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SELECTED DATA ON POLLUTION EMISSIONS, ABATEMENT COSTS AND ABATEMENT TECHNOLOGIES IN US INDUSTRY

Final Report Submitted to the
Global Studies Branch of UNIDO

by

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West Virginia University
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March 1, 1990

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1. LETTER OF TRANSMITTAL

Department of Mineral Resource Economics
West Virginia University
College of Mineral and Energy Resources

March 8, 1990

Dr. Se-Hark Park
Senior Economist
Global and Conceptual Studies
Vienna International Centre
P.O. Box 400
A-1400 Vienna
Austria

Dear Dr. Park:

The purpose of this letter is to submit to you the final report for my contract on pollution abatement information in US manufacturing industries. This report meets all of the requirements identified in the project contract. The information collection required consists of the following:

(A) Value data for each 3-digit ISIC industry (ISIC 311-390) including manufacturers value added, gross production value, pollution abatement capital costs, and pollution abatement equipment operating costs. The major source has been the US Department of Commerce.

(B) Quantity data describing the quantity of pollutants emitted by the same group of industries. This data has been collected in the form of the three most important toxic chemical pollutants for each ISIC industry (ISIC 311-390). The major source has been the US Environmental Protection Agency.

(C) Case studies describing process specific micro-data, including (1) major types of pollutant, (2) types of abatement equipment used, (3) quantity of pollutants, (4) estimates of quantities with/without the use of abatement equipment, (5) physical characteristics of pollutants, (6) minimum standards for pollutants, (7) remedial methods and costs of treatment and disposals of industrial effluents, (8) pollution abatement equipment available and their cost estimates per ton, and (9) alternative new low-waste technologies and related cost estimates.

This final report represents the final stage of data provided to UNIDO over the past month. Altogether the following information has been sent to UNIDO:

304 293-5695 ◻ 214 White Hall ◻ P.O. Box 6070 ◻ Morgantown, WV 26506-6070

February 14, 1990

(1) The first part of the case studies required under Part (C).

February 20, 1990

(1) Bibliographical support information for the case studies, specifically the table of contents for each study listed in the Bibliography.

February 23, 1990

(1) The second part of the case studies required under Part (C).

(2) Preliminary data tables and underlying sources for the value data required under Part (A) above.

(3) Preliminary data tables and underlying sources for the quantity of pollutant data required under Part (B) above.

The attached supporting material completes the required information set. This material has been organized as follows:

(1) Final tables for the value data, required in Part (A).

(2) Final tables for the quantity of pollutant data, required in Part (B). Note that these tables have been reorganized since the Feb. 23 mailing, and supercedes the previous tables.

(3) Final list of case studies, required for Part (C).

(4) Bibliographical listings providing further support material for the case studies.

(5) Copies of correspondence summarizing previous mailings.

I would appreciate your placing the remaining portion of the contract payment in my bank account as previously directed.

Yours sincerely,

Walt Labys

Walter C. Labys
Benedum Distinguished Scholar and
Professor of Resource Economics

WCL:bdh

2. MANUFACTURERS' POLLUTION ABATEMENT VALUE DATA (ISIC 311-390)

This table features dollar values for the following US industry variables: Pollution abatement capital and operating costs, manufacturers value added, costs of materials, and gross value of production. The sources are the following publications from the US Department of Commerce, Washington, DC: Census of Manufacturers, 1987 (Preliminary Report MC87-SUM-I(P)); and Pollution Abatement Costs and Expenditures, 1986 (Current Industrial Reports MA-200(86)-1).

ISIC THREE DIGIT INDUSTRIAL DATA: MANUFACTURERS VALUE-ADDED AND GROSS PRODUCTION, CAPITAL AND OPERATING POLLUTION ABATEMENT COSTS (United States, 1986 and 1987)

1. Food products (ISIC 311, 312)
2. Beverages (ISIC 313)
3. Tobacco products (ISIC 314)
4. Textiles (ISIC 321)
5. Wearing apparel (ISIC 322)
6. Leather and fur products (ISIC 323)
7. Footwear (ISIC 324)
8. Wood and wood products (ISIC 331)
9. Furniture and fixtures (ISIC 332)
10. Paper and paper products (ISIC 341)
11. Printing and publishing (ISIC 342)
12. Industrial chemicals (ISIC 351)
13. Other chemical products (ISIC 352)
14. Petroleum refineries (ISIC 353)
15. Miscellaneous petroleum and coal products (ISIC 354)
16. Rubber products (ISIC 355)
17. Plastic products (ISIC 356)
18. Pottery, china and earthware (ISIC 361)
19. Glass and glass products (ISIC 362)
20. Other non-mineral products (ISIC 369)
21. Iron and Steel (ISIC 371)
22. Non-ferrous metal (ISIC 372)
23. Metal products (ISIC 381)
24. Non-electrical machinery (ISIC 382)
25. Electrical machinery (ISIC 383)
26. Transport equipment (ISIC 384)
27. Professional and scientific equipment (ISIC 385)
28. Other manufacturing industries (ISIC 390)

Walter C. Labys. Professor, Department of Mineral and Energy Resource Economics, West Virginia University, Morgantown, WV 26506.

Table 1

AGGREGATE U.S. INDUSTRY POLLUTION ABATEMENT EXPENDITURES, VALUE ADDED AND GROSS PRODUCTION VALUE
(1986, Million current dollars)

ISIC Number	Abatement Operating Cleaning ($M Total Cost)	Abatement Capital Expenditure ($M Total Cost)	Value Added MVA ($M, 1987)	Cost of Materials ($M, 1987)	Production Gross-Output ($M, 1987)
ISIC 311		Food Product Manufacturing			
Total	449.7	155.5	85,617.0	168,323.3	253,940.3
Air	104.4	52.7			
Water	210.7	79.0			
Solid	4.6	10.4			
ISIC 312		Food Product Manufacturing			
Total	97.8	16.4	22,693.7	24,859.8	47,553.5
Air	11.2	3.2			
Water	50.1	10.1			
Solid	.8	3.2			
ISIC 313		Beverages			
Total	61.0	13.9	13,762.0	15,445.6	29,207.6
Air	10.4	5.9			
Water	15.3	7.0			
Solid	.3	1.0			
ISIC 314[a]		Tobacco Product			
Total	28.8	x	27,334.2	6,497.8	38,312.5
Air	13.7	x			
Water	x	x			
Solid	.2	x			
ISIC 321		Textiles			
Total	101.2	24.0	26,013.9	37,902.0	63,915.9
Air	25.9	11.1			
Water	43.5	3.2			
Solid	2.9	1.3			
ISIC 322		Wearing Apparel			
Total	101.6	25.5	26,013.9	37,901.9	89,929.7
Air	28.5	12.3			
Water	43.5	10.5			
Solid	3.4	2.6			

[a] x = unreported

Table 1

AGGREGATE U.S. INDUSTRY POLLUTION ABATEMENT EXPENDITURES, VALUE ADDED AND GROSS PRODUCTION VALUE
(1986, Million current dollars)

ISIC Number	Abatement Operating Cleaning ($M Total Cost)	Abatement Capital Expenditure ($M Total Cost)	Value Added MVA ($M, 1987)	Cost of Materials ($M, 1987)	Production Gross-Output ($M, 1987)
ISIC 323		Leather and Fur Products			
Total	x	x	1,952.1	2,488.6	4,440.7
Air	x	x			
Water	x	x			
Solid	x	x			
ISIC 324		Footwear			
Total	x	x	2,323.0	2,192.8	4,515.8
Air	x	x			
Water	x	x			
Solid	x	x			
ISIC 331		Wood and Wood Products			
Total	164.2	33.4	28,590.9	41,180.9	69,771.8
Air	61.7	17.8			
Water	36.0	11.0			
Solid	13.5	4.6			
ISIC 332		Furniture and Fixtures			
Total	66.4	20.3	20,239.1	17,068.0	37,307.1
Air	29.9	14.9			
Water	5.4	.8			
Solid	9.7	5.2			
ISIC 341		Paper and Paper Products			
Total	1042.0	271.3	49,725.8	58,788.4	108,514.2
Air	319.2	137.1			
Water	479.0	96.9			
Solid	32.0	37.3			
ISIC 342		Printing and Publishing			
Total	119.7	25.4	89,207.9	46,028.3	135,236.2
Air	59.2	18.0			
Water	8.5	4.3			
Solid	11.2	3.1			

Table 1

AGGREGATE U.S. INDUSTRY POLLUTION ABATEMENT EXPENDITURES, VALUE ADDED AND GROSS PRODUCTION VALUE
(1986, Million current dollars)

ISIC Number	Abatement Operating Cleaning ($M Total Cost)	Abatement Capital Expenditure ($M Total Cost)	Value Added MVA ($M, 1987)	Cost of Materials ($M, 1987)	Production Gross-Output ($M, 1987)
ISIC 351		Industrial Chemicals			
Total	2131.7	522.5	56,957.5	69,604.3	126,561.8
Air	585.3	160.4			
Water	1022.7	277.4			
Solid	261.7	84.8			
ISIC 352		Other Chemical Products			
Total	373.8	102.0	64,284.1	39,749.8	104,033.9
Air	61.2	37.5			
Water	149.0	48.2			
Solid	88.2	16.2			
ISIC 353		Petroleum Refineries			
Total	1931.5	413.2	14,128.2	105,217.0	119,345.2
Air	1204.2	268.2			
Water	558.6	116.8			
Solid	108.6	28.3			
ISIC 354		Miscellaneous Petroleum and Coal Products			
Total	55.9	413.2	4,270.6	7,954.6	12,225.2
Air	26.7	268.2			
Water	6.7	116.8			
Solid	1.1	28.3			
ISIC 355[b]		Rubber Products			
Total	75.0	14.8	5,886.0	5,137.2	11,023.2
Air	18.7	2.0			
Water	11.3	5.7			
Solid	8.1	1.9			
ISIC 356[c]		Plastic Products			
Total	113.5	21.2	30,970.8	30,787.8	61,758.6
Air	32.1	13.0			
Water	20.6	3.9			
Solid	15.5	4.3			

[b] = abatement cost data incomplete due to disclosure laws.
[c] = value added, materials and output data incomplete

Table 1

AGGREGATE U.S. INDUSTRY POLLUTION ABATEMENT EXPENDITURES, VALUE ADDED AND GROSS PRODUCTION VALUE
(1986, Million current dollars)

ISIC Number	Abatement Operating Cleaning ($M Total Cost)	Abatement Capital Expenditure ($M Total Cost)	Value Added MVA ($M, 1987)	Cost of Materials ($M, 1987)	Production Gross-Output ($M, 1987)
ISIC 361		Pottery, China and Earthware			
Total	10.8	x	1,637.5	712.1	2,349.6
Air	2.6	x			
Water	3.0	x			
Solid	1.6	x			
ISIC 362		Glass and Glass Products			
Total	57.2	18.0	9,408.0	6,678.3	16,086.3
Air	19.1	3.7			
Water	17.7	.4			
Solid	6.0	1.4			
ISIC 369		Other Non-Mineral Products			
Total	x	x	22,030.8	20,510.8	42,541.6
Air	x	x			
Water	x	x			
Solid	x	x			
ISIC 371		Iron and Steel			
Total	1103.0	110.2	27,268.1	35,767.0	63,035.1
Air	601.3	61.4			
Water	351.7	32.7			
Solid	46.6	12.7			
ISIC 372		Non-Ferrous Metals			
Total	586.3	115.6	19,203.2	38,471.1	56,674.3
Air	366.9	41.5			
Water	113.8	21.3			
Solid	53.8	16.8			
ISIC 381		Metal Products, Excluding Machinery			
Total	400.5	127.2	70,160.4	70,611.8	140,772.2
Air	90.8	33.8			
Water	130.8	77.2			
Solid	84.7	16.3			

Table 1

AGGREGATE U.S. INDUSTRY POLLUTION ABATEMENT EXPENDITURES, VALUE ADDED AND GROSS PRODUCTION VALUE
(1986, Million current dollars)

ISIC Number	Abatement Operating Cleaning ($M Total Cost)	Abatement Capital Expenditure ($M Total Cost)	Value Added MVA ($M, 1987)	Cost of Materials ($M, 1987)	Production Gross-Output ($M, 1987)
ISIC 382[c]		Non-Electrical Machinery			
Total	341.4	49.3	87,626.6	71,212.6	158,839.2
Air	84.3	16.7			
Water	103.0	21.1			
Solid	72.3	7.9			
ISIC 383		Electrical Machinery			
Total	459.5	125.1	95,958.1	76,431.7	172,389.8
Air	88.3	46.6			
Water	157.0	61.5			
Solid	114.1	16.9			
ISIC 384		Transport Equipment			
Total	x	x	134,813.8	197,265.3	332,079.1
Air	x	x			
Water	x	x			
Solid	x	x			
ISIC 385		Professional and Scientific Equipment			
Total	146.5	18.8	71,487.2	37,374.5	108,861.7
Air	19.9	10.8			
Water	64.1	5.1			
Solid	26.1	2.9			
ISIC 390[d]		Other Manufacturing Industries			
Total	75.0	6.2	17,431.6	14,579.0	32,010.6
Air	5.8	d			
Water	24.0	d			
Solid	16.9	d			

[c] = value added, materials and output data incomplete

[d] = data unavailable because of disclosure laws.

By KIT D. FARBER and GARY L. RUTLEDGE

Pollution Abatement and Control Expenditures, 1984–87

REAL spending for pollution abatement and control (PAC) declined slightly—0.6 percent—in 1987 (chart 1). In contrast, real spending had increased at least 4 percent in each of the preceding 4 years. Prices for PAC goods and services, as measured by the fixed-weighted price index for PAC, rose 2.6 percent in 1987, following a leveling off in 1986.

Real pollution abatement (PA) expenditures—which account for over nine-tenths of total PAC expenditures—declined slightly in 1987. Of the remaining portion of PAC, spending for regulation and monitoring declined 4.4 percent, and spending for research and development increased less than 1 percent.[1]

The 1987 decline in real PAC spending, traceable to a 7.2-percent decline in air PAC, reflects large declines in personal and business purchases and operation of emission abatement devices on motor vehicles. The decline was partly offset by a moderate increase in business operation of plant and equipment. The decline in air PAC was the first since 1982.

The other portions of PAC spending increased in 1987, continuing a pattern of increases since 1983. Water PAC increased 5.7 percent, mainly reflecting increases in business operation of plant and equipment and of public sewer systems and in government construction of sewer systems. Solid waste disposal increased 6.6 percent, mainly reflecting an increase in business operation of plant and equipment.

Before 1987, estimates for spending by manufacturing industries were based on data from the Pollution Abatement Costs and Expenditures Survey collected by the Census Bureau. This survey was not conducted for 1987. In the absence of 1987 data, estimates for manufacturing industries, which underlie total spending for plant and equipment and its operation, were prepared using indirect estimation methods. Technical notes at the end of the article discuss the sources of data used to prepare the estimates for PAC spending.

