. But most owner/operators of treatment, storage or

disposal facilities (TSDFs) claim that they are able to meet RCRA financial responsibility requirements even with the current general unavailability of pollution insurance. Because of these concerns, EPA and industry representatives have been meeting over the last year to discuss the adequacy of financial responsibility tests and to explore other options to ensure financial responsibility under environmental laws.[10]

Case Studies of Five Commercial Firms

The following excerpts, usually found under "contingent liabilities" are culled from the elegantly constructed annual reports of these companies. These statements make clear that though these firms are technically in compliance with the regulations, they are not, however, protected against potentially catastrophic losses. Several companies have agreements to reimburse their carriers in the event of a loss (to the full extent of the loss); another, a consulting firm, has formed an off-shore captive insurance company. In the advent of catastrophic loss of revenue there would remain strong incentives to declare bankruptcy, contracts with insurance carriers notwithstanding.

International Technologies Corporation (IT), Annual Report, 1986:

> Additionally, a portion of the Company's comprehensive general liability and automobile insurance and all of the Company's EIL insurance are provided through

> arrangements which require the Company to indemnify the insurance carriers for all losses and expenses under the policies and to support the indemnity commitments with letters of credit. The Company has a $10,000,000 letter of credit supporting this indemnity agreement. Its current insurance posture increases its contingent financial exposure to the extent that monetary loss may result from formerly insured hazards.
>
> Under the Resource Conservation and Recovery Act (RCRA), the Company is required to develop cost estimates for the closure and post-closure of each of its hazardous waste disposal sites and provide financial assurance by either funding a trust, posting a bond, providing a letter of credit, providing a certificate of insurance or, if the operator meets certain financial tests, giving a corporate guarantee.
>
> The Company has principally satisfied these requirements by making deposits to a trust fund, the balance of which was $2,648,000 and $1,777,000 at March 31, 1987 and 1986. In addition, the Company has accrued $289,000, $452,000 and $182,000 in 1987, 1986 and 1985, respectively, for such closure costs.[11]

IT has entered into an agreement to reimburse the insurance carrier for any losses. Technically, the company is in compliance with the regulations. But the possibility of catastrophic loss to the firm could and probably would cause it to cease operations and file for bankruptcy as protection against creditors. The intent of insurance is to share the risk. The Oxford English Dictionary defines insurance as,

> the act or system of insuring property, life, etc.; a contract by which the one party(usually a company or corporation) undertakes in consideration of a payment(called a premium) proportioned to the nature of the risk contemplated, to secure the other agent against the pecuniary loss, by payment of a sum of money in the event of destruction or damage of property.[12]

Websters-Third International Dictionary adds to the definition:

> The business of insuring person or property; specifically; a device for the elimination or reduction

> of an economic risk common to all members of a lay group and employing a system of equitable contributions out of which losses are paid.[13]

These definition will help the reader to understand the mechanisms that firms can use to demonstrate "insurance." Under IT's arrangement described above, the financial burden appears to remain with the insured.

In the following example it is unclear what type of insurance USPCI has purchased. The excerpt suggests the management is preparing their stockholders for a shock! They might not be able to purchase any insurance, next time.

U.S. Pollution Control Inc. (USPCI), Annual Report, 1986

> The Company currently has insurance in the amounts required by the Federal Resource Conservation and Recovery Act (RCRA) and the United States Department of Transportation (DOT). In addition, PPM has insurance in the amounts required by its permit for PCB destruction issued pursuant to the Federal Toxic Substances Control Act (TSCA). If the Company is unable to maintain the required RCRA insurance or obtain adequate replacement insurance when its current policy expires, the Company's RCRA interim status could be terminated which would force the Company to suspend a significant portion of its operations. Such suspension would have severe adverse consequences on the Company's business, results of operations and financial condition. The availability of adequate insurance is a problem faced by the hazardous waste industry as a whole.[14]

Rollins, Inc., Annual Report, 1986

> Regulatory agencies frequently require that operators with temporary or long-term permits meet certain conditions by specified times, properly operate their facilities, provide insurance protection for other parties in the event of environmental damage and provide for continued maintenance after operations are

> terminated. The Company has posted irrevocable standby letters of credit to regulatory agencies and an insurance company in the aggregate amount of $24,938,000 in this regard.
>
> Because of conditions in the casualty insurance market, the Company, like many of its customers and competitors, has not been able to renew its liability insurance policies at prior coverage limits. Renewal and replacement policies have provided reduced dollar coverage and exclude certain risks previously covered. The reduction in insurance coverage and the increase in insurance costs reflects trends in the liability insurance industry generally and are not unique to the Company.[15]

Rollins has chosen the letter of credit option; however, an "irrevocable letter of credit" means nothing more than that the firms will reimburse a third party for any claims made on that account. It does not indemnify the company against the possibility of loss of revenues to pay claims against the firm. It faces the same problem described in the agreement with the insurance carrier. Further, the report implies that the company is only covered against sudden and accidental losses and is unable to obtain gradual pollution liability.

Browning Ferris Industries (BFI), Annual Report, 1986

> Under this policy, the company must either prefund or reimburse the carrier for losses. Except for this coverage, the Company has not been able to obtain comprehensive EIL insurance coverage on any terms.
>
> The Company's former EIL insurance carrier is seeking declaratory judgment against the Company claiming, among other things, that the company breached certain of its obligations to the carrier and that the carrier has no duty to defend the Company with respect to certain claims asserted under the policy. It also seeks other relief.[16]

BFI is already in trouble with a former carrier. The insurance arrangement with the carrier is the same as IT's, i.e., it will reimburse the carrier for the full extent of the losses incurred.

Harding Associates, Inc., Annual Report, 1986.

> In 1986, the Company experienced significant difficulty in obtaining affordable insurance for its professional liability and environmental impairment needs. The Company therefore decided to place its professional and general liability insurance with a Bermuda insurance company, Redwood Insurance, Ltd. ("Redwood"), a wholly-owned subsidiary of Redwood Holding Company, Inc. ("RHC"), a Bermuda corporation which is owned in turn by certain of the Company's officers, directors and employees. The Company is currently Redwood's only customer. Redwood currently provides the Company with combined general and professional liability and environmental impairment insurance coverage of $1,000,000 per claim and the same amount for all claims in the aggregate, on a claims made basis, with a $75,000 deductible for each claim. The amount payable on any claim is also limited by the available liquid assets of Redwood, which at May 31, 1987, totaled approximately $964,000. While the insurance carried by the Company meets or exceeds that required by its contracts, it is limited and may not be sufficient to cover all claims that may arise, particularly given the nature of the Company's business.[17]

Harding is somewhat more inventive; it formed an off-shore captive insurance company. The capitalization is for approximately the amount required but if claims made against the firm are in excess of this amount, then what?

Waste Management Inc., in their 1988 annual report omits any discussion of contingent liabilities. Presumably the issue is too sensitive for stockholders!

Restating the argument differently, the purpose of insuring is to share the burden of risk among many financially responsible parties. In so doing, each party assumes a smaller proportion of the total risk and this protects against possible catastrophic losses to any single company. That is not the case when a firm agrees to reimburse its carrier for any losses. There is no relief from the possibility of crippling losses. The net effect of an off-shore captive is the same. It is the firm's money and there is no excess capacity above the minimum requirement.

The ability of facility owners to comply with insurance and financial instrument requirements is the key to whether the RCRA facility will become a CERCLA site in the event of a catastrophic loss.

According to a memo from Lee Thomas,[18] administrator for the EPA, the compliance record of major facilities with RCRA's four other financial-instrument requirements is similar to that for non-sudden occurrences coverage. One-third of the evaluated major facilities had inadequate insurance for sudden occurrences. The EPA and the states had evaluated only half of all major facilities' closure plans and found that more than one-third of those were deficient. Forty-four percent of the facilities had made inadequate cost estimates of closure. Twenty-five percent did not even have the proper financial instruments--a trust fund, a bond, a financial test,

insurance, or some other instrument--to pay for closure. Bear in mind that these statistics refer only to the sites that the states identified as "major." Thousands of nonmajor active facilities that are not monitored via the status sheets must also meet the requirements for closure assurance and sudden occurrences insurance.[19]

Liability for Remedial Action Contractors

Congress incorporated into the Superfund legislation (SARA) Section 119, which established a non-preemptive federal negligence liability standard for Superfund response action contractors (RAC's). It also authorized the U.S. EPA and other federal agencies to indemnify RACs subject to certain requirements and restrictions.

Before the enactment of SARA, it was uncertain whether CERCLA's strict, joint and several liability standard for owners, generators or transporters could be applied to RACs in the event of a release occurring during or following a response action. Under CERCLA's strict, joint and several liability standard, any RAC working at a Superfund site was potentially liable for all removal and remedial costs associated with the release or threatened release of a hazardous substance from that site.

Congress explicitly removed any doubt that a strict liability standard could be applied to RACs under federal law in Section 119(a):

1) A person who is a response action contractor with respect to any release or threatened release of a hazardous substance or pollutant or contaminant from a vessel or facility shall not be liable under this title or under any other Federal law to any person for injuries, costs, damages, expenses, or other liability (including but not limited to claims for indemnification or contribution and claims by third parties for death, personal injury, illness or loss of or damage to property or economic loss) which results from such release or threatened release.

2) Paragraph (1) shall not apply in the case of a release that is caused by conduct of the response action contractor which is negligent, grossly negligent, or which constitutes intentional misconduct.

3) Provides the U.S. EPA and other federal agencies with discretionary authority to indemnify RACs for claims brought for negligent liability. The U.S. EPA and other federal agencies are not authorized to provide indemnification for strict liability where it exists at the state level.

4) Authorizes indemnification of RACs working for the U.S. EPA, other federal agencies, a state under a contract or cooperative agreement, or any principal responsible parties.[20]

Property Transfer Liability

Whenever a corporation is seeking to acquire another corporation, the assumption of unknown or contingent liabilities should factor into the purchasing decision. The following are a few suggestions for potential purchasing corporations (and depending on the acquisition, some suggestions are more practicable than others):

- A buyer should obtain as much available information as possible to make an accurate assessment of the environmental risks. Protections once afforded corporations purchasing assets are minimal. It is

advisable that the purchaser become "an informed buyer." With the cost of cleanup and removal at astronomical levels, a buyer should beware of latent environmental hazards.

- An environmental audit of the seller's assets, operations and known liabilities may be conducted. The buyer should investigate past and present land uses and business operations. Whether hazardous waste was generated or stored by the seller should be determined. If the seller's operations entailed use of hazardous materials, the buyer should ascertain the extent of such use. (In this instance, the buyer may request a history of the seller's waste disposal practices, including on-site and off-site facilities.)

- An inspection of corporate and government records to determine regulatory compliance history may alert the buyer to any prior violations or regulatory non-compliance.[21]

After a thorough investigation of the seller's operations, sale negotiations should err on the side of caution. The purchase agreement should be clear and unambiguous as to the assumption or disclaimer of liabilities. The parties may enter an indemnification agreement to indemnify the seller should an action arise from the predecessor's activities. The indemnification should clearly protect a party from strict liability actions such as environmental torts. The buyer may insist the seller obtain liability insurance for discharge or release of hazardous substances. The seller should be aware that the insurance industry is becoming more reserved in writing insurance policies for parties that may have environmental hazard claims.[22]

New Jersey developed an innovative program to clean up hazardous waste called the Environmental Cleanup

Responsibility Act. This Act requires all industrial properties, before there can be a sale or shutdown of a business, to clean up their hazardous waste sites. In one and a half years under this Act, 255 sites have been cleaned up at a cost of $70 million. This compares to $88 million spent on site cleanups under 10 years of the state Superfund.[23]

Superfund Post-Closure Liability Trust Fund

Six years after CERCLA, section 232, enacted the Post-Closure Liability Trust Fund (PCLTF) and after only three years of contributions into the fund, it was repealed by SARA part 11, section 201. The actual wording suspends transfer of liability to the fund prior to completion of a study by the Government Accounting Office. This is widely interpreted as repeal of the fund. The issue remains open, however, because industry, environmentalists, politicians and the public have a strong incentive to provide for the future of today's toxic waste sites. In testimony before the Superfund Implementation Hearings, Congressman James Florio remarked:

> What we have done in the RCRA bill is to put in motion a clear sense of direction that land disposal is the least preferred disposal mechanism, and that in fact it should be discouraged,....but that does not detract from the need to provide people with incentives to go into this business, and you (James J. Kimble Counsel American Insurance Association) point out the desirability of waste reduction,..but I think most people acknowledge the fact that you will never totally eliminate...the hazardous waste creation capability of industry. So therefore we have to have some disposal facilities.

> The rationale for the post-closure fund...is that someone can be an operator of one of these facilities, do everything that is humanly possible to have it operate in a safe way, comply with all the regulations, and still the state of the art is not that advanced that you can guarantee that it will not have some problem at some point in the future.[24]

Closure, defined by RCRA, is the period after which wastes may no longer be accepted by the site. During closure, acts of decontamination, application of caps, disposal of contaminated equipment and landscaping take place. Closure of a hazardous waste facility comes about for one of two reasons: the site is at capacity; or the owner or the operator of the facility is ordered to cease operations.

Post-closure is the prescribed thirty year period of time after closure during which the owner or operator must monitor the closed site for residual or escaping waste.[25] Post-closure consists of the following: ground water monitoring and reporting, maintenance and monitoring of waste containment systems and provisions for the security of the site.[26]

Under the repealed section 232 of CERCLA, the owner/operator was to make a site-specific estimate of both closure and post-closure costs during the interim permitted status,. That money was then to be collected over a period of 20 years or the life of the site, whichever was less. After the site was closed,this money was to be spent for maintenance and monitoring of the site during the 30-year post-closure period. At the conclusion of this period, the post-closure

maintenance and monitoring responsibilities were to be shifted to the CERCLA post-closure liability trust fund.

The hazardous waste industry developed this concept of a post-closure liability fund. The industry felt that an entirely new mechanism was needed based on the idea of an industry-financed fund to be paid by fees on current disposals. The idea was that industry would pre-pay all long-term costs. The fee structure and fund size would be determined on the basis of an actuarial computation based on the anticipated technical performance of the facilities, including the cost for remedial action as well as assessment of the potential for discharges, and the costs associated with any property damages or personal injury which such discharges would cause.

The hazardous waste industry then tried to determine whether private companies could manage their long-term liabilities associated with land disposal facilities and thus ensure that the public would be protected not only by stringent facility standards but also by a perpetual provision of funds to maintain or repair the facility or compensate persons who might suffer property damage or personal injury as a result of an unanticipated discharge from the facility. It was concluded that the federal government should manage the fund because only it could provide the stability necessary to guarantee funds for future claims.[27]

The fund was intended to cover only closed RCRA-permitted sites, not the unregulated sites of the past. As such, claims on the fund would not only have been much smaller because of the higher facility standards exacted under the RCRA program, but also, claims would not have been forthcoming for many years. If someone were to invest millions of dollars in securing a permit for a hazardous waste facility, it would have been unlikely that such a facility would have closed after only a few years, but, rather, would have been more likely to operate for a decade or more. Once closed, the facility would have been inspected to ensure compliance with its permit conditions and then granted eligibility for the fund. An important side benefit would have been that of allaying public concern about the long-term ability of facility operators to respond to any environmental emergency which might occur at a facility, even some time far into the future.

