Liability Exposure of a Hazardous Waste Generator: A Preliminary Assessment of Certain Factors

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LIABILITY EXPOSURE OF A HAZARDOUS WASTE GENERATOR: A PRELIMINARY ASSESSMENT OF CERTAIN FACTORS

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Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1987

Submitted to the Faculty of the
School of Industrial Engineering
and Management of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
December, 1989

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my Major Advisor, Professor Wayne C. Turner, whose guidance and encouragement have been instrumental in my professional development. This study rests upon his research foundation in hazardous waste management, and his contributions appear throughout the report.

Professor Turner, Regents' Professor Kenneth E. Case, and Joyce Sibley were pivotal in my decision to pursue graduate studies in industrial engineering, and I give them my heartiest approbation. I am privileged to have received counsel and instruction from such an endearing man as Professor Case.

I would also like to thank Professor and Head Carl B. Estes for procuring the Apple Macintosh® SE/30 computer used in this study for data analysis and report production. Professor Estes also greatly enriched my graduate program by allowing me to teach a course in engineering economics, which was a rewarding learning experience.

It has been a pleasure to study under and work with all of the faculty of the School of Industrial Engineering and Management.

My masters studies have been made possible by a Graduate Fellowship from the National Science Foundation. The support of this organization has removed the financial limit on my options for further graduate study and has made my goal of obtaining a doctorate reachable.

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An economy functions efficiently and equitably when the price of goods produced in the society reflects the actual social and private costs of production (i.e., when the costs are internalized). Until now, in most states, firms could dispose of wastes in environmentally unsafe ways at a cost substantially less than that for adequate disposal. Thus, the price of goods often did not reflect the full social cost of production.[1]

LIABILITY EXPOSURE OF A HAZARDOUS WASTE GENERATOR: A PRELIMINARY ASSESSMENT OF CERTAIN FACTORS

ABSTRACT

The liability exposure of a hazardous waste generator is a nebulous concept, one that has eluded quantification by insurance companies and governmental agencies. This study is pioneering--never before has a study been made available to the public which quantifies the liability exposure of a hazardous waste generator. The purpose of this study is to determine the relative importance of factors which affect the liability exposure of a hazardous waste generator and incorporate these factors into a risk assessment form which then could be used to assign a risk rating to a generator.

Absolutely no numerical data or statistics on hazardous waste liability were located during a thorough search of federal government documents and other collections of the university library. To collect data on hazardous waste liability, a survey was mailed to 88 persons. In the selection of survey factors, particular emphasis was given to non-regulatory factors such as choice of transporter, choice of waste disposal site, and choice of waste disposal method. Because of the small population chosen, a prime consideration in survey design was maximizing the response rate.

Descriptors were developed for each factor. The average value of a descriptor is termed a benchmark. The survey format was designed such that response data could be easily collected and entered into a personal computer. The four sections of the survey were on-site liability factors, off-site liability factors, variables describing liability as a function of disposal method, and cleanup history variables. A "Response Frequency Plot" was made for each factor. Twenty-seven pages of the report contain plots and tables of statistical data for each factor and variable in the survey. Statistical data for descriptors and variables is interpreted and three tables are given which summarize the analysis results.

The results of the analysis confirm that the choice of disposal method is the single most important decision made by a generator with regard to liability exposure. Analysis of the cleanup history variables showed that the likelihood of being named as a PRP, having to pay for cleanup, and being named as a defendant in a lawsuit increases as the volume of hazardous waste generated increases but not necessarily as company size increases.

The benchmarks and average values for variables were used to develop the *Risk Assessment Procedure for a Single Disposal Option*, a form developed for use in determining the on-site and off-site liability exposure of a generator. A two-dimensional scoring plot was developed to accompany the procedure, termed the *Relative Liability Classification Plot*. The values plotted on the axes for liability exposure is a scaled score which is computed from the position of the generator relative to the upper and lower benchmarks for several factors.

The two principal products of this study are the *Risk Assessment Procedure for a Single Disposal Option* coupled with the *Relative Liability Classification Plot*. These two tools can be used in an environmental audit to numerically and objectively evaluate the liability exposure of a generator and then to graphically represent the generator's liability position.

The results discussed in this report constitute the first of five phases of research on liability related to hazardous wastes and hazardous substances. A suggested research agenda is given for the last four phases.

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I. THE RESEARCH PROBLEM

INTRODUCTION

The liability exposure of a hazardous waste generator is a nebulous concept, one that has eluded quantification by insurance companies and governmental agencies. This study is pioneering--never before has a study been made available to the public which quantifies the liability exposure of a hazardous waste generator. Volumes have been written on actions which, if taken, will reduce liability exposure, yet no method for actually estimating liability exposure has been developed until now.

STATEMENT OF PURPOSE

The intent of this study is to gain insight into the factors which influence the liability exposure of a hazardous waste generator. This study will attempt to determine the relative importance of factors which affect the liability exposure of a hazardous waste generator and incorporate these factors into a risk assessment form which then could be used to assign a risk rating to a generator. The expected cost of regulatory compliance penalties are neglected as these are under the direct control of the generator. Later phases of the study will attempt to determine the expected liability costs (in dollars) associated with hazardous waste disposal and correlate these to a generator's assigned risk value.

JUSTIFICATION FOR THE RESEARCH

A company can estimate its compliance costs, direct disposal costs, and other elements of the true cost model.[2] A company also can through proper operating procedures avoid regulatory penalties. There is, however, virtually no data on liability costs.

Unfortunately, because of the standard of strict liability imposed on generators, in the long run some liability cost will be unavoidable. In order to determine operating strategies with the lowest true or total cost, companies need to know the expected value of liability costs as a function of their decisions regarding selection of disposal options and facilities and on other choices made in their operations.

Knowledge of the magnitude of liability exposure in dollars will also make waste reduction efforts more economically attractive. "In a 1986 Office of Technology Assessment survey, industry representatives said that economic factors were the most significant barriers to waste reduction."[3] A 1986 EPA report to Congress noted that even though waste minimization practices often lead to cost savings in the long run, availability of capital in the short run for plant modernization is often a significant obstacle to their implementation.[4]

RESEARCH OBJECTIVES

The research on liability exposure addressed by this study has been divided into five phases. This report discusses results from Phase I research.

Phase I

- Use an opinion survey to estimate the relative importance of macro-level factors which affect liability exposure under RCRA.
- Establish two benchmarks on a scale with endpoints of zero liability and certain liability exposure.

- Incorporate factors and their importance value into a prototype risk assessment form which could be used to assign a risk rating (in units of "liables") to a generator.

Phases II thru V

- Develop an accurate, valid risk assessment procedure based on results from a rigorous survey.
- Correlate a generator's risk rating in liables to a range of expected dollars of liability by estimating the true cost of off-site hazardous waste disposal.
- Repeat the RCRA research for OSHA employee right-to-know and SARA community right-to-know legislation.

KEY DEFINITIONS

RCRA
RCRA is the principal legislation governing the handling and disposal of hazardous waste and is an anacronym for Resource Conservation and Recovery Act, originally enacted in 1976 and amended in 1984.

Hazardous Waste
A waste material is a hazardous waste if it is listed in RCRA or possesses one of four characteristics of hazardous waste as defined in RCRA (ignitability, corrosivity, reactivity, or toxicity).

Generator
A facility which generates more than 1000 kg of hazardous waste per month or greater than 1 kg of certain wastes classified as acute is classified as a hazardous waste generator under RCRA. Generator is also the generic classification used to refer to all producers of hazardous waste.

100 to 1000 kg Generator
A facility which generates between 100 and 1000 kg of hazardous waste per month and less than 1 kg of certain wastes classified as acute receives this classification under RCRA.

Conditionally Exempt Small Quantity Generator (SQG)
A facility which generates less than 100 kg of hazardous waste per month and less than 1 kg of certain wastes classified as acute is classified as a conditionally exempt small quantity generator.

Factor
For the purposes of this study, factors are those conditions, actions, methods, or decisions which potentially affect the liability exposure of a hazardous waste generator. Associated with a factor is a scale of liability exposure.

Descriptor
In the survey, verbal descriptions of the various conditions, actions, methods, or decisions related to a factor are termed descriptors. Associated with a descriptor is a numerical position on the liability exposure scale for the related factor.

Disposal Option
For the purposes of this study, a disposal option includes both the method of disposal and the disposal site identity. A disposal option is the the complete plan for disposal of hazardous wastes (excluding transportation plans).

II. RESULTS OF LITERATURE REVIEW

THE DEARTH OF DATA ON GENERATOR LIABILITY

Rather than trying to collect and analyze raw data on expected liability costs, government analyses and estimates were investigated as a source of raw or partially massaged data. This type of data would be useful in developing rules of thumb such as "the expected liability cost for disposing of 55 gallons of flammable waste by injection is expected to be X% of the disposal cost."

Absolutely no numerical data or statistics on hazardous waste liability were located during a thorough search of federal government documents and other collections of the university library. Documents and indexes which were perused included:

- Environmental Protection Agency Publications Bibliography
- General Accounting Office Reports
- Office of Technology Assessment Studies
- Federal Register
- Organization for Economic Cooperation and Development Publications
- Index to International Statistics
- American Statistical Index
- Oklahoma State University collection of books and periodicals
- Risk Management periodical

Some of the key words used in the search were:

- hazardous substance
- hazardous waste
- liability
- lawsuits
- risk analysis
- risk assessment
- risk management
- disposal
- database
- injection
- landfill
- incineration

The General Accounting Office (GAO) is preparing studies on issues related to hazardous waste disposal liability but has not yet published their findings. "In passing SARA ... the Congress directed GAO to review four key issues associated with insurance for handlers of hazardous substances:

- The liability of those who clean up hazardous waste sites.
- The liability of those associated with hazardous waste sites after their closure.
- The liability of those responsible for underground petroleum storage tanks.
- The availability of insurance for individuals who may be liable for the release of hazardous substances into the environment."[5]

A report on the fourth topic has been issued by GAO, numbered GAO/RCED-88-2. Reports on the first three issues have not been completed. Reports on the first two issues would be especially helpful for this study on generator liability.

The difficulty in finding analyses of data is due to the lack of data itself, as underscored by a comment made by GAO in their report on insurance availability: "Because many of the financial data

needed to perform this study are proprietary or unavailable in any readily accessible form, we relied on the voluntary cooperation of the insurance and hazardous substances industries to provide us with relevant information."[6] A frustrated GAO noted that "there is no central information source to capture data on all pollution claims"[7] and that "the Congress should consider requiring insurers or responsible parties, as appropriate, to report to EPA the amounts of indemnity payments made to cover pollution cleanups and related third-party bodily injury and property damage."[8]

The type of data generally contained in government analyses quantifies the costs of regulatory compliance and compares these to the expected benefits. For example, the Economic Impact Analysis for RCRA Subtitle C stated that:

> As a result of the Phase I regulations, the annual hazardous waste disposal costs for the 29,000 generators covered by the EIA are predicted to increase by $510 million. Of this annual cost, about 50% is for compliance with surface impoundment requirements. Recurring operational and administrative expenses account for $430 million (1980 dollars) of the total annual cost; the rest is for capital and other initial expenditures (as annualized). Total capital and other initial expenditures are estimated to be $310 million.... The $510 million annual cost amounts to less than 0.2 percent of the value of sales of the affected industries.[9]

Quantification of liability costs is an area which has been carefully avoided by federal agencies. Most material in the private sector on risk management and liability exposure consists of general strategies and techniques to reduce liability. An example is given in Figure 1.

1. Know where your wastes are going.
2. Know what's happening to them once they arrive.
3. Verify the destruction of these wastes.
4. Reduce, eliminate or recycle your wastes to limit your "cradle-to-grave" responsibility.
5. Do not rely on the words of others for what will happen to your wastes.
6. Understand the concepts of strict liability and joint and several liability as they pertain to your waste management program and potential liabilities.
7. Do not accept certificates of disposal as evidence that your wastes no longer exist.
8. Limit your exposures to risk by dealing directly with the end disposal site, limiting or eliminating the involvement of middlemen.
9. Perform comprehensive audits of the complete waste disposal chain.
10. Accept full responsibility for your wastes as long as they are on this earth.

Figure 1: Ten Steps to Reduce Your Liability[10]

INSURANCE AVAILABILITY AND CLEANUP COSTS

Because of the nebulous nature of liability costs, insurance companies have become increasingly reluctant to underwrite pollution insurance policies. A GAO report concluded that:

> Pollution liability insurance continues to be generally unavailable. Although more than 100,000 companies generate, handle, or dispose of hazardous substances, few of them have insurance for pollution risks.
>
> Only one insurance organization is actively marketing pollution insurance. A few hundred companies are insured under its policies.
>
> According to insurance industry officials, the uncertainties created by potentially enormous claim payments and unfavorable legal trends have led most of the insurance industry to perceive pollution as an uninsurable risk.[11]

Three categories of unquantifiable costs exist: litigation expenses, environmental cleanup costs, and emergency response costs. Litigation expenses can arise from lawsuits concerning health problems due to exposure at the disposal site, health problems due to exposure at a spill site, health problems associated with handling and transporting, and damage to the environment. Environmental cleanup may be required at the facility, at legal disposal sites, at sites of illegal dumping, and at emergency response locations. Emergency response costs include the response cost itself, the cost of lost equipment, facilities, vehicles, etc., and medical costs related to injuries and workmans compensation.

As an example of the magnitude of cleanup costs at a disposal site, the Office of Technology Assessment estimated that 10,000 or more sites will require cleanup under the Superfund program, an effort expected to require 50 years and $100 billion. The costs for temporary cleanup (not even a permanent action) will average $300,000 per site for immediate removal and $10,000,000 per site for remedial cleanup.[12]

III. RESEARCH METHODOLOGY

RESEARCH METHODS CONSIDERED

It was originally expected that in the great quantity of material and research published by the U.S. government there would be data related to generator liability. As already discussed, no such data was found.

Failing the discovery of analyzed data, it was postulated that EPA regional offices would have data on cleanup costs incurred by generators in CERCLA settlements. However, this data is not maintained in an easily accessible and analyzable format.

At this point the decision to use a survey was made. One option considered to increase the dispersion of surveys was to publish the survey in a journal read by generators. This option was not taken due to time constraints, and the survey was mailed instead. However, the journal approach might be used in subsequent phases.

PRELIMINARY RESEARCH

To obtain a list of potential survey recipients, the Region 6 office of EPA was contacted in writing (see Appendix A) and a printout from HWDMS (Hazardous Waste Data Management System) of about 300 generators located in Region 6 was obtained. Data consisted of the generator's EPA ID number, RCRA status, and all information needed to contact the generator in writing or by phone. Information requested on CERCLA settlement figures was withheld without explanation, perhaps because the cost of obtaining this information exceeded the $25 limit specified in the letter to EPA.

To understand the types of factors which an insurance company would consider when underwriting a policy for a hazardous waste generator, Environmental Compliance Services was contacted in writing (see Appendix B) and by phone. The company president was very helpful and sent a sample application for insurance coverage contained in Appendix C.

A discussion on the statistical aspects of a mailed survey was held with Will Focht, Department of Environmental Sciences. The main conclusions drawn from the discussion were that:

- randomness in the population is very important
- for a reasonable margin of error, 200-300 responses or 20% of population (whichever is smaller) are required
- the return rate on a mailed survey is about 25 to 45%

- people will not create numbers for you in the mail--at best they will give you information which is at their fingertips. To get more difficult information you must conduct a personal or phone interview.

DESCRIPTION OF THE SAMPLE POPULATION

The population for this study consisted of environmental coordinators, consultants, public servants, and other individuals who received training in the Certificate Program in Hazardous Materials Management at Oklahoma State University directed by Wayne C. Turner, Ph.D., P.E., CHMM.

The names and addresses of these individuals were obtained from registration records of the Certificate Program for the years 1987 thru 1989. A purposive survey was mailed to these individuals. (Because the survey was mailed to a select group of environmental professionals rather than to a random population, the survey is described as "purposive.") Because the sample population does not consist of a random cross section of environmental coordinators, results of the survey may be skewed.

Figure 2 illustrates that the geographical location of respondents tended to be concentrated in Oklahoma and surrounding states. Figure 3 shows that the size of respondents' companies was fairly evenly distributed from 1 to 1000 persons. However, no larger companies were included in the survey as such companies were not represented in the population. Table 1 lists the principal SIC codes of respondents where applicable. The companies fell into a wide range of industrial classifications. Finally, Figure 4 categorizes companies by RCRA regulatory status. Strong representation was obtained in each of the four categories.

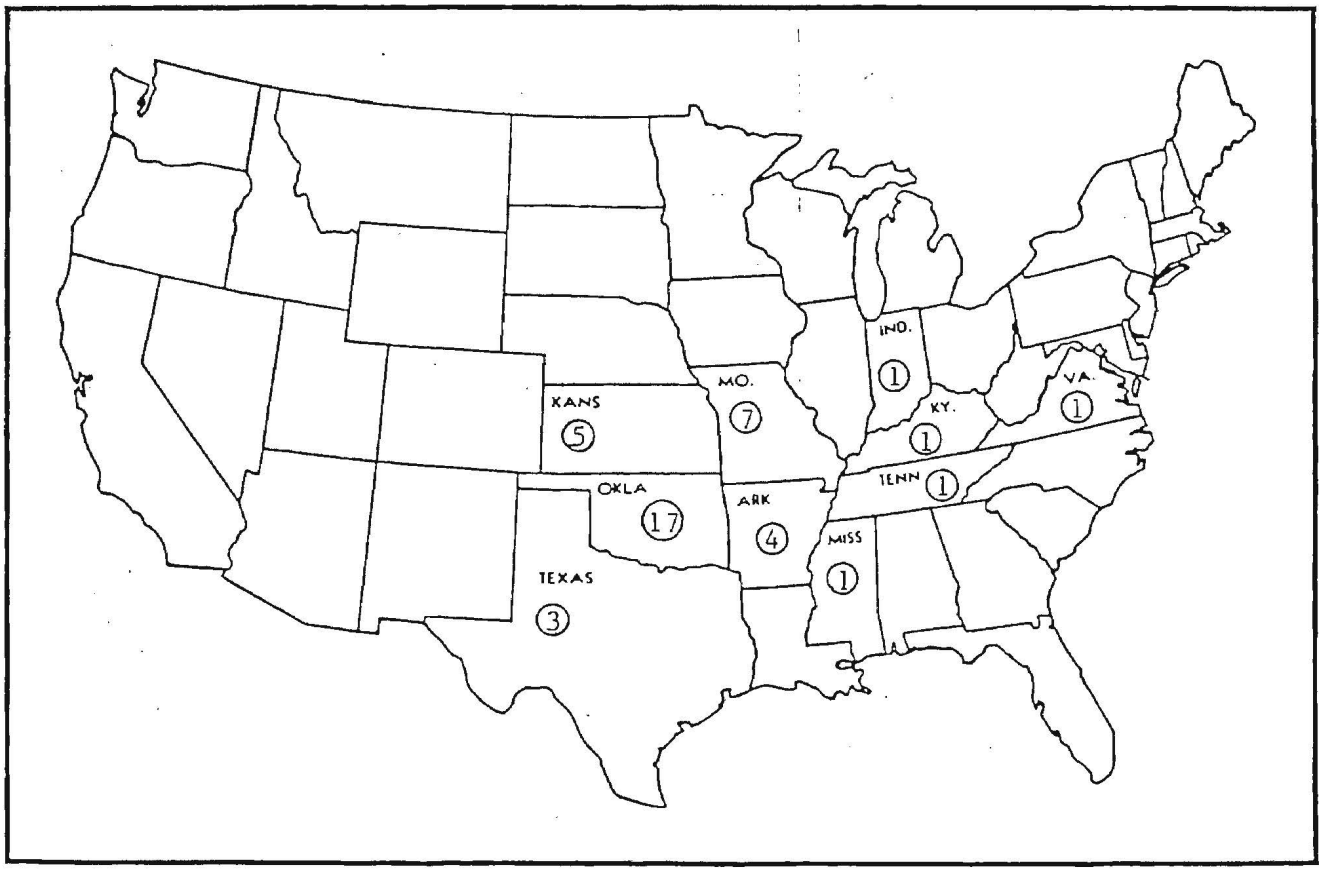


Figure 2: Geographical Location of Respondents

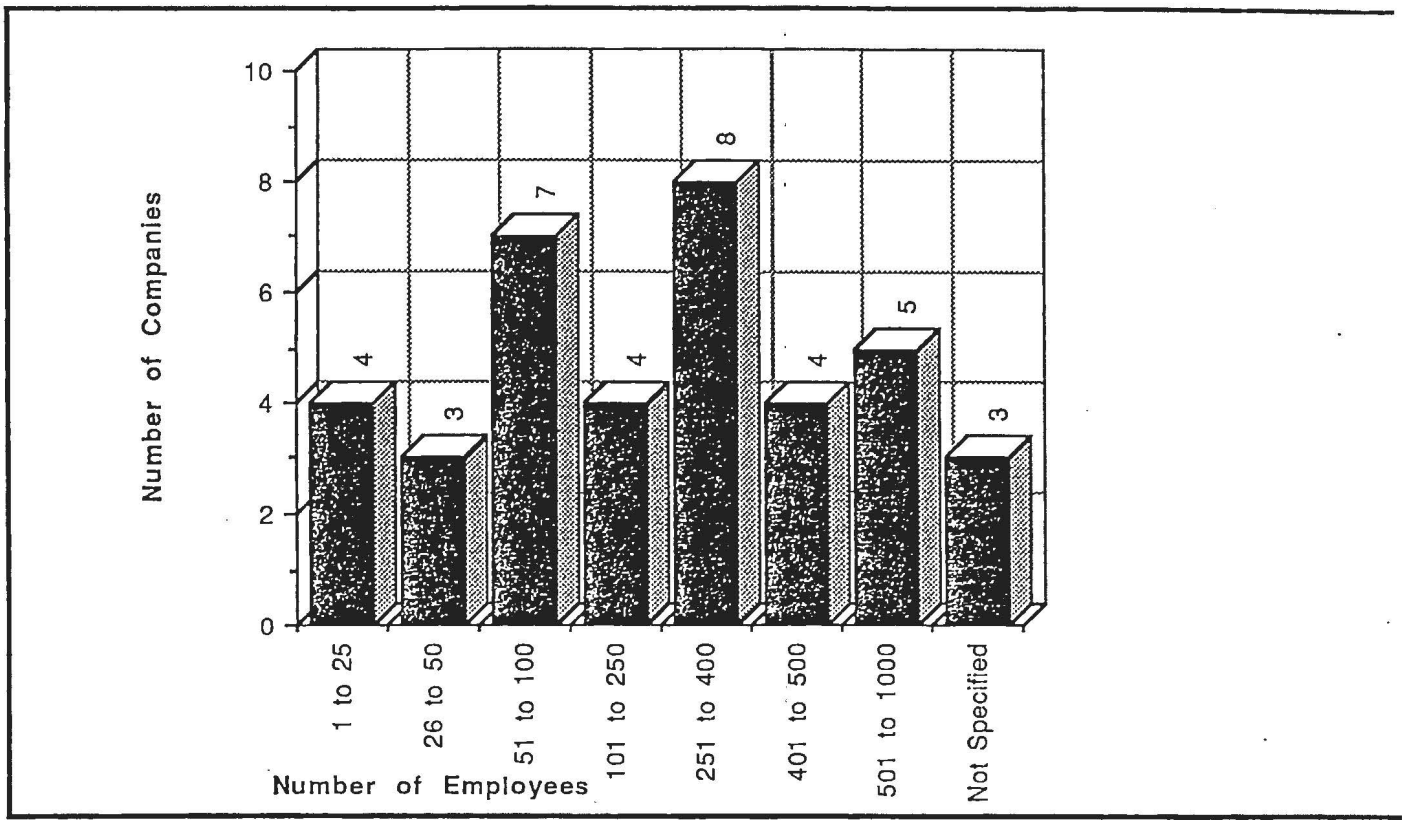


Figure 3: Size of Companies in Population

Table 1: SIC Codes Represented in the Population

2681	3079	3429	3533	4231
2819	3079	3469	3572	4923
2819	3221	3496	3575	
2992	3312		3641	
	3317		3724	

Not Specified or Not Applicable	22

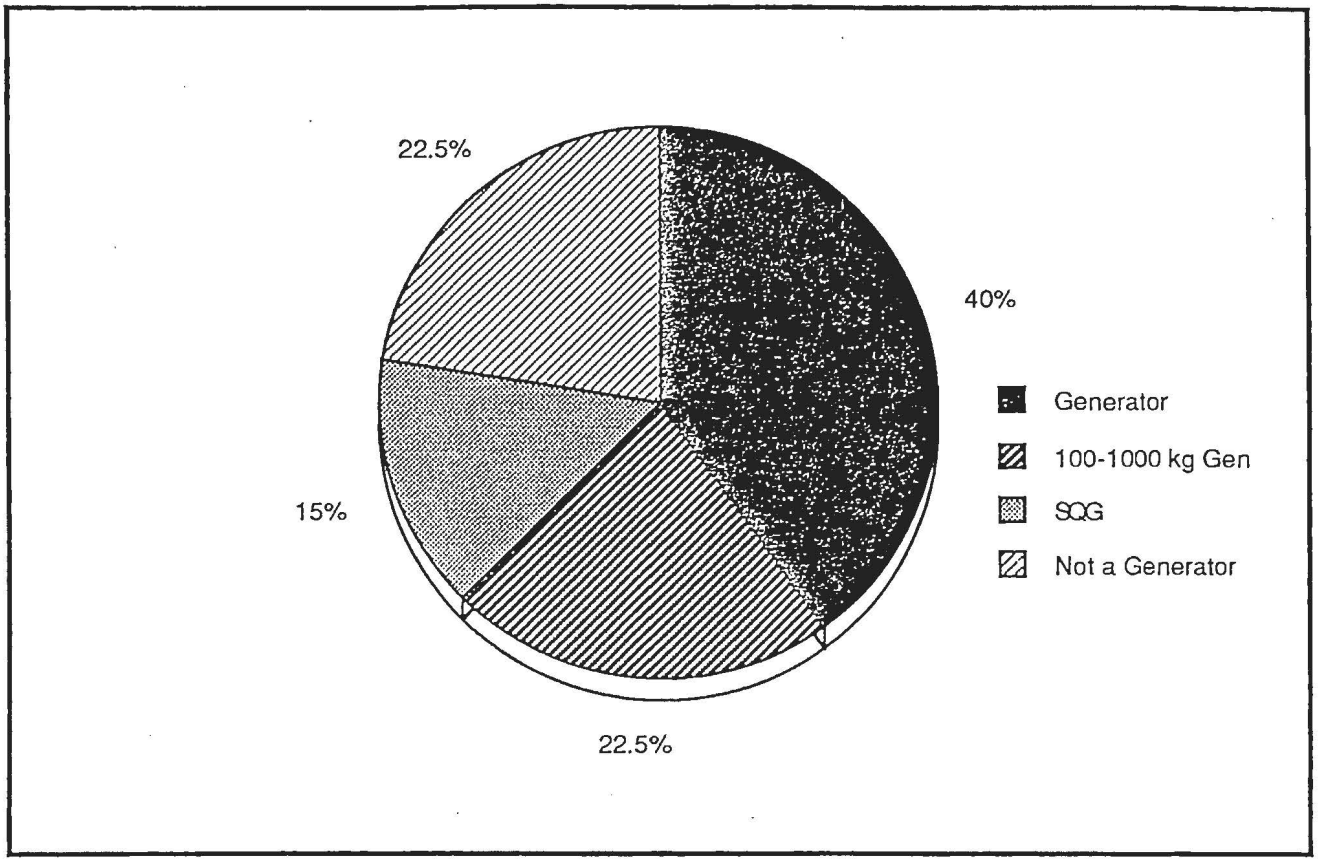


Figure 4: Regulatory Status Under RCRA

LIMITATIONS

Phase I of this study was primarily limited by the expense and time required to conduct a full-scale survey. The unit cost of a mailed survey including a pre-notice card, a cover letter and survey, a reminder letter, a return envelope, and a copy of the results exceeds $2.00.

Respondents will not search for numbers (such as the number of dollars their company has spent on cleanup of disposal sites) to complete a survey which arrives in the mail . If the survey cannot be filled out on-the-spot, a personal interview and/or some authority is required to extract this information. If personal interviews were utilized for this study, a staff would need to be employed to conduct the interviews.

Another limitation in the population which was selected is that it is not random. All respondents have had similar training in hazardous waste management.

MAJOR ASSUMPTIONS

Perhaps the main assumption in this study is that respondents have sufficient training, experience, and insight to make valid judgements on factors affecting liability exposure. Secondly, the method in which data was collected also assumes that respondents will give appropriate weights to factors of greater and lesser importance. Thirdly, this study assumes that the list of factors which was included on the survey represents the complete set of liability-modifying actions. Finally, in analyzing the responses the view was taken that the average response of all data is the most correct. This is likely not true, for reasons discussed in Sections IV and VI.

SELECTION OF SURVEY FACTORS

Factors were selected to include actions which increase liability exposure, actions which decrease liability exposure, and actions associated with regulatory compliance but which also affect liability exposure. In the selection, particular emphasis was given to non-regulatory factors such as choice of transporter, choice of waste disposal site, choice of waste disposal method.

Several sources were consulted to generate a pool of potential factors. These included material from an insurance firm, textbooks on hazardous waste management[13], government publications on hazardous waste legislation, and material used in a class on hazardous waste management at Oklahoma State University.

The factors listed at the front of "ECS Underwriting Pollution Department Capabilities" (see Appendix C) were considered in developing the survey, but because many are industry specific, they were considered as inappropriate to the general purposes of this survey. These factors would be useful in designing an industry-specific risk assessment procedure. Factors listed in the "Application for Pollution Legal Liability Insurance" and the "Supplemental Application" would be useful in a detailed survey such as that conducted in Phase III of this research project.

The topics to be included in the survey corresponded to basic elements of a hazardous waste management program, including inspections, RCRA training, marking and labeling, manifesting and exception reporting, choosing a transporter, choosing disposal methods, and choosing disposal sites. These were suggested by Turner[14].

An alternate list of additional factors and descriptors was developed. Factors were classified as external, evidence of internal management commitment, and quality of management decisions. External factors included:

- Demographics
  - Proximity to urban center
  - Population density
  - Amount of identifiable citizen opposition
- Location
- Type of industry
- Status of pollution insurance
- Type of waste
  - Quantity of acute waste
  - Degree of waste toxicity
- Amount of waste
  - Amount of waste produced
  - Amount of acute waste produced
  - Number of years that hazardous waste has been produced
- Size of company
  - Number of employees
  - Annual sales

Factors evidencing internal management commitment included:

- Waste reduction initiative
  - Percent of waste recycled or reused
  - Percent increase/decrease each year in waste volume
  - Percent waste treated before disposal
- Full-time environmental coordinator?
  - Percent of budget spent on environmental management
  - Number of man-hours assigned to environmental matters

- Regulatory compliance
  - Number of enforcement actions
  - Amount of penalties
- Contingency plan and emergency preparation
  - Level of detail
  - Review frequency
  - Amount of emergency response equipment

Factors related to management decision quality included:

- Disposal
  - Disposal method chosen
  - Usage of waste brokers
- Choice of disposal site
  - Selection criteria
  - Percent disposed of on-site
  - Frequency that site is audited
- Choice of transporter
  - Selection criteria
  - Percent transported off-site
  - Frequency that transporter is audited
  - Transporter training
  - Average distance transported

When generating a list of disposal methods, reuse and recycling was combined with other waste minimization techniques such as process modification, raw material substitution, and source segregation and separation. Chemical treatment, biological treatment, and physical treatment were neglected because of low usage of these methods. Surface impoundments, tanks, containers, vaults, and waste piles were combined into one group: indefinite storage.

SURVEY DESIGN

Maximization of Response Rate

Because of the small population chosen, a prime consideration in survey design was maximizing the response rate. The original intent of the survey was to ask respondents to provide a dollar estimate of liability costs actually incurred to date, expected future liability costs per year, and the number of lawsuits which had been incurred or were expected in the future. However, not only is this sensitive information to many companies, few environmental coordinators would know this information. (Indeed, it is questionable whether many companies other than large corporations have tabulated this data at all). Therefore, any question which would require respondents to search for data or which might be considered sensitive was omitted. All survey questions ask for opinions, rather than numerical data.

Special consideration was also given to the published format of the survey, all in the interest of increasing response rate. A laser printer was used to produce the survey, making its appearance professional and easy to read. The survey was printed on one sheet to reduce handling errors and was duplexed to reduce mailing and copying costs. Colored paper was also used to improve the response.

Survey Pretest

A pretest was conducted with the environmental coordinator of a local industrial firm with considerable hazardous waste experience. Results of the pretest were very favorable. Only two minor changes were made: the scale on disposal method liability was changed from 100 to 10 in order to be

consistent with the rest of the survey and the term "company" was replaced by "facility" in the three questions related to cleanup history. A few minor additions were also made following the pretest: an additional regulatory status box ("not a generator of hazardous waste") was added, space was provided for respondents to list their name and company if desired, and lines were added between sections to improve readability.

DATA COLLECTION

A cover letter was developed to accompany the survey. This letter was individually addressed to each respondent and hand-signed (two signatures) to increase return rate. A copy of the survey and a sample cover letter is included in Appendix D.

The survey and cover letter were mailed to 88 persons. An addressed, stamped response envelope was provided and complete anonymity was assured. A summary of results of the study was promised by December. of 1989.

The response rate for the survey was 47 percent, i.e. 41 out of 88. The raw data collected from the surveys is included in Appendix G.