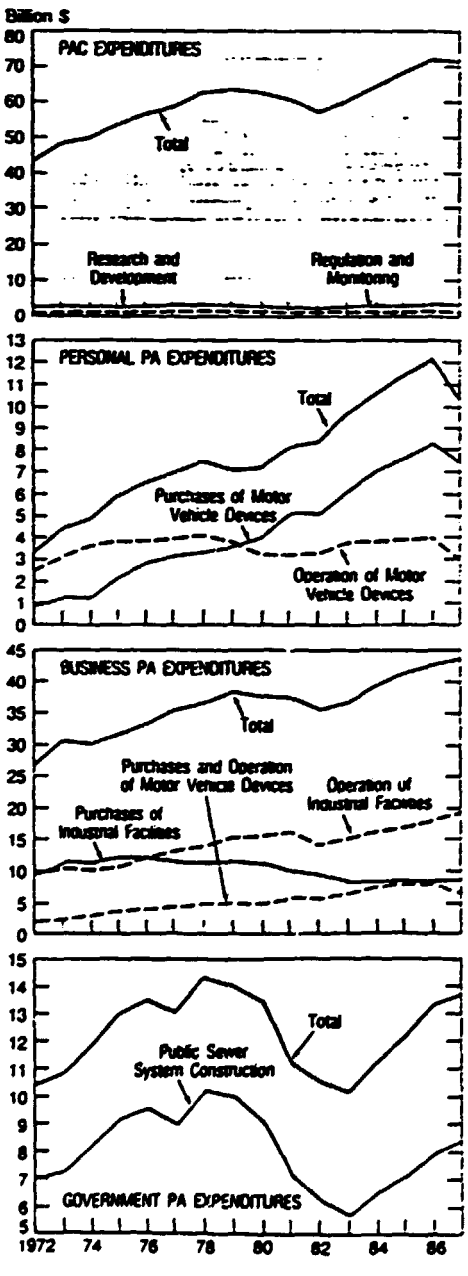
The first section of this article discusses real PAC spending in 1987, prices of PAC goods and services in 1987, and likely real PAC spending in 1988. The next section compares real PAC spending in recent years with that in 1972–82.

Recent estimates

Real PAC spending in 1987.—Real PAC spending declined $0.4 billion in 1987 to $71.4 billion (table 1, with detail in tables 6 and 7). The overall decline in PAC spending was due to a decline of $1.8 billion to $5.1 billion in personal and business operation of

CHART 1

Real Expenditures for Pollution Abatement and Control, 1972-87



Note.—Pollution abatement and control (PAC) expenditures include expenditures for the direct abatement of pollution (PA) and for regulation, monitoring, research and development.

U.S. Department of Commerce, Bureau of Economic Analysis

NOTE.—Gary L. Rutledge, Chief of the Environmental Economics Division, supervised the preparation of the estimates. Kit D. Farber planned and coordinated the compilation and analysis of the estimates. The preparation of estimates involved the entire staff: Personal consumption—Frederick G. Kappler; business—David M. Bratton, Kit D. Farber, Frederick G. Kappler, Nikolaos A. Stergiouias, and Howard J. White; and government—David M. Bratton, Kit D. Farber, and Howard J. White. Shirley D. Tisdale and Sonia R. Bundy provided statistical assistance and secretarial services, respectively.

1. Expenditures discussed in this article are for goods and services that U.S. residents use to produce cleaner air and water and to dispose of solid waste. PA directly reduces pollutant emissions by preventing the generation of pollutants, recycling them, or treating them prior to discharge. Regulation and monitoring is a government activity that stimulates and guides action to reduce pollutant emissions. Research and development by business and government not only supports abatement but also helps increase the efficiency of regulation and monitoring.

PAC spending covers most, but not all, PAC activities, which are defined as those resulting from rules and regulations restricting the release of pollutants into common-property media such as the air and water. PAC spending excludes (1) PAC activities that do not use productive resources (e.g., plant closings due to PAC, delays in plant construction, or curtailments in the use of chemicals in manufacturing and agriculture) and (2) PAC activities that do use productive resources but that are nonmarket activities (e.g., volunteer litter removal).

Table 1.—Constant-Dollar PAC Spending in 1987

[Billions of 1982 dollars]

	Level*	Change from preceding year	
		Dollars*	Percent*
[illegible]	71.4	−0.43	−0.6
[illegible]	67.8	−.39	−.6
Personal consumption	10.3	−1.90	−15.5
Motor vehicle emission abatement devices	7.4	−.82	−10.0
Operation of devices	3.0	−1.08	−26.7
Business	43.8	1.06	2.5
Capital	14.6	.10	.7
Motor vehicle emission abatement devices	4.3	−.17	−3.9
Plant and equipment	8.2	.48	6.3
Other	2.1	−.21	−9.0
Current account	29.2	.96	3.4
Operation of motor vehicle emission abatement devices	2.1	−.70	−24.6
Operation of plant and equipment	19.5	1.58	8.8
Operation of public sewer systems	7.1	.39	5.8
Costs recovered	−1.8	−.40	−29.4
Other	2.3	.09	4.0
Government	13.7	.44	3.3
Public sewer system construction	3.3	.18	6.2
Other	5.5	−.04	−.7
[illegible]	1.2	−.06	−4.4
[illegible]	2.3	.01	.4

* Preliminary.

NOTE.—Based on table 6.

Table 2.—PAC Spending in Current and Constant Dollars and Fixed-Weighted Price Indexes: Percent Change

	1977–82 average annual rate	Change from preceding year				
		1983	1984	1985*	1986*	1987*
Total:						
Current dollars	12.3	7.1	11.6	8.3	5.5	3.0
1982 dollars	3.0	4.0	7.8	5.3	3.4	−.4
Fixed-weighted price index	8.9	3.0	3.4	2.9	2.1	3.4
Air:						
Current dollars	15.5	8.0	10.6	5.9	.1	−3.2
1982 dollars	5.0	6.6	8.0	3.8	3.1	−7.2
Fixed-weighted price index	9.1	1.2	2.3	1.8	−3.5	2.7
Water:						
Current dollars	9.6	5.7	11.3	9.6	7.7	7.7
1982 dollars	.3	1.6	7.5	6.2	6.7	5.7
Fixed-weighted price index	9.1	4.2	3.9	3.2	1.0	2.0
Solid waste:						
Current dollars	11.6	5.6	15.8	10.8	12.5	10.3
1982 dollars	3.3	.8	10.5	6.6	7.3	6.6
Fixed-weighted price index	8.1	4.9	4.7	3.9	4.4	3.4

* Revised.

* Preliminary.

NOTE.—Based on table 6.

otor vehicle emission abatement devices and to a decline of $1.0 billion $11.7 billion in purchases of such evices. Other major components of AC spending increased: Business operation of plant and equipment, $1.6 illion to $19.5 billion; business purhases of plant and equipment, $0.5 illion to $8.2 billion; government conruction of sewer systems, $0.5 billion $8.3 billion; and business operation sewer systems, $0.4 billion to $7.1 illion.

Personal consumption spending for A, all of which is to purchase and perate motor vehicle emission abatement devices, declined $1.9 billion to 10.3 billion. Operation of motor ehicle emission abatement devices—ostly for the additional cost of using nleaded rather than leaded gasoline vehicles with catalytic converters—eclined $1.1 billion; the decline ainly reflects the narrowing gap beween the prices of leaded and of unaded gasoline. Purchases of devices eclined $0.8 billion, reflecting a deline in purchases of motor vehicles.

Business PA spending increased $1.1 illion to $43.8 billion. Most of the ncrease was for spending on current ccount, which increased $1.0 billion o $29.2 billion. Large increases in pending to operate industrial plant nd equipment and public sewer systems offset a small decline in spending to operate motor vehicle emission abatement devices. Capital spending increased slightly, $0.1 billion to $14.6 billion, reflecting a moderate increase in purchases of plant and equipment coupled with a small decline in purchases of motor vehicle emission abatement devices.

Government PA spending increased $0.4 billion to $13.7 billion. Spending to construct sewer systems, which is about three-fifths of government PA spending, accounted for the increase.

Business and government spending for research and development combined remained at about $2.3 billion—business spending increased slightly, while government spending declined slightly. Government spending for regulation and monitoring declined $0.1 billion to $1.2 billion.

Prices in 1987.—Prices of PAC goods and services increased 2.6 percent in 1987, following a leveling off of overall prices in 1986 (table 2). Underlying the 1987 increase was a sharp 13-percent increase in energy prices, following 5 consecutive years of decline. Prices for components other than energy rose by only 1.6 percent. Air PAC prices increased 2.7 percent, water PAC prices increased 2.0 percent, and solid waste disposal prices increased 3.4 percent.

Real PAC spending in 1988.—Real PAC spending is expected to increase somewhat in 1988, according to the limited information available in mid-June 1989. Personal and business spending to purchase motor vehicle emission abatement devices is expected to increase in line with increased sales of motor vehicles. Spending to operate devices is expected to continue to decline. Business plans, according to a survey of U.S. companies conducted by BEA, indicate a decline in spending to purchase plant and equipment for pollution abatement. Government spending to construct sewer systems is expected to decline.

Patterns in real PAC spending, 1972–87

The slight decline in real PAC spending in 1987 followed growth of 5.6 percent in 1982–86 and growth of 3.0 percent in 1972–82. During 1972–82, the impetus of newly enacted environmental legislation in the early 1970's spurred PAC spending early on, but a moderate recession in the general economy reversed PAC spending from 1980–82. Renewed economic growth and, in the mid-1980's, increased environmental regulatory activity led to the resurgence in PAC spending generally.

Real spending by sector.—From 1972 to 1987, as a percentage of total PAC spending, business PAC remained about the same at 64 percent, government PAC declined from 27 percent to 22 percent, and personal PAC about doubled from 8 percent to 15 percent.

Personal consumption spending for PAC declined 15.5 percent in 1987, following strong growth in the preceding 4 years and in 1972–82 (table 3). The pattern of strong growth in 1972–86 closely resembles the pattern of increases in spending to purchase motor vehicle emission abatement devices; spending to operate these devices grew more moderately. In 1987, spending

to purchase and operate these devices both declined.

Business PAC spending increased 2.5 percent in 1987, continuing a 3-year slowdown in growth from a high of 7.7 percent in 1984. The increase in 1987 was about the same as that in 1972–82. This pattern mainly reflects spending on current account, which is about two-thirds of total business PAC spending. Current-account spending increased 3.4 percent in 1987, following growth at about twice that rate in the preceding 4 years and at about the same rate in 1972–82. Of the components, spending to operate plant and equipment contributed most to the increase.

Business spending on capital account grew less than 1 percent in 1987, following a pattern of bumpy growth over the preceding 4 years and slight growth in 1972–82. This pattern mainly reflects spending to purchase plant and equipment, which—despite an increase of 6.3 percent in 1987—was at about the same level as in 1972.

Government PAC spending increased 2.3 percent in 1987, following growth at about three times that rate in the preceding 3 years, a decline in 1983, and only slight growth in 1972–82. Spending to construct sewer systems accounted for the overall trend.

Real spending by type.—Table 4 organizes the estimates of PAC spending according to definitions emphasized in PAC legislation. For air PA, the Clean Air Act classifies sources of pollutants as mobile (e.g., cars) or stationary (e.g., factories). For water PA, the Federal Water Pollution Control Act classifies sources of pollutants as point (e.g., facilities) or nonpoint (e.g., highway construction projects).

From 1972 to 1987, as a percentage of total PAC spending, air PA increased from 34 percent to 40 percent, water PA declined from 46 percent to 40 percent, and solid waste disposal remained about the same at 17 percent.

Air PA spending declined 7.6 percent in 1987, following moderate growth in the preceding 4 years and in 1972–82. The reversal in 1987 was due to a 14.2-percent decline in spending to abate pollution from mobile sources, which is about three-fifths of total air PA spending. Growth in spending for mobile sources moderated in 1985 and 1986, following strong increases throughout earlier years. The 1987 decline was mostly attributable to declines in spending to operate and main-

Table 3.—Constant-Dollar PAC Spending, by Sector

	Millions of 1982 dollars					Percent change					
						1972–82 average annual rate	Change from preceding year				
	1983	1984	1985 r	1986 r	1987 p		1983	1984	1985 r	1986 r	1987 p
Pollution abatement and control	68,897	64,713	68,121	71,880	71,366	3.0	4.0	7.8	5.3	5.4	-0.6
Personal consumption	9,731	10,565	11,336	12,228	10,333	9.8	17.8	8.6	7.3	7.9	-15.5
Durables	6,060	6,892	7,518	8,196	7,377	19.4	21.6	13.7	9.1	9.8	-10.0
Nondurables	3,671	3,673	3,818	4,032	2,957	3.3	10.1	.1	3.9	5.6	-26.7
Business	38,124	41,078	42,905	44,687	45,519	2.7	3.7	7.7	4.4	3.5	2.5
On capital account	12,898	14,561	14,832	14,980	14,980	.7	-4.0	12.9	1.9	-2.3	.7
Motor vehicle emission abatement	3,231	4,333	4,615	4,456	4,284	28.9	28.6	34.2	6.5	-3.4	-3.9
Plant and equipment	7,615	7,905	7,975	7,899	8,182	(*)	-14.9	3.8	.9	-3.5	6.3
Other	2,052	2,320	2,242	2,335	2,124	-3.3	13.8	13.1	-3.4	4.1	-9.0
On current account	25,226	26,517	28,074	29,918	30,929	4.2	5.1	5.1	5.9	6.6	3.4
Motor vehicle emission abatement	2,619	2,661	2,745	2,824	2,129	7.7	6.1	1.6	3.2	2.9	-24.6
Plant and equipment	14,998	16,173	16,788	17,886	19,466	3.8	6.5	7.8	3.8	6.5	8.8
Public sewer systems [1]	5,475	5,699	6,016	6,691	7,881	5.8	6.1	3.2	6.5	11.2	5.8
Other [2]	2,133	2,034	2,525	2,517	2,253	-.8	31.5	-4.6	24.1	-.3	-10.5
Government	12,152	13,070	13,879	15,165	15,514	.7	-3.6	7.6	6.2	9.3	2.3
Public sewer system construction	5,521	6,387	7,005	7,774	8,256	-1.1	-6.7	15.1	9.7	11.0	6.2
Other [3]	6,631	6,683	6,874	7,391	7,258	2.8	2.3	1.2	2.9	7.5	-1.8

r Revised.
p Preliminary.
* Less than 0.1 percent.
1. Spending to operate public sewer systems is classified in the national income and product accounts as business spending. Construction of public sewer systems is classified in the national income and product accounts as government spending.
2. For this table, private purchases for research and development are included with business pollution abatement spending on current account.
3. For this table, spending for government regulation and monitoring and for research and development are included with government pollution abatement spending.

NOTE.—Based on table 6.

