FINAL REPORT

An Industry Survey of Chemical Company Activities to Reduce Unreasonable Risk

Prepared For

CMA

CHEMICAL MANUFACTURERS ASSOCIATION

February 11, 1983

Peat, Marwick, Mitchell & Co.

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Mr. Timothy F. O'Leary, Jr.
Associate Director - Health,
Safety, and Chemical Regulations
Chemical Manufacturers Association
2501 M Street, N.W.
Washington, DC 20037

Dear Mr. O'Leary:

Peat, Marwick, Mitchell & Co. is pleased to submit this final report, An Industry Survey of Chemical Company Activities to Reduce Unreasonable Risk (CMA reference number C04).

The report is organized as follows:

- Executive Summary;
- Background;
- Study Objectives;
- Study Approach; and
- Findings.

The executive summary is an overview of the entire study. The background section provides a summary of the need for the study and a review of Peat Marwick's and CMA's preparation for conducting the survey. The study objectives and approach sections review the objectives and methodology in performing the survey. The findings section provides a straightforward presentation of the survey results.

Four appendices have been prepared to augment the basic report. Appendix A contains a copy of the survey questionnaire. Appendix B provides detailed results for key questionnaire responses to support our findings. Appendix C contains detailed results for all questionnaire responses. Appendix D contains examples of our statistical analysis of the data base in an attempt to identify and understand key relationships in the responses to the survey.

Appendices A and B are attached to this report and Appendices C and D are bound in a separate volume entitled "Statistical Appendices."

We have greatly appreciated the assistance and support that we have received from you, the Impact Analysis Task Group and participating chemical companies in developing and conducting this important industry survey. We look forward to use of the data collected in the survey in presenting the industry's current activities to reduce unreasonable risk to health and the environment.

Very truly yours,

Peat, Marwick, Mitchell & Co.

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EXECUTIVE SUMMARY

The U.S. chemical industry has identified a need to collect information about individual chemical company efforts to reduce unreasonable risk to health and the environment. In response to that objective the Chemical Manufacturers Association (CMA) has undertaken a survey with the assistance of Peat, Marwick, Mitchell & Co. This report summarizes the survey results.

Prior to conducting a survey of the chemical industry, Peat Marwick assisted CMA in developing a questionnaire and testing it in a pilot survey of 22 companies. The pilot survey evaluated the feasibility of conducting an industry survey and identified flaws in the questionnaire design. As a result of the pilot survey, it was determined that a full-industry survey was feasible with modifications to the questionnaire. The final questionnaire used in the survey is contained in Appendix A.

Participation in the survey was not limited in any way, provided that the participating companies could respond to the questionnaire for their U.S. chemical business (defined as domestic sales plus domestic based exports of products in SIC Code 28, Chemicals and Allied Products, but excluding SIC Code 283, Drugs). CMA requested the participation of their own member companies and made an extensive effort to contact and encourage participation of member companies from other chemical trade associations.

Completed questionnaires were submitted directly to Peat Marwick to maintain the confidentiality of individual company responses. Each survey response was coded, and company specific information was removed from each questionnaire. The data collected from the survey have been compiled into a computerized data base to provide the aggregated results for this report.

One hundred and twelve valid survey responses were received during the course of the survey. The size of responding companies, as measured by 1981 U.S. chemical sales, varied greatly. Thirty-seven responses were received from companies with 1981 U.S. chemical sales of less than $50 million. Eleven responses were received from companies with 1981 U.S. chemical sales of greater than $2 billion.

The total U.S. chemical sales represented by the survey are $78 billion, which is estimated to represent slightly more than one half of the 1981 industry sales. The total U.S. chemical industry employment represented by the survey is 474,300, which also represents slightly more than one-half of the 1981 industry employment.

The following is a list of major findings from the survey by each of the five sections to the questionnaire.

I. General Company Information

. 1981 U.S. chemical sales (mean response)	$733 million
. 1981 U.S. chemical employment (mean response)	4,400
. Number of health/environmental specialists (mean response)	84

II. Chemical Hazard Assessment

. Percentage of responding companies with chemical hazard assessment programs	88%
. Percentage of responding companies that perform toxicity testing	78%
. Annual expense for toxicity testing in 1981 (mean response)	$1.7 million
. Total number of reported Toxic Substances Control Act (TSCA) pre-manufacture notifications (PMNs) submitted through 1981 (EPA received a total of 1,063 PMNs)	389
. Percentage of responding companies that have filed at least one TSCA 8(e) substantial risk report	51%

III. Hazard Communication

. Percentage of responding companies that use Material Safety Data Sheets (MSDS) to communicate information about chemical products	99%
. Percentage of responding companies that maintain the following information:	
. Lists of chemicals used	97%
. Lists of chemicals produced	99%
. Work histories	83%
. Work site exposures	92%

- Medical records 95%
- Significant adverse effects 81%
- Customer complaints 86%
- Employee complaints 85%

IV. Hazard Control

- Percentage of responding companies that have an industrial hygiene or similar program 90%
- Percentage of responding companies with industrial hygiene or similar programs that cover manufacturing activities 100%
- Percentage of responding companies that conduct health, environmental, or other type of compliance audits 76%

V. Environmental Control Costs

- 1981 capital investment in air, water, and solid waste pollution control facilities (mean response) $11.5 million
- 1981 Operation and Maintenance expenses for air, water, and solid waste pollution control (mean response) $14.1 million

The complete survey results are summarized in the Findings section of the report. Appendix B, which is attached to this report, provides statistical summaries for the responses to "continuous" variables, such as sales and staffing levels. Appendix C, which is bound in a supporting document labeled "Statistical Appendices," provides a complete listing of statistical summaries for the responses to each question in the survey. The statistics included in both Appendix B and Appendix C are presented for completeness.

This survey has resulted in the collection and analysis of a substantial data base of information about the U.S. chemical industry's activities to reduce unreasonable risk to health and the environment. The format of the survey also permits industry, government, and the public to assess issues by various parameters. Appendix D presents representative examples of statistical analyses conducted on the survey responses, to determine if chemical companies of a particular size, line of business, or other factor responded to the survey in a significantly different way. The conclusion from these analyses is that the vast majority of responses bear little relationship to company size, line of business, or other company characteristic.

BACKGROUND

During the past decade, the U.S. chemical industry has received significant attention from regulators and the public concerning the safety of chemicals to health and the environment. To address concerns that have arisen, the chemical industry needed to gather information that describes typical company practices for controlling and reducing unreasonable risk to health and the environment.

The information needed to document efforts by the industry to control and reduce unreasonable risk has not been readily available. The information is company-specific and relates to health and environmental policies and procedures, staffing, expenditures, use and availability of information, and many other practices. To collect this information and develop a profile of the industry, a survey of the companies in the industry was required.

The Chemical Manufacturers Association (CMA) requested that Peat Marwick assist them in conducting an industry survey of chemical company activities to reduce unreasonable risk. Preceding the industry survey, a questionnaire was developed by industry experts with the assistance of Peat Marwick. This questionnaire was pilot tested during a limited survey of chemical companies during July and August 1982. As a result of the pilot survey, it was determined that a full industry survey was feasible with a few modifications to the questionnaire.

The questionnaire was revised to increase clarity and a follow-up effort was conducted with companies that participated in the pilot survey to update their survey responses to the revised questionnaire. The refined pilot survey responses were then included in the full industry survey on a comparable basis.

STUDY OBJECTIVES

This study is a chemical industry survey of U.S. chemical company activities to reduce unreasonable risk to health and the environment. The objectives in conducting the survey were to:

- develop a credible data base of information on the chemical industry; and
- provide accurate results that document the industry's level of effort in reducing unreasonable risk.

STUDY APPROACH

The approach in conducting the industry survey was to conduct a widespread mailing of questionnaires (see Appendix A for a copy of the questionnaire) to chemical companies. CMA was responsible for coordinating all mailing activities and also contacted other chemical trade associations to elicit participation in the survey from companies that do not belong to CMA. The other trade associations who participated were:

- the Adhesive and Sealant Council (ASC);
- the Synthetic Organic Chemical Manufacturers Association (SOCMA);
- the Metal Finishing Suppliers' Association (MFSA); and
- the Manmade Fiber Producers Association (MFPA).

Survey questionnaires were mailed out to potential participants in October, and a response was requested by November 30, 1982. While the questionnaires were being completed, Peat Marwick provided telephone assistance to companies that required clarification of instructions for completing the questionnaire.

Prior to receiving survey responses, an internal computerized data entry and retrieval system was developed to store survey results. This system was designed to provide for rapid data entry and review in preparing the data base.

All survey responses were returned directly to Peat Marwick to maintain the confidentiality of individual company responses. Each of the questionnaires received was logged into a master coding book, reviewed for completeness, and, when necessary, the participating company was called for additional information or clarification of survey input.

Survey responses were then entered into the data retrieval system and independently reviewed in order to minimize errors in the data base. All company-specific information that could be used to identify respondents was then removed from each survey. Although individual questionnaires were reviewed for completeness and clarity, Peat Marwick did not independently verify any of the information provided in this survey.

The remaining portions of this report present our findings based on the survey data base.

FINDINGS

This section of the report provides a complete summary of the survey results. It includes a discussion of general results, an introduction to the presentation approach, and the presentation of aggregated survey results.

General Survey Results

One hundred seventeen (117) companies responded to the survey describing their U.S. chemical business and efforts to reduce unreasonable risk. Most of these respondents completed all or at least the majority of the questionnaire, as requested. Five of the responses were not considered to be valid responses due to incomplete data (e.g., the majority of the questionnaire was not completed) or their chemical business did not fall within the survey definition of a chemical business.[1] Therefore, the survey results are based on 112 valid responses to the questionnaire.

The sizes of responding companies, as measured by 1981 U.S. chemical sales, varied greatly and are summarized in the following table.

TABLE 1

SURVEY RESPONSES BY 1981 U.S. CHEMICAL SALES

Sales ($1981)	Number of Respondents
Greater than 2 billion	11
Between 2 and 1 billion	12
Between 1 billion and 500 million	16
Between 500 and 200 million	15
Between 200 and 50 million	21
Less than 50 million	37
Sales category not reported	1
TOTAL	112

[1] The survey definition of U.S. chemical sales is: "All domestic sales plus domestic based exports of products in SIC code 28 (chemicals and allied products), excluding SIC code 283 (drugs)."

The total 1981 U.S. chemical sales reported by the participants in the survey is $78.45 billion (1981 dollars). This compares with $139.0 billion (1981 dollars) in sales reported for the industry (SIC code 28, excluding code 283) by the Federal Trade Commission.[1] Therefore, the 1981 U.S. chemical sales reported in the survey represents approximately 56 percent of the total industry sales.

The total 1981 U.S. chemical industry employment reported by the survey participants is 474,293. This compares with total industry employment of 907,800 reported for the industry (SIC code 28, excluding 283) by the Labor Department.[2] Therefore, the 1981 U.S. chemical industry employment reported in the survey represents approximately 52 percent of the total industry employment.

In summary, the responding companies represent approximately one-half of the total industry on the basis of sales and employment, and Table 1 indicates that a broad distribution of company sizes is represented in the survey.

Approach for Presenting Results

The survey results are presented in the remainder of the report following the structure of the survey questionnaire.

The questionnaire consists of five major sections.

- I General Company Information;
- II Chemical Hazard Assessment;
- III Hazard Communication;
- IV Hazard Control; and
- V Environmental Control Costs.

In presenting results, these sections are presented in order, and the original language of the questionnaire has been maintained wherever possible.

The responses to each survey question are aggregated to present the total and mean (arithmetic average) responses for appropriate questions (e.g., number of employees) and response

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1 Federal Trade Commission, Quarterly Financial Report for Manufacturing, Mining and Trade Corporations.

2 Labor Department, Bureau of Labor Statistics, Monthly Employment and Earnings Report.

frequencies (e.g., percent of companies indicating "yes" of the companies responding to the question) for all other questions. A number of the survey questions also requested "other" responses. These responses have been compiled and are presented directly after the results for each question.

Detailed results for key questions are presented in Appendix B and a complete summary of responses for each question is provided in Appendix C. These appendices provide a number of useful statistics that describe the distribution of responses to individual questions. The statistics included are comprehensive and are provided as complete documentation.

Generally, 105 to 112 responses were received for any one question; however, in certain instances the response rate is lower due to the survey design (sections are skipped by respondents due to contingent questions) or other factors. Appendices B and C should be referenced for a better understanding of the response to a particular question.

A statistical analysis of relationships between key variables has been conducted. Representative examples of these analyses are presented and discussed in Appendix D. The analyses conducted included multiple linear regression for continuous variables such as sales and staffing, and cross-tabulation for integer variables such as responses to "yes/no" questions. In both cases the analysis is directed toward identifying associations between responses to specific survey questions and key industry segments (e.g., sales and line of business) and then determining the significance of those associations.

This effort was undertaken to determine if the data collected in the survey can be used to define industry segments that have significantly different practices. The conclusions to be drawn from Appendix D are that the vast majority of responses bear little relationship to company size, line of business or other company characteristic.

SECTION I

GENERAL COMPANY INFORMATION

Survey Results

This section was designed to identify general information about each company. The results from this section of the questionnaire are used to establish the baseline for analyzing all survey responses.

I. A. Company Information

These questions requested specific company information to characterize the responding company.

> Questions A.1.1 to A.1.7 identify a company's total sales and employment, worldwide chemical sales and employment, U.S. chemical sales and employment, and total number of U.S. chemical products for calendar year 1981.

The aggregated survey results to these questions are as follows.

	1981 Data	
	Total	Mean
A.1.1 Total company sales (worldwide) in millions of dollars	$415,115	$3,844
A.1.2 Total company employment (worldwide) at calendar year end (thousands)	2,365	21.7
A.1.3 Total worldwide chemical product sales (all sales of products in SIC code 28, excluding 283) in millions of dollars	$108,856	$1,027
A.1.4 Total number of employees at calendar year end associated with worldwide chemical product sales (ref. question 1.3) (thousands)	694	6.4
A.1.5 Total U.S. chemical product sales (domestic sales plus domestic based exports of products in SIC code 28, excluding 283) in millions of dollars	$78,452	$733
A.1.6 Total number of employees at calendar year end associated with U.S. chemical product sales (ref. question 1.5) (thousands)	474	4.4
A.1.7 Total number of chemical products (count all product distinctions except package size as individual products) associated with U.S. chemical product sales (ref. question 1.5)	115,500	1,070

Question A.1.8 asked a company to identify the major product categories associated with their U.S. chemical business, according to SIC codes. For this question, major product categories represent at least 10 percent of a company's total U.S. chemical sales.

The responding companies identified major product categories with the following frequencies.

SIC Code	Title	Response Frequency
281	Industrial Inorganic Chemicals	43%
282	Plastics and Synthetics	44%
284	Toilet Preparations	16%
285	Paints and Allied Products	14%
286	Industrial Organic Chemicals	66%
287	Agricultural Chemicals	29%
289	Miscellaneous Chemical Products	44%

I. B. Management Attention to Health and Environmental Matters

The following questions were designed to determine the attention that management devotes to health and environmental matters.

B.1 What is the highest level in your company that is routinely involved in health and environmental matters concerning your U.S. chemical business?

Highest Level	Response Frequency
BOARD OF DIRECTORS	6%
PRESIDENT	24%
CORPORATE VICE PRESIDENT	43%
VICE PRESIDENT	15%
DEPARTMENT HEAD	9%

Other responses to question B.1 were:

- executive vice president; and
- manager of corporate toxicology.

B.2 Does your company have formal policies that address the following health and environmental concerns and are these policies publicly available?

Policy	Frequency of Response: Internal Policy	Frequency of Response: Policy is Publicly Available
Medical	94%	26%
Product Safety	91%	40%
Worker Safety	98%	41%
Transportation	88%	30%
Hazardous Wastes	90%	31%
Environment	89%	33%
Disaster Plans	84%	36%

Other health and environmental policies cited by companies were:

- Internal Policies
  - process safety;

- training;
- regulatory compliance;
- respirator use;
- occupational health;
- product quality; and
- industrial hygiene.

. Publicly Available Policies

- emergency response;
- toxic substances;
- labeling; and
- business conduct.

Question B.3 was an open question which requested specific examples demonstrating management's approach for dealing with health and environmental matters.

Sixty-four percent of the survey respondents provided examples. The examples fall into six major categories:

. upper management involvement;

. designation of health and environmental responsibilities;

. health and environmental policies;

. health and environmental programs;

. industry research association membership; and

. health and environmental performance.

Many respondents cited examples of upper management involvement to demonstrate their management's approach to health and environmental matters. This involvement took many forms:

- Environmental staff reporting directly to upper management. One company's environmental staff reports directly to the executive vice president. Another company's health, safety and environmental affairs manager reports to a corporate vice-president.

- Upper management environmental policy oversight. One company has a vice presidential regulatory affairs committee which oversees policy decisions. Another company established a corporate level environmental affairs committee to attend to health and environmental issues.