Siting is the biggest challenge for the entire RCRA program. Until modern new facilities exist to replace the facilities that may not meet RCRA standards, there are no alternatives to the often-inadequate disposal practices of the past which prompted the legislation in the first place.[28]

The Fund had been envisioned to last forever. Although the Fund was to be capped at $200 million, at $2.13 per dry weight ton and, using the EPA estimate of 58 million metric

tons disposed per year, waste disposal facility operators would have paid about $240 million dollars into the Fund. This, together with the interest which would have accrued to the Fund while it awaited its first claim, would certainly have accumulated in excess of over a half billion dollars by the time any facility could potentially have claimed benefits from the Fund. Nevertheless, the tax mechanism would have been necessary to replenish the Fund when and if it were ever drawn down as a result of claims being made against it. Therefore, elaborate provisions were made to ensure that the Fund could never go into a negative balance and thereby jeopardize the U.S. Treasury.

The Countervailing Argument

In addition to the direct disincentives to protective land disposal methods that could be created by such a potential subsidy, existence of the Post-Closure Liability Trust Fund (PCLTF) raised several other issues:

- the fund was limited to a maximum of $200 million. In light of the facts that liabilities are potentially unlimited and that the fund could begin to assume liability for closed facilities in less than five years, it was highly questionable whether $200 million would cover the liabilities of such a fund;

- in the event that more claims were made on the fund than it could handle, and given that the facility owner would be shielded from liability, who or what would be available to provide relief to a third party? The Superfund itself is not currently available to cover such a contingency. Under these

circumstances it appeared that due process would be denied to a person seeking remedial relief;[29]

- the collection of fees on the basis of dry weight ton was confusing and was contributing to a likely undercollection of PCLTF fees. Most firms were simply collecting such fees on the basis on net rather than dry weight, which represented a simpler and more reliable method of collecting fees and monitoring payments into the PCLTF.[30]

The law would have created a five-year window between the time the facility closed and the transfer of liability to the post-closure trust fund. It was not a mandatory five-year waiting period. It could have been only months if a regional administrator determined that there was no substantial likelihood of a release. As the mechanism would work under the Act, an operator would complete the closure permit requirements and notify the Agency that the facility had been properly closed. This process was expected to take up to two years following the final receipt of wastes at the facility. Remember that land disposal facilities generally operate for at least a decade. Thus, in the example of a landfill, some portions of the facility could have been closed for at least eight or nine years and some as many as fifteen or twenty years, by the time the entire facility itself was closed. RCRA facilities were to be regularly inspected and virtually all, if not all, would have had monitoring devices to determine if containment was intact. Thus, by the time of complete closure of a facility, the regulatory agency would have had a decade or more of data on the adequacy of the first

cells to close, presumably those built with the least sophisticated technology since this is a developing field.

Arguments Against

The determination of whether the facility was safe is much more complicated. The very existence of the Fund and the refusal of the insurance industry to insure such facilities reminds us that their integrity cannot be guaranteed. Private enterprise is not willing to take the financial risk because the probability of accidents is too high or too poorly known to establish actuarial standards.

Environmentalists are not entirely happy with a post-closure fund either and for the same reasons. The fund is a recognition that accidents will inevitably continue to occur at land disposal sites, and it is only a mechanism to pay for the clean-up costs to ameliorate environmental damage rather than a mechanism to prevent it. They reason that waste reduction is therefore a more worthwhile goal than waste storage. They are not willing to sacrifice these sites just because a quasi-governmental fund is created to attempt a clean-up of the environmental disasters that will, with some certainty, occur.[31] We can assure that these facilities are built with the best technology available and used for wastes which have been pre-treated to render them less hazardous or non-hazardous. But, of necessity, the judgment on facility

safety will be made at some point in time without absolute assurance of what will happen thereafter.[32]

The best mechanism to prevent leakage is through waste minimization to decrease the number of sites needed. The EPA and others consider the incentives for waste minimization to be the result of rising waste management costs and liabilities, difficulties in siting waste management facilities, and regulatory burdens. But none of these conditions was purposefully designed to elicit a waste reduction response nor is there any evidence that they have done so systematically, and it is misleading to call them incentives for waste reduction. Since current regulatory programs are not purposeful incentives, policy-makers should be cautious about their value to increase waste reduction. Increasing regulations and improving their enforcement have their own merits, but they are unlikely to offer as effective and efficient a way to increase waste reduction as do policies designed to promote waste reduction.[33] The Congressional Office of Technical Assessment concludes that:

> Industry is investing in waste management techniques (particularly incineration) which are familiar and which are marketed aggressively by vendors. Treatment equipment often requires large amounts of waste to operate efficiently, and capital investments in treatment facilities can take many years to amortize. Large investments in waste management facilities can preclude, limit, or delay waste reduction.[34]

Countering Arguments in Favor of the PCLTF

Currently many surface impoundments that are being used for storage could be changed to disposal impoundments at closure. A storage impoundment would not have collected post-closure fees because the wastes were not supposed to remain there at closure, but the question is whether it would then be eligible for the PCLTF.

Class I hazardous waste injection wells (deep wells) are not required to carry the third party liability coverage that is a part of interim status for other RCRA facilities. It is unclear at this point whether such facilities are required to pay into the PCLTF, and moreover, whether they could become the responsibility of the PCLTF. In light of the large volumes of wastes that are injected into deep wells each year, one claim by such a facility could dramatically alter the projected composition and operation of the fund. Ninety deep wells in the country inject hazardous waste; this amounts to 57 percent of the total liquid waste and varies from 8.5 to 10 billion gallons per year.

All generators of hazardous waste should be required to pay the total long-term costs associated with managing their wastes. It is fair and equitable. It would also provide the appropriate stimulus to technology for waste reduction and waste treatment. The Post-Closure Liability Trust Fund would prevent any unintended subsidy to land disposal and thus

further the Congressional resolve to use land disposal only as a last resort.[35]

Reviving the Post-Closure Liability Trust Fund

In the absence of an insurance market for these types of liabilities, it seems inevitable that government will be forced into the insurance business. There is a precedent in the Federal Deposit Insurance Corporation (FDIC). Formed in the 1930s to guarantee deposits up to $2500, this insurance provided banks the stability they needed to operate. In effect, it calmed depositors so that they didn't make runs on the bank. The new fund should be constructed along similar lines as both the FDIC and the Federal Reserve. Disposal facilities would have to maintain certain reserve requirements. The reserves would serve initially to capitalize the fund, and later, as an investment fund against future claims.

Any fund will be considered a subsidy for land disposal. But if the fund had compulsory participation from all landfill operators, not just commercial disposal facilities, it would have a much broader base of support. Underground storage tanks should be strongly considered for inclusion in the fund also. Similar to the Federal Reserve, companies would be able to borrow money for expansion (discount window), unexpected expenses, etc. The fund then would serve as a bank for the

industry. Like the Fed, the discount rate would be favorably low, perhaps one-half a point below prime. The board, however, would need to establish very strict loan requirements.

The most important function of the new fund would be to provide Environmental Impairment Liability insurance. Premiums would be paid in addition to the reserve requirements. This quasi-governmental Risk Retention Group would be responsible for issuing policies through the carriers that currently provide coverage. This would create a tiered system, allowing market forces to dictate the premium levels for policies and assuring an adequate coverage. The fund should be expanded to $5 billion with a council composed of industry professionals, public officials, members of environmental protection groups to administer it.[36]

The OTA examined a waste-end tax option because, as it concluded in its 1983 report on hazardous waste, a waste-end tax was an important option to deal with the national hazardous waste problem. Its importance stems from its potential to generate funds while it serves as an economic incentive to reduce waste generation and shift management away from land disposal. However, to use a waste-end tax as an economic incentive, the tax must be structured carefully. This means varying tax rates depending on the nature of the waste, the way it is managed, or both. Moreover, the tax

rates must be sufficiently high to act as an economic incentive. This requires an understanding of current market conditions and management policies.[37]

In summary there would be three methods by which revenues could be accrued to the fund: a waste-end tax on all disposed wastes; a reserve requirement; and a percentage of the policy premium.

The advantages of the system are numerous. It hurdles the problem of initial capitalization by compulsory participation and reserve requirements. The fund would have the ability to set standards that presumably would force the less satisfactory facilities to close. In effect, this agency could relieve the EPA of the watchdog role in the industry. In addressing the issue of the reserve acting as an investment fund, a set percentage of the money could be dedicated towards research and emerging technologies in the field of hazardous wastes. If the discoveries prove profitable, the revenues could be used to lower premium levels or distributions could be made to all members. In effect, the landfill subsidy could be financing new methods of disposal.

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CHAPTER IV

MUNICIPAL ENVIRONMENTAL RISK MANAGEMENT FINANCE

Municipal environmental risk management finance exemplifies the complexities of modern government. The potential liability exposures facing municipalities and Federal and State regulations have driven the insurance industry from the Environmental Impairment Liability market. The need for greater and expanded terms of insurance coverage have forced municipalities to become ever more creative in financing against possible catastrophic losses. A few elements contributing to the complexity of the problem are ambiguities caused by recent court decisions, underground storage tank regulations, and increased public awareness about toxic issues. The problem has landed squarely in the lap of municipalities, and their constituents want action. Actions, translated into remediation of toxic sites and contaminant removal from groundwater are expensive. Exploring financial solutions for environmental liabilities is the topic of this chapter.

This chapter reviews the role of risk managers and then defines the environmental problems posed by landfills and underground storage tanks. The chapter then shifts to a

discussion of comprehensive general liability policies and language and of environmental impairment liability as a subset of property and casualty insurance. The discussion comes back to the municipal risk manager's financial and accounting options when considering self-insurance or purchasing insurance. In April of this year, the EPA promulgated rules providing for the financial responsibility for underground storage tanks (USTs). These financial requirements affect every municipality in the nation and are addressed in detail. USTs touch on every issue regarding municipal environmental risk management finance and, therefore, are important to any discussion of this topic. The chapter concludes with excerpts from the response of the National League of Cities regarding the UST regulations.

Risk Management

The operations of government involve such a wide range of activities that a correspondingly wide range of risks arises. For many years, the typical local government was interested in insurance only for the protection of real property from such hazards as fires and windstorms. Recently two interrelated concepts have been emerging in the public and private sectors: (1) The realization that governments are subject to a host of risks which can be analyzed, evaluated and protected against, so that the entity will not suffer crippling losses, become

front page news, or cause deleterious environmental contamination both to man and resources; and (2) the gradually diminishing role played by the insurance industry in the treatment and ultimate disposition of risks.[1]

Risk management is a planned approach to protecting a local government or corporate entity's assets from accidental loss. Accidental loss or damage can occur to both real and personal property. Real property includes government owned buildings, parks, and boilers; personal property risks include such items as motorized equipment, desks, etc. Other losses include loss of property (e.g., money), loss of income, and the risk of loss through liability exposures. This last risk is the most serious loss exposure municipalities face. The old doctrine of "sovereign immunity" has eroded and most local governments can now be held responsible for their acts.

Risk management encompasses functions of risk identification, evaluation, control, funding, and the administration of risks. Risk identification is a systematic process of identifying all of a municipality's resources that are subject to accidental loss. Risk evaluation involves efforts to measure the loss potential of each identified risk- how frequently the loss might occur and its severity. Risk control involves efforts to avoid or reduce risks. Reducing the risk (sometimes called "loss control measures") focuses on eliminating or preventing losses by reducing incidences of

personal injury, property damage, work interruptions and liability claims. Process modifications may result in a significant reduction in the exposures of people and property to risk, which is called risk avoidance. An example of avoiding risk is when a municipality decides to forego a program or service because the risks involved are too great.

Risk administration focuses on the development of the administrative capacity needed to carry out the risk management function. An integral part of the task is establishing lines of authority for the program and defining a program philosophy and goals. Risk funding involves establishing the capacity to pay for losses. This can be done by either transferring the risk or retaining the risk. One way a risk manager can transfer potential hazardous substance liabilities is through pollution liability insurance, notably Environment Impairment Liability (EIL) insurance. There are other risk retention and risk transfer options, such as municipal or association primary and excess onshore and offshore captives or risk retention groups and self-funded insurance programs.[2]

Municipalities can create or acquire pollution liability problems because of landfills, storage tanks, transformers, pesticide application, power generation, road de-icing, and acquiring properties.[3] Many municipalities provide domestic refuse collection and disposal services. As a part of this

service they will operate a landfill. Many landfills have been in operation for 25 years or longer and a number are sited in flood plains and marshy areas where development seemed unlikely. The environmental problems which can arise from landfill operations include releases of harmful substances into groundwater, surface water and soils, and which may create odors, dust, noise and conflicts over land use priorities.

The most serious problem is, of course, the potential for contamination of ground and surface waters. This can occur where chemicals are dumped into the landfill without the operator's permission or knowledge or from industrial wastes which might have been deposited at the site. Until recently, it was common for such sites to accept commercial and industrial wastes. Determining the risk is compounded by a lack of accurate records for deposits, inadequate security, poor site location, and inconsistent monitoring.[4] These exposures are not new, but many factors are working together to increase public awareness of the dangers of releases of hazardous substances into the environment. As awareness of these problems grows, public entities are facing new challenges in dealing with problems associated with the disposal of solid waste (primary domestic refuse), and supplying drinking water. The potential for truly

catastrophic losses from claims for environmental damage makes it imperative that these exposures not be ignored.

The Office of Technology Assessment's (OTA) estimate of additional waste sites includes: 5,000 sites from the more than 621,000 open and closed solid waste facilities, such as sanitary and municipal landfills, which can release toxic substances into the groundwater. The two most prevalent effects at problem solid waste sites are leachate migration, groundwater pollution (at 89% of the 5,000 sites) and drinking water contamination (at 49% of those sites). The OTA's estimate of the total number of sites that might be placed on the National Priority List (NPL) is approximately 10,000. This includes Superfund sites, surface impoundments, industrial landfills, and all other waste sites.[5]

Subtitle D of RCRA set out minimum technical requirements for environmentally acceptable facilities. These requirements are mandatory for solid waste disposal facilities. Unlike the technical standards, the solid waste management program is voluntary. Those states that develop and implement EPA-approved plans are eligible for Federal technical and financial assistance.[6]

A municipality has two primary concerns when it is named as a potentially responsible party for the release of hazardous substances into the environment that has resulted in the contamination of a domestic water supply. First, the

municipality will be concerned with limiting the total response costs incurred with respect to the site, and second, it will be equally if not more concerned with the nature and extent of the proposed cleanup to ensure that its water supply is restored to acceptable levels to the extent possible. The participation by insurers is often a critical element in the remedial and cost recovery stages.[7]

Insurance

Before 1966, some pollution insurance coverage was provided by the Comprehensive General Liability (CGL) policy on an "accident" basis.[8] Eventually, the CGL policy was changed to an "occurrence" coverage with pollution liability limited to incidents that were "sudden or accidental."[9] It excluded coverage for seepage and other "gradual" pollution.[10] Separate policies, usually known as environmental impairment liability (EIL) insurance, began to be marketed.