Table 4.—Constant-Dollar Spending for Pollution Abatement and Control, by Type

	Millions of 1982 dollars					Percent change					
						1972–82 average annual rate	Change from preceding year				
	1983	1984	1985 r	1986 r	1987 p		1983	1984	1985 r	1986 r	1987 p
Pollution abatement and control	68,897	64,713	68,121	71,880	71,366	3.0	4.0	7.8	5.3	5.4	-0.6
Pollution abatement	56,653	61,326	64,846	68,218	67,527	3.1	3.6	8.6	5.7	5.2	-.6
Air [1]	26,367	28,591	29,665	30,580	28,253	5.5	5.6	8.4	3.8	3.1	-7.6
Mobile sources [2]	15,581	17,561	18,697	19,508	16,746	10.8	15.7	12.7	6.5	4.3	-14.2
Devices	9,780	11,227	12,134	12,653	11,660	19.9	21.3	20.8	8.1	4.3	-7.8
Operation of devices	6,790	6,334	6,563	6,855	5,085	4.9	8.4	.7	3.6	4.4	-25.8
Stationary sources	10,785	11,030	10,968	11,073	11,508	1.6	-4.2	2.3	-.6	1.0	3.9
Facilities	4,520	4,511	4,244	4,177	4,215	.7	-19.2	-.2	-5.9	-1.6	.9
Industrial [3]	4,104	4,115	3,935	3,864	3,955	(*)	-19.3	.3	-4.4	-1.3	1.8
Other [4]	416	396	309	293	260						
Operation of facilities	6,266	6,519	6,723	6,896	7,292	2.6	6.2	4.0	3.1	2.6	5.7
Industrial	5,990	6,260	6,452	6,660	7,039	2.7	5.6	4.5	3.1	3.2	5.7
Other [5]	276	260	272	235	253						
Water [6]	21,543	23,257	24,724	26,336	27,933	.8	1.6	8.0	6.3	6.7	5.9
Point sources	20,428	22,103	23,632	25,310	26,977	1.2	2.1	8.2	6.9	7.1	6.6
Facilities	10,001	11,180	11,925	12,653	13,306	-1.4	-5.4	11.8	6.7	6.1	5.2
Industrial [7]	2,811	2,900	2,995	2,953	3,131	-.7	-4.7	3.2	3.3	-4.7	9.7
Public sewer systems [8]	5,551	6,367	7,005	7,774	8,256	-1.1	-9.7	15.1	9.7	11.0	6.2
Other [9]	1,639	1,893	1,925	2,026	1,920						
Operation of facilities	10,427	10,922	11,707	12,658	13,671	5.3	10.5	4.7	7.2	8.1	8.0
Industrial	4,909	4,795	5,035	5,319	5,957	4.8	12.1	6.3	5.0	5.6	12.6
Public sewer systems [8]	5,475	5,699	6,016	6,691	7,881	5.8	6.1	3.2	6.5	11.2	5.8
Other [9]	443	479	656	648	603						
Nonpoint sources	1,115	1,154	1,092	1,075	956	-4.6	-4.3	3.5	-5.4	-1.6	-11.1
Solid [10]	9,740	10,752	11,446	12,203	13,158	3.1	1.5	10.7	6.2	7.5	6.9
Industrial	5,200	6,009	6,345	6,869	7,536	4.3	.6	13.6	5.6	8.3	9.7
Other [9]	4,540	4,773	5,101	5,335	5,621	1.8	2.5	5.1	6.9	6.5	5.4
Other [11]	-1,196	-1,304	-988	-1,051	-1,517	1.3	-4.8	9.0	-24.2	6.4	44.3
Regulation and monitoring	1,315	1,230	1,104	1,291	1,234	6.0	-5.9	-6.5	-10.2	16.9	-4.4
Air	310	316	304	347	332						
Water	448	428	460	493	474						
Solid	149	162	220	259	239						
Other [9]	408	325	119	192	188						
Research and development	2,239	2,157	2,171	2,292	2,306	-.9	25.6	-3.7	.6	5.6	.6
Air	1,393	1,411	1,311	1,335	1,351						
Water	307	283	273	282	293						
Solid	96	91	97	115	112						
Other [9]	443	372	290	360	350						

r Revised.
p Preliminary.
* Less than 0.1 percent.
1. The Clean Air Act classifies sources of pollutants as either mobile, such as passenger cars, or stationary, such as factories.
2. Excludes spending to reduce emissions from mobile sources other than cars and trucks.
3. Consists of new plant and equipment expenditures for pollution abatement according to results from the plant and equipment expenditures survey by BEA.
4. Consists of spending for fixed capital of government enterprises such as the Tennessee Valley Authority.
5. Consists of spending to operate government enterprises and all spending by government; separate data on spending to acquire and operate government pollution abatement facilities are not available.
6. The Federal Water Pollution Control Act defines point sources as facilities that discharge to a body of water through a pipe or ditch.
7. Consists of spending for private operators of public sewer systems, capital spending by owners of facilities, and spending for fixed capital of government enterprises such as the Tennessee Valley Authority.
8. Consists of spending by Federal, State, and local governments for the collection and disposal of solid waste and of spending by households for collection and disposal of solid waste by business.
9. Consists of "other and unallocated" spending from table 6.

in motor vehicle emission abatement vices; the increases throughout the rly 1980's were mainly due to in-eases in purchases of devices.

In 1987, there were declines in components of spending to oper-e and maintain motor vehicle emis-on abatement devices: (1) The fuel ice penalty—the additional cost of leaded fuel for motor vehicles with talytic converter emission abate-nt devices, (2) the fuel consumption nalty—the additional gasoline con-med by motor vehicles because of re-ced fuel efficiency due to emission atement devices, and (3) the main-nance cost penalty or benefit—the ef-t of emission abatement devices on e cost to maintain motor vehicles.

The 1987 fuel price penalty de-ne, the first since 1980, reflected the rrowing gap between the prices of aded and of unleaded gasoline. The l consumption penalty decline, be-nning in 1976, reflected increasing el efficiency of motor vehicles in gen-al. The decline in spending to main-n motor vehicles, beginning in 1976, curred because unleaded gasoline is s corrosive on motor vehicle en-nes and exhaust systems than leaded soline.

Of the factors affecting purchases of otor vehicle emission abatement de-ces, unit sales of motor vehicles de-ned in 1987 and exhaust emission andards have remained basically un-anged since 1981 for the largest por-n of motor vehicles—passenger cars. endments in 1970 and in 1977 to e Clean Air Act led to the intro-ction of catalytic converter emission atement devices in 1975 and expen-ve computer-like devices in 1981, re-ectively; the introduction of these de-ces spurred spending. Purchases of vices increased during 1972–81 in sponse to regulations stipulating ex-ust emission and fuel economy lev-, despite declining unit sales of mo-r vehicles from 1979–81. From 1982–, in the absence of additional emis-n requirements above the 1981 lev-s for passenger cars, spending to pur-ase devices mainly reflected sales of otor vehicles.

Spending to abate pollution from sta-nary sources increased 3.9 percent 1987, following a bumpy pattern of erall decline in the preceding 4 years d slow growth in 1972–82. This pat-rn reflects spending to purchase in-strial facilities. Growth in spending operate industrial facilities has been generally moderate since 1983, following stronger growth in 1983 and slow growth in 1972–82.

Water PA spending increased 5.9 percent in 1987, following comparable growth in the preceding 3 years, slow growth in 1983, and slight growth in 1972–82. This pattern reflects spending to abate pollution from point sources, almost all of water PA spending. Purchases of industrial facilities picked up in 1987, following a moderate decline in 1986, modest growth in 1985 and 1984, and an overall decline during 1972–83. Growth in public spending to construct sewer systems, moderating somewhat in 1987 after 3 years of very high growth, reversed the downward trend during 1972–83. Growth in spending in 1987 to operate industrial facilities was about twice that in each of the preceding 3 years and in 1972–82. Growth in spending to operate sewer systems in 1987 was about one-half that in 1986 but comparable to growth in the preceding years. Spending for nonpoint sources of water pollution declined since 1985, following a moderate increase in 1984 and declines in 1983 and in 1972–82.

Spending for solid waste disposal increased 6.9 percent in 1987, following 3 years of strong growth and moderate growth during 1972–83. Industrial spending, mostly to operate plant and equipment, has grown at strong rates since 1984 and more moderately before 1984. The other portion of spending, mostly by government to collect and dispose of residential and commercial solid waste, grew moderately in 1987, more strongly in the preceding 3 years, and slowly during 1972–83.

Technical notes

Table 5 summarizes sources of PAC expenditures in 1987, compared with those for earlier years, and distinguishes the PAC component estimates based directly on surveys and censuses from the estimates based on indirect estimation methods. Direct sources accounted for about three-fifths of total PAC spending prior to 1987. The most important direct sources are the Pollution Abatement Costs and Expenditures Survey (for capital and operating spending by manufacturing industries), the Pollution Abatement Plant

Table 5.—Sources of Estimates for Pollution Abatement and Control (PAC) Expenditures, by Major Component

Letters in parentheses refer to the four types of spending for pollution abatement and control: (A)ir, (W)ater, (S)olid waste, and (O)ther.	Percent of total PAC expenditures in 1986	Source: (C)ensus, (S)urvey, (I)ndirect method		Census or survey[1]
		Data for years prior to 1987	Data for 1987	
Pollution abatement:				
Personal consumption:				
Durables (A)	11	I	I	
Nondurables (A)	4	I	I	
Business:				
Capital:				
Motor vehicle emission abatement (A)	6	I	I	
Manufacturing industries (A, W, S)	3	S	I	a
Other industries (A, W)	6	S	S	d
Other	4	I	I	
Current account:				
Motor vehicle emission abatement (A)	3	I	I	
Manufacturing industries (A, W, S)	11	S	I	a
Privately and publicly owned electric utilities (A, W)	3	S	S	g, h
Other nonmanufacturing industries (A, W)	5	I	I	
Sewer systems (W)	9	C, S	S	b, c
Costs recovered by manufacturing industries (O)	2	S	I	a
Other	9	I	I	
Government:				
Sewer system construction (W)	11	C, S	S	b, c, e
Solid waste collection and disposal (S)	5	C, S	S	b, c
Publicly owned electric utility fixed capital (A, W)	1	S	S	h
Other	2	I	I	
Business research and development (A, W, S, O)	2	S	S	i
Government research and development and regulation and monitoring (A, W, S, O)	3	S	S	f

1. Surveys used as sources for pollution abatement and control expenditures:
   a. *Pollution Abatement Costs and Expenditures* (SIAs-200), Bureau of Census.
   b. *Census of Governments*, Bureau of Census.
   c. *Governmental Finances*, Bureau of Census.
   d. "Plant and Equipment Expenditures by Business for Pollution Abatement," Survey of Current Business, Bureau of Economic Analysis.
   e. *Value of New Construction Put in Place*, Bureau of Census.
   f. Federal Funding for Pollution Control (data published separately), Bureau of Economic Analysis.
   g. *Electric Power Quarterly*, Department of [illegible].
   h. *Steam-Electric Plant Air and Water Quality* [illegible] *Control Data*, Department of Energy.
   i. "Funds for Industrial Pollution Abat[illegible] R&D," *National Patterns of Science and Technology Resources*, National Science Foundation.

and Equipment Expenditures Survey (for capital spending by other industries and capital spending control totals by nonfarm business), and *Governmental Finances* (for government spending for sewer systems and solid waste collection and disposal).

In 1987 direct sources accounted for a little more than two-fifths of total PAC spending because the Pollution Abatement Costs and Expenditures Survey was not conducted. The 1987 estimates for manufacturing for operating spending, costs recovered, and capital spending were estimated using multiple regression techniques. The absence of the Pollution Abatement Costs and Expenditures Survey results also affected estimates for operating spending by other industries except electric utilities because these estimates involve indirect methods sensitive to general spending patterns (including those for manufacturing).

The explanatory variables in the multiple regression equations used to obtain the 1987 estimates for manufacturing were as follows: For operating spending—annual changes in value added according to the 1987 Annual Survey of Manufacturers conducted by the Census Bureau and in the net stock of pollution abatement capital estimated by BEA; for costs recovered—annual changes in prices for industrial chemicals as indicated by the Producer Price Index prepared by the Bureau of Labor Statistics and in industrial energy use according to a survey by the Department of Energy; and for capital spending—annual changes in capital spending according to the Pollution Abatement Plant and Equipment Expenditures Survey and in Environmental Protection Agency outlays.

The Pollution Abatement Costs and Expenditures Survey of manufacturers is being resumed for 1988. However, coverage of the Pollution Abatement Plant and Equipment Expenditures Survey of business capital is being cut back for 1988.

Tables 6 and 7 follow.

Table 6.—Expenditures for Pollution Abatement and Control in

Line		1983 Total [r]	1983 Air	1983 Water	1983 Solid waste	1983 Other and unallocated [2]	1984 Total [p]	1984 Air	1984 Water	1984 Solid waste	1984 Other and unallocated [2]
		Millions of current dollars									
1	Pollution abatement and control	61,779	28,419	23,234	10,449	-323	68,929	31,432	25,962	12,119	-584
2	Pollution abatement [3]	58,049	26,630	22,421	10,212	-1,212	65,230	29,552	25,180	11,840	-1,342
3	Personal consumption	9,771	9,771				10,767	10,767			
4	Durable goods	6,214	6,214				7,274	7,274			
5	Nondurable goods	3,557	3,557				3,492	3,492			
6	Business	37,589	16,306	15,752	6,932	-1,402	42,191	18,241	17,324	8,188	-1,562
7	On capital account	13,278	7,408	5,006	865		15,542	8,858	5,635	1,050	
8	On current account	24,311	8,898	10,747	6,127	-1,402	26,649	9,383	11,670	7,158	-1,562
9	Private	19,907	8,696	5,084	6,127		21,983	9,236	5,588	7,158	
10	Government enterprise	5,805	143	5,663	(*)	(*)	6,229	147	6,082	(*)	(*)
11	Costs recovered	-1,402				-1,402	-1,562				-1,562
12	Government	10,708	562	6,670	3,279	189	12,273	545	7,856	3,652	220
13	Federal	795	136	443	130	97	944	115	402	197	140
14	State and local	3,547	4	290	3,161	92	3,886	14	337	3,455	80
15	Government enterprise fixed capital	6,358	422	5,936			7,443	416	7,027		
16	Regulation and monitoring	1,385	327	473	158	427	1,362	351	475	180	355
17	Federal	806	88	241	72	405	743	101	239	76	346
18	State and local	579	239	232	85	22	619	250	236	104	9
19	Research and development	2,335	1,453	330	100	452	2,337	1,528	307	99	403
20	Private	1,659	1,315	167	28	149	1,714	1,359	172	29	154
21	Federal	640	133	143	66	299	590	165	120	65	240
22	State and local	35	6	10	6	14	32	4	14	5	9
		Millions of constant (1982) dollars									
23	Pollution abatement and control	60,087	28,070	22,297	9,985	-345	64,713	30,338	23,967	11,036	-608
24	Pollution abatement [3]	56,453	26,307	21,543	9,740	-1,196	61,126	28,591	23,257	10,782	-1,504
25	Personal consumption	9,731	9,731				10,565	10,565			
26	Durable goods	6,060	6,060				6,893	6,893			
27	Nondurable goods	3,671	3,671				3,673	3,673			
28	Business	36,533	16,081	15,223	6,611	-1,386	39,405	17,506	16,046	7,438	-1,516
29	On capital account	12,898	7,334	4,793	771		14,561	8,450	5,346	965	
30	On current account	23,635	8,747	10,435	5,840	-1,386	24,934	9,056	10,900	6,404	-1,516
31	Private	19,389	8,609	4,941	5,840		20,645	8,921	5,231	6,404	
32	Government enterprise	5,632	137	5,494	(*)	(*)	5,805	135	5,669	(*)	(*)
33	Costs recovered	-1,386				-1,386	-1,516				-1,516
34	Government	10,188	555	6,315	3,129	190	11,266	520	7,211	3,324	211
35	Federal	771	135	424	116	96	884	111	457	182	134
36	State and local	3,375	4	275	3,013	94	3,513	13	231	3,142	77
37	Government enterprise fixed capital	6,043	416	5,626			6,869	396	6,474		
38	Regulation and monitoring	1,315	310	448	149	408	1,230	316	478	162	325
39	Federal	771	84	230	69	387	680	93	251	70	317
40	State and local	545	226	218	80	21	551	224	227	92	8
41	Research and development	2,239	1,393	307	96	443	2,157	1,411	233	91	372
42	Private	1,591	1,280	140	27	143	1,533	1,255	139	27	143
43	Federal	615	127	137	63	287	545	152	111	60	221
44	State and local	34	5	9	6	13	29	4	13	5	8
		Selected fixed-weighted price indexes									
45	Pollution abatement and control	103.0	101.2	104.2	104.9	102.1	106.5	103.5	108.3	109.8	105.1
46	Pollution abatement [3]	102.9	101.0	104.2	104.9	101.0	106.3	103.2	108.3	109.8	103.2
47	Personal consumption	100.3	100.3				101.3	101.3			
48	Business	102.9	101.4	103.4	104.9	101.1	106.7	104.1	107.9	109.5	103.1
49	On capital account	102.5	101.7	104.3	104.4		106.5	104.6	109.5	106.8	
50	On current account	102.9	101.1	103.0	104.9	101.1	106.9	103.6	107.2	110.2	103.1
51	Government	105.1	101.4	105.7	104.9	100.2	109.0	104.9	109.0	110.0	104.0
52	Regulation and monitoring	105.3	105.6	105.5	105.0	104.9	110.5	111.2	110.8	110.0	110.0
53	Research and development	104.3	104.3	104.3	104.3	104.3	108.4	108.3	108.5	108.5	108.5
		Addendum: Business capital consumption allowances (millions of dollars) [4]									
54	Valued at replacement cost in current dollars	11,590					12,471				
55	Valued at replacement cost in constant (1982) dollars	11,307					11,836				

r Revised.

p Preliminary.