- Upper management review of corporate environmental performance and programs. One company appointed members of the board of directors to a "public responsibility committee" which meets regularly to review corporate performance in environmental health areas. Another company has a corporate environmental committee composed of corporate officers and company managers which reviews, coordinates and approves all environmental programs. Another company has a corporate group which is responsible for developing policy and advising and auditing line functions. One company sends copies of environmental assessment reports to its board of directors.

- Upper management participation in environmental committees. One company reported top management involvement in environmental committees.

- Upper management responsibility for environmental compliance. One company has a "corporate compliance committee" whose members are the corporate general counsel, vice president of technology, and manager of regulatory affairs. This committee reviews health and environmental concerns and reports directly to the president. Another company's major executives are responsible for ensuring facility compliance with corporate health and environmental policies. Another company compiles reports of incidents by computer and then summarizes them for corporate management. All lost time accidents are immediately reported to the corporate management of another company.

Many companies cited examples of the designation of health and environmental responsibilities to illustrate their management's approach to health and environmental matters. Companies designated vice presidents, managers, and line management and established boards, committees, and departments with environmental responsibilities. Many of the health and environmental committees are corporate level organizations.

Companies frequently cited health and environmental policies to illustrate their health and environmental approaches. Companies reported that they have policies concerning distribution practices, technical publications, health, environmental quality, social responsibility, product testing, production, industry associations, information availability, product quality, and regulatory compliance. Some of these policies were to:

- encourage technical publications;
- stop production to avoid or minimize health or environmental problems;
- perform health, safety, environmental, and regulatory reviews of new products, new processes, and old processes which have been significantly changed;
- encourage participation in CMA committees and with governmental agencies;
- review all new or modified projects;
- apply contaminant standards;
- use only approved hazardous waste disposal companies;
- provide occupational health manuals for each plant;
- have all employees wear proper safety equipment;
- evaluate health and environmental hazards of new raw materials;
- collect MSDSs for all materials and make them available on site;
- provide MSDSs for all products;
- maintain open communications with OSHA and NIOSH; and
- comply with all OSHA regulations.

Survey respondents provided 81 examples of health and environmental programs which demonstrate their approach to health and environmental matters. The examples fall under seven major types of programs:

- Product safety. Examples included product stewardship, quality control, loss prevention, and testing programs.
- Audits. Respondents cited safety, health, environmental and industrial hygiene audit programs.
- Employee training. Companies train employees in safety, loss prevention, first aid and CPR.
- Emergency response. Respondents have emergency response systems for chemical emergencies. One company specified that it has emergency response teams for transportation incidents.
- Worker health. Companies perform physicals, blood tests, and medical surveys; monitor chemical exposures; use medical systems manuals; and have ventilation, hearing conservation, and industrial hygiene programs. One company developed a computer-based information system to track worker health, exposures, and materials at a cost of $2 million.
- Environmental. Companies cited water monitoring, hazardous waste, environmental engineering and toxicity testing programs.
- Information systems. Companies cited MSDS management, 8(e) reporting, customer information distribution, coding, labeling and chemical data collection programs.

Several companies cited industry research association membership as an example of how they approach health and environmental matters. One company's upper management is actively involved in the Chemical Industry Institute of Toxicology (CIIT), and its key managers participate in the safety, health, and environment committes of several industry associations including the Chemical Manufacturers Association (CMA), American Petroleum Institute (API), Society of Plastics Industry (SPI), International Institute of Synthetic Rubber Producers (IISRP), and Chemical Specialties Manufacturers Association (CSMA). Other companies reported that they:

- are members of the National Safety Council;
- participate in outside environmental organizations;

- are members of CHEMTREC;
- encourage participation in CMA committees; and
- encourage working with governmental agencies.

Several companies cited their health and environmental performance records as a demonstration of their approach to health and environmental matters. These companies cited the following examples:

- In 1981, a company had no OSHA citations, no fatalities, and the lowest frequency of employee injury and illness in the nation.
- A company withdrew a product from the market because of discovered chronic health effects.
- A company led the industry in the development of quality assurance testing methods and company specifications on emissions from building products.
- A company modified manufacturing processes to eliminate hazardous waste.
- A company's major industrial chemical facility has coordinated an emergency response plan and served as the command center for a major region in the country.

I. C. Organization

The following questions were designed to determine how companies have organized their U.S. chemical business to carry out their environmental and health policies.

> Question C.1 asks if a company has one or more groups whose sole function is dealing with health or environmental matters.

Of the responding companies, 78 percent indicated that they do have one or more of these groups.

> Question C.2 asks for a count of all health/environmental specialists (internal staff and outside consultants) used by a U.S. chemical company in 1981 on an equivalent full-time basis without double counting.

The following is a summary of the total response and mean response by function.

Function	Number of Specialists	
	Mean Response	Total Response
Product Safety	5.6	574
Worker Safety	19.8	2,018
Health	22.0	2,245
Legal (Env./Health)	1.9	197
Transportation Safety	2.1	218
Labeling	1.4	138
Air Pollution Control	6.4	650
Water Pollution Control	11.8	1,201
Hazardous Waste Management	8.6	877
Other Functions	5.6	574
Total[1]	84.4	8,693

The specific other functional areas identified above include:

- regulatory and legislative affairs;

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[1] Totals are not precisely equal to the addition of columns due to a limited number of partial responses. Some respondents provided totals for this question, but did not answer the question in detail. The results presented reflect the most complete data available.

- environmental impact;
- odor control;
- fire control;
- management and administration;
- process safety; and
- environmental audits.

The following is a summary of the total response and mean response by specialist.

Specialist	Number of Specialists Mean Response	Total Response
Physician	2.4	257
Immunologist	.1	9
Pathologist	.3	28
Nurse	5.5	580
Epidemiologist	.4	38
Toxicologist	4.7	497
Industrial Hygienist	4.6	491
Lawyer	2.0	217
Environmental Engineer	11.0	1,166
Other Professionals	25.5	2,701
Technicians	18.7	1,979
Total[1]	84.4	8,693

[1] Totals are not precisely equal to the addition of columns due to a limited number of partial responses. Some respondents provided totals for this question, but did answer the question in detail. The results presented reflect the most complete data available.

SECTION II

CHEMICAL HAZARD ASSESSMENT

Survey Results

This section was designed to determine what U.S. chemical companies are doing to identify chemical hazards to health and the environment. Hazard assessment is sometimes called loss prevention or product safety review; it involves the determination of a hazard's presence or absence through the review of available data such as toxicity, environmental fate, and physical/chemical properties to evaluate the potential for harm or need for additional information.

II. A. Chemical Hazard Assessment Review

This section asks what a company is doing to assess chemical hazards.

A.1 Do you have a program for chemical hazard assessment?

Of the companies responding, 88 percent have a program.

The remaining questions in Section II.A were answered by companies with a program.

A.2 About what percent of the time do you perform chemical hazard assessments when you have:

	Mean Response
New Products	85%
New Processes	76%
Any Formulation Changes	57%

A.3 Which of the following events typically trigger a chemical hazard assessment for existing products or existing processes.

	Response Frequency
Routine	41%
Process Change	73%
New Data	94%
New Product Use	63%
Employee Concern	81%
Consumer Concern	78%
New Regulatory Requirements	92%

Other events identified as triggering chemical hazard assessments on existing products were:

- labeling and bulletin changes;
- product literature revisions;
- environmental incidents and concerns;
- MSDS cyclical review;
- sales volume changes;
- raw material changes;
- employee protection;
- insurance company requests;
- consultant recommendations; and
- unspecified audits.

A.4 What technical specialties were involved in your chemical hazard assessment program during 1981?

	FREQUENCY OF RESPONSES			
Specialties	No Personnel	Internal Personnel Only	Outside Consultants Only	Internal Personnel and Outside Consultants
TOXICOLOGY	17%	21%	26%	35%
LEGAL	10%	52%	15%	23%
REGULATORY	9%	65%	3%	23%
ENGINEERING	12%	70%	2%	16%
ENVIRONMENTAL	9%	66%	3%	22%
SAFETY	7%	73%	2%	18%
ANALYTICAL (CHEMIST)	5%	66%	3%	26%
MEDICAL	21%	39%	21%	18%
INDUSTRIAL HYGIENE	17%	54%	12%	17%
R&D/TECHNICAL	9%	86%	-	5%
PRODUCTION	19%	79%	-	2%

Other technical specialities involved in 1981 chemical hazard assessment programs were:

- Internal Personnel Only:
  - microbiology;
  - transportation; and
  - quality control.
- Internal Personnel and Outside Consultants:
  - epidemiology; and
  - industrial task force.
- Outside Consultants Only:
  - aquatic toxicology;
  - management consultants; and
  - insurance.

A.5 Do you have a chemical hazard assessment committee(s)?

51 percent of the responding companies have committee(s).

A.5.1 If yes, in approximately what year was your committee(s) started?

The mean response to the survey was 1974.

A.6 Does your company conduct formal environmental health and safety reviews for the design of new plants or equipment projects?

82 percent of the responding companies conduct these reviews.

II. B. Testing

Toxicity testing can be helpful to determine whether a substance could pose a hazard. This testing is defined to include animal, environmental, epidemiological, clinical, toxicological, etc.

B.1 Does your company have toxicity tests performed to evaluate the health effects or environmental effects of chemicals?

Of the companies responding, 78 percent answered yes to this question.

The remaining questions in Section II.B were answered by the companies that perform toxicity testing.

B.1.1 In approximately what year did your company begin performing toxicity tests?

The mean response to the survey was 1963.

Questions B.2-B.4 request information that describes a chemical company's 1981 toxicity testing program in terms of staffing, number of products tested, expense of program, and replacement value of testing facilities. Recognizing that a company's testing program may include a level of effort towards business segments other than their U.S. chemical business, as defined in the survey, question B.3 requested an estimate of percentage of total expense that was attributable to the U.S. chemical business segment only. This factor has been used to adjust survey responses in all categories of questions B.2 and B.4.

The corresponding results of the survey are presented in Table 2.

TABLE 2

CHEMICAL INDUSTRY SURVEY
1981 TOXICITY TESTING PROGRAMS
MEAN AND TOTAL RESPONSES[1]

Question No.		Mean Response	Total Response
B.2.1	Equivalent full-time staff	14	1,178
B.2.2	Number of new substances/ products tested	22	1,856
B.2.3	Number of existing substances/products tested	29	2,418
	Total Number Tested[2]	53	4,421
B.2.4	Annual in-house expense	$1,184,000	$97,103,000
B.2.5	Annual contracted expense	380,000	31,170,000
B.2.6	Annual cooperative expense	123,000	10,309,000
	Total expense[2]	$1,724,000	$137,953,000
B.4	Replacement value of toxicity testing facilities in 1981	$3,148,000	$255,028,000

[1] Responses have been adjusted to percent of effort attributable to U.S. Chemical business.

[2] Totals do not sum exactly due to a limited number of partially complete questionnaires.

Question B.5 asked for examples which demonstrated changes in testing programs during the past 10 years.

Fifty-five percent of the survey respondents provided examples. The examples fall into one of the following testing program changes:

- organizational changes;
- new toxicity testing facilities and equipment;
- increased staffing;
- new testing policies;
- improved testing practices;
- increased numbers of tests;
- more sophisticated tests; and
- improved recordkeeping and information collection.

Most of the companies reporting organizational changes designated groups or individuals with environmental, health, and safety responsibilities. One company reported that it had set up its environmental, health, and safety group as an operating expense center with an annual budget. Another company established a toxicology department and another reported that it had moved toxicological responsibilities to a more senior organization. The organizational changes reflect the increasing responsibilities and importance of environmental, health, and safety functions.

New toxicity testing facilities or equipment were reported by seven companies. One of the companies indicated that it had constructed a multi-million dollar toxicity testing laboratory. Another company spent nearly one and a half million dollars on an addition to its lab for inhalation toxicological testing.

Increased staffing for toxicological testing was reported by 11 respondents. One company reported that it expanded its health staff from 5 to 60 professionals. Another company reported that its full-time staff devoted to assessing toxicological hazards increased from 4 to 25. A third company staffed a new lab with 39 employees.

New testing policies were instituted by 11 companies. The new policies covered new, existing and acquisition product testing; raw material testing; labeling; and government regulatory compliance.

Four companies reported that they test all new products. One of these companies reported that toxicity testing is "now part of new product development and is carried out at an early stage." Another company indicated that commercialization development costs include testing costs.

Three companies reported that they have procedures in place for testing existing products: two reported that they prioritize mature chemicals for testing and one reported that it conducts annual reviews to identify chemicals for testing and proposes annual chemical testing programs to each division.

Another company reported that it establishes the toxicity of all raw materials and examines products from acquisitions. Another company added intermediate and bulk chemical testing capabilities to test for safe environmental handling of these chemicals.

Many companies cited examples of improved testing practices. Companies reported improvements in:

- Good laboratory practices (GLPs). Companies reported that they now adhere to GLPs. Those previously following GLPs said that their GLPs are now "formalized," "better defined," or "strengthened."

- Protocols. Protocols are now "updated," "more complex," "formalized," "more comprehensive," and "better defined." Several companies designed internal testing protocols and one company "gained facility in protocol selection."

- Quality control in testing. Examples of greater quality control in testing include auditing of testing, validation procedures for studies, review procedures for reports, quality assurance programs, and careful review of subcontracted work.

Many respondents also cited examples of increased numbers of tests as a major change in testing programs. Examples of tests which are conducted more often are:

- behavioral toxicology;

- chemical fate;

- chronic;

- chronic and carcinogenic inhalation;
- corrosion;
- environmental toxicity;
- fertility;
- flash point;
- genetic;
- in vitro mutagenicity;
- metabolic;
- metals analysis;
- molecular toxicology;
- oncogenic;
- pharmacokinetic;
- reproductive;
- sub-chronic;
- teratology; and
- wildlife.

One respondent indicated that it tests more species, more animals per species, and more samples of internal organs. Another respondent said that its testing has "greatly expanded from previous years" to the point where it now is spending over $1.5 million on contracted and cooperative toxicity testing. Another company identified increasing regulatory requirements and concern for product liability as major reasons for conducting considerably more tests.

Closely related to the increase in numbers of tests is the conduct of more sophisticated tests. Testing state of the art has advanced markedly; many current tests such as the Ames and cell transformation tests were not known in 1969. Companies reported that their current testing programs:

- emphasize bio-medical aspects of testing;
- use a tier-test approach to assess the toxicological hazards of chemicals;

- emphasize chronic, sub-chronic, and reproductive testing as opposed to the earlier emphasis on simple acute testing;

- use greater scientific depth;

- emphasize long-term testing;

- apply a greater breadth of tests;

- use more extensive histopathology;

- use more analytical chemistry; and

- apply more sophisticated analytical characterization.

Improved recordkeeping and information collection was cited by a number of respondents as an example of testing program improvements. Most of the companies cited use of computers as their improvement in recordkeeping. Respondents use computers for data collection, storage and search.

The kinds of data computerized are:

- test documentation;

- medical health and environmental data;

- toxicity reports;

- industrial hygiene data; and

- material safety data.

Companies also cited examples of recordkeeping improvements which did not involve computers. These companies:

- established archives for all data;

- expanded MSDS coverage;

- use MSDSs for all products; and

- established recordkeeping and reporting systems.

Two companies cited examples of improvements in information collection. One reported that it began monitoring worldwide literature; another reported increased interaction with regulatory agencies in the planning and reporting of studies.

II.C. TSCA Premanufacture Notification (PMN)

The impact of PMN may be different depending on company size and the products involved. The questions below are designed to indicate the factors that affect U.S chemical companies.

C.1 Do you have a procedure for determining that a PMN is required?

84 percent of the survey respondents have such a procedure.

C.2 Have you declined to manufacture any new chemicals because of the time or cost of PMN compliance?

18 percent of the survey respondents indicated that they have declined to manufacture due to PMNs.

Ten companies gave explanations as to why they declined to manufacture new chemicals because of PMN compliance. These ten responses were:

- "[PMN compliance was] more costly/more complex than market potential warranted."
- "Cost of PMN [was] too high to warrant filing in hope of generating unknown dollars worth of sales."
- "[The] number of specialty chemicals has been reduced to those products clearly demonstrating superior performance."
- "PMNs [were] submitted [for] all new imported chemicals but [were] withdrawn due to costs of tests requested by EPA."
- "Toxicity costs [were] excessive for market volume."
- "Cost not a factor. Research and marketing objectives occasionally switch from a PMN candidate to a non-PMN candidate for commercial development because of apprehension over PMN delays."

- "[We] have encountered at least seven instances where both time and cost of PMN have deterred further work on a new substance."
- "Low volume materials cannot bear the expense or the time [of PMN compliance]."
- "Planned production was based on an expressed immediate need by the customer. The PMN approval process precluded the immediate production of the product. Consequently, consideration of its production was dropped."
- "It [the new chemical] would have been a useful addition to our product line but [potential sales] could not justify up-front toxicology expense."