In the case of Ayers v. Jackson Municipal Township, charges were leveled against a New Jersey municipality alleging that it had acquired a landfill in 1972 and was both negligent in the selection of the site and in the design and maintenance of the landfill. The poorly located landfill allowed pollutants to seep into an underground aquifer with the result of contamination to 97 privately owned wells. The court held that plaintiffs had a valid claim for injuries from

exposure to toxic wastes from the municipal dump even if they had no identifiable illnesses. The exposure gave rise to compensable emotional distress and a need for medical surveillance. The jury awarded a total of $15 million.[11]

The town of Jackson, unable to recover from its insurer, sued. The case resulted in Jackson Municipal Township Municipal Authority v. Hartford Accident and Indemnity Company. The Hartford insurance policy contained the standard pollution exclusion, but the New Jersey Court, in interpreting the sudden and accidental requirements, stated,

> Although the permeation of pollution into the groundwater may have been gradual rather than sudden, the behavior of the pollutants as they seeped into the aquifer is irrelevant if the permeation was unexpected.

The court felt the exclusion clause could be interpreted not as exclusionary language, but as a restatement of the definition of occurrence:

> That is, the policy will cover claims where the injury was neither expected nor intended. It is a reaffirmation of the principle that coverage will not be provided for the intended results of intentional acts but will be provided for the unintended results of an intentional act.[12]

New coverage provided by Comprehensive General Liability (CGL) policies has been limited in some important ways. The current CGL is designed to cover liability arising from a sudden and accidental release of pollutants, not a gradual release. In response to court interpretations that have broadened the coverage of the current policies beyond the

intended scope of the industry, a blanket exclusion will apply in the new forms. The written exclusion precludes coverage for all liability arising from pollution with an exception only for certain off-premises releases and claims involving products completed operations. Most of the pollution liability exposures of public entities do not come within the purview of the two exceptions to the exclusions. Therefore, the new CGL contains an absolute pollution exclusion from the perspective of most public agencies.[13]

Despite the efforts of insurers to provide some pollution coverages through new and modified policies, many were forced to withdraw from the market because of the creation of vast new uncertainties just as these policies were beginning to be marketed.[14] Some of the insurance industry's strongest concerns about pollution liability exposure involve certain jurisdictions concerning commercial general liability insurance contracts. Courts have imposed enormous retroactive liabilities on insurers for pollution damage and cleanup costs that were never intended to be covered. Therefore, the portion of the CGL policy regarding pollution coverage now excludes gradual pollution damage, such as leaking underground storage tanks or the seepage of toxic substances from a landfill site.[15]

The Insurance Services Offices (ISO)[16] has written a pollution coverage extension endorsement which, when attached

to the policy, provides coverage for bodily injury and property damage arising from pollution, whether the pollution release was gradual or sudden and accidental. This endorsement will not, however, cause the CGL to provide coverage for costs associated with the cleanup of environmental pollutants. ISO and a number of insurance companies have drafted stand-alone EIL insurance policies which are designed to cover pollution liability exposures. Some of these policies will provide coverage for cleanup of off-site pollution. The market for pollution liability insurance has been practically nonexistent in recent years, and it remains to be seen whether or not the CGL endorsement or separate insurance policies will be readily available in the near future.[17]

The inability of cities and towns to obtain EIL insurance will prove especially significant since they may be held liable for cleaning up municipal dumps under federal and state Superfund laws. The specter of "naked" communities trying to deal with contaminated water supplies without adequate funds, because they cannot get insurance or cannot afford the steep premiums, may soon become commonplace.[18]

Many local governments now undertake self-insurance for large portions of the risk involved. This is particularly true of the larger governments which own many facilities widely dispersed over a broad area. A self-insurance policy

may be accompanied by building up reserves for the payment of claims. In other circumstances, the local government merely assumes the liabilities which are paid from current appropriations, except where the loss is very large. In the latter circumstances, the local government relies upon its power to incur debt to meet large claims or rebuild major facilities. Self-insurance has many advantages. Governments may invest money set aside (reserved) for claims not yet settled and thereby gain profit, rather than see those profits go to an insurance company. Service criteria (loss control, claims management, inspection services) can be tailored to the needs of the community and the government can gain greater control over how claims are handled and settled.[19]

The risk manager should consider a combination of various risk control and risk financing techniques. Risk retention (self-insuring) capacity reflects the ability of an organization to absorb retained losses and still meet major financial and operating goals. Risk retention capacity equals the expected losses and expenses plus the cost of adverse experience. There is no standard method for determining an entity's risk retention capacity since each entity has unique characteristics. Following are several guidelines:

- Percentage of annual revenues: an entity can absorb one percent of annual revenues in unexpected losses and expenses;
- Percentage of general reserve for contingencies: municipality can absorb 25-35 percent of the general

reserve for contingencies in unexpected losses and expenses;

- Percentage of ending general fund balance: municipality can absorb 10-20 percent of the ending general fund balance in unexpected losses and expenses.[20]

A common practice is for the municipality to buy liability insurance with a large deductible for each occurrence. All losses under the deductible are assumed by the government and paid out of a special fund or current appropriations. In the event of a catastrophe, the government looks to the insurance company for any judgements in excess of the deductible. Larger governments can generally afford larger deductibles.[21]

There are other factors to consider when determining risk retention capacity. A lower current debt level indicates a greater ability to obtain funds to pay for unexpected losses and expenses by borrowing. A good economic outlook for taxpayers indicates a greater ability to obtain funds for unexpected losses and expenses because tax revenue will generally be higher. The entity's ability to raise temporarily taxes or fees, its ability to obtain reimbursement from other programs (e.g., Federal Disaster Relief funds), and the availability of other risk financing options also have an impact on an entity's risk retention capacity decision. Finally the risk manager must consider the entity's philosophy toward retaining risk. This is sometimes best determined by the "flinch test" in which several scenarios and their financial consequences are presented and the reactions of the

decision-makers are gauged by how much they "flinch" at each scenario.[22]

A cost allocation system will allocate costs to the units that generate them (to motivate cooperation in risk control programs) and to spread the costs over multiple units (to moderate the effect of fortuitous claim experience). These purposes conflict, and each entity must find its appropriate balance between them. A good cost allocation system will serve the entity's needs, balance risk sharing and experience, be simple to administer, motivate cooperation in risk control programs, not be subject to manipulation, and not result in large fluctuations in payments from each unit from one year to the next.

Several of the cost allocations in use are: (1) direct costing, (2) aggregate limit, (3) averaging, and (4) pooling. In the direct costing method, the department would be charged with the total cost of the actual loss. Another approach is to place an aggregate limit on the amount of uninsured losses each cost center would be charged during the fiscal year. To be effective, the aggregate limit needs to be sufficiently high to prevent normal losses from exceeding the limit. The averaging method would base charges on a running average of past incurred losses and other costs. In the pooling method, each department annually budgets for a self-insurance program that includes estimated cost of predictable losses,

administration costs, probate share of administrative costs, and loan repayment to a reserve fund prorated over a fixed number of years.[23]

Money set aside for a risk retention program can be safeguarded in two ways: by the controlling mechanism that sets the money aside, and by requiring an independent actuary to authorize the release of the money so that it can be used for other purposes. Local elected officials have been tempted to raid self-insurance reserve funds. A local government should set a ceiling above which it will not continue to make annual contributions from the general fund. Presumably, the reserve fund will increase through profits on investments. The primary funding mechanisms, from least to most protective, are as follows: (1) Part of the general fund, (2) a segregated part of the general fund, (3) a separate fund, not a trust fund, and (4) a trust fund.[24]

The reserve setting and budgeting for the losses and allocated loss adjustment expenses of a risk retention program are performed as part of annual actuarial studies. The studies may also provide other components of the reserves and budget, indicate an appropriate risk margin, provide recommendations regarding dividends (dividends are monies that are released from the fund for other than what the fund is intended to pay) and changes in retention, and allocation costs to units.

The Financial Accounting Standards Board's #5 and National Council of Government Accounting's #4 directives require an entity to show all incurred and unpaid obligations as a liability on its financial statement. For a risk retention program, an entity must show as liabilities on its financial statement quantities such as: (1) case reserves, (2) case development reserves, (3) reserve for incurred but not reported claims, and (4) reserve for the cost of handling claims which have been incurred but are not settled. The two examples shown if Figure 2 indicate how self-insurance might appear in a financial statement.

An important part of the risk manager's approach to avoiding environmental liabilities is to adopt guidelines for conducting environmental risk assessment procedures for their communities. A risk assessment should include: descriptions of past and present waste disposal practices, past site operations and ownership, inspection reports relating to environmental and engineering practices, site plans and locations maps, environmental permits such as air, sewer and hazardous wastes, information on underground tanks, and an inventory of chemical storage. The Community Right-To-Know provisions (Superfund Amendments Reauthorization Act, October 1986 Title lll, §301-§330, P.L. 99-499, 99th Congress) mandates the collection of this chemical inventory throughout the community, including private businesses.

Example 1

[Santa Barbara, California (June 30, 1983). Notes to the combined financial statement (in part).] Note L. self-insurance. The city is self-insured for workers compensation claims, unemployment claims, medical and dental claims, and general liability. This provided through an internal Service Fund. As of June 30, 1983, the estimated accrued liabilities were as follows:

Worker's compensation	$755,127
Unemployment claims	$124,945
Medical and dental claims	$133,816
General liability claims	$544,240

Example 2

[Norfolk, Virginia (June 30, 1983), Notes to financial statements (in part).] Note #16. Protected self-insurance program. A protected self-insurance program was established pursuant to an ordinance adopted by the City Council on July 11,1978. The concept of the program was that the City would establish an insurance fund consisting of the maximum amount the city could afford to pay during any fiscal year. Excess liability and property damage coverage would then be purchased for protection above the maximum amount. Insurance costs during the year are charged to appropriations of the general fund. The appropriation for fiscal year 1983 was $938,690. Expenditures against that appropriation amounted to $905,565; encumbrances of $33,125 are included in the total encumbrances, shown as a reservation of fund balance.

The program has been based on $250,000 per year maximum City exposure with a further maximum of $25,000 per occurrence. The excess coverage provides protection above the $250,000 maximum exposure per fiscal year to the limits of varying coverages up to $5,000,000.

The fund balance designated for self-insurance includes the balance of unencumbered appropriations for insurance accounts in the General Fund, interest earnings on these funds and refunds of premiums which had been expenditures of prior years. These resources now amount to $2,776,385.[25]

FIGURE 2. Examples of self-insurance in financial statements.

A copy of the final assessment should be provided to the broker and a request made for an E.I.L market survey. In requesting a market survey, the organization should select the appropriate deductible or retention level. Then it should solicit quotes at two or three levels to aid the decision. A spreadsheet should be prepared to compare the quotes, with particular attention paid to coverages definitions, exclusion, etc. The company should ask what additional cost, if any, is involved in eliminating any undesirable exclusions or amending definitions.[26]

Alternatives to self-insurance are as complex and varied as the coverage they attempt to provide. A captive insurance company is a corporation licensed as an insurer and formed to insure the risks of its parent organization or the members of an association. A "pure" captive insurance company is a wholly-owned subsidiary of a parent, created to insure the parent's risks. An "association" or "industry" captive is an insurer owned jointly by a group of entities, which may or may not be related by a formal or established trade organization having the same risk exposure. Captive insurance companies, whether formed offshore or in in a state having specific captive legislation, are usually subject to lower capital and surplus requirements and less governmental regulation than traditional insurers.

The Federal Liability Risk Retention Act of 1986 (LRRA), 15 U.S.C. Section 3901, authorizes the creation of risk retention groups and preempts certain state insurance laws. The major goal of the legislation was to facilitate alternatives to standard liability insurance for small businesses, non-profit organizations, local governments, and professionals whose insurance costs have skyrocketed over the past few years. Many of these entities are too small to self-insure, and state regulations often limit or eliminate other pooling options. Recognizing this problem, Congress acted to make easier the formation of risk retention groups (RRG's). A RRG is any corporation or limited liability association organized for and whose primary activity consists of assuming and spreading the liability exposure of its group members. The members must be engaged in businesses or activities which are similar or related with respect to their liability exposure. In general, the RRG must be chartered, licensed, and authorized to do business as a liability insurance company under the laws of one state. It may then transact liability insurance in any state simply upon notifying that state's insurance commissioner of its intent to do business there and providing a copy of its plan of operation or feasibility study and annual financial statement.

States could create a pollution liability assigned risk plan similar to current State automobile assigned risk plans.

Under such a plan, the state could mandate that all insurers writing liability insurance underwrite pollution liability risks that cannot find insurance coverage in the admitted or nonadmitted market.

The states could establish a reinsurance fund to provide coverage in excess of any primary insurance. Similarly, the state could establish an insurance fund to insure primary risks for which insurance is not available in the admitted or nonadmitted market. It is assumed that the establishment of either fund would require the creation of a state agency.

One form of proposed pooling arrangement would require the state to establish a joint underwriting association for the purpose of providing primary coverage to pools or groups composed of "insureds" in the same or similar industry. Eligibility for the pool would be based upon an inability to obtain pollution liability insurance through the traditional insurance market. All admitted liability insurers, or limited groups of insurers, would be required to join the underwriting associations. The association would issue policies in its own name on a group or individual basis. This is distinguished from RRG's in that such associations cannot cross state boundaries.[27]

In the opinion of Thomas L. Vance, Vice president of the Public Risk and Insurance Management Association (PRIMA), "It is doubtful that groups will be able to form risk-sharing

groups of sufficient size or scope to really meet the needs in this area."[28] His reasoning is outlined as follows: (1) the catastrophic dollar exposures are far beyond the abilities of almost all pools, (2) liberal court interpretations, (3) the reluctance of private insurance competitors to share information, (4) the reluctance of good/safe entities to share risk with bad/unsafe entities, (5) assessment clauses may well scare off potential members, (6) environmental impairment liability does not appear to meet the requirements of insurable risk. On this final point Vance continues,

> The insurance industry cannot properly insure for EIL due to all the unknowns and uncertainty; EIL coverage falls into the area of speculative risk rather than pure or insurable risk.[29]

Furthermore, in a correspondence with David Dybdahl, Vice-president of Carroon and Black (Provider of EIL insurance) Vance states,

> Public entities in general seem to be the least aware group of consumers towards the need for Environmental Impairment Liability coverage. I am not aware of any public entities particularly worried about the pending of regulations for financial responsibility on underground tanks. There are some state pools that are being organized to write this coverage but I don't believe that it is the public entities that are creating the pools. They are usually organized by a broker who stands to profit from their formation.[30]

W. Lee Carter of Alexander & Alexander states,

> We have had some considerable interest from municipalities in EPIC (Environmental Protection Insurance Company), but it relates more to waste disposal sites than it does underground tanks. My guess is, because there is very little insurance available, that many municipalities will be self-insuring their

> underground storage tank exposures. In addition, there is an inherent problem in many states with risk retention groups for municipalities. A large number of states have provisions that would prohibit participation of a municipality in a risk retention group specifically. Others have rules and regulations which prohibit municipalities from owning insurance companies. In Texas this was previously interpreted to prohibit municipalities from doing business with mutual insurance companies because of the ownership factor. The participation of a municipality is, therefore, on a state-by-state basis. My guess is that many of them are self-insured.[31]

At this point the reader might be asking, "why go to such detail in describing the various aspects of self-insurance, other avenues of risk sharing, policy language, accounting principles, and the problem of procuring EIL insurance?" The EPA has brought the problem home to roost. Everything that has been described will be mentioned again in one form or another. The U.S. EPA recently proposed regulations for USTs containing petroleum. These regulations would require all municipalities that own USTs to prove financial responsibility. The EPA provides several alternatives to demonstrate financial responsibility and one is private pollution liability insurance, an option that even EPA admits is both rarely available and extremely expensive. The financial responsibility requirements would require all tank owners or operators to obtain $1 million per occurrence coverage and aggregate coverage between $1 million and $6 million, depending on the number of tanks owned.[32]

Underground Storage Tanks

The total numbers of underground storage tanks combine to point out that the magnitude of the problem is greater than when viewed in the context of each community's exposures. Current estimates are that there are between 1.5 to 3.5 million underground storage tanks in the United States. Estimates of leaking tanks range from 75,000 to 100,000, and 350,000 may develop leaks over the next 5 years. New York State estimates that 19% of its 83,000 active USTs are now leaking. Maine estimates that 25% of its retail gasoline USTs are leaking approximately 11 million gallons annually. In Michigan, 39% of ground water contamination incidents are attributed to storage tanks.[33] EPA estimates that 695,000 USTs are used for storing motor fuel. Of that number, 62,000 tanks in 29,000 facilities are operated by local governments.[34] According to the the Oregon Department of Environmental Quality (DEQ), there are approximately 23,000 USTs throughout the state.[35] The DEQ publishes a newsletter, TankLine for an update on local issues.