IV. ANALYSIS OF DATA

CODING AND ORGANIZATION OF DATA

The survey format was designed such that response data could be easily collected and entered into a personal computer. Respondents circled a number from a string similar to "0 1 2 3 4 5 6 7 8 9 10."

All data analysis was conducted with the aid of an Apple Macintosh® SE/30 computer with a 68882 floating-point coprocessor. A Microsoft® Excel spreadsheet was used to organize and manipulate data. Graphics were prepared with the aid of Cricket Graph. Statistical tables were prepared from Excel data using the table utility in Microsoft® Word.

FACTORS, DESCRIPTORS, AND VARIABLE NAMES

Various descriptive phrases are used to refer to the factors and descriptors used in the survey. Also, the set of responses to each question on the survey has been given a variable name. A list of all terminology is provided in this section.

Factors and Descriptors

Table 2 lists the identifying name for each factor, the descriptor texts for each factor, and the description given on the plot legend for each descriptor.

Table 2: Terminology for Factors and Descriptors

Ident-ifier	Factor Description	Survey Descriptor	Plot Legend Description
1	Container Inspection	Containers are not inspected. Containers (such as 55-gallon drums) are inspected weekly.	None Weekly
2	Tank Inspection	Tanks are not inspected. Tanks are inspected daily.	None Daily
3	Environmental Audits	Environmental audits are not conducted. Environmental audits are conducted regularly and follow-up actions are taken.	None Regular
4	Employee Training	Employees are not trained in proper waste handling and emergency procedures. All employees are trained upon initial assignment and retrained annually.	Not Trained Trained
5	Container Marking	Containers of hazardous waste which are being stored are not marked. All containers being stored are labeled as "Hazardous Waste" and dated.	Not Marked Marked
6	Storage Period	Some containers are held in storage for longer than 90 days (or longer if SQG) without a permit. All containers are transported within 90 days.	> 90 Days < 90 Days
7	Exception Reporting	If a manifest is not returned from the disposal site no action is taken. If a manifest is not returned within 35 days an investigation is conducted and a report is filed.	No Action Taken Investigation
8	Waste Determination Profile and Disposal Plan	Documentation such as the waste determination profile and the disposal plan does not exist. Waste determination profiles and disposal plans are up-to-date.	None Current
9	Other Documentation	Documentation of inspections, training records, and manifest copies is lost or missing. All documentation is available in well-organized files.	None Current
10	Contingency Plan Status	No contingency plan has been written. Contingency plan exists and is reviewed periodically for accuracy.	None Current

11	Emergency Equipment	Emergency equipment (such as an alarm, telephone, fire exting., etc.) is inadequate or improper. Emergency equipment is adequate and meets fire department guidelines.	Inadequate Adequate
12	Spill Control Equipment	Spill control equipment (PPE, containment, absorbent, etc.) is only available in a few locations. Spill control equipment is readily available and is of proper type for the type of waste handled.	Limited Availability Readily Available
13	Arrangements with Local Authorities	Arrangements with local fire, police, and hospital officials have not been made. Local authorities are aware of the types of waste handled and are available in an emergency.	Not Made Made
14	Emergency Coordinator	Emergency coordinator has not been appointed. Emergency coordinator has been appointed and his name and telephone posted.	Not Appointed Appointed
A	Transporter Insurance and EPA ID Number Status	Transporter does not have an EPA ID number or insurance. Transporter has an EPA ID number and insurance.	None Current
B	Transporter Reputation	Reputation of transporter with associates, trade associations, or other agencies is unknown. Reputation of transporter is known to be favorable.	Unknown Favorable
C	Transporter Vehicle Condition	Transporter's vehicles are in poor condition and do not have emergency equipment. Transporter's vehicles are in good condition and equipped with emergency equipment.	Poor Good
D	Transporter Origin	An independent transporter is hired by the generator to transport waste to the disposal site. The generator transports waste with his own company vehicles and drivers. The disposal site transports the waste to their site.	Independent Generator Disposal Site
E	Shared Transportation of Waste	Waste from other generators is also on the truck with this generator's waste. The transporter has waste from one generator only on the truck.	Shared Load Not Shared
F	Disposal Site EPA ID Number Status	Disposal site does not have an EPA ID number. Disposal site has an EPA ID number.	None Current

G	Disposal Site Reputation	Reputation of site with associates, trade associations, or other agencies is unknown. Reputation is known to be favorable.	Unknown Favorable
H	Disposal Site Audits	Disposal site has not been audited. Disposal site is personally audited by the generator regularly.	Not Audited Audited
I	Disposal Site Location	Hazardous waste is disposed of at an off-site commercial facility. Hazardous waste is disposed of on-site.	Off-Site On-Site
J	Disposal Site Age	Disposal site has been in operation for many years. Disposal site has been in operation for only a few years.	Many Years Old Few Years Old

Variable Names

Variable names have been assigned for data contained in the two sections of the survey which do not have factors: disposal liability and cleanup history.

Disposal liability is also referred to as "Likelihood of Cleanup for Various Disposal Options." The variables contained in this section are:

- Burning as Fuel
- Incineration
- Indefinite Storage
- Landfill
- Recycle/Reuse
- Injection
- Percent

All of the variables refer to the possibility of cleanup given a particular disposal option (ranked on a scale from 1 to 10) with the exception of "percent," which is the percentage of a generator's liability exposure arising strictly from his choice of disposal method (not specific transporter or disposal site selection).

The last three questions on the survey are optional and refer to the cleanup history of the survey respondent. Variables in this section are:

- Named as PRP
- Paid for Cleanup
- Defendant in Lawsuit

The acceptable responses to these variables are "yes", "no", and "unsure". "Named as PRP" describes the status of the respondent as a potentially responsible party. "Paid for Cleanup" describes whether the respondent has paid for the cleanup of any disposal sites. "Defendant in Lawsuit" indicates whether the respondent has been named as a defendant in a lawsuit because of his generation of hazardous waste.

METHODS USED IN THE ANALYSIS OF DATA

No attempt was made to judge the expertise of respondents based on their responses, as this would bias the conclusions of this study. However, three of the surveys returned by respondents were deemed invalid. Two of these has a large number of zeros (#12 and #28) and one had a large number of blanks (#9). The responses contained in these three surveys were deleted from the data base.

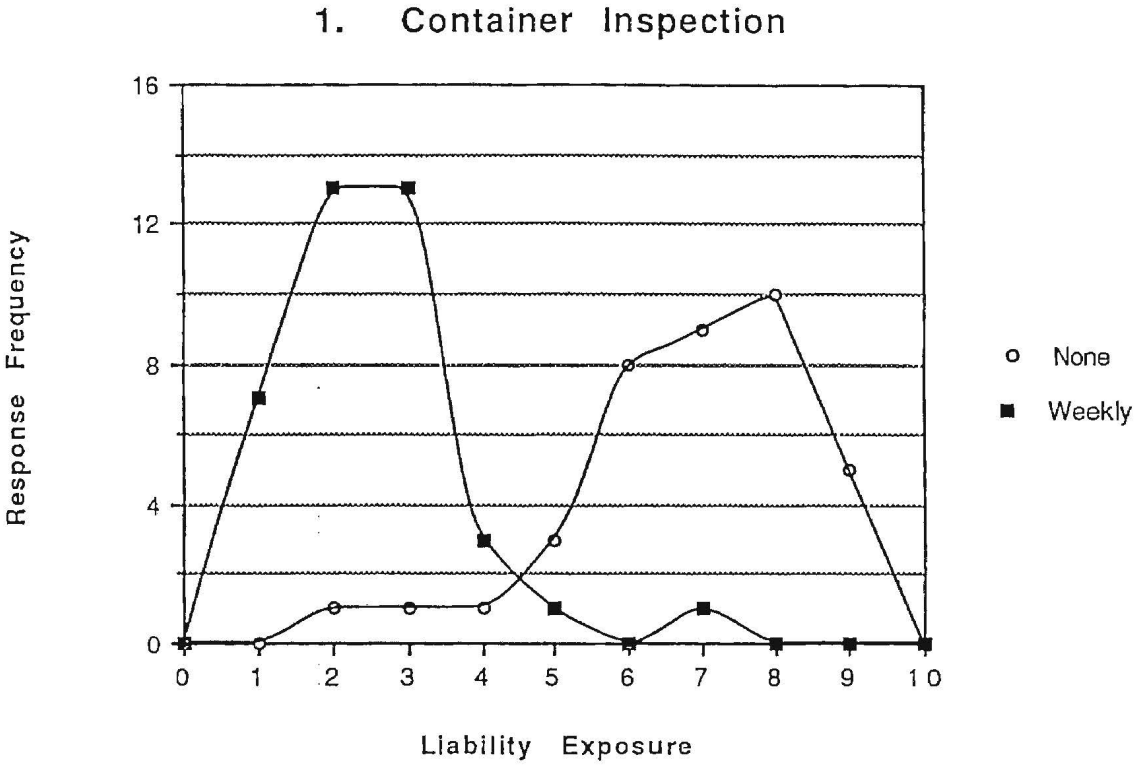
The remaining data from 38 respondents was tabulated and the average, variance, standard deviation, maximum, minimum, and number of responses for each descriptor and variable were calculated. A "Response Frequency Plot" was made for each factor. Often, two peaks appeared in the response frequency plot for a descriptor, reflecting two valid but differing opinions. Rather than making a judgement on which opinion is most accurate, *this analysis assumes that the average response is the most correct.*

Because of the number of data points (generally 30 to 38 per descriptor or variable), it was assumed that the response frequency distribution was normal. The values which approximated the 75% maximum (value below which 75% of the responses lie) and 75% minimum (value above which 75% of the responses lie) were calculated by adding and subtracting 0.68 standard deviations from the average. The 90% maximum and 90% minimum were calculated in a similar manner using 1.28 standard deviations.

Then, as a statistical experiment, all values greater than the 90% maximum and less than the 90% minimum were excluded. The remaining data was used to compute "adjusted" statistics: adjusted average, adjusted variance, adjusted standard deviation, adjusted maximum, adjusted minimum, and the adjusted number of responses. The adjusted average changed somewhat but not substantially. The adjusted variance was significantly smaller. However, because the adjusted average was not significantly changed, because the distributions were observed to be not very normal, and because there was no basis for excluding any data points (the extremes could be the correct responses), the adjusted statistics were not used in developing the risk assessment procedure and are given only as a curiosity.

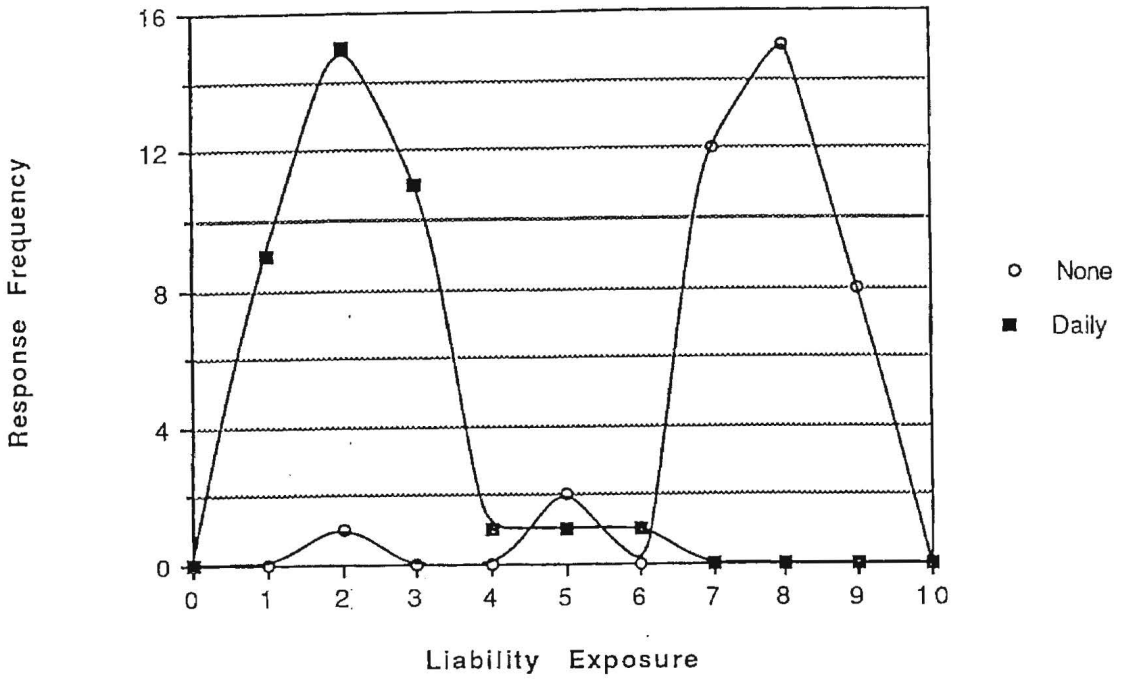
V. DATASET PLOTS AND STATISTICAL SUMMARIES

The next twenty-seven pages contain plots and tables of statistical data for each item in the survey--Factors 1 thru 14, Factors A thru J, Disposal Liability variables (various disposal options and "Percent"), and Cleanup History variables.



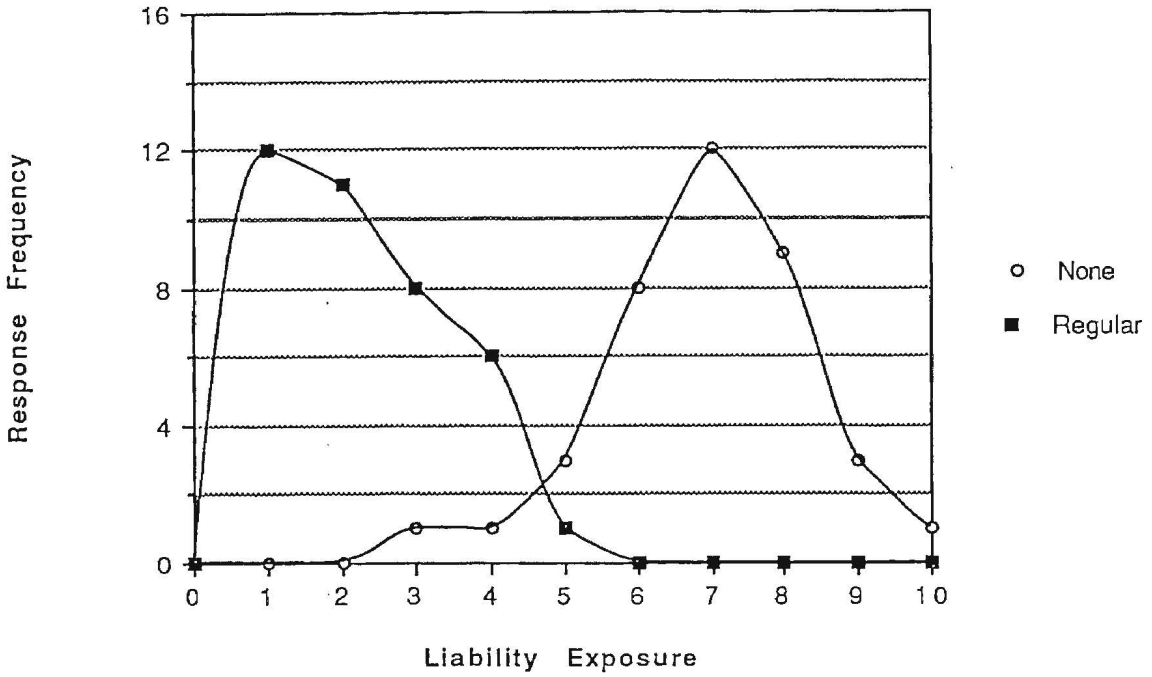
	None	Weekly
Average	6.84	2.53
Variance	2.68	1.50
Standard Deviation	1.64	1.22
Maximum	9	7
Minimum	2	1
Responses	38	38
75% Maximum	7.95	3.36
75% Minimum	5.73	1.69
90% Maximum	8.94	4.09
90% Minimum	4.75	0.96
Adj. Average	6.87	2.33
Adj. Variance	1.02	0.80
Adj. Standard Deviation	1.01	0.89
Adj. Responses	30	36
Adj. Maximum	8	4
Adj. Minimum	5	1

2. Tank Inspection



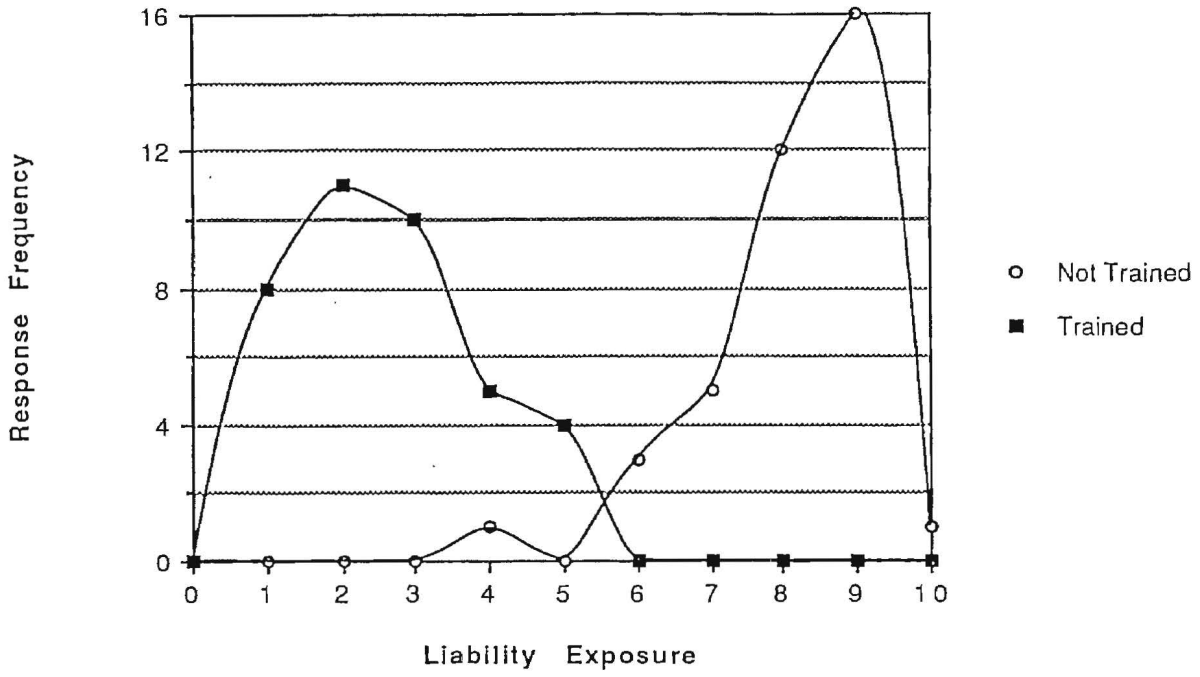
	None	Daily
Average	7.58	2.29
Variance	1.82	1.24
Standard Deviation	1.35	1.11
Maximum	9	6
Minimum	2	1
Responses	38	38
75% Maximum	8.50	3.05
75% Minimum	6.66	1.53
90% Maximum	9.30	3.71
90% Minimum	5.85	0.87
Adj. Average	7.89	2.06
Adj. Variance	0.57	0.58
Adj. Standard Deviation	0.76	0.76
Adj. Responses	35	35
Adj. Maximum	9	3
Adj. Minimum	7	1

3. Environmental Audits



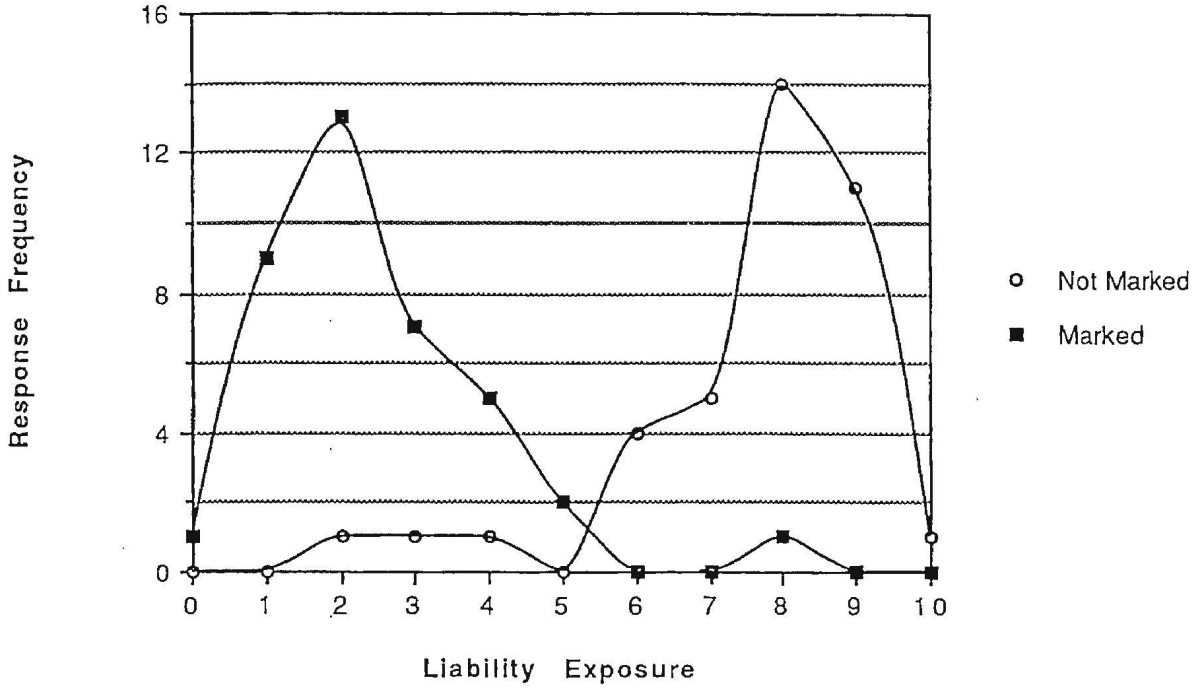
	None	Regular
Average	6.92	2.29
Variance	2.02	1.35
Standard Deviation	1.42	1.16
Maximum	10	5
Minimum	3	1
Responses	38	38
75% Maximum	7.89	3.08
75% Minimum	5.95	1.50
90% Maximum	8.74	3.77
90% Minimum	5.10	0.80
Adj. Average	7.03	1.87
Adj. Variance	0.61	0.65
Adj. Standard Deviation	0.78	0.81
Adj. Responses	29	31
Adj. Maximum	8	3
Adj. Minimum	6	1

4. Employee Training



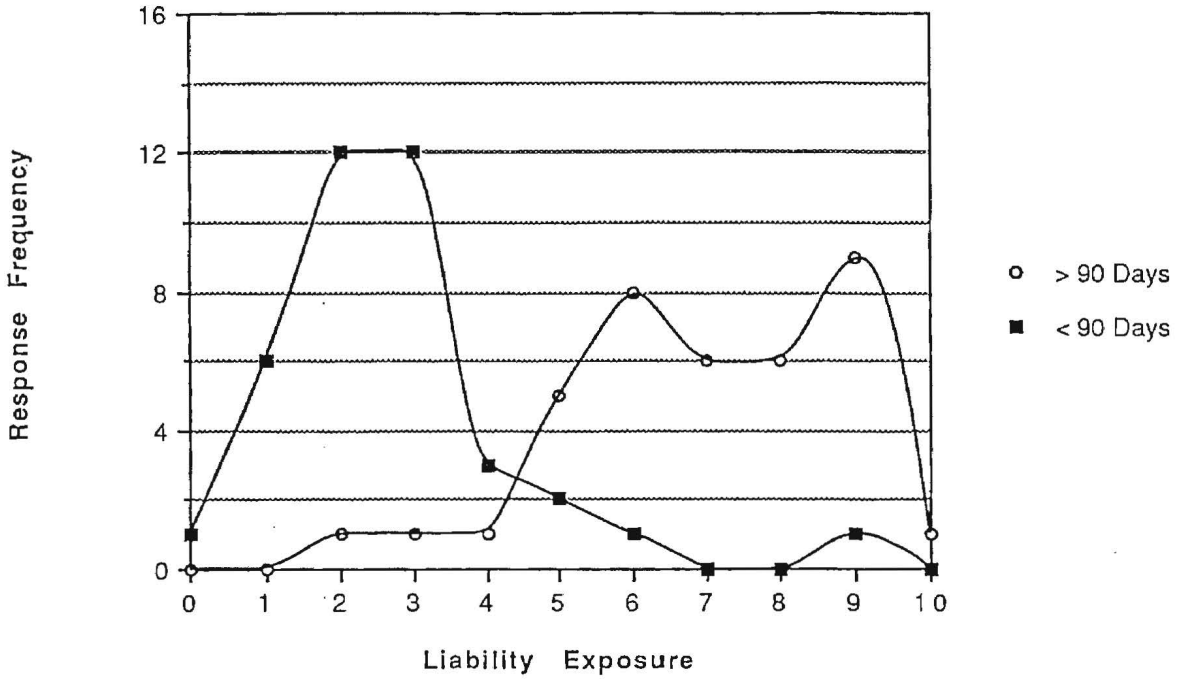
	Not Trained	Trained
Average	8.08	2.63
Variance	1.43	1.59
Standard Deviation	1.19	1.26
Maximum	10	5
Minimum	4	1
Responses	38	38
75% Maximum	8.89	3.49
75% Minimum	7.27	1.77
90% Maximum	9.61	4.25
90% Minimum	6.55	1.02
Adj. Average	8.33	2.77
Adj. Variance	0.54	0.58
Adj. Standard Deviation	0.74	0.76
Adj. Responses	33	26
Adj. Maximum	9	4
Adj. Minimum	7	2

5. Container Marking



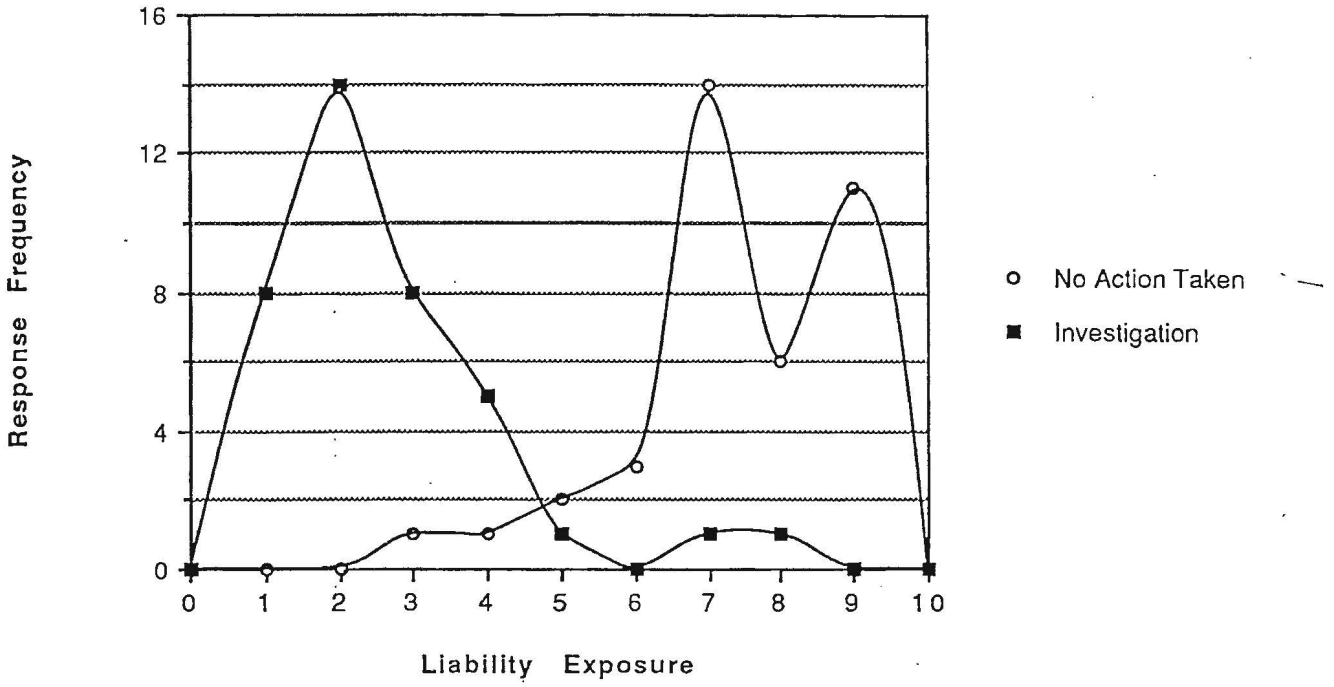
	Not Marked	Marked
Average	7.61	2.47
Variance	2.89	2.31
Standard Deviation	1.70	1.52
Maximum	10	8
Minimum	2	0
Responses	38	38
75% Maximum	8.76	3.51
75% Minimum	6.45	1.44
90% Maximum	9.78	4.42
90% Minimum	5.43	0.53
Adj. Average	7.94	2.24
Adj. Variance	0.97	1.03
Adj. Standard Deviation	0.98	1.02
Adj. Responses	34	34
Adj. Maximum	9	4
Adj. Minimum	6	1

6. Storage Period



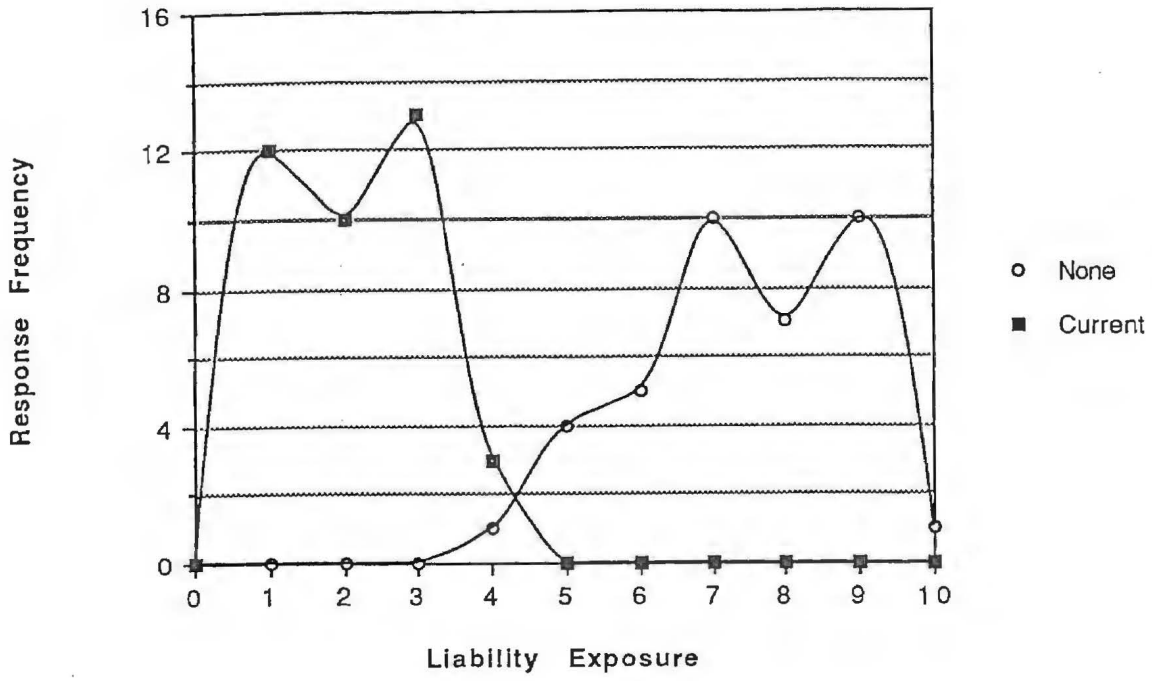
	> 90 Days	< 90 Days
Average	6.92	2.71
Variance	3.48	2.64
Standard Deviation	1.87	1.63
Maximum	10	9
Minimum	2	0
Responses	38	38
75% Maximum	8.19	3.82
75% Minimum	5.65	1.60
90% Maximum	9.31	4.79
90% Minimum	4.53	0.63
Adj. Average	7.18	2.36
Adj. Variance	2.09	0.80
Adj. Standard Deviation	1.45	0.90
Adj. Responses	34	33
Adj. Maximum	9	4
Adj. Minimum	5	1

7. Exception Reporting



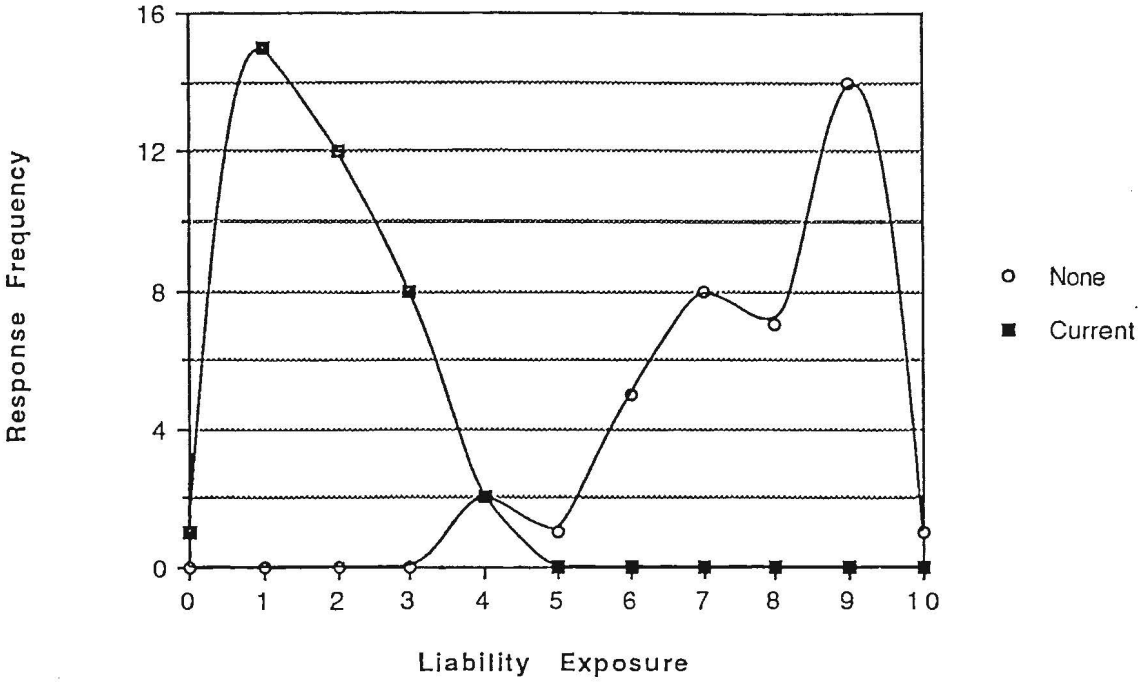
	No Action Taken	Investigation
Average	7.37	2.63
Variance	2.18	2.46
Standard Deviation	1.48	1.57
Maximum	9	8
Minimum	3	1
Responses	38	38
75% Maximum	8.37	3.70
75% Minimum	6.36	1.57
90% Maximum	9.26	4.64
90% Minimum	5.48	0.63
Adj. Average	7.74	2.29
Adj. Variance	1.05	0.97
Adj. Standard Deviation	1.02	0.99
Adj. Responses	34	35
Adj. Maximum	9	4
Adj. Minimum	6	1