Questions II.C.3 and II.C.4 ask how many PMNs a company submitted and how many of these PMN substances have been or are likely to be commercialized.

The total of survey responses is presented below in comparison to the total number of PMNs received by EPA.

Total PMNs Submitted
Survey vs. Actual

	Survey Total	EPA[1] Total	Survey Total as a Percentage of EPA Total
1979	19	36	53%
1980	145	365	40%
1981	225	662	34%
Total	389	1,063	37%
No. Commercialized	247	unknown[2]	
Percent Commercialized	63%		

[1] Received through direct correspondence with U.S. EPA, Office of Pesticides and Toxic Substances.

[2] The total number of substances commercialized of all PMNs is not readily available.

II.D. TSCA 8(e) Reports

An 8(e) report informs EPA that a chemical may present a substantial risk to health or the environment.

D.1 Do you have a company procedure in place for considering 8(e) reports?

74% of the responding companies have a procedure for considering 8(e) reports.

Questions D.1.1 and D.1.2 were answered by companies with a procedure.

D.1.1 What are the sources of information that initiate an 8(e) review?

Information Source	Response Frequency
TOXICOLOGY	90%
RESEARCH	72%
PRODUCTION (EMPLOYEES)	78%
CUSTOMER/CONSUMER REPORT	78%
DATA FROM SUPPLIERS	70%

Twenty-six companies reported "other" sources of information which initiate an 8(e) review. These "other" responses were:

- employee reports;
- employee requests;
- data from trade associations;
- data from other manufacturers;
- data from government reports;
- data from trade literature;

- data from outside labs;
- medical data;
- industrial hygiene;
- company management;
- National Toxicology Program (NTP) reports;
- public information; and
- regulations.

D.1.2 Approximately how many people are normally involved in your company's 8(e) review procedure?

The mean survey response was 6.4.

D.2 Has your company filed at least one 8(e) report?

51 percent of the responding companies indicated that they have filed at least one report.

D.2.1 If yes, whom do you advise of your 8(e) reports?

	Response Frequency
CUSTOMERS	90%
CO-PRODUCERS	69%
EMPLOYEES	94%

Other responses to this question were:

- the public;
- government agencies;
- other research organizations;

- suppliers; and
- company management.

D.3 Has the information provided on 8(e) reports prepared by your company or any other company been used for your Material Safety Data Sheets (MSDSs)?

	Frequency of Response		
	Always	Sometimes	Never
Your own 8(e) reports	54%	40%	6%
Other 8(e) reports	21%	51%	28%

D.3.1 Has this information been used in your industrial hygiene practices?

	Frequency of Response		
	Always	Sometimes	Never
Your own 8(e) reports	74%	22%	4%
Other 8(e) reports	29%	44%	27%

SECTION III

HAZARD COMMUNICATION

Survey Results

This section identifies what chemical companies are doing to inform employees and customers about chemical hazards.

III.A. MSDS

The Material Safety Data Sheet (MSDS) is a source of information about a chemical. This question will determine how extensively they are used to transmit information.

A.1 What systems do you use to communicate information about chemical products?

Information System	Response Frequency
MSDS	99%
LABELS	95%
PRODUCT BULLETIN	87%
LETTERS	80%
TRAINING	84%
POISON CONTROL CENTERS	34%

A number of companies provided "other" systems that they use to communicate information. These systems are:

- CHEMTREC;
- emergency response systems (emergency staff, call-in service, call response services);
- chemical data sheets (manufacturer data sheets, toxicity reports, hazardous material data sheet);
- bulletins (chemical hazard bulletins, environmental bulletins, safety bulletins, industrial hygiene bulletins, technical bulletins);
- educational programs (video tapes, slide presentations, seminars, presentations, meetings, movies, personal discussions);
- reference materials (American Industrial Hygiene Association guides, hazardous material transportation guides, catalogs, repack sheets, transportation documents, wall charts, safety guides, user manuals, handbooks, publications);

- medical advisors; and
- local municipal services (hospitals, fire departments).

The remaining questions in III.A. were answered by companies with MSDSs.

A.2 Do you send MSDSs to your customers?

	Response Frequency
UPON THE FIRST SHIPMENT ONLY	26%
UPON EVERY SHIPMENT	5%
ON REQUEST	96%
WHEN UPDATED	60%

Other instances when companies give MSDSs to customers that were identified by respondents are:

- with samples;
- with product literature;
- during sales calls and visits by technical representatives;
- with customer information packets;
- annually;
- semiannually;
- periodic mailings through a computerized system;
- special mailing lists;
- to potential customers; and
- with contracts.

A.3 Approximately what percent of your purchased chemicals and chemical products were covered by MSDSs in 1981?

	Mean Response
Purchased Chemicals	86%
Chemical Products	92%

A.4 Is the information provided on your MSDS more, the same, or less then that called for on OSHA Form 20?

	Response Frequency
More	55%
The Same	45%
Less	0%

A.5 "How often do you review and update your MSDSs?

Of the companies responding, 97 percent indicated that their MSDSs are reviewed and updated as new information becomes available. Twenty-three companies provided actual review and update periods and the mean response was every 2.0 years.

Other companies reported that they review and update MSDSs:

- after formula modifications;
- continually;
- before each new MSDS print run;
- periodically;
- when determined by product steward audit; and
- according to regulatory requirements.

A.6 Do you maintain files of MSDSs?

99 percent of the companies responding indicated that they do maintain MSDS files. Of the companies with MSDS files, 100 percent indicated that the files are available to company personnel. Sixty-five percent indicated that the files are available to the public. It should be noted that a number of the companies that make the files available to the public limit the release of this type of information to people with "a legitimate need to know."

III. B. Labels

Labeling provides information to customers and employees. The following questions are designed to indicate the type of information transmitted and the proportion of chemical products for which such information is provided.

B.1 Typically, which of the following pieces of information appeared on your chemical product labels in 1981?

The frequency of survey responses ordered by response frequency are:

Label Information	Response Frequency
PRODUCT OR TRADE NAME	98%
NAME OF MANUFACTURER	97%
COMPANY ADDRESS	96%
PRECAUTIONS FOR USE	87%
HAZARD IDENTIFICATION	86%
EMERGENCY PROCEDURES	72%
CODE NUMBER	68%
COMMON NAME	66%
CHEMICAL NAME	64%
CONTAINER DISPOSAL	41%
TELEPHONE CONTACT	34%
CAS NUMBER	12%

The following is a list of other information that was identified as being included on chemical product labels.

- measure statement;
- DOT shipping name;
- United Nations hazard number;

- marketing company name;
- first aid;
- MSDS availability;
- flash point;
- warranty;
- open code date;
- signal word;
- CHEMTREC;
- lot marking;
- disclaimer;
- applications;
- label code number;
- specifications; and
- use date.

III.C. Information Systems

Information systems identify, communicate, and record information on chemicals.

C.1 Do you formally maintain the following information at either a corporate, divisional, or local level?

Information Maintained	Response Frequency
LISTS OF CHEMICALS USED	97%
LISTS OF CHEMICALS PRODUCED	99%
WORK HISTORIES	83%
WORK SITE EXPOSURES	92%
MEDICAL RECORDS	95%
SIGNIFICANT ADVERSE EFFECTS	81%
CUSTOMER COMPLAINTS	86%
EMPLOYEE COMPLAINTS	85%

C.2 Do you have procedures established to respond to health and safety questions raised by customers and employees?

Of the responding companies, 91 percent indicated that they have procedures established to respond to questions raised by customers and 96 percent indicated that they have procedures established to respond to questions raised by employees.

III.D. Training

Training frequently involves communicating information on chemical hazards and teaches people how to avoid those hazards.

D.1 In which areas do your chemical plant employees (hourly and supervisory) receive training?

	Response Frequency by Type Of Chemical Plant Employee	
AREAS OF TRAINING	HOURLY	SUPERVISORY
CHEMICAL HAZARDS	97%	96%
WORKPLACE SAFETY	99%	97%
HANDLING of MATERIALS	99%	96%
EMERGENCY RESPONSE	86%	96%
OFF-THE-JOB SAFETY	63%	63%
REGULATORY COMPLIANCE	64%	90%

Companies provided a long list of areas in which they train supervisory and/or hourly personnel. Many of the responses were specific examples of the general areas of training already listed in the survey. Specific examples of emergency response training for both hourly and supervisory personnel were fire-fighting and confined space entry. Examples of training in workplace safety for both hourly and supervisory personnel were fire protection, respiratory protection, radiation protection, hearing conservation, transportation safety. In addition, supervisory personnel were trained in industrial hygiene and industrial ventilation. Examples of chemical hazard training for both hourly and supervisory personnel were carcinogens, hazardous wastes, and flammable liquids.

Other areas in which both hourly and supervisory personnel receive training are:

- basic chemistry;
- equipment operation;
- disaster plans;

- electrostatics;
- preventive health;
- transportation requirements;
- quality control; and
- employees' right-to-know.

Other areas in which just supervisory personnel receive training are:

- process and product hazard reviews;
- community complaints; and
- accident investigation.

SECTION IV

HAZARD CONTROL

Survey Results

This section is designed to identify what chemical companies are doing to control hazards that have been identified.

IV. A Listing of Chemicals

Lists of chemicals are ready sources of information that management can use to control hazards. The following questions identify items that are listed and how the information is used.

A.1 Does your company maintain complete lists of the following materials? If yes, approximately when was this practice started?

Lists Maintained	Response Frequency	Mean Year Started
PRODUCTS	100%	1956
RAW MATERIALS AND SEGREGATED INTERMEDIATES	98%	1965
SOLID WASTES	90%	1976
EFFLUENTS	87%	1972
EMISSIONS	83%	1973

In completing question IV.A.1., several companies indicated that they began maintaining one or more of these lists in 1982. These companies are included in the data base.

Other information which companies keep lists of are:

- chemical supplies;
- liquid wastes;
- deepwell-disposed wastes;
- ocean-disposed wastes;
- hazardous materials;
- DOT regulated materials;
- RCRA wastes;
- waste sites; and
- by-products.

Question IV.A.2 has been answered by companies that maintain at least one of the lists identified above.

A.2 Are internal chemical lists used to:

Use of Lists	Response Frequency
Meet Regulatory Requirements?	94%
Maintain Internal Control?	98%
Research Health and Safety?	86%

Other activities for which chemical lists are used are to:

- target hazard communications;
- alert transportation departments of hazardous chemicals;
- respond to environmental incidents;
- plan waste disposal;
- produce precautionary labels; and
- plan for emergency responses to environmental incidents.

IV. B. Industrial Hygiene Program

Industrial hygiene or similar programs are designed to protect workers from chemical hazards.

B.1 Do you have an industrial hygiene program or a similar program performing the same functions?

90 percent of the responding companies indicated that they do have a program.

The remaining questions in Section IV.B were answered by companies with a program.

B.2 How many total industrial hygienists and/or trained hygiene technicians were used in your U.S. chemical business in 1981 on an equivalent full-time basis?

The mean response was 6.9 and the total response was 660.

B.3 What areas of operation does your industrial hygiene or similar program address?

Area of Operation Covered by Program	Response Frequency
Manufacturing	100%
Maintenance	87%
Incoming Raw Materials	77%
Processing	94%
Packaging	82%
Storage	72%
Transportation	60%
Laboratory	87%
Product Use	70%
Disposal	62%

Other areas addressed by companies' industrial hygiene programs are:

- labeling;
- personal protection;
- regulatory reviews and audits;
- contractors;
- customers;
- pilot plants;
- product development;
- environmental remedial work sites;
- research and development; and
- contracted manufacturing.

IV. C. Health Effects Monitoring

Health effects monitoring provides an early warning of work-related health problems.

C.1 Does your company perform periodic reviews of their employees' medical histories?

Of the responding companies, 39 percent indicated that they perform periodic reviews on all employees and 47 percent indicated that they review selected groups of employees.

Companies performing reviews of selected groups of employees' medical histories were asked to specify these groups. Approximately one half of these companies periodically review the medical histories of employees who are exposed or potentially exposed to hazardous chemicals. Most of the rest of the companies performed periodic medical history reviews of selected in-plant and out-of-plant employees.

In-plant employees cited were:

- production workers;
- lab personnel;
- chemical operators;
- waste handlers;
- all plant personnel;
- manufacturing workers;
- warehouse workers;
- shipping and receiving workers;
- supervisors; and
- ex-production workers.

Out-of-plant employees cited were:

- sales personnel;

- key people;
- management and senior management;
- truck drivers;
- executives; and
- senior staff.

A few companies reported that they review the medical records of those required by government regulations. A few other companies perform periodic medical reviews of all older employees.

IV. D. Emergency Response

The following questions seek to determine the types of emergency response teams that companies maintain and the training that they receive. These teams could include fire brigades, first aid teams, or chemical spills teams.

D.1 Does your company have emergency response teams?

Response Teams	Frequency of Response
Fire Control	88%
First Aid	87%
Chemical Spills or Releases	83%

Other incidences for which companies have emergency response teams are:

- transportation emergencies;
- CHEMTREC;
- CHLOREP (for chlorine emergency responses);
- hydrogen cyanide emergencies;
- rescues;
- power failures;
- noxious fumes;
- mutual aid;
- contractor's emergencies; and
- natural disasters.

The remaining questions in Section IV.D were answered by companies with emergency response teams for chemical spills or releases.

D.2 Indicate the number of trained emergency response personnel for chemical spills or releases inside and outside of your facilities (emergency site activities and all activities) that your company maintained in the U.S. in 1981.

	Number of Personnel	
	Mean Response	Total Response
Emergency Site Activities	100	8,197
All Emergency Activities	160	11,992

D.3 Do your company's emergency response teams respond to outside emergencies not involving your products?

46 percent of the responding companies indicated that they do respond to outside emergencies not involving their products.

IV. E. Internal Health/Environmental Compliance Audits/Reviews

Internal health/environmental compliance audits/reviews are one means that companies use to ensure that they are following health and environmental policies and regulations. The following questions will determine how extensively U.S. chemical companies use this management tool.

E.1 Does your company have an internal health, environmental, or other type of compliance audit program?

Of the responding companies, 76 percent indicated that they do have a compliance audit/review program.

The remaining questions in Section IV.E were answered by companies that have an audit program.

Questions E.2 and E.3 requested specific information about the types of audits conducted, the year that the audits were started, the frequency with which audits are conducted, and the skills represented in conducting audits.

Table 3 presents the results of the survey.

Twenty-nine companies reported they perform other audits besides health and environmental compliance audits. Twenty companies perform safety audits, seven companies perform transportation compliance audits, and five perform industrial hygiene audits. Other audits cited were:

- product safety;
- site assessment;
- process safety;
- FDA compliance;
- quality control; and
- RCRA.

TABLE 3

SURVEY RESULTS - COMPLIANCE AUDITS/REVIEWS

	Health Compliance Audits/Reviews	Environmental Compliance Audits/Reviews
Frequency audit/review was reported as a company practice[1]	93%	93%
Mean year started[1]	1975	1978
Mean audit/review frequency	1.2 years	1.3 years
Skills involved - frequency of response		
Legal	47%	63%
Technical	96%	97%
Management	91%	86%

[1] Several companies indicated that they began audits/reviews in 1982. In these cases, the companies were considered to perform audits/reviews and the year started was recorded as 1982.

Other skills used in conducting and reviewing audits are:

- medical;
- industrial hygienist;
- regulatory;
- managerial
- engineering;
- internal audit;
- toxicological;
- safety; and
- operations.

IV. F. Transportation

Transportation safety is an important element in reducing the public's risk from chemicals. The following questions seek to determine what your company is doing concerning transportation.

F.1 Does your company train its personnel to understand transportation safety regulations and standards?

96 percent of the respondents provide this type of training.

F.2 Does your company have a transportation procedures manual?

80 percent of the respondents have a transportation procedures manual.

F.3 If you have procedures, are the following items included in the transportation procedures manual?

Procedures Included	Response Frequency
Loading/Unloading	90%
Handling	91%
Packaging	97%
Labeling	97%
Placarding	94%
Inspection	87%
Spill/Emergency	83%

Other procedures contained in transportation procedure manuals are:

- audits;
- shipping document preparation;
- routing;
- government regulations;
- DOT hazard material definitions;
- hazardous substance lists;
- product lists;
- drum codes;
- hazardous waste transportation rules;
- driver responsibilities;
- markings;
- CHEMTREC;
- classifications;
- bill of lading instructions;
- Federal Motor Carrier Safety Regulations, parts 391-397; and
- transportation equipment selection.

F.4 Does your company provide precautionary information beyond Department of Transportation (DOT) standards for identifying the hazardous nature of chemicals in transit?

64 percent of the responding companies indicated that they do provide precautionary information beyond DOT standards.

F.5 Does your company use:

	Response Frequency
Labels	98%
Placards	87%
Written Instructions	88%
Verbal Instructions	81%

Other aids companies use in their transportation programs are:

- transportation data sheets;
- MSDS;
- training;
- slide presentations;
- transportation emergency guides;
- audits;
- hose connection tags;
- driver instruction cards;
- bill of lading notations;
- hazardous waste manifests;
- checklists;
- handouts; and
- CHEMTREC.