On November 8, 1984, President Reagan signed into law the Hazardous and Solid Waste Amendments of 1984 (HSWA), (P.L.98-616). These amendments extended and strengthened the provisions of the Solid Waste Disposal Act of 1970 as amended by the Resource Conservation and Recovery Act of 1976 (RCRA). One portion of this legislation, Subtitle I, provided for the

development and implementation of a regulatory program for underground storage tanks used to maintain regulated substances. Section 9003(d) of subtitle I, provided the EPA Administrator with the discretion to establish a financial responsibility program for the USTs. Under the promulgated rules (see Federal Register, Vol. 52, No. 74, April 17, 1987, beginning page 12786), all operators and owners of USTs must demonstrate a minimum financial responsibility in the amount of $1,000,000 per occurrence and an aggregate amount based on the number of USTs to be covered. By aggregate amount the EPA means the total costs within a given year for all the releases from petroleum-containing USTs covered by a single financial mechanism. There are six proposed aggregate levels of coverage: for the first level with 1-12 tanks, the aggregate amount is $1,000,000; the four intermediate tiers cover the next 341 tanks or more; and then the top tier which requires a financial responsibility of $6,000,000.

As mentioned, there are several alternatives for demonstrating financial responsibility and they are worth investigating because all municipalities are required to comply with the proposed rules. Allowable mechanisms and combinations of mechanisms include: financial test of self-insurance, guarantee, indemnity contract, insurance, risk retention, group coverage, surety bond, letter of credit, state-required mechanism, state fund or other state assurance

including standby trust fund, or substitution of financial assurance mechanism. The EPA has exempted Federal and State government entities because they are permanent and stable institutions. They have the requisite financial strength to cover the cost of taking corrective action and compensating third parties. The regulated community includes firms in almost every four digit SIC code and almost every type of municipal government.

The National League of Cities (NLC) has commented at length on the proposed regulations, inevitably concluding that,

> The EPA should include municipalities...along with the States and the Federal government, in an exemption to their financial responsibility requirements for underground storage tanks.[36]

They make the point that municipal governments are more directly accountable to the public than their Federal and State counterparts and cities are unalterably attached to their particular location and are not likely to "leave town."[37]

The proposed criteria for self-insurance exclude even the most creditworthy cities from qualifying. The self-insurance criteria include such factors as net worth, Dun and Bradstreet ratings, and financial statements filed with the Security and Exchange Commission, none of which is applicable to cities. Two possibilities which EPA has considered in the past are bond ratings and a revenue test for municipalities. A city's

most recent bond rating does not measure the financial soundness of the city as a whole, but merely assesses the value of whatever the city has offered as collateral to secure the individual bond. Cities can rarely obtain pollution liability insurance, and coverage for USTs which have not undergone tank tightness testing is even more unusual.[38]

Joining a risk retention group, a third mechanism provided in the proposed regulations, is another non-option for cities. As the proposal is worded, this category would not include intergovernmental risk pools. These pools serve the same function for local government entities as risk retention groups serve for private business, but their structure is quite different. Whereas risk retention groups are treated in all respects like an insurance company, intergovernmental risk pools are creatures of the state set up by a joint agreement of the member entities. Consequently, risk retention groups can be interstate and are taxed like an insurance company, while intergovernmental risk pools can only be intrastate, and they are tax exempt.[39]

Another proposed mechanism for proving financial responsibility, state funds or state assurances, would also be of questionable utility to cities. Even if states did start implementing such programs, it is far from clear that they would be willing to include cities in their pool of eligible participants. State-city relations are always complicated,

and the allocation of funds and financial responsibility between the two is inevitably a sensitive area. It is unlikely that the EPA would want to involve itself in state-city politics, yet that might very well be the result if the state funds were the only option left open to most cities to prove financial responsibilities for their USTs. Finally, the paperwork burden would involve filing certifications each time a new tank is installed, adding to an already growing mountain of paper.[40]

Like states, cities have the ability to tax, borrow and issue bonds. The most likely source of funds for responding to an average tank leak would be existing revenue. Also, city budgets are designed to allow for emergency expenditures, and city appropriations procedures are structured to permit officials to take funds originally intended for one purpose and divert them to a more pressing need. A leaking petroleum tank which threatened the local drinking water supply would no doubt create enough political incentive to use any excess taxing authority.[41]

One of the more burdensome mandates of CERCLA was that it prohibited state cleanup programs from imposing fees or taxes for the same purposes as the federal program. SARA deletes this provision, but mandates expanded state involvement in the federal cleanup process. For instance, states have specific cost-sharing responsibilities in the new program. Before any

long-term cleanup action can start at a privately owned waste site, the state must come up with at least 10 percent of the cleanup costs. For public waste sites, the state's share goes up to at least 50 percent. In addition, states eventually will be required to assume 100 percent of the longterm maintenance costs once the cleanup is completed. This provision is seen as a test for the states to gauge their commitment and interest in cleaning up the major hazardous waste sites in their state.

The dilemma is that in this age of tight budgets, most states are hard-pressed to adopt expensive environmental programs, but they also are wary of replaying the horrors of Love Canal. General revenues and "waste-end" taxes provide the dollars for the majority of state cleanup programs. Waste-end taxes are levied on companies producing or disposing of hazardous waste, either at the point of waste generation or disposal, while state general fund money is directed toward cleanup through state appropriations. At least 24 states used waste-end taxes last year. This method is beneficial not only in raising money, but also in encouraging certain hazardous waste management practices. Many of the larger programs are starting to move toward bond measures to fund their cleanup efforts. A bond measure passed by New York voters last November 4 will launch one of the country's largest state hazardous waste cleanup programs.[42]

Conclusion

The absence of adequate environmental pollution liability insurance might, but not in the foreseeable future, require that Congress pass additional legislation with respect to victims' compensation. Whether persons harmed by hazardous substances will find it more or less difficult to obtain recovery in the future will depend largely on courts' decisions and whether other state legislatures follow suit by enacting legislation to limit liability.

Insurers believe that these broad interpretations expressly ignore the plain meaning of insurance policies for perceived public policy reasons. Insurers cite this situation as being the major cause for their withdrawal from the pollution insurance market.[43] The increased propensity of the public to sue, emerging theories of civil and tort liability introduced by recent court decisions and the erosion of governmental immunity have left the municipalities exposed to victims' compensation claims from environmental liabilities.[44]

Underground storage tanks will retrospectively afford us an expensive lesson. It was, after all, compliance with fire codes and insurance requirements that drove operators and owners to bury the tanks. Now it is the absence of insurance that will require them to dig them up. Creative risk management finance practices are not new to municipalities. UST regulations will force municipalities to expand their

coverage and necessitate their participation into larger, more complex state insurance pooling plans. More uniformity of risk management practices and accounting will benefit communities. With the greater uniformity, insurance companies will reenter the market.

Notes

1. Edward Lalley, Corporate Uncertainty and Risk Management (New York: Risk Management Society Publishing Inc.), 1982, 3.

2. Paula R. Valente, Current Approaches to Risk Management: A Directory of Practices (Washington, D.C.: International City Management Association, 1980), vi.

3. Alfred G. Haggerty,"Municipalities Told to Assess Pollution Risks," National Underwriter, 3 October 1986, 5.

4. Rodney Taylor, "Liability of the Public Entity for Environmental Damage," paper presented at the Annual PRIMA Conference, St. Paul, Minnesota, 1 June 1983.

5. U.S. Congress, Office of Technology Assessment, Superfund Strategy (Washington, D.C.: GPA, 1985), 11-13.

6. U.S. EPA, Office of Solid Waste, RCRA Orientation Manual (Washington, D.C.: GPO, 1986), III51.

7. Mark E. Beliveau, "Protection of Municipal Groundwater Supplies,"Housing and Hazardous Waste Contamination-Problems and Remedies," (New York: American Society of Civil Engineers, 1986), n.p.

8. Eugene Anderson and Avraham C. Moskowita, "Standard Comprehensive General Liability Insurance," Risk Management, April 1984, 28-34.

9. Jack Gibson, The New CGL Policies- A Guide for Public Agencies (Washington, D.C.: Public Risk and Insurance Management Association, 1985), 2.

10. The reader is encouraged to pursue the evolution of these terms and recent court interpretations. I recommend two excellent articles on this topic, the first by Bradford W. Rich, "Environmental Litigation and the Insurance Dilemma," Risk Management, December 1985 pp. 34-41. Rich concludes, "The failure to resolve problems of this nature other than by complex and expensive litigation is undermining public confidence in the legal profession...Others begin to suggest that we are as much a part of the problem as those who have willingly polluted the air, sea, and land." He further adds, "Insurance companies are not likely to rush enthusiastically back into the environmental impairment business."

The second article is by Paul E.B. Glad and Thomas L. Forsyth, "Pollution Liability: Rediscovery of Policy Language," The John Liner Review, Fall 1987. They conclude, "It appears that an element of certainty has been restored to the interpretation of insurance policies. The courts have rediscovered that an insurance policy is a contract between the insurer and the insured and that it should be constructed to give effect to the language of the contract. The courts are less likely to strain to find ambiguity and more likely to construe insurance policies as intended both by the insurance company and the insured."

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12. Bradford W. Rich "Environmental Litigation and the Insurance Dilemma," Risk Management, December 1985, 34.

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GAO, under its section on contract amendments to clarify terms of coverage mentions an even more recent change in the language. ISO is considering eliminating the word "sudden" but in its place notes that "the (pollution) exclusion (contained in the CGL policy) does not apply to emissions that begin on a clearly identifiable day and lasts no longer than 15 days thereafter."

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CHAPTER V

THE ROLE OF INSURERS

The insurance industry in this country has been the bulwark for risk abatement in a number of other endeavors. This concept of risk management through writing insurance is as old as the industry itself. It has worked well in fire prevention, electrical safety, maritime activities and road and rail safety, to mention just a few. There is no reason to believe that this concept will not function to handle environmental claims.[1] The insurance industry now must turn to the environmental field and there do the same.

With demand for payments growing, and supply of insurance declining, environmental liability law is on an unstable course that cannot long be sustained without outside intervention. To wait for changes in the law to release carriers from liability is the riskiest course of all. The insurance industry has no choice but to set a course of its own. Indeed, it seems likely that in this field we are now committed to march steadily toward the complete "socialization of the liability-insurance complex."[2] Examples of the socialization of environmental liabilities are the suspended Post Closure Liability Trust Fund, the Superfund, and

financial guarantees for post-closure monitoring and care of hazardous waste disposal facilities.

RCRA mandates that all operating interim status and permitted facilities must maintain insurance for sudden and accidental releases and gradual pollution from the facility. Insurers are not providing Environmental Impairment Liability policies at affordable premiums. Because of infinitely elastic court interpretations of policy coverage, the insurance industry has abandoned the field, even in a captive marketplace. Perhaps the most damaging self-perpetuating myth is that private enterprise will step into the breach and provide the environmental liability coverage for future claims against the industry. Consider the entire milieu of environmental liabilities exposures associated with hazardous wastes applications and disposal, i.e., landfill disposal, accidental spills, pesticide contamination, etc. Firms that are able to find and purchase this type of insurance represent the least risk to insurers, even then the insurance is severely limited. But the problems with all disposal sites occur 15, 30, even 50 years into the future. Essentially all the profits, all the premiums, the firms' abilities to generate revenues, are no longer available to meet future claims. The opportunity to create a pool of revenues is lost.

All premiums would be paid into a national pool to provide coverage for claims, both sudden accidental and gradual.

Because solid waste landfill disposal problems are so similar and many landfills contain hazardous wastes, both household and industrial, a proposed tipping fee tax of, for the sake of discussion, $3 a ton could be collected from these sources to finance the pool. This tax should hurt; it should serve notice that hazardous waste minimization and resource recycling of solid waste is the national policy. Waste is a resource, not a liability. In many respects Risk Retention Groups may be viewed as the precursors to this national pool.

What are the options for the future? One option, suggested by Peter Huber, engineer and attorney, is to:

> move environmental liability law back to its common-law roots, and insist on truly rigorous courtroom proof of cause and effect.[3]

The practical consequence would be to cut off virtually all environmental lawsuits. Good science has not found a comfortable home in the courts and favors defendants in toxic torts litigation. The common assumption in the legal literature, the public mind, and in an increasing number of courtrooms, is that disease (and especially cancer) of unknown origin is quite likely to have been caused by exposure to diffuse, man-made, environmental toxins. Huber continues, "If taken seriously in litigation, all the imponderable causation issues are going to prevent many wealth transfers from defendants to plaintiffs."[4] As a consequence insurers would then return to the environmental liability market, to cover

both cleanup expenses after accidental releases, and the very rare claims of personal injury that could meet honest burdens of proof. According to Huber,

> The resurrection of environmental liability insurance would of course also depend on restoring judicial respect for the language of the insurance contract. Insurers wishing to cover only "sudden and accidental" environmental incidents must be allowed to do so, or they will end up where they are now, not covering environmental incidents of any description at all.[5]

Huber further cautions that:

> The compensation of suspected environmental injuries can be left in the liability courts, or the process can be moved into an administrative compensation program. Either way, we will be forced sooner or later to stop prevaricating on the question of environmental cause and effect. Evasion of this core issue in the courts has already eviscerated the insurance backing that makes third-party liability possible. A government compensation program that repeats the same error will very quickly find itself deluged with claims not actually linked to man-made environmental toxins.[6]

Insurance risk management has particular relevance to the environmental field. Preventive insurance risk management, compared with governmental application of the scientific method, is a much more flexible tool to bring about decision making in the interest of abatement of claims. It can operate more on the basis of caution and common sense with little unnecessary delay.[7]

> Manufacturers tend to want to do things right. The cost of abatement and cleanup is not the main problem for them; the main problem is contrary and conflicting directions from government. Lack of direction and guidance makes predictability in business decision-making difficult. Carriers can fill that void.[8]

For example, Michael Diamond, an insurance executive, suggests an independent carrier review of all incineration problems. It would be financed by each insured as a precondition to coverage. "The very future of incineration of hazardous wastes could be enhanced by insurance company involvement."[9] Carriers writing pollution policies are in a position to demand immediate stoppage of the spread of pollution. The technical capability to accomplish this is well known and is surprisingly easy to put in place. Policies may be conditioned upon the purchase and installation of certain state-of-the-art pollution "scrubbers." The industry can help solve the tough problems of dealing with the nation's toxic waste crisis. Government programs, with the invaluable help of the insurance industry, may begin to set industry standards and encourage minimization and resource recycling. Real problem-solving partnerships between government, carriers, and insureds can be forged.