8. Waste Determination Profile and Disposal Plan



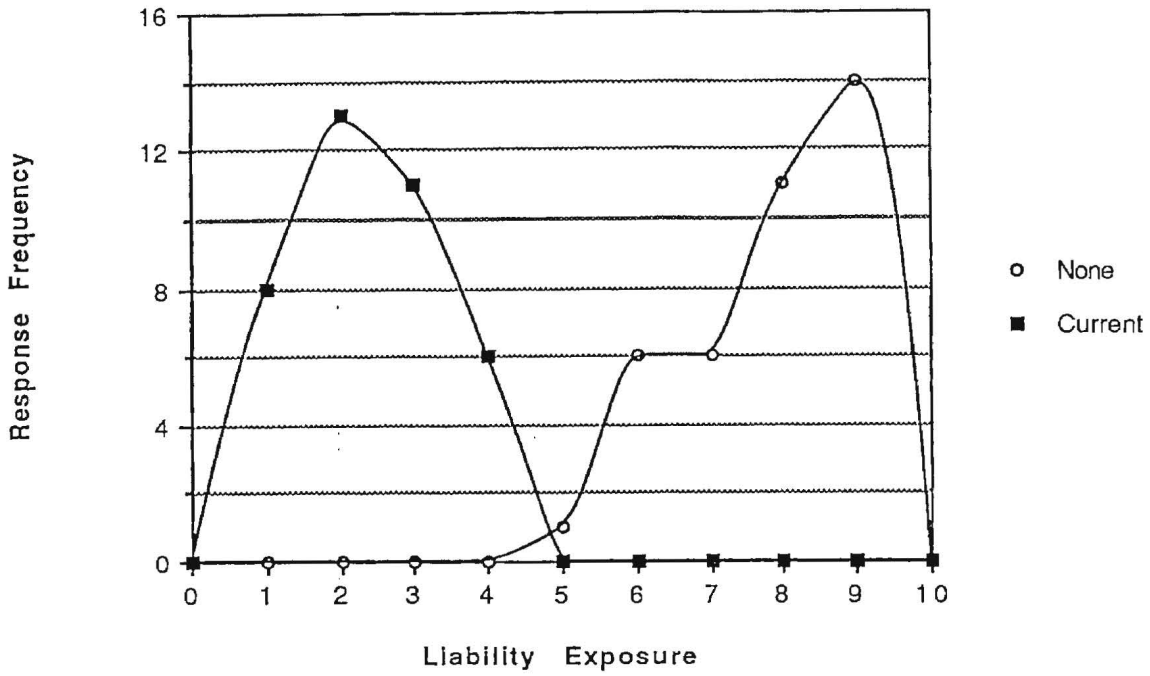
	None	Current
Average	7.37	2.18
Variance	2.18	0.97
Standard Deviation	1.48	0.98
Maximum	10	4
Minimum	4	1
Responses	38	38
75% Maximum	8.37	2.85
75% Minimum	6.36	1.52
90% Maximum	9.26	3.44
90% Minimum	5.48	0.93
Adj. Average	7.69	2.03
Adj. Variance	1.19	0.73
Adj. Standard Deviation	1.09	0.86
Adj. Responses	32	35
Adj. Maximum	9	3
Adj. Minimum	6	1

9. Other Documentation



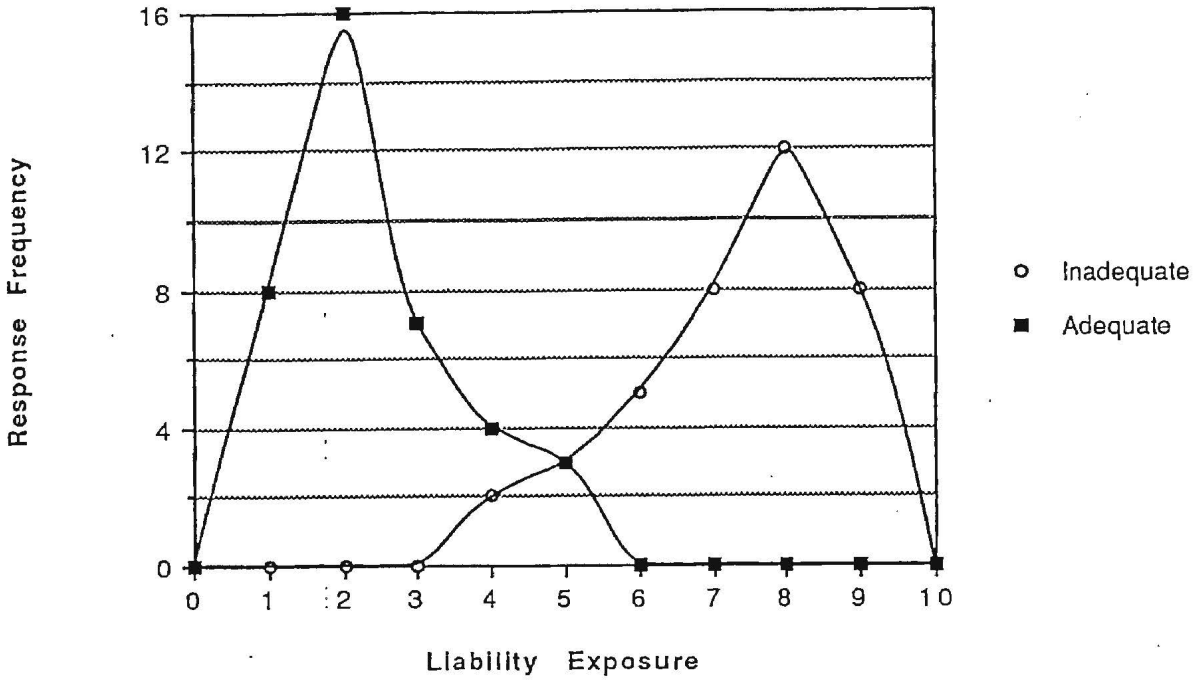
	None	Current
Average	7.66	1.87
Variance	2.23	0.93
Standard Deviation	1.49	0.96
Maximum	10	4
Minimum	4	0
Responses	38	38
75% Maximum	8.67	2.52
75% Minimum	6.64	1.21
90% Maximum	9.57	3.10
90% Minimum	5.75	0.64
Adj. Average	7.88	1.80
Adj. Variance	1.26	0.64
Adj. Standard Deviation	1.12	0.80
Adj. Responses	34	35
Adj. Maximum	9	3
Adj. Minimum	6	1

10. Contingency Plan Status



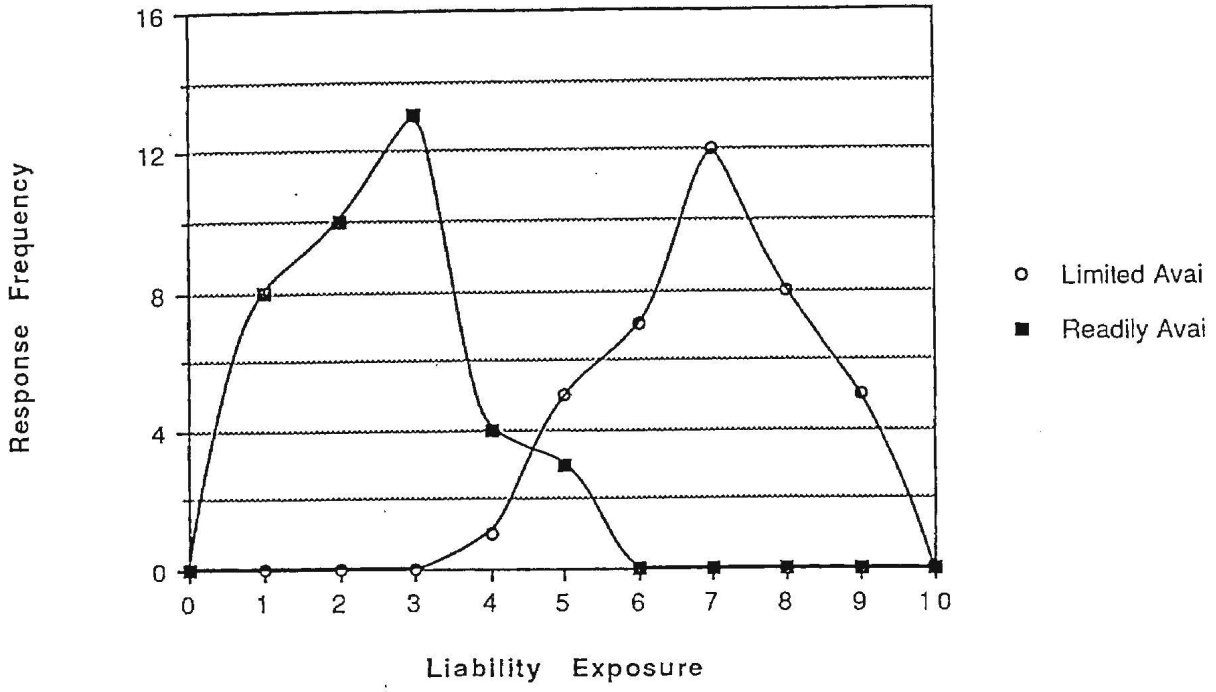
	None	Current
Average	7.82	2.39
Variance	1.40	1.00
Standard Deviation	1.18	1.00
Maximum	9	4
Minimum	5	1
Responses	38	38
75% Maximum	8.62	3.08
75% Minimum	7.01	1.71
90% Maximum	9.33	3.68
90% Minimum	6.30	1.11
Adj. Average	8.26	2.46
Adj. Variance	0.60	0.26
Adj. Standard Deviation	0.77	0.51
Adj. Responses	31	24
Adj. Maximum	9	3
Adj. Minimum	7	2

11. Emergency Equipment



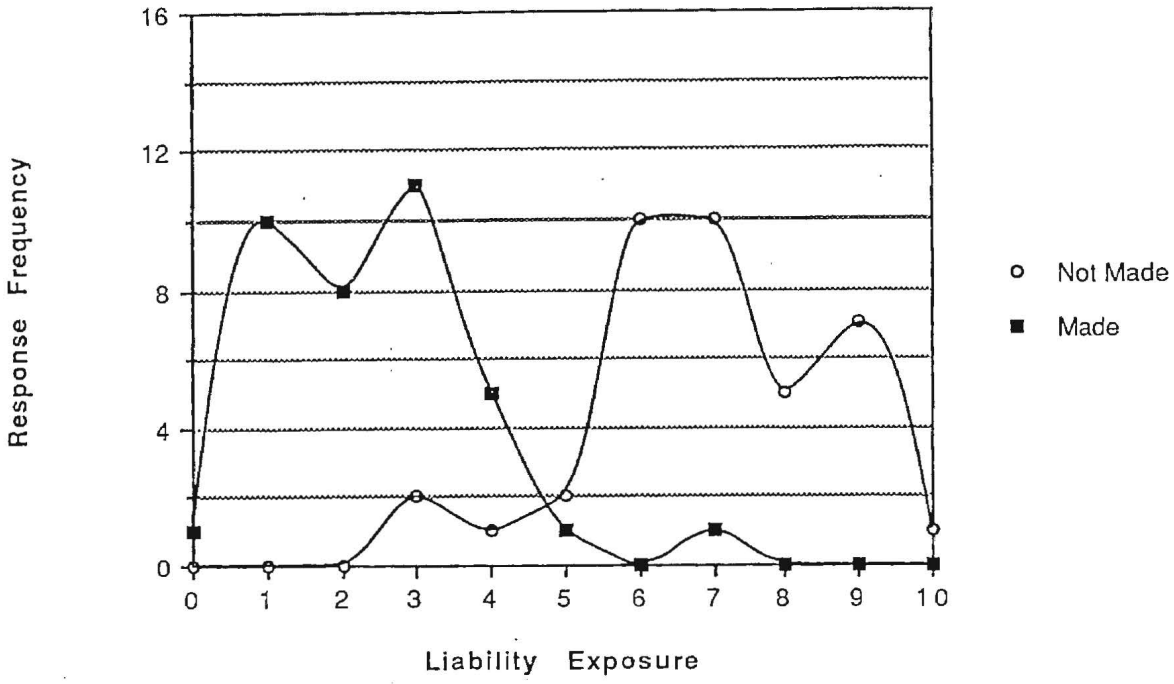
	Inadequate	Adequate
Average	7.29	2.42
Variance	2.05	1.39
Standard Deviation	1.43	1.18
Maximum	9	5
Minimum	4	1
Responses	38	38
75% Maximum	8.26	3.22
75% Minimum	6.32	1.62
90% Maximum	9.12	3.93
90% Minimum	5.46	0.91
Adj. Average	7.70	1.97
Adj. Variance	1.03	0.50
Adj. Standard Deviation	1.02	0.71
Adj. Responses	33	31
Adj. Maximum	9	3
Adj. Minimum	6	1

12. Spill Control Equipment



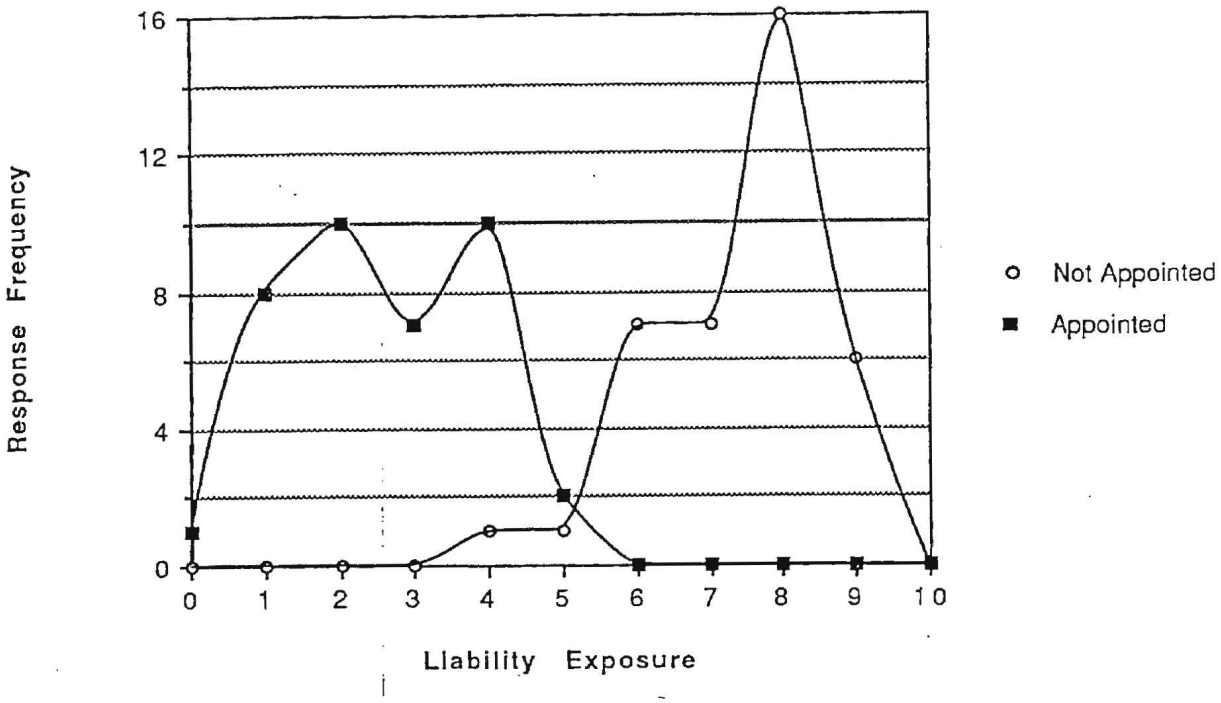
	Limited Availability	Readily Available
Average	6.95	2.58
Variance	1.73	1.39
Standard Deviation	1.31	1.18
Maximum	9	5
Minimum	4	1
Responses	38	38
75% Maximum	7.84	3.38
75% Minimum	6.05	1.78
90% Maximum	8.63	4.09
90% Minimum	5.27	1.07
Adj. Average	7.04	2.78
Adj. Variance	0.58	0.49
Adj. Standard Deviation	0.76	0.70
Adj. Responses	27	27
Adj. Maximum	8	4
Adj. Minimum	6	2

13. Arrangements with Local Authorities

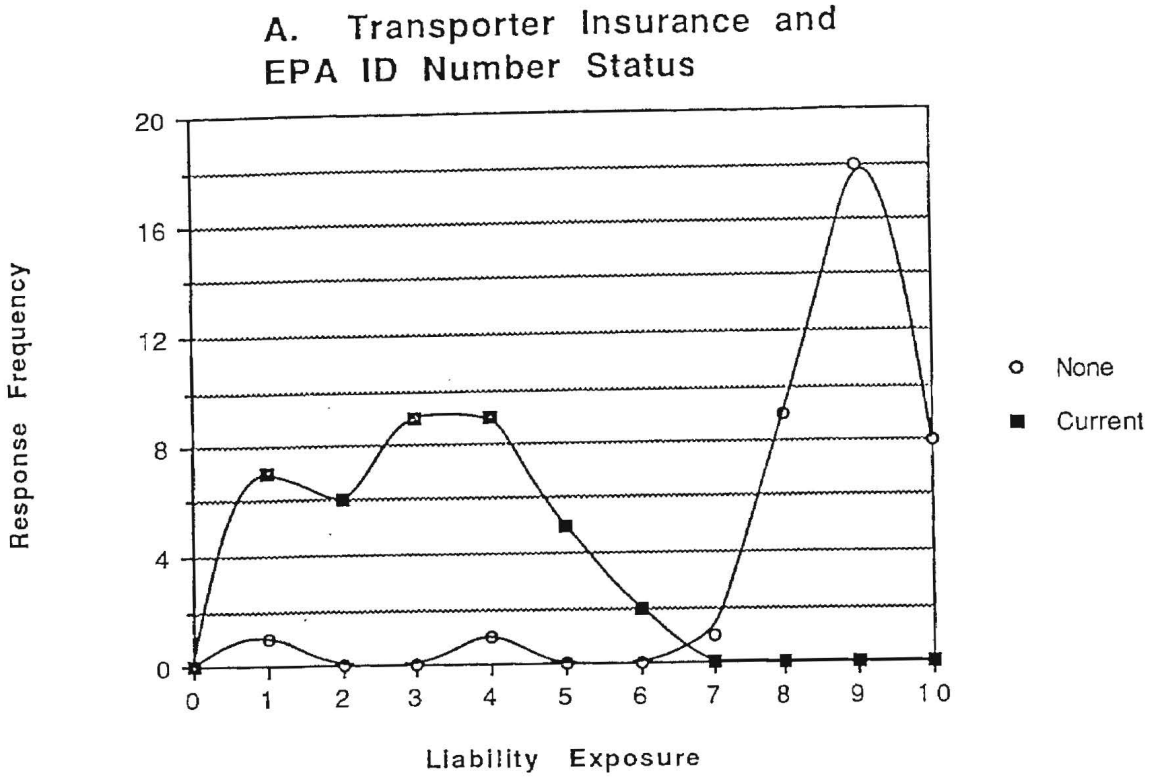


	Not Made	Made
Average	6.92	2.46
Variance	2.72	1.98
Standard Deviation	1.65	1.41
Maximum	10	7
Minimum	3	0
Responses	38	37
75% Maximum	8.04	3.42
75% Minimum	5.80	1.50
90% Maximum	9.03	4.26
90% Minimum	4.81	0.66
Adj. Average	7.15	2.32
Adj. Variance	1.52	1.13
Adj. Standard Deviation	1.23	1.07
Adj. Responses	34	34
Adj. Maximum	9	4
Adj. Minimum	5	1

14. Emergency Coordinator

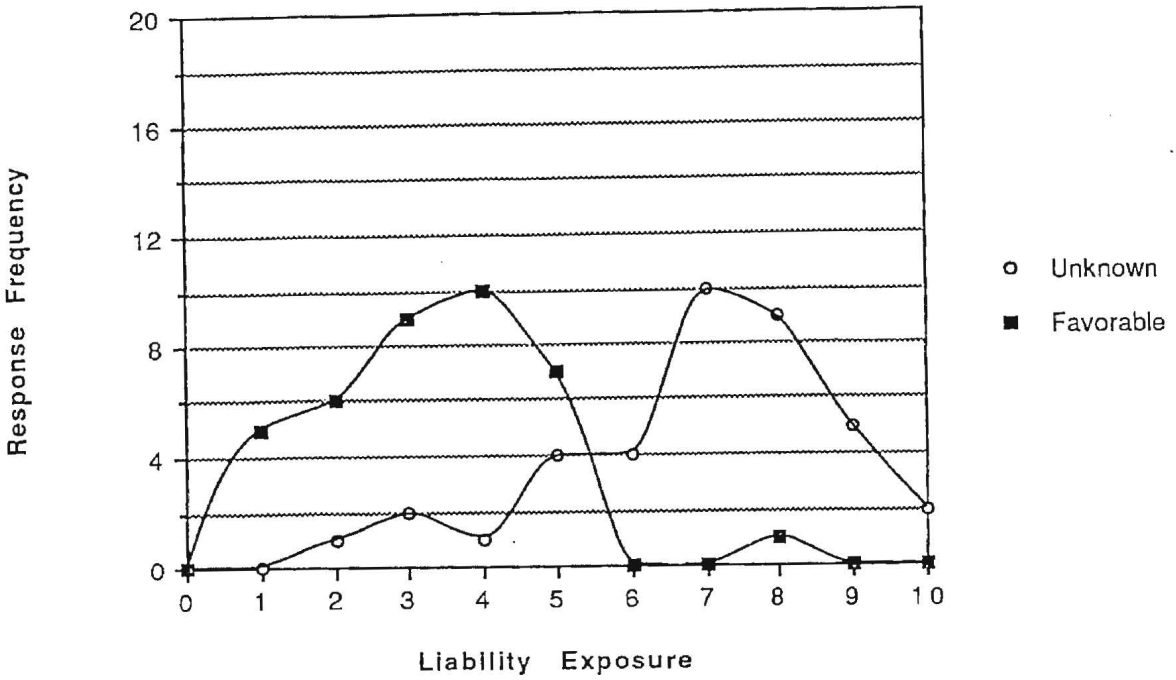


	Not Appointed	Appointed
Average	7.42	2.61
Variance	1.44	1.70
Standard Deviation	1.20	1.31
Maximum	9	5
Minimum	4	0
Responses	38	38
75% Maximum	8.24	3.49
75% Minimum	6.61	1.72
90% Maximum	8.96	4.28
90% Minimum	5.89	0.93
Adj. Average	7.30	2.54
Adj. Variance	0.70	1.31
Adj. Standard Deviation	0.84	1.15
Adj. Responses	30	35
Adj. Maximum	8	4
Adj. Minimum	6	1



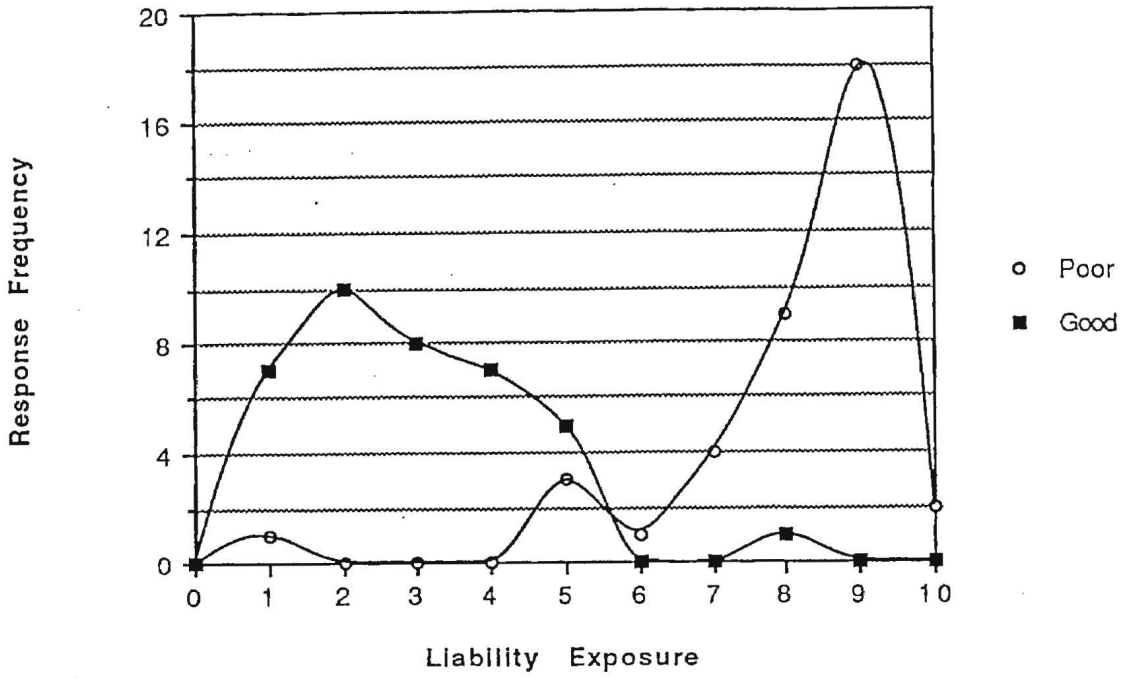
	None	Current
Average	8.58	3.13
Variance	2.79	2.17
Standard Deviation	1.67	1.47
Maximum	10	6
Minimum	1	1
Responses	38	38
75% Maximum	9.71	4.13
75% Minimum	7.44	2.13
90% Maximum	10.72	5.02
90% Minimum	6.44	1.25
Adj. Average	8.92	3.45
Adj. Variance	0.59	1.04
Adj. Standard Deviation	0.77	1.02
Adj. Responses	36	29
Adj. Maximum	10	5
Adj. Minimum	7	2

B. Transporter Reputation



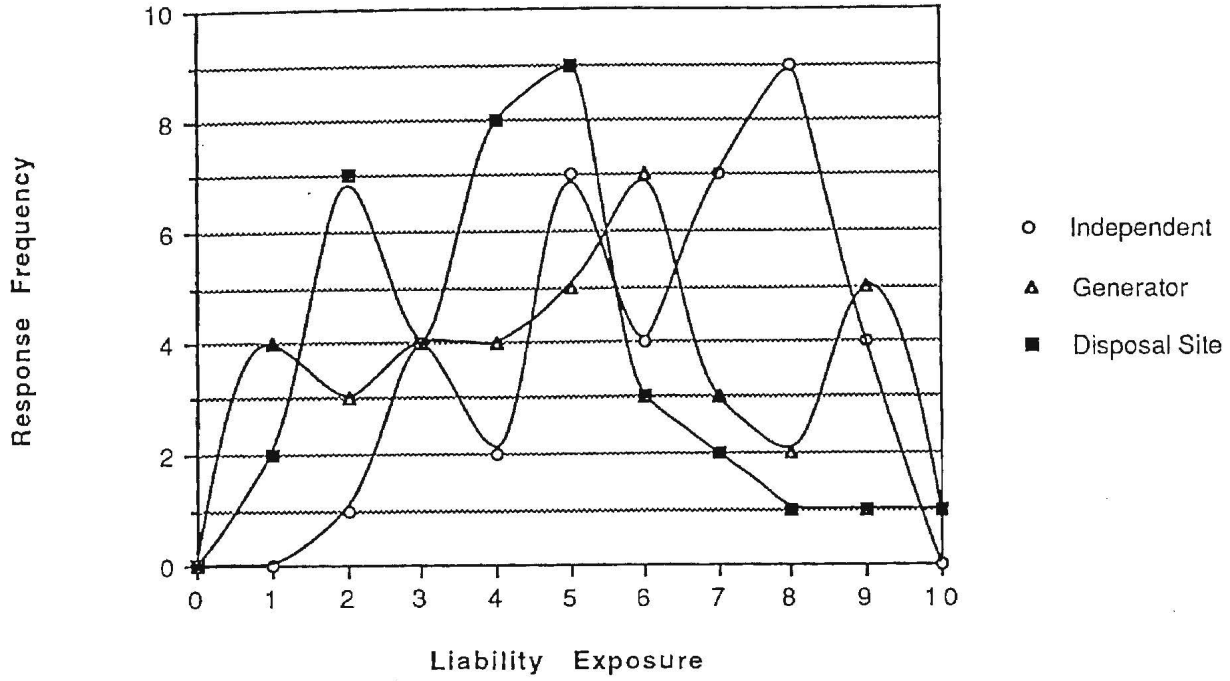
	Unknown	Favorable
Average	6.92	3.34
Variance	3.59	2.29
Standard Deviation	1.89	1.51
Maximum	10	8
Minimum	2	1
Responses	38	38
75% Maximum	8.21	4.37
75% Minimum	5.63	2.31
90% Maximum	9.35	5.28
90% Minimum	4.50	1.41
Adj. Average	7.22	3.56
Adj. Variance	1.53	1.09
Adj. Standard Deviation	1.24	1.05
Adj. Responses	32	32
Adj. Maximum	9	5
Adj. Minimum	5	2

C. Transporter Vehicle Condition



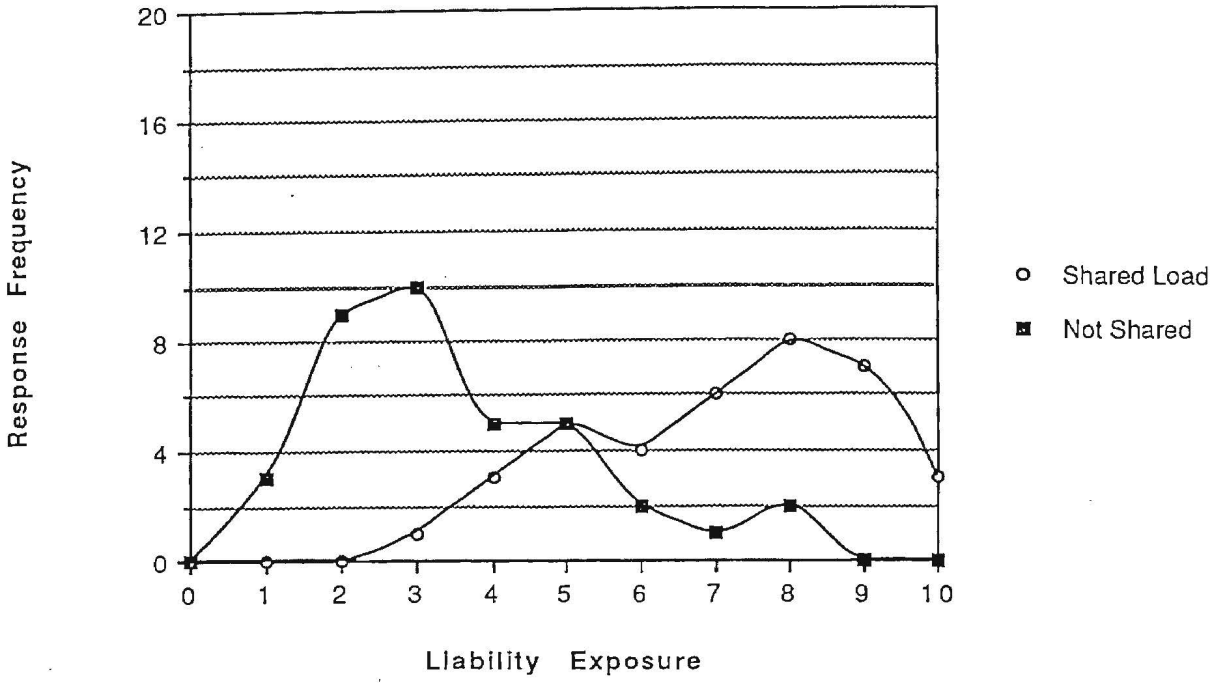
	Poor	Good
Average	8.00	2.95
Variance	2.97	2.43
Standard Deviation	1.72	1.56
Maximum	10	8
Minimum	1	1
Responses	38	38
75% Maximum	9.17	4.01
75% Minimum	6.83	1.89
90% Maximum	10.21	4.94
90% Minimum	5.79	0.95
Adj. Average	8.47	2.47
Adj. Variance	0.80	1.16
Adj. Standard Deviation	0.90	1.08
Adj. Responses	34	32
Adj. Maximum	10	4
Adj. Minimum	6	1