F.6 Are your company products listed with CHEMTREC?

76 percent of the responding companies indicated yes.

F.7 Does your company maintain its own transportation emergency hotline?

50 percent of the responding companies indicated yes.

IV. G. Waste Disposal Procedures

The following question is designed to determine how companies handle their chemical wastes.

> G.1 In recent years, has your company been using proportionately more, the same, or less of the following waste disposal methods for your chemical wastes? Indicate in the right-hand column if the method has not been used recently.

	Frequency of Response			
	Recent Use of Disposal Methods			
	More	Same	Less	Method Not Used Recently
Recycled	74%	21%	0%	5%
Stored on-site	16%	24%	42%	18%
Stored off-site	4%	8%	30%	58%
Incinerated on-site	36%	11%	5%	48%
Incinerated off-site	43%	15%	12%	30%
Landfilled on-site	3%	13%	30%	54%
Landfilled off-site	39%	24%	30%	7%

Twenty-one companies cited examples of other recent methods of waste disposal. The most common cited example was deepwell injection. Eight companies reported using deepwell injection: three more, three the same, and two less. Five companies reported they are using more process changes to reduce wastes. Three companies are landfarming (one more, one less, and one the same). One company indicated that it is using less ocean disposal.

Other disposal methods which were cited as being used more are:

- chemical destruction;
- biological treatment;
- bio-degradation;

- neutralization;
- chemical-fixation;
- sell for recovery or use;
- detoxification; and
- pyrolysis.

SECTION V

ENVIRONMENTAL CONTROL COSTS

Survey Results

This section is designed to update the estimated costs to the U.S. chemical industry for end-of-process pollution control. Please provide the following information for your U.S. chemical business, defined as domestic sales plus domestic based exports of products in SIC code 28 (excluding 283). Pollution control facilities serve company questions using appropriate estimates of the proportion dedicated to your U.S. chemical business. One source of information for this section may be submittals to the Census Bureau on Form MA-200.

For the purpose of the survey, pollution control facilities fall into three major categories; air, water, and solid waste. Use the following definitions of these pollutants to complete Section V.

Air pollutants are airborne substances including particulates (dust, fly ash, smoke), sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, odors, fluorides, lead and other heavy metals, radioactive and toxic substances.

Water pollutants are waterborne substances including phosphate, nitrates (-trites), substances that generate chemical or biochemical oxygen demand, solids, acids, bases, heavy metals, radioactive and toxic substances, synthetic organic molecules, harmful microbes, oil, grease, dyes, and heat.

Solid waste includes garbage, trash, sewage sludge, dredged spoil, incinerator residue, wrecked or discarded equipment, biological and chemical wastes, radioactive and other toxic materials. Include solid waste produced as a result of air and water pollutant abatement.

V.A. Estimate your capital investment in pollution control facilities (original installed cost) during calendar years 1981, 1980, 1979, 1978, and 1977 for end-of-process waste treatment/disposal.

The following table summarizes the mean company response and total response to the survey in millions of dollars (not adjusted for inflation).

	Capital Expenditures ($ Millions)			
Year	Air	Water	Solid Waste	Total
1981 - Mean	3.8	6.5	1.2	11.5
- Total	349	602	113	1,083
1980 - Mean	3.7	6.0	1.1	10.9
- Total	331	544	92	966
1979 - Mean	3.5	6.1	1.3	10.5
- Total	303	523	108	926
1978 - Mean	3.3	6.1	0.9	10.1
- Total	268	493	67	829
1977 - Mean	3.4	7.4	0.6	11.1
- Total	259	573	48	864

Totals are not precisely equal to the addition of rows due to a limited number of partial responses.

V. B. Estimate your 1981, 1980, 1979, 1978, and 1977 annual Operations and Maintenance (C&M) costs for end-of-process waste treatment/disposal.

The following table summarizes the mean company response and total response to the survey in millions of dollars (not adjusted for inflation).

	Operation and Maintenance Costs ($ Millions)			
Year	Air	Water	Solid Waste	Total
1981 - Mean	3.6	6.9	2.8	14.1
- Total	323	632	254	1,323
1980 - Mean	3.7	6.8	2.5	13.4
- Total	319	590	217	1,190
1979 - Mean	3.1	6.1	2.0	11.7
- Total	258	522	169	998
1978 - Mean	2.6	5.6	1.7	10.5
- Total	198	429	125	809
1977 - Mean	2.3	4.9	1.5	9.2
- Total	172	366	106	691

Totals are not precisely equal to the addition of rows due to a limited number of partial responses.

V. C. Estimate the equivalent number of full-time personnel (operations, maintenance, engineering, administration, etc.) dedicated to operating and maintaining your pollution control facilities in 1981, 1979, and 1977 at calendar year end.

The following table summarizes the mean company response and total response to the survey in equivalent full-time personnel.

	Number of Personnel			
Year	Air	Water	Solid Waste	Total
1981 - Mean	20.7	43.8	19.0	92.6
- Total	1,820	3,945	1,713	8,427
1979 - Mean	20.2	44.5	17.0	91.5
- Total	1,655	3,736	1,427	7,778
1977 - Mean	18.7	38.1	15.4	81.3
- Total	1,458	3,050	1,233	6,589

Totals are not precisely equal to the addition of rows due to a limited number of partial responses.

APPENDIX A

SURVEY QUESTIONNAIRE

SURVEY OF CHEMICAL COMPANY ACTIVITIES TO REDUCE UNREASONABLE RISK

CHEMICAL MANUFACTURERS ASSOCIATION

2501 M Street, N.W.
Washington, D.C. 20037

PURPOSE: To survey the chemical industry's commitment to reducing unreasonable risk to health and the environment.

BENEFIT: To demonstrate to policy makers and the general public the degree to which the chemical industry is ensuring the safety of chemicals.

Please return this survey form by November 30, 1982. Thank you for participating in this important effort.

SURVEY OF CHEMICAL COMPANY ACTIVITIES TO REDUCE UNREASONABLE RISK

The U.S. chemical industry needs information to demonstrate its commitment to controlling and reducing unreasonable risk to health and the environment. This is a survey to identify that information.

The results are intended to:

- present the U.S. chemical industry's efforts to reduce unreasonable risk for the TSCA reauthorization hearings;
- support the regulatory positions of the chemical industry;
- provide performance and compliance documentation for the public; and
- provide feedback to participating companies on the industry's effort to control and reduce chemical risks.

Instructions for Completing the Questionnaire

This is a survey of the U.S. chemical industry's activities to reduce unreasonable risk in calendar year 1981. For the purposes of this survey, the industry is defined as all domestic sales plus domestic based exports of products in SIC code 28 (chemicals and allied products), excluding 283 (drugs). This definition must be used in completing the questionnaire for your U.S. chemical business, unless specific requests are made for other information.

The questionnaire contains five major sections, addressing:

I. General Company Information;

II. Chemical Hazard Assessment;

III. Chemical Hazard Communication;

IV. Chemical Hazard Control; and

V. Environmental Control Costs.

Each section contains three to eight subsections with specific instructions for completing each question. The questionnaire is printed so that the sections can be separated and distributed to appropriate personnel for completion. If you do separate the questionnaire, please copy these instructions and send them with the portion(s) of the questionnaire being distributed.

The questionnaire is designed to minimize the effort required to respond. Therefore informed estimates are acceptable where exact data is not available. We are not requesting that major internal studies be undertaken to complete the questionnaire. If you have any problems in completing the questionnaire, please call Mr. Deems Buell of Peat, Marwick, Mitchell & Co. at (202) 223-9525.

Confidentiality of Questionnaire Responses

Completing the questionnaire requires the disclosure of business information that many companies will consider confidential. To assure that responses are maintained confidentially during and after the survey, CMA is using Peat, Marwick, Mitchell & Co., a major public accounting and management consulting firm, to conduct the survey and evaluate the survey results. The information released at the conclusion of the survey will be in aggregated form to protect the identity of individual respondents. To provide additional assurance to your company, a confidentiality agreement is enclosed for your company to enter into with Peat, Marwick, Mitchell & Co. Your response will be maintained as confidential even if your company does not enter into this agreement.

Responding to the Survey

All participating companies must return their completed questionnaire by November 30, 1982. To limit follow up, a postcard is enclosed for your company to complete and return as soon as a decision has been made about participating in the survey.

A return envelope is enclosed for submitting your completed questionnaire. If you do not use this envelope, please mark your return envelope "CONFIDENTIAL" and mail it to:

Peat, Marwick, Mitchell & Co.
1990 K Street, N.W.
Washington, D.C. 20006
ATTN: Mr. Deems Buell

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CURRENT ACTIVITIES TO REDUCE UNREASONABLE RISK

SECTION I. GENERAL COMPANY INFORMATION

This section will identify general information about your company. The results from this section of the questionnaire will establish the baseline for analyzing all of your survey responses.

I. A. Company Information

Specific company information is essential to the survey for standardizing responses. The questions below request information about your entire company's activities (world-wide) and your company's chemical business (world-wide and U.S.). For this survey, a chemical business is defined by products in SIC code 28, excluding 283, and a U.S. chemical business is defined as domestic sales plus domestic based exports of products in SIC code 28, excluding 283.

Your responses to the remainder of the questionnaire must be based on your U.S. chemical business, unless a question specifically states otherwise. Supporting functions provided by other areas of your company should be considered to be a part of your U.S. chemical business on a proportional basis when possible.

A.1 Provide the following information about your company's activities for the 1981 calendar year.

1.1 Total company sales (world-wide) in millions of dollars $_____ (1981$s)

1.2 Total company employment (world-wide) at calendar year end _____

1.3 Total world-wide chemical/product sales (all sales of products in SIC Code 28, exluding 283) in millions of dollars $_____ (1981$s)

1.4 Total number of employees at calendar year end associated with your world-wide chemical/product sales (ref. question 1.3) _____

1.5 Total U.S. chemical/product sales (domestic sales plus domestic based exports of products in SIC code 28, excluding 283) in millions of dollars $_____ (1981$s)

1.6 Total number of employees at calendar year end associated with your U.S. chemical/product sales (ref. question 1.5) _____

1.7 Total number of chemical products (count all product distinctions except package size as individual products) associated with your U.S. chemical/product sales (ref. question 1.5) _____

1.8 Identify the major products associated with your 1981 U.S. chemical/product sales (ref. question 1.5) by checking the appropriate SIC codes below. (Consider major chemical product categories to represent at least 10% of your total U.S. chemical/product sales.)

SIC Code	Title	
281	Industrial Inorganic Chemicals	____
282	Plastics and Synthetics	____
284	Toilet Preparations	____
285	Paints and Allied Products	____
286	Industrial Organic Chemicals	____
287	Agricultural Chemicals	____
289	Miscellaneous Chemical Products	____

A.2 What is your company's name?

_____

A.3 Who is your company's principal contact in completing the questionnaire, their job title, and telephone number?

_____ Name _____ Job Title ( ) _____ Telephone Number

I. B. Management Attention to Health and Environmental Matters

The following questions will determine the attention that management devotes to health and environmental matters.

For each question, check (✓) all appropriate answers or provide the requested information.

B.1 What is the highest level in your company that is routinely involved in health and environmental matters concerning your U.S. chemical business? (check appropriate response)

BOARD OF DIRECTORS	____
PRESIDENT	____
CORPORATE VICE-PRESIDENT	____
VICE-PRESIDENT	____
DEPARTMENT HEAD	____
OTHER (SPECIFY):	

_____

B.2 Does your company have formal policies that address the following health and environmental concerns and are these policies publicly available? (check appropriate responses)

	INTERNAL POLICY		PUBLICLY AVAILABLE	
	YES	NO	YES	NO
MEDICAL	____	____	____	____
PRODUCT SAFETY	____	____	____	____
WORKER SAFETY	____	____	____	____
TRANSPORTATION	____	____	____	____
HAZARDOUS WASTES	____	____	____	____
ENVIRONMENT	____	____	____	____
DISASTER PLANS	____	____	____	____
OTHER (SPECIFY)				
_____	____	____	____	____
_____	____	____	____	____
_____	____	____	____	____

B.3 Please provide any specific examples that demonstrate your management's approach for dealing with health and environmental matters.

_____
_____
_____
_____
_____

I. C. Organization

The following questions will find how companies have organized their U.S. chemical business to carry out their environmental and health policies.

For each question, check (✓) all appropriate answers or provide the requested information.

C.1 Do you have one or more groups whose sole function is dealing with health or environmental matters?

_____YES _____NO

C.2 Use the matrix below to provide a count of all the health/environmental specialists (internal personnel plus outside consultants) that your U.S. chemical business used in calendar year 1981. Present all specialists on an equivalent full-time basis according to their most appropriate health/environmental function. Do not double count.

(In completing the matrix, product safety is defined as a function that includes coordination and development of hazard communication and regulatory compliance programs making use of other health information. Worker safety is defined as a function that includes occuptional safety and employee health monitoring. Health is defined as a function that includes human, animal, and environmental research and assessment.)

SPECIALISTS

FUNCTIONS	Physician	Immunologist	Pathologist	Nurse	Epidemiologist	Toxicologist	Industrial Hygienist	Lawyer	Environmental Engineer	Other Professionals	Technicians
Product Safety											
Worker Safety											
Health											
Legal (Env./Health)											
Transportation Safety											
Labeling											
Air Pollution Control											
Water Pollution Control											
Hazardous Waste Management											
Other's (Specify)											
_____											
_____											
_____											

Number of Equivalent Full-Time Specialists

SECTION II. CHEMICAL HAZARD ASSESSMENT

In this section we would like to know what your company is doing to identify chemical hazards to health and the environment within your U.S. chemical business. Hazard assessment is sometimes called loss prevention or product safety review; it involves the determination of a hazard's presence or absence through the review of available data such as toxicity, environmental fate, and physical/chemical properties to evaluate the potential for harm or need for additional information.

II. A. Chemical Hazard Assessment Review

We need to know what your company is doing to assess chemical hazards.

For each question, check (✓) all appropriate answers or provide the requested information.

A.1 Do you have a program for chemical hazard assessment?

_____YES _____NO

If the answer is NO, skip to question II.B.1.

A.2 About what percent of the time do you perform chemical hazard assessments when you have:

New Products _____%

New Processes _____%

Any Formulation Changes _____%

A.3 Which of the following events typically trigger a chemical hazard assessment for existing products or existing processes. (Check all appropriate answers)

Routine _____
Process Change _____
New Data _____
New Product Use _____
Employee concern _____
Consumer concern _____
New regulatory requirements _____

Other (Specify)

_____
_____
_____

A.4 What technical specialties were involved in your chemical hazard assessment program during 1981? (check all appropriate answers.)

Specialties	Internal Personnel	Outside Consultants
TOXICOLOGY	_____	_____
LEGAL	_____	_____
REGULATORY	_____	_____
ENGINEERING	_____	_____
ENVIRONMENTAL	_____	_____
SAFETY	_____	_____
ANALYTICAL (CHEMIST)	_____	_____
MEDICAL	_____	_____
INDUSTRIAL HYGIENE	_____	_____
R & D/TECHNICAL	_____	_____
PRODUCTION	_____	_____
SPECIFY OTHERS:		
_____	_____	_____
_____	_____	_____
_____	_____	_____

A.5 Do you have a chemical hazard assessment committee(s)?
_____ Yes _____ No

5.1 If yes, in approximately what year was your committee(s) started? _____

A.6 Does your company conduct formal environmental health and safety reviews for the design of new plants or equipment projects?

_____ YES _____ NO

II. B. Testing

Toxicity testing can be helpful to determine whether a substance could pose a hazard. This testing is defined to include animal, environmental, epidemiological, clinical, toxicological, etc.

For each question, check (✓) all appropriate answers or provide the requested information.

B.1 Does your company have toxicity tests performed to evaluate the health effects or environmental effects of chemicals?

_____YES _____NO

If the answer is NO, skip to question II.C.1.

1.1 In approximately what year did your company begin performing toxicity tests? _____

B.2 Toxicity testing programs often overlap between testing in support of a company's U.S. chemical business and testing in support of a company's other activities. To simplify estimating U.S. chemical business toxicity testing efforts, provide the following information on the entire toxicity testing program(s) within your company in 1981 that provides all support for your U.S. chemical business. Include both human health effects and environmental effects testing.

2.1 Equivalent full-time technical staff directly involved in the toxicity testing program. _____

2.2 Number of new substances/products tested (don't count individual tests) _____

2.3 Number of existing substances/products tested (don't count individual tests) _____

2.4 Annual operating expense of in-house toxicity testing $_____ (1981 $s)

2.5 Annual expense of contracted toxicity testing $_____ (1981 $s)

2.6 Annual expense of toxicity testing performed in cooperative research programs $_____ (1981 $s)

B.3 Based on your answer to B.2, estimate the percentage of total testing expense that was attributable to your U.S. chemical business. _____%

B.4 Estimate the replacement value of your toxicity testing facilities that were in place during 1981 for the toxicity testing program described in question B.2.