* Less than $500,000.

1. Includes expenditures for air and water pollution abatement and control. Includes expenditures for solid waste collection and disposal by means acceptable to Federal, State, and local authorities. Excludes agricultural production except feedlot operations.

2. "Other" includes expenditures for abatement and control of noise, radiation, and pesticide pollution; "unallocated" includes business expenditures not assigned to media.

3. Expenditures are attributed to the sector that performs the air or water pollution abatement or solid waste collection and disposal.

4. To facilitate conversion of expenditures to a cost basis.

Current and Constant Dollars and Selected Fixed-Weighted Price Indexes

1985 r					1986 r					1987 p					Line
Total [1]	Air	Water	Solid waste	Other and unallocated [2]	Total [1]	Air	Water	Solid waste	Other and unallocated [2]	Total [1]	Air	Water	Solid waste	Other and unallocated [2]	
Millions of current dollars															
74,636	33,308	28,443	13,422	-438	78,713	33,325	30,641	15,380	-384	81,057	32,373	32,987	16,685	-988	1
70,943	31,372	27,805	13,057	-980	74,407	31,193	29,336	14,630	-980	76,880	30,887	32,085	16,325	-1,408	2
11,830	11,830				12,276	12,276				10,905	10,905				3
8,188	8,188				9,308	9,308				8,672	8,672				4
3,651	3,651				2,968	2,968				2,232	2,232				5
43,097	18,995	18,337	8,976	-1,231	46,743	18,524	19,445	10,101	-1,326	49,308	18,811	20,966	11,361	-1,770	6
16,156	9,067	5,730	1,239		16,129	9,151	5,784	1,194		16,532	9,211	5,945	1,375		7
23,941	9,828	12,079	7,738	-1,231	30,615	9,374	13,661	8,907	-1,326	32,836	9,600	15,030	9,906	-1,770	8
23,442	9,630	6,033	7,739		24,543	9,191	6,445	8,907		26,629	9,408	7,236	9,985		9
6,761	180	6,572	(*)	1	7,399	182	7,216	(*)	1	7,977	192	7,784	(*)	1	10
-1,232				-1,232	-1,327				-1,327	-1,771				-1,771	11
14,880	438	9,248	4,881	242	15,588	393	10,291	4,538	346	16,618	372	11,089	4,865	292	12
1,225	98	723	239	164	1,346	67	737	281	271	1,237	80	707	230	220	13
4,324	12	391	3,842	79	4,788	14	421	4,278	75	5,138	15	436	4,615	82	14
8,460	328	8,132			9,454	312	9,142			10,243	277	9,966			15
1,279	333	554	257	135	1,532	413	587	311	221	1,519	490	503	300	226	16
575	108	244	28	130	715	106	258	135	216	708	110	250	120	220	17
705	230	290	150	5	817	307	329	176	5	819	300	333	180	6	18
2,412	1,677	304	108	323	2,573	1,719	318	130	405	2,640	1,776	330	120	406	19
1,808	1,427	181	31	162	1,891	1,409	280	32	170	1,987	1,574	199	35	179	20
591	247	110	75	150	651	237	111	95	229	630	200	130	90	220	21
20	3	13	2	2	31	4	18	3	7	31	2	20	4	5	22
Millions of constant (1982) dollars															
65,121	30,480	25,457	11,762	-579	71,930	32,062	27,161	12,677	-980	71,366	30,136	28,780	13,509	-976	23
64,046	29,665	24,724	11,446	-908	68,218	30,500	26,306	12,385	-1,051	67,827	28,253	27,933	13,158	-1,517	24
11,336	11,336				12,228	12,228				10,333	10,333				25
7,508	7,518				8,196	8,196				7,377	7,377				26
3,808	3,808				4,032	4,052				2,957	2,957				27
41,282	17,915	16,700	7,573	-1,206	42,718	17,903	17,613	8,480	-1,358	43,780	17,573	18,743	9,223	-1,758	28
14,832	8,550	5,158	1,123		14,400	8,340	5,104	1,046		14,590	8,239	5,166	1,185		29
26,450	9,365	11,542	6,740	-1,206	28,225	9,643	12,509	7,435	-1,358	29,191	9,334	13,577	8,038	-1,758	30
21,458	9,197	5,512	6,740		22,534	9,484	5,805	7,434		23,685	9,168	6,480	8,038		31
6,199	168	6,029	(*)	1	6,863	159	6,703	(*)	1	7,264	166	7,097	(*)	1	32
-1,207				-1,207	-1,359				-1,359	-1,758				-1,758	33
12,228	413	8,025	3,573	218	13,272	309	8,773	3,825	307	13,713	348	9,190	3,935	241	34
1,092	92	638	215	147	1,177	64	630	244	240	1,039	74	532	212	171	35
3,717	11	277	3,358	71	3,951	12	293	3,579	67	4,085	13	279	3,723	70	36
7,419	309	7,110			8,144	295	7,850			8,590	300	8,330			37
1,104	304	440	220	119	1,291	347	493	259	192	1,234	332	474	239	188	38
538	91	276	56	115	621	92	224	117	188	585	92	209	100	184	39
597	214	245	134	5	670	255	269	141	4	649	240	265	139	5	40
2,171	1,511	273	97	290	2,292	1,535	232	115	340	2,306	1,351	293	112	350	41
1,634	1,287	163	38	146	1,690	1,339	170	29	152	1,736	1,377	174	31	156	42
530	222	99	67	142	578	192	99	84	203	543	172	103	78	190	43
17	2	11	2	1	25	3	14	2	5	24	2	16	3	4	44
Selected fixed-weighted price indexes															
109.6	105.4	111.8	114.1	106.0	109.3	101.7	112.9	119.1	104.3	112.5	104.4	115.2	123.2	107.7	45
109.4	105.0	111.7	114.1	102.9	109.0	101.1	112.8	119.2	99.4	111.7	103.8	115.0	123.3	102.8	46
103.6	103.6				97.6	97.6				100.7	100.7				47
109.2	103.5	109.9	114.1	101.8	109.1	102.7	110.6	119.1	97.5	111.5	105.2	112.1	123.1	100.5	48
108.5	106.5	111.2	110.3		110.4	108.3	113.1	114.2		112.0	109.8	114.8	116.2		49
109.6	105.1	109.3	114.6	101.8	108.4	97.5	109.3	119.8	97.5	111.2	100.9	110.8	124.2	100.8	50
114.6	106.0	115.5	114.3	111.2	117.4	106.1	117.6	119.4	112.5	121.1	106.5	121.2	123.8	117.1	51
115.2	116.0	115.6	114.4	114.4	117.9	118.2	118.3	116.9	117.1	122.5	123.5	122.1	121.4	122.1	52
111.2	111.0	111.5	111.7	111.5	112.4	112.0	112.8	113.1	112.9	115.1	114.5	115.7	114.2	116.0	53
Addenda: Business capital consumption allowances (millions of dollars) [4]															
3,402					14,281					15,029					54
2,465					13,020					13,435					55

Table 7.—Business and Government Expenditures for Air and Water Pollution Abatement in Current and Constant Dollars

	1983			1984			1985 r			1986 r			1987 p		
	Total [3]	Air	Water	Total [3]	Air	Water	Total [3]	Air	Water	Total [3]	Air	Water	Total [3]	Air	Water
	Millions of current dollars														
...ess (line 6) [4]	32,058	16,306	15,752	35,566	18,241	17,324	37,352	18,995	18,357	37,969	18,524	19,445	39,777	18,811	20,966
...capital account (line 7)	12,473	7,468	5,005	14,513	8,858	5,655	14,917	9,167	5,750	14,935	9,151	5,784	15,157	9,211	5,946
Motor vehicle emission abatement	3,313	3,313		4,576	4,576		5,026	5,026		5,080	5,080		5,032	5,032	
Plant and equipment expenditures [5]	7,055	4,155	2,900	7,405	4,282	3,123	7,420	4,141	3,279	7,250	4,080	3,199	7,757	4,179	3,578
Residential systems [6]	2,103		2,103	2,529		2,529	2,468		2,468	2,582		2,582	2,364		2,364
Agricultural business [5]	2		2	3		3	3		3	3		3	3		3
...current account (line 8)	19,585	8,838	10,747	21,053	9,383	11,670	22,435	9,828	12,607	23,034	9,374	13,661	24,620	9,600	15,020
Private (line 9)	13,780	8,696	5,084	14,825	9,236	5,589	15,675	9,640	6,035	15,636	9,191	6,445	16,644	9,408	7,236
Motor vehicle emission abatement	2,547	2,547		2,546	2,546		2,642	2,642		2,119	2,119		1,645	1,645	
Operation of plant and equipment [5]	10,785	6,149	4,636	11,704	6,610	5,094	12,467	6,997	5,470	12,914	7,072	5,842	14,372	7,763	6,609
Residential systems [6]	441		441	486		486	557		557	595		595	619		619
Agricultural business [5]	7		7	9		9	8		8	8		8	8		8
Government enterprise (line 10)	5,805	143	5,663	6,228	147	6,082	6,760	189	6,572	7,398	182	7,216	7,976	192	7,784
Publicly owned electric utilities	161	143	18	167	147	20	201	189	12	194	182	12	207	192	15
Public sewer systems [6]	5,642		5,642	6,059		6,059	6,557		6,557	7,201		7,201	7,766		7,766
Other	2		2	2		2	3		3	3		3	3		3
...rnment (line 12)	7,232	562	6,670	8,401	545	7,856	9,686	438	9,248	10,684	393	10,291	11,471	372	11,099
...eral (line 13)	579	136	443	607	115	492	823	98	725	795	67	727	787	80	707
Federal excl. highway erosion abatement	572	136	436	599	115	484	816	98	717	788	67	721	780	80	700
Highway erosion abatement	8		8	8		8	7		7	6		6	7		7
...te and local (line 14)	294	4	290	351	14	337	403	12	391	435	14	421	441	15	426
State and local excl. highway erosion abatement	4	4		14	14		12	12		14	14		15	15	
Highway erosion abatement	290		290	337		337	391		391	421		421	426		426
...ernment enterprise fixed capital (line 15)	6,358	422	5,936	7,443	416	7,027	8,460	328	8,132	9,454	312	9,142	10,243	277	9,966
Publicly owned electric utilities	501	422	79	510	416	94	442	328	115	397	312	86	359	277	82
Public sewer systems [6]	5,857		5,857	6,933		6,933	8,018		8,018	9,057		9,057	9,884		9,884
	Millions of constant (1982) dollars														
...ess (line 28) [4]	31,308	16,081	15,228	33,552	17,506	16,046	34,615	17,915	16,760	35,596	17,983	17,613	36,316	17,573	18,743
...capital account (line 29)	12,127	7,334	4,793	13,596	8,450	5,146	13,708	8,550	5,158	13,444	8,340	5,104	13,405	8,239	5,166
Motor vehicle emission abatement	3,231	3,231		4,335	4,335		4,615	4,615		4,456	4,456		4,284	4,284	
Plant and equipment expenditures [5]	6,915	4,004	2,911	7,015	4,115	2,900	6,930	3,935	2,995	6,737	3,884	2,853	7,086	3,955	3,131
Residential systems [6]	1,980		1,980	2,243		2,243	2,159		2,159	2,247		2,247	2,031		2,031
Agricultural business [5]	2		2	3		3	4		4	4		4	4		4
...current account (line 30)	19,181	8,747	10,435	19,956	9,056	10,900	20,907	9,365	11,542	22,152	9,643	12,509	22,911	9,334	13,577
Private (line 31)	13,550	8,609	4,941	14,152	8,921	5,231	14,709	9,197	5,512	15,289	9,484	5,805	15,648	9,168	6,480
Motor vehicle emission abatement	2,619	2,619		2,661	2,661		2,745	2,745		2,824	2,824		2,129	2,129	
Operation of plant and equipment [5]	10,499	5,990	4,509	11,055	6,260	4,795	11,487	6,452	5,035	11,980	6,660	5,319	13,036	7,039	5,997
Residential systems [6]	425		425	428		428	467		467	476		476	484		484
Agricultural business [5]	6		6	8		8	9		9	10		10	10		10
Government enterprise (line 32)	5,632	137	5,494	5,804	135	5,669	6,198	168	6,029	6,863	159	6,703	7,263	166	7,097
Publicly owned electric utilities	155	137	18	153	135	18	179	168	11	170	159	10	179	166	13
Public sewer systems [6]	5,475		5,475	5,649		5,649	6,016		6,016	6,691		6,691	7,081		7,081
Other	2		2	2		2	3		3	3		3	3		3
...rnment (line 34)	6,870	555	6,315	7,731	520	7,211	8,437	413	8,025	9,142	369	8,773	9,537	348	9,190
...eral (line 35)	559	135	424	568	111	457	731	92	638	694	64	630	656	74	582
Federal excl. highway erosion abatement	552	135	417	561	111	450	725	92	633	689	64	625	652	74	577
Highway erosion abatement	7		7	7		7	5		5	5		5	5		5
...te and local (line 36)	268	4	265	294	13	281	288	11	277	305	12	293	292	13	279
State and local excl. highway erosion abatement	4	4		13	13		11	11		12	12		13	13	
Highway erosion abatement	265		265	281		281	277		277	293		293	279		279
...ernment enterprise fixed capital (line 37)	6,043	416	5,626	6,869	396	6,474	7,419	309	7,110	8,144	293	7,850	8,590	260	8,330
Publicly owned electric utilities	492	416	75	482	396	87	414	309	105	370	293	77	334	260	74
Public sewer systems [6]	5,551		5,551	6,387		6,387	7,005		7,005	7,774		7,774	8,256		8,256

...vised.
...iminary.
...Consists of air and water pollution abatement expenditures only.
...Line numbers correspond to those in table 6.
...Consists of manufacturing companies and of privately and cooperatively owned electric utilities and other ...manufacturing companies.
4. Consists of private septic systems and sewer connections linking household plumbing to street sewers.
5. Feedlot operations only, see footnote 1 to table 6.
6. Public sewer systems consists of treatment plants, collection sewers, interceptor sewers, pumping stations, and dry waste disposal plants.

3. MANUFACTURERS' QUANTITY OF POLLUTION DATA (ISIC 311-390)

These tables feature quantities of toxic pollutants for US industries measured in the form of the following variables: ISIC number, frequency or number of firms reporting chemical release quantities, total chemical release quantities based on form of release, and forms of release including air, water, underground, land and transfers. The major release characteristic of any single industry is specified by air, water, land and underground release only. All data shown are reported in pounds for the year 1987. The source for this data is the Toxic Release Inventory prepared by the US Environmental Protection Agency, Washington, DC. Table 1 specifies the quantity of releases for three major chemicals for each ISIC three-digit industry. Table 2 contains the total chemical release for all industries confirmed. Table 3 features total quantities of all releases by ISIC three-digit industries.