D. Transporter Origin



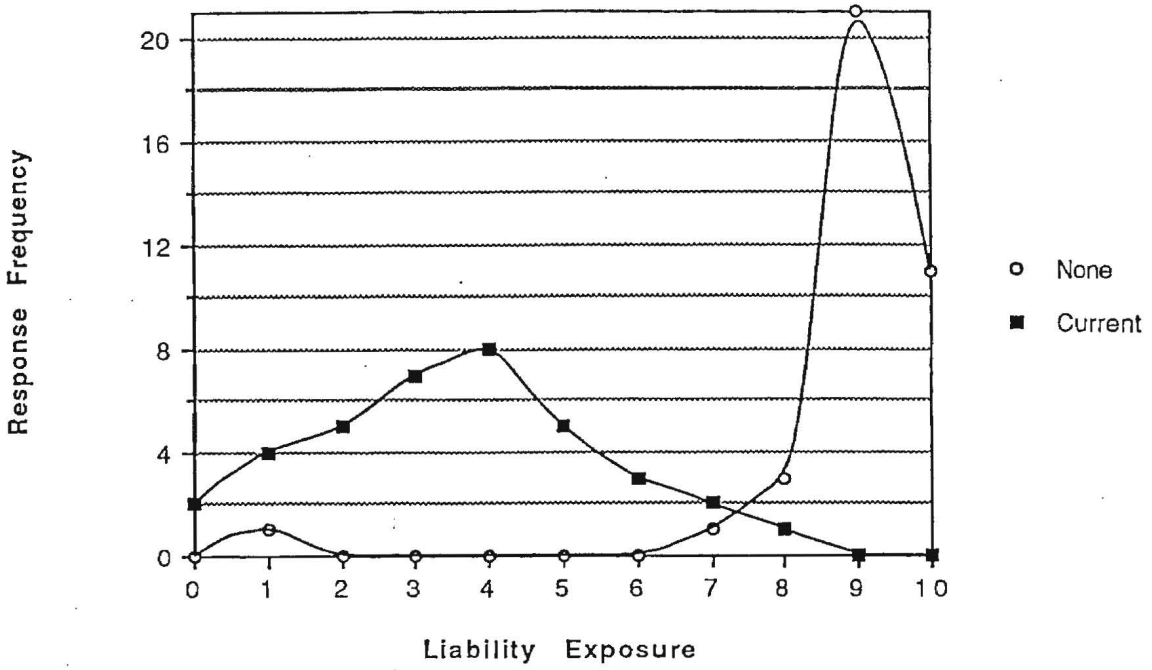
	Independent	Generator	Disposal Site
Average	6.26	5.18	4.32
Variance	3.87	6.80	4.38
Standard Deviation	1.97	2.61	2.09
Maximum	9	10	10
Minimum	2	1	1
Responses	38	38	38
75% Maximum	7.60	6.96	5.74
75% Minimum	4.92	3.41	2.89
90% Maximum	8.78	8.52	7.00
90% Minimum	3.74	1.85	1.64
Adj. Average	6.48	4.93	3.90
Adj. Variance	1.83	3.11	1.76
Adj. Standard Deviation	1.35	1.76	1.33
Adj. Responses	29	28	31
Adj. Maximum	8	8	6
Adj. Minimum	4	2	2

E. Shared Transportation of Waste



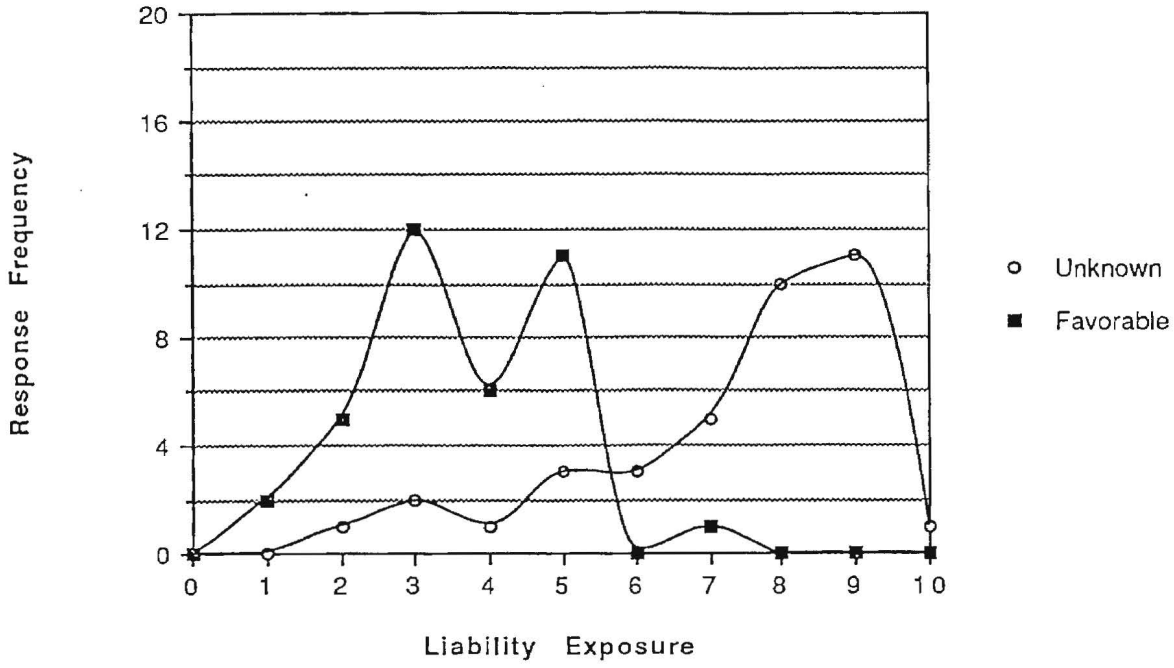
	Shared Load	Not Shared
Average	7.11	3.54
Variance	3.60	3.31
Standard Deviation	1.90	1.82
Maximum	10	8
Minimum	3	1
Responses	37	37
75% Maximum	8.40	4.78
75% Minimum	5.82	2.30
90% Maximum	9.54	5.87
90% Minimum	4.68	1.21
Adj. Average	7.27	3.21
Adj. Variance	2.00	1.17
Adj. Standard Deviation	1.41	1.08
Adj. Responses	30	29
Adj. Maximum	9	5
Adj. Minimum	5	2

F. Disposal Site EPA ID Number Status



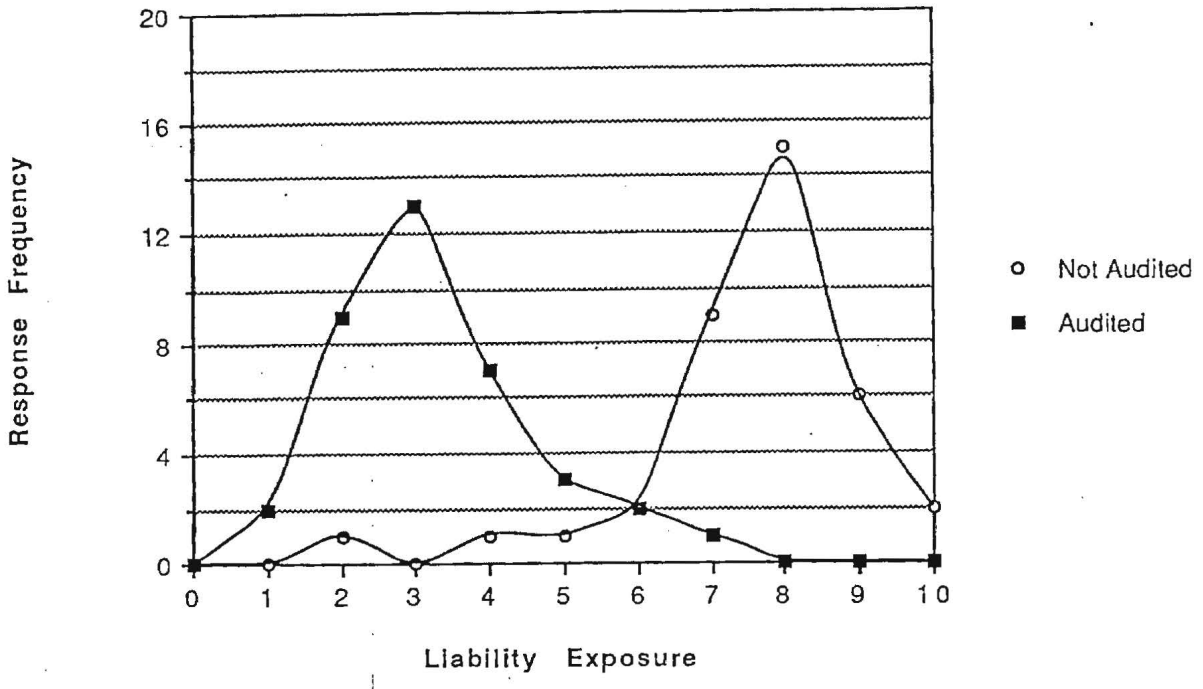
	None	Current
Average	8.95	3.57
Variance	2.27	3.86
Standard Deviation	1.51	1.97
Maximum	10	8
Minimum	1	0
Responses	37	37
75% Maximum	9.97	4.90
75% Minimum	7.92	2.23
90% Maximum	10.88	6.08
90% Minimum	7.02	1.05
Adj. Average	9.23	3.79
Adj. Variance	0.36	1.58
Adj. Standard Deviation	0.60	1.26
Adj. Responses	35	28
Adj. Maximum	10	6
Adj. Minimum	8	2

G. Disposal Site Reputation



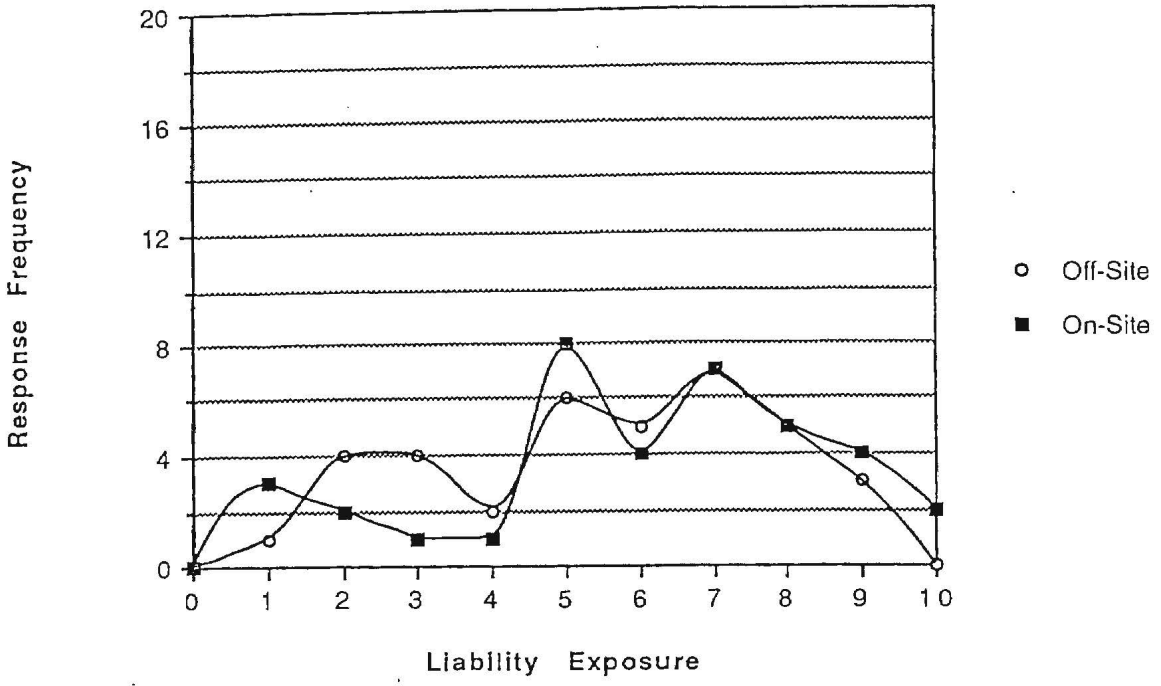
	Unknown	Favorable
Average	7.27	3.62
Variance	3.92	1.80
Standard Deviation	1.98	1.34
Maximum	10	7
Minimum	2	1
Responses	37	37
75% Maximum	8.62	4.53
75% Minimum	5.92	2.71
90% Maximum	9.81	5.34
90% Minimum	4.73	1.91
Adj. Average	7.72	3.68
Adj. Variance	1.69	1.20
Adj. Standard Deviation	1.30	1.09
Adj. Responses	32	34
Adj. Maximum	9	5
Adj. Minimum	5	2

H. Disposal Site Audits



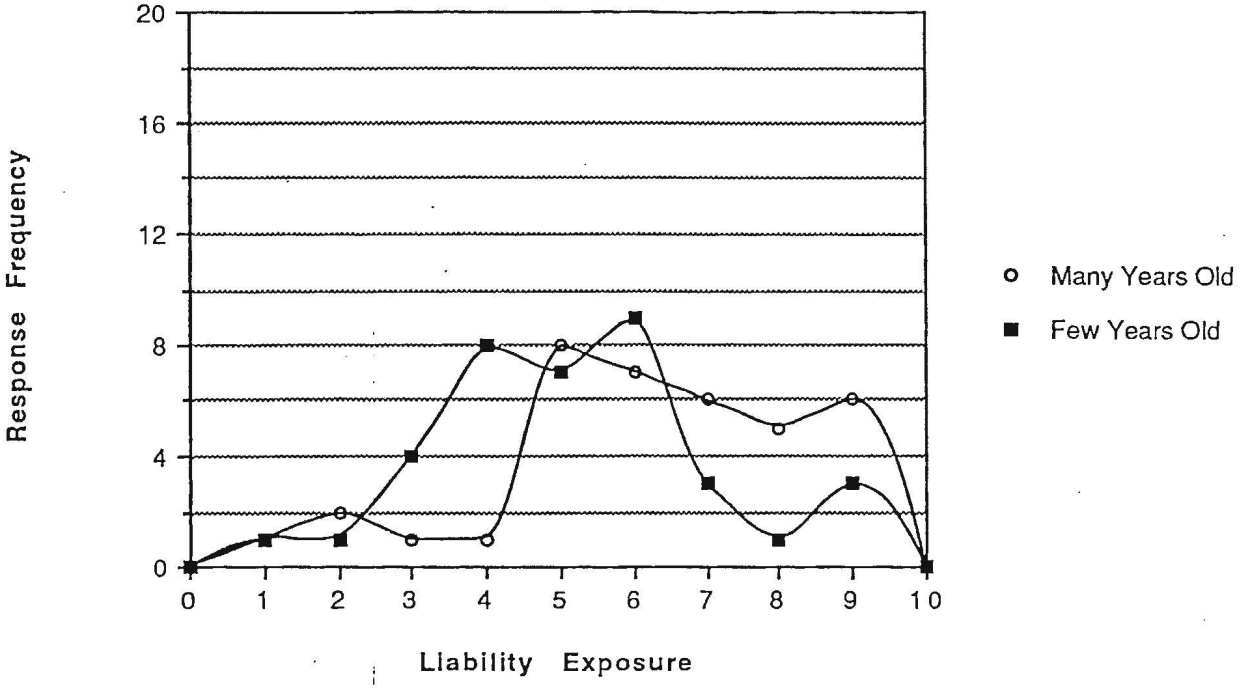
	Not Audited	Audited
Average	7.57	3.27
Variance	2.36	1.87
Standard Deviation	1.54	1.37
Maximum	10	7
Minimum	2	1
Responses	37	37
75% Maximum	8.61	4.20
75% Minimum	6.52	2.34
90% Maximum	9.54	5.02
90% Minimum	5.60	1.52
Adj. Average	7.78	3.13
Adj. Variance	0.69	0.89
Adj. Standard Deviation	0.83	0.94
Adj. Responses	32	32
Adj. Maximum	9	5
Adj. Minimum	6	2

I. Disposal Site Location

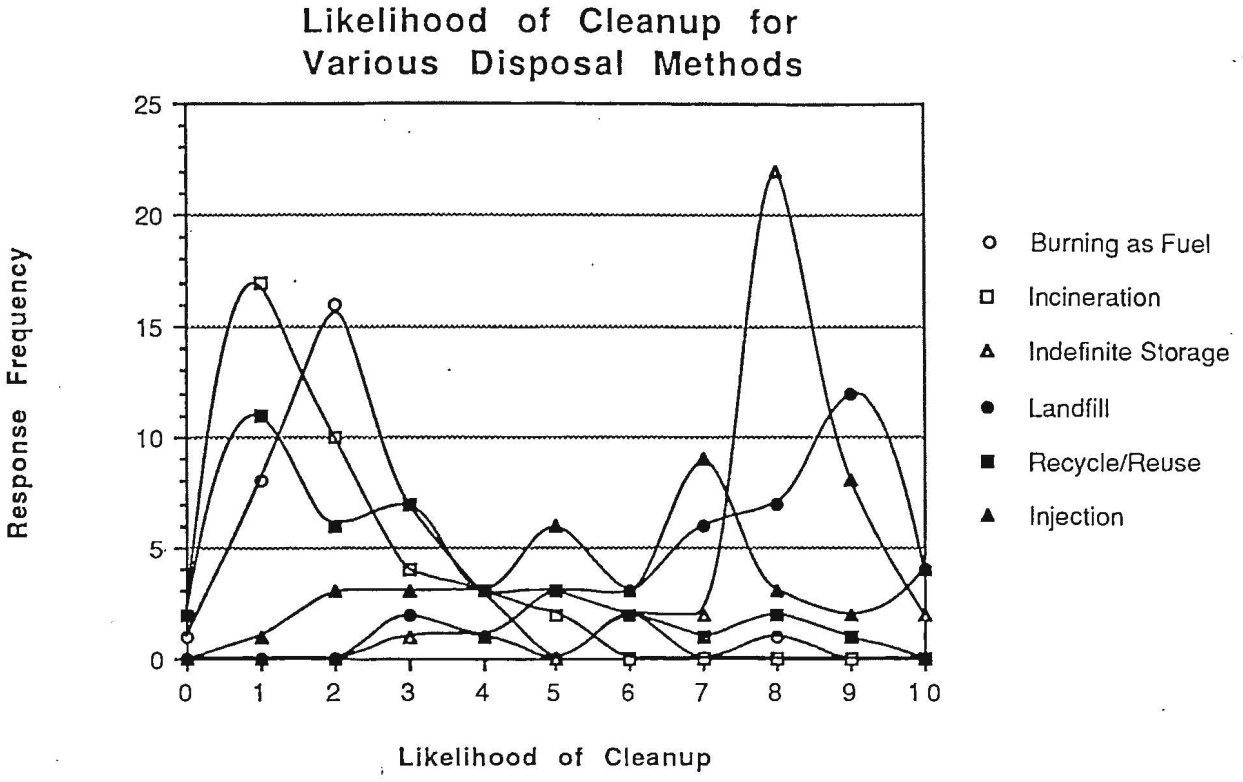


	Off-Site	On-Site
Average	5.54	6.03
Variance	5.14	6.19
Standard Deviation	2.27	2.49
Maximum	9	10
Minimum	1	1
Responses	37	37
75% Maximum	7.08	7.72
75% Minimum	4.00	4.33
90% Maximum	8.44	9.21
90% Minimum	2.64	2.84
Adj. Average	5.83	6.53
Adj. Variance	2.72	2.60
Adj. Standard Deviation	1.65	1.61
Adj. Responses	29	30
Adj. Maximum	8	9
Adj. Minimum	3	3

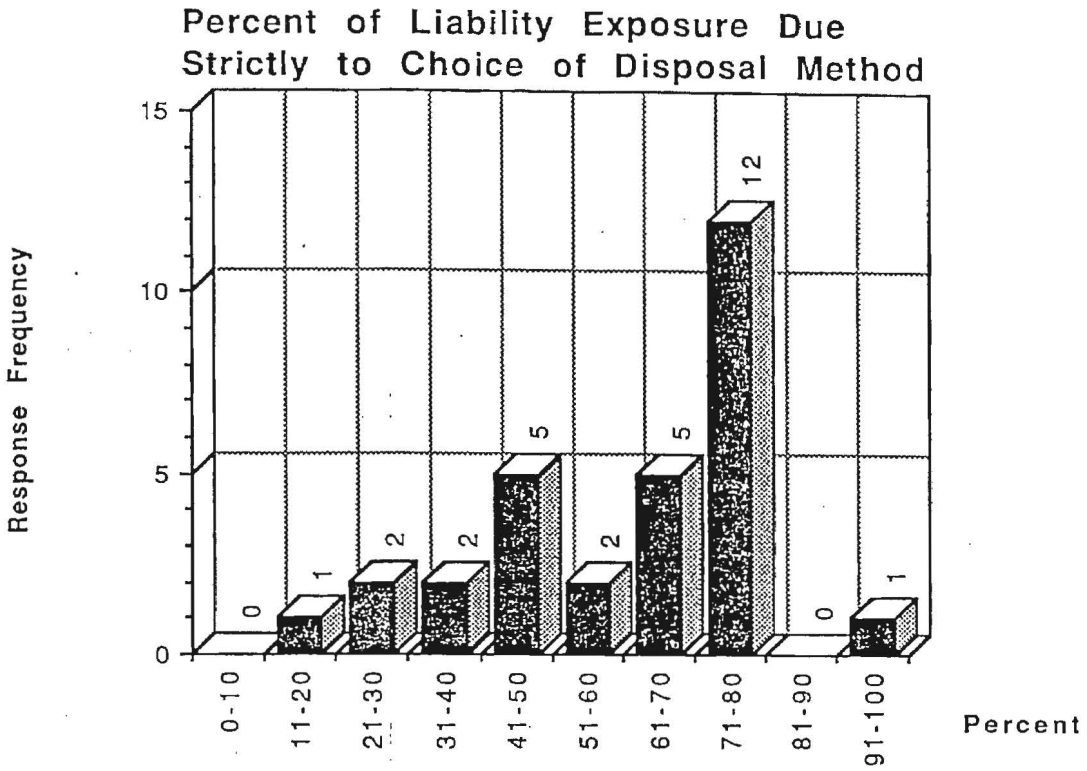
J. Disposal Site Age



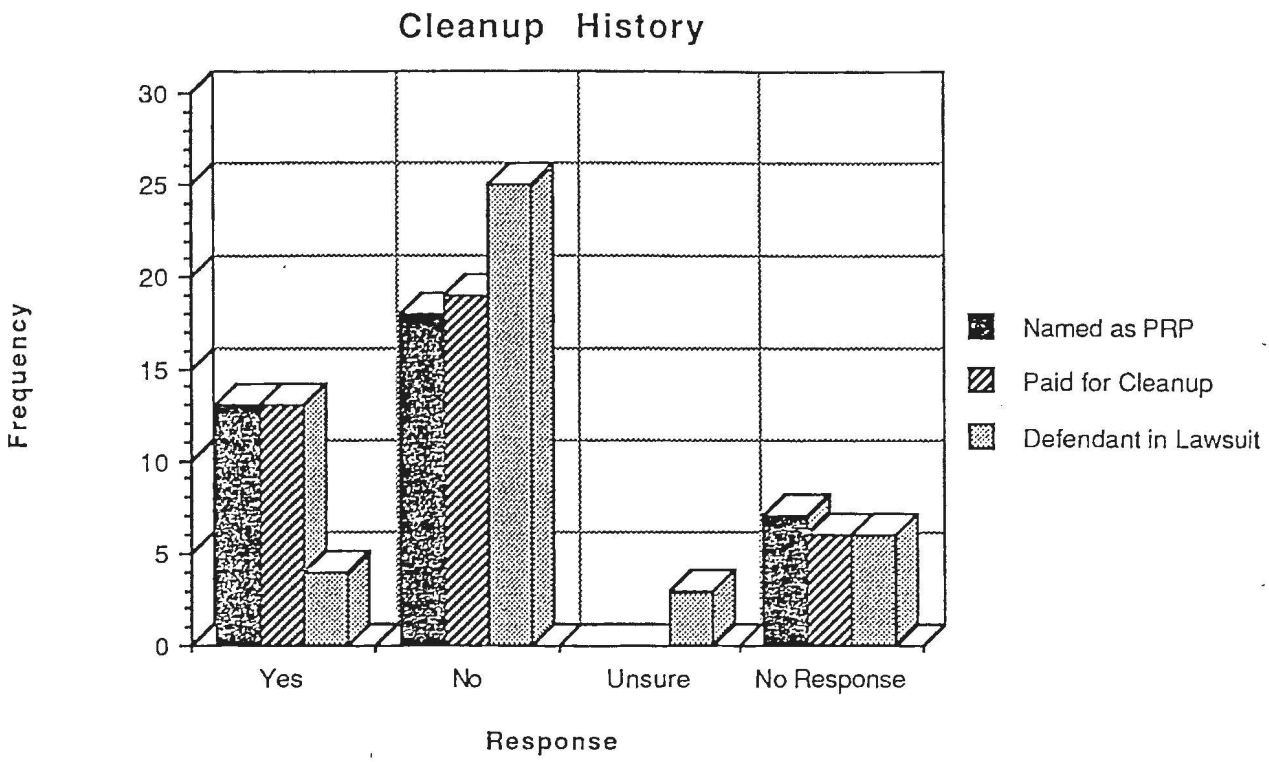
	Many Years Old	Few Years Old
Average	6.22	5.19
Variance	4.34	3.49
Standard Deviation	2.08	1.87
Maximum	9	9
Minimum	1	1
Responses	37	37
75% Maximum	7.63	6.46
75% Minimum	4.80	3.92
90% Maximum	8.88	7.58
90% Minimum	3.55	2.80
Adj. Average	6.22	4.97
Adj. Variance	1.41	1.50
Adj. Standard Deviation	1.19	1.22
Adj. Responses	27	31
Adj. Maximum	8	7
Adj. Minimum	4	3



	Burning as Fuel	Incineration	Indefinite Storage	Landfill	Recycle/ Reuse	Injection
Average	2.45	1.87	7.92	7.61	3.03	5.97
Variance	2.47	1.58	1.80	3.60	5.49	6.14
Std. Dev.	1.57	1.26	1.34	1.90	2.34	2.48
Maximum	8	5	10	10	9	10
Minimum	0	0	3	3	0	1
Responses	38	38	38	38	38	37
75% Max.	3.52	2.72	8.83	8.89	4.62	7.66
75% Min.	1.38	1.01	7.01	6.32	1.43	4.29
90% Max.	4.46	3.48	9.64	10.03	6.02	9.14
90% Min.	0.44	0.26	6.20	5.18	0.03	2.80
Adj. Avg.	2.15	1.58	8.19	8.25	2.59	6.00
Adj. Var.	0.80	0.52	0.29	1.42	2.51	3.00
Adj. Std. Dev.	0.89	0.72	0.54	1.19	1.58	1.73
Adj. Resp.	34	31	32	32	32	29
Adj. Max.	4	3	9	10	6	9
Adj. Min.	1	1	7	6	1	3



	Percent
Average	63.17
Variance	380.14
Standard Deviation	19.50
Maximum	100
Minimum	15
Responses	30
75% Maximum	76.42
75% Minimum	49.91
90% Maximum	88.12
90% Minimum	38.21
Adj. Average	66.35
Adj. Variance	181.12
Adj. Standard Deviation	13.46
Adj. Responses	26
Adj. Maximum	80
Adj. Minimum	40



	Yes	No	Unsure	No Response
Named as PRP	13	18	0	7
Paid for Cleanup	13	19	0	6
Defendant in Lawsuit	4	25	3	6

VI. ANALYSIS OF RESPONSES TO THE SURVEY

This section summarizes the findings from the analysis of responses to the survey. The average value for each descriptor is referred to as a benchmark. Determining these two (or in the case of Factor D, three) values was the main objective of this study. Factors with a high upper benchmark, wide separation between benchmarks, narrow separation, and descriptors with a high variance and a low variance are identified.

When the data was analyzed the upper benchmark for Factor I was found to be less than the lower benchmark. This demonstrates that respondents were thinking for themselves and not letting the order of descriptors influence their ranking. It should be noted, though, that in succeeding analyses the values for Factor I were switched, such that the highest average corresponds to the upper benchmark (on-site disposal, in this case).

FACTORS WITH HIGH UPPER BENCHMARK

Factors with a high value for the upper benchmark have the greatest impact on liability exposure if neglected. The factors and their associated values are ranked in decreasing order below:

• F	Disposal Site EPA ID Number Status	(8.9)
• A	Transporter Insurance and EPA ID Number Status	(8.6)
• 4	Employee Training	(8.1)
• C	Transporter Vehicle Condition	(8.0)
• 10	Contingency Plan Status	(7.8)
• 9	Other Documentation	(7.7)
• 2	Tank Inspection	(7.6)
• 5	Container Marking	(7.6)

FACTORS WITH WIDE SEPARATION

Factors with wide separation between upper and lower benchmarks identify actions which if taken will have the greatest effect on reducing liability exposure. The factors and their associated values are ranked in decreasing order below:

• 9	Other Documentation	(5.8)
• 4	Employee Training	(5.5)
• A	Transporter Insurance and EPA ID Number Status	(5.5)
• 10	Contingency Plan Status	(5.4)
• C	Transporter Vehicle Condition	(5.4)
• 2	Tank Inspection	(5.3)
• F	Disposal Site EPA ID Number Status	(5.3)

FACTORS WITH NARROW SEPARATION

Factors with narrow separation between upper and lower benchmarks identify actions which have little effect on reducing liability exposure. The factors and their associated values are ranked in increasing order below:

• I	Disposal Site Location	(0.5)
• J	Disposal Site Age	(1.0)
• D	Transporter Origin	(2.0)

• 6	Storage Period	(4.2)
• 1	Container Inspection	(4.3)
• 12	Spill Control Equipment	(4.3)
• 13	Arrangements with Local Authorities	(4.4)

DESCRIPTORS WITH HIGHEST VARIANCE

Descriptors with a high variance are those over which there is general disagreement or lack of understanding over the impact of the descriptor on liability exposure among the respondents. A likely cause is that respondents with less experience in hazardous waste management tended to give about the same ratings for upper and lower benchmarks, whereas experts tended to show more variation. It could be postulated that on the descriptors with larger variance due to two peaks, the less-typical response peak should be used rather than the average of the two peaks as was done in the analysis.

If the variance exceeds 3.00 (arbitrary rule), then the descriptor is listed below. Usually Factors A to J had the highest variance and often this was for the descriptor related to the upper benchmark. Descriptors are identified by their associated factor designation and their plot legend description and and are listed by decreasing variance:

• D	Transporter Origin	Generator	(6.80)
• I	Disposal Site Location	On-Site	(6.19)
• I	Disposal Site Location	Off-Site	(5.14)
• D	Transporter Origin	Disposal Site	(4.38)
• J	Disposal Site Age	Many Years Old	(4.34)
• G	Disposal Site Reputation	Unknown	(3.92)
• D	Transporter Origin	Independent	(3.87)
• F	Disposal Site EPA ID Number Status	Current	(3.86)
• E	Shared Transportation	Shared Load	(3.60)
• B	Transporter Reputation	Unknown	(3.59)
• J	Disposal Site Age	Few Years Old	(3.49)
• 6	Storage Period	>90 days	(3.48)
• E	Shared Transportation	Not Shared	(3.31)

DESCRIPTORS WITH LOWEST VARIANCE

Descriptors with a low variance are those over which there is general agreement over the impact of the descriptor on liability exposure among the respondents. If the variance does not exceed 1.00 (arbitrary rule), then the descriptor is listed below. All of these descriptors are the lower benchmark from Factors 1 to 14. Descriptors are identified by their associated factor designation and their plot legend description and are listed by increasing variance:

• 9	Other Documentation	Current	(0.93)
• 8	Waste Determination Profile and Disposal Plan	Current	(0.97)
• 10	Contingency Plan Status	Current	(1.00)

RESPONSES TO DISPOSAL LIABILITY VARIABLES

As the dataset for disposal liability shows, respondents expressed strong favor towards incineration and burning as fuel. Most respondents liked recycle/reuse and strongly disliked indefinite storage. They indicated a general but inconsistent aversion to landfills (probably some respondents are using landfills and approve of their decision) and were confused about injection.

Incineration and indefinite storage had the smallest variances. Injection and recycle/reuse had the largest variances. The average responses as shown in Figure 5 identify indefinite storage (7.9) and landfills as the disposal methods with the highest liability exposure, while incineration (1.9), burning as fuel (2.4) and recycle/reuse (3.0) offer the lowest liability exposure.