$_____ (1981 $s)

B.5 Do you have examples which demonstrate changes in your testing program during the past ten years? (Consider planning, protocols, auditing, recordkeeping, types of studies, and reporting.)

_____
_____
_____
_____
_____

II. C. TSCA Premanufacture Notification (PMN)

The impact of PMN may be different depending on company size and the products involved. The questions below will indicate the factors that affect your U.S. chemical business.

For each question, check (✓) all appropriate answers or provide the requested information.

C.1 Do you have a procedure for determining that a PMN is required?

_____YES _____NO

C.2 Have you declined to manufacture any new chemicals because of the time or cost of PMN compliance?

_____YES _____NO

If yes, how many due to: Time _____
Cost _____

Please explain_____
_____
_____

C.3 How many PMN's did your company submit in:
1979_____ 1980_____ 1981_____

If none, skip to question II.D.1.

C.4 How many of your PMN substances, reported in C.3, have actually been or are likely to be commercialized? _____

II. D. TSCA 8(e) Reports

An 8(e) report informs EPA that a chemical may present a substantial risk to health or the environment.

For each question, check (√) all appropriate answers or provide the requested information.

D.1 Do you have a company procedure in place for considering 8(e) reports?

_____YES _____NO

If the answer is NO, skip to question II.D.4.

1.1 What are the sources of information that initiate an 8(e) review? (Check all appropriate answers)

TOXICOLOGY	_____
RESEARCH	_____
PRODUCTION (EMPLOYEES)	_____
CUSTOMER/CONSUMER REPORT	_____
DATA FROM SUPPLIERS	_____
OTHER (SPECIFY)	

_____

_____

_____

1.2 Approximately how many people are normally involved in your company's 8(e) review procedure?_____

D.2 Has your company filed at least one 8(e) report?

_____YES _____NO

2.1 If yes, whom do you advise of your 8(e) reports? (Check all appropriate answers)

CUSTOMERS	_____
CO-PRODUCERS	_____
EMPLOYEES	_____
OTHERS (SPECIFY)	

_____

_____

_____

D.3 Has the information provided on 8(e) reports prepared by your company or any other company been used for your Material Safety Data Sheets (MSDS's)? (Check appropriate answers)

	Always	Sometimes	Never
Your own 8(e) reports	_____	_____	_____
Other 8(e) reports	_____	_____	_____

3.1 Has this information been used in your industrial hygiene practices? (Check appropriate answers)

	Always	Sometimes	Never
Your own 8(e) reports	_____	_____	_____
Other 8(e) reports	_____	_____	_____

SECTION III. HAZARD COMMUNICATION

This section will identify what chemical companies are doing to inform employees and customers about chemical hazards.

III. A. MSDS

The Material Safety Data Sheet (MSDS) is a source of information about a chemical. This question will determine how extensively they are used to transmit information.

For each question, check (✓) all appropriate answers or provide the requested information.

A.1 What systems do you use to communicate information about chemical products. (Check all appropriate answers)

MSDS	_____
LABELS	_____
PRODUCT BULLETIN	_____
LETTERS	_____
TRAINING	_____
POISON CONTROL CENTERS	_____
OTHER (SPECIFY)	

_____
_____
_____
_____

(If you do not use MSDSs, skip to question III.B.1)

A.2 Do you send MSDSs to your customers? (Check all appropriate answers)

UPON THE FIRST SHIPMENT ONLY	_____
UPON EVERY SHIPMENT	_____
ON REQUEST	_____
WHEN UPDATED	_____
OTHER (SPECIFY)	

_____
_____
_____
_____

A.3 Approximately what percent of your purchased chemicals and chemical products were covered by MSDSs in 1981?

Purchased Chemicals _____%

Chemical Products _____%

A.4 Is the information provided on your MSDS more, the same, or less then that called for on OSHA Form 20?

More _____
The Same _____
Less _____

A.5 How often do you review and update your MSDSs?

ANNUALLY _____
AS NEW INFORMATION BECOMES AVAILABLE _____
OTHER (SPECIFY).
_____
_____
_____

A.6 Do you maintain files of MSDS's?

_____YES _____NO

If the answer is NO, skip to question III.B.1

6.1 Are these MSDS's available to company personnel?

_____YES _____NO

6.2 Are these MSDS's available to the public?

_____YES _____NO

III. B. Labels

Labeling provides information to customers and employees. The following questions will indicate the type of information transmitted and the proportion of chemical products for which such information is provided.

For this question, check (✓) all appropriate answers.

B.1 Typically, which of the following pieces of information appeared on your chemical product labels in 1981.

PRODUCT OR TRADE NAME	____
COMMON NAME	____
CODE NUMBER	____
CHEMICAL NAME	____
NAME OF MANUFACTURER	____
CAS NUMBER	____
HAZARD IDENTIFICATION	____
PRECAUTIONS FOR USE	____
EMERGENCY PROCEDURES	____
CONTAINER DISPOSAL	____
COMPANY ADDRESS	____
TELEPHONE CONTACT	____
OTHER (specify)	
_____	____
_____	____
_____	____

III. C. Information Systems

Information systems identify, communicate, and record information on chemicals.

For each question, check (✓) all appropriate answers.

C.1 Do you formally maintain the following information at either a corporate, divisional or local level?

	YES	NO
LISTS OF CHEMICALS USED	____	____
LISTS OF CHEMICALS PRODUCED	____	____
WORK HISTORY	____	____
WORK SITE EXPOSURES	____	____
MEDICAL RECORDS	____	____
SIGNIFICANT ADVERSE EFFECTS	____	____
CUSTOMER COMPLAINTS	____	____
EMPLOYEE COMPLAINTS	____	____

C.2 Do you have procedures established to respond to health and safety questions raised by:

CUSTOMERS ___YES ___NO

EMPLOYEES ___YES ___NO

III. D. Training

Training frequently involves communicating information on chemical hazards and teaches people how to avoid those hazards. We would like to obtain information on the areas in which you train your employees.

For this question, check (✓) all appropriate answers.

D.1 In which areas do your chemical plant employees (hourly and supervisory) receive training? (Check all appropriate answers)

	Chemical Plant Employees	
AREAS OF TRAINING	HOURLY	SUPERVISORY
CHEMICAL HAZARDS	____	____
WORKPLACE SAFETY	____	____
HANDLING of MATERIALS	____	____
EMERGENCY RESPONSE	____	____
OFF THE JOB SAFETY	____	____
REGULATORY COMPLIANCE	____	____
OTHER (SPECIFY)		
_____	____	____
_____	____	____
_____	____	____
_____	____	____

SECTION IV. HAZARD CONTROL

This section will identify what chemical companies are doing to control hazards that have been identified.

IV. A Listing of Chemicals

Lists of chemicals are ready sources of information that management can use to control hazards. The following questions will identify items that are listed and how the information is used.

For each question, check (✓) all appropriate answers or provide the requested information.

A.1 Does your company maintain complete lists of the following materials? If yes, approximately when was this practice started?

	YES	NO	WHEN STARTED
PRODUCTS	___	___	_____
RAW MATERIALS AND SEGREGATED INTERMEDIATES	___	___	_____
SOLID WASTES	___	___	_____
EFFLUENTS	___	___	_____
EMISSIONS	___	___	_____
OTHER (SPECIFY)			
_____			_____
_____			_____
_____			_____

If the answer is NO in each case skip to question IV.B.1

A.2 Are internal chemical lists used to:

	YES	NO
MEET REGULATORY REQUIREMENTS?	___	___
MAINTAIN INTERNAL CONTROL?	___	___
RESEARCH HEALTH AND SAFETY?	___	___
OTHER (SPECIFY)		
_____		
_____		
_____		

IV. B. Industrial Hygiene Program

Industrial hygiene or similar programs are designed to protect workers from chemical hazards.

For each question, check (✓) all appropriate answers or provide the requested information.

B.1 Do you have an industrial hygiene program or a similar program performing the same functions?

_____YES _____NO

If the answer is NO, skip to question IV.C.1

B.2 How many total industrial hygienists and/or trained hygiene technicians were used in your U.S. chemical business in 1981 on an equivalent full-time basis?

_____

B.3 What areas of operation does your industrial hygiene or similar program address? (Check appropriate items.)

MANUFACTURING	_____
MAINTENANCE	_____
INCOMING RAW MATERIALS	_____
PROCESSING	_____
PACKAGING	_____
STORAGE	_____
TRANSPORTATION	_____
LABORATORY	_____
PRODUCT USE	_____
DISPOSAL	_____
OTHER (SPECIFY)	

_____

_____

IV. C. Health Effects Monitoring

Health effects monitoring provides an early warning of work-related health problems.

C.1 Does your company perform periodic reviews of their employees' medical histories? (check appropriate answer)

_____ALL EMPLOYEES
_____SELECTED GROUP(S) OF EMPLOYEES (SPECIFY)

_____

_____

_____

_____DOES NOT PERFORM REVIEW

IV. D. Emergency Response

The following questions seek to find out the types of emergency response teams that companies maintain and the training that they receive. These teams could include fire brigades, first aid teams, or chemical spills teams.

For each question, check (✓) all appropriate answers or provide the requested information.

D.1 Does your company have emergency response teams for:

	YES	NO
Fire Control	___	___
First Aid	___	___
Chemical Spills or Releases	___	___
Other (Specify)		

_____

_____

_____

If you do not have emergency response teams for chemical spills or releases, skip to question IV.E.1

D.2 Indicate the number of trained emergency response personnel for chemical spills or releases inside and outside of your facilities (emergency site activities and all activities) that your company maintained in the U.S. in 1981.

Emergency Site Activities ____

All Emergency Activities ____

D.3 Do your company's emergency response teams respond to outside emergencies not involving your products?

_____YES _____NO

IV. E. Internal Health/Environmental Compliance Audits/Reviews

Internal health/environmental compliance audits/reviews are one means that companies use to ensure that they are following health and environmental policies and regulations. The following questions will determine how extensively U.S. chemical companies use this management tool.

For each question, check (✓) all appropriate answers or provide the requested information.

E.1 Does your company have an internal health, environmental, or other type of compliance audit program?

_____YES _____NO

If the answer is NO, skip to question IV.F.1

E.2 Indicate below which programs you have, the approximate year started, and approximate frequency that each type of audit is conducted on an annual basis.

	YES	NO	If yes, approx. Year Started	Frequency Audit is Conducted
Health compliance audits/reviews	___	___	_____	_____
Environmental compliance audits/reviews	___	___	_____	_____
Other (specify)				
_____			_____	_____
_____			_____	_____
_____			_____	_____

E.3 What skills are represented in conducting and reviewing the audits identified in E.2? (check appropriate answers)

	Health	Environmental	Others Specified in E.2		
			_____	_____	_____
Legal	_____	_____	_____	_____	_____
Technical	_____	_____	_____	_____	_____
Management	_____	_____	_____	_____	_____
Other (specify)					
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

IV. F. Transportation

Transportation safety is an important element in reducing the public's risk from chemicals. The following questions seek to determine what your company is doing concerning transportation.

For each question, check (√) all appropriate answers.

F.1 Does your company train its personnel to understand transportation safety regulations and standards?

_____YES _____NO

F.2 Does your company have a transportation procedures manual?

_____YES _____NO

F.3 If you have procedures, are the following items included in the transportation procedures manual?

	YES	NO
LOADING/UNLOADING	____	____
HANDLING	____	____
PACKAGING	____	____
LABELING	____	____
PLACARDING	____	____
INSPECTION	____	____
SPILL/EMERGENCY	____	____
OTHER (SPECIFY)		

_____
_____
_____

F.4 Does your company provide precautionary information beyond Department of Transportation (DOT) standards for identifying the hazardous nature of chemicals in transit?

_____YES _____NO

F.5 Does your company use:

	YES	NO
LABELS	____	____
PLACARDS	____	____
WRITTEN INSTRUCTIONS	____	____
VERBAL INSTRUCTIONS	____	____
OTHER (SPECIFY)		

_____
_____
_____

F.6 Are your company products listed with CHEMTREC?

_____YES _____NO

F.7 Does your company maintain its own transportation emergency hotline?

_____YES _____NO

IV. G. Waste Disposal Procedures

We would like to determine how companies handle their chemical wastes.

For the following question, check (✓) the appropriate answers.

G.1 In recent years, has your company been using proportionately more, the same, or less of the following waste disposal methods for your chemical wastes? Indicate in the right-hand column if the method has not been used recently. (Check appropriate answers)

	RECENT USE OF DISPOSAL METHODS			
	MORE	SAME	LESS	METHOD NOT USED RECENTLY
RECYCLED	____	____	____	____
STORED ON-SITE	____	____	____	____
STORED OFF-SITE	____	____	____	____
INCINERATED:				
ON-SITE	____	____	____	____
OFF-SITE	____	____	____	____
LANDFILLED:				
ON-SITE	____	____	____	____
OFF-SITE	____	____	____	____
OTHER (SPECIFY)				
_____	____	____	____	____
_____	____	____	____	____
_____	____	____	____	____

SECTION V. ENVIRONMENTAL CONTROL COSTS

This section will serve to update the estimated cost to the U.S. chemical industry of end-of-process pollution control. Please provide the following information for your U.S. chemical business, defined as domestic sales plus domestic based exports of products in SIC code 28 (excluding 283). In cases where your pollution control facilities serve company activities beyond your U.S. chemical business, answer the following questions using appropriate estimates of the proportion dedicated to your U.S. chemical business. One source of information for this section may be submittals to the Census Bureau on Form MA-200.

For the purposes of the survey, pollution control facilities fall into three major categories; air, water, and solid waste. Use the following definitions of these pollutants to complete Section V.

Air pollutants are airborne substances including particulates (dust, fly ash, smoke), sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, odors, fluorides, lead and other heavy metals, radioactive and toxic substances.

Water pollutants are waterborne substances including phosphate, nitrates(trites), substances that generate chemical or biochemical oxygen demand, solids, acids, bases, heavy metals, radioactive and toxic substances, synthetic organic molecules, harmful microbes, oil, grease, dyes, and heat.

Solid waste includes garbage, trash, sewage sludge, dredged spoil, incinerator residue, wrecked or discarded equipment, biological and chemical wastes, radioactive and other toxic materials. Include solid waste produced as a result of air and water pollutant abatement.

V. A. Capital Investment

Estimate your capital investment in pollution control facilities (original installed cost) during calendar years 1981, 1980, 1979, 1978, and 1977 for end-of-process waste treatment/disposal. (Ranges may be used.)

	Air Pollution Control	Water Pollution Control	Solid Waste Disposal
1981 (installed cost)	$_____ (1981 $'s)	$_____ (1981 $'s)	$_____ (1981 $'s)
1980 (installed cost)	$_____ (1980 $'s)	$_____ (1980 $'s)	$_____ (1980 $'s)

(Continued to next page)

V. A. Capital Investment (Con't.)

1979 (installed cost)	$_____ (1979 $'s)	$_____ (1979 $'s)	$_____ (1979 $'s)
1978 (installed cost)	$_____ (1978 $'s)	$_____ (1978 $'s)	$_____ (1978 $'s)
1977 (installed cost)	$_____ (1977 $'s)	$_____ (1977 $'s)	$_____ (1977 $'s)

V. B. Operation and Maintenance (O&M) Costs

Estimate your 1981, 1980, 1979, 1978, and 1977 annual O&M costs for end-of-process waste treatment/disposal. (Ranges may be used.)

	Air Pollution Control	Water Pollution Control	Solid Waste Disposal
1981	$_____ (1981 $'s)	$_____ (1981 $'s)	$_____ (1981 $'s)
1980	$_____ (1980 $'s)	$_____ (1980 $'s)	$_____ (1980 $'s)
1979	$_____ (1979 $'s)	$_____ (1979 $'s)	$_____ (1979 $'s)
1978	$_____ (1978 $'s)	$_____ (1978 $'s)	$_____ (1978 $'s)
1977	$_____ (1977 $'s)	$_____ (1977 $'s)	$_____ (1977 $'s)

V. C. Staffing

Estimate the equivalent number of full-time personnel (operations, maintenance, engineering, administration, etc.) dedicated to operating and maintaining your pollution control facilities in 1981, 1979, and 1977 at calendar year end.

	Air Pollution Control	Water Pollution Control	Solid Waste Disposal
1981	_____	_____	_____
1979	_____	_____	_____
1977	_____	_____	_____

APPENDIX B

DETAILED SURVEY RESULTS FOR KEY QUESTONS

Appendix B provides individual summary tables that statistically describe the distribution of responses to all "continuous" type questions in the survey such as sales and employment. The tables are organized in the order that questions were asked on the survey. The response to each of these questions is identified by an alphanumeric that ranges from VAR3 to VAR391 and an abbreviated title for the question. A complete set of summary tables (one table for each question) is provided in Appendix C.