ISIC THREE DIGIT INDUSTRIAL DATA:
TOXIC RELEASE CHEMICALS BY WEIGHT (Pounds)
(United States, 1987)

1. Food products (ISIC 311, 312)
2. Beverages (ISIC 313)
3. Tobacco products (ISIC 314)
4. Textiles (ISIC 321)
5. Wearing apparel (ISIC 322)
6. Leather and fur products (ISIC 323)
7. Footwear (ISIC 324)
8. Wood and wood products (ISIC 331)
9. Furniture and fixtures (ISIC 332)
10. Paper and paper products (ISIC 341)
11. Printing and publishing (ISIC 342)
12. Industrial chemicals (ISIC 351)
13. Other chemical products (ISIC 352)
14. Petroleum refineries (ISIC 353)
15. Miscellaneous petroleum and coal products (ISIC 354)
16. Rubber products (ISIC 355)
17. Plastic products (ISIC 356)
18. Pottery, china and earthware (ISIC 361)
19. Glass and glass products (ISIC 362)
20. Other non-mineral products (ISIC 369)
21. Iron and Steel (ISIC 371)
22. Non-ferrous metal (ISIC 372)
23. Metal products (ISIC 381)
24. Non-electrical machinery (ISIC 382)
25. Electrical machinery (ISIC 383)
26. Transport equipment (ISIC 384)
27. Professional and scientific equipment (ISIC 385)
28. Other manufacturing industries (ISIC 390)

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Table 1. THREE MAJOR POLLUTANTS REPORTED FOR ISIC 311-390 ACCORDING TO FORM OF DISCHARGE: AIR, WATER, LAND AND UNDERGROUND (Pounds)

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURQTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
1	.	001310732	3	2	491916	0	1560	0	.	0	490356	SODIUM HYDROXIDE
2	.	007440508	3	2	135500	0	500	0	0	0	135000	COPPER
3	.	000067561	3	3	68637	0	68637	0	0	0	0	METHANOL
4	311	001310732	3	516	77780893	1145619	66137	16851422	78480	10859013	49925861	SODIUM HYDROXIDE
5	311	007664939	3	105	15623601	37500	3043	419226	40995	1089023	14071316	SULFURIC ACID
6	311	007664382	3	213	8969460	63100	5019	295742	0	2524742	6143957	PHOSPHORIC ACID
7	312	001310732	3	38	1721671	13500	0	57751	0	250	1663670	SODIUM HYDROXIDE
8	312	007664417	3	16	1023396	0	33591	10323	0	30000	949480	AMMONIA
9	312	000075092	3	2	380740	0	22540	0	0	0	358200	DICHLOROMETHANE
10	313	001310732	3	142	24774708	46450	4550	94623	57700	98762	24519073	SODIUM HYDROXIDE
11	313	007664417	3	34	664989	0	254450	81527	0	90190	238822	AMMONIA
12	313	007664939	3	20	616032	0	1957	169500	0	224213	220362	SULFURIC ACID
13	314	007664417	3	5	2080263	0	1845563	27300	0	0	207400	AMMONIA
14	314	001310732	3	4	543510	0	0	0	0	0	543510	SODIUM HYDROXIDE
15	314	000067561	3	3	523519	62336	59219	93300	0	0	371000	METHANOL
16	321	001310732	3	140	80986181	552292	6078	32858213	0	174780	47947110	SODIUM HYDROXIDE
17	321	000078933	3	35	12880947	96000	10184856	750	0	289	2695052	METHYL ETHYL KETONE
18	321	007664939	3	38	12079286	102945	13597	6079599	0	63275	5922815	SULFURIC ACID
19	322	001330207	3	1	140723	0	140723	0	0	0	0	XYLENE
20	322	000071556	3	1	137000	0	137000	0	0	0	0	1,1,1-TRICHLOROETHANE
21	322	000108883	3	3	123722	0	90612	0	0	0	33110	TOLUENE
22	323	007664939	3	11	6505711	3700000	250	500	0	0	6504961	SULFURIC ACID
23	323	001310732	3	7	4637700	4500000	1000	15000	0	0	4621700	SODIUM HYDROXIDE
24	323	000108883	3	15	3767152	30248	3077831	0	0	0	689321	TOLUENE
25	324	000067641	3	19	542312	0	536967	0	0	0	5345	ACETONE
26	324	000108883	3	24	229141	3694	223118	78	0	0	5945	TOLUENE
27	324	000078933	3	16	168107	0	165002	105	0	0	3000	METHYL ETHYL KETONE
28	331	001330207	3	72	5679087	101736	5304866	0	0	539	373684	XYLENE
29	331	000108883	3	92	5635455	121865	5018424	0	0	1942	615089	TOLUENE
30	331		3	428	2585853	15515	1186461	10523	0	1595	1387274	TRADE SECRET/NOT REPORTED
31	332	000108883	3	231	12309891	698742	10573389	30400	0	2352	1703750	TOLUENE
32	332	001330207	3	192	10864453	815179	8676075	551	0	2236	2185591	XYLENE
33	332	000067561	3	145	7635441	403194	7234358	7	0	1500	399576	METHANOL
34	341	000067561	3	144	121628937	606599	53796828	17304850	0	11536972	38990287	METHANOL
35	341	007647010	3	78	34917854	1987	26204300	5148402	29000	250	3535902	HYDROCHLORIC ACID
36	341	000108883	3	112	31241024	89703	24477351	3100	0	11668	6748905	TOLUENE
37	342	000108883	3	93	13887336	191504	10906932	47	0	0	2980357	TOLUENE
38	342	000078933	3	37	2655724	102264	1723606	0	0	0	932118	METHYL ETHYL KETONE
39	342		3	49	1674961	670	1320528	0	0	0	354433	TRADE SECRET/NOT REPORTED
40	351	007647010	3	432	327882727	45003414	6987699	220264	211700216	176897	108797651	HYDROCHLORIC ACID
41	351	007664382	3	173	311809795	12027	800036	125322879	1209	182936057	2749614	PHOSPHORIC ACID
42	351	007664417	3	462	260278069	1694230	231155620	7742089	10777599	3038079	7564682	AMMONIA
43	352	000067561	3	332	57574007	176356	7073308	5381173	2886750	1621522	40611254	METHANOL
44	352	006484522	3	24	33338503	644391	588203	436916	29700000	1429254	1184130	AMMONIUM NITRATE
45	352	000075092	3	239	30061869	1164602	17235348	332962	350400	5800	12137359	DICHLOROMETHANE
46	353	007664939	3	39	51773284	0	135652	2841756	0	53383	48742493	SULFURIC ACID
47	353	007664417	3	94	47493013	11743	5219185	4097643	27217150	20499	10938736	AMMONIA
48	353	001310732	3	63	45004553	0	2468	1494390	2570665	1310638	39626392	SODIUM HYDROXIDE
49	354	NA	3	5	4916713	0	3744	1000	0	0	4911969	
50	354	001332214	3	17	1350231	0	5500	0	0	870871	473860	ASBESTOS
51	354	007664939	3	7	913002	0	500	15000	0	0	897502	SULFURIC ACID
52	355	000108883	3	82	7111986	22414	6578022	500	0	250	533214	TOLUENE
53	355	000075092	3	30	6763436	25800	6508909	0	0	0	254527	DICHLOROMETHANE
54	355		3	154	4405743	24976	64718	5632	0	33827	4301566	TRADE SECRET/NOT REPORTED
55	356	000067641	3	142	14954116	1042159	12468988	212	23000	4216	2457698	ACETONE
56	356	000067561	3	30	12611263	68465	11443032	1250	0	0	1166981	METHANOL
57	356	000075150	3	7	11209400	0	11080000	1950	0	0	127450	CARBON DISULFIDE
58	361		3	27	3055727	0	42729	5400	0	188950	2818648	TRADE SECRET/NOT REPORTED
59	361	000071556	3	2	734450	0	715000	0	0	0	19450	1,1,1-TRICHLOROETHANE
60	361	000100425	3	1	249256	0	245642	0	.	250	3364	STYRENE
61	362		3	59	2422941	168745	627562	4721	0	8241	1782417	TRADE SECRET/NOT REPORTED
62	362	007664393	3	12	995146	0	175360	9385	0	290000	520401	HYDROGEN FLUORIDE
63	362	007664939	3	14	736817	0	813	135900	0	120250	479854	SULFURIC ACID
64	369	001332214	3	16	10414004	2040647	24380	750	0	355750	10033124	ASBESTOS
65	369		3	206	9733898	474901	1127077	7344	0	1381560	7217917	TRADE SECRET/NOT REPORTED
66	369	007664939	3	11	6743643	139000	17837	217135	6300000	12000	136671	SULFURIC ACID
67	372		3	1007	162738106	10220871	12891247	73129	0	129714500	20057230	TRADE SECRET/NOT REPORTED
68	372	007440508	3	409	153384881	1325693	1937286	57984	350	136456374	14932387	COPPER
69	372	007664939	3	606	118495289	3038273	1961612	2140533	1211157	59255448	53926570	SULFURIC ACID
70	381	007664382	3	10	3914915	0	1500	68600	0	250	3844565	PHOSPHORIC ACID
71	381	001330207	3	33	2937903	0	2649806	250	0	492	287355	XYLENE
72	381	007697372	3	20	2305234	0	55898	13820	0	250	2235266	NITRIC ACID
73	382	000071556	3	237	8426672	359328	6141843	2844	0	5610	2276375	1,1,1-TRICHLOROETHANE
74	382	001330207	3	160	5787542	56933	5104003	525	0	500	682514	XYLENE
75	382	000079016	3	79	4999201	256859	4028510	2618	0	8000	960073	TRICHLOROETHYLENE

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURQTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
76	383	001310732	3	358	30187419	997648	119019	2124609	844700	269186	26829907	SODIUM HYDROXIDE
77	383	007664939	3	420	23321924	544597	527487	837995	491500	81180	21383762	SULFURIC ACID
78	383	000071556	3	400	16572736	775992	11386194	4803	250	5406	5176083	1,1,1-TRICHLOROETHANE
79	384	001330207	3	219	39452953	117077	31062570	1250	0	2318	8386815	XYLENE
80	384	000078933	3	216	30526190	284254	23457764	1750	0	2084	7064592	METHYL ETHYL KETONE
81	384	000108883	3	221	24409599	98988	17130665	2071	1200	1930	7273733	TOLUENE
82	385	000075092	3	28	19194843	0	11143906	5050	0	25000	8020887	DICHLOROMETHANE
83	385	000067641	3	38	6970556	49	5176000	37000	0	650	1756906	ACETONE
84	385	000108883	3	31	6294526	25626	3769200	1200	0	0	2524126	TOLUENE
85	390	000108883	3	72	5830853	43040	4676226	501	250	500	1153376	TOLUENE
86	390	000078933	3	53	5267664	63801	4486705	2	0	17176	763781	METHYL ETHYL KETONE
87	390	000071556	3	66	3631486	332587	2224462	250	0	67000	1339774	1,1,1-TRICHLOROETHANE
88	999	007647010	3	167	233335997	0	7404741	6313809	201009750	4011248	14596450	HYDROCHLORIC ACID
89	999		3	642	184532347	16417	7184584	1325755	126524	62149095	113746389	TRADE SECRET/NOT REPORTED
90	999	007664939	3	246	102301933	469432	766170	22952705	21381840	1436237	42840893	SULFURIC ACID

Table 2. MAJOR CHEMICAL POLLUTANTS FOR MANUFACTURING INDUSTRIES ACCORDING TO FORM OF DISCHARGE: AIR, WATER, LAND AND UNDERGROUND (Pounds)

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURQTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
1	.		1	5937	540635290	17286953	45868813	14256582	19106591	233752128	227651176	TRADE SECRET/NOT REPORTED
2	.	NA	1	84	9115667	488901	209732	493501	16000	429952	7966482	
3	.	000050000	1	647	22429598	4423061	8137709	1611341	6409150	301985	5969413	FORMALDEHYDE
4	.	000051285	1	12	982916	0	9564	87200	199100	750	686302	2,4-DINITROPHENOL
5	.	000051796	1	10	565337	800	497250	935	0	12000	55152	URETHANE
6	.	000052686	1	2	1748	0	3	0	0	0	1745	TRICHLORFON
7	.	000055630	1	11	88915	0	44187	16553	0	19175	9000	NITROGLYCERIN
8	.	000056235	1	72	5522328	80000	3235090	71484	211000	3160	2001594	CARBON TETRACHLORIDE
9	.	000056382	1	8	350289	0	1260	250	0	250	348529	PARATHION
10	.	000057147	1	1	6056	0	750	0	0	0	5306	1,1-DIMETHYL HYDRAZINE
11	.	000057749	1	4	247816	0	257	4	19825	0	227730	CHLORDANE
12	.	000058899	1	4	8461	0	311	250	0	250	7650	LINDANE
13	.	000060093	1	1	693	0	0	0	693	.	.	4AMINOAZOBENZENE
14	.	000060344	1	2	4609	0	273	0	0	0	4336	METHYL HYDRAZINE
15	.	000060355	1	3	20960	0	760	0	0	0	20200	ACETAMIDE
16	.	000062533	1	54	5685488	736650	401012	14556	1283678	14962	3971280	ANILINE
17	.	000062566	1	18	68776	0	5250	16090	5400	16500	25536	THIOUREA
18	.	000062737	1	3	8805	0	240	0	0	0	8565	DICHLORVOS
19	.	000063252	1	17	477427	0	5011	124	0	53294	418998	CARBARYL
20	.	000064675	1	12	6455	0	3005	250	0	250	2950	DIETHYL SULFATE
21	.	000067561	1	1728	373978911	1619419	151126224	24909084	19582087	13886160	164477356	METHANOL
22	.	000067630	1	529	16447240	769116	9435468	29206	500	159408	4822658	ISPROPYL ALCOHOL
23	.	000067641	1	1739	169754732	4389094	93442158	2026749	2280943	243275	51761607	ACETONE
24	.	000067663	1	161	22260496	290000	17343346	1343855	80500	44377	3448418	CHLOROFORM
25	.	000067721	1	12	831000	0	2007	8	197	1	828787	HEXACHLOROETHANE
26	.	000071363	1	825	36041092	403718	24511047	210788	211184	485530	10622543	N-BUTYL ALCOHOL
27	.	000071432	1	412	13612324	109502	8967811	275637	395622	202972	3770282	BENZENE
28	.	000071556	1	2306	98845341	5760817	68071834	40700	28325	199061	30505421	1,1,1-TRICHLOROETHANE
29	.	000072435	1	2	502	0	250	2	0	250	0	METHOXYCHLOR
30	.	000074839	1	9	1001620	0	996340	0	2200	0	3080	BROMOMETHANE
31	.	000074851	1	166	31629108	1424500	22949800	12686	0	7436	8659186	ETHYLENE
32	.	000074873	1	67	6664354	1421072	6200293	109958	131800	3100	219203	CHLOROMETHANE
33	.	000074884	1	1	805	0	250	0	55	0	500	METHYL IODIDE
34	.	000074908	1	34	1520128	134000	509462	1826	979650	3370	25820	HYDROGEN CYANIDE
35	.	000074953	1	6	27503	18339	21817	250	0	0	5436	METHYLENE BROMIDE
36	.	000075003	1	36	2533166	153000	2196690	2021	1510	2	332943	CHLOROETHANE
37	.	000075014	1	45	2051663	0	1011684	5598	700	2833	1030848	VINYL CHLORIDE
38	.	000075058	1	61	23234358	0	878109	70174	17263442	1260	5021373	ACETONITRILE
39	.	000075070	1	49	5497849	0	3529957	141636	1568090	27001	231165	ACETALDEHYDE
40	.	000075092	1	1157	110451450	14201743	76581814	369392	550000	67621	32872623	DICHLOROMETHANE
41	.	000075150	1	73	133380580	0	132832898	22791	89500	3480	431911	CARBON DISULFIDE
42	.	000075218	1	168	5734673	458651	3985694	43141	1205323	1445	499070	
43	.	000075274	1	5	2353097	0	7700	0	0	0	2345397	DICHLOROBROMOMETHANE
44	.	000075354	1	20	312989	0	192072	1267	10200	7	109443	VINYLIDENE CHLORIDE
45	.	000075445	1	26	77701	0	75201	250	250	0	2000	PHOSGENE
46	.	000075558	1	1	500	0	250	0	0	0	250	PROPYLENEIMINE
47	.	000075569	1	100	3937233	64071	3022672	68499	120000	336353	389709	PROPYLENE OXIDE
48	.	000075650	1	45	2230328	0	303102	104306	363379	57025	1402516	TERT-BUTYL ALCOHOL
49	.	000076131	1	747	26706603	2138803	17417064	36587	617	22562	9229773	FREON 113
50	.	000076448	1	1	118613	0	4	2	0	0	118607	HEPTACHLOR
51	.	000077474	1	3	518052	0	664	32	9913	0	507643	HEXACHLOROCYCLOPENTADIENE
52	.	000077781	1	15	10285	7600	2855	6680	0	0	750	DIMETHYL SULFATE
53	.	000078842	1	18	643930	0	590772	1036	0	3	52119	ISOBUTYRALDEHYDE
54	.	000078875	1	10	1041152	0	834840	34615	5000	540	166157	1,2-DICHLOROPROPANE
55	.	000078922	1	63	1262896	91027	550587	70051	47000	1000	594258	SEC-BUTYL ALCOHOL
56	.	000078933	1	1895	154746367	4263539	107814598	75691	75250	89263	46691565	METHYL ETHYL KETONE
57	.	000079005	1	40	3308106	25881	1495869	12019	0	9	1800209	1,1,2-TRICHLOROETHANE
58	.	000079016	1	756	37203161	2399975	26[illegible]963	31467	18720	70411	10468600	TRICHLOROETHYLENE
59	.	000079061	1	40	967438	154341	7872	4750	918000	914	35902	ACRYLAMIDE
60	.	000079107	1	125	27946064	0	200236	16376	27264250	6153	459049	ACRYLIC ACID
61	.	000079118	1	19	42457	0	6404	28300	280	0	7473	CHLOROACETIC ACID
62	.	000079210	1	4	7511	0	7488	23	0	0	0	PERACETIC ACID
63	.	000079345	1	16	772240	0	87951	8118	0	2	676169	1,1,2,2-TETRACHLOROETHANE
64	.	000079469	1	12	478847	12910	271192	4100	167501	0	36054	2-NITROPROPANE
65	.	000080057	1	48	683777	0	168138	13315	250	116954	385120	4,4-ISOPROPYLIDENEDIPHENOL
66	.	000080159	1	19	129855	320	9039	1256	63000	270	56290	CUMENE HYDROPEROXIDE
67	.	000080626	1	166	7278500	986759	2239982	25396	227550	3909	4781663	METHYL METHACRYLATE
68	.	000081072	1	2	9700	0	500	0	0	0	9200	SACCHARIN
69	.	000082688	1	2	14802	0	253	0	0	0	14549	QUINTOZENE
70	.	000084662	1	26	412188	1663	165138	1220	0	0	245830	DIETHYL PHTHALATE
71	.	000084742	1	91	647682	714	115192	22436	270000	252	239802	DIBUTYL PHTHALATE
72	.	000085449	1	147	5601542	1750100	405699	1560	0	1557	5192726	PHTHALIC ANHYDRIDE
73	.	000085687	1	79	1234027	15	208860	1000	0	8500	1015667	BUTYL BENZYL PHTHALATE
74	.	000086306	1	1	34000	0	0	0	34000	0	0	N-NITROSODIPHENYLAMINE
75	.	000087627	1	1	250	0	250	0	0	0	0	2,6-XYLIDINE