In recent years, environmental impairment liability insurance coverage has undergone significant changes in an unsettled property and casualty insurance market. Many businesses have been faced with the inability to obtain coverage not only for gradual impairments, but also for sudden and accidental occurrences. Others have obtained coverage, but with substantial restrictions and at significant premium increases. The shrinking market is a result of several

factors including increased public awareness of pollution hazards leading to increased pressure on regulators for enforcement, increasingly strict standards imposed by state and federal environmental laws, and liberal court interpretations of the definition of pollution and the coverage afforded by past insurance policies. The uncertainty created by these changes has caused the withdrawal of many insurers from the environmental impairment liability market. Many businesses affected by this withdrawal are too small to self-insure, and, before the passage of the Risk Retention Act, state regulations often limited or eliminated other pooling options.

Risk-Retention Groups

In October 1986, just before adjournment, Congress passed the Liability Risk Retention Act of 1986, amending and expanding the Product Liability Risk Retention Act of 1981. President Reagan signed the bill into law on October 27, 1986. The Liability Act allows the formation of risk retention groups for the purpose of insuring all types of business liability. The viability of this option for pollution insurance was enhanced by two recent laws. First, the Risk Retention Amendments of 1986 expanded the concept of risk retention beyond product liability risks to allow a broader range of firms with common liability risks (not necessarily

related to product liability) to form self-insurance pools. Second, section 210 of SARA specifies that risk-retention groups may operate to provide pollution liability insurance to their members.[10]

The major goal of the legislation was to facilitate alternatives to standard liability insurance for small businesses, non-profit organizations, local governments, and professionals whose insurance costs have skyrocketed over the past few years. Many of these entities are too small to self-insure, and state regulations often limit or eliminate other pooling options. Recognizing this problem, Congress acted to make easier the formation of risk retention groups, that is, self-insurance pools for organizations with similar liability risks.

The most basic requirement of an RRG is that its members must be engaged in businesses or activities which are similar or related because of the type of risk exposure they create. The related risks can arise because of similar or common business, trade, product, services, premises, or operations.

The primary innovation of the Liability Act is its preemption of state insurance laws and regulations that inhibit the formation of risk retention groups. When groups meet certain federal criteria set by the Act, they must comply with the licensing requirements of only one state, and can then do business in all other states. State consumer

protection laws continue to apply to the activities of such groups and state insurance commissions retain the ability to bar financially impaired groups from operating. But states can no longer prohibit outright the formation of risk retention groups or impose licensing requirements, such as insolvency guaranty deposits, that often make interstate operation of such groups impossible.

A risk retention group under the Risk Retention Act is a state chartered and licensed liability insurance company organized for the primary purpose of assuming and spreading the liability exposures of its group members. The Act provides straightforward requirements dealing with the ownership of the organization. A number of different structures are permitted, but all maintain an identity between the owners, members, and insureds of an RRG. The intent of the provisions is to ensure that ownership of the organization is closely tied to the members served rather than outside interests.

In the past 18 months, several RRGs have been formed as a result of the legislation. The list includes Hypercept, EPIC, Demeter, Pollution Liability Insurance Association (PLIA is a reinsurer) and WILL, an effort by the waste disposal firms to form a captive insurance program. To date, only Demeter has been successful in meeting the initial capitalization requirements. PLIA is an association of insurance firms

offering pollution liability insurance and is not technically a risk retention group. The following description of the firms will allow the reader to get a sense of how RRGs are organized and their target clientele.

Demeter

Demeter Ltd. was formed in Bermuda in November 1986. It represents the culmination of efforts by Terra Insurance Ltd. and the Hazardous Waste Action Coalition to provide Environmental Impairment Liability insurance for professional engineering firms with an environmental practice. Terra capitalized Demeter in November 1986, with $1,000,000. The coalition was formed by the American Consulting Engineers Council which focuses on legislative and regulatory issues to reduce professional liability exposure. Demeter covers claims alleging environmental impairment that are excluded from professional and commercial liability policies.[11]

The first insurance policy was issued in March 1987. As of October 1987, there were eleven policy holders; eight are members of Terra and three are members of the coalition. Premiums in 1987 will approximate $800,000. In 1988, $1,800,000 in premiums is projected. Demeter insures qualified firms of varying size and practice. Total revenues of policyholders range from $1,000,000 to $200,000,000.[12]

Highly Protected Environmental Risk Concept, Inc.

This company commonly uses the acronym, Hypercept, in its business dealing. It requires the application of intensive and aggressive loss prevention, control engineering and science. Hypercept Insurance Company is a Tennessee Association Captive Insurance Company which is licensed to write environmental impairment and pollution liability insurance. It is wholly owned by the Hypercept Membership Association, a not-for-profit membership corporation also incorporated in Tennessee.[13]

Hypercept policies will cover bodily injury, property damage, and environmental damage for named insureds from date of inception for both sudden and accidental and nonsudden, gradual environmental impairments in a single claims-made, third party liability policy. Policy limits will include defense costs and claims expenses, but will exclude damages to the insured's property or to persons except as specifically stipulated in the policy.[14]

Hypercept insurance is available for small and medium sized companies (gross sales of less than $1 million to $500 million), representative of industrial manufacturers, distributors and service firms which cannot afford to self insure, but which need to satisfy environmental regulations and/or permit requirements and desire to protect themselves against toxic torts. The common denominator for this group is

risk of environmental exposure from the research, development, manufacture, formulation, transportation, distribution and use of dangerous and hazardous materials and the associated generation, treatment, storage and disposal of toxic and hazardous wastes. Hypercept is not designed to accommodate the commercial hazardous waste industry, including storers, haulers and disposers. Treaters and recyclers will be considered on a case-by-case basis. Similarly, commercial hazardous waste facilities engaged in storage, transfer and disposal will not be accepted, including dumps, landfills, impounds, lagoons, injection wells, and ocean disposal operations.[15]

Pollution Liability Insurance Association

The Pollution Liability Insurance Association (PLIA) was formed explicitly to solve the pollution liability availability problem. Technically, PLIA is a pollution liability reinsurance pool that provides 100% reinsurance and administrative and technical services to its member insurers. An insurance carrier must either maintain a Best Rating of A or A+, or a B+ and meet six or more of the NAIC financial tests. Each member must also be licensed in one or more states, the District of Columbia, or territorial possessions, maintain a minimum policyholder surplus of $3 million, commit to a minimum participation in PLIA of $100,000, and be

approved for membership by the Board of Directors. Upon approval by PLIA, a pool member may issue a claims-made policy subject to the following conditions:

- Coverage will insure liability for both sudden, accidental and gradual release of toxic and hazardous material;
- Risks can be bound and reinsured only after approval by PLIA;
- Approved policies will be 100% reinsured by the pool;
- Primary coverage only, no excess.

PLIA is the largest reinsurer of underground tanks in the United States.[16]

Environmental Protection Insurance Company

Environmental Protection Insurance Company (EPIC) is an insurance company organized under the laws of Illinois which will be operated as a risk retention group. The Company will offer environmental impairment liability insurance.[17]

EPIC's authorized common stock consists of 50 million shares, $1 par value (the "Common Stock"). EPIC also has an authorized class of 10 million shares of non-voting cumulative preferred stock, $1 par value (the "Preferred Stock"). Both the Common Stock and the Preferred Stock will be offered at a subscription price of $2 a share. EPIC has determined not to commence operations until it has raised at least $30 million of paid-in capital and surplus. The shares are transferable only in limited circumstances and EPIC's stock may be owned only by its insureds.[18]

EPIC will provide to its stockholders Environmental Impairment Liability insurance, which covers liability for bodily injury and property damage, both for gradual and for sudden and accidental events. Policies will be issued on a claims-made basis and will offer coverage only on specified sites for a term of 12 months. Policies will provide either primary or excess coverage. EPIC's Policy limits will be $5 million per impairment and $10 million aggregate per Policy, although until $50 million in Capital is raised, Policy limits per impairment will be limited to 10% of EPIC's Capital and the aggregate per Policy will be limited to 20% thereof.[19]

Environmental impairment liability insurance has been written as a stand-alone policy only for a short time and by a limited number of insurers. In addition, claims experience for environmental impairment risks is not extensive. Furthermore, the nature and source of future claims cannot be accurately predicted. EPIC's losses may be catastrophic, with a small number of claims resulting in large losses. EPIC will offer only a single line of insurance and will not benefit from diversification of risks underwritten. In addition, the spread of risk will be limited because of the small number of insureds.[20]

An "environmental impairment" is defined in the policy as any one or a combination of discharge, dispersal, release, or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic

chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon land, the atmosphere or any groundwater, watercourse or body of water which are fortuitous and neither expected nor intended from the standpoint of the insured and which arise out of the conduct of insured's business.[21]

A claim must be made during the policy period. A claim is defined as a written demand received by the insured for money or services, including the service of suit or institution of arbitration proceedings against the insured. The injury or damage must first manifest itself after the Policy inception date and the environmental impairment must take place in whole or in part after the inception date. Further, the insured must have no knowledge or injury or damage related to the impairment on or before the inception date. The Policy will cover compensatory damages only. Fines, penalties, multiple damages or punitive damages of any sort imposed by statute or regulation are not covered. EPIC has the sole right to settle claims, but will consult with the insured with respect to settlements. The Policy is intended to satisfy environmental financial responsibility requirements to the extent possible.[22]

Waste Insurance Liability Limited

Waste Insurance Liability Limited (WILL) was to be a

mutual insurance company incorporated with limited liability under the laws of the State of Vermont.

> Unfortunately, we were unsuccessful in getting this program off the ground,"writes Charles Johnson, technical director for the National Solid Waste Management Association, "because the participation needed did not materialize. In retrospect, we attribute this to the heterogeneity of size among the sponsoring companies. The insurance needs of large companies are quite different from those of small companies and it is difficult to satisfy the needs of both in a single program.[23]

The financial resources of the company may not be sufficient to cover its losses, according to the prospectus, and there can be no assurance that the company will have sufficient funds to return a member's reserve premium. Each member was to commit to an initial policy term of four years, during which time each member's annual premium is subject to change. A member must normally give WILL three years notice of non-renewal in order to cease being a member of, and purchase insurance from, the company. The company will begin insurance operations after at least 30 commitments for membership, with aggregate annual premiums of at least $17 million.[24]

WILL offered coverage of $10,000,000 per environmental impairment and annual aggregate, subject to a deductible of $1,000,000 per environmental impairment. Any member had the option of purchasing coverage of $3,000,000 per environmental impairment and $6,000,000 annual aggregate, subject to a

deductible of $1,000,000 per environmental impairment. There was a minimum premium of $50,000 for coverage of $3,000,000 per environmental impairment and $6,000,000 annual aggregate, and a minimum premium of $100,000 for coverage of $10,000,000 per environmental impairment and annual aggregate.[25]

Because of limited historical experience in this area, statistical determinations of the projected loss experience of WILL were not possible. The financial resources of WILL were structured to provide for a pool of resources which, although limited, were believed adequate. Nevertheless, losses exceeding the company's total resources are possible and no assurance can be given that they would not in fact occur.[26]

WILL's initial business was to provide insurance coverage against third party liability arising from the release of hazardous substances, pollutants or contaminants. Under the policy, WILL was to pay on behalf of the member all amounts, subject to the limits set forth in Section VI(C), which its members were legally or contractually obligated to pay as a result of (a) personal injury, (b) property damage, or (c) impairment, loss of diminution of, or other interference with, any other environmental right or amenity protected by law, caused by an "environmental impairment.[27]

Determining the amount of the premium for an Environmental Impairment Liability Policy at this time is a largely subjective undertaking. Underwriters' attempts to evaluate

the materials present, environmental routes, and target populations. From this they estimate the probable cost of a loss. They then add in the estimated underwriting expenses, defense expenses, broker commissions, and insurance company profits. The gross premium is then divided by an exposure basis, receipts being a common one, to develop a rate. The policies are then issued either with a flat premium or with a minimum and deposit premium subject to an audit at the end of the policy period. If sales go up, so does the Environmental Impairment Liability premium. In theory, this is how an underwriter would price any insurance risk. In practice, although the underwriters say they use 28 variables to evaluate the risk, at this time, there are insufficient actuarial data for any kind of rating basis, and for all practical purposes most premiums appear to be picked out of the sky. Underwriters strive to keep a "book" of business with similar characteristics where at least the same parameters are used on each account so that in the case of a needed pricing adjustment, the underwriter knows that he can apply the adjustment across a specific business category.[28]

Little information is available on the number of persons who may have actually been harmed by hazardous waste and there are relatively few published court decisions in victim hazardous waste cases. In this area, too, it is unclear how legal changes affecting alleged hazardous waste victims have

affected insurance availability. Indeed, the majority of changes that have occurred at the state level were intended to limit liability. On the other hand, the willingness of some courts to permit recovery by persons seeking compensation for harm from hazardous substances, whether on new theories and types of evidence or on theories and evidence which had earlier been rejected, represents a significant change.[29]

Private Enterprise

Writing and managing environmental risks will require an information-gathering effort similar to that put forth by those who charted dangerous seas. Once the areas of greatest risk are mapped properly, specially designed policies can be written based on the known risks. The following outlines a private enterprise designed to gather the necessary information.

The most important source of revenue for this enterprise will be the compilation of financial test ratios and registrations of underground storage tanks. There are several additional sources of revenue; a depository of record; a source of information for corporate successor liability searches, litigation resources, a collection center for site assessments and a host source for computed financial ratios.

During the last three years the responsibility for gathering the financial information has been turned over to

the states. There is no centralized data system at the federal level that identifies the frequency with which TSDFs use the different financial options to demonstrate financial responsibility. However, most federal and state representatives responsible for administering the RCRA program in the 15 states said that the financial test was the option most often used to meet the RCRA requirements. Insurance was cited as the second most often used option. These program representatives pointed out that smaller companies, in particular, are having a difficult time meeting these requirements due to high insurance premiums and an inability to meet the financial test requirements.[30]

The pending financial requirements for underground storage tanks greatly expand the need for some type of national information base. These requirements consume valuable states' resources, e.g., personnel, the large volume of paperwork, computer time, etc. This enterprise would allow the states the opportunity to use their resources more effectively. There are an estimated 1.5 million USTs. For the sake of discussion, if owner/operators were required to renew their permits annually or bi-annually at $35.00 per permit and the firm gathered and evaluated the information, this would represent a large source of revenue. One of the services that the firm would provide is to standardize many of the forms and methods used throughout the states. A centralized data base

would facilitate this process and at the same time there could be many mutually beneficial arrangements between the states and the firm.