Each page in Appendix B may contain more than one table. The pages are numbered and an index that relates questions with page numbers is provided at the end of this discussion.

Figure B-1 illustrates the descriptive tables used in this Appendix. Comments have been added to both tables to clarify the information provided. It should be noted that a complete set of statistics is provided with each table and that all statistics are not necessarily appropriate indicators for the responses to each "continuous" type question.

Appendix B

INDEX

Appendix B

INDEX (continued)

TABLE B-1

AN ILLUSTRATION OF A CONDESCRIPTIVE TABLE
USED TO QUANTIFY CONTINUOUS VARIABLES

Alphanumeric Identifyer — Abbreviated Question Title

VARIABLE VAR380 AIR-1981 STAFF

MEAN	20.686	STD ERROR	5.942	STD DEV	55.742
VARIANCE	3107.202	KURTOSIS	41.882	SKEWNESS	5.907
RANGE	450.000	MINIMUM	0.0	MAXIMUM	450.000
SUM	1820.400				

VALID OBSERVATIONS = 88 — Number of responses to the questions

MISSING OBSERVATIONS = 24 — Number of non-responses to the questions

B-14

Definitions

Mean - Sum of responses divided by the number of responses

Variance - Average squared deviation from the mean, a measure of central tendency (variance may not be printed due to large values)

Range - Maximum response minus the minimum response

Sum - All responses added together

Standard error - estimated by dividing standard deviation of responses by the square root of the number of responses, used to determine discrepancy between sample mean and population mean

Kurtosis - Measure of relative peakedness or flatness of curve defined by responses, a positive value indicates greater peakedness than a normal distribution

Minimim - Lowest response

Standard Deviation - Square root of the variance

Skewness - Measures the symmetry of the distribution of responses, a positive value indicates that responses are clustered to the left of the mean with extreme values to the right

Maximum - Highest response

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 SIT02B SP15T01B S20BT50B S50T020B SLTS0H SMISS

VARIABLE VAR3 TOTAL COMPANY SALES-BILLIONS 1981$

MEAN	3.844	STD ERROR	0.962	STD DEV	9.994
VARIANCE	99.976	KURTOSIS	24.704	SKEWNESS	4.64n
RANGE	68.585	MINIMUM	0.002	MAXIMUM	68.587
SUM	415.115				

VALID OBSERVATIONS = 108 MISSING OBSERVATIONS = 4

VARIABLE VAR4 TOTAL COMPANY EMPLOYMENT-THOUSANDS

MEAN	21.699	STD ERROR	4.949	STD DEV	51.673
VARIANCE	2670.137	KURTOSIS	29.481	SKEWNESS	4.814
RANGE	403.963	MINIMUM	0.037	MAXIMUM	404.000
SUM	2365.195				

VALID OBSERVATIONS = 109 MISSING OBSERVATIONS = 3

VARIABLE VAR5 WORLD-WIDE CHEMICAL SALES-BILLIONS 1981$

MEAN	1.027	STD ERROR	0.191	STD DEV	1.969
VARIANCE	3.849	KURTOSIS	11.548	SKEWNESS	3.217
RANGE	11.871	MINIMUM	0.002	MAXIMUM	11.873
SUM	108.856				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR6 WORLD-WIDE CHEMICAL EMPLOYMENT-THOUSANDS

MEAN	6.426	STD ERROR	1.357	STD DEV	14.100
VARIANCE	198.802	KURTOSIS	12.914	SKEWNESS	3.522
RANGE	80.143	MINIMUM	0.037	MAXIMUM	80.180
SUM	694.009				

VALID OBSERVATIONS = 108 MISSING OBSERVATIONS = 4

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 SIT028 SPTSTO1B S200T500 S50T0200 SLTS0H SMISS

VARIABLE VAR7 U.S. CHEMICAL SALES-BILLIONS 1980$S

MEAN	0.733	STD ERROR	0.124	STD DEV	1.286
VARIANCE	1.653	KURTOSIS	11.487	SKEWNESS	3.091
RANGE	7.871	MINIMUM	0.002	MAXIMUM	7.873
SUM	78.452				

VALID OBSERVATIONS = 107 MISSING OBSERVATIONS = 5

VARIABLE VAR8 U.S. CHEMICAL EMPLOYMENT-THOUSANDS

MEAN	4.351	STD ERROR	0.897	STD DEV	9.366
VARIANCE	87.723	KURTOSIS	22.140	SKEWNESS	4.201
RANGE	67.063	MINIMUM	0.037	MAXIMUM	67.100
SUM	474.293				

VALID OBSERVATIONS = 109 MISSING OBSERVATIONS = 3

VARIABLE VAR9 NUMBER OF CHEMICAL PRODUCTS

MEAN	1069.907	STD ERROR	227.697	STD DEV	2366.294
VARIANCE	**********	KURTOSIS	31.205	SKEWNESS	5.164
RANGE	17749.000	MINIMUM	1.000	MAXIMUM	17750.000
SUM	115550.000				

VALID OBSERVATIONS = 108 MISSING OBSERVATIONS = 4

VARIABLE VAR27 TOTAL-PRODUCT SAFETY

MEAN	5.624	STD ERROR	1.113	STD DEV	11.240
VARIANCE	126.344	KURTOSIS	16.099	SKEWNESS	3.641
RANGE	74.500	MINIMUM	0.0	MAXIMUM	74.500
SUM	573.600				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 SITO28 . SPTSTO18 S2001500 S50T0200 .SLTSON SHISS

VARIABLE VAR39 TOTAL-WORKER SAFETY

MEAN	19.706	STD ERROR	4.114	STD DEV	41.554
VARIANCE	1726.423	KURTOSIS	26.399	SKEWNESS	4.402
RANGE	318.000	MINIMUM	0.0	MAXIMUM	318.000
SUM	2010.200				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR51 TOTAL-HEALTH

MEAN	22.012	STD ERROR	6.363	STD DEV	64.269
VARIANCE	4130.052	KURTOSIS	39.100	SKEWNESS	5.684
RANGE	525.000	MINIMUM	0.0	MAXIMUM	525.000
SUM	2245.200				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR63 TOTAL-LEGAL

MEAN	1.933	STD ERROR	0.321	STD DEV	3.237
VARIANCE	10.480	KURTOSIS	9.231	SKEWNESS	2.900
RANGE	17.000	MINIMUM	0.0	MAXIMUM	17.000
SUM	197.200				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR75 TOTAL-TRANSPORTATION

MEAN	2.130	STD ERROR	0.488	STD DEV	4.931
VARIANCE	24.330	KURTOSIS	35.097	SKEWNESS	5.330
RANGE	40.000	MINIMUM	0.0	MAXIMUM	40.000
SUM	218.100				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SG120 S1102B SPIST010 S200T500 S50T0200 SLTSOH SMISS

VARIABLE VAR87 TOTAL-LABELING

MEAN	1.356	STD ERROR	0.211	STD DEV	2.139
VARIANCE	4.551	KURTOSIS	6.955	SKEWNESS	2.543
RANGE	11.000	MINIMUM	0.0	MAXIMUM	11.000
SUM	138.300				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR99 TOTAL-AIR

MEAN	6.373	STD ERROR	1.385	STD DEV	13.989
VARIANCE	195.702	KURTOSIS	37.784	SKEWNESS	5.366
RANGE	116.000	MINIMUM	0.0	MAXIMUM	116.000
SUM	650.000				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR111 TOTAL-WATER

MEAN	11.775	STD ERROR	2.914	STD DEV	29.428
VARIANCE	866.021	KURTOSIS	32.736	SKEWNESS	5.196
RANGE	230.000	MINIMUM	0.0	MAXIMUM	230.000
SUM	1201.100				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

VARIABLE VAR123 TOTAL-HAZARDOUS WASTE

MEAN	8.595	STD ERROR	2.446	STD DEV	24.708
VARIANCE	610.400	KURTOSIS	67.528	SKEWNESS	7.646
RANGE	232.000	MINIMUM	0.0	MAXIMUM	232.000
SUM	876.700				

VALID OBSERVATIONS = 102 MISSING OBSERVATIONS = 10

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B SIT02B SPTST010 S2001500 SS0TU200 SLT50M SMISS

VARIABLE VAR135 TOTAL-OTHER

MEAN	5.627	STD ERROR	2.192	STD DEV	22.140
VARIANCE	490.159	KURTOSIS	32.168	SKEWNESS	5.480
RANGE	151.000	MINIMUM	0.0	MAXIMUM	151.000
SUM	574.000				

VALID OBSERVATIONS - 102 MISSING OBSERVATIONS - 10

VARIABLE VAR147 TOTAL STAFF

MEAN	84.394	STD ERROR	15.136	STD DEV	153.611
VARIANCE	23596.485	KURTOSIS	9.435	SKEWNESS	2.925
RANGE	806.000	MINIMUM	0.0	MAXIMUM	806.000
SUM	8692.598				

VALID OBSERVATIONS - 103 MISSING OBSERVATIONS - 9

VARIABLE VAR148 TOTAL PHYSICIAN

MEAN	2.427	STD ERROR	0.420	STD DEV	4.325
VARIANCE	18.709	KURTOSIS	9.566	SKEWNESS	2.864
RANGE	25.000	MINIMUM	0.0	MAXIMUM	25.000
SUM	257.300				

VALID OBSERVATIONS - 106 MISSING OBSERVATIONS - 6

VARIABLE VAR149 TOTAL IMMUNOLOGIST

MEAN	0.081	STD ERROR	0.052	STD DEV	0.531
VARIANCE	0.282	KURTOSIS	73.204	SKEWNESS	8.244
RANGE	5.000	MINIMUM	0.0	MAXIMUM	5.000
SUM	8.600				

VALID OBSERVATIONS - 106 MISSING OBSERVATIONS - 6

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1TO2B SP15T01B S2007S0 S5010200 SLTSOH SHISS

VARIABLE VAR150 TOTAL PATHOLOGIST

MEAN	0.261	STD ERROR	0.099	STD DEV	1.021
VARIANCE	1.043	KURTOSIS	27.364	SKEWNESS	5.01m
RANGE	7.000	MINIMUM	0.0	MAXIMUM	7.000
SUM	27.700				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR151 TOTAL NURSE

MEAN	5.474	STD ERROR	0.974	STD DEV	10.027
VARIANCE	100.540	KURTOSIS	7.200	SKEWNESS	2.651
RANGE	40.000	MINIMUM	0.0	MAXIMUM	40.000
SUM	500.200				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR152 TOTAL EPIDEMIOLOGIST

MEAN	0.359	STD ERROR	0.089	STD DEV	0.920
VARIANCE	0.846	KURTOSIS	15.217	SKEWNESS	3.504
RANGE	6.000	MINIMUM	0.0	MAXIMUM	6.000
SUM	38.100				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR153 TOTAL TOXICOLOGIST

MEAN	4.690	STD ERROR	1.147	STD DEV	11.809
VARIANCE	139.464	KURTOSIS	15.148	SKEWNESS	3.73A
RANGE	74.000	MINIMUM	0.0	MAXIMUM	74.000
SUM	497.100				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 SITO28 SPTSTO1B S2001S09 SSOTU200 SLTSOM SMISS

VARIABLE VAR154 TOTAL INDUSTRIAL HYGIENIST

MEAN	4.636	STD ERROR	0.877	STD DEV	9.025
VARIANCE	81.459	KURTOSIS	16.070	SKEWNESS	3.617
RANGE	61.000	MINIMUM	0.0	MAXIMUM	61.000
SUM	491.400				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR155 TOTAL LAWYER

MEAN	2.042	STD ERROR	0.295	STD DEV	3.042
VARIANCE	9.255	KURTOSIS	10.402	SKEWNESS	2.919
RANGE	17.000	MINIMUM	0.0	MAXIMUM	17.000
SUM	216.500				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR156 TOTAL ENVIRONMENTAL ENGINEER

MEAN	11.003	STD ERROR	2.029	STD DEV	20.889
VARIANCE	436.340	KURTOSIS	14.264	SKEWNESS	3.404
RANGE	125.000	MINIMUM	0.0	MAXIMUM	125.000
SUM	1166.300				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR157 TOTAL OTHER PROFESSIONALS

MEAN	25.482	STD ERROR	5.395	STD DEV	55.543
VARIANCE	3085.004	KURTOSIS	23.172	SKEWNESS	4.388
RANGE	390.000	MINIMUM	0.0	MAXIMUM	390.000
SUM	2701.100				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 SIT028 SPTST018 S260T500 S54T0200 SLT50M SMISS

VARIABLE VAR158 TOTAL TECHNICIANS

MEAN	18.669	STD ERROR	5.107	STD DEV	52.583
VARIANCE	2764.925	KURTOSIS	35.030	SKEWNESS	5.367
RANGE	420.000	MINIMUM	0.0	MAXIMUM	420.000
SUM	1978.900				

VALID OBSERVATIONS - 106 MISSING OBSERVATIONS - 6

VARIABLE VAR160 NEW PRODUCT ASSESSMENTS

MEAN	85.000	STD ERROR	3.251	STD DEV	30.840
VARIANCE	951.124	KURTOSIS	1.725	SKEWNESS	-1.821
RANGE	100.000	MINIMUM	0.0	MAXIMUM	100.000
SUM	7650.000				

VALID OBSERVATIONS - 90 MISSING OBSERVATIONS - 22

VARIABLE VAR161 NEW PROCESS ASSESSMENTS

MEAN	76.091	STD ERROR	3.903	STD DEV	36.616
VARIANCE	1340.727	KURTOSIS	-0.489	SKEWNESS	-1.119
RANGE	100.000	MINIMUM	0.0	MAXIMUM	100.000
SUM	6696.000				

VALID OBSERVATIONS - 88 MISSING OBSERVATIONS - 24

VARIABLE VAR162 FORMULATION CHANGE ASSESSMENTS

MEAN	57.325	STD ERROR	4.464	STD DEV	39.926
VARIANCE	1594.121	KURTOSIS	-1.666	SKEWNESS	-0.160
RANGE	100.000	MINIMUM	0.0	MAXIMUM	100.000
SUM	4586.000				

VALID OBSERVATIONS - 80 MISSING OBSERVATIONS - 32

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1TO2B SPTSTO1B S2B0T5B0 S5B1O2B0 SLT5ON SHISS

VARIABLE VAR182 YEAR COMMITTEE STARTED

MEAN	1974.328	STD ERROR	1.422	STD DEV	10.05A
VARIANCE	101.161	KURTOSIS	7.105	SKEWNESS	-2.686
RANGE	46.000	MINIMUM	1936.000	MAXIMUM	1982.000
SUM	98716.000				

VALID OBSERVATIONS = 50 MISSING OBSERVATIONS = 62

VARIABLE XXX186 % ATTRIB TESTING STAFF

MEAN	14.192	STD ERROR	3.490	STD DEV	31.796
VARIANCE	1010.971	KURTOSIS	7.726	SKEWNESS	2.82A
RANGE	148.400	MINIMUM	0.0	MAXIMUM	148.400
SUM	1177.965				

VALID OBSERVATIONS = 83 MISSING OBSERVATIONS = 29

VARIABLE XXX187 % ATTRIB # NEW PRODUCTS TESTED

MEAN	22.357	STD ERROR	8.012	STD DEV	72.998
VARIANCE	5327.602	KURTOSIS	28.307	SKEWNESS	5.223
RANGE	452.900	MINIMUM	0.0	MAXIMUM	452.900
SUM	1855.620				

VALID OBSERVATIONS = 83 MISSING OBSERVATIONS = 29

VARIABLE XXX188 % ATTRIB # EXISTING PRODUCTS TESTED

MEAN	29.483	STD ERROR	9.031	STD DEV	81.783
VARIANCE	6608.424	KURTOSIS	42.539	SKEWNESS	6.042
RANGE	650.000	MINIMUM	0.0	MAXIMUM	650.000
SUM	2417.630				

VALID OBSERVATIONS = 82 MISSING OBSERVATIONS = 30

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 S11020 SP1ST01B S200T500 S5DT0200 SLTS0M SMISS

VARIABLE XXX189 .% ATTRIB # TOTAL PRODUCTS TESTED

MEAN	53.260	STD ERROR	13.762	STD DEV	125.375
VARIANCE	15719.000	KURTOSIS	15.494	SKEWNESS	3.877
RANGE	690.000	MINIMUM	0.0	MAXIMUM	690.000
SUM	4421.250				

VALID OBSERVATIONS = 83 MISSING OBSERVATIONS = 29

VARIABLE XXX190 .% ATTRIB IN HOUSE EXP-THOUSANDS 1981SS

MEAN	1184.183	STD ERROR	337.593	STD DEV	3057.031
VARIANCE	**********	KURTOSIS	11.674	SKEWNESS	3.339
RANGE	16000.000	MINIMUM	0.0	MAXIMUM	16000.000
SUM	97102.998				

