# Appendix A. Pollution Abatement Form and Instructions

MA-200(I)

U S. DEPARTMENT OF COMMERCE

### INSTRUCTIONS AND DEFINITIONS **1983 SURVEY OF POLLUTION ABATEMENT COSTS AND EXPENDITURES**

#### **GENERAL INSTRUCTIONS and DEFINITIONS**

The purpose of the questionnaire is to collect total expenditures made by industry to abate pollutant emissions. The survey covers current operating costs and capital expenditures made to reduce pollution in its air, water, or solid forms.

ANSWER ALL QUESTIONS. If you cannot answer a question from your company records, please estimate the answer Trom you company records, prease stimute the analysis carefully. In particular cases, identification of abatement expenditures may require the joint efforts of your establishment id not operate for a full year, please indicate the disposition by marking the appropriate box(es) in item 1A, Onerships Status **Operating Status** 

Report all value figures in thousands of dollars.

Report data on a calendar year basis for 1983, However, if your establishment uses a fiscal year that ends between 10/31/83 and 2/28/84, fiscal year data will be acceptable.

For information concerning the possible use of reporting for-mats other than the form provided, such as computer tape or printouts, contact Mr. Mendel D. Gayle (301) 763-1755.

Poliution abatement means the reduction or elimination of pollutants emitted from your property or activities. Pollution abatement includes prevention, treatment, and recycling. Treatment refers to the wide variety of techniques used to cool, detoxify, decompose, and separate-to-store or ameliorate.

Efforts to improve environmental aesthetics or employee comfort, such as landscaping or air conditioning, should **not** be included in the answers to this survey. Do **not** include expenditures for health and safety. Do **not** include purchases of motor vehicles with pollution abatement devices. The cost of such devices will be estimated by other means.

Some establishments manufacture equipment and materials, such as electrostatic precipitators or desulfurized fuels, to be sold to others for pollution abatement purposes. Current and capital expenditures for the production of such equipment and materials should not be reported.

Air pollutants are airborne substances, including particulates (dust, fly ash, smoke), sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, volatile organic compounds, lead, hazardous air pollutants (as identified in Sec. 112 of the Clean Air Act), and other air pollutants.

Water polutants are harmful or objectionable waterborne substances causing alterations in water quality. They include:

- · Conventional pollutants (total suspended solids, oil and grease, fecal coliform, ph, BOD5)
- Nonconventional pollutants (aluminum, ammonia, iron, barium, boron, chlorine, cobalt, fluoride, manganese, phosphorous, sulfur-hydrogen sulfide, titanium)
- Toxic metals/toxic inorganic compounds (antimony, arsenic, asbestos, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, thallium, zinc)
- Toxic organic (benzene, chlorethane, chloremethane, toluene, zylene or those designated by the Clean Water Act and EPA)

Solid waste includes garbage, trash, aewage sludge, dredged spoils, incinerator residue; wrecked or diacarded equipment. Include solid waste produced as a result of air and water pollu-tion abatement. "Hazardous solid waste are solid waste or combinations of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in serious irreversible, or incapacitating reversible illness; or (B) pose a substantial present or potential hazard to numan health or the environment when improperly treated. Stored, transported, or disposed of, or otherwise manage." For identification and listing of hazardous waste, refer to Sub-trite C-Hazardous Waste Management – Section 3001. Resource Conservation and Recovery Act 1976, Public Law 94-580, 42 US 6903,

#### SPECIFIC INSTRUCTIONS

#### item 1A -- OPERATIONAL STATUS

Report the status of operations at this plant at the end of 1983.

Idle Plents - If this plant was temporarily idle during the entire period covered by this survey, this report should still be completed in its entirety. Actual operations for the various items should be reported as zero where appropriate.

Sold or Leased Plant - If this plant was sold or leased to another company to operate, indicate the month and year this action took place, report the new owner or operator in item 1B, complete item 3, and return form.