This type of firm would be a privately held company that provides information services to all fifty states and interested parties, including insurance firms, lawyers, and other corporations, i.e., to whoever wants the service at whatever price the market will support. Originally, the service was envisioned as providing a way for states to easily administer their programs without becoming buried in paperwork. For example, my service would provide standardized forms that can be optically scanned for coding, distributed by the states and mailed to my firm. The information is compiled and organized and then a standardized report is prepared and mailed to the states. Information contained in the report would include the names of firms not in compliance with the financial test. The idea, however, lacks sophistication. Possibly this data transfer could be best distributed by dedicated terminals in each state, where they would simply call up the information from a centralized data bank. The carrot to induce the states to adopt this program would be to remit to the states a percentage of gross revenues to help fund their programs. This relieves the states of paperwork and leaves them to concentrate on enforcement action, remediation, or other priorities.

The mechanics of the system would utilize already well understood technology for mailing, processing, optical scanning-coding, and electronic data transfer, the idea being to automate as much of the process as possible. Initially, everything could be leased, including terminals, computer time, mailing machinery, desks, etc. Keep it simple, keep the algorithms clean, keep costs down and standardize!

Conclusion

A recent editorial in Hazardous Waste & Hazardous Materials poses the question, "Is it possible we have temporized too long?" The results of ten years of the hazardous waste program is gridlock. Waste disposal is, "barely maintained by the expansion of those landfills which have managed to survive." The editorial calls for treatment and incineration facilities near to the waste generators and the promotion of competition among companies based on the quality of their technology and low cost. The editorial claims that these goals are not, "utopian" and that inefficiencies in the field of hazardous waste, "make the Pentagon look frugal."[31]

What happened to waste minimization? If hazardous waste engineers and technicians foster this technocentric view to finding solutions, we will inevitably fail in our effort to remove all toxics in our environment. Temporary solutions

will result from quick engineering fixes. Parallel with trying to technically solve the problems presented by disposal we ought to be carefully examining why we produce many of the products and materials from the start. Why is that observation lost in a publication presumably directed toward the hazardous waste professional? This firebrand editorializing shakes the credibility of the industry. The industry does not exist soley to make profits, we have a hazardous waste industry to provide services and protect against the improper disposal of hazardous materials.

Firms produce products in their search for profits and they are often not mindful of the greater risks they produce to society as byproducts. Insurance in a sense closes the loop. It is the mitigation of the risk to society. If a company is compelled to produce a hazardous waste, then insurance determines what is the acceptable risk to society and what are the costs. As I have already stated, insurance has an opportunity to play a key role in setting the standards and direction for the future of the hazardous waste industry. In fact, it should be the mandate of the insurance industry to accept this responsibility.

Municipalities, owners and operators of underground storage tanks, landfills, perhaps pesticide applicators, in addition to treatment storage and disposal facilities, all need to be drawn together to form a national insurance pool.

From our knowledge of toxicological data, actuarial studies, lessons learned from the past, and regulatory and insurance industry oversight we can then apply some common sense approaches to these difficult issues. Only then can we begin to determine what is an acceptable risk from exposures to hazardous substances and groundwater contamination to our society.

Notes

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APPENDIX A

GLOSSARY

CERCLA: The Comprehensive Environmental Response, Compensation,and Liability Act (CERCLA), passed in 1980 and commonly known as "Superfund". CERCLA gives the Federal government the power to respond to releases, or threatened releases, of any hazardous substance into the environment as well as to a release of a pollutant or contaminant that may present an imminent and substantial danger to public health or welfare. CERCLA established a Hazardous Substance Trust Fund (Superfund), available to finance responses taken by the Federal Government.

CGL: Commercial general liability.

Claims-Made Policies:
When an insurance policy uses a claims-made coverage trigger, the insurance policy in effect during the year that the claim is actually made against the insured covers the loss. The determining factor is when notice of a claim is "received and recorded" by any insured or the insurance company. The reporting of an "occurrence" or an event that may give rise to a claim does not trigger coverage. One of the most important advantages of claims-made insurance to public entities is that, since the policy in effect this year responds to claims made this year, the limits of liability selected can be based upon the legal environment during the time period when judgments are rendered.

Disposal: The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

Disposal Facility:
A facility or part of a facility at which hazardous waste is intentionally placed into or on any land or water, and at which waste will remain after closure.

Environmental Impairment Liability:
Insurance coverage against claims-made, nonsudden and gradual pollution resulting in bodily injury, property damage, or environmental impairment has evolved in the marketplace as Environmental Impairment Liability (EIL) insurance. This type of insurance was originally developed principally as the result of Federal and state regulations, imposed

under RCRA, on owners and operators of TSDFs. This type of insurance was also meant to fill the gap caused by the 1970 revisions in the CGL policy form that excluded nonsudden and gradual pollution releases from future general liability contracts. EIL insurance also addresses the concerns among many industrial hazardous waste generators seeking to reduce loss exposures and liabilities from enforcement actions and common toxic tort litigation. Recently, EIL policies have been written to insure against both sudden and nonsudden environmental pollution releases. Certain EIL carriers will endorse sudden accidental occurrences on their EIL policy forms.

Facility: All contiguous land, structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units, e.g., one or more landfills, surface impoundments, or a combination of them.

Ground Water:
Water below the land surface in zone of saturation.

Hazardous Waste:
As defined in RCRA the term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

As defined in the regulations, a solid waste is hazardous if it meets one of four conditions:

1) Exhibits a characteristic of a hazardous waste (40 CFR Sections 261.33)
2) Has been listed as hazardous (40 CFR Sections 261.31 through 261.33)
3) Is a mixture containing a listed hazardous waste and a non-hazardous solid waste (unless the mixture

is specifically excluded or no longer exhibits any of the characteristics of hazardous waste)
4) Is not excluded from regulation as a hazardous waste.

HSWA: The Hazardous and Solid Waste Amendments of 1984 (Public Law 98-616) that significantly expanded both the scope and the coverage of RCRA.

Off-site: The opposite of on-site (see on-site)

On-site: Means on the same or geographically contiguous property which may be divided by public or private rights(s)-of-way, provided the entrance and exit between the properties is at a cross-roads, intersection, and access is by crossing as opposed to going along the right(s)-of-way. Noncontiguous properties owned by the same person but connected by a right-of-way which the person controls and to which the public does not have access is also considered on-site property.

Open Dump: Specifically, any facility or site where solid waste is disposed of which is not a sanitary landfill which meets the Criteria listed in 40 CFR Part 257 ("Subtitle D Criteria") and which is not a facility for the disposal of hazardous waste.

Operator: The person responsible for the overall operation of a facility.

Owner: The person who owns a facility or part of a facility.

RCRA: Resource Conservation and Recovery Act of 1976. What we commonly refer to as RCRA is an amendment to the first piece of Federal solid waste called the Solid Waste Disposal Act of 1965. RCRA was amended in 1980 and most recently on November 8, 1984 by HSWA.

RI/FS: Remedial Investigation and Feasibility Study (RI/FS) is the core of any remedial planning contract. It consists of an extensive technical investigation of a permanent solution to a contamination problem at an NPL site. Because no two sites are physically, chemically, and biologically alike, each RI/FS must address a particular site or cluster of sites. In June 1985, EPA issued final guidelines for conducting an RI/FS: the "Guidance Document for Remedial Investigation Under CERCLA, EPA/540/G-

85/002," and "Guidance for Feasibility Studies Under CERCLA, EPA/540/G-85/003.

Risk Retention Groups:

The Liability Risk Retention Act of 1986 (LRRA), amending and expanding the Product Liability Risk Retention Act of 1981 allows the formation of risk retention groups for the purpose of insuring all types of business liability. The major goal of the legislation was to facilitate alternatives to standard liability insurance for small businesses, non-profit organizations, local governments, and professionals whose insurance costs have skyrocketed over the past few years.

The primary innovation of the LRRA is its preemption of state insurance laws and regulations that inhibit the formation of risk retention groups. When groups meet certain federal criteria set by the LRRA, they must comply with the licensing requirements of only one state, and can then do business in all other states.

The most basic requirement of an RRG is that its members must be engaged in businesses or activities which are similar or related because of the type of risk exposure that they create. The related risks can arise because of similar or common business, trade, product, services, premises, or operations.

Site: The land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Solid Waste:

As defined in RCRA the term means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under the Clean Water Act, or special nuclear or byproduct material as defined by the Atomic Energy Act of 1954.

TSDF: Acronym for treatment, storage, or disposal facility.

APPENDIX B

FINANCIAL RATIOS

	A	B	C	D	E
1	INCOME STATEMENT ITEMS-1986 ANNUAL REPORTS				
2					
3	NOTE 1: UNAUDITED AND PARTIAL YEAR STATEMENTS				
4					COST OF
5			NAME OF CO.	REVENUE	REVENUES
6	ENVIRONMENTAL CONSULTING				
7			VERSAR	38,275,808	36,051,653
8			REI	36,317,980	28,946,169
9			WESTON	98,676,796	33,149,256
10				173,270,584	
11	REMEDIATION				
12			CANONIE ENVIR	30,019,462	17,113,344
13	NOTE 1:		ALLWASTE	16,401,000	10,746,000
14	NOTE 1:		EC & ENVIRON	43,370,797	5,176,627
15			EN TREAT & TECH	101,420,000	67,902,000
16	NOTE 1:		ENVIROPACT	6,970,252	4,136,626
17			OXFORD ENERGY	3,665,976	2,016,971
18			WASTE RECOVERY	1,491,518	873,617
19			CALGON CARBON	138,153,000	75,994,000
20			RIEDEL	33,283,386	24,886,847
21			GROUNDWATER	37,153,250	20,468,515
22			LOPAT	445,300	43,834
23				412,373,941	
24	DISPOSAL				
25			ROLLINS	136,903,000	83,974,000
26			CHEM WASTE	418,070,000	239,160,000
27			ENVIROSAFE	31,568,000	21,017,000
28			AM ECOLOGY	47,875,000	35,010,000
29			USPCI	56,898,000	26,802,000
30	END 3/87		INT TECH	237,121,000	179,899,000
31	NOTE 1:		CHEMCLEAR	12,142,968	9,806,978
32	NOTE 2		BFI	1,328,393,000	836,413,000
33			CECOS	85,698,000	
34				1,026,275,968	
35	LABORATORY				
36			THERMO ANA	16,565,000	7,477,000
37			ENSECO	29,530,135	17,092,951
38			NYTEST ENV INC	2,397,971	1,631,152
39			REUTER	25,073,996	22,345,051
40				73,567,102	
41	CONGLOMERATES				
42			BLOUNT	1,233,940,000	1,078,287,000
43			OGDEN	799,833,000	366,504,000
44			COMBUST ENG	2,551,469,000	2,163,448,000
45			FOSTER WHEELER	1,257,858,000	1,082,014,000
46				5,843,100,000	

	F	G	H	I
1	BALANCE SHEET ITEMS			
2				
3		NOTE 2: less than 7% of parent revenue		
4				
5	EBIT	EBT	NET INCOME	ASSETS
6				
7	2,224,155	1,493,902	748,902	41,350,696
8	3,132,359	2,111,877	1,412,846	19,584,877
9	5,831,885	5,384,012	2,713,912	48,470,579
10				
11				
12	8,120,709	8,124,709	3,939,709	17,170,180
13	1,403,000	1,296,000	902,000	12,858,000
14	4,434,392	4,227,787	2,124,436	31,252,239
15	9,367,000	5,992,000	2,785,000	114,394,000
16	728,038	486,785	433,292	12,448,509
17	498,549	1,023,884	1,123,670	9,777,898
18	617,901	-858,624	-858,624	6,776,084
19	31,976,000	23,707,000	11,353,000	134,490,000
20	2,505,676	2,518,604	246,652	20,756,022
21	16,684,735	6,628,534	3,380,510	23,332,160
22	-1,152,584	-1,154,779	-1,154,779	1,017,273
23				
24				
25	33,797,000	33,386,000	18,696,000	109,038,000
26	110,014,000	104,087,000	52,246,000	544,364,000
27	5,773,000	3,483,000	4,724,000	54,950,000
28	8,018,000	6,318,000	3,244,000	38,610,000
29	44,063,000	12,835,000	6,774,000	61,376,000
30	17,424	13,309,000	7,965,000	306,848,000
31	474,007	227,986	203,986	17,977,203
32	491,980,000	240,801,000	136,853,000	1,225,685,000
33			8883000	108972000
34				
35				
36	496,000	1,443,000	719,000	40,350,000
37	4,725,961	1,384,987	709,987	45,143,406
38	-53,099	-91,362	-80,062	4,247,570
39	208,637	187,269	1,813,990	37,675,828
40				
41				
42	41,442,000	13,512,000	7,215,000	723,913,000
43	69,737,000	50,195,000	119,562,000	836,185,000
44	113,816,000	98,398,000	50,866,000	2,161,408,000
45	29,084,000	29,071,000	24,108,000	1,118,835,000
46				

	J	K	L	M
1				
2				
3				
4		CURRENT	LONG TERM	
5	CURRENT ASSET:	LIABILITY	DEBT	EQUITY
6				
7	18,852,555	6,544,587	20,789,981	11,897,739
8	9,597,441	10,008,537	3,941,886	1,894,416
9	36,718,987	21,155,735	4,494,628	23,513,452
10				
11				
12	14,576,297	6,584,826	1	10,585,354
13	7,151,000	2,422,000	357,000	9,732,000
14	26,266,002	8,897,627	1	22,365,532
15	71,459,000	18,652,000	58,510,000	34,677,000
16	4,298,607	3,940,299	2,533,728	12,448,509
17	6,734,057	939,932	1,200,000	7,637,966
18	3,576,962	690,824	1,113,709	4,881,994
19	56,109,000	29,365,000	58,711,000	28,759,000
20	10,411,916	5,382,855	765,227	13,692,940
21	17,588,659	3,059,117	15,404	20,203,115
22	726,446	59,044	15,743	942,486
23				
24				
25	40,106,000	24,744,000	2,973,000	72,110,000
26	124,616,000	127,497,000	6,253,000	369,273,000
27	10,693,000	14,470,000	3,526,000	16,064,000
28	16,889,000	8,121,000	344,000	22,835,000
29	22,516,000	8,225,000	9,896,000	39,968,000
30	79,014,000	47,482,000	102,647,000	131,939,000
31	6,649,367	10,901,286	2,560,754	4,183,642
32	276,131,000	245,600,000	101,824,000	746,867,000
33				
34				
35				
36	31,462,000	132,000	23,000,000	13,826,000
37	21,742,577	6,281,690	9,431,301	28,790,169
38	2,533,651	998,505	1,033,822	2,208,212
39	12,674,361	3,092,136	11,291,358	21,716,104
40				
41				
42	424,839,000	378,445,000	173,165,000	141,097,000
43	517,803,000	226,617,000	34,933,000	395,781,000
44	1,175,044,000	1,240,412,000	95,932,000	688,053,000
45	686,057,000	426,103,000	196,503,000	426,580,000
46				