Percent is variable which describes the liability exposure of a generator which is due strictly to the disposal method employed. The average value for Percent was 63%. The largest number of respondents (12 out of 30) estimated Percent to be within 71 and 80%. The response given most often (the mode) was 80% (7 out of 30). Only 5 out of 30 respondents estimated Percent to be less than 50%. *These results confirm that the choice of disposal method is the single most important decision made by a generator with regard to liability exposure.*

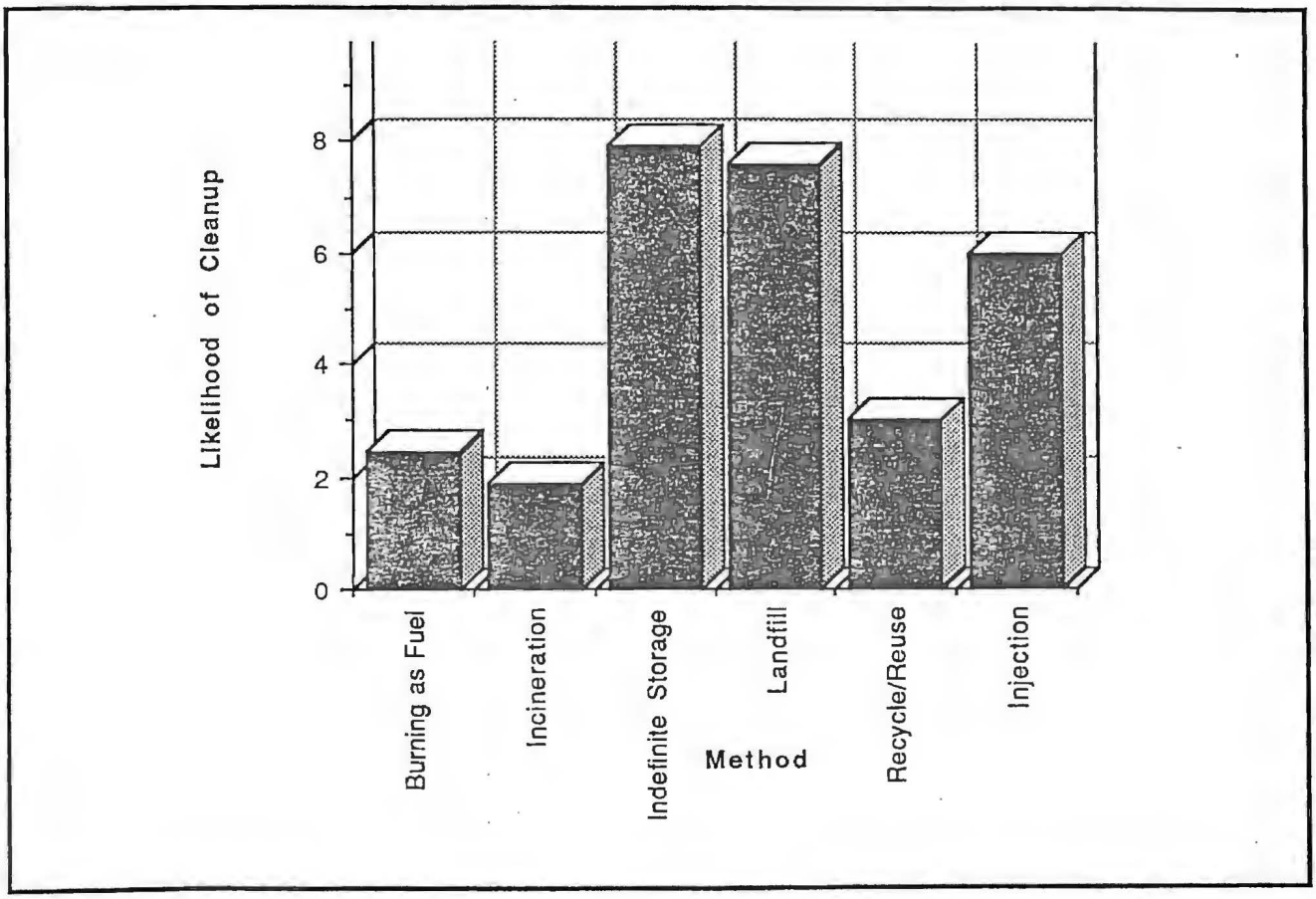


Figure 5: Disposal Liability, Average of Responses

RESPONSES TO CLEANUP HISTORY VARIABLES

The responses to the Cleanup History variables give an indication of the magnitude of the hazardous waste cleanup predicament. 13 out of 31 respondents indicated that they had been named as a potentially responsible party in a cleanup action. The same number, 13 out of 32, declared that they had paid for cleanup. Only 4 out of 29, however, had been named as a defendant in a lawsuit. Perhaps this is because all of the companies surveyed are relatively small, and larger companies are the ones more likely to be sued because of their "deep pockets."

WEIGHTING OF RESPONSES TO SURVEY, GENERAL

A comparison of the average response to all factors was made to determine if respondents were giving differentiated weights to factors. The average response to Factors 1 thru 14 (see Figure 6) showed little variation, implying that either 1) each of the factors is of equal importance, 2) factors are of different importance but the respondents were unsure of their relative importance. The average response to Factors A thru J (see Figure 7) indicated a greater degree of variation, especially among the upper benchmarks. The average response to disposal option variables (see Figure 5, above) showed marked variation.

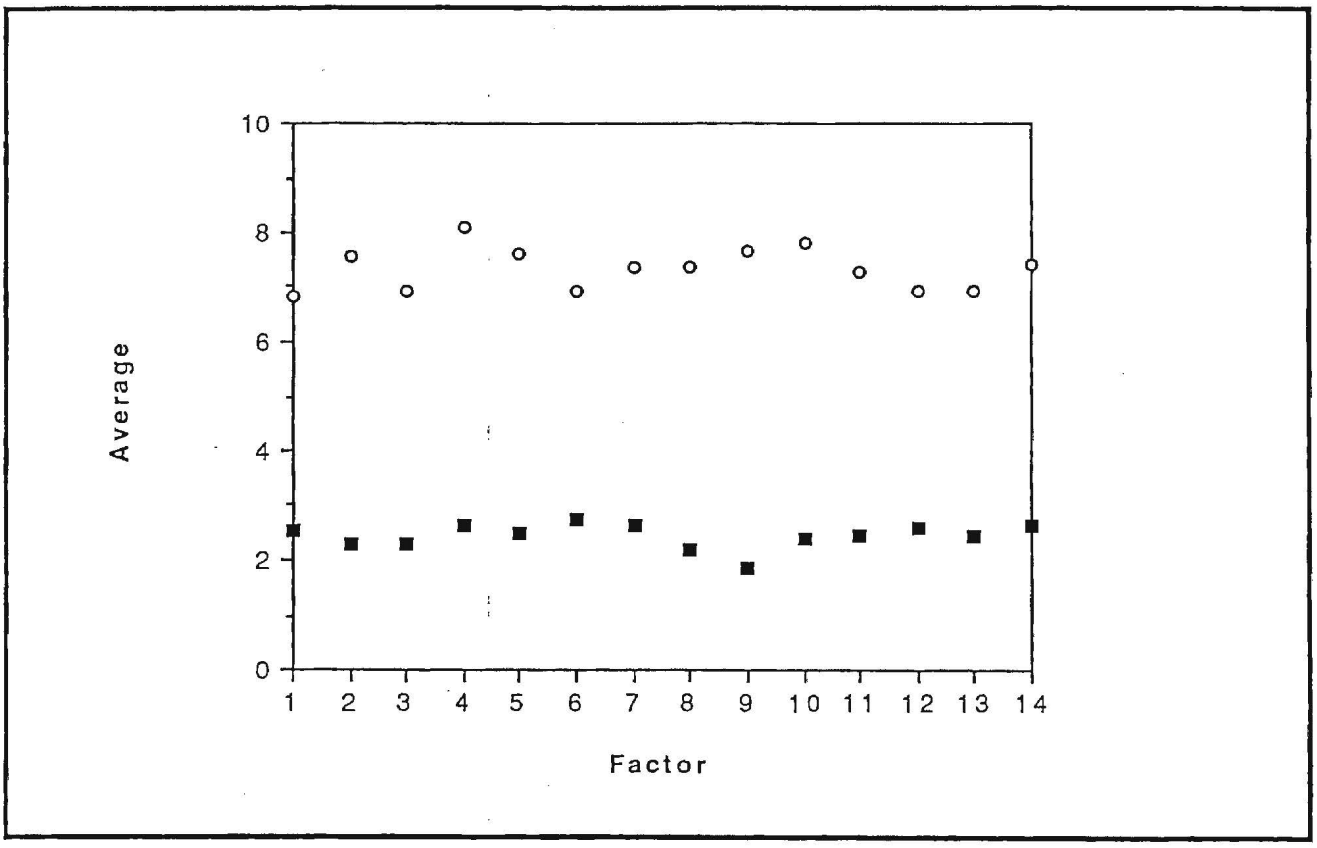


Figure 6: Average Response to Factors 1 thru 14

DISCLAIMER

Some of the results of the analysis do not support expectations based on previous experience. No interpretation of validity has been made in this analysis; rather, an objective report has been made on the opinions held by respondents.

SUMMARY OF RESPONSES

A summary of the benchmarks for Factors 1 thru 14 and Factors A thru J follows in Tables 3 and 4. A summary of the responses to Disposal Options variables follows in Table 5.

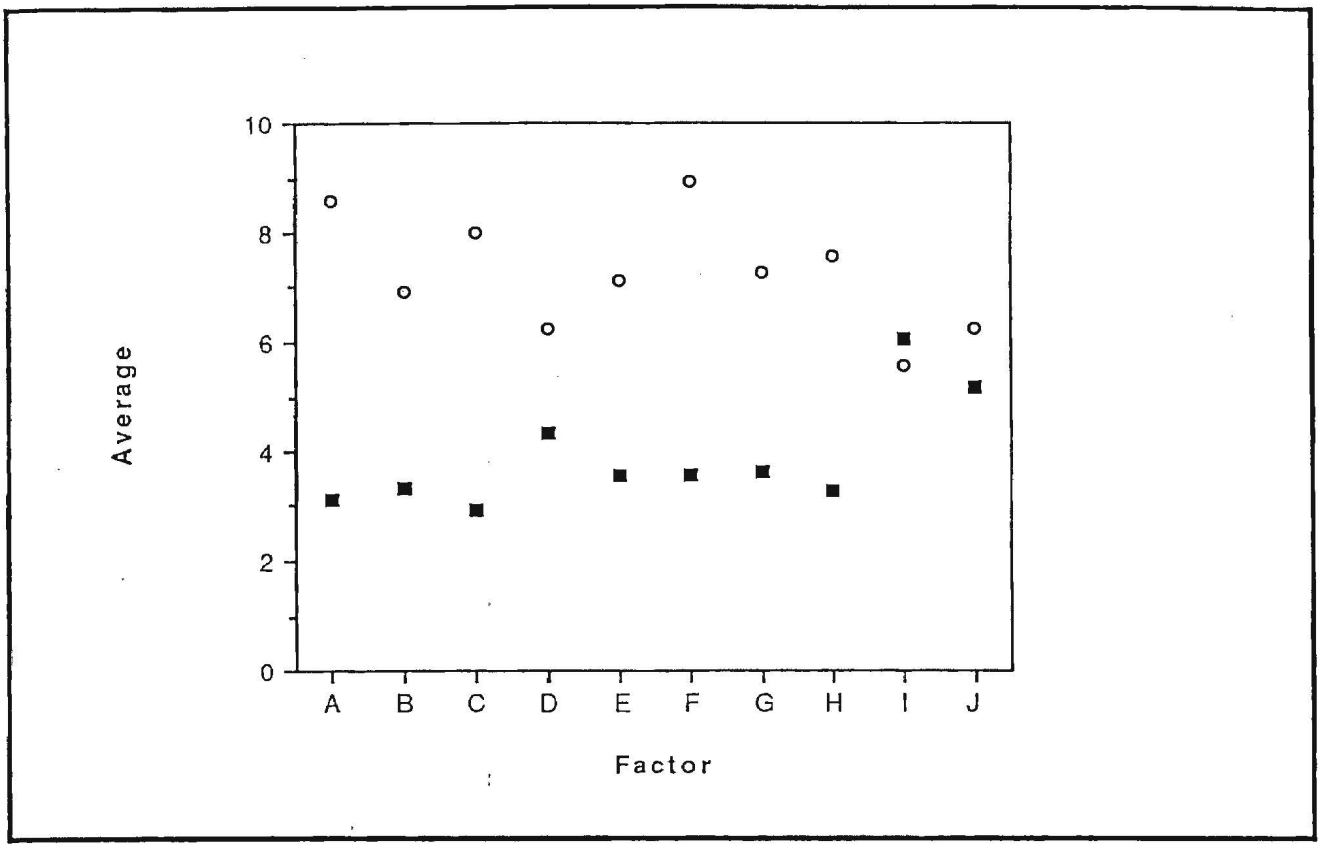


Figure 7: Average Response to Factors A thru J

Table 3: Summary of Responses to Factors 1 thru 14

Factor	Low Avg.	High Avg.
1 Container Inspection	2.5	6.8
2 Tank Inspection	2.3	7.6
3 Environmental Audits	2.3	6.9
4 Employee Training	2.6	8.1
5 Container Marking	2.5	7.6
6 Storage Period	2.7	6.9
7 Exception Reporting	2.6	7.4
8 Profile and Plan	2.2	7.4
9 Other Documentation	1.9	7.7
10 Contingency Plan Status	2.4	7.8
11 Emergency Equipment	2.4	7.3
12 Spill Control Equipment	2.6	6.9
13 Arrangements with Local Authorities	2.5	6.9
14 Emergency Coordinator	2.6	7.4

Table 4: Summary of Responses to Factors A thru J

Factor	Low Avg.	Sub Avg.	High Avg.
A Transporter Status	3.1		8.6
B Transporter Reputation	3.3		6.9
C Transporter Vehicle Condition	2.9		8.0
D Transporter Origin	4.3 (disposal site)	5.2 (generator)	6.3 (independent)
E Shared Transportation	3.5		7.1
F Disposal Site Status	3.6		8.9
G Disposal Site Reputation	3.6		7.3
H Disposal Site Audits	3.3		7.6
I Disposal Site Location	5.5 (off-site)		6.0 (on-site)
J Disposal Site Age	5.2		6.2

Table 5: Summary of Responses to Disposal Liability Variables

Disposal Method	Average
Burning as Fuel	2.4
Incineration	1.9
Indefinite Storage	7.9
Landfill	7.6
Recycle/Reuse	3.0
Injection	6.0

Percent	63

VII. PRINCIPAL RESULTS OF THE STUDY

CLEANUP HISTORY CORRELATIONS

When the cleanup history variables were compared to the size of the company reporting. The correlation of cleanup experience with the size of the company was weak (Figure 8). However, the relationship of cleanup history to RCRA status showed a strong correlation (Figure 9), the relationship being that: *the likelihood of being named as a PRP, having to pay for cleanup, and being named as a defendant in a lawsuit increases as the volume of hazardous waste generated increases.*

DEVELOPMENT OF RISK ASSESSMENT PROCEDURE

The benchmarks and average values for variables calculated in Section V were used to develop a risk assessment procedure. In the following analysis, factors with a narrow differential between minimum and maximum benchmarks could have been excluded as insignificant, but for consistency this was not done, and all factors were included in the risk assessment procedure.

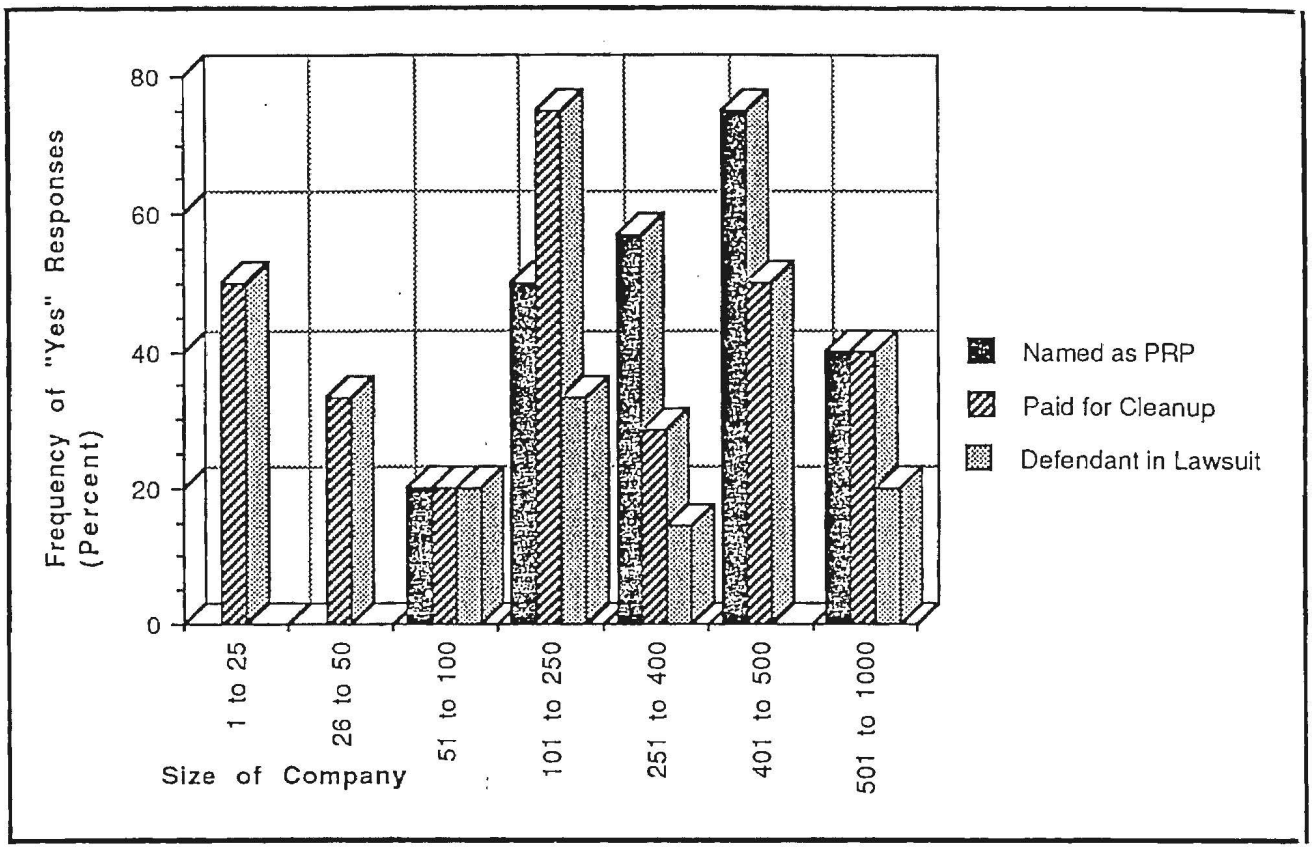


Figure 8: Cleanup History Compared to Size of Company

Relative Liability Classification Plot

A two-dimensional scoring plot was developed, termed the *Relative Liability Classification Plot*, on which a graphical representation of a company's liability position could be viewed (see Appendix E). The x-axis of this plot corresponds to on-site liability exposure. The off-site liability exposure is plotted on the y-axis. The maximum value on both axes is 100 in units of "liables," a fictitious standard of measure. The *Relative Liability Classification Plot* has four regions, I thru IV. A generator's liability position will be contained in one of these regions. Later research will describe the characteristics shared by generators in each region and suggest management strategies for each region.

The value plotted on the axes for liability exposure is a scaled score which is computed from the position of the generator relative to the upper and lower benchmarks for several factors. For each factor, point values are given for various actions. The points associated with a generator's actions for each factor are summed and converted to units of "liables" using a scaling function.

Because of strict liability, the lower benchmark will always exceed zero. Also, even if a generator is blatantly negligent, liability is not absolutely certain, so the higher benchmark will always be less than 10. Subdivisions will be added between benchmarks in a later research phase with point values lying between the point values for upper and lower benchmarks.

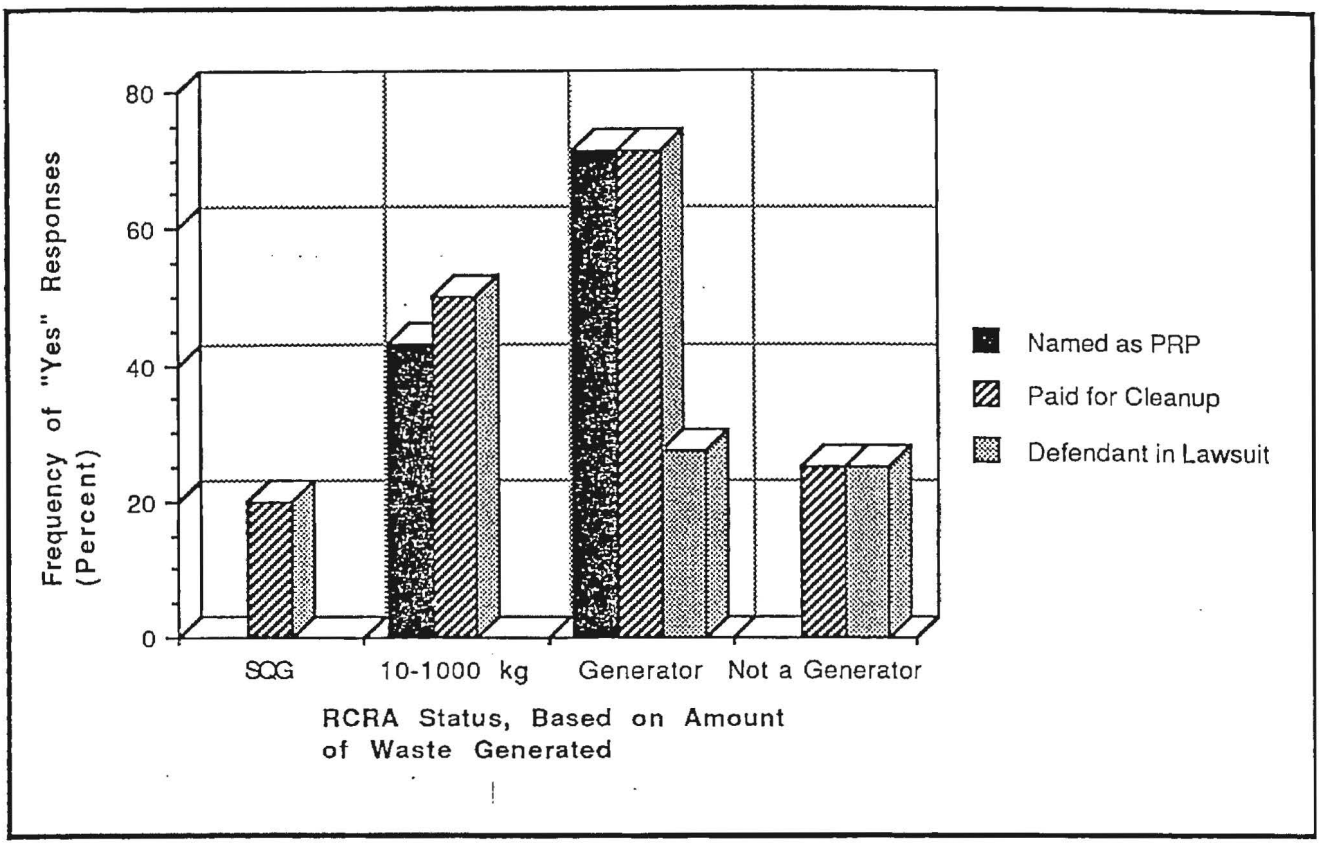


Figure 9: Cleanup History Compared to RCRA Status

On-Site Liability

Factors 1 thru 14 relate to on-site liability and have a theoretical maximum score of 140 points. The score obtained by adding the point values for Factors 1 thru 14 is scaled to 100 liables by multiplying the score obtained by (100/140). Adding up the actual points for upper benchmarks for Factors 1 thru 14 gives a worst-case score of 102.7 points. Even worst case scenarios as defined by the descriptors might not result in certain liability, so although the score is scaled to 100 liables, the worst scaled score possible on the x-axis would be (102.7)*(100/140) = 73.4 liables.

Off-Site Liability

Factors A thru J *and* the Disposal Option variables comprise the off-site liability exposure. Off-site liability is a weighted average of the scaled score from Factors A thru J and the probability of cleanup for a particular disposal option using Percent as a weighting factor. This relation can be expressed as:

Off-site liability = (total points from Factors A thru J)(100 - Percent)(1/100)
+ (Percent)(Disposal Method score)(1/100)

Since the average value of Percent was 63, the contribution of the choice of disposal method to off-site liability is 63% of 100 liables, or 63 liables. The contribution of Factors A-J to off-site liability is (100 - Percent), or (100 - 63) = 37 liables.

Factors A-J have a theoretical maximum score of 100 points, and the theoretical maximum score from Factors A-J was scaled to 37 liables by multiplying by (37/100). The values obtained for disposal options were scaled on the scoring sheet such that the sum of these two subscores equal 100 liables at the theoretically worst condition. The actual worst-case scaled score for off-site liability exposure is 76.8 liables.

DETERMINING LIABILITY EXPOSURE FOR A SPECIFIC GENERATOR

Appendix F shows the *Risk Assessment Procedure for a Single Disposal Option*, a form developed for use in determining the on-site and off-site liability exposure of a generator. This form has two sections. To determine the liability exposure for a specific generator, take the following steps:

- In Section A of the *Risk Assessment Procedure*, for each factor determine which descriptor is closest to the generator's present condition (currently only two descriptors per factor are listed, the best and worst cases, but later research would generate more subdivisions).
- Add up the points for all of the selected descriptors and multiply the number of points by 0.7143 to obtain the scaled score for liability from on-site activities.

- In Section B of the *Risk Assessment Procedure*, the responses are specific to a particular disposal option. For each factor determine which descriptor is closest to the condition of the transporter and disposal site which will handle the waste.
- Add up the points for all of the selected descriptors and multiply by 0.37 to obtain the first subscore.
- Determine the value corresponding to the disposal method being considered and add this to the first subscore to obtain the scaled score for liability from off-site activities.

The *Relative Liability Classification Plot* can now be used to classify the liability position of the generator being evaluated. By plotting the scaled score for on-site and off-site liability, the generator can be assigned to one of four regions on the plot.

USING THE RISK ASSESSMENT PROCEDURE IN ITS PRESENT STATE OF DEVELOPMENT

At this time (Phase I of this study), the *Risk Assessment Procedure* has not been developed fully. Only two descriptors were analyzed for each factor in most cases. Therefore, the *Risk Assessment Procedure* should be used only to evaluate the general liability position of a generator.

In the process of conducting an environmental audit, the generator's activities related to each of the factors listed on the *Risk Assessment Procedure* could be examined. Then, an estimate of where the generator stands relative to each benchmark should be made. The number of points corresponding to this position should then be estimated and used in calculating the scaled score of the generator for on-site and off-site activities.

VIII. RECOMMENDATIONS FOR FURTHER RESEARCH

Determining the liability exposure for any particular activity requires that consequences of possible actions be known and that these consequences be documented in a large database. When an effort is made to determine hazardous waste liability, these starting conditions are found to be lacking as was discussed in Section II. Consequences are relatively unknown, since most of the consequences of past actions have not yet occurred. Furthermore, the problem is tough to assess due to the absence of a general database, the lack of quantified expected legal and cleanup costs, and the lack of motivation on the part of companies to compute and supply this data.

RECOMMENDATIONS FOR PHASE II RESEARCH

During the first phase two benchmarks were established on a scale with two endpoints corresponding to zero liability and certain liability. For Phase II, this work would be extended to quantify subdivisions on the scale for various degrees of compliance or various actions. Subdivisions could exceed benchmarks (i.e., an action which exceeded regulatory requirements).
The following list of descriptors illustrates the types of subdivisions which could be quantified and also list some additional factors:

Additional Descriptors

- Container inspections (none, sometimes, weekly, documented weekly, more often than weekly)
- Tank Inspections (none, sometimes, daily, documented daily, continuous monitoring)
- Training (none, informal: employees learn by experience as required, initial, initial and annual review, periodic emergency rehearsal drills)
- Number of employees trained (none, some, everyone who works with waste regularly, all who could ever come in contact with waste)
- Marking and Labeling (none, conducted but no formal procedure, all containers labeled with Hazardous Waste and the date according to a set procedure, contents also labeled, satellite containers also labeled)
- Disposal Plan (none, out-of-date, current and accurate)
- Contingency Plan (none, meets regulatory requirements, exceeds regulatory requirements by including ...)

Additional Factors

- Contingency Plan Review (not reviewed, reviewed with irregularity, reviewed at least annually)
- Impact of state requirements (analysis of state regulations)
- Demographics (mileage to the nearest standard metropolitan statistical area, population density, amount of identifiable citizen opposition)
- Hydrogeologic characteristics of region
- Emergency response team (no arrangements, aware of teams in area, standing agreement with a local team or have own team)

RECOMMENDATIONS FOR PHASE III RESEARCH

The purpose of Phase III would be to mail a rigorous, statistically valid survey (or conduct personal interviews) to a large number of facilities in all regions of the country and more accurately determine the benchmarks and subdivisions established in Phases I and II. The factors identified in Phases I and II would form the basis for the survey. Random selections from the HWDMS database would be taken to identify recipients.

Responses from the survey would be used to develop a risk assessment procedure realistic enough to be used by an insurance company. During this phase descriptive classifications could be assigned to each region of the *Relative Liability Classification Plot* presented in Section VII. These classifications would be based upon the characteristics shared by most generators falling into the region. In addition, suggested management strategies could be developed for each region.

RECOMMENDATIONS FOR PHASE IV RESEARCH

The goal of Phase IV would be to correlate a generator's risk rating in liables to a range of expected dollars of liability. The steps to reach this goal would be: 1) estimate the true-cost of off-site

hazardous waste disposal *given* that the generator of the waste will be named as a PRP and 2) determine the probability that a generator would be named a PRP *given* his risk rating and choice of disposal method.

A formula to calculate the true cost of hazardous waste disposal for a given disposal method is (from Sullivan[15]):

$$Cn(S) = Cp(S) + Lg*Cu*P(S)$$

where

Cn(S) is "the net unit cost of disposal"
Cp(S) is the unit cost charged by the disposal firm
Lg is "the liability share of the generator"
Cu is "the unit cleanup cost"
P(S) is "the probability of being designated unsafe
S is "a measure of the safety of a disposal facility"

To estimate the deterministic true cost of off-site hazardous waste disposal (that is, the average liability and disposal costs which a generator would pay *given* that he is named a PRP for the disposal site) the following steps would need to be taken:

- Determine the expected liability costs associated with various disposal options. Requires a site visit to a large number of generators and TSDs and also the authority to obtain the information.
- Show the liability cost a generator can expect if found to be a responsible party (aggregate cost or possibly the cost for each disposal option).

To determine the probability of becoming a PRP given the risk rating and the disposal option used, the following steps would need to be taken:

- Calculate the risk rating of a company in "liables" based on results from the risk assessment procedure.
- Compare cleanup history of survey respondents to their risk rating to determine the approximate probability of cleanup associated with a risk rating. Requires a large population.

RECOMMENDATIONS FOR PHASE V RESEARCH

The work done in Phases I thru IV for hazardous wastes would be repeated for hazardous substances regulated under OSHA employee right-to-know programs and SARA community right-to-know programs.

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[1]*Federal Register*, Vol. 45, No. 98, Monday, May 19, 1980, pp. 33070-33071.
[2]See for example, Wayne C. Turner, Ph.D., *Introduction to Hazardous Materials Management and Certification*, Oklahoma State University, Stillwater, OK, 1988, p. 580.
[3]Office of Technology Assessment, *Serious Reduction of Hazardous Waste for Pollution Prevention and Industrial Efficiency*, September, 1986.
[4] Environmental Protection Agency, *Minimization of Hazardous Waste*, "Executive Summary and Fact Sheet," October 1986.
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[6]*Ibid*, p. 15.
[7]*Ibid*, p. 3.
[8]*Ibid*, p. 3.
[9]*Federal Register*, Vol. 45, No. 98, Monday, May 19, 1980, p. 33071.
[10]T.D. Herod, "Waste Behind the Waste," *Risk Management*, 36:4, April 1989, p. 84.
[11]GAO/RCED-88-2, pp. 2, 3, 5, 17.
[12]Office of Technology Assessment, *Superfund Strategy: Summary*, March 1985, p. 7,10.
[13]Benjamin A. Goldman, James A. Hulme, and Cameron Johnson for Council on Economic Priorities, *Hazardous Waste Management: Reducing the Risk*, Island Press, 1985.
[14]Wayne C. Turner, Ph.D., *Introduction to Hazardous Materials Management and Certification*, Oklahoma State University, Stillwater, OK, 1988.
[15]Arthur M. Sullivan, "Liability Rules for Toxics Cleanup," *Journal of Urban Economics*, Vol. 20, 1986, pp. 191-204.

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APPENDIX A. LETTER TO EPA

OSU

Oklahoma State University

INDUSTRIAL ENGINEERING AND MANAGEMENT

STILLWATER, OKLAHOMA 74078-0540
ENGINEERING NORTH, ROOM 322
(405) 744-6055
FAX: (405) 744-7673

May 9, 1989

Nita House
FOIA Control Officer
U.S. EPA, Region 6
1445 Ross Avenue
Dallas, TX 75202

Dear Ms. House:

As a graduate student at Oklahoma State University, I am researching the liability exposure of a hazardous waste generator based on his method of disposal. The project is entirely objective and not associated with any sponsoring agency, thus I am limited financially.

I would like to request the following information to the extent that it is free of charge. If there is a cost involved, please send what you can for free or have an administrative representative call me. My request is for:

* information relating to settlements for generators (only) who have settled CERCLA cases. I am interested in knowing the cleanup and legal costs and the method of disposal which was used. I would like copies or access to settlement figures.

* a complete listing from HWDMS of all hazardous waste generators-only and generator-transporters, but not generators who are also TSD's. Specifically, I would like to know the company name, EPA ID number, mailing address, facility contact and phone number. If the list becomes extremely long, 300 entries is sufficient.

Thank you for your assistance.

Sincerely,

Scott A. Moses

Scott A. Moses
Research Associate

APPENDIX B. LETTER TO ECS

OSU

Oklahoma State University

INDUSTRIAL ENGINEERING AND MANAGEMENT

STILLWATER, OKLAHOMA 74078-0540
ENGINEERING NORTH, ROOM 322
(405) 744-6055
FAX: (405) 744-7673

May 1, 1989

215-269-6731
800-ECS-1414

David M. Rosenberg
President
Environmental Compliance Services, Inc.
721 East Lancaster Avenue
Downington, PA 19335

Dear Mr. Rosenberg:

We are writing to you because of your expertise in the area of environmental risk assessment. We are developing a survey to be sent to environmental coordinators which we hope will allow us to:

* determine the factors which tend to increase or decrease the liability exposure of a hazardous waste generator and the relative importance of these factors
* develop a risk assessment form which could be used to assign a risk rating to a generator
* determine the range of liability exposure in dollars based on the risk rating of a generator
* determine the expected liability costs associated with various disposal options.