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURQTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
76	.	000087683	1	7	1985022	0	350	189	70	1	1984412	HEXACHLORO-1,3-BUTADIENE
77	.	000087865	1	52	542573	0	6527	3153	8520	66905	457468	PCP
78	.	000088062	1	2	15750	0	0	250	15500	0	0	2,4,6-TRICHLOROPHENOL
79	.	000088755	1	3	155218	0	1731	250	0	0	153237	2-NITROPHENOL
80	.	000088891	1	2	637143	0	250	500	0	500	635893	PICRIC ACID
81	.	000090040	1	5	8773	0	3103	607	0	250	4833	O-ANISIDINE
82	.	000090437	1	7	18536	0	1500	254	0	250	16532	2-PHENYLPHENOL
83	.	000090948	1	2	30739	0	400	0	0	0	30339	MICHLERS KETONE
84	.	000091087	1	120	600210	6	399705	102510	250	1000	96745	TOLUENE-2,6-DIISOCYANATE
85	.	000091203	1	307	30935226	120478	1906987	28210	34773	149888	28815366	NAPHTHALENE
86	.	000091225	1	24	33683	0	14678	507	0	351	18147	QUINOLINE
87	.	000091941	1	10	9952	0	504	2052	0	0	7396	3,3-DICHLOROBENZIDINE
88	.	000092524	1	145	2577683	194040	845802	158396	14000	51749	1507736	BIPHENYL
89	.	000092671	1	1	7	0	1	0	6	.	.	4AMINOBIPHENYL
90	.	000094360	1	25	144327	75	3470	950	19250	16000	104657	BENZOYL PEROXIDE
91	.	000094597	1	2	500	0	250	0	0	0	250	SAFROLE
92	.	000094757	1	17	98003	28216	2536	506	0	36079	58882	2,4D (ACETIC ACID)
93	.	000095476	1	86	2536741	30	1664342	14551	0	318184	539664	O-XYLENE
94	.	000095487	1	22	146675	0	10947	721	0	3200	131807	O-CRESOL
95	.	000095501	1	34	2255401	250	358718	27230	18000	15454	1835999	1,2-DICHLOROBENZENE
96	.	000095534	1	11	96766	16465	4551	823	250	525	88617	O-TOLUIDINE
97	.	000095636	1	156	1981672	161020	1311163	31521	253	16343	622392	1,2,4-TRIMETHYLBENZENE
98	.	000095807	1	1	317	0	67	250	0	0	0	2,4 DIAMINOTOLUENE
99	.	000096093	1	2	1548	0	769	779	0	0	0	STYRENE OXIDE
100	.	000096333	1	55	263610	3400	104946	1800	0	277	156587	METHYL ACRYLATE
101	.	000096457	1	3	4714	0	0	0	0	0	4714	ETHYLENE THIOUREA
102	.	000097563	1	1	1133	0	0	263	0	676	194	C.I. SOLVENT YELLOW 3
103	.	000098077	1	5	79996	0	982	0	0	0	79014	BENZOIC TRICHLORIDE
104	.	000098828	1	88	2870687	376000	2468768	4177	1000	8107	388635	CUMENE
105	.	000098873	1	3	682963	0	257	0	0	0	682706	BENZAL CHLORIDE
106	.	000098884	1	17	519731	0	31142	0	130000	0	358589	BENZOYL CHLORIDE
107	.	000098953	1	15	1555344	0	64412	17326	646000	250	807356	NITROBENZENE
108	.	000099592	1	1	400	0	0	0	0	0	400	5-NITRO-O-ANISIDINE
109	.	000100027	1	6	368251	0	2501	0	6800	250	358700	4-NITROPHENOL
110	.	000100210	1	39	2930339	0	287230	76425	0	12750	2553934	TEREPHTHALIC ACID
111	.	000100414	1	379	7877020	211227	3317692	21308	71030	105584	4361406	ETHYLBENZENE
112	.	000100425	1	643	45350698	1317512	18050687	107107	250	336122	26856532	STYRENE
113	.	000100447	1	34	226008	375	19037	870	1600	250	204251	BENZOYL CHLORIDE
114	.	000101144	1	1	250	0	.	0	0	0	250	MBOCA
115	.	000101611	1	1	18173	0	18173	0	0	0	0	4,4-METHYLENBIS BENZENAMINE
116	.	000101688	1	125	1320674	60787	95888	770	0	86975	1137041	MBI
117	.	000101779	1	16	714140	0	16049	2692	456000	2	239397	4,4-METHYLENEDIANILINE
118	.	000101804	1	3	1103	0	310	583	0	0	210	4,4-DIAMINODIPHENYL ETHER
119	.	000103231	1	32	340675	0	70174	4784	0	500	265217	BIS(2ETHYLHEXYL) ADIPATE
120	.	000104949	1	1	40	0	0	40	0	0	0	P-ANISIDINE
121	.	000105679	1	8	50469	0	545	563	44658	641	4062	2,4-DIMETHYLPHENOL
122	.	000106423	1	52	6635288	20	5651262	4110	0	598881	381035	P-XYLENE
123	.	000106445	1	17	564072	0	77397	1000	96000	16912	372763	P-CRESOL
124	.	000106467	1	9	1084685	0	840025	11557	19000	740	213363	1,4-DICHLOROBENZENE
125	.	000106503	1	11	490505	100	116124	3269	148287	2500	220325	P-PHENYLENEDIAMINE
126	.	000106514	1	4	912	0	563	110	0	0	239	QUINONE
127	.	000106887	1	12	35865	98930	31050	750	0	0	4065	1,2-BUTYLENE OXIDE
128	.	000106898	1	64	467244	1	178368	7161	73000	2480	206235	EPICHLORONYDRIN
129	.	000106934	1	26	86824	0	32565	1034	44	1952	51229	1,2-DIBROMOETHANE
130	.	000106990	1	100	4453396	90095	3737520	432668	0	4491	278717	1,3-BUTADIENE
131	.	000107028	1	8	139675	0	31963	562	106650	250	250	ACROLEIN
132	.	000107051	1	13	159576	22884	70289	48465	250	0	40572	ALLYL CHLORIDE
133	.	000107062	1	93	13491311	22780	3491086	73076	1312844	3173	8611132	1,2-DICHLOROETHANE
134	.	000107131	1	92	10245824	35723	4197362	7579	4539962	14948	1485973	ACRYLONITRILE
135	.	000107211	1	916	42519017	682336	9787190	4251829	1843362	543341	23093295	ETHYLENE GLYCOL
136	.	000107302	1	2	78	0	78	0	0	0	0	CHLOROMETHYL METHYL ETHER
137	.	000108054	1	127	9060892	218007	4509530	9923	2109378	1898984	533077	VINYL ACETATE
138	.	000108101	1	653	31440577	1300729	16821417	1116924	60450	84917	13356869	METHYL ISOBUTYL KETONE
139	.	000108316	1	139	2205151	0	772038	15354	250	5453	1412056	MALEIC ANHYDRIDE
140	.	000108383	1	63	2817890	22530	1491278	3646	0	300814	1022152	M-XYLENE
141	.	000108394	1	14	53369	0	12520	0	0	250	40579	M-CRESOL
142	.	000108781	1	61	1574192	0	161141	537048	25000	5530	845473	MELAMINE
143	.	000108883	1	2880	245100704	5429756	158538348	339959	1520944	1747264	82954189	TOLUENE
144	.	000108907	1	64	7363769	2115000	1474065	62744	56503	18878	5751579	CHLOROBENZENE
145	.	000108952	1	516	27012661	7905	4802398	403464	7721468	1096041	12989290	PHENOL
146	.	000109864	1	82	8404088	16900	6338827	28454	12000	252	2024555	2-METHOXYETHANOL
147	.	000110805	1	100	2942650	400	2008576	133783	0	54101	746190	2-ETHOXYETHANOL
148	.	000110827	1	232	7937015	10368	6178514	36446	332192	41006	1348857	CYCLOHEXANE
149	.	000110861	1	24	944215	0	42843	4630	303650	28656	564436	PYRIDINE
150	.	000111422	1	220	8852145	654719	122839	394342	3159500	101763	5073701	DIETHANOLAMINE