#### Item 2 - WHO SHOULD REPORT?

No Pollution Abatement Activities -- Every concern receiving a report form which had no pollution abatement operating costs, payments to government, or capital expenditures during 1983, should complete only items 2 and 12, and return form for processing. Failure to return the form will require the issuance of followup letters.

Pollution Abstement Activities - Every concern receiving a report form which had some pollution abatement operating costs, payment to government, or capital expenditures during 1983, is required to submit data for items 3 through 11 as applicable.

# Items 3 through 5 - ANNUAL COST FOR POLLUTION ABATEMENT

Item 3 — Report the annual operating costs and expenses for pollution abatement incurred in 1983. Include all costs and expenses to operate and maintain plant and equipment that abate air or water pollutants and for solid waste management. Include services provided by private contractor

This item should include the operating cost for all pollution abatement equipment and processes in operation during 1983 regardless of the year the equipment was installed or the process initiated.

#### INCLUDE THESE COSTS

- Operation and maintenance of plant and equipment
- Depreciation (or amortization) due to usage of plant and equipment
- Materials, leasing of equipment, parts, and direct labor
- Fuel and power as well as any increased cost due to increased consumption
- Services provided by private contractor

#### DO NOT INCLUDE THESE COSTS

- Expenditures for research and development
- Expenditures for health and safety
- Interest for financing pollution abatement capital expenditures
- Payment to governmental units (item 4)

## If you abate pollutants (air, water, or solid waste), be sure to complete the corresponding quantity section sure to comple (items 9-11).

Item 4a - Report all payments to governmental units for sewage arrice. Include payments for industrial or sanitary sewage and payments to government for overstrength effluent charges, sewer district tax assessment, etc. include sewage service charges which are included in your local tax bill; estimate if necessary.

Item 4b — Report all payments to governmental units for municipal solid waste collection and disposal services. Included are collection cost to municipal agency (hauler) and disposal cost such as dump or burial fees at a landfill or incinerator.

Item 5 — The estimate of costs recovered through abatement activities may have two parts: (1) the value of materials or energy reclaimed through abatement activities that were reused in production, and (2) revenue that was channed from the sale of materials or energy reclaimed through abatement activities. Heat is an example of reclaimed energy. Value and revenue are net of any additional cost incurred for additional processing of materials or energy to make them reusable or salable.

For air and water, exclude the value of items if they would have been recovered, sold, or reused in production in the absence of pollution control regulations. In the case where a pollution abatement device is installed solely for the purpose of making a manufacturing process profitable; the recovery cost obtained by the usage of this device should **not** be reported in this item.

Do not reduce annual costs of abatement (item 3) by the estimate reported here.

#### SPECIFIC INSTRUCTIONS - Continued

Items 6 through 8 - CAPITAL EXPENDITURES FOR NEW PLANT AND EQUIPMENT FOR POLLUTION ABATEMENT

Capital expenditures for new plant and equipment include new plant and equipment acquisitions (both replacement and expansion) and expenditures for construction in progress Capital expenditures are those chargeable to your establishment is accounts for plant and eoupment that are subject to depreciation or to amortization. Total capital expenditures for abatement include expenditures for both end-of-line techniques and changes-in-production processes Exclude expenditures for research and development.

Item 6a – End-of-line techniques treat air pollutants after their generation in your production processes by use of separately identifiable abatement (retrofit) facilities such as dust collectors, scrubbers, precipitators, or other treatment processes. These facilities are installed exclusively for the purpose of abating pollutant emissions from your plant or property

Itom 6b — Changes-in-production processes reduce or eliminate the generation of pollutants by employing material substitution, improved catalysts, reuse of waste or water, and equipment alteration. These changes may involve converting equipment to handle the use of substitute fuels that generate less pollutants. This item refers to new plant and equipment necessary for such changes in production processes. If your establishment has made expenditures for **changes-inproduction processes**, estimate the expenditures as the difference between expenditures on new plant and equipment that your establishment actually made for changes-inproduction processes and what your establishment would have spent for comparable plant and equipment without air pollution abatement features

Item 6d — To estimate the impact of emission standards upon capital investment for pollution abatement in industry, it is necessary to match investment expenditures to major types of pollutants abated. Note: When a single device has the ability to abate more than one pollutant, the classification of the device is to be guided by the primary purpose for which the device was installed.