This survey is being conducted as a graduate research project in Industrial Engineering at Oklahoma State University. It is entirely objective and not associated with any sponsoring agency.

We are asking for your help. Your underwriting experience and risk assessment activities have given you knowledge about what factors tend to increase or decrease a generator's risk as well as some knowledge of the dollar magnitude of these risks.

Would you be willing to share this knowledge with us to aid in our devlopment of this survey? We will gladly send a copy of the final report on this project which will be published in December, 1989.

If you have any questions please contact either of us at 405/744-6055. Thank you.

Sincerely,

Wayne C. Turner, Ph.D., P.E., CHMM
Professor

Scott A. Moses
Research Associate

CENTENNIAL
1890 • 1990

Celebrating the Past . . . Preparing for the Future

APPENDIX C. ECS APPLICATION FOR COVERAGE

May 22, 1989

Mr. Scott A. Moses
Research Associate
Oklahoma State University
Stillwater, Oklahoma 74078-0540

ECS

721 East Lancaster Avenue
Downingtown, PA 19335
(215) 269-0731
800-ECS-1414

Dear Scott:

In regard to our conversation concerning your research project at the University, I am enclosing a supplemental application for your review. In addition, please find a pollution legal liability application. These applications should initially give you an idea of the type of questions we expect to be answered by our insureds prior to insurance consideration.

In addition, all hazardous waste generators require an environmental risk assessment survey to be performed by an outside environmental engineering firm as part of the insurance evaluation process. Our consulting division, CSI, performs many of these surveys, and if you should need assistance regarding the type of information our consultants look for in their site evaluation, I would be more than happy to put you in touch with one of our senior environmental consultants.

If you have any additional questions, please do not hesitate to contact my office.

Very truly yours,

David M. Rosenberg, Esq.
Executive Vice President

DMR:kb
Enclosures

ENVIRONMENTAL
COMPLIANCE
SERVICES, INC.

ECS
OUTLINE OF
INSURANCE COVERAGES

Effective October, 1988

721 East Lancaster Avenue • Downingtown, PA 19335
(215) 269-6731 • (800) ECS-1414 (outside PA) • (215) 873-1605 (FAX)

A. Special Coverages

1. **Pollution Liability:** any firm with an environmental exposure
   a. Sudden and gradual coverages
   b. Claims-made form, no retro date provision
   c. Defense costs provided as a supplemental limit, where required by statute
   d. All regulatory filings provided
   e. Risk assessment at insured's cost and by company approved engineering firm may be required (not applicable to renewal surveys)
   f. Limits of **$3 million/$6 million** in-house capacity; higher limits may be arranged

2. **First Party Pollution Clean-up:** Provides reimbursement for clean-up costs associated with mandated clean-up of insured premises
   a. Claims-made policy, no retro date provision
   b. Risk assessment at insured's cost and by company approved engineering firm may be required (not applicable to renewal surveys)
   c. Limit of **$1 million/$1 million**

B. **Transporters: Hazardous Waste/Materials**

1. General Liability
   a. Claims-made policy: ISO form (2/86)
   b. Unlimited Supplemental Defense Costs
   c. Automatic five (5) year discovery period, extended discovery available
   d. Absolute pollution exclusion
   e. Limits of $5 million in-house capacity; higher limits can be arranged

2. Transporters Pollution Liability
   a. Provides coverage at designated disposal locations
   b. Claims-made form, no retro date provision
   c. Limits of **$1 million**

3. Automobile Liability and Physical Damage
   a. Business Automobile policy: ISO form (1/87)
   b. MCS 90 Endorsement provided
   c. Physical damage values as needed
   d. All regulatory filings provided
   e. Limits of $5 million in-house capacity; higher limits can be arranged

4. Property
   a. Values as needed
   b. All risk form available

5. Bonds
   a. License and Permit bonds
      1. Massachusetts $10,000
      2. Michigan $15,000 resident, $30,000 non-resident
      3. Maryland $50,000

6. Applications Required
   a. General Liability, Automobile and Property Acord applications
   b. ECS Supplemental Application

C. **Treatment, Storage, Disposal (TSD)**

1. General Liability
   a. Claims-made policy: ISO Form (2/86)
   b. Unlimited Supplemental Defense Costs
   c. Automatic five (5) year discovery period, extended discovery available
   d. Absolute pollution exclusion
   e. Limits of $5 million in-house capacity; higher limits may be arranged

2. Pollution Liability
   a. Sudden and gradual coverages
   b. Claims-made form, no retro date provision
   c. Defense costs provided as a supplemental limit, where required by statute
   d. All regulatory filings provided
   e. Risk assessment at insured's cost and by company approved engineering firm may be required (not applicable to renewal surveys)
   f. Limits of **$3 million/$6 million** available in-house; higher limits may be arranged

3. Automobile Liability and Physical Damage
   a. Business Automobile policy: ISO Form (1/87)
   b. MCS 90 Endorsement provided
   c. Physical damage values as needed
   d. All regulatory filings provided
   e. Limits of $5 million in-house capacity; higher limits can be arranged

4. Property
   a. Values as needed
   b. All risk form available

5. Applications Required
   a. General Liability, Automobile Liability, and Property Acord applications
   b. ECS Supplemental Application
   c. Pollution Liability Application
   d. Available engineering data or prior risk assessment survey may be required

D. Clean-up/Remedial Action Contractors

1. General Liability
   a. Claims-made policy: ISO form (2/86)
   b. Unlimited Supplemental Defense Costs
   c. Automatic five (5) year discovery period, extended discovery available
   d. Absolute pollution exclusion
   e. Limits of $5 million in-house capacity; higher limits can be arranged

2. Contractors Pollution Liability: Provides coverage for work performed by contractor at non-owned locations on blanket basis
   a. Claims-made form, retro date provision
   b. Need for risk assessment survey to be determined on an individual basis
   c. Separate policy for Superfund site work available on job-by-job basis
   d. Completed operations coverage available
   e. Limits of **$1 million/$2 million,** defense costs included in limit

3. Automobile Liability and Physical Damage
   a. Business Automobile policy: ISO Form (1/87)
   b. MCS 90 Endorsement provided
   c. Physical damage values as needed
   d. All regulatory filings provided
   e. Limits of $5 million in-house capacity; higher limits can be arranged

4. Property
   a. Values as needed
   b. Equipment floater available
   c. All risk form available

5. Applications Required
   a. General Liability, Automobile Liability and Property Acord applications
   b. ECS Supplemental Application
   c. Contractor's Supplement
   d. Pollution Liability Application
   e. Available engineering data or prior risk assessment survey may be required

E. Environmental Consultants

1. Professional Liability Coverage
   a. Claims-made form, retro date provision
   b. Pollution Liability coverage provided (no B.I. or P.D. coverage)
   c. Limits of $1 million/$1 million, defense costs included in limit

2. General Liability
   a. Claims-made policy: ISO form (2/86)
   b. Unlimited Supplemental Defense Costs
   c. Automatic five (5) year discovery period, extended discovery available
   d. Absolute pollution exclusion
   e. Limits of $5 million in-house capacity; higher limits can be arranged

3. Applications Required
   a. ECS Environmental Consultants E&O Application
   b. General Liability Acord application

F. Chemical Distributors

1. General Liability and Products Liability
   a. Claims-made form: ISO form (2/86)
   b. Unlimited supplemental defense costs
   c. Automatic five (5) year discovery period, extended discovery available
   d. Absolute pollution exclusion
   e. Asbestos exclusion
   f. Broad form blanket vendors available
   g. Limits of $2 million

2. Automobile Liability and Physical Damage
   a. Business Automobile policy: ISO form (1/87)
   b. MCS 90 Endorsement
   c. Physical damage values as needed
   d. All regulatory filings provided
   e. Limits of $5 million

3. Property
   a. Values as needed
   b. All risk form available

4. Applications Required
   a. General Liability, Automobile and Property Acord applications
   b. ECS Chemical Risk Supplemental Application

G. Pollution Equipment Manufacturers

1. Products Liability
   a. Claims-made policy, retro date provision
   b. Pollution Liability coverage provided
   c. Limits of $1 million/$1 million, defense costs included in limit
2. Application required
   a. ECS Products Liability Application

H. General Information

1. ECS is constantly working to obtain broader coverages and higher limits for its clients. If you require higher limits or different coverages than outlined above, please inquire as to our capacilities.
2. All policies are provided through an admitted company with an A Best rating.
3. Please contact ECS Marketing at 800-ECS-1414 or (215) 269-6731 in PA for more information.

NOTE: This outline is intended to provide a broad overview of the coverages and terms available. However, because of the vast differences between accounts, the actual terms of coverage will be specifically enumerated in a separate quote letter.

ENVIRONMENTAL COMPLIANCE SERVICES (ECS)

ECS is an organization dedicated to assisting environmental or technical companies with their insurance, safety, and compliance needs through the unique combination of in-house expertise in environmental regulation, technical risk management, and insurance underwriting.

ECS consists of the following subsidiaries:

- **ECS Underwriting**

  ECS Underwriting is a Managing General Agency (MGA) responsible for underwriting and administering a program of insurance for companies facing an environmental exposure. This includes companies involved in the hazardous waste/materials, infectious waste and chemical industries. The program is underwritten through Reliance National Risk Specialists.

  ECS Underwriting also acts as a Program Administrator for Reliance Specialty Programs of Philadelphia and is responsible for administering a program of insurance for the chemical distribution industry.

- **Consulting Services, Inc. (CSI)**

  CSI is an environmental consulting firm which offers a wide range of services directly to corporate clientele. These services include:

  - Technical assistance to ECS Underwriting
  - Performance of environmental risk assessment surveys
  - Management consulting
  - Compliance audits
  - Onsite preparation of corporate health and safety program
  - Development of complete emergency response procedures

  Consulting services can be specifically tailored to meet individual clients corporate needs.

- **Bailey, Meyers & Associates (BMA)**

  BMA is a unique retail insurance agency specializing in the placement of insurance for companies whose scientific and technical operations could impact the environment. BMA's current book of business primarily consists of those companies involved in the chemical industry and the transportation, treatment, storage, disposal and cleanup of hazardous waste/materials.

- **ECS Brokerage**

  ECS Brokerage is the wholesale brokerage division of ECS. As a wholesaler, ECS Brokerage works with retail agencies in the placement of all forms of property and casualty business not available in the standard marketplace.

For additional information concerning ECS, please contact ECS Marketing at:

721 East Lancaster Avenue
Downingtown, PA 19335
(800) ECS-1414
(215) 269-6731 (inside PA)

ECS
UNDERWRITING
POLLUTION DEPARTMENT
CAPABILITIES

Effective April, 1989

721 East Lancaster Avenue • Downingtown, PA 19335
(215) 269-6731 • (800) ECS-1414 (outside PA) • (215) 873-1605 (FAX)

TYPES OF ACCEPTABLE ACCOUNTS

MANUFACTURING
- Building Material
- Chemical
- Wood Treatment
- Plastic
- Pulp/Paper
- Electronic
- Food Production
- Furniture
- Paint
- *Petroleum
- Equipment/Supply
- *Electroplating
- Steel/Iron

WAREHOUSING
- Chemical
- Petroleum
- Trucking

DEEP WELLS
- Drilling
- Chemical
- Hazardous Waste
- Oil and Gas

UTILITIES
- Generating Stations
  - — Coal Fired
  - — Gas Fired
  - — Hydroelectric
  - — Water Works

WASTEWATER TREATMENT
- Municipal
- Industrial
- Hazardous

PROCESSING
- Metal
- Food
- Chemical

DISTRIBUTION
- Chemical
- *Petroleum
- Paint

REFINING
- Petroleum
- Chemical
- Metal

STORAGE (Above Ground)
- Chemical
- Petroleum
- Coal/Ore
- Equipment

MINING
- Coal
- Phosphate
- Metal Ores

MISCELLANEOUS
- R & D Labs
- Office Buildings

WASTE TREATMENT, STORAGE & DISPOSAL FACILITIES (TSDF's)
- Hazardous Waste
- Municipal Waste
- Solvent Recyclers
- Recycling Centers
- Sludge Applicators
- Acid/Base Neutralization Facilities
- Transfer Stations
- *Landfills

INCINERATORS
- Municipal
- Chemical
- Hazardous Waste
- Trash to Steam
- *Hospitals

CONTRACTORS
- General Construction
- Sewer
- *Remedial Action or Response Action Contractors (RAC's)
- Mobile Treatment
- Mobile Incinerators
- Electrical
- Tank Cleaning
- Pipeline

NOTE: This listing is intended to provide a broad overview of the categories of acceptable pollution accounts. If you have an account that doesn't fit the generic categories listed above, please submit it for review.

*See following page for specific information required for these accounts.

GENERAL INFORMATION REQUIRED FOR ALL POLLUTION ACCOUNTS

1. POLLUTION LEGAL LIABILITY application.
2. Minimum two (2) years financials.
3. Plot plans or facility layout.
4. Existing environmental studies or documentation.
5. Details on past and present regulatory or civil complaints, fines, and/or claims.

The following information is also required for the types of accounts listed below:

PETROLEUM

1. List all tanks (above and below the ground). Include tank age, contents and capacity.
2. Indicate type of flooring and type of secondary containment surrounding the tanks.
3. Detail presence of any high level alarms on aboveground tanks and any ultrasonic testing performed in the past five (5) years.
4. Provide details on loading/unloading areas (include containment provisions).
5. Include a copy of the latest revision of the site SPCC Plan.
6. Detail fire protection provisions at the site.

ELECTROPLATING OPERATIONS

1. Indicate presence of any surface impoundments. Indicate type of liner (if any), and include any soil and groundwater well results.
2. Include past six (6) months of effluent (wastewater) monitoring data.
3. Detail the type of plating operations performed onsite (include process flow diagrams, site blueprints).

WASTEWATER TREATMENT

1. Indicate details of chlorine storage; indicate annual quantity utilized and presence of chlorine detection systems or alarms.
2. Include past six (6) months of National Pollutant Discharge and Elimination Systems (NPDES) monitoring data for effluent discharges.
3. Include detailed description of wastewater treatment process.
4. Detail any onsite sludge application or incineration.

LANDFILLS

1. List total number of acres of land and number of acres permitted for disposal.
2. Include copies of any federal, state or local permits.
3. Indicate existence and type of landfill liner (include details on liner permeability).
4. Include detailed description of leachate treatment and collection system. Also, indicate final point of discharge or disposal of leachate.
5. Include the past year's groundwater monitoring well results.
6. Include copies of any engineering specifications for the landfill (erosion and sedimentation plans; environmental impact statements; standard operating procedures).
7. Indicate details of methane collection systems (include any testing results).

HOSPITALS

1. Please complete our separate hospital questionnaire.

REQUIRED INFORMATION FOR CONTRACTORS:

Blanket Contractors Pollution

1. Completed POLLUTION LEGAL LIABILITY application and SUPPLEMENTAL application
2. Past year's job listing
3. Resumes of key company personnel
4. Training/medical monitoring/safety plans
5. Statement of qualifications
6. Any specific treatment technologies or mobile units

Project Basis

1. Completed POLLUTION LEGAL LIABILITY application and CONTRACTORS PROJECT application
2. Past year's job listing
3. Resumes of key company personnel
4. Training/medical monitoring/safety plans
5. Statement of qualifications
6. Detailed description of the specific project operations to be performed by the contractor
7. Listing of other contractors (i.e. subcontractors) involved at the site
8. Specific environmental problems at the site (detail any environmental risk assessments or historical background at the site)

Superfund Projects

1. Completed POLLUTION LEGAL LIABILITY application and SUPPLEMENTAL application
2. Past year's job listing
3. Resumes of key company personnel
4. Training/medical monitoring/safety plans
5. Statement of qualifications
6. Copies of the RI/FS (Remedial Investigation/Feasibility Study)
7. ROD (Record of Decision)
8. Copy of the remedial action work plans for the site

ENVIRONMENTAL COMPLIANCE SERVICES (ECS)

ECS is an organization dedicated to assisting environmental or technical companies with their insurance, safety, and compliance needs through the unique combination of in-house expertise in environmental regulation, technical risk management, and insurance underwriting.

ECS consists of the following companies:

- **ECS Underwriting**

  ECS Underwriting is a Managing General Agency (MGA) responsible for underwriting and administering a program of insurance for companies facing an environmental exposure. This includes companies involved in the hazardous waste/materials, infectious waste and chemical industries. The program is underwritten through Reliance National Risk Specialists.

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  - Technical assistance to ECS Underwriting
  - Performance of environmental risk assessment surveys
  - Management consulting
  - Compliance audits
  - Onsite preparation of corporate health and safety program
  - Development of complete emergency response procedures

  Consulting services can be specifically tailored to meet individual clients' corporate needs.

- **Bailey, Meyers & Associates (BMA)**

  BMA is a unique retail insurance agency specializing in the placement of insurance for companies whose scientific and technical operations could impact the environment. BMA's current book of business primarily consists of those companies involved in the chemical industry and the transportation, treatment, storage, disposal and cleanup of hazardous waste/materials.

- **ECS Brokerage**

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For additional information concerning ECS, please contact ECS Marketing at:

721 East Lancaster Avenue
Downingtown, PA 19335
(800) ECS-1414
(215) 269-6731 (inside PA)

PLANET INSURANCE COMPANY
MADISON, WISCONSIN

APPLICATION FOR POLLUTION LEGAL LIABILITY INSURANCE
(Include 10K report, annual report, and flow chart of process if available.)

THIS IS AN APPLICATION FOR A **CLAIMS MADE** POLICY

1. NAMED INSURED: (Include All Subsidiary Companies to be Covered) _____

   _____

   _____

   EPA IDENTIFICATION NUMBER(S): _____

   _____

   POST OFFICE ADDRESS: _____

   _____

   _____

   LOCATIONS TO BE COVERED: _____

   _____

   _____

2. NAMED INSURED IS:
   ____ Partnership ____ Corporation ____ Joint Venture ____ Other _____

3. HOW LONG HAS THE NAMED INSURED BEEN IN BUSINESS? _____

4. SALES:

   A) ESTIMATED (Ensuing Year): _____

   B) LAST 5 YEARS: 19 _____ 19 _____ 19 _____ 19 _____ 19 _____

5. DESCRIBE THE PAST USES OF THE LOCATION(S), INCLUDING ANY INACTIVE OR CLOSED LANDFILLS OR SURFACE IMPOUNDMENTS:

   _____

   _____

6. DESCRIBE THE FACILITY OPERATIONS, INCLUDING MANUFACTURING OR PRODUCTION PROCESSES AND ANY WASTE TREATMENT OR DISPOSAL ACTIVITIES. (ATTACH A SITE DIAGRAM OUTLINING BUILDINGS, STORAGE AREAS, TANKS, ETC.): _____

   _____

   _____

   _____

7. PLEASE LIST: A. RAW MATERIALS USED AT LOCATION
B. PROCESS MATERIALS USED AT LOCATION:
(Plating agents, degreasers, heat treating agents, cleaning solvents, etc.)
(Please use additional sheet if space provided is insufficient.)

	QUANTITY OF MATERIAL			METHOD OF STORAGE	
DESCRIPTION	PER YEAR	ANY ONE TIME	DRUM	UNDERGROUND TANK	ABOVEGROUND TANK

8. HAS THERE BEEN ANY CHANGE IN PROCESS DURING THE LAST 5 YEARS THAT HAS ALTERED (LESSENED OR INCREASED) THE RISK OF POLLUTION LIABILITY? ____ YES ____ NO

IF SO, GIVE DETAILS: _____

9. DO YOU HAVE AN ENVIRONMENTAL SAFETY COMMITTEE OR ANY EMPLOYEES VESTED WITH SPECIFIC RESPONSIBILITY FOR ENVIRONMENTAL CONTROL? ____ YES ____ NO

IF SO, DESCRIBE THEIR DUTIES AND TO WHOM THEY REPORT: _____

10. ARE THERE ANY STATUTES, STANDARDS, OR OTHER CITY, STATE AND FEDERAL REGULATIONS RELATING TO THE PROTECTION OF THE ENVIRONMENT WHICH APPLY TO ANY LOCATION WITH WHICH YOU CANNOT AT PRESENT COMPLY? ____ YES ____ NO

IF SO, GIVE DETAILS: _____

11. EFFLUENT TREATMENT AND DISCHARGE:

COMPOSITION	TREATMENT PROCESS	DISCHARGE TO	HOW MANY YEARS	QTY/YR

12. SEMI-SOLID AND SOLID WASTE DISPOSAL:
A. ON-SITE DISPOSAL (LANDFILL, SURFACE IMPOUNDMENT, DEEPWELL INJECTION, ETC.)

COMPOSITION	QTY/YR	DISPOSAL METHOD	EPA/STATE PERMITTED

FOR LANDFILLS OR SURFACE IMPOUNDMENTS, INDICATE SIZE, TYPE OF LINER, ANY MONITORING WELLS, LEACHATE COLLECTION.

B. OFF-SITE DISPOSAL

COMPOSITION	ON-SITE STORAGE METHOD	LENGTH OF STORAGE	QTY/YR	DISPOSAL FACILITY

13. TRANSPORTER INFORMATION:

	1	2	3
NAME OF WASTE HAULER			
EPA ID #			
STATE ID #			

14. AIR EMISSIONS:

NATURE:	COMPOSITION:
TOXIC GASES & VAPORS	
IRRITANT GASES	
MALODOROUS GASES & VAPORS	
ASPHYXIANTS	
AEROSOLS	
DUST & ASH	

VOLUME PER YEAR (WHERE KNOWN): _____

DESCRIBE METHODS AND EQUIPMENT USED FOR COLLECTION AND TREATMENT OF POLLUTING AIR EMISSIONS: _____

15. THE LOCATION'S SURROUNDING ENVIRONMENT:

A. PLEASE DESCRIBE THE PROPERTIES IMMEDIATELY ADJACENT TO THE LOCATION(S) TO BE COVERED:

B. PLEASE DESCRIBE THE NATURE OF OTHER INDUSTRIES LOCATED WITHIN A RADIUS OF 3 MILES: ____

16. ADDITIONAL INFORMATION:

A. PLEASE ATTACH THE LATEST MONITORING RESULTS FOR FACILITY EFFLUENT DISCHARGES, AIR EMISSIONS, LANDFILLS OR SURFACE IMPOUNDMENTS.

B. PLEASE ATTACH A SCHEDULE OF ALL STORAGE TANKS INCLUDING THE FOLLOWING INFORMATION: CAPACITY, AGE, ABOVE OR BELOW GROUND, SPILL CONTAINMENT METHODS, CONTENTS, STEEL OR FIBERGLASS, TYPE OF INVENTORY CONTROL, TESTING METHODS.

17. RECORD:

A. HAVE YOU DURING THE LAST 5 YEARS BEEN PROSECUTED FOR CONTRAVENTION OF ANY STANDARD OR LAW RELATING TO THE RELEASE FROM THE LOCATION OF A SUBSTANCE INTO SEWERS, RIVERS, SEA, AIR OR INTO LAND? ____ YES ____ NO

IF SO, GIVE DETAILS: _____

_____

B. PLEASE DESCRIBE ANY POLLUTION CLAIMS DURING THE LAST 5 YEARS (IF NONE, PLEASE SO STATE): _____

_____

_____

_____

C. AT THE TIME OF SIGNING THIS APPLICATION, ARE YOU AWARE OF ANY CIRCUMSTANCES WHICH MAY REASONABLY BE EXPECTED TO GIVE RISE TO A CLAIM UNDER THIS POLICY? ____ YES ____ NO

IF SO, GIVE DETAILS: _____

_____

_____

_____

THE APPLICANT REPRESENTS THAT THE ABOVE STATEMENTS AND FACTS ARE TRUE AND THAT NO MATERIAL FACTS HAVE BEEN SUPPRESSED OR MISSTATED.

*NOTICE TO NY APPLICANTS:

Any person who knowingly and with intent to defraud any Insurance Company or other person files an application for insurance containing any false information, or conceals for the purpose of misleading, information concerning any false material thereto, commits a fraudulent insurance act, which is a crime.

COMPLETION OF THIS FORM DOES NOT BIND COVERAGE. APPLICANT'S ACCEPTANCE OF COMPANY'S QUOTATION IS REQUIRED PRIOR TO BINDING COVERAGE AND POLICY ISSUANCE. IT IS AGREED THAT THIS FORM SHALL BE THE BASIS OF THE CONTRACT SHOULD A POLICY BE ISSUED, AND IT WILL BE ATTACHED TO THE POLICY.

Applicant: _____

By: _____ (Title) Date: _____

Agent/Broker: _____

Address: _____

IF AN ORDER IS RECEIVED, THE APPLICATION IS ATTACHED TO THE POLICY SO IT IS NECESSARY THAT ALL QUESTIONS BE ANSWERED IN DETAIL.

ECS

721 East Lancaster Avenue
Downingtown, PA 19335
(215) 269-6731
FAX (215) 873-1605
(800) ECS-1414
(outside Pennsylvania)

ENVIRONMENTAL
COMPLIANCE
SERVICES, INC.

SUPPLEMENTAL APPLICATION

IMPORTANT NOTICE: All questions must be answered. If "none" or "not applicable", so indicate.

PART I: INTRODUCTION/MANAGEMENT/ADMINISTRATION

1. Company Name _____

_____

☐ Partnership ☐ Corporation ☐ Joint Venture Other _____

Mailing Address _____

City _____ State _____ Zip Code _____

Phone (___) _____

2. Length of time in business _____

Identify previous owners and describe the past uses of the location(s), including any inactive or closed landfills c surface impoundments (attach additional sheet if necessary).

_____

_____

_____

3. Person(s) responding to survey:

Name _____ Title _____

Name _____ Title _____

4. Attach Resume or statement of qualifications of Key Personnel.

   List all Memberships in Trade Associations.

   _____

   _____

5. Locations to be covered _____

   _____

   _____

6. Provide Number of Employees by Category:

   A. Management _____

   B. Administration _____

   C. Supervisors _____

   D. Foremen/Leadmen _____

   E. Clerical _____

   F. Drivers _____

   G. Driver Helpers _____

   H. Operators _____

   I. Laborers _____

   J. Mechanics _____

   K. Recovery Technicians _____

   L. Technicians _____

   M. Technical Specialists _____

   N. Other (Describe) _____

   TOTAL _____

7. Attach past three years financial statements, including balance sheets and income statements.

8. Record:

A. Have you during the last 5 years been cited for contravention of any standard or law relating to the releas from the location of a substance into sewers, rivers, sea, air, or onto land? ☐ Yes ☐ No

If so, give details _____

_____

B. Please describe any incidents during the last 5 years (if none, please so state) _____

_____

_____

_____

C. At the time of signing this application, are you aware of any circumstances which may reasonably be expectec to give rise to a claim? ☐ Yes ☐ No

If so, give details _____

_____

_____

_____

9. Is your company operating under a Consent Agreement with any Federal, State or Local Government? If so, give date and reason for Consent Agreement ☐ Yes ☐ No

_____

_____

_____

_____

_____

PART II: NATURE OF OPERATIONS

1. Utilizing the categories below, what are the company's business activities?
Note: Sums of columns A & B across must equal 100%.

Category	A % In-House	+	B % Sub-Contracted	= 100%
A. Transportation: Hazardous Waste				
Non Haz Waste				
Waste Oil				
Other				
Back-Haul				
B. Treatment/Solidification				
C. Recycling/Recovery				
D. Storage				
E. Disposal				
F. Cleanup				
G. Consulting				
H. Laboatory Testing & Analysis				
I. Chemical Cleaning				
J. Pipeline Cleaning				
K. Sewer/Septic Cleaning				
L. Boiler/Cooling Tower Cleaning				
M. Refinery Tank Cleaning				
N. Other Tank Cleaning				
O. Hydro Reconditioning				
P. Drum Reconditioning				
Q. Soil & Water Testing				
R. Virgin Chemical Wholesale Storage				
S. Truck Washing				
T. Other (specify) _____				

2. Utilizing the categories below, what are the company's business activities?
Note: Sums of columns A or B down must equal 100%.

Category	% Gross Sales	% Business Activity (Payroll)
A. Transportation: Hazardous Waste		
Non Haz Waste		
Waste Oil		
Other		
Back-Haul		
B. Treatment/Solidification		
C. Recycling/Recovery		
D. Storage		
E. Disposal		
F. Cleanup		
G. Consulting		
H. Laboratory Testing & Analysis		
I. Chemical Cleaning		
J. Pipeline Cleaning		
K. Sewer/Septic Cleaning		
L. Boiler/Cooling Tower Cleaning		
M. Refinery Tank Cleaning		
N. Other Tank Cleaning		
O. Hydro Reconditioning		
P. Drum Reconditioning		
Q. Soil & Water Testing		
R. Virgin Chemical Wholesale Storage		
S. Truck Washing		
T. Other (specify) _____		
	100%	100%

3. Provide complete physical description of plant, building, grounds, and appurtenances:

A. Location 1 _____

_____

Length of time at this location _____

_____

B. Location 2 _____

_____

Length of time at this location _____

_____

Attach site plans, previous insurance surveys or other materials describing physical features of the operation

4. Please List:

A. Raw Materials used at location

B. Process Materials used at location

(Plating agents, degreasers, heat treating agents, cleaning solvents, etc.)

C. Gasoline, Diesel, Fuel Oil, Kerosene, etc.

(Please use additional sheet if space provided is insufficient.)

QUANTITY OF MATERIAL			METHOD OF STORAGE		
Description	Per Year	Any One Time	Drum	Underground Tank	Aboveground Tank

5. Describe owned or leased storage/treatment/disposal/transportation facility:

Size:_____ Acres_____ Plant Area (square footag

Storage Capacity: _____ Bulk: _____ # Drums: _____

Description of Containment/Storage Area; _____

_____

Storage Tanks: # _____ Size(s): _____

6. If company operates a treatment/recycling facility, indicate type of process utilized and percentage of operations

Process		Percentage
A.	Stills	_____
B.	Distillation	_____
C.	Thermal Separation	_____
D.	Filtration	_____
E.	Separation	_____
F.	Clarifications	_____
G.	Ion Exchange	_____
H.	Solidifications	_____
I.	Other (describe fully) _____	_____

_____

7. List all permits held with Federal, State, County or Municipal Governments, including permit numbers and expiration dates.

Permit	Permit Number	Expiration Date
_____	_____	_____
_____	_____	_____

Attach additional sheet if necessary.

Attach copy of your EPA permit application Part A.

8. List all ICC and PUC docket numbers.

_____

_____

_____

9. What percentage of the sub-contractors that you hire:

A. Work under their own permits, rights or authority? _____

B. Work under your permits, rights or authority? _____

C. Do you check required permits for sub-contractors? ☐ Yes ☐ No

10. A. Are updated certificates of insurance from sub-contractors kept on file? ☐ Yes ☐ No

B. Are certificates of insurance reviewed? ☐ Yes ☐ No

C. What are the minimum limits of liability you require for your sub-contractors?

Workers' Compensation: _____

General Liability: _____

Automobile Liability: _____

D. Are all sub-contractors hired under a written contract? ☐ Yes ☐ No

E. Do your contracts with sub-contractors contain an indemnification provision? ☐ Yes ☐ No
If so, attach copy.

F. Does your company enter into written contracts where **you** assume liability? ☐ Yes ☐ No
If so, attach copy of all insurance requirements and indemnification clauses.

G. Describe the nature of work you sub-contract to others:

_____

_____

_____

PART III: OPERATIONS REQUIREMENTS

1. What materials are you permitted to transport?

Materials	Form		Container	
	Liquid	Solid	Bulk	Drums
A. Flammable Liquid				
B. Flammable Gas				
C. Flammable Solids				
D. Combustible Liquid				
E. Combustible Gas				
F. Combustible Solid				
G. Oxidizers				
H. Explosives A B C				
I. Lab Chemicals				
J. Lab Packs				
K. Etiologic Agents				
L. Corrosive Acid				
M. Corrosive Base				
N. Insecticides				
O. Air Reactives				
P. Water Reactives				
Q. Poisons "A"				
R. Poisons "B"				
S. Toxic				
T. Gas Cylinders				
U. Cyanides				
V. Sulfides				

Continued

Materials	Form		Container	
	Liquid	Solid	Bulk	Drums
W. Radioactives				
X. Waste Oil				
Y. Salt Water, Brine, Drilling Mud etc.				
Z. Other (Describe) _____				

Attach a complete list of all materials transported, treated, stored or disposed.

2. List all TSD facilities and provide permit numbers/locations for those facilities currently used by your company. Separately indicate any other facilities you have used since 1980. Attach separate list if necessary.

_____

_____

_____

3. Does your company **select** site of disposal for hazardous waste? ☐ Yes ☐ No

_____

_____

_____

4. List address where records, manifests, inspection reports and personnel records are maintained.

_____

_____

_____

5. Who is authorized to sign hazardous waste manifests?

_____

_____

A. Is this part of the employee's regular job description? ☐ Yes ☐ No

6. Does company comply with DOT rules with regard to placarding and labeling to properly identify hazardous waste? ☐ Yes ☐ No

PART IV: SAFETY

1. Does company have a safety person(s)? ☐ Yes ☐ No

   Name: _____

   Address: _____

   Telephone Number: _____

   List qualifications and certifications.