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURQTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
151	.	000111444	1	6	45275	0	1080	160	0	2	44033	BIS(2CHLOROETHYL) ETHER
152	.	000114261	1	1	750	0	0	0	0	0	750	PROPOXUR
153	.	000115071	1	145	12400087	600000	12375697	1186	0	2697	20507	PROPYLENE
154	.	000115322	1	1	1840	0	0	0	0	0	1840	DICOFOL
155	.	000117817	1	228	5027334	65797	957548	3595	500	18944	4046747	DEHP
156	.	000117840	1	38	185313	26540	24958	4600	0	1890	153865	N-DIOCTYL PHTHALATE
157	.	000118741	1	8	657673	0	189	6	522	0	656956	HEXACHLOROBENZENE
158	.	000120127	1	115	841132	0	89592	4883	0	22870	725787	ANTHRACENE
159	.	000120718	1	5	240456	0	1296	250	0	1678	237232	P-CRESIDINE
160	.	000120809	1	8	663535	0	270866	80300	0	10290	302079	CATECHOL
161	.	000120821	1	54	1923024	875321	202696	146678	2600	10034	1561016	1,2,4-TRICHLOROBENZENE
162	.	000120832	1	5	97373	0	1821	250	4580	12000	78722	2,4-DICHLOROPHENOL
163	.	000121142	1	10	5008540	0	71107	11270	203000	261	4722902	2,4-DINITROTOLUENE
164	.	000121697	1	16	609461	0	49136	17613	0	250	542462	N,N-DIMETHYLANILINE
165	.	000123319	1	42	1680665	0	6640	8113	402050	1854	1262008	HYDROQUINONE
166	.	000123386	1	11	646459	0	641487	423	3400	10	1139	PROPIONALDEHYDE
167	.	000123728	1	18	989804	0	538207	17653	2600	252	431292	BUTYRALDEHYDE
168	.	000123911	1	40	1075891	32	145558	163851	0	22501	743981	1,4-DIOXANE
169	.	000126998	1	12	1745799	0	869482	277	48200	0	847840	CHLOROPRENE
170	.	000127184	1	529	25440404	1916351	15978799	154971	354000	4746	8947888	TETRACHLOROETHYLENE
171	.	000131113	1	27	220727	0	48272	5001	630	1001	165823	DIMETHYL PHTHALATE
172	.	000132649	1	91	618431	0	28109	11891	0	13524	564907	DIBENZOFURAN
173	.	000133062	1	21	388425	0	18346	0	6100	500	363479	CAPTAN
174	.	000133904	1	1	4259	0	250	0	0	0	4009	CHLORAMBEN
175	.	000134327	1	3	31491	0	30241	0	0	0	1250	ALPHA-NAPHTHYLAMINE
176	.	000135206	1	3	2663	0	690	678	0	0	1295	CUPFERRON
177	.	000139139	1	11	2085024	0	2676	2900	1900000	4300	175148	NITRILOTRIACETIC ACID
178	.	000140885	1	91	315142	400460	139299	856	0	23007	151980	ETHYL ACRYLATE
179	.	000141322	1	143	2165717	25422	340425	2397	0	18733	1804162	BUTYL ACRYLATE
180	.	000151564	1	1	500	0	0	0	0	0	500	ETHYLENEIMINE
181	.	000156105	1	2	2250	0	0	0	2000	0	250	P-NITROSODIPHENYLAMINE
182	.	000156627	1	1	1000	0	750	0	0	250	0	CALCIUM CYANAMIDE
183	.	000177817	1	2	750	0	250	0	0	0	500	
184	.	000302012	1	30	202769	0	6465	31718	0	3108	161478	HYDRAZINE
185	.	000463581	1	19	20878344	0	20877594	750	0	0	0	CARBONYL SULFIDE
186	.	000510156	1	1	10	0	10	0	0	0	0	CHLOROBENZILATE
187	.	000532274	1	1	2156	0	250	1656	0	0	250	2-CHLOROACETOPHENONE
188	.	000534521	1	7	72706	0	788	1202	0	0	70716	4,6-DINITRO-O-CRESOL
189	.	000540590	1	8	148461	0	88977	357	346	1	58780	1,2-DICHLOROETHYLENE
190	.	000541413	1	4	1843	0	1843	0	0	0	0	ETHYL CHLOROFORMATE
191	.	000541731	1	6	120500	0	14848	1526	0	26	104100	1,3-DICHLOROBENZENE
192	.	000542756	1	5	23100	0	22050	560	0	490	0	1,3-DICHLOROPROPYLENE
193	.	000569642	1	2	1835	1586	1	0	0	0	1834	C.I. BASIC GREEN 4
194	.	000584849	1	188	1464291	58933	714432	250	0	1000	748609	TOLUENE-2,4-DIISOCYANATE
195	.	000593602	1	2	27200	0	27200	0	0	0	0	VINYL BROMIDE
196	.	000606202	1	6	1406593	0	17960	602	50700	250	1337081	2,6-DINITROTOLUENE
197	.	000615054	1	1	230	0	0	0	0	0	230	2,4-DIAMINOANISOLE
198	.	000624839	1	4	221624	0	210774	0	0	0	10850	METHYL ISOCYANATE
199	.	000842079	1	1	3652	0	0	0	0	0	3652	C.I. SOLVENT YELLOW 14
200	.	000961115	1	4	13196	0	6975	0	0	0	6219	TETRACHLORVINPHOS
201	.	001163195	1	39	572958	6020	150129	326	250	16250	406003	DECABROMODIPHENYL OXIDE
202	.	001310732	1	3981	616876980	12069857	2450069	78536126	34336890	131871282	369682613	SODIUM HYDROXIDE
203	.	001313275	1	50	791644	0	64458	65889	0	10384	650913	MOLYBDENUM TRIOXIDE
204	.	001314201	1	1	671100	0	1100	0	.	.	670000	THORIUM DIOXIDE
205	.	001319773	1	91	5342666	0	466994	11475	1295345	833144	2735708	CRESOL
206	.	001330207	1	2491	185910273	4234822	105279180	472783	586751	644453	78927106	XYLENE
207	.	001332214	1	128	24200443	2260367	39128	20129	252000	3676021	20213165	ASBESTOS
208	.	001336363	1	103	3614055	71560	1	510	250	250	3613044	PCBS
209	.	001582098	1	11	137766	0	1250	257	71	250	135938	TRIFLURALIN
210	.	001634044	1	68	1254901	0	1080305	95298	6900	2160	72238	METHYL TERT-BUTYL ETHER
211	.	001897456	1	6	871077	200	19127	240	0	0	851710	CHLOROTHALONIL
212	.	002164172	1	2	15826	0	250	0	0	0	15576	FLUOMETURON
213	.	002650182	1	1	750	0	0	0	0	0	750	C.I. ACID BLUE 9,DIAMMONIUM
214	.	003844459	1	5	230861	0	541	0	0	250	230070	C.I. ACID BLUE 9,DISODIUM SA
215	.	006484522	1	134	114208132	644391	6905275	11716298	58565000	15076212	21945347	AMMONIUM NITRATE
216	.	007429905	1	232	37865239	117773	3781167	119073	3	2924080	31040916	ALUMINUM
217	.	007439921	1	550	50449019	2059807	939052	66055	287872	19903258	29252782	LEAD
218	.	007439965	1	396	38570464	169257	363857	417178	250	14237072	23552107	MANGANESE
219	.	007439976	1	30	293802	10777	6067	2111	0	28267	257357	MERCURY
220	.	007440020	1	598	16466298	3162729	264482	117183	22663	752639	15309331	NICKEL
221	.	007440224	1	39	27752	11	8709	1076	500	1922	15545	SILVER
222	.	007440280	1	5	95903	0	54161	1850	0	0	39892	THALLIUM
223	.	007440360	1	102	1188208	26600	30124	37256	8800	641058	470970	ANTIMONY
224	.	007440382	1	89	1568908	4517	39292	2662	0	70861	1456093	ARSENIC
225	.	007440393	1	98	10747251	3620	68203	8981	0	7004752	3665315	BARIUM

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURRTY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
226	.	007440417	1	6	52325	0	1250	1005	0	27620	22450	BERYLLIUM
227	.	007440439	1	63	277974	1000	7892	7840	4220	144461	113761	CADMIUM
228	.	007440473	1	676	33767524	1172188	352856	198652	2844	2690651	30514721	CHROMIUM
229	.	007440484	1	80	266224	524000	10091	13753	0	18711	225669	COBALT
230	.	007440508	1	1009	177759255	7835865	2122208	272449	452890	138314090	36597618	COPPER
231	.	007440622	1	18	219139	0	16706	1092	0	54944	146397	VANADIUM
232	.	007440666	1	457	89062188	6945460	2929167	454486	189574	44081364	41387589	ZINC
233	.	007550450	1	20	144125	0	37008	25	0	750	1603456	TITANIUM TETRACHLORIDE
234	.	007647010	1	1966	6517339.7	48073121	47501620	13671616	413452666	12111401	164996614	HYDROCHLORIC ACID
235	.	007664382	1	1125	342961221	1403079	1224710	128515077	75704	187198201	25929529	PHOSPHORIC ACID
236	.	007664395	1	367	37132139	386702	8106818	284086	598220	19185998	9859017	HYDROGEN FLUORIDE
237	.	007664417	1	1514	388240824	5671882	263154902	31661355	47761820	4857305	48825442	AMMONIA
238	.	007664939	1	2781	59-495794	12961128	17077108	77534067	136299725	80073259	283511635	SULFURIC ACID
239	.	007697372	1	1172	97084779	1500261	6205048	14570456	9187612	8919011	56202652	NITRIC ACID
240	.	007723140	1	34	6166845	35810	5337	17840	0	4043178	2100598	PHOSPHORUS
241	.	007782492	1	10	15563	0	1522	850	0	6677	6514	SELENIUM
242	.	007782505	1	992	125513670	144365	104617580	10969716	83959	1526301	8316134	CHLORINE
243	.	010034932	1	1	139000	0	0	0	139000	0	0	HYDRAZINE SULFATE
244	.	010049044	1	97	12090889	0	11986281	7965	0	133371	43272	CHLORINE DIOXIDE
245	.	012122677	1	3	417946	0	750	0	0	0	417196	ZINEB
246	.	012427382	1	9	56366	50	35104	0	0	0	21262	MANEB
247	.	025321226	1	15	458758	65609	59712	1068	250	78610	319118	DICHLOROBENZENE
248	.	025376458	1	9	1687857	48	10039	1843	28000	500	1647475	DIAMINOTOLUENE
249	.	039156417	1	1	1000	0	250	250	0	0	500	2,4-DIAMINOANISOLE SULFATE

Table 3. TOTAL CHEMICAL POLLUTANTS FOR ISIC 311-390 ACCORDING TO FORM OF DISCHARGE: AIR, WATER, LAND AND UNDERGROUND (Pounds)

OBS	ISIC	CAS	_TYPE_	_FREQ_	CALCTOT	CURRITY	TOTAIR	WATER	UNDGRD	LAND	TOTTRAN	CHEM
1	.		2	19	846549	0	179891	17500	0	0	649158	TRADE SECRET/NOT REPORTED
2	311		2	1431	125317245	1644306	4442632	19363383	132225	18890721	82488284	TRADE SECRET/NOT REPORTED
3	312		2	115	4560343	13500	558677	152224	0	67300	3782142	TRADE SECRET/NOT REPORTED
4	313		2	307	28220257	46450	1367684	355743	58341	450165	25988324	TRADE SECRET/NOT REPORTED
5	314		2	29	3796159	62336	2190562	131600	0	0	1473997	TRADE SECRET/NOT REPORTED
6	321		2	728	144245274	1269053	35544403	40563773	0	455789	67681309	TRADE SECRET/NOT REPORTED
7	322		2	22	758179	0	432003	0	0	0	326176	TRADE SECRET/NOT REPORTED
8	323		2	168	29226791	11891795	11089919	80630	0	110042	17946200	TRADE SECRET/NOT REPORTED
9	324		2	70	1034349	8494	995129	246	0	0	38974	TRADE SECRET/NOT REPORTED
10	331		2	1455	27033164	4902248	21245850	137136	0	181613	5468565	TRADE SECRET/NOT REPORTED
11	332		2	1268	52633835	3338225	43983329	48234	0	29043	8573229	TRADE SECRET/NOT REPORTED
12	341		2	1757	325921496	3261855	183595427	38013864	30394	13873960	90407851	TRADE SECRET/NOT REPORTED
13	342		2	475	26513221	1516324	17925362	4021	0	1803	8582035	TRADE SECRET/NOT REPORTED
14	351		2	10281	2379198605	81145510	595850662	216167765	520530284	360704538	687945106	TRADE SECRET/NOT REPORTED
15	352		2	6064	329026062	13144577	76719110	29870935	36794511	5173078	18068428	TRADE SECRET/NOT REPORTED
16	353		2	2139	189974766	1298725	24637499	9480039	30756670	10027351	115073207	TRADE SECRET/NOT REPORTED
17	354		2	240	11397015	202248	1242957	145122	891000	1117576	8000360	TRADE SECRET/NOT REPORTED
18	355		2	682	35508146	178934	25721761	69315	0	62644	9654426	TRADE SECRET/NOT REPORTED
19	356		2	1203	99696121	4051725	75003663	209616	49550	27636	24405656	TRADE SECRET/NOT REPORTED
20	361		2	74	4722576	3391	1553474	20900	0	189744	2958458	TRADE SECRET/NOT REPORTED
21	362		2	237	8188062	176980	2912608	270312	7050	496002	4502090	TRADE SECRET/NOT REPORTED
22	369		2	748	43866619	2903745	11669475	306110	6319250	2524463	23047321	TRADE SECRET/NOT REPORTED
23	372		2	7752	805009960	32045942	178298103	7125305	2014150	385838236	231734166	TRADE SECRET/NOT REPORTED
24	381		2	464	22046148	469684	8303772	166874	500	228599	13344403	TRADE SECRET/NOT REPORTED
25	382		2	1875	61695128	7391357	29436449	682910	250	276566	31298953	TRADE SECRET/NOT REPORTED
26	383		2	4274	216176759	5608365	80252015	3697904	1746306	4090784	126389750	TRADE SECRET/NOT REPORTED
27	384		2	3635	255437348	3632069	147566575	972297	421509	4978443	101498524	TRADE SECRET/NOT REPORTED
28	385		2	900	68799626	797382	37616117	623787	0	164466	30395256	TRADE SECRET/NOT REPORTED
29	390		2	687	32548011	1115215	19117273	307120	250	248233	12875135	TRADE SECRET/NOT REPORTED
30	999		2	4696	875991725	12696975	111206090	60759583	236004166	149585954	318435932	TRADE SECRET/NOT REPORTED

TRI List Of Chemicals for 1987 Reporting

SECTION 313 TOXIC CHEMICAL LIST
(Including Chemical Categories)

Note: Chemicals may be added or deleted to the list. The Emergency Planning and Community Right-to-Know Hotline, (800) 535-0202 or (202) 479-2449 in Washington, D.C. or Alaska, will provide up-to-date information on the status of these changes.

a. Alphabetical List (Effective Date January 1, 1987)

CAS Number	Chemical Name
75-07-0	Acetaldehyde
60-35-5	Acetamide
67-64-1	Acetone
75-05-8	Acetonitrile
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
309-00-2	Aldrin [1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-(1.alpha., 4.alpha.,4a.beta.,5.alpha., 8.alpha.,8a.beta.)-]
107-05-1	Allyl chloride
7429-90-5	Aluminum (fume or dust)
1344-28-1	Aluminum oxide
117-79-3	2-Aminoanthraquinone
60-09-3	4-Aminoazobenzene
92-67-1	4-Aminobiphenyl
82-28-0	1-Amino-2-methylanthraquinone
7664-41-7	Ammonia
6484-52-2	Ammonium nitrate (solution)
7783-20-2	Ammonium sulfate (solution)
62-53-3	Aniline
90-04-0	o-Anisidine
104-94-9	p-Anisidine
134-29-2	o-Anisidine hydrochloride
120-12-7	Anthracene
7440-36-0	Antimony
7440-38-2	Arsenic
1332-21-4	Asbestos (friable)
7440-39-3	Barium
98-87-3	Benzal chloride
55-21-0	Benzamide
71-43-2	Benzene
92-87-5	Benzidine
98-07-7	Benzoic trichloride (Benzotrichloride)
98-88-4	Benzoyl chloride
94-36-0	Benzoyl peroxide
100-44-7	Benzyl chloride
7440-41-7	Beryllium
92-52-4	Biphenyl
111-44-4	Bis(2-chloroethyl) ether
542-88-1	Bis(chloromethyl) ether
108-60-1	Bis(2-chloro-1-methylethyl) ether
103-23-1	Bis(2-ethylhexyl) adipate
75-25-2	Bromoform (Tribromomethane)
74-83-9	Bromomethane (Methyl bromide)
106-99-0	1,3-Butadiene
141-32-2	Butyl acrylate
71-36-3	n-Butyl alcohol
78-92-2	sec-Butyl alcohol
75-65-0	tert-Butyl alcohol
85-68-7	Butyl benzyl phthalate
106-88-7	1,2-Butylene oxide
123-72-8	Butyraldehyde
2650-18-2	C.I. Acid Blue 9, diammonium salt
3844-45-9	C.I. Acid Blue 9, disodium salt
4680-78-8	C.I. Acid Green 3
569-64-2	C.I. Basic Green 4
989-38-8	C.I. Basic Red 1
1937-37-7	C.I. Direct Black 38
2602-46-2	C.I. Direct Blue 6
16071-86-6	C.I. Direct Brown 95
2832-40-8	C.I. Disperse Yellow 3
3761-53-3	C.I. Food Red 5
81-88-9	C.I. Food Red 15
3118-97-6	C.I. Solvent Orange 7
97-56-3	C.I. Solvent Yellow 3
842-07-9	C.I. Solvent Yellow 14
492-80-8	C.I. Solvent Yellow 34 (Auramine)
128-66-5	C.I. Vat Yellow 4
7440-43-9	Cadmium
156-62-7	Calcium cyanamide
133-06-2	Captan [1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-]
63-25-2	Carbaryl [1-Naphthalenol, methylcarbamate]
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
463-58-1	Carbonyl sulfide
120-80-9	Catechol
133-90-4	Chloramben [Benzoic acid, 3-amino-2,5-dichloro-]
57-74-9	Chlordane [4,7-Methanoindan, 1,2,4,5,6,7,8,8- octachloro-2,3,3a,4,7,7a-hexahydro-]
7782-50-5	Chlorine
10049-04-4	Chlorine dioxide
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate [Benzeneacetic acid, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-hydroxy-, ethyl ester]
75-00-3	Chloroethane (Ethyl chloride)
67-66-3	Chloroform
74-87-3	Chloromethane (Methyl chloride)
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
1897-45-6	Chlorothalonil [1,3-Benzenedicarbonitrile, 2,4,5,6-tetrachloro-]
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
120-71-8	p-Cresidine
1319-77-3	Cresol (mixed isomers)
108-39-4	m-Cresol
95-48-7	o-Cresol
106-44-5	p-Cresol
98-82-8	Cumene
80-15-9	Cumene hydroperoxide
135-20-6	Cupferron [Benzeneamine, N-hydroxy-N-nitroso, ammonium salt]