Item 7a — Same as item 6a, except that it refers to waste water treatment techniques such as trickling filters, settling ponds, clarifiers, oil spill dikes, and other separately identifiable treatment techniques. Item 7b - Same as tem 6b, except that trefers to abate ment of water pollutants. The purpose of pollution abatement may be achieved by converting processes and equipment to enable recycling -closed or partially closed Jobo systems) or to enable additional uses of water prior to discharge. Do not include capital expenditures undertaken exclusively for the purpose of insuring adequate water supply for production

Item Sa – Solid waste management is the collection and disposal of solid waste materials and energy recovery and changes-in-production processes to reduce the generation of solid waste. Collection and disposal refer to the collection storage transport processing, and disposal of solid waste by incineration sanitary or other landfill methods and dumping in authorized areas. Materials and energy recovery refer to taking materials that cannot be converted into profitmaking output and recycling them for further use included are capital expenditures to recycle scrap metal, scrap paper scrap wood, etc.; excluded are capital expenditures for secondary products le g, animal hides)

#### Items 9 through 11 — TONNAGES OF POLLUTANTS REMOVED

**Item 9** — Report the total tonnages of air pollutants abated during 1983. The tonnages should include all air pollutants abated during 1983 by new as well as previously existing pollution abatement equipment if this information is not available from records report engineering estimates where possible.

Item 10 — Report the total tonnages of the listed water pollutants during 1983 The tonnages should include all water pollutants abated during 1983 by new as well as previously existing pollution abatement equipment. If this information is not available from records, report engineering estimates where possible

Item 11 — Report the total tonnages of solid waste disposed of by means acceptable to local state, and Federal authorities Solid wastes disposed consist of all solid wastes, including those wastes generated by air and water pollution abatement activities. In the case where solid waste is combined with industrial wastewater and disposed, include only the actual amount of hazardous solid waste disposed. Do not include the weight of the wastewater that was added for disposal purposes. If this information is not available from records, report engineering estimates where possible.

IF YOU HAVE ANY QUESTIONS REGARDING THIS REPORT, PLEASE CALL (301) 763-1755.

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APPENDIX	A
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AP	ΡE	ND	IX	А