VALID OBSERVATIONS = 82 MISSING OBSERVATIONS = 30

VARIABLE XXX191 .% ATTRIB CONTRACTED EXP-THOUSANDS 1981SS

MEAN	380.126	STD ERROR	92.451	STD DEV	833.553
VARIANCE	694810.240	KURTOSIS	9.918	SKEWNESS	3.069
RANGE	4130.000	MINIMUM	0.0	MAXIMUM	4130.000
SUM	31170.320				

VALID OBSERVATIONS = 82 MISSING OBSERVATIONS = 30

VARIABLE XXX192 .% ATTRIB COOP EXP-THOUSANDS 1981SS

MEAN	122.730	STD ERROR	25.994	STD DEV	238.249
VARIANCE	56759.316	KURTOSIS	14.464	SKEWNESS	3.378
RANGE	1494.500	MINIMUM	0.0	MAXIMUM	1494.500
SUM	10309.320				

VALID OBSERVATIONS = 84 MISSING OBSERVATIONS = 28

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 S1T020 SP1ST018 S200TS00 S50T0200 SLTSOM SMISS

VARIABLE XXX193 # ATTRIB TOTAL EXP-THOUSANDS 1981SS

MEAN	1724.408	STD ERROR	411.154	STD DEV	3677.472
VARIANCE	**********	KURTOSIS	7.792	SKEWNESS	2.777
RANGE	17000.000	MINIMUM	0.0	MAXIMUM	17000.000
SUM	137952.637				

VALID OBSERVATIONS = 80 MISSING OBSERVATIONS = 32

VARIABLE XXX195 # ATTRIB FACILITY VALUE-THOUSANDS 1981SS

MEAN	3148.498	STD ERROR	849.777	STD DEV	7647.991
VARIANCE	**********	KURTOSIS	11.769	SKEWNESS	3.172
RANGE	45000.000	MINIMUM	0.0	MAXIMUM	45000.090
SUM	255027.695				

VALID OBSERVATIONS = 81 MISSING OBSERVATIONS = 31

VARIABLE VAR203 1979-PHN

MEAN	0.190	STD ERROR	0.066	STD DEV	0.667
VARIANCE	0.438	KURTOSIS	21.027	SKEWNESS	4.461
RANGE	4.000	MINIMUM	0.0	MAXIMUM	4.000
SUM	19.000				

VALID OBSERVATIONS = 100 MISSING OBSERVATIONS = 12

VARIABLE VAR204 1980-PHN

MEAN	1.408	STD ERROR	0.399	STD DEV	4.045
VARIANCE	16.362	KURTOSIS	53.033	SKEWNESS	6.517
RANGE	36.000	MINIMUM	0.0	MAXIMUM	36.000
SUM	145.000				

VALID OBSERVATIONS = 103 MISSING OBSERVATIONS = 9

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1T02B SPTST01B S200TS0B SS0T0200 SLTSON SNISS

VARIABLE VAR205 1981-PMN

MEAN	2.184	STD ERROR	0.405	STD DEV	4.108
VARIANCE	16.877	KURTOSIS	13.797	SKEWNESS	3.235
RANGE	27.000	MINIMUM	0.0	MAXIMUM	27.000
SUM	225.000				

VALID OBSERVATIONS = 103 MISSING OBSERVATIONS = 9

VARIABLE VAR206 COMMERCIALIZED PMN'S

MEAN	2.446	STD ERROR	0.455	STD DEV	4.571
VARIANCE	20.890	KURTOSIS	20.490	SKEWNESS	3.023
RANGE	33.000	MINIMUM	0.0	MAXIMUM	33.000
SUM	247.000				

VALID OBSERVATIONS = 101 MISSING OBSERVATIONS = 11

VARIABLE VAR213 # 8-E REVIEW

MEAN	6.407	STD ERROR	0.419	STD DEV	3.774
VARIANCE	14.244	KURTOSIS	0.761	SKEWNESS	1.052
RANGE	17.000	MINIMUM	1.000	MAXIMUM	18.000
SUM	519.000				

VALID OBSERVATIONS = 81 MISSING OBSERVATIONS = 31

VARIABLE VAR232 # MSDS-PURCHASED CHEMICALS

MEAN	86.165	STD ERROR	1.674	STD DEV	16.994
VARIANCE	288.786	KURTOSIS	2.285	SKEWNESS	-1.651
RANGE	75.000	MINIMUM	25.000	MAXIMUM	100.000
SUM	8875.000				

VALID OBSERVATIONS = 103 MISSING OBSERVATIONS = 9

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1T02B SPT5T01B S2001500 S50T0200 SLT50M SMISS

VARIABLE VAR233 % MSDS-CHEMICAL PRODUCTS

MEAN	91.811	STD ERROR	1.494	STD DEV	15.381
VARIANCE	236.574	KURTOSIS	7.629	SKEWNESS	-2.630
RANGE	80.000	MINIMUM	20.000	MAXIMUM	100.000
SUM	9732.000				

VALID OBSERVATIONS = 106 MISSING OBSERVATIONS = 6

VARIABLE VAR235 MSDS UPDATE FREQUENCY

MEAN	1.957	STD ERROR	0.222	STD DEV	1.065
VARIANCE	1.134	KURTOSIS	-1.448	SKEWNESS	0.309
RANGE	3.500	MINIMUM	0.500	MAXIMUM	4.000
SUM	45.000				

VALID OBSERVATIONS = 23 MISSING OBSERVATIONS = 89

VARIABLE VAR269 PRODUCT LIST-YEAR STARTED

MEAN	1956.326	STD ERROR	2.688	STD DEV	24.854
VARIANCE	617.705	KURTOSIS	7.253	SKEWNESS	-2.276
RANGE	136.000	MINIMUM	1846.000	MAXIMUM	1982.000
SUM	168244.000				

VALID OBSERVATIONS = 86 MISSING OBSERVATIONS = 26

VARIABLE VAR271 MATERIALS LIST-YEAR STARTED

MEAN	1965.048	STD ERROR	1.485	STD DEV	13.529
VARIANCE	183.022	KURTOSIS	-0.769	SKEWNESS	-0.630
RANGE	52.000	MINIMUM	1930.000	MAXIMUM	1982.000
SUM	163099.000				

VALID OBSERVATIONS = 83 MISSING OBSERVATIONS = 29

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1T02B SPT5T01B S200T50B S50T020B SLT50N SMISS

VARIABLE VAR273 SOLID WASTE LIST-YEAR STD

MEAN	1975.882	STD ERROR	0.683	STD DEV	6.291
VARIANCE	39.605	KURTOSIS	7.154	SKEWNESS	-2.522
RANGE	32.000	MINIMUM	1950.000	MAXIMUM	1982.000
SUM	167950.000				

VALID OBSERVATIONS = 85 MISSING OBSERVATIONS = 27

VARIABLE VAR275 EFFLUENT LIST-YEAR STARTED

MEAN	1972.014	STD ERROR	0.651	STD DEV	5.527
VARIANCE	30.493	KURTOSIS	2.346	SKEWNESS	-0.021
RANGE	32.000	MINIMUM	1950.000	MAXIMUM	1982.000
SUM	141985.000				

VALID OBSERVATIONS = 72 MISSING OBSERVATIONS = 40

VARIABLE VAR277 EMISSION LIST-YEAR STARTED

MEAN	1972.727	STD ERROR	0.651	STD DEV	5.290
VARIANCE	27.986	KURTOSIS	4.015	SKEWNESS	-1.077
RANGE	32.000	MINIMUM	1950.000	MAXIMUM	1982.000
SUM	130200.000				

VALID OBSERVATIONS = 66 MISSING OBSERVATIONS = 46

VARIABLE VAR391 NUMBER OF INDUSTRIAL HYGIENISTS OR TECHN

MEAN	6.948	STD ERROR	1.201	STD DEV	11.708
VARIANCE	137.086	KURTOSIS	8.519	SKEWNESS	2.768
RANGE	61.000	MINIMUM	0.0	MAXIMUM	61.000
SUM	660.100				

VALID OBSERVATIONS = 95 MISSING OBSERVATIONS = 17

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 S1T028 SPTSTQ1R S200T50H S50T0200 SLT50H SMISS

VARIABLE VAR296 # EMERGENCY SITE

MEAN	99.963	STD ERROR	28.195	STD DEV	255.315
VARIANCE	65185.789	KURTOSIS	39.197	SKEWNESS	5.733
RANGE	2000.000	MINIMUM	0.0	MAXIMUM	2000.000
SUM	8197.000				

VALID OBSERVATIONS = 82 MISSING OBSERVATIONS = 30

VARIABLE VAR297 # ALL EMERGENCY

MEAN	159.893	STD ERROR	38.136	STD DEV	330.266
VARIANCE	109075.718	KURTOSIS	14.689	SKEWNESS	3.539
RANGE	2000.000	MINIMUM	0.0	MAXIMUM	2000.000
SUM	11992.000				

VALID OBSERVATIONS = 75 MISSING OBSERVATIONS = 37

VARIABLE VAR301 HEALTH AUDIT-YEAR STARTED

MEAN	1975.206	STD ERROR	0.776	STD DEV	6.401
VARIANCE	40.972	KURTOSIS	3.356	SKEWNESS	-1.781
RANGE	32.000	MINIMUM	1950.000	MAXIMUM	1982.000
SUM	134314.000				

VALID OBSERVATIONS = 68 MISSING OBSERVATIONS = 44

VARIABLE VAR302 HEALTH AUDIT-FREQUENCY

MEAN	1.243	STD ERROR	0.077	STD DEV	0.624
VARIANCE	0.392	KURTOSIS	4.355	SKEWNESS	1.480
RANGE	3.800	MINIMUM	0.200	MAXIMUM	4.000
SUM	83.300				

VALID OBSERVATIONS = 67 MISSING OBSERVATIONS = 45

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 SLT020 SPT5T010 S200T500 S50T0200 SLT50M SMISS

VARIABLE VAR309 ENV AUDIT-YEAR STARTED

MEAN	1977.586	STD ERROR	0.486	STD DEV	4.070
VARIANCE	16.565	KURTOSIS	1.264	SKEWNESS	-1.255
RANGE	18.000	MINIMUM	1964.000	MAXIMUM	1982.000
SUM	138431.000				

VALID OBSERVATIONS - 70 MISSING OBSERVATIONS - 42

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VARIABLE VAR310 ENV AUDIT-FREQUENCY

MEAN	1.312	STD ERROR	0.099	STD DEV	0.790
VARIANCE	0.623	KURTOSIS	3.031	SKEWNESS	1.476
RANGE	3.900	MINIMUM	0.100	MAXIMUM	4.000
SUM	84.000				

VALID OBSERVATIONS - 64 MISSING OBSERVATIONS - 48

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 S1TO20 SPT5TO10 S200T500 S50TO200 SLT50M SMISS

VARIABLE VAR339 1981-TOTAL CAPITAL-MILLIONS 1981$S

MEAN	11.525	STD ERROR	5.696	STD DEV	55.220
VARIANCE	3050.151	KURTOSIS	86.691	SKEWNESS	9.153
RANGE	531.000	MINIMUM	0.0	MAXIMUM	531.000
SUM	1083.374				

VALID OBSERVATIONS - 94 MISSING OBSERVATIONS - 18

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VARIABLE VAR340 AIR-1981 CAPITAL-MILLIONS 1981$S

MEAN	3.796	STD ERROR	1.626	STD DEV	15.590
VARIANCE	243.313	KURTOSIS	75.854	SKEWNESS	8.401
RANGE	145.000	MINIMUM	0.0	MAXIMUM	145.000
SUM	349.217				

VALID OBSERVATIONS - 92 MISSING OBSERVATIONS - 20

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VARIABLE VAR341 WATER-1981 CAPITAL-MILLIONS 1981$S

MEAN	6.548	STD ERROR	3.797	STD DEV	36.424
VARIANCE	1326.693	KURTOSIS	87.554	SKEWNESS	9.257
RANGE	348.000	MINIMUM	0.0	MAXIMUM	348.000
SUM	602.456				

VALID OBSERVATIONS - 92 MISSING OBSERVATIONS - 20

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VARIABLE VAR342 SOLID WASTE-1981 CAPITAL-MILLIONS 1981$S

MEAN	1.237	STD ERROR	0.439	STD DEV	4.190
VARIANCE	17.560	KURTOSIS	67.379	SKEWNESS	7.751
RANGE	30.000	MINIMUM	0.0	MAXIMUM	30.000
SUM	112.611				

VALID OBSERVATIONS - 91 MISSING OBSERVATIONS - 21

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AP00004698

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SG128 S11028 SP1ST018 52001500 S5010200 SLT50M SMISS

VARIABLE VAR343 1980-TOTAL CAPITAL-MILLIONS 1980$S

MEAN	10.852	STD ERROR	5.836	STD DEV	55.041
VARIANCE	3031.705	KURTOSIS	84.458	SKEWNESS	9.005
RANGE	518.000	MINIMUM	0.0	MAXIMUM	518.000
SUM	965.857				

VALID OBSERVATIONS - 89 MISSING OBSERVATIONS - 23

VARIABLE VAR344 AIR-1980 CAPITAL-MILLIONS 1980$S

MEAN	3.674	STD ERROR	1.556	STD DEV	14.765
VARIANCE	217.999	KURTOSIS	70.156	SKEWNESS	8.035
RANGE	134.000	MINIMUM	0.0	MAXIMUM	134.000
SUM	330.619				

VALID OBSERVATIONS - 90 MISSING OBSERVATIONS - 22

VARIABLE VAR345 WATER-1980 CAPITAL-MILLIONS 1980$S

MEAN	6.042	STD ERROR	3.841	STD DEV	36.435
VARIANCE	1327.522	KURTOSIS	87.996	SKEWNESS	9.332
RANGE	346.000	MINIMUM	0.0	MAXIMUM	346.000
SUM	543.736				

VALID OBSERVATIONS - 90 MISSING OBSERVATIONS - 22

VARIABLE VAR346 SOLID WASTE-1980 CAPITAL-MILLIONS 1980$S

MEAN	1.087	STD ERROR	0.457	STD DEV	4.216
VARIANCE	17.779	KURTOSIS	72.028	SKEWNESS	8.203
RANGE	38.000	MINIMUM	0.0	MAXIMUM	38.000
SUM	92.427				

VALID OBSERVATIONS - 85 MISSING OBSERVATIONS - 27

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SG72B S1102B SP1S7Q1B S2001S00 S5010200 SLT50H SHISS

VARIABLE VAR347 1979-TOTAL CAPITAL-MILLIONS 1979$S

MEAN	10.527	STD ERROR	5.365	STD DEV	50.331
VARIANCE	2533.252	KURTOSIS	83.175	SKEWNESS	9.006
RANGE	471.000	MINIMUM	0.0	MAXIMUM	471.000
SUM	926.347				

VALID OBSERVATIONS = 88 MISSING OBSERVATIONS = 24

VARIABLE VAR348 AIR-1979 CAPITAL-MILLIONS 1979$S

MEAN	3.527	STD ERROR	1.457	STD DEV	13.508
VARIANCE	182.454	KURTOSIS	69.288	SKEWNESS	8.009
RANGE	121.000	MINIMUM	0.0	MAXIMUM	121.000
SUM	303.280				

VALID OBSERVATIONS = 86 MISSING OBSERVATIONS = 26

VARIABLE VAR349 WATER-1979 CAPITAL-MILLIONS 1979$S

MEAN	6.079	STD ERROR	3.560	STD DEV	33.014
VARIANCE	1089.956	KURTOSIS	82.803	SKEWNESS	9.029
RANGE	306.000	MINIMUM	0.0	MAXIMUM	306.000
SUM	522.792				

VALID OBSERVATIONS = 86 MISSING OBSERVATIONS = 26

VARIABLE VAR350 SOLID WASTE-1979 CAPITAL-MILLIONS 1979$S

MEAN	1.288	STD ERROR	0.547	STD DEV	5.014
VARIANCE	25.141	KURTOSIS	65.213	SKEWNESS	7.711
RANGE	44.000	MINIMUM	0.0	MAXIMUM	44.000
SUM	108.176				

VALID OBSERVATIONS = 84 MISSING OBSERVATIONS = 28

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 SIT028 SPT5T018 S200T500 S50T0200 SLT50M SMISS

VARIABLE VAR351 1978-TOTAL CAPITAL-MILLIONS 1978$S

MEAN	10.106	STD ERROR	5.294	STD DEV	47.941
VARIANCE	2298.301	KURTOSIS	76.639	SKEWNESS	8.630
RANGE	432.000	MINIMUM	0.0	MAXIMUM	432.000
SUM	828.675				

VALID OBSERVATIONS - 82 MISSING OBSERVATIONS - 30

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VARIABLE VAR352 AIR-1978 CAPITAL-MILLIONS 1978$S

MEAN	3.314	STD ERROR	1.575	STD DEV	14.173
VARIANCE	200.882	KURTOSIS	78.164	SKEWNESS	8.157
RANGE	125.000	MINIMUM	0.0	MAXIMUM	125.000
SUM	268.422				

VALID OBSERVATIONS - 81 MISSING OBSERVATIONS - 31

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VARIABLE VAR353 WATER-1978 CAPITAL-MILLIONS 1978$S