110-82-7	Cyclohexane
94-75-7	2,4-D [Acetic acid, (2,4-dichlorophenoxy)-]
1163-19-5	Decabromodiphenyl oxide
2303-16-4	Diallate [Carbamothioic acid,bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester]
615-05-4	2,4-Diaminoanisole
39156-41-7	2,4-Diaminoanisole sulfate
101-80-4	4,4'-Diaminodiphenyl ether
25376-45-8	Diaminotoluene (mixed isomers)
95-80-7	2,4-Diaminotoluene
334-88-3	Diazomethane
132-64-9	Dibenzofuran
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)
106-93-4	1,2-Dibromoethane (Ethylene dibromide)
84-74-2	Dibutyl phthalate
25321-22-6	Dichlorobenzene (mixed isomers)
95-50-1	1,2-Dichlorobenzene
541-73-1	1,3-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
91-94-1	3,3'-Dichlorobenzidine
75-27-4	Dichlorobromomethane
107-06-2	1,2-Dichloroethane (Ethylene dichloride)
540-59-0	1,2-Dichloroethylene
75-09-2	Dichloromethane (Methylene chloride)
120-83-2	2,4-Dichlorophenol
78-87-5	1,2-Dichloropropane
542-75-6	1,3-Dichloropropylene
62-73-7	Dichlorvos [Phosphoric acid, 2 dichloroethenyl dimethyl ester]
115-32-2	Dicofol [Benzenemethanol, 4-chloro-.alpha.- 4-chlorophenyl)-.alpha.- (trichloromethyl)-]
1464-53-5	Diepoxybutane
111-42-2	Diethanolamine
117-81-7	Di-(2-ethylhexyl) phthalate (DEHP)
84-66-2	Diethyl phthalate
64-67-5	Diethyl sulfate
119-90-4	3,3'-Dimethoxybenzidine
60-11-7	4-Dimethylaminoazobenzene
119-93-7	3,3'-Dimethylbenzidine (o-Tolidine)
79-44-7	Dimethylcarbamyl chloride
57-14-7	1,1-Dimethyl hydrazine
105-67-9	2,4-Dimethylphenol
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfate
534-52-1	4,6-Dinitro-o-cresol
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
606-20-2	2,6-Dinitrotoluene
117-84-0	n-Dioctyl phthalate
123-91-1	1,4-Dioxane
122-66-7	1,2-Diphenylhydrazine (Hydrazobenzene)
106-89-8	Epichlorohydrin
110-80-5	2-Ethoxyethanol
140-88-5	Ethyl acrylate
100-41-4	Ethylbenzene
541-41-3	Ethyl chloroformate
74-85-1	Ethylene
107-21-1	Ethylene glycol
151-56-4	Ethyleneimine (Aziridine)
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
2164-17-2	Fluometuron [Urea, N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]-]
50-00-0	Formaldehyde
76-13-1	Freon 113 [Ethane, 1,1,2-trichloro-1,2,2-trifluoro-]
76-44-8	Heptachlor [1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene]
118-74-1	Hexachlorobenzene
87-68-3	Hexachloro-1,3-butadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
1335-87-1	Hexachloronaphthalene
680-31-9	Hexamethylphosphoramide
302-01-2	Hydrazine
10034-93-2	Hydrazine sulfate
7647-01-0	Hydrochloric acid
74-90-8	Hydrogen cyanide
7664-39-3	Hydrogen fluoride
123-31-9	Hydroquinone
78-84-2	Isobutyraldehyde
67-63-0	Isopropyl alcohol (manufacturing-strong acid process, no supplier notification)
80-05-7	4,4'-Isopropylidenediphenol
7439-92-1	Lead
58-89-9	Lindane[Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha.,3.beta.,4.alpha.,5.alpha.,6.beta.)-]
108-31-6	Maleic anhydride
12427-38-2	Maneb [Carbamodithioic acid, 1,2-ethanediylbis-, manganese complex]
7439-96-5	Manganese
108-78-1	Melamine
7439-97-6	Mercury
67-56-1	Methanol
72-43-5	Methoxychlor [Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-methoxy-]
109-86-4	2-Methoxyethanol
96-33-3	Methyl acrylate
1634-04-4	Methyl tert-butyl ether
101-14-4	4,4'-Methylenebis(2-chloro aniline) (MBOCA)
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzenamine
101-68-8	Methylenebis(phenylisocyanate) (MBI)
74-95-3	Methylene bromide
101-77-9	4,4'-Methylenedianiline
78-93-3	Methyl ethyl ketone
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide
108-10-1	Methyl isobutyl ketone
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
90-94-8	Michler's ketone
1313-27-5	Molybdenum trioxide
505-60-2	Mustard gas [Ethane, 1,1'-tahiobis[2-chloro-]
91-20-3	Naphthalene
134-32-7	alpha-Naphthylamine
91-59-8	beta-Naphthylamine
7440-02-0	Nickel
7697-37-2	Nitric acid
139-13-9	Nitrilotriacetic acid
99-59-2	5-Nitro-o-anisidine
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl
1836-75-5	Nitrofen [Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-]
51-75-2	Nitrogen mustard [2-Chloro-N-(2-chloroethyl) -N-methylethanamine]
55-63-0	Nitroglycerin
88-75-5	2-Nitrophenol
100-02-7	4-Nitrophenol

79-46-9	2-Nitropropane
156-10-5	p-Nitrosodiphenylamine
121-69-7	N,N-Dimethylaniline
924-16-3	N-Nitrosodi-n-butylamine
55-18-5	N-Nitrosodiethylamine
62-75-9	N-Nitrosodimethylamine
86-30-6	N-Nitrosodiphenylamine
621-64-7	N-Nitrosodi-n-propylamine
4549-40-0	N-Nitrosomethylvinylamine
59-89-2	N-Nitrosomorpholine
759-73-9	N-Nitroso-N-ethylurea
684-93-5	N-Nitroso-N-methylurea
16543-55-8	N-Nitrosonornicotine
100-75-4	N-Nitrosopiperidine
2234-13-1	Octachloronaphthalene
20816-12-0	Osmium tetroxide
56-38-2	Parathion [Phosphorothioic acid, 0, 0-diethyl-0-(4-nitrophenyl) ester]
87-86-5	Pentachlorophenol (PCP)
79-21-0	Peracetic acid
108-95-2	Phenol
106-50-3	p-Phenylenediamine
90-43-7	2-Phenylphenol
75-44-5	Phosgene
7664-38-2	Phosphoric acid
7723-14-0	Phosphorus (yellow or white)
85-44-9	Phthalic anhydride
88-89-1	Picric acid
1336-36-3	Polychlorinated biphenyls (PCBs)
1120-71-4	Propane sultone
57-57-8	beta-Propiolactone
123-38-6	Propionaldehyde
114-26-1	Propoxur [Phenol, 2-(1-methylethoxy)-, methylcarbamate]
115-07-1	Propylene (Propene)
75-55-8	Propyleneimine
75-56-9	Propylene oxide
110-86-1	Pyridine
91-22-5	Quinoline
106-51-4	Quinone
82-68-8	Quintozene [Pentachloronitrobenzene]
81-07-2	Saccharin (manufacturing, no supplier notification) [1,2-Benzisothiazol -3(2H)-one, 1,1-dioxide]
94-59-7	Safrole
7782-49-2	Selenium
7440-22-4	Silver
1310-73-2	Sodium hydroxide (solution)
7757-82-6	Sodium sulfate (solution)
100-42-5	Styrene
96-09-3	Styrene oxide
7664-93-9	Sulfuric acid
100-21-0	Terephthalic acid
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethylene (Perchloroethylene)
961-11-5	Tetrachlorvinphos [Phosphoric acid, 2-chloro-1- (2,3,5-trichlorophenyl)ethenyl dimethyl ester]
7440-28-0	Thallium
62-55-5	Thioacetamide
139-65-1	4,4'-Thiodianiline
62-56-6	Thiourea
1314-20-1	Thorium dioxide
7550-45-0	Titanium tetrachloride
108-88-3	Toluene
584-84-9	Toluene-2,4-diisocyanate
91-08-7	Toluene-2,6-diisocyanate
95-53-4	o-Toluidine
636-21-5	o-Toluidine hydrochloride
68-76-8	Triaziquone [2,5-Cyclohexadiene-1,4-dione, 2,3,5-tris(1-aziridinyl)-]
52-68-6	Trichlorfon [Phosphonic acid, (2,2,2-trichloro-1-hydroxyethyl)-, dimethyl ester]
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
1582-09-8	Trifluralin [Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-]
95-63-6	1,2,4-Trimethylbenzene
126-72-7	Tris(2,3-dibromopropyl) phosphate
51-79-6	Urethane (Ethyl carbamate)
7440-62-2	Vanadium (fume or dust)
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride
1330-20-7	Xylene (mixed isomers)
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene
87-62-7	2,6-Xylidine
7440-66-6	Zinc (fume or dust)
12122-67-7	Zineb [Carbamodithioic acid, 1,2-ethanediylbis-, zinc complex]

4. LIST OF POLLUTION ABATEMENT CASE STUDIES

CASE STUDIES ON POLLUTION ABATEMENT IN MANUFACTURING INDUSTRIES AND IN INDUSTRIAL PROCESSING

1. Metal Parts Cleaning
2. Printed Circuit Board Industry
3. Copper Smelting
4. Agro - Industries - General
5. Dairy Processing
6. Animal Waste
7. Grain Milling
8. Sugar Refining
9. Oils and Fats Processing
10. Fish and Seafood Processing
11. Red Meat Processing
12. Poultry Processing
13. Vegetable and Fruit Processing
14. Speciality Food Processing
15. Beer/Malt Liquor Processing
16. Wine, Brandy, Distilled Liquors Processing
17. Soft Drinks Processing
18. Flavoring and Extracts Processing
19. Egg Processing
20. Paper and Pulp Processing

Walter C. Labys. Professor, Department of Mineral and Energy Resource Economics, West Virginia University, Morgantown, WV 26506.

CASE STUDIES ON POLLUTION ABATEMENT IN MANUFACTURING INDUSTRIES AND IN INDUSTRIAL PROCESSING

21. Iron and Steel Processing
22. Textile Industry
23. Aluminum Processing
24. Metal Finishing
25. Primary and Secondary Lead Processing
26. Copper and Brass Processing
27. Zinc Processing
28. Metal Foundry
29. Cadium Processing
30. Trichloroethylene Manufacturing
31. Petroleum Refining
32. Plastics Manufacture
33. Synthetic Rubber Manufacture
34. Plastics Products Industry
35. Rubber Products Industry
36. Asbestos Milling
37. Asbestos Products
38. Brick Industry
39. Cement Industry
40. Ceramic Clay Products

CASE STUDIES ON POLLUTION ABATEMENT IN MANUFACTURING INDUSTRIES AND IN INDUSTRIAL PROCESSING

41. Concrete Industry

42. Fiberglass Industry

43. Frit Manufacturing

44. Glass Industry

45. Mineral Wool Industry

46. Sand and Gravel Industry

47. Stone Quarrying and Processing

48. Metal Pretreatment Processes

49. Electroplating Processes

50. Printed Board Production Processes

51. Related Metal Finishing Processes

52. Metal Post-treatment Processes

53. Electroplating and Related Metal Finishing Pollution Control Processes

54. Petrochemical Processing

5. SUPPORTING BIBLIOGRAPHICAL INFORMATION

LIST OF AVAILABLE STUDIES: POLLUTION ABATEMENT IN THE INDUSTRIAL PROCESSING INDUSTRY

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LIST OF COMPENDUMS ON ADDITIONAL INDUSTRY PROCESS POLLUTION ABATEMENT INFORMATION

1. Case Summaries of Waste Reduction in the Southeast

2. California Waste Reduction Studies

3. U.S. Environmental Protection Agency

4. Environmental High Technology from Finland

5. OECD Environment Studies

6. UN Environment Studies

7. Miscellaneous Monographs

6. SUMMARY OF PREVIOUS MAILINGS

Department of Mineral Resource Economics
West Virginia University
College of Mineral and Energy Resources

February 7, 1990

Dr. Se-Hark Park
Senior Economist
Global and Conceptual Studies
Vienna International Centre
P.O. Box 400
A-1400 Vienna
Austria

Dear Dr. Park:

I have enclosed the second set of case studies describing pollution abatement in industrial processes for a selected set of process industries. This material relates to Part II of the work task for my contract. Any individual study may not contain all of the requested information. However, they do contain in aggregate the following requested information:

(1) Major types of pollutant, (2) types of abatement equipment used, (3) quantity of pollutants, (4) estimates of quantities with/without the use of abatement equipment, (5) physical characteristics of pollutants, (6) minimum standards for pollutants, (7) remedial methods and costs of treatment and disposals of industrial effluents, (8) pollution abatement equipment available and their cost estimates per ton, and (9) alternative new low-waste technologies and related cost estimates.

I hope that these studies meet with your approval and look forward to hearing from you. This package contains studies No.

Yours sincerely,

Walter C. Labys
Professor of Resource Economics

WCL:bdh

Enclosure

Department of Mineral Resource Economics
West Virginia University
College of Mineral and Energy Resources

February 21, 1990

Dr. Se-Hark Park
Senior Economist
Global and Conceptual Studies
Vienna International Centre
P.O. Box 400
A-1400 Vienna
Austria

Dear Dr. Park:

I have attached the first set of value added, gross output and cost of pollution abatement data tables related to Part I of the work tasks stipulated for my contract. These tables conform to the requested ISIC 3-digit level configuration. The source of information for all of the data featured in the tables is the Bureau of the Census, Department of Commerce, Washington, DC.

The second set of tables provides a supplement to the first set of tables. According to the guidelines of Part I of the contract, data were to be provided regarding the volume of the major industrial pollutants, conforming to ISIC Code of the first set of tables. The volume of pollutants listed are given in pounds of concentrated chemical pollutant, no matter whether the release or transfer was by air, water or land.

Please recognize that these tables are only in preliminary form. To meet the deadline imposed by the contract, I have enclosed computer data which has not yet been organized and printed in suitable tabular form. The chemical emissions identified in the tables are listed by chemical code only: CAS Registry Number. I have attached separately a chemical code sheet which can be used to identify the quantities of chemicals reported. At this point, the data appear to satisfy our needs for emission volumes. However, the data needs further evaluation and refinement on my part, before I give you the final tables. The forthcoming set of tables among other things will list the names of the chemicals and be organized in a professional manner.

I am sorry that the second set of tables could not be finalized by February 15. However, I hope that you appreciate the substantial amount of effort required to read and to interpret the tapes. The Toxic Release Inventory (TRI) is the most up-to-date product of the Environmental Protection Agency regarding pollution emission data. In order to provide UNIDO with the required data, I had to purchase a data set which required four tapes consisting of some one million bits of information. We have been working since the end of December to read the tapes. This has required a considerable amount of effort and only this week have we been able to transfer the data into a SAS format which can be manipulated. This difficulty accounts for the delay in submitting the research product to you. Now that we can easily work the tape, we can prepare the required tables in the manner suggested above. I hope to send these tables to you soon.

Finally, we have discussed the possibility that UNIDO may want to acquire or to purchase a fuller set of case studies on pollution abatement than what has been possible to provide. I am now completing this bibliography or list of case studies and related publications and will send it to you shortly.

Please note that this mailing also contains the second set of case studies. There should be about two or three more of these studies, and I will send these studies later along with the bibliography.

Yours sincerely,

Walter C. Labys
Professor of Resource Economics
Benedum Distinguished Scholar

WCL:bdh