	N	O	P	Q
1	CHANGE IN FINANCIAL POSITION STATEMENT			
2				
3				
4	CHANGE L. T.	FROM SALE	WORKING	
5	LIABILITIES	OF STOCK	CAPITAL	DIVIDENDS
6				
7	9,895,562	7,141,821	10,715,841	0
8	-831,113	-85,400	-1,249,954	0
9	104,094	1,892,530	11,515,512	0
10				
11				
12	-6,584,826	3,448,318	5,394,783	0
13	N/A	N/A	N/A	0
14	4,500,000	14,443,193	12,812,380	314,851
15	51,984,000	3,346,000	33,264,000	65,000
16	-966,430	1,682,608	73,858	0
17	-800,000	5,294,993	1,356,512	0
18	-43,074	4,905,246	2,635,879	0
19	-23,077,000	0	-1,240,000	0
20	-235,541	9,834,006	5,348,250	0
21	-2,233,997	11,894,136	10,069,745	0
22	6,827	0	-1,267,605	0
23				
24				
25	-461,000	0	-2,773,000	1,617,000
26	1,827,000	307,815,000	231,691,000	80,000,000
27	-36,000	0	-5,227,000	0
28	N/A	370,000	-2,446,000	0
29	8,543,000	313,000	3,912,000	0
30	138,720,000	1,145,000	4,573,000	0
31	-235,056	0	-291,985	0
32	-13,800,000	102,632,000	32,849,000	45,662,000
33				
34				
35				
36	22,330,000	0	18,450,000	0
37	1,127,527	17,266,547	12,113,838	0
38	659,806	2,156,579	1,776,381	0
39	9,958,944	0	349,653	0
40				
41				
42	-54,502,000	-415,000	9,597,000	5,187,000
43	14,250,000	-32,000,000	86,637,000	35,064,000
44	9,184,000	1,043,000	-41,535,000	33,255,000
45	75,154,000	10,988,000	-27,595,000	15,166,000
46				

	R	S	T	U	V
1	NOTES SECTION OF THE ANNUAL REPORT				
2					
3					
4	DEPRECIATION			EFFECT.	OUT-
5	& AMORT.	INTEREST	TAX	TAX RATE	STANDING
6					
7	1,133,554	748,363	745,000	0.50	3095966
8	431,256	1,020,482	699,031	0.33	5948349
9	1,734,994	825,156	2,670,100	0.50	5369833
10				0.44	
11					
12	516,788	4,000	4,185,000	0.52	5121918
13	1	107,000	394,000	0.30	3200000
14	691,159	206,605	2,103,351	0.50	3295325
15	3,645,000	2,220,000	3,483,000	0.58	11891000
16	471,130	297,572	198,801	0.41	2422026
17	25,784	99,786	525,335	0.51	6499947
18	318,527	119,618	0	0.00	3175157
19	6,090,000	8,553,000	12,354,000	0.52	17766510
20	1,102,834	233,724	814,341	0.32	3025000
21	984,045	-197,246	3,248,024	0.49	6243762
22	19,147	2,195	0	0.00	7407406
23				0.38	
24					
25	5,589,000	411,000	14,690,000	0.44	31116000
26	27,553,000	5,757,000	51,841,000	0.50	99926000
27	2,916,000	1,711,000	2,081,000	0.60	3000000
28	965,000	1,700,000	3,074,000	0.49	2949000
29	5,286,000	0	6,061,000	0.47	8342000
30	11,068,000	4,115,000	5,344,000	0.40	28446430
31	573,478	317,648	98,000	0.43	9079754
32	136,715,000	8,102,000	103,948,000	0.43	72003000
33	108972000			0.47	
34					
35					
36	602,000	-947,000	645,000	0.45	4703000
37	2,579,431	1,064,785	1,850,000	1.34	7774000
38	111,636	38,263	-11,300	0.00	4003100
39	1,367,568	21,368	-1,600,000	0.00	1030367
40				0.45	
41					
42	24,528,000	24,738	6,297,000	0.47	11934132
43	16,016,000	19,542,000	11,553,000	0.23	20168000
44	67,507,000	23,132,000	42,069,000	0.43	33321654
45	19,573,000	13,000	4,527,000	0.16	34483076
46				0.32	

	W	X	Y	Z	AA	AB	AC
1	MARKET DATA						
2				FINANCIAL RATIOS			
3							
4			SALES/	DEBT/	ASSET/	EARN/	
5	SHARE PRICE		ASSETS	EQUITY	EQUITY	SALES	ROE
6							
7	8.12		0.93	1.75	3.48	0.06	6%
8	13.00		1.85	2.08	10.34	0.09	75%
9	12.19		2.04	0.19	2.06	0.06	11%
10		GROUP AVERAGE	1.61	1.34	5.29	0.07	31%
11							
12	21.75		1.75	0.00	1.62	0.27	37%
13	6.00		1.28	0.04	1.32	0.09	9%
14	21.50		1.39	0.00	1.40	0.10	9%
15	27.75		0.89	1.69	3.30	0.09	9%
16	10.00		0.56	0.20	1.00	0.10	2%
17	8.00		0.37	0.16	1.28	0.14	3%
18	1.62		0.22	0.23	1.39	0.41	10%
19	31.12		1.03	2.04	4.68	0.23	39%
20	14.25		1.60	0.06	1.52	0.08	11%
21	15.66		1.59	0.00	1.15	0.45	43%
22	0.31		0.44	0.02	1.08	-2.59	-123%
23		GROUP AVERAGE	1.07	0.44	1.79	0.20	17%
24							
25	17.25		1.26	0.04	1.51	0.25	26%
26	23.00		0.77	0.02	1.47	0.26	14%
27	17.85		0.57	0.22	3.42	0.18	10%
28	14.00		1.24	0.02	1.69	0.17	14%
29	16.50		0.93	0.25	1.54	0.77	58%
30	16.00		0.77	0.78	2.33	0.00	-2%
31	6.00		0.68	0.61	4.30	0.04	2%
32	22.30		1.08	0.14	1.64	0.37	37%
33		GROUP AVERAGE	0.91	0.26	2.24	0.26	20%
34							
35							
36	7.00		0.41	1.66	2.92	0.03	6%
37	17.35		0.65	0.33	1.57	0.16	-4%
38	1.06		0.56	0.47	1.92	-0.02	-4%
39	12.50		0.67	0.52	1.73	0.01	8%
40		GROUP AVERAGE	0.57	0.74	2.04	0.04	2%
41							
42	12.20		1.70	1.23	5.13	0.03	16%
43	20.00		0.96	0.09	2.11	0.09	10%
44	30.75		1.18	0.14	3.14	0.04	8%
45	13.13		1.12	0.46	2.62	0.02	6%
46		GROUP AVERAGE	1.24	0.48	3.25	0.05	10%

	AD	AE	AF	AG	AH	AI
1					GROWTH CALCULATIONS	
2						
3						
4			PAY	MARKET		
5	PE	EPS	OUT	SHARE	SUSTAINABLE	GROWTH
6						
7	33.57	0.24	0.00%	22.09%	5.24%	5.68%
8	54.73	0.24	0.00%	20.96%	28.58%	19.04%
9	24.11	0.51	0.00%	56.95%	7.15%	13.68%
10	37.47	0.33	0.00%	33.33%	13.65%	12.80%
11						
12	28.28	0.77	0.00%	7.29%	29.78%	89.74%
13	21.29	0.28	0.00%	3.98%	7.84%	12.25%
14	33.35	0.64	14.82%	10.53%	6.15%	16.54%
15	118.48	0.23	2.33%	24.62%	6.83%	8.92%
16	55.90	0.18	0.00%	1.69%	4.37%	6.21%
17	46.28	0.17	0.00%	0.89%	15.34%	5.37%
18	-5.99	-0.27	0.00%	0.36%	-13.47%	10.03%
19	48.70	0.64	0.00%	33.54%	34.54%	31.19%
20	174.77	0.08	0.00%	8.08%	1.27%	13.73%
21	28.92	0.54	0.00%	9.02%	16.96%	251.00%
22	-2.00	-0.16	0.00%	0.11%	-53.58%	-53.12%
23	55.00	0.33	1.72%		9.11%	35.62%
24						
25	28.71	0.60	8.65%	6.03%	19.49%	44.92%
26	43.99	0.52	153.12%	18.43%	-4.93%	25.33%
27	11.34	1.57	0.00%	1.39%	11.71%	11.74%
28	12.73	1.10	0.00%	2.11%	9.32%	26.21%
29	20.32	0.81	0.00%	2.51%	15.97%	254.51%
30	57.14	0.28	0.00%	10.45%	4.84%	0.01%
31	267.07	0.02	0.00%	0.54%	1.86%	2.71%
32	11.73	1.90	33.37%	58.55%	9.24%	67.05%
33		0.1366	24.39%		8%	54.06%
34						
35						
36	45.79	0.15	0.00%	22.52%	4.98%	1.24%
37	189.97	0.09	0.00%	40.14%	2.13%	11.69%
38	-53.00	-0.02	0.00%	3.26%	-2.69%	-1.23%
39	7.10	1.76	0.00%	34.08%	7.90%	0.56%
40	47.47	0.50	0.00		3.08%	3.06%
41						
42	20.18	0.60	71.89%	21.12%	0.63%	6.07%
43	3.37	5.93	29.33%	13.69%	12.36%	9.10%
44	20.14	1.53	65.38%	43.67%	0.94%	5.56%
45	18.77	0.70	62.91%	21.53%	1.18%	2.67%
46	15.62	2.19	57.38%		3.78%	5.85%

	AJ	AK	AL	AM	AN	AO	AP
1							
2							
3							
4	COST OF			ROI-	EARN/	DEBT/	ASSETS/
5	CAPITAL	WACC	ROI	WACC	SALES	EQUITY	SALES
6							
7	5.68%	0.03	0.03	-0.01	0.02	1.75	1.08
8	19.04%	0.18	0.11	-0.07	0.04	2.08	0.54
9	13.68%	0.13	0.06	-0.07	0.03	0.19	0.49
10	12.80%	0.11	0.06	-0.05	0.03	1.34	0.70
11							
12	89.74%	0.90	0.23	-0.67	0.13	0.00	0.57
13	12.25%	0.13	0.08	-0.05	0.05	0.04	0.78
14	16.98%	0.17	0.07	-0.10	0.05	0.00	0.72
15	8.94%	0.04	0.03	-0.01	0.03	1.69	1.13
16	6.21%	0.06	0.03	-0.03	0.06	0.20	1.79
17	5.37%	0.05	0.02	-0.03	0.31	0.16	2.67
18	10.03%	0.10	0.09	-0.01	-0.58	0.23	4.54
19	31.19%	0.15	0.11	-0.04	0.08	2.04	0.97
20	13.73%	0.14	0.08	-0.06	0.01	0.06	0.62
21	251.00%	2.50	0.36	-2.14	0.09	0.00	0.63
22	-53.12%	-0.52	-1.13	-0.61	-2.59	0.02	2.28
23	44.54%	0.42	0.11	-0.31	0.02	0.40	1.52
24							
25	45.22%	0.43	0.17	-0.26	0.14	0.04	0.80
26	28.81%	0.26	0.10	-0.16	0.12	0.02	1.30
27	11.74%	0.13	0.04	-0.09	0.15	0.22	1.74
28	26.21%	0.30	0.11	-0.19	0.07	0.02	0.81
29	254.51%	2.04	0.38	-1.66	0.12	0.25	1.08
30	0.01%	0.01	0.00	-0.01	0.03	0.78	1.29
31	2.71%	0.04	0.02	-0.03	0.02	0.61	1.48
32	69.90%	0.60	0.23	-0.37	0.10	0.14	0.92
33	54.89%	0.48	0.13	-0.35	0.09	0.26	1.18
34							
35							
36	1.24%	-0.01	0.01	0.02	0.04	1.66	2.44
37	11.69%	0.08	-0.04	-0.11	0.02	0.33	1.53
38	-1.23%	0.00	-0.01	-0.02	-0.03	0.47	1.77
39	0.56%	0.00	0.01	0.00	0.07	0.52	1.50
40	3.06%	0.02	-0.01	-0.03			
41							
42	9.63%	0.03	0.03	0.00	0.01	1.23	0.59
43	17.79%	0.12	0.06	-0.05	0.15	0.09	1.05
44	8.80%	0.07	0.03	-0.04	0.02	0.14	0.85
45	6.02%	0.02	0.02	0.00	0.02	0.46	0.89
46	10.56%	0.06	0.04	-0.02	0.05	0.48	0.84

	AQ	AR	AS
1			
2	RCRA'S FINANCIAL TEST RATIOS		
3			
4	value<2	>than 0.1	>than 1.5
5	DEBT/ASSETS	FINANCIAL	CURRENT
6			
7	0.66	0.07	2.88
8	0.71	0.13	0.96
9	0.53	0.17	1.74
10	0.63	0.12	1.86
11			
12	0.38	0.68	2.21
13	0.22	0.32	2.95
14	0.28	0.32	2.95
15	0.67	0.08	3.83
16	0.52	0.14	1.09
17	0.22	0.54	7.16
18	0.27	-0.30	5.18
19	0.65	0.20	1.91
20	0.30	0.22	1.93
21	0.13	1.42	5.75
22	0.07	-15.18	12.30
23	0.34	0.36	3.50
24			
25	0.25	0.88	1.62
26	0.25	0.60	0.98
27	0.33	0.42	0.74
28	0.22	0.50	2.08
29	0.30	0.67	2.74
30	0.49	0.13	1.66
31	0.75	0.06	0.61
32	0.28	0.79	1.12
33	0.36	0.50	1.44
34			
35			
36	0.57	0.06	238.35
37	0.35	0.21	3.46
38	0.48	0.02	2.54
39	0.38	0.22	4.10
40			62.11
41			
42	0.76	0.06	1.12
43	0.31	0.52	2.28
44	0.62	0.09	0.95
45	0.56	0.07	1.61
46	0.56	0.18	1.49

APPENDIX C

DATA AND FORMULAS USED IN SPREADSHEET

D. Revenue
E. Cost of goods sold
F. Earnings before interest and taxes
G. Earnings before taxes
H. Net income
I. Total assets
J. Current assets
K. Current liabilities
L. Long term debt
M. Equity (share holders)
N. Change in long term debt
O. Equity from sale of stock
P. Working capital
Q. Dividends
R. Depreciation and amortization
S. Interest
T. Tax
U. Effective tax rate = tax/earnings before tax
V. Shares outstanding
W. Share price -- December 1986
X.
Y. Turnover = revenue/assets
Z. Leverage = longterm debt/equity
AA. Asset/equity
AB. Profit Margin = earnings before interest and taxes/revenues
AC. Return on equity = (EBIT/S)(S/A)(1-(IE/EBIT))x (1-(TE/EBT))(A/E)

EBIT. = earnings before interest and taxes
S. = sales
A. = assets
IE. = interest expense
TE. = tax expense
EBT. = earnings before taxes
E. = expense

AD. Price earnings = price of share/earning per share
AE. Earnings per share = net income/shares outstanding
AF. Payout ratio = dividends/net income
AG. Market share = revenues/total revenues of industry segment
AH. Sustainable growth = (earnings/sales)*(1-payout)*1+(debt/equity))/ assets/sales-(earning/sales*(1-payout)*(1+debt/equity)))
AI. Growth = ((earnings/sales)*(1-payout)*(assets/equity)/(((1/sales/assets)-earnings/sales)*(1-payout)*(assets/equity)
AJ. Cost of Capital = ((dividends/shares outstanding)/current price) + growth