MEAN	6.086	STD ERROR	3.392	STD DEV	30.527
VARIANCE	931.075	KURTOSIS	76.826	SKEWNESS	8.664
RANGE	274.000	MINIMUM	0.0	MAXIMUM	274.000
SUM	492.973				

VALID OBSERVATIONS - 81 MISSING OBSERVATIONS - 31

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VARIABLE VAR354 SOLID WASTE-1978 CAPITAL-MILLIONS 1978$S

MEAN	0.863	STD ERROR	0.433	STD DEV	3.822
VARIANCE	14.611	KURTOSIS	67.074	SKEWNESS	7.959
RANGE	33.000	MINIMUM	0.0	MAXIMUM	33.000
SUM	67.302				

VALID OBSERVATIONS - 78 MISSING OBSERVATIONS - 34

FILE SURVEYA (CREATION DATE = 01/19/83)
SURFILE SGT2B S1TO2B SPTSTO1B S200T500 S50T0200 SLT50M SMISS

VARIABLE VAR355 1977-TOTAL CAPITAL-MILLIONS 1977$S

MEAN	11.074	STD ERROR	5.302	STD DEV	46.824
VARIANCE	2192.508	KURTOSIS	69.404	SKEWNESS	8.139
RANGE	400.000	MINIMUM	0.0	MAXIMUM	400.000
SUM	863.777				

VALID OBSERVATIONS - 78 MISSING OBSERVATIONS - 34

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VARIABLE VAR356 AIR-1977 CAPITAL-MILLIONS 1977$S

MEAN	3.412	STD ERROR	1.658	STD DEV	14.455
VARIANCE	208.947	KURTOSIS	66.060	SKEWNESS	7.970
RANGE	124.000	MINIMUM	0.0	MAXIMUM	124.000
SUM	259.275				

VALID OBSERVATIONS - 76 MISSING OBSERVATIONS - 36

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VARIABLE VAR357 WATER-1977 CAPITAL-MILLIONS 1977$S

MEAN	7.440	STD ERROR	3.423	STD DEV	30.036
VARIANCE	902.141	KURTOSIS	65.078	SKEWNESS	7.874
RANGE	258.000	MINIMUM	0.0	MAXIMUM	258.000
SUM	572.853				

VALID OBSERVATIONS - 77 MISSING OBSERVATIONS - 35

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VARIABLE VAR358 SOLID WASTE-1977 CAPITAL-MILLIONS 1977$S

MEAN	0.645	STD ERROR	0.354	STD DEV	3.069
VARIANCE	9.419	KURTOSIS	65.206	SKEWNESS	7.899
RANGE	26.000	MINIMUM	0.0	MAXIMUM	26.000
SUM	48.366				

VALID OBSERVATIONS - 75 MISSING OBSERVATIONS - 37

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1TO2B SPTSTO1B S2BOTSOB S5OTU2BO SLTSOH SMISS

VARIABLE VAR359 1981-TOTAL O&M-MILLIONS 1981$

MEAN	14.071	STD ERROR	3.392	STD DEV	32.887
VARIANCE	1081.527	KURTOSIS	37.514	SKEWNESS	5.461
RANGE	265.000	MINIMUM	0.0	MAXIMUM	265.000
SUM	1322.641				

VALID OBSERVATIONS = 94 MISSING OBSERVATIONS = 18

VARIABLE VAR360 AIR-1981 O&M-MILLIONS 1981$

MEAN	3.634	STD ERROR	0.911	STD DEV	8.597
VARIANCE	73.900	KURTOSIS	23.845	SKEWNESS	4.543
RANGE	56.000	MINIMUM	0.0	MAXIMUM	56.000
SUM	323.412				

VALID OBSERVATIONS = 89 MISSING OBSERVATIONS = 23

VARIABLE VAR361 WATER-1981 O&M-MILLIONS 1981$

MEAN	6.943	STD ERROR	2.098	STD DEV	20.017
VARIANCE	400.669	KURTOSIS	57.786	SKEWNESS	7.044
RANGE	176.000	MINIMUM	0.0	MAXIMUM	176.000
SUM	631.778				

VALID OBSERVATIONS = 91 MISSING OBSERVATIONS = 21

VARIABLE VAR362 SOLID WASTE-1981 O&M-MILLIONS 1981$

MEAN	2.762	STD ERROR	0.614	STD DEV	5.890
VARIANCE	34.691	KURTOSIS	17.605	SKEWNESS	3.928
RANGE	35.600	MINIMUM	0.0	MAXIMUM	35.600
SUM	254.118				

VALID OBSERVATIONS = 92 MISSING OBSERVATIONS = 20

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT20 S1T020 SPT5T010 S2001500 S5010200 SLT50H SMISS

VARIABLE VAR363 1980-TOTAL O&M-MILLIONS 1980$S

MEAN	13.366	STD ERROR	3.342	STD DEV	31.532
VARIANCE	994.274	KURTOSIS	37.149	SKEWNESS	5.477
RANGE	250.000	MINIMUM	0.0	MAXIMUM	250.000
SUM	1189.592				

VALID OBSERVATIONS - 89 MISSING OBSERVATIONS - 23

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VARIABLE VAR364 AIR-1980 O&M-MILLIONS 1980$S

MEAN	3.748	STD ERROR	0.960	STD DEV	8.847
VARIANCE	78.277	KURTOSIS	21.481	SKEWNESS	4.317
RANGE	57.000	MINIMUM	0.0	MAXIMUM	57.000
SUM	318.585				

VALID OBSERVATIONS - 85 MISSING OBSERVATIONS - 27

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VARIABLE VAR365 WATER-1980 O&M-MILLIONS 1980$S

MEAN	6.777	STD ERROR	2.026	STD DEV	18.898
VARIANCE	357.116	KURTOSIS	54.046	SKEWNESS	6.784
RANGE	162.000	MINIMUM	0.0	MAXIMUM	162.000
SUM	589.563				

VALID OBSERVATIONS - 87 MISSING OBSERVATIONS - 25

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VARIABLE VAR366 SOLID WASTE-1980 O&M-MILLIONS 1980$S

MEAN	2.520	STD ERROR	0.628	STD DEV	5.821
VARIANCE	33.888	KURTOSIS	24.167	SKEWNESS	4.604
RANGE	39.000	MINIMUM	0.0	MAXIMUM	39.000
SUM	216.685				

VALID OBSERVATIONS - 86 MISSING OBSERVATIONS - 26

AP00004704

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B S1T02B SPIST01B S200T50B S50T0200 SLT50M SMISS

VARIABLE VAR367 1979-TOTAL O&M-MILLIONS 1979$

MEAN	11.746	STD ERROR	2.970	STD DEV	27.385
VARIANCE	749.937	KURTOSIS	35.598	SKEWNESS	5.349
RANGE	213.000	MINIMUM	0.0	MAXIMUM	213.000
SUM	998.392				

VALID OBSERVATIONS = 85 MISSING OBSERVATIONS = 27

VARIABLE VAR368 AIR-1979 O&M-MILLIONS 1979$

MEAN	3.072	STD ERROR	0.798	STD DEV	7.314
VARIANCE	53.487	KURTOSIS	24.576	SKEWNESS	4.501
RANGE	50.000	MINIMUM	0.0	MAXIMUM	50.000
SUM	258.072				

VALID OBSERVATIONS = 84 MISSING OBSERVATIONS = 28

VARIABLE VAR369 WATER-1979 O&M-MILLIONS 1979$

MEAN	6.071	STD ERROR	1.758	STD DEV	16.299
VARIANCE	265.657	KURTOSIS	49.933	SKEWNESS	6.465
RANGE	137.000	MINIMUM	0.0	MAXIMUM	137.000
SUM	522.095				

VALID OBSERVATIONS = 86 MISSING OBSERVATIONS = 26

VARIABLE VAR370 SOLID WASTE-1979 O&M-MILLIONS 1979$

MEAN	2.032	STD ERROR	0.533	STD DEV	4.850
VARIANCE	23.604	KURTOSIS	27.120	SKEWNESS	4.900
RANGE	33.200	MINIMUM	0.0	MAXIMUM	33.200
SUM	168.623				

VALID OBSERVATIONS = 83 MISSING OBSERVATIONS = 29

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT28 S1T028 SPTST018 S200TS00 SS0T0200 SLTS0M SMISS

VARIABLE VAR371 1978-TOTAL O&M-MILLIONS 1978$

MEAN	10.502	STD ERROR	2.903	STD DEV	25.47?
VARIANCE	648.816	KURTOSIS	31.452	SKEWNESS	5.09e
RANGE	187.000	MINIMUM	0.0	MAXIMUM	187.00e
SUM	808.651				

VALID OBSERVATIONS = 77 MISSING OBSERVATIONS = 35

VARIABLE VAR372 AIR-1978 O&M-MILLIONS 1978$

MEAN	2.643	STD ERROR	0.793	STD DEV	6.87?
VARIANCE	47.222	KURTOSIS	26.821	SKEWNESS	4.837
RANGE	47.000	MINIMUM	0.0	MAXIMUM	47.00e
SUM	198.261				

VALID OBSERVATIONS = 75 MISSING OBSERVATIONS = 37

VARIABLE VAR373 WATER-1978 O&M-MILLIONS 1978$

MEAN	5.575	STD ERROR	1.707	STD DEV	14.98e
VARIANCE	224.418	KURTOSIS	42.764	SKEWNESS	6.009
RANGE	118.000	MINIMUM	0.0	MAXIMUM	118.00e
SUM	429.310				

VALID OBSERVATIONS = 77 MISSING OBSERVATIONS = 35

VARIABLE VAR374 SOLID WASTE-1978 O&M-MILLIONS 1978$

MEAN	1.662	STD ERROR	0.517	STD DEV	4.477
VARIANCE	20.040	KURTOSIS	24.410	SKEWNESS	4.77e
RANGE	29.000	MINIMUM	0.0	MAXIMUM	29.00e
SUM	124.654				

VALID OBSERVATIONS = 75 MISSING OBSERVATIONS = 37

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B SITO2B SP1STO1B S200T500 S50TO200 SLT50M SHISS

VARIABLE VAR375 1977-TOTAL O&M-MILLIONS 1977$S

MEAN	9.216	STD ERROR	2.735	STD DEV	23.683
VARIANCE	560.899	KURTOSIS	37.527	SKEWNESS	5.605
RANGE	180.008	MINIMUM	0.0	MAXIMUM	180.000
SUM	691.225				

VALID OBSERVATIONS - 75 MISSING OBSERVATIONS - 37

VARIABLE VAR376 AIR-1977 O&M-MILLIONS 1977$S

MEAN	2.349	STD ERROR	0.769	STD DEV	6.574
VARIANCE	43.219	KURTOSIS	32.130	SKEWNESS	5.30c
RANGE	47.000	MINIMUM	0.0	MAXIMUM	47.00ñ
SUM	171.508				

VALID OBSERVATIONS - 73 MISSING OBSERVATIONS - 39

VARIABLE VAR377 WATER-1977 O&M-MILLIONS 1977$S

MEAN	4.886	STD ERROR	1.586	STD DEV	13.733
VARIANCE	188.583	KURTOSIS	45.826	SKEWNESS	6.283
RANGE	109.000	MINIMUM	0.0	MAXIMUM	109.000
SUM	366.420				

VALID OBSERVATIONS - 75 MISSING OBSERVATIONS - 37

VARIABLE VAR378 SOLID WASTE-1977 O&M-MILLIONS 1977$S

MEAN	1.453	STD ERROR	0.486	STD DEV	4.151
VARIANCE	17.232	KURTOSIS	26.851	SKEWNESS	5.087
RANGE	25.400	MINIMUM	0.0	MAXIMUM	25.400
SUM	106.051				

VALID OBSERVATIONS - 73 MISSING OBSERVATIONS - 39

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2H S11028 SPISTOIB S2001500 S5010200 SLT50M SMISS

VARIABLE VAR379 TOTAL STAFF-1981

MEAN	92.605	STD ERROR	28.024	STD DEV	267.331
VARIANCE	71466.018	KURTOSIS	59.718	SKEWNESS	7.17[illegible]
RANGE	2370.000	MINIMUM	0.0	MAXIMUM	2370.000
SUM	8427.100				

VALID OBSERVATIONS = 91 MISSING OBSERVATIONS = 21

VARIABLE VAR380 AIR-1981 STAFF

MEAN	20.006	STD ERROR	5.942	STD DEV	55.742
VARIANCE	3107.202	KURTOSIS	41.802	SKEWNESS	5.907
RANGE	450.000	MINIMUM	0.0	MAXIMUM	450.000
SUM	1820.400				

VALID OBSERVATIONS = 88 MISSING OBSERVATIONS = 24

VARIABLE VAR381 WATER-1981 STAFF

MEAN	43.033	STD ERROR	16.792	STD DEV	159.307
VARIANCE	25378.752	KURTOSIS	72.026	SKEWNESS	8.12[illegible]
RANGE	1460.000	MINIMUM	0.0	MAXIMUM	1460.000
SUM	3945.000				

VALID OBSERVATIONS = 90 MISSING OBSERVATIONS = 22

VARIABLE VAR382 SOLID WASTE-1981 STAFF

MEAN	19.030	STD ERROR	5.927	STD DEV	56.224
VARIANCE	3161.112	KURTOSIS	45.244	SKEWNESS	6.30[illegible]
RANGE	460.000	MINIMUM	0.0	MAXIMUM	460.000
SUM	1712.700				

VALID OBSERVATIONS = 90 MISSING OBSERVATIONS = 22

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SG128 S11028 SP1STO10 S280T500 S5010200 SLT50M SNISS

VARIABLE VAR383 TOTAL STAFF-1979

MEAN	91.504	STD ERROR	31.181	STD DEV	287.475
VARIANCE	82641.743	KURTOSIS	59.103	SKEWNESS	7.220
RANGE	2490.000	MINIMUM	0.0	MAXIMUM	2490.000
SUM	7777.000				

VALID OBSERVATIONS - 85 MISSING OBSERVATIONS - 27

VARIABLE VAR384 AIR-1979 STAFF

CE	30475.448	KURTOSIS	78.502	SKEWNESS	8.112
RANGE	1560.000	MINIMUM	0.0	MAXIMUM	1560.000
SUM	3736.100				

VALID OBSERVATIONS - 84 MISSING OBSERVATIONS - 28

VARIABLE VAR385 WATER-1979 STAFF

MEAN	44.477	STD ERROR	19.047	STD DEV	174.572
VARIANCE	30475.448	KURTOSIS	78.502	SKEWNESS	8.112
RANGE	1560.000	MINIMUM	0.0	MAXIMUM	1560.000
SUM	3736.100				

VALID OBSERVATIONS - 84 MISSING OBSERVATIONS - 28

VARIABLE VAR386 SOLID WASTE-1979 STAFF

MEAN	16.993	STD ERROR	6.028	STD DEV	55.250
VARIANCE	3052.512	KURTOSIS	39.102	SKEWNESS	6.006
RANGE	420.000	MINIMUM	0.0	MAXIMUM	420.000
SUM	1427.400				

VALID OBSERVATIONS - 84 MISSING OBSERVATIONS - 28

FILE SURVEYA (CREATION DATE = 01/19/83)
SUBFILE SGT2B SIT02B SPTSTO1B S200T500 S50T0200 SLT50M SMISS

VARIABLE VAR387 TOTAL STAFF-1977

MEAN	81.349	STD ERROR	27.993	STD DEV	251.934
VARIANCE	63478.967	KURTOSIS	56.016	SKEWNESS	7.010
RANGE	2138.000	MINIMUM	0.0	MAXIMUM	2138.000
SUM	6589.300				

VALID OBSERVATIONS - 81 MISSING OBSERVATIONS - 31

VARIABLE VAR388 AIR-1977 STAFF

MEAN	18.694	STD ERROR	7.096	STD DEV	62.673
VARIANCE	3927.907	KURTOSIS	54.660	SKEWNESS	6.979
RANGE	520.000	MINIMUM	0.0	MAXIMUM	520.000
SUM	1458.100				

VALID OBSERVATIONS - 78 MISSING OBSERVATIONS - 34

VARIABLE VAR389 WATER-1977 STAFF

MEAN	38.121	STD ERROR	15.416	STD DEV	137.083
VARIANCE	19011.684	KURTOSIS	63.488	SKEWNESS	7.624
RANGE	1198.000	MINIMUM	0.0	MAXIMUM	1198.000
SUM	3049.700				

VALID OBSERVATIONS - 80 MISSING OBSERVATIONS - 32

VARIABLE VAR390 SOLID WASTE-1977 STAFF

MEAN	15.406	STD ERROR	6.026	STD DEV	53.903
VARIANCE	2905.482	KURTOSIS	43.253	SKEWNESS	6.272
RANGE	420.000	MINIMUM	0.0	MAXIMUM	420.000
SUM	1232.500				

VALID OBSERVATIONS - 80 MISSING OBSERVATIONS - 32