2. Under what condition is personal protective equipment used by your company personnel?

   A. SCBA _____

   B. Cartridge or Canister _____

   C. Respirators _____

   D. Protective Suits _____

   E. Boots _____

   F. Safety Glasses _____

   G. Aprons _____

   H. Gloves _____

   I. Hoods _____

3. Are personnel trained in the use of personal protective equipment? ☐ Yes ☐ No

4. Does your company conduct on a regular basis, the following seminars?

			Conducted By Whom
A.	Right to Know	☐ Yes ☐ No	_____
B.	OSHA	☐ Yes ☐ No	_____
C.	RCRA Compliance	☐ Yes ☐ No	_____

5. Does company have a medical monitoring program? ☐ Yes ☐ No

   A. Company Doctor: _____

   Address: _____

   _____

   Telephone Number: _____

6. Does company institute the following medical procedures?

   A. Pre-employment physicals ☐ Yes ☐ No

   B. DOT physical for drivers ☐ Yes ☐ No

   C. Baseline physicals for hazardous materials handling ☐ Yes ☐ No

   D. Routine follow-up physicals ☐ Yes ☐ No

      State intervals: _____

   E. Exposure reports ☐ Yes ☐ No

   F. Incident follow-up physicals ☐ Yes ☐ No

   G. Exit physicals ☐ Yes ☐ No

7. Indicate the type and length of training given to employees who will be working with hazardous materials for new employees and ongoing employee programs.

   Training Interval (hours, days, etc.)

   ☐ None

   ☐ In-house Seminars _____

   ☐ Outside Seminars _____

   ☐ On-the-Job Training _____

   ☐ Other (specify) _____

8. Does company have a confined space entry protocol? ☐ Yes ☐ No

9. Does company issue permits to gas free tanks:

   A. Prior to welding ☐ Yes ☐ No

   B. Prior to entry by individual ☐ Yes ☐ No

Include copy of employee safety and training procedures.

PART V: SPILL CONTINGENCY PLAN

1. Does company have a Notification Plan/Emergency Plan, or other Contingency Plan?

   ☐ Disaster Plan ☐ Evacuation Plan

   ☐ SPCC Plan ☐ Response Plan

   List the address where plans are filed.

   _____

   _____

2. When was the last time the plan was updated? _____

3. Has plan been provided to local support groups (e.g. police, fire, hospital)? ☐ Yes ☐ No

4. Has plan been reviewed and approved by management? ☐ Yes ☐ No

   If so, indicate name of person approving: _____

Attach copy of Plan(s).

PART VI: VEHICLE MAINTENANCE

1. List locations where company vehicles are decontaminated:

   Location 1: _____

   _____

   _____

   Location 2: _____

   _____

   _____

   (Attach additional sheet is necessary.)

2. Describe method of decontamination: _____

   _____

   _____

   _____

   _____

   _____

3. Does company complete pre-trip and post-trip inspection reports? ☐ Yes ☐ No

   Attach samples of these reports.

   A. Who reviews these reports?

   _____

   _____

   _____

4. How does company handle, store and dispose of used motor oils and other fluids necessary to the operation of your vehicles? Describe fully.

   _____

   _____

   _____

   _____

5. Describe any general repair and maintenance performed on your equipment by in-house mechanics.

By outside garages:

6. Describe in full the company's routine and preventative vehicle maintenance program. (Attach additional sheets if necessary.)

7. Are written records kept in regard to routine and preventative vehicle maintenance? ☐ Yes ☐ No

Attach samples of complete records.

Include copy of vehicle maintenance program.

PART VII: DRIVER SELECTION AND TRAINING

1. Indicate driver training and orientation program, including whether program is handled through in-house or outside seminars, on-the-job training, and length of training:

Training Intervals (hours, days, etc.)

- ☐ None
- ☐ In-House Seminars _____
- ☐ Outside Seminars _____
- ☐ On-the-job Training _____
- ☐ Other (specify) _____

2. List the minimum qualifications under which new drivers are hired.

_____

_____

_____

3. A. Do you obtain Motor Vehicle Reports (MVRs) on all drivers? ☐ Yes ☐ No

   B. How frequently are MVRs re-checked? _____

_____

4. Do you keep DOT files on all drivers? ☐ Yes ☐ No

5. Describe regular driving safety program. Include copy of regular agenda.

_____

_____

_____

Include full copy of driver training procedure manual.

PART VIII: CONTRACTOR OPERATIONS

Describe in detail past cleanup work in which you were involved (attach additional sheets if necessary). Include the following for all work:

1. Describe nature of long term (90 days or over) projects during the past three years:

   A. Private or Government Projects _____

   _____

   _____

   _____

   _____

   B. Bonded? ☐ Yes ☐ No

   If so, Insurance Company _____ Amount of Bond $ _____

   C. Length of time you spent on project _____

   D. Capacity: General Contractor _____

   Sub-Contractor _____ ; Transporter _____

   Other, describe _____

   _____

   _____

   E. Did you use Sub-Contractors?
   Explain in detail: _____

   _____

   _____

   F. Explain in detail Safety Protocol including who developed it: _____

   _____

   _____

   _____

G. Do you ever make use of casual labor? ☐ Yes ☐ No

If so, give details: _____

_____

H. Did your work progress on schedule? ☐ Yes ☐ No

If not, why? _____

_____

2. Describe nature of short term (under 90 days) projects: _____

_____

_____

_____

A. Emergency cleanup _____

_____

% of total work performed _____

B. If you perform jobs other than Emergency Spill cleanup answer same questions in 1. A-H. _____

_____

C. Are you under a long term emergency spill cleanup contract? ☐ Yes ☐ No

If yes, with whom is contract—include copy _____

If no, do you bid jobs? Explain _____

_____

_____

_____

D. For whom are you listed as a qualified Emergency Response firm? _____

_____

3. Describe in detail Employee Safety Program _____

_____

_____

_____

_____

4. Have you ever or do you expect to perform work on any Superfund Sites? ☐ Yes ☐ No

If yes, explain in detail _____

_____

_____

_____

_____

5. Do you ever rent out equipment? ☐Yes ☐ No

If yes, give type of equipment and if it will be with or without operator. Explain in detail_____

_____

_____

_____

_____

6. Include a copy of your standard operating procedure.

7. Include a copy of your company statement of qualifications.

8. A. Have you been insured for Workers' Compensation, General Liability, and Auto Liability during all your jobs? ☐ Yes ☐ No

If yes, with whom? _____

B. Describe all claims, losses, or incidents which have or may give rise to a claim related to your performance in a cleanup project: _____

_____

_____

_____

_____

9. Please provide us with any additional information you feel is needed regarding your operation. _____

_____

_____

_____

_____

NOTICE TO NEW YORK APPLICANTS

Any person who knowingly and with intent to defraud any Insurance Company or other person files an application for insurance containing any false information, or conceals for the purpose of misleading, information concerning any false material thereto, commits a fraudulent insurance act, which is a crime.

WARRANTY:

The purpose of the Supplemental Application is to assist the underwriting process and related loss-control activities. Information contained herein is specifically relied upon in determination of insurability. The undersigned, therefore, warrants that the information contained herein is true and accurate to the best of his knowledge, information and belief. It is the responsibility of the undersigned/insured to notify agent or broker in the event of any changes in the information in this application.

Signed: _____

Date: _____

Please check to see that all required attachments are enclosed.

1. Financial Statements ☐
2. Resume of Key Personnel ☐
3. Part A Application ☐
4. Indemnity Agreements ☐
5. List of Materials ☐
6. Employee Safety/Training Manual ☐
7. Spill Plan ☐
8. Copy of Maintenance Program ☐
9. Driver Training Manual ☐

APPENDIX D. THE SURVEY QUESTIONNAIRE AND COVER LETTER

he following decision criteria which can be used to select a transporter or disposal option may affect generator's liability exposure. Decide what you believe the liability exposure would be for a enerator if the conditions below are true. Then, circle a number on the scale according to the ollowing definition:

0 = no liability exposure. If this condition exists, a generator cannot be found liable.
10 = certain liability. If this condition exists, a generator will certainly be found liable.

lease note that you probably will not give a "0" or "10" to any one of these issues. Also, all factors re not of equal significance, so reserve the higher ratings for the factors of greatest importance.

hoosing a Transporter

1 2 3 4 5 6 7 8 9 10 Transporter does not have an EPA ID number or insurance.
1 2 3 4 5 6 7 8 9 10 Transporter has an EPA ID number and insurance.

1 2 3 4 5 6 7 8 9 10 Reputation of transporter with associates, trade associations, or other agencies is unknown.
1 2 3 4 5 6 7 8 9 10 Reputation of transporter is known to be favorable.

1 2 3 4 5 6 7 8 9 10 Transporter's vehicles are in poor condition and do not have emergency equipment.
1 2 3 4 5 6 7 8 9 10 Transporter's vehicles are in good condition and equipped with emergency equipment.

1 2 3 4 5 6 7 8 9 10 An independent transporter is hired by the generator to transport waste to the disposal site.
1 2 3 4 5 6 7 8 9 10 The generator transports waste with his own company vehicles and drivers.
1 2 3 4 5 6 7 8 9 10 The disposal site transports the waste to their site.

1 2 3 4 5 6 7 8 9 10 Waste from other generators is also on the truck with this generator's waste.
1 2 3 4 5 6 7 8 9 10 The transporter has waste from one generator only on the truck.

:hoosing a Disposal Site

1 2 3 4 5 6 7 8 9 10 Disposal site does not have an EPA ID number.
1 2 3 4 5 6 7 8 9 10 Disposal site has an EPA ID number.

1 2 3 4 5 6 7 8 9 10 Reputation of site with associates, trade associations, or other agencies is unknown.
1 2 3 4 5 6 7 8 9 10 Reputation is known to be favorable.

1 2 3 4 5 6 7 8 9 10 Disposal site has not been audited.
1 2 3 4 5 6 7 8 9 10 Disposal site is personally audited by the generator regularly.

1 2 3 4 5 6 7 8 9 10 Hazardous waste is disposed of at an off-site commercial facility.
1 2 3 4 5 6 7 8 9 10 Hazardous waste is disposed of on-site.

1 2 3 4 5 6 7 8 9 10 Disposal site has been in operation for many years.
1 2 3 4 5 6 7 8 9 10 Disposal site has been in operation for only a few years.

---

he following hazardous waste disposal methods are listed alphabetically. Estimate the probability iat a generator would have to pay to cleanup a disposal site if he used each method:

0 = absolutely no possibility of having to pay for cleanup
10 = absolute certainty of having to pay for cleanup

_____ Burning as fuel in an industrial boiler or furnace
_____ Incineration
_____ Indefinite storage (containers, tanks, or surface impoundments)
_____ Landfill
_____ Recycle or Reuse
_____ Underground injection

bout what percent of a generator's liability exposure is due strictly to his choice of disposal method ot specific transporter or disposal site selection): Percent _____

---

ie following questions are **optional** but a response would be appreciated (please circle):
as your facility been named as a potentially responsible party (PRP)? _____ Y N Unknown
as your facility had to pay for cleanup of any disposal sites? _____ Y N Unknown
as your facility been a defendant in any lawsuits because of your generation of hazardous waste? _____ Y N Unknown

Thank you for your participation.

OSU

Oklahoma State University

INDUSTRIAL ENGINEERING AND MANAGEMENT

STILLWATER, OKLAHOMA 74078-0540
ENGINEERING NORTH, ROOM 322
(405) 744-6055
FAX: (405) 744-7673

May 30, 1989

Name
Company
Address
(address)
City

Dear Mr. Name:

We want to help environmental managers better understand liability problems and are writing to you because of your experience in the field of hazardous waste management. We need your help. To determine the significance of factors which affect the liability of hazardous waste generators, we are asking for your opinions on the enclosed survey.

As a member of an elite group selected for the survey, your experience and opinions are of vital importance. The objective of the survey is to better understand the importance of factors used in liability risk assessment for hazardous waste generators and to develop a tool which an environmental manager can use to assess programs and determine management strategies.

A response, which will only take a few minutes to complete, is requested by June 23, 1989. Two copies of the survey have been enclosed. We suggest that you use one as a working copy, transpose your results to the second copy, and return it in the envelope provided. Results will be shared with survey respondents and also will be used in a broader research effort on liability management.

Looking at the survey, you will notice that each factor can be given a rating from 0 to 10. It is unlikely that you would give a 0 or 10 to any one of these factors. For example, suppose you gave the first four factors ratings of 5, 3, 8, and 2, respectively. We would interpret your ratings to mean that both container and tank inspections are important, but that tank inspections are much more important than container inspections. Please consider the relative importance of each factor and reserve the higher ratings for factors of greater importance.

This survey is part of a graduate research project in Industrial Engineering at Oklahoma State University and not associated with any sponsoring agency. We assure you that your responses will remain confidential. If you have any questions, please do not hesitate to call. Thank you for your help.

Sincerely,

Wayne C. Turner, Ph.D., P.E., CHMM
Professor

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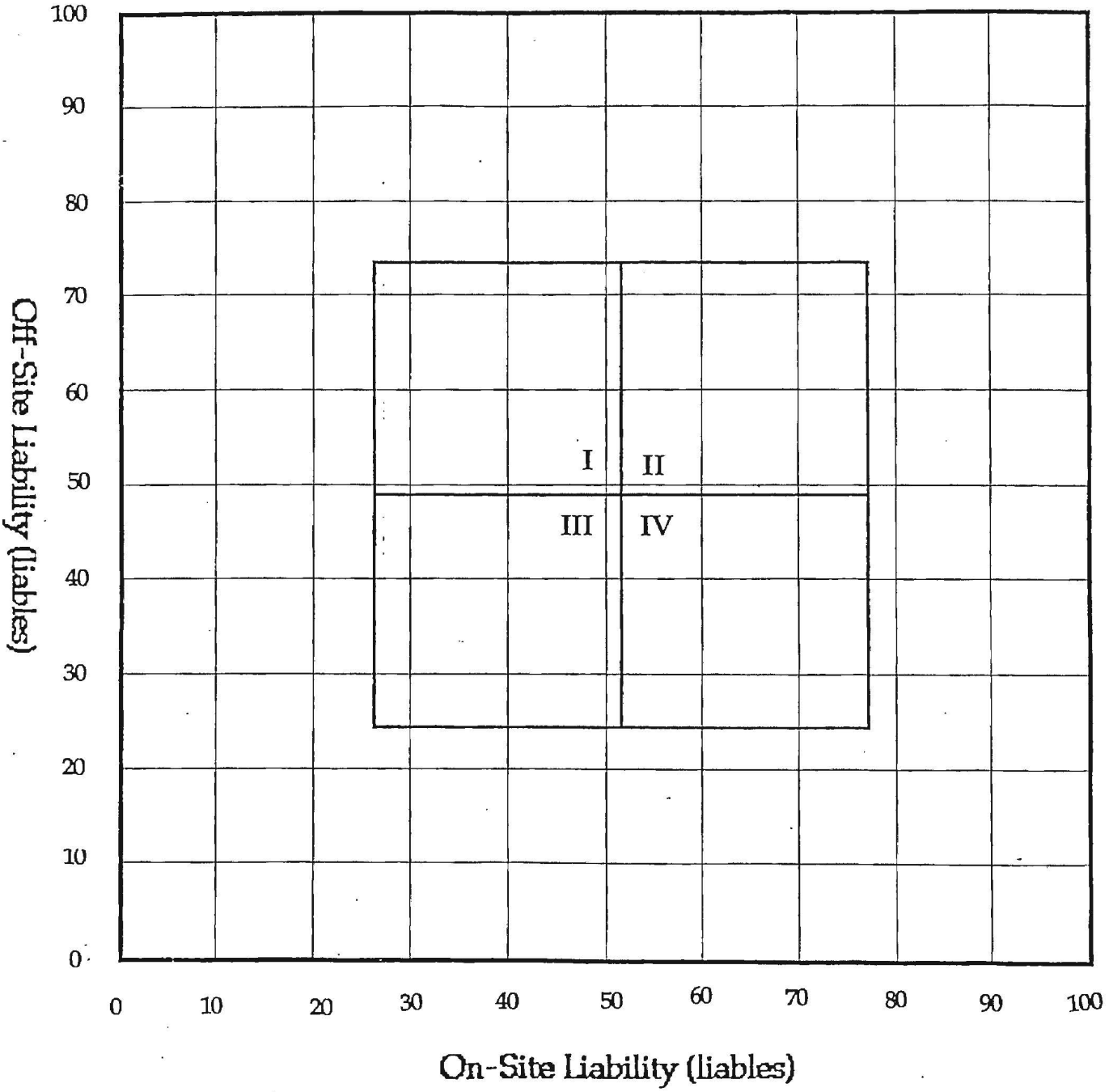
Celebrating the Past . . . Preparing for the Future

Scott A. Moses
Research Associate

APPENDIX E. RELATIVE LIABILITY CLASSIFICATION PLOT

Relative Liability Classification Plot



APPENDIX F. RISK ASSESSMENT PROCEDURE FOR A SINGLE DISPOSAL OPTION

LIABILITY EXPOSURE OF A HAZARDOUS WASTE GENERATOR: RISK ASSESSMENT PROCEDURE FOR A SINGLE DISPOSAL OPTION

This procedure is designed to assess the liability exposure of a hazardous waste generator for a particular disposal option.

SECTION A: ON-SITE LIABILITY EXPOSURE

Activities associated with regulatory compliance may also affect liability exposure. For each factor, determine which descriptor is closest to your present condition and circle one corresponding numerical value.

Factor 1. Container Inspection

6.8 Containers are not inspected.
2.5 Containers (such as 55-gallon drums) are inspected weekly.

Factor 2. Tank Inspection

7.6 Tanks are not inspected.
2.3 Tanks are inspected daily.

Factor 3. Environmental Audits

6.9 Environmental audits are not conducted.
2.3 Environmental audits are conducted regularly and follow-up actions are taken.

Factor 4. Employee Training

8.1 Employees are not trained in proper waste handling and emergency procedures.
2.6 All employees are trained upon initial assignment and retrained annually.

Factor 5. Container Marking

7.6 Containers of hazardous waste which are being stored are not marked.
2.5 All containers being stored are labeled as "Hazardous Waste" and dated.

Factor 6. Storage Period

6.9 Some containers are held in storage for longer than 90 days (or longer if SQG) without a permit.
2.7 All containers are transported within 90 days.

Factor 7. Exception Reporting

7.4 If a manifest is not returned from the disposal site no action is taken.
2.6 If a manifest is not returned within 35 days an investigation is conducted and a report is filed.

Factor 8. Profile and Plan

7.4 Documentation such as the waste determination profile and the disposal plan does not exist.
2.2 Waste determination profiles and disposal plans are up-to-date.

Factor 9. Other Documentation

7.7 Documentation of inspections, training records, and manifest copies is lost or missing.
1.9 All documentation is available in well-organized files.

Factor 10. Contingency Plan Status

7.8 No contingency plan has been written.
2.4 Contingency plan exists and is reviewed periodically for accuracy.

Factor 11. Emergency Equipment

7.3 Emergency equipment (such as an alarm, telephone, fire exting., etc.) is inadequate or improper.
2.4 Emergency equipment is adequate and meets fire department guidelines.

Factor 12. Spill Control Equipment

6.9 Spill control equipment (PPE, containment, absorbent, etc.) is only available in a few locations.
2.6 Spill control equipment is readily available and is of proper type for the type of waste handled.

Factor 13. Arrangements with Local Authorities

6.9 Arrangements with local fire, police, and hospital officials have not been made.
2.5 Local authorities are aware of the types of waste handled and are available in an emergency.

Factor 14. Emergency Coordinator

7.4 Emergency coordinator has not been appointed.
2.6 Emergency coordinator has been appointed and his name and telephone posted.

Add up the values circled for Factors 1 thru 14 and multiply the total by 0.7143.

_____. This is the scaled score for liability from on-site activities.

SECTION B: OFF-SITE LIABILITY EXPOSURE

Responses in Sections B are specific to a particular disposal option. The following decision criteria can be used to select a transporter and disposal site. For each factor, determine which descriptor is closest to the condition of the transporter and disposal site which will handle the waste and circle one corresponding numerical value.

Factor A. Transporter Status

8.6 Transporter does not have an EPA ID number or insurance.
3.1 Transporter has an EPA ID number and insurance.

Factor B. Transporter Reputation

6.9 Reputation of transporter with associates, trade associations, or other agencies is unknown.
3.3 Reputation of transporter is known to be favorable.

Factor C. Transporter Vehicle Condition

8.0 Transporter's vehicles are in poor condition and do not have emergency equipment.
2.9 Transporter's vehicles are in good condition and equipped with emergency equipment.

Factor D. Transporter Origin

6.3 The disposal site transports the waste to their site.
5.2 An independent transporter is hired by the generator to transport waste to the disposal site.
4.3 The generator transports waste with his own company vehicles and drivers.

Factor E. Shared Transportation

7.1 Waste from other generators is also on the truck with this generator's waste.
3.5 The transporter has waste from one generator only on the truck.

Factor F. Disposal Site Status

8.9 Disposal site does not have an EPA ID number.
3.6 Disposal site has an EPA ID number.

Factor G. Disposal Site Audits

7.3 Reputation of site with associates, trade associations, or other agencies is unknown.
3.6 Reputation is known to be favorable.

Factor H. Disposal Site Audits

7.6 Disposal site has not been audited.
3.3 Disposal site is personally audited by the generator regularly.

Factor I. Disposal Site Location

6.0 Hazardous waste is disposed of on-site.
5.5 Hazardous waste is disposed of at an off-site commercial facility.

Factor J. Disposal Site Age

6.2 Disposal site has been in operation for many years.
5.2 Disposal site has been in operation for only a few years.

Circle the numerical value corresponding to the disposal method being used.

15.1 Burning as fuel in an industrial boiler or furnace
12.0 Incineration
49.8 Indefinite storage (containers, tanks, or surface impoundments)
47.9 Landfill
18.9 Recycle or Reuse
37.8 Underground Injection

Add up the values circled for Factors A thru J and multiply the total by 0.3700.

_____ This is subscore B1.

Write the value circled above for disposal method below.

_____ This is subscore B2.

Add subscores B1 and B2.

_____. This is the scaled score for liability from off-site activities.

APPENDIX G. RAW DATA

	A	B	C	D	E	F	G
1	Record	Company Description			1 Container Inspection		2 Tank Inspe
2	Number	*State*	*Size*	*Status Code*	*1a*	*1b*	*2a*
3							
4	1	AR	260	3	6	2	7
5	2	AR	60	2	7	2	8
6	3	AR	950	3	8	1	8
7	4	AR	80	1	9	3	9
8	5	IN	325	2	9	2	9
9	6	KS	205	3	3	2	5
10	7	KS	100	4	4	1	5
11	8	KS	650	3	7	3	7
12	10	KS	31	4	6	3	9
13	11	KY	100	3	8	2	7
14	13	MO	30	2	7	3	7
15	14	MO	10	4	6	4	7
16	15	MO	60	4	9	3	9
17	16	MO		1	6	2	7
18	17	MO	225	3	9	1	9
19	18	MO	425	3	5	4	8
20	19	MO	400	3	8	2	8
21	20	OK	450	3	6	2	8
22	21	OK	23	1	7	3	7
23	22	OK		4	7	3	7
24	23	OK	100		8	2	8
25	24	OK	250	1	5	1	8
26	25	OK	200	2	6	3	9
27	26	OK	280	3	6	3	7
28	27	OK	750	2	6	4	7
29	29	OK	350	1	6	3	8
30	30	OK	350	3	8	3	8
31	31	OK	400	3	2	7	2
32	32	OK	500	2	5	2	8
33	33	OK	50	3	8	3	8
34	34	OK	450	3	7	2	8
35	35	OK	400	3	8	1	8
36	36	TN	15	4	6	1	9
37	37	TX	100	2	7	2	7
38	38	TX		3	7	5	7
39	39	TX	600	2	8	3	8
40	40	VA	600	2	7	3	8
41	41	OK	3	4	9	1	9
42							
43		Description			1 Container Inspection		2 Tank Inspe
44	Totals	*State*	*Size*	*Status Code*	*Hi*	*Lo*	*Hi*
45	# Responses		35	37	38	38	36
46	Average		279		6.84	2.53	7.58
47	Variance		57053		2.68	1.50	1.82
48	Std Dev		239		1.64	1.22	1.35

	A	B	C	D	E	F	G
49	Maximum		950		9	7	9
50	Minimum		3		2	1	2
51	75% Max				7.95	3.36	8.50
52	75% Min				5.73	1.69	6.66
53	90% Max				8.94	4.09	9.30
54	90% Min				4.75	0.96	5.85
55							
56							
57							
58	Record	Company Description			1 Container Inspection		2 Tank Inspe
59	Number	*State*	*Size*	*Status Code*	*1a*	*1b*	*2a*
60							
61	101	AR	260	3	6	2	7
62	102	AR	60	2	7	2	8
63	103	AR	950	3	8	1	8
64	104	AR	80	1		3	9
65	105	IN	325	2		2	9
66	106	KS	205	3		2	
67	107	KS	100	4		1	
68	108	KS	650	3	7	3	7
69	110	KS	31	4	6	2	9
70	111	KY	100	3	8	2	7
71	113	MO	30	2	7	3	7
72	114	MO	10	4	6	4	7
73	115	MO	60	4		3	9
74	116	MO		1	6	2	7
75	117	MO	225	3		1	9
76	118	MO	425	3	5	4	8
77	119	MO	400	3	8	2	8
78	120	OK	450	3	8	2	8
79	121	OK	23	1	7	3	7
80	122	OK		4	7	3	7
81	123	OK	100		8	2	8
82	124	OK	250	1	5	1	8
83	125	OK	200	2	6	3	9
84	126	OK	280	3	6	3	7
85	127	OK	750	2	6	4	7
86	129	OK	350	1	8	3	8
87	130	OK	350	3	8	3	8
88	131	OK	400	3			
89	132	OK	500	2	5	2	8
90	133	OK	50	3	8	3	8
91	134	OK	450	3	7	2	8
92	135	OK	400	3	8	1	8
93	136	TN	15	4	6	1	9
94	137	TX	100	2	7	2	7
95	138	TX		3	7		7
96	139	TX	600	2	8	3	8

	A	B	C	D	E	F	G
97	140	VA	600	2	7	3	8
98	141	OK	3	4		1	9
99							
100	Adjusted	Description			1 Container Inspection		2 Tank Inspe
101	Totals	*State*	*Size*	*Status Code*	*Hi*	*Lo*	*Hi*
102	Adj # Resp		35	37	30	36	35
103	Adj. Average		279		6.87	2.33	7.89
104	Adj. Variance		57053		1.02	0.80	0.57
105	Adj Std Dev		239		1.01	0.89	0.76
106	Adj Max		950		8	4	9
107	Adj Min		3		5	1	7
108							
109							
110							
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140							
141							
142							
143							
144							

	A	B	C	D	E	F	G
145							
146							
147							
148							
149							
150	Unusable Data						
151	9	KS	367	4			
152	12	MS	6	4	1	1	
153	28	OK	4000	1	5	5	5
154							

	H	I	J	K	L	M	N
1	ction	3 Audits		4 Training		5 Marking	
2	*2b*	*3a*	*3b*	*4a*	*4b*	*5a*	*5b*
3							
4	2	5	3	8	3	7	2
5	1	7	2	9	2	9	2
6	1	5	1	7	2	9	1
7	3	8	1	10	1	9	1
8	3	10	2	9	4	8	4
9	2	6	2	8	4	7	2
10	1	9	1	8	2	3	1
11	3	8	3	7	3	6	2
12	2	7	4	7	3	6	1
13	2	6	2	7	1	10	1
14	3	8	2	8	4	8	3
15	4	6	2	9	5	8	5
16	3	6	2	9	3	8	3
17	2	7	1	7	1	7	2
18	1	9	1	9	1	9	1
19	6	3	1	9	4	9	2
20	2	6	4	8	3	8	5
21	2	7	1	6	3	8	3
22	2	7	2	9	1	8	2
23	3	8	2	8	2	7	3
24	2	8	2	9	2	9	2
25	1	8	1	9	2	8	1
26	2	6	2	6	2	9	2
27	1	7	1	8	1	9	0
28	3	6	3	9	2	6	4
29	3	8	4	8	3	8	3
30	3	5	1	8	2	6	2
31	5	4	5	4	5	2	8
32	2	7	3	8	2	8	4
33	2	8	4	9	1	9	2
34	1	6	3	9	3	8	2
35	1	7	1	8	3	7	3
36	2	8	4	9	5	4	1
37	2	9	1	8	2	9	2
38	3	7	3	9	3	8	4
39	3	7	3	9	4	8	3
40	2	7	4	6	5	8	4
41	1	7	3	9	1	9	1
42							
43	ction	3 Audits		4 Training		5 Marking	
44	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
45	36	36	36	36	36	36	36
46	2.29	6.92	2.29	8.08	2.63	7.61	2.47
47	1.24	2.02	1.35	1.43	1.59	2.89	2.31
48	1.11	1.42	1.16	1.19	1.26	1.70	1.52

	H	I	J	K	L	M	N
49	6	10	5	10	5	10	8
50	1	3	1	4	1	2	0
51	3.05	7.89	3.08	8.89	3.49	8.76	3.51
52	1.53	5.95	1.50	7.27	1.77	6.45	1.44
53	3.71	8.74	3.77	9.61	4.25	9.78	4.42
54	0.87	5.10	0.80	6.55	1.02	5.43	0.53
55							
56							
57							
58	ction	3 Audits		4 Training		5 Marking	
59	*2b*	*3a*	*3b*	*4a*	*4b*	*5a*	*5b*
60							
61	2		3	8	3	7	2
62	1	7	2	9	2	9	2
63	1		1	7	2	9	1
64	3	8	1			9	1
65	3		2	9	4	8	4
66	2	6	2	8	4	7	2
67	1		1	8	2		1
68	3	8	3	7	3	6	2
69	2	7		7	3	6	1
70	2	6	2	7			1
71	3	8	2	8	4	8	3
72		6	2	9		8	
73	3	6	2	9	3	8	3
74	2	7	1	7		7	2
75	1		1	9		9	1
76			1	9	4	9	2
77	2	6		8	3	8	
78	2	7	1		3	8	3
79	2	7	2	9		8	2
80	3	8	2	8	2	7	3
81	2	8	2	9	2	9	2
82	1	8	1	9	2	8	1
83	2	6	2		2	9	2
84	1	7	1	8		9	
85	3	6	3	9	2	6	4
86	3	8		8	3	8	3
87	3		1	8	2	6	2
88							
89	2	7	3	8	2	8	4
90	2	8		9		9	2
91	1	6	3	9	3	8	2
92	1	7	1	8	3	7	3
93	2	8		9			1
94	2		1	8	2	9	2
95	3	7	3	9	3	8	4
96	3	7	3	9	4	8	3

	H	I	J	K	L	M	N
97	2	7				0	4
98	1	7	3	9		9	1
99							
100	ction	3 Audits		4 Training		5 Marking	
101	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
102	35	29	31	33	26	34	34
103	2.06	7.03	1.87	8.33	2.77	7.94	2.24
104	0.58	0.61	0.65	0.54	0.58	0.97	1.03
105	0.76	0.78	0.81	0.74	0.76	0.98	1.02
106	3	8	3	9	4	9	4
107	1	6	1	7	2	6	1
108							
109							
110							
111							
112							
113							
114							
115							
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136							
137							
138							
139							
140							
141							
142							
143							
144							

	H	I	J	K	L	M	N
145							
146							
147							
148							
149							
150							
151				3	2		
152		1	1	1	0	0	0
153	5	7	8	0	0	5	0
154							

	O	P	Q	R	S	T	U
1	6 Storage Period		7 Exceptions		8 Profiles		9 Records
2	*6a*	*6b*	*7a*	*7b*	*8a*	*8b*	*9a*
3							
4	4	2	7	5	4	3	4
5	7	2	9	2	9	1	7
6	9	3	6	2	7	1	9
7	9	1	7	1	10	1	7
8	6	6	7	2	8	2	9
9	9	2	9	4	5	2	8
10	6	1	7	3	6	3	6
11	6	2	7	1	6	1	8
12	6	2	6	1	5	1	6
13	10	0	9	1	9	1	9
14	9	3	7	3	9	3	9
15	9	3	9	3	7	4	8
16	9	1	8	2	7	3	7
17	7	2	8	2	6	2	7
18	9	1	9	1	9	1	9
19	5	3	7	2	6	3	4
20	7	3	8	1	6	4	9
21	7	3	7	4	8	2	7
22	8	2	9	2	8	2	9
23	6	5	7	4	7	3	8
24	9	2	9	2	9	2	9
25	8	2	7	2	7	1	6
26	5	3	8	3	8	3	7
27	6	2	5	2	9	3	8
28	7	4	7	4	7	3	9
29	8	2	9	3	7	2	8
30	6	2	4	2	8	1	6
31	2	9	3	8	9	1	9
32	5	4	5	3	5	2	6
33	7	3	9	2	9	3	10
34	6	3	6	1	7	2	9
35	8	4	7	3	8	3	9
36	5	3	9	7	5	1	5
37	3	1	7	2	9	2	8
38	8	3	8	3	8	3	9
39	8	3	7	2	7	3	7
40	5	5	8	4	7	4	7
41	9	1	9	1	9	1	9
42							
43	6 Storage Period		7 Exceptions		8 Profiles		9 Records
44	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*
45	38	38	38	38	38	38	38
46	6.92	2.71	7.37	2.63	7.37	2.18	7.66
47	3.48	2.64	2.18	2.46	2.18	0.97	2.23
48	1.87	1.63	1.48	1.57	1.48	0.98	1.49