AK. Weighted average cost of capital = ((growth*equity) + (1-effective tax rate)*(interest/long term debt)*long term debt)/(long term debt + equity)
AL. Return on investment = ((1-effective tax rate)*EBIT)/assets
AM. ROI-WACC
AN. Margin = net income/sales
AO. Debt equity ratio
AP. Assets/sales
AQ. (total) Debt/assets
AR. Net income plus depreciation and amortization/total liabilities
AS. Liquidity current = current assets/current liabilities

APPENDIX D

LIST OF CORPORATIONS

Allwaste, Inc.
4800 Sugar Grove Blvd., Suite, 170
Stafford, TX 77477
NASDAQ (ALWS)

American Ecology Corp.
30423 Canwood Street, Suite 201
Agoura Hills, CA 91301
NASDAQ (ECOL)

Banner Industries, Inc.
25700 Science Park Drive
Cleveland, OH 44122
NYSE (BNR)

Blount, Inc.
P.O. Box 949
Montgomery, AL 36192-1201
AMSX (BLT.A & BLT.B)

Browning-Ferris Industries, Inc.
P.O. Box 3151
Houston TS 77253
NYSE (BFI)

Calgon Carbon Corporation
P.O. Box 717
Pittsburgh, PA 15230-0717
OTC (CRBN)

Canonie Environmental Services Corp.
800 Canonie Drive
Porter, IN 46304
NASDAQ (CANO)

ChemClear, Inc.
992 Old Eagle School Road
Wayne, PA 19087
NASDAQ (CMCL)

Chemical Waste Management, Inc.
3001 Butterfield Road
Oak Brook, IL 60521
NYSE (CHW)

Combustion Engineering, Inc.
P.O. Box 9308
Stamford, CT 06904
NYSE (CSP)

Ecology and Environment, Inc.
P.O. Box D
Buffalo, NY
AMSX (EEI)

Enseco, Inc.
205 Alewife Brook Parkway
Cambridge, MA 02138
OTC (NCCO)

Envirex
1901 South Prairie Avenue
Waukesha, WI 53186

Environmental Treatment and Technologies Corp
P.O. Box 551
Findlay, OH 45839-0551
NYSE (ETC)

Enviropact, Inc.
4790 N.W. 157th Street
Miami, FL 33014

Envirosafe Services, Inc.
P.O. Box 833
Valley Forge, PA 19482-0833
NASDAQ (ENVI)

Foster Wheeler Corporation
110 South Orange Avenue
Livingston, NJ 07039
NYSE (FWC)

Groundwater Technology, Inc.
220 Norwood Park South
Norwood, MA 02062
NASDAQ (GWTI)

International Technology Corporation
23456 Hawthorne Blvd.
Torrance, CA 90505
NTSE (ITX)

Lopat Industries, Inc.
1750 Bloomsbury, Ave., Bldg. #1
Wanamassa, NJ 07712
NASDAQ (LPAT)

Nytest Environmental, Inc.
Call Box 1518, 60 Seaview Blvd
Port Washington, NY 11050

NASDAQ (NYTS)

Ogden Corporation
277 Park Avenue
New York, NY 10172
NYSE (OG)

Resource Engineering, Inc.
3000 Richmond Avenue
Houston, TX 77098

Reuter, Inc.
410-11th Avenue South
Hopkins, MN 55343
OTC (REUT)

Rexnord, Inc.
350 North Sunny Slope
Brookfield WI 53005
NYSE (REX)

Riedel Environmental Technologies, Inc.
P.O. Box 5007
Portland, OR 97208-5007
NASDAQ (RETI)

Rollins Environmental Services, Inc.
P.O. Box 2349
Wilmington, DE 19899
NYSE (REN)

Roy F. Weston, Inc.
Weston Way
West Chester, PA 19380
NASDAQ (WSTNA)

The Oxford Energy Co.
675 Third Avenue
New York, NY 10017
AMSX (OEN)

Thermo Analytical, Inc.
P.O. Box 9046
Waltham, MA 02254-9046
NASDAQ (TMAI)

USPCI, Inc.
2000 Classen Center Buildings, Suite 400 South
Oklahoma, City, OK 73106
NYSE

Versar, Inc.
6850 Versar Center
Springfield, VA 22151
AMSX (VSR)

Waste Recovery, Inc.
8501 North Borthwick
Portland, OR 97217
OTC (WRII)

APPENDIX E

FINANCIAL TESTS AND CORPORATE GUARANTEES

1) A financial test for self-insurance requires the chief financial officer, of the firm, municipality, owner/ operator of TSDFs to sign a letter that attests to the ability to provide coverage. The entity must have a tangible net worth of at least ten times the appropriate aggregate, it must have a tangible net worth of of at least $10 million, assigned a Dunn and Bradstreet financial strength rating of 4A or 5A, and the year end financial statement must be annually audited.

2) The financial guarantee is a promise by one party to pay specified debts or perform specialized obligations of another party(the principal) in the event the principal fails to satisfy those debts or obligations. Generally there is a contract between the principal and a third party, creating the primary obligation, and a contract between the principal and the guarantor creating the guarantee, which supports the primary obligation.

3) An indemnity contract is a two party contractual mechanism under which one party can obtain protection from another party against future losses or harm. An indemnity generally is for actual losses or damage(a "contract for indemnity"). Under such a contact, if the indemnitee actually suffers a loss, the indemnitee must pay the damages and is then reimbursed by the indemnitor. However, indemnity contracts (including insurance contracts, which are generally defined as a form of indemnity) may pay the damages directly, and it is this type of contract that is being proposed by the EPA.

4) By purchasing insurance, the insured transfers financial risk to the insurer.

Closure and Post-Closure Insurance. Insurance may be purchased that assures funds for closure and post-closure care. As evidence of this insurance, the owner or operator must submit to EPA a certificate of insurance issued by the insurer. The insurer must provide the owner or operator the option to renew the policy each year with coverage in at least the amount of the expiring policy. The insurer cannot cancel or terminate this insurance except for nonpayment of premium.

Financial Test for Liability Coverage. The financial test for liability coverage is similar to the test for assuring closure and post-closure costs. The test criteria are the same except that they do not include financial ratios, and they refer to the amount of liability coverage to be demonstrated rather than to closure and post-closure cost estimates.

If an owner or operator is using the financial test to satisfy both the liability coverage requirements and the closure or post-closure financial requirements, he must use a single letter from the chief financial officer for both purposes.

Unlike the regulations for financial assurance of closure and post-closure care, the liability coverage requirements do not allow use of a guarantee from a parent corporation that passes the financial test as a means of satisfying the requirements.

5) Risk retention groups function in the same manner as insurance companies: the individual risks of the group members are transferred to a risk pool administered by the group or association.

6) A surety bond guarantees that the owner or operator will perform corrective action and/or compensate third parties, also known as performance bonds. Thus a surety bond guarantees that if the owner or operator fails to perform corrective action or compensate third parties injured by a release, the surety will (1) perform the corrective action in accordance with the corrective action regulations or pay the third-party liability claims or (2) fund the standby trust, as required by the regional administrator, up to the level of the bond sum.

For TSDFs needing to comply with post-closure liability requirements, two kinds of surety bonds are specified in the regulations. One kind, the Financial Guarantee Bond, may be used for either interim status facilities or facilities with permits. It guarantees that if the owner or operator does not establish a closure or post-closure trust fund before closure of the facility begins, the surety company will fund a standby trust fund in the amount guaranteed by the bond.

The other kind of bond, the Performance Bond, may be used only for facilities with permits. It guarantees that if the owner or operator does not fulfill closure or post-closure requirements, the surety company will perform these duties or pay the amount of the bond into the standby trust fund. The performance bond may not be used before the facility is permitted because specifications for performing closure or post-closure care will generally not have been reviewed by EPA until then. When either kind of surety bond is used, a standby trust fund must also be established.

7) A letter of credit is a financial instrument under which an issuing institution (the issuer) undertakes to meet a

monetary obligation of its customer (the account party) if the later fails to do so. Payment is ordinarily made to a predesignated third party, or beneficiary, who initiates payment by making a claim directly on the issuing institution. The issuer, in return for a fee, becomes the primary obligor and has recourse to the account party for reimbursement. Thus, a letter of credit is an instrument that substitutes the issuer's superior credit for the account party's credit, thereby facilitating a transaction between the account party and the beneficiary.

In the case of post-closure liability requirements, the letter will entitle the EPA Regional Administrator to direct the issuing institution to deposit funds into the owner's or operator's standby trust fund if the owner or operator fails to fulfill closure or post-closure requirements.

8) The State required mechanisms means that the owner or operator may adopt a State approved mechanism that is not otherwise specified under the Federal mechanisms. However the Regional Administrator must determine whether the State mechanism is at least equivalent to the mechanisms under the Federal programs.

PCLR. The owner or operator must submit to EPA evidence of having established the State-required mechanism and a letter requesting that it be considered acceptable for meeting the Federal requirements.

9) State fund or other State assurance means that the states promulgate requirements for "maintaining evidence of financial responsibility as a condition of state program approval." It authorizes the use of "corrective action and compensation programs administered by the state and local

agencies or departments." A State may also wish to sponsor insurance type corrective action and third party compensation programs (i.e., programs that allow owners or operators who cannot purchase insurance from private providers to purchase it from the state).

10) A standby trust fund is a depository mechanism that must be established when an owner or operator obtains one of the following financial instruments: guarantee, indemnity contract, surety bond, or letter of credit. Funds drawn under any of the instruments listed, pursuant to the Regional Administrator's instruction, must be deposited directly into the standby trust fund by the institution making the payment.

The post-closure liability requirements for interim status facilities determine the pay-in period is a maximum of 20 years or the remaining operating life of the facility, whichever is shorter. The payment is equal to the current cost estimate, minus the current value of the trust fund, divided by the number of years remaining in the pay-in period.

11) Financial Test and Corporate Guarantee. Evidence of passing a test of financial strength is also accepted as financial assurance. Two alternative sets of test criteria are specified:

The first set of criteria is:

A. Two of the following three ratios:

1. $\frac{\text{Total liabilities}}{\text{Net worth}}$ = less than 2

2. $\frac{\text{Net income plus depreciation, depletion, and amortization}}{\text{Total liabilities}}$ = greater than 1

3. $\frac{\text{Current assets}}{\text{Current liabilities}}$ = greater than 1.5

B. Net working capital and tangible net worth each at least 6 times the sum of closure and post-closure cost estimates covered by the test.

C. Tangible net worth of at least $10 million.

D. U.S. assets amounting to at least 90 percent of total assets or at least 6 times the sum of closure and post-closure cost estimates covered by the test.

The alternative set of criteria is:

A. Bond rating of most recent bond issuance within the highest four categories of ratings by Standard and Poor's or Moody's.

B. Tangible net worth at least 6 times the sum of the closure and post-closure cost estimates covered by the test.

C. Tangible net worth of at least $10 million.

D. U.S. assets amounting to at least 90 percent of total assets or at least 6 times the sum of closure and post-closure cost estimates covered by the test.

RCRA/Superfund Hotline. For copies of the regulations and general information about all RCRA and Superfund programs, call the Hotline at (800) 424-9346 (this is a toll-free number) or, in Washington, D.C., (202) 382-3000.

APPENDIX F

POST-CLOSURE

SARA, the Superfund Amendments Reauthorization Act of 1986, amended subsection (k) of section 197 of CERCLA by adding the following:

5) Suspension of Liability Transfer.--Notwithstanding paragraphs (1), (2), (3), and (4) of this subsection and subsection (j) of section 111 o this Act, no liability shall be transferred to or assumed by the Post-Closure Liability Trust Fund established by section 232 of this Act prior to completion of the study required under paragraph (6) of this subsection, transmission of a report of such study to both Houses of Congress, and authorization of such a transfer or assumption by Act of Congress following receipt of such study and report.

6) Study of Options for Post-Closure Program.--

(A) Study.--The Comptroller General shall conduct a study of options for a program for the management of the liabilities associated with hazardous waste treatment, storage, and disposal sites after their closure which complements the policies set forth in the Hazardous and Solid Waste Amendments of 1984 and assures the protection of human health and the environment.

(B) Program Elements.--The program referred to in subparagraph (A) shall be designed to assure each of the following:

(i) Incentives are created and maintained for the safe management and disposal of hazardous wastes so as to assure protection of human health and the environment.
(ii) Members of the public will have reasonable confidence that hazardous wastes will be managed and disposed of safely and that resources will be available to address any problems that may arise and to cover costs of long-term monitoring, care, and maintenance of such sites.
(iii) Persons who are or seek to become owners and operators of hazardous waste disposal facilities will be able to manage their potential future liabilities and to attract the investment capital necessary to build, operate, and close such facilities in a

manner which assures protection of human health and the environment.

(C) Assessments.--The study under this paragraph shall include assessments of treatment, storage, and disposal facilities which have been or are likely to be issued a permit under section 3005 of the Solid Waste Disposal Act and the likelihood of future insolvency on the part of owners and operators of such facilities. Separate assessments shall be made for different classes of facilities and for different classes of land disposal facilities and shall include but not be limited to-

(i) the current and future financial capabilities of facility owners and operators;
(ii) the current and future costs associated with facilities, including the costs of routine monitoring and maintenance, compliance monitoring, corrective action, natural resource damages, and liability for damages to third parties; and
(iii) the availability of mechanisms by which owners and operators of such facilities can assure that current and future costs, including post-closure costs, will be financed.

(D) Procedures--In carrying out the responsibilities of this paragraph, the Comptroller General shall consult with the Administrator, the Secretary of Commerce, the Secretary of the Treasury, and the heads of other appropriate Federal agencies.

(E) Consideration of Options--In conducting the study under this paragraph, the Comptroller General shall consider various mechanisms and combinations of mechanisms to complement the policies set forth in the Hazardous and Solid Waste Amendments of 1984 to serve the purposes set forth in subparagraph (B) and to assure that the current and future costs associated with hazardous waste facilities, and, to the greatest extent possible, borne by the owners and operators of such facilities. Mechanisms to be considered include, but are not limited to--

(i) revisions to closure, post-closure, and financial responsibility requirements under

subtitles C and I of the Solid Waste Disposal Act;

(ii) voluntary risk pooling by owners and operators;

(iii) legislation to require risk pooling by owners and operators;

(iv) modification of the Post-Closure Liability Trust Fund previously established by section 232 of this Act, and the conditions for transfer of liability under this subsection, including limiting the transfer of some or all liability under this subsection only in the case of insolvency of owners and operators;

(v) private insurance;

(vi) insurance provided by the Federal Government;

(vii) coinsurance, reinsurance, or pooled-risk insurance, whether provided by the private sector or provided or assisted by the Federal Government; and

(viii) creation of a new program to be administered by a new or existing Federal agency or by a federally chartered corporation.

(F) Recommendations.--The Comptroller General shall consider options for funding any program under this section and shall, to the extent necessary, make recommendations to the appropriate committees of Congress for additional authority to implement such program.

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