			Page 2				
tion 6 - CAPITAL EXPENDITURES FOR ABATEMENT OF AIR	d. Distribute total expenditures (on line 6c) in terms of percent by TYPE OF POLLUTANTS (Please give best estimates.)	(1) Particulates	Percentage ett %				
POLLUTANTS -		(2) Sulfur oxides	812 %				
	EXAMPLE	(3) Nitrogen oxides and carbon monoxide	\$13				
	(1) Particulates 40% (2) Sulfur oxides 10%	(4) Hydrocarbons-volatile organic compounds	614 %				
	(3) Nitrogen oxides, stc 35% (4) Hydrocarbons-voc 4%	(5) Leed	615 %				
	(5) Lead	(6) Hazardous sir pollutants	616 %				
	(7) Other	(7) Other	617 <b>%</b>				
		(8) TOTAL (Sum of lines (1) through (7))>	100%				
tion 7 - CAPITAL EXPENDITURES FOR ABATEMENT OF	<ul> <li>Report total expenditures for new pla abate water pollutants through and</li> </ul>		Mil. Thou. Doi. 701				
WATER POLLUTANTS	b. Report total expenditures for change abate water pollutants.		702				
	c. TOTAL WATER CAPITAL (Sum of	f lines 7e and 7b)	705				
item 8 - CAPITAL EXPENDITURES FOR	e, Report total expenditures for new pla	ant and equipment designed for	Mil. Thou. Dol.				
SOLID WASTE MANAGEMENT	management of solid waste. (See spi b. Distribute total expenditures (on	ecific instructions.)	Percentage				
	line Ba) in terms of percent by TYPE OF POLLUTANTS (Please give best estimates.)		- Forcentage				
	EXAMPLE	(1) Hezerdous	\$11				
	(1) Hezerdous         25%           (2) Nonhezerdous         75%	(2) Nonhazardous	812 %				
<u></u>	(3) TOTAL	(3) TOTAL (Sum of lines (1) and (2))	100%				
' Item 9 - AIR POLLUTANTS ABATED BY	a. Particulates	• 	910 Tons 911				
WEIGHT Estimate total tonnage of	b. Sulfur oxides	······································	Tons 912				
specific air pollutants abated by new as well as previously installed pollution abatement	c. Nitrogen oxides and carbon monoxid	Nitrogen oxides and carbon monoxide					
facilities.	d. Hydrocarbons-volatile organic comp	ounds	Tons 914				
	e. Lead		Tons				
	f. Hazardous air pollutants	1	Tons 916				
Item 10 - WATER	g. Other		1920				
POLLUTANTS ABATED BY WEIGHT			Tons 921				
Estimate total tonnage of specific water pollutants abated by new as well as require units and total to the second sec	b. Nonconventional	· · · · · · · · · · · · · · · · · · ·	922 Tons				
previously installed pollution abatement facilities.	c. Toxic metals d. Toxic organics	· · ·	\$23 Tons				
item 11 - SOLID WASTE DISPOSAL BY WEIGHT	Include those wastes generated by sir an (s.g., dust, fly ash, sludge, and contained		930				
Estimate total tonnage of solid waste disposed.	a. Hazardous		Tons 931				
	b. Nonhezerdous		Tons				
EMARKS 30							
	DN — This report is substantially accurate act regarding this report — Print or type	and has been prepared in accordance with	Mo. Day Year				
131							
Area code and number	ephone Signature	of authorized person	·				
32							

STATE ABBREVIATION	<u>STATE</u>
AL	ALABAMA
AR	ARKANSAS
CA	CALIFORNIA
CT	CONNECTICUT
DE	DELAWARE
FL	FLORIDA
GA	GEORGIA
IA	IOWA
IL	ILLINOIS
IN	INDIANA
KS	KANSAS
KY	KENTUCKY
LA	LOUISIANA
MA	MASSACHUSETTS
MD	MARYLAND
MI	MICHIGAN
NJ	NEW JERSEY
NY	NEW YORK
OH	OHIO
OH OK PA RI SC TN	OKLAHOMA PENNSYLVANIA RHODE ISLAND SOUTH CAROLINA TENNESSEE
TX	TEXAS
VA	VIRGINIA
WA	WASHINGTON
WI	WISCONSIN
WV	WEST VIRGINIA

N	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	480	25.6	480	25.6
2	241	12.8	721	38.4
3	225	12.0	946	50.4
4	177	9.4	1123	59.8
5	147	7.8	1270	67.7
6	125	6.7	1395	74.3
7	124	6.6	1519	80.9
8	120	6.4	1639	87.3
9	86	4.6	1725	91.9
10	73	3.9	1798	95.8
11	79	4.2	1877	100.0

# Table 1: Frequency and Percent of Plants in the Study Sample for N Years, N=1, 2, $\ldots$ , 11

Table 2: Frequency and Percent of Plants in the StudySample that Opened Before and After 1970

	Frequency Percent	Cumulative Frequency	Cumulative Percent
Opened Before 1970	1199 63.9	1199	63.9
Opened After 1970	678 36.1	1877	100.0

Table 3: Frequency and Percent of Observations (Plant-Years) in the Study Sample in Each Year

YEAR	Frequency	Percent	Cumulative Frequency	Cumulative Percent
79	966	12.0	966	12.0
80	939	11.7	1905	23.7
81	890	11.1	2795	34.8
82	1036	12.9	383	47.7
83	402	5.0	4233	52.7
84	447	5.6	4680	58.3
85	493	6.1	5173	64.4
86	652	8.1	5825	72.5
88	617	7.7	6442	80.2
89	944	11.8	7386	92.0
90	645	8.0	803	100.0