	O	P	Q	R	S	T	U
49	10	9	9	8	10	4	10
50	2	0	3	1	4	1	4
51	8.19	3.82	8.37	3.70	8.37	2.85	8.67
52	5.65	1.60	6.36	1.57	6.36	1.52	6.64
53	9.31	4.79	9.26	4.64	9.26	3.44	9.57
54	4.53	0.63	5.48	0.63	5.48	0.93	5.75
55							
56							
57							
58	6 Storage Period		7 Exceptions		8 Profiles		9 Records
59	*6a*	*6b*	*7a*	*7b*	*8a*	*8b*	*9a*
60							
61		2	7			3	
62	7	2	9	2	9	1	7
63	9	3	6	2	7	1	9
64	9	1	7	1		1	7
65	6		7	2	8	2	9
66	9	2	9	4		2	8
67	6	1	7	3	6	3	6
68	6	2	7	1	6	1	8
69	6	2	6	1		1	6
70			9	1	9	1	9
71	9	3	7	3	9	3	9
72	9	3	9	3	7		8
73	9	1	8	2	7	3	7
74	7	2	8	2	6	2	7
75	9	1	9	1	9	1	9
76	5	3	7	2	6	3	
77	7	3	8	1	6		9
78	7	3	7	4	8	2	7
79	8	2	9	2	8	2	9
80	6		7	4	7	3	8
81	9	2	9	2	9	2	9
82	8	2	7	2	7	1	6
83	5	3	8	3	8	3	7
84	6	2		2	9	3	8
85	7	4	7	4	7	3	9
86	8	2	9	3	7	2	8
87	6	2		2	8	1	6
88					9	1	9
89	5	4		3		2	6
90	7	3	9	2	9	3	
91	6	3	6	1	7	2	9
92	8	4	7	3	8	3	9
93	5	3	9			1	
94		1	7	2	9	2	8
95	8	3	8	3	8	3	9
96	8	3	7	2	7	3	7

	O	P	Q	R	S	T	U
97	5		8	4	7		7
98	9	1	9	1	9	1	9
99							
100	6 Storage Period		7 Exceptions		8 Profiles		9 Records
101	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*
102	34	33	34	35	32	35	34
103	7.18	2.36	7.74	2.29	7.69	2.03	7.88
104	2.09	0.80	1.05	0.97	1.19	0.73	1.26
105	1.45	0.90	1.02	0.99	1.09	0.86	1.12
106	9	4	9	4	9	3	9
107	5	1	6	1	6	1	6
108							
109							
110							
111							
112							
113							
114							
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136							
137							
138							
139							
140							
141							
142							
143							
144							

	O	P	Q	R	S	T	U
145							
146							
147							
148							
149							
150							
151					4	4	2
152	0	0	0	0	0	0	0
153	4	2	7	5	0	0	0
154							

	V	W	X	Y	Z	AA	AB
1		10 Contingency Plan		11 Emergency Equipment		12 Spill Control Equipme	
2	*9b*	*10a*	*10b*	*11a*	*11b*	*12a*	*12b*
3							
4	3	5	3	4	2	6	2
5	2	9	2	8	2	8	1
6	1	8	3	7	1	7	1
7	1	9	1	8	1	7	1
8	1	8	3	7	4	7	3
9	2	9	2	5	2	6	2
10	2	7	3	6	4	6	3
11	1	6	1	5	1	4	1
12	2	6	2	5	1	5	2
13	0	8	1	7	1	7	1
14	3	8	3	8	3	8	4
15	4	7	2	9	5	7	5
16	3	9	3	8	3	8	3
17	1	6	2	7	2	7	2
18	1	9	1	9	1	9	1
19	2	8	3	4	2	5	3
20	1	9	1	8	2	6	4
21	1	7	4	6	3	5	5
22	2	9	1	9	1	7	2
23	4	9	4	8	4	8	4
24	2	9	2	9	2	9	2
25	1	9	2	8	3	8	2
26	3	8	2	8	2	6	3
27	1	8	1	8	2	6	4
28	2	8	3	9	2	9	3
29	2	8	2	8	2	7	1
30	2	7	2	6	2	5	2
31	1	6	4	7	5	5	5
32	2	6	4	7	4	7	3
33	1	8	2	8	2	8	2
34	2	8	2	7	3	7	3
35	3	9	4	7	2	8	3
36	1	9	3	9	3	8	2
37	1	7	2	8	2	6	3
38	3	9	3	9	3	9	3
39	3	7	3	6	2	7	3
40	3	6	4	6	5	7	3
41	1	9	1	9	1	9	1
42							
43		10 Contingency Plan		11 Emergency Equipment		12 Spill Control Equipme	
44	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
45	38	38	38	38	38	38	38
46	1.87	7.82	2.39	7.29	2.42	6.95	2.58
47	0.93	1.40	1.00	2.05	1.39	1.73	1.39
48	0.96	1.18	1.00	1.43	1.18	1.31	1.18

	V	W	X	Y	Z	AA	AB
49	4	9	4	9	5	9	5
50	0	5	1	4	1	4	1
51	2.52	8.62	3.06	8.26	3.22	7.64	3.38
52	1.21	7.01	1.71	6.32	1.62	6.05	1.78
53	3.10	9.33	3.68	9.12	3.93	8.63	4.09
54	0.64	6.30	1.11	5.46	0.91	5.27	1.07
55							
56							
57							
58		10 Contingency Plan		11 Emergency Equipment		12 Spill Control Equipme	
59	*9b*	*10a*	*10b*	*11a*	*11b*	*12a*	*12b*
60							
61	3		3		2	6	2
62	2	9	2	8	2	8	
63	1	8	3	7	1	7	
64	1	9		8	1	7	
65	1	8	3	7		7	3
66	2	9	2		2	6	2
67	2	7	3	6		6	3
68	1				1		
69	2		2		1		2
70		8		7	1	7	
71	3	8	3	8	3	8	4
72		7	2	9		7	
73	3	9	3	8	3	8	3
74	1		2	7	2	7	2
75	1	9		9	1		
76	2	8	3		2		3
77	1	9		6	2	6	4
78	1	7		6	3		
79	2	9		9	1	7	2
80		9		8		8	4
81	2	9	2	9	2		2
82	1	9	2	8	3	8	2
83	3	8	2	8	2	6	3
84	1	8		8	2	6	4
85	2	6	3	9	2		3
86	2	8	2	8	2	7	
87	2	7	2	6	2		2
88	1			7			
89	2			7		7	3
90	1	8	2	8	2	8	2
91	2	8	2	7	3	7	3
92	3	9		7	2	8	3
93	1	9	3	9	3	8	2
94	1	7	2	8	2	6	3
95	3	9	3	9	3		3
96	3	7	3	6	2	7	3

	V	W	X	Y	Z	AA	AB
97	3			6		7	3
98	1	9		9	1		
99							
100		10 Contingency Plan		11 Emergency Equipment		12 Spill Control Equipme	
101	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
102	35	31	24	33	31	27	27
103	1.80	8.26	2.46	7.70	1.97	7.04	2.78
104	0.64	0.60	0.26	1.03	0.50	0.58	0.49
105	0.80	0.77	0.51	1.02	0.71	0.76	0.70
106	3	9	3	9	3	8	4
107	1	7	2	6	1	6	2
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
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139							
140							
141							
142							
143							
144							

	V	W	X	Y	Z	AA	AB
145							
146							
147							
148							
149							
150							
151	2	3	3	2	2	3	
152	0	0	0	0	0	0	0
153	1	0	0	0	1	3	3
154							

	AC	AD	AE	AF	AG	AH	AI
1	13 Arrangements		14 Coordinator		A ID and insurance		B Reputation
2	*13a*	*13b*	*14a*	*14b*	*Aa*	*Ab*	*Ba*
3							
4	3	2	7	3	10	4	4
5	7	3	8	2	9	5	6
6	7	1	6	1	9	1	6
7	7	0	8	0	4	1	3
8	6	2	8	2	10	6	5
9	4	3	6	4	10	4	9
10	3	7	9	4	8	3	7
11	5	1	8	2	9	2	8
12	6	1	4	1	10	3	8
13	7	1	6	1	9	1	8
14	8	4	8	4	9	4	7
15	10		8	4	9	2	8
16	7	3	8	3	10	5	6
17	7	2	6	2	8	3	8
18	9	1	9	1	9	1	9
19	6	3	7	3	7	6	3
20	6	3	6	2	9	5	5
21	6	4	5	5	9	4	7
22	9	1	9	1	8	1	9
23	8	4	8	4	8	3	8
24	8	3	8	3	8	3	8
25	7	2	8	2	9	3	7
26	7	1	8	2	10	3	10
27	5	3	7	3	8	4	6
28	9	3	8	4	8	2	7
29	6	1	6	2	9	2	7
30	6	2	7	1	1	5	2
31	7	3	8	3	8	2	5
32	6	3	6	4	9	3	8
33	7	2	7	2	10	4	8
34	6	2	8	3	9	4	7
35	9	1	7	1	8	1	7
36	9	4	9	4	9	4	9
37	8	2	9	2	9	2	7
38	9	4	8	4	10	5	10
39	6	3	8	4	9	3	7
40	8	5	7	5	9	4	9
41	9	1	9	1	9	1	5
42							
43	13 Arrangements		14 Coordinator		A ID and insurance		B Reputation
44	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*
45	38	37	38	38	38	38	38
46	6.92	2.46	7.42	2.61	8.58	3.13	6.92
47	2.72	1.98	1.44	1.70	2.79	2.17	3.59
48	1.65	1.41	1.20	1.31	1.67	1.47	1.89

	AC	AD	AE	AF	AG	AH	AI
49	10	7	9	5	10	6	10
50	3	0	4	0	1	1	2
51	8.04	3.42	8.24	3.49	9.71	4.13	8.21
52	5.80	1.50	6.61	1.72	7.44	2.13	5.63
53	9.03	4.26	8.96	4.28	10.72	5.02	9.35
54	4.81	0.66	5.89	0.93	6.44	1.25	4.50
55							
56							
57							
58	13 Arrangements		14 Coordinator		A 10 and insurance		B Reputation
59	*13a*	*13b*	*14a*	*14b*	*Aa*	*Ab*	*Ba*
60							
61		2	7	3	10	4	
62	7	3	8	2	9	5	6
63	7	1	6	1	9		6
64	7		8				
65	6	2	8	2	10		5
66		3	6	4	10	4	9
67				4	8	3	7
68	5	1	8	2	9	2	8
69	6	1		1	10	3	6
70	7	1	6	1	9		8
71	8	4	8	4	9	4	7
72			8	4	9	2	8
73	7	3	8	3	10	5	6
74	7	2	6	2	8	3	8
75	9	1		1	9		9
76	6	3	7	3	7		
77	6	3	6	2	9	5	5
78	6	4			9	4	7
79	9	1		1	8		9
80	8	4	8	4	8	3	8
81	8	3	8	3	8	3	8
82	7	2	8	2	9	3	7
83	7	1	8	2	10	3	
84	5	3	7	3	8	4	6
85	9	3	8	4	8	2	7
86	6	1	6	2	9	2	7
87	6	2	7	1		5	
88	7	3	8	3	8	2	5
89	6	3	6	4	9	3	8
90	7	2	7	2	10	4	8
91	6	2	8	3	9	4	7
92	9	1	7	1	8		7
93	9	4		4	9	4	9
94	8	2		2	9	2	7
95	9	4	8	4	10	5	
96	6	3	8	4	9	3	7

	AC	AD	AE	AF	AG	AH	AI
97	8		7		9	4	9
98	9	1		1	9		5
99							
100	13 Arrangements		14 Coordinator		A ID and insurance		B Reputation
101	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*
102	34	34	30	35	36	29	32
103	7.15	2.32	7.30	2.54	8.92	3.45	7.22
104	1.52	1.13	0.70	1.31	0.59	1.04	1.53
105	1.23	1.07	0.84	1.15	0.77	1.02	1.24
106	9	4	8	4	10	5	9
107	5	1	6	1	7	2	5
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							
121							
122							
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127							
128							
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130							
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133							
134							
135							
136							
137							
138							
139							
140							
141							
142							
143							
144							

	AC	AD	AE	AF	AG	AH	AI
145							
146							
147							
148							
149							
150							
151	3	3	0	0			
152	0	0	0	0	0	0	
153	1	1	0	0	5	5	5
154							

Data

	AJ	AK	AL	AM	AN	AO	AP
1		C Vehicle condition		D Source of transporter			E Split loads
2	*Bb*	*Ca*	*Cb*	*Da*	*Db*	*Dc*	*Ea*
3							
4	3	5	2	3	3	2	4
5	5	9	5	6	6	6	9
6	1	8	1	6	4	2	8
7	1	5	1	5	10	10	5
8	4	8	4	8	4	5	7
9	4	8	4	9	7	4	4
10	2	9	2	7	1	5	6
11	2	7	2	8	7	2	7
12	4	6	4	9	3	2	5
13	1	8	1	2	1	2	6
14	4	8	4	8	4	4	5
15	8	9	8	8	6	6	8
16	4	9	2	6	6	5	7
17	3	8	3	3	2	2	7
18	1	9	1	9	1	1	9
19	3	5	3	7	9	7	5
20	5	8	2	6	2	4	4
21	4	7	3	5	6	4	7
22	1	9	1	9	1	1	9
23	4	9	4	7	9	5	8
24	3	9	3	3	9	5	9
25	3	8	3	7	5	3	6
26	3	10	3	8	8	4	10
27	4	9	1	5	6	4	8
28	3	9	2	7	5	7	8
29	2	9	2	3	3	3	5
30	5	1	5	4	6	6	3
31	5	9	2	7	2	9	10
32	3	8	3	5	5	5	7
33	4	9	4	8	8	8	8
34	2	9	3	4	3	4	8
35	5	7	1	7	5	5	9
36	3	9	4	5	5	5	9
37	2	9	2	8	9	2	9
38	5	10	5	8	4	5	10
39	4	7	5	5	9	4	8
40	5	9	5	8	7	3	
41	2	9	2	5	6	3	6
42							
43		C Vehicle condition		D Source of transporter			E Split loads
44	*Lo*	*Hi*	*Lo*	*Hi*	*Med*	*Lo*	*Hi*
45	38	38	38	38	38	38	37
46	3.34	8.00	2.95	6.26	5.18	4.32	7.11
47	2.29	2.97	2.43	3.87	6.80	4.38	3.60
48	1.51	1.72	1.56	1.97	2.61	2.09	1.90

	AJ	AK	AL	AM	AN	AO	AP
49	8	10	8	9	10	10	10
50	1	1	1	2	1	1	3
51	4.37	9.17	4.01	7.60	6.96	5.74	8.40
52	2.31	6.83	1.89	4.92	3.41	2.89	5.82
53	5.28	10.21	4.94	8.78	8.52	7.00	9.54
54	1.41	5.79	0.95	3.74	1.85	1.64	4.68
55							
56							
57							
58		C Vehicle condition		D Source of transporter			E Split loads
59	*Bb*	*Ca*	*Cb*	*Da*	*Db*	*Dc*	*Ea*
60							
61	3		2		3	2	
62	5	9		6	6	6	9
63		8	1	6	4	2	8
64			1	5			5
65	4	8	4	8	4	5	7
66	4	8	4		7	4	
67	2	9	2	7		5	6
68	2	7	2	8	7	2	7
69	4	6	4		3	2	5
70		8	1			2	6
71	4	8	4	8	4	4	5
72		9		8	6	6	8
73	4	9	2	6	6	5	7
74	3	8	3		2	2	7
75		9	1				9
76	3		3	7			5
77	5	8	2	6	2	4	
78	4	7	3	5	6	4	7
79		9	1				9
80	4	9	4	7		5	8
81	3	9	3			5	9
82	3	8	3	7	5	3	6
83	3	10	3	8	8	4	
84	4	9	1	5	6	4	8
85	3	9	2	7	5		8
86	2	9	2		3	3	5
87	5			4	6	6	
88	5	9	2	7	2		
89	3	8	3	5	5	5	7
90	4	9	4	8	8		8
91	2	9	3	4	3	4	8
92	5	7	1	7	5	5	9
93	3	9	4	5	5	5	9
94	2	9	2	8		2	9
95	5	10		8	4	5	
96	4	7		5		4	8

	AJ	AK	AL	AM	AN	AO	AP
97	5	9		8	7	3	
98	2	9	2	5	6	3	6
99							
100		C Vehicle condition		D Source of transporter			E Split loads
101	*Lo*	*Hi*	*Lo*	*Hi*	*Med*	*Lo*	*Hi*
102	32	34	32	29	28	31	30
103	3.56	8.47	2.47	6.48	4.93	3.90	7.27
104	1.09	0.80	1.16	1.83	3.11	1.76	2.00
105	1.05	0.90	1.08	1.35	1.76	1.33	1.41
106	5	10	4	8	8	6	9
107	2	6	1	4	2	2	5
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
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123							
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130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							
141							
142							
143							
144							

	AJ	AK	AL	AM	AN	AO	AP
145							
146							
147							
148							
149							
150							
151							
152							
153	5	2	2	0	4	3	5
154							

	AQ	AR	AS	AT	AU	AV	AW
1		F ID number		G Reputation		H Audited	
2	*Eb*	*Fa*	*Fb*	*Ga*	*Gb*	*Ha*	*Hb*
3							
4	3	10	4	4	3	4	3
5	3	9	6	9	5	9	4
6	2	8	1	9	4	9	3
7	6	7	1	3	1	5	3
8	3	10	7	5	4	7	2
9	6	10	4	9	5	9	4
10	2	9	4	6	5	8	3
11	2	9	2	8	2	6	2
12	4	10	7	9	5	7	6
13	2	9	1	8	2	8	2
14	5	9	3	7	4	8	2
15	7	9	5	9	7	8	5
16	2	10	5	6	4	8	2
17	2	9	3	8	3	8	2
18	1	9	1	9	1	9	1
19	8	8	8	3	3	8	6
20	3	9	2	8	3	7	4
21	4	9	5	7	4	7	3
22	3	9	2	9	3	8	1
23	5	8	4	8	5	7	2
24	3	9	3	9	3	9	3
25	3	9	3	7	3	8	3
26	2	10	3	10	3	10	3
27	1	9	5	6	2	6	3
28	4	9	6	7	5	8	4
29	3	9	3	8	3	8	3
30	5	1	4	2	5	2	7
31	1	10	0	8	2	9	2
32	3	9	3	8	3	8	3
33	6	10	6	9	5	8	4
34	4	10	4	7	5	7	4
35	2	10	0	5	5	8	5
36	5	9	4	9	3	7	3
37	2	10	2	8	2	7	2
38	5	9	5	9	5	10	5
39	4	9	4	8	4	7	4
40							
41	3	9	2	5	3	8	3
42							
43		F ID number		G Reputation		H Audited	
44	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
45	37	37	37	37	37	37	37
46	3.54	8.95	3.57	7.27	3.62	7.57	3.27
47	3.31	2.27	3.86	3.92	1.80	2.36	1.87
48	1.82	1.51	1.97	1.98	1.34	1.54	1.37

	AQ	AR	AS	AT	AU	AY	AW
49	8	10	8	10	7	10	7
50	1	1	0	2	1	2	1
51	4.78	9.97	4.90	8.62	4.53	8.61	4.20
52	2.30	7.92	2.23	5.92	2.71	6.52	2.34
53	5.67	10.88	6.08	9.81	5.34	9.54	5.02
54	1.21	7.02	1.05	4.73	1.91	5.60	1.52
55							
56							
57							
58		F ID number		G Reputation		H Audited	
59	*Eb*	*Fa*	*Fb*	*Ga*	*Gb*	*Ha*	*Hb*
60							
61	3	10	4		3		3
62	3	9	6	9	5	9	4
63	2	8		9	4	9	3
64							3
65	3	10		5	4	7	2
66		10	4	9	5	9	4
67	2	9	4	6	5	8	3
68	2	9	2	8	2	6	2
69	4	10		9	5	7	
70	2	9		8	2	8	2
71	5	9	3	7	4	8	2
72		9	5	9		8	5
73	2	10	5	6	4	8	2
74	2	9	3	8	3	8	2
75		9		9		9	
76		8			3	8	
77	3	9	2	8	3	7	4
78	4	9	5	7	4	7	3
79	3	9	2	9	3	8	
80	5	8	4	8	5	7	2
81	3	9	3	9	3	9	3
82	3	9	3	7	3	8	3
83	2	10	3		3		3
84		9	5	6	2	6	3
85	4	9	6	7	5	8	4
86	3	9	3	8	3	8	3
87	5		4		5		
88		10		8	2	9	2
89	3	9	3	8	3	8	3
90		10	6	9	5	8	4
91	4	10	4	7	5	7	4
92	2	10		5	5	8	5
93	5	9	4	9	3	7	3
94	2	10	2	8	2	7	2
95	5	9	5	9	5		5
96	4	9	4	8	4	7	4

	AQ	AR	AS	AT	AU	AY	AW
97							
98	3	9	2	5	3	8	3
99							
100		F ID number		G Reputation		H Audited	
101	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*	*Hi*	*Lo*
102	29	35	28	32	34	32	32
103	3.21	9.23	3.79	7.72	3.68	7.78	3.13
104	1.17	0.36	1.58	1.69	1.20	0.69	0.89
105	1.08	0.60	1.26	1.30	1.09	0.83	0.94
106	5	10	6	9	5	9	5
107	2	8	2	5	2	6	2
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
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121							
122							
123							
124							
125							
126							
127							
128							
129							
130							
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133							
134							
135							
136							
137							
138							
139							
140							
141							
142							
143							
144							

	AQ	AR	AS	AT	AU	AV	AW
145							
146							
147							
148							
149							
150							
151			3	8	10		
152		0	0	0	0	0	0
153	5	5	5	5	5	5	5
154							

Off-site On-Site

Data

	AX	AY	AZ	BA	BB	BC	BD
1	I Location		J Age		Disposal Liability		
2	*Ia*	*Ib*	*Ja*	*Jb*	*Fuels Burn.*	*Incin.*	*Storage*
3							
4	2	7	5	3	4	4	6
5	7	8	6	6	8	5	8
6	3	7	2	7	1	1	8
7	6	10	3	5	1	1	10
8	9	7	9	6	2	2	9
9	7	10	7	6	1	2	7
10	6	5	7	4	1	1	8
11	3	9	2	4	2	1	8
12	8	5	6	6	2	4	9
13	2	1	1	2	2	1	8
14	5	5	5	5	2	2	8
15	6	6	9	9	6	1	9
16	4	5	6	4	3	2	10
17	7	6	7	5	3	2	8
18	9	1	9	1	2	1	9
19	8	8	8	8	2	2	9
20	5	5	5	4	1	4	8
21	6	6	6	4	4	3	8
22	5	5	7	9	1	1	8
23	9	4	5	5	2	1	8
24	3	9	9	3	1	2	8
25	7	7	7	7	2	3	8
26	5	7	8	3	2	1	8
27	1	8	5	4	3	1	8
28	7	3	8	6	6	5	8
29	3	2	5	3	2	1	4
30	4	5	4	5	3	2	8
31	2	9	6	6	0	0	9
32	5	6	5	5	2	2	8
33	7	6	6	7	4	3	8
34	6	8	6	6	2	1	8
35	6	1	8	4	2	0	8
36	7	7	9	6	1	1	9
37	2	9	8	4	2	1	9
38	8	5	9	9	3	3	3
39	5	7	7	6	3	1	8
40					3	2	7
41	8	2	5	5	2	1	6
42							
43	I Location		J Age		Disposal Liability		
44	*Hi*	*Lo*	*Hi*	*Lo*	*els Burning*	*Incineration*	*Storage*
45	37	37	37	37	38	38	38
46	5.54	6.03	6.22	5.19	2.45	1.87	7.92
47	5.14	6.19	4.34	3.49	2.47	1.58	1.80
48	2.27	2.49	2.08	1.87	1.57	1.26	1.34

	AX	AY	AZ	BA	BB	BC	BD
49	9	10	9	9	8	5	10
50	1	1	1	1	0	0	3
51	7.06	7.72	7.63	6.46	3.52	2.72	8.83
52	4.00	4.33	4.80	3.92	1.38	1.01	7.01
53	8.44	9.21	8.88	7.58	4.46	3.48	9.64
54	2.64	2.84	3.55	2.80	0.44	0.26	6.20
55							
56							
57							
58	I Location		J Age		Disposal Liability		
59	*Ia*	*Ib*	*Ja*	*Jb*	*Fuels Burn.*	*Incin.*	*Storage*
60							
61		7	5	3	4		
62	7	8	6	6			8
63	3	7		7	1	1	8
64	6			5	1	1	
65		7		6	2	2	9
66	7		7	6	1	2	7
67	6	5	7	4	1	1	8
68	3	9		4	2	1	8
69	6	5	6	6	2		9
70					2	1	8
71	5	5	5	5	2	2	8
72	6	6				1	9
73	4	5	6	4	3	2	
74	7	6	7	5	3	2	8
75					2	1	9
76	8	8	8		2	2	9
77	5	5	5	4	1		6
78	6	8	6	4	4	3	8
79	5	5	7		1	1	8
80		4	5	5	2	1	8
81	3	9		3	1	2	8
82	7	7	7	7	2	3	8
83	5	7	8	3	2	1	8
84		8	5	4	3	1	8
85	7	3	8	6			6
86	3		5	3	2	1	
87	4	5	4	5	3	2	8
88		9	6	6			9
89	5	6	5	5	2	2	8
90	7	6	6	7	4	3	8
91	6	8	6	6	2	1	8
92	8		8	4	2		8
93	7	7		6	1	1	9
94		9	8	4	2	1	9
95	8	5			3	3	
96	5	7	7	6	3	1	8

	AX	AY	AZ	BA	BB	BC	BD
97					3	2	7
98	8		5	5	2	1	
99							
100	I Location		J Age		Disposal Liability		
101	*Hi*	*Lo*	*Hi*	*Lo*	*els Burning*	*Incineration*	*Storage*
102	29	30	27	31	34	31	32
103	5.83	6.53	6.22	4.97	2.15	1.58	8.19
104	2.72	2.60	1.41	1.50	0.80	0.52	0.29
105	1.65	1.61	1.19	1.22	0.89	0.72	0.54
106	8	9	8	7	4	3	9
107	3	3	4	3	1	1	7
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	AX	AY	AZ	BA	BB	BC	BD
145							
146							
147							
148							
149							
150							
151	5	6	9		4	4	9
152	0	0	0	0	5	2	10
153	5	5	5	5	5	5	5
154							

	BE	BF	BG	BH	BI	BJ	BK
1					Cleanup History		
2	*Landfill*	*Recycle*	*Injection*	*Percent*	*PRP*	*Cleanup*	*Lawsuit*
3							
4	5	3	4	40	N	N	N
5	6	3			N	N	N
6	9	5	7	80	N	N	N
7	10	9	10	50	N	N	N
8	10	3	7	70	Y	Y	N
9	8	1	1	50	Y	Y	Y
10	7	5	6	80			
11	3	1	2	75	Y	Y	Y
12	10	0	7	80	N	N	N
13	10	8	2	80	Y	Y	N
14	8	2	7			Y	N
15	9	4	7	60	N	Y	N
16	9	3	9				
17	9	6	8	75	N	N	N
18	7	1	5	80	Y	Y	U
19	9	1	9		N	N	N
20	8	1	6	75	Y	N	N
21	7	3	5	75	Y	Y	N
22	8	4	10		N	N	N
23	9	2	8		N	N	N
24	3	1	5	50	N	N	Y
25	8	3	5	25	N	Y	N
26	7	1	4	60	N	N	N
27	9	1	2	40	Y	Y	Y
28	9	8	7	70	Y	Y	N
29	4	2	3		N	N	N
30	8	4	6	15	Y	N	N
31	9	0	10	100			
32	5	2	4	80	Y	Y	N
33	7	5	7	50			
34	6	1	10	65	Y	N	U
35	5	1	5	75	N	N	N
36	9	1	5	65			
37	6	2	3	70	N	N	N
38	9	6	7	80	Y	Y	U
39	7	2	3	50	N	N	N
40	9	3	7		N	N	N
41	6	7	8	30			
42							
43							
44	*Landfill*	*Recycle*	*Injection*	*Percent*	**Totals**		
45	38	38	37	30	# Responses		
46	7.61	3.03	5.97	63.17	Average		
47	3.60	5.49	6.14	380.14	Variance		
48	1.90	2.34	2.48	19.50	Std Dev		

Data

	BE	BF	BG	BH	BI	BJ	BK
49	10	9	10	100	Maximum		
50	3	0	1	15	Minimum		
51	8.89	4.62	7.66	76.42	75% Max		
52	6.32	1.43	4.29	49.91	75% Min		
53	10.03	6.02	9.14	88.12	90% Max		
54	5.18	0.03	2.80	38.21	90% Min		
55							
56							
57							
58					Cleanup History		
59	*Landfill*	*Recycle*	*Injection*	*Percent*	*PRP*	*Cleanup*	*Lawsuit*
60							
61		3	4	40	N	N	N
62	6	3			N	N	N
63	9	5	7	80	N	N	N
64	10			50	N	N	N
65	10	3	7	70	Y	Y	N
66	8	1		50	Y	Y	Y
67	7	5	6	80			
68		1		75	Y	Y	Y
69	10		7	80	N	N	N
70	10			80	Y	Y	N
71	8	2	7			Y	N
72	9	4	7	60	N	Y	N
73	9	3	9				
74	9	6	8	75	N	N	N
75	7	1	5	80	Y	Y	U
76	9	1	9		N	N	N
77	8	1	6	75	Y	N	N
78	7	3	5	75	Y	Y	N
79	8	4			N	N	N
80	9	2	8		N	N	N
81		1	5	50	N	N	Y
82	8	3	5		N	Y	N
83	7	1	4	60	N	N	N
84	9	1		40	Y	Y	Y
85	9		7	70	Y	Y	N
86		2	3		N	N	N
87	8	4	6		Y	N	N
88	9						
89		2	4	80	Y	Y	N
90	7	5	7	50			
91	6	1		65	Y	N	U
92		1	5	75	N	N	N
93	9	1	5	65			
94	6	2	3	70	N	N	N
95	9	6	7	80	Y	Y	U
96	7	2	3	50	N	N	N

	BE	BF	BG	BH	BI	BJ	BK
97	9	3	7		N	N	N
98	8		8				
99							
100					**Adjusted**		
101	*Landfill*	*Recycle*	*Injection*	*Percent*	**Totals**		
102	32	32	29	26	Adj # Resp		
103	8.25	2.59	6.00	66.35	Adj. Average		
104	1.42	2.51	3.00	181.12	Adj. Variance		
105	1.19	1.58	1.73	13.46	Adj Std Dev		
106	10	6	9	80	Adj Max		
107	6	1	3	40	Adj Min		
108							
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142							
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	BE	BF	BG	BH	BI	BJ	BK
145							
146							
147							
148							
149							
150							
151	5	6	7		N	N	N
152	8	0	8	20	N	N	N
153	5	0	6	70	N	N	N
154							

	BL	BM	BN	BO	BP	BQ
1	Record	Index of Optimism (O)		Index of Pessimism (10)		
2	Number	Fact. 1-14	Fact. A-J	Fact. 1-14	Fact. A-J	Disp. Opt.
3						
4	1	2.6	3.4	5.5	5.1	4.3
5	2	1.9	5.3	8.0	7.9	6.0
6	3	1.4	2.9	7.4	6.8	5.2
7	4	1.1	3.9	8.4	4.6	6.8
8	5	2.9	4.8	7.9	7.8	5.5
9	6	2.5	5.1	6.4	8.2	3.3
10	7	2.6	3.5	6.1	7.3	4.7
11	8	1.8	2.9	6.4	6.7	2.8
12	10	1.8	4.6	6.0	7.8	5.3
13	11	1.1	1.5	7.9	6.1	5.2
14	13	3.2	4.0	8.0	7.1	4.8
15	14	3.8	6.3	7.9	8.3	6.0
16	15	2.7	3.8	8.0	7.2	6.0
17	16	1.8	3.2	6.8	7.3	6.0
18	17	1.0	1.0	9.0	9.0	4.2
19	18	2.9	6.0	6.1	6.2	5.3
20	19	2.6	3.7	7.4	6.6	4.7
21	20	3.0	4.3	6.8	7.0	5.0
22	21	1.7	2.7	8.2	8.2	5.3
23	22	3.5	4.1	7.6	7.7	5.0
24	23	2.1	3.8	8.6	7.6	3.3
25	24	1.6	3.8	7.6	7.5	4.8
26	25	2.4	3.4	7.2	9.1	3.8
27	26	1.9	3.6	7.1	6.3	4.0
28	27	3.1	4.2	7.6	7.8	7.2
29	29	2.4	2.6	7.6	6.6	2.7
30	30	1.9	5.2	6.4	2.4	5.2
31	31	4.9	3.8	5.0	7.4	4.7
32	32	3.0	3.7	6.4	7.2	3.8
33	33	2.2	5.6	8.2	8.3	5.7
34	34	2.3	4.4	7.3	7.3	4.7
35	35	2.4	2.9	7.9	7.7	3.5
36	36	2.9	4.4	7.4	8.2	4.3
37	37	1.9	2.9	7.5	7.7	3.8
38	38	3.4	5.4	8.2	9.3	5.2
39	39	3.0	4.5	7.4	7.2	4.0
40	40	4.0	4.3	6.9	8.8	5.2
41	41	1.1	2.6	8.9	6.9	5.3
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48						

	BL	BM	BN	BO	BP	BQ
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58	Record					
59	Number					
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61	101					
62	102					
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82	124					
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84	126					
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89	132					
90	133					
91	134					
92	135					
93	136					
94	137					
95	138					
96	139					

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97	140					
98	141					
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149						
150	Unusable Data					
151	9					
152	12					
153	28					
154						