STA	TE	19 <b>79</b>	1980	1981	1982	1983	1984	1985	1986	1988	1989	1990	
ĂI		19	19	20	22	12	10	12	9	11	18	13	
AF	2	14	14	13	12	5	5	6	0	7	9	8	
CA		64	61	59	65	22	29	32	46	48	65	43	
CI		9	9	9	12	0	5	6	8	8	10	10 ·	
DE		13	13	12	<b>8</b> .	5	5	5	7	7	12	7	
FL		24	24	23	29	13	11	9	16	9	18	12	
GA		28	26	27	30	14	15	15	15	19	34	17	
IA		10	10	9	15	5	5	7	6	0	9	0	
IL		<u>82</u>	78	73	75	24	29	30	43	46	70	39	
IN		21	21	21	21	7	11	9	16	14	24	15	
KS		9	10	9	15	8	7	10	11	6	·6	5	
KY		22	21	18	21	10	11	12	20	18	22	17	
LA		55	56	53	48	30	36	35	46	39	49	41	
M		18	18	16	19	6	6	7	13	9	17	11	
MI		20	19	18 /	20	6	9	9	13	13	18	10	
MI		31	29	. 28	28	8	-10	13	18	17	33	26	
M		7	6	0	0	0	0	0	0	0	5	0	
M		29	29	28	28	7	14	11	21	18	25	14	
MS		11	11	10	9	0	0	9	7	7	9	8	
NC		24	23	21	35	19	20	22	20	19	30	23	
NE		5	5	5	6	0	0	0	0	0	0	0	
NJ		106	105	100	116	38	40	51	67	63	75	53	
NJ		47	46	43	57	19	21	21	35	23	39	26	
OF		67	65	61	73	23	21	31	41	36	72	47.	
OK		0	0	0	·6	0	0	0	0	0	5	0	
PA		46	42	- 45-	52	23	21	19	28	29	48	32	•
RI		0	0	0	5	0	0	0	0	0	0	0	
SC		24	23	20	21	11	13	13	19	18	25	23	
TN		30	29	29	31	15	13	16	23	16	28	20	
TX		87	85	85	102	48	56	57	. 75	81	114	88	
VA		18	16	16	21	11	10	13	12	14	23	20	. '
W		0	0	0	5	0	0	0	0	5	6	0	
W		5	5	0	9	0	0	0	0	0	8 1 0	0	
W	V	21	21	19	20	13	14	13	17	17	18	17	

Table 5: Frequency and Percent of Plants Reporting	
Zero Abatement Operating Cost	

<u>Yea</u> r	Frequency	Percent
1979	32	3.3
1980	77	8.2
1981	101	11.3
1982	142	13.7
1983	0	0.0
1984	8	1.8
1985	10	2.0
1986	5	0.8
1988	4	0.6
1989	34	3.6
1990	12	1.9

# Table 6a: Estimated Coefficients From Truncated Regressions<sup>1</sup>

Variable	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Constant	-6.65**	-6.49**	-6.18**	-5.45**	-3.82**	-4.00**	-5.36**	-4.88**	-4.84**	-6.05**	-4.10**
Log(tvs) <sup>2</sup>	1.12**	1.10**	1.09**	1.05**	0.92**	0.92**	1.05**	1.00**	0.97**	1.07**	0.95**
Age	0.03**	0.02*	0.02**	0.02**	0.03**	0.03**	0.04**	0.02**	0.02**	0.03**	0.02**
<u>States</u>											
AL	0.58	0.63	0.45	0.44	0.00	-0.01	-0.17	0.10	0.16	0.11	-0.27
AR	0.52	.0.45	0.31	0.19	-0.18	0.31	0.16	3	0.09	0.52	-0.16
CA	-0.18	-0.06	-0.41	-0.44	-0.43	-0.35	-0.32	-0.02	-0.09	0.08	-0.44
CT	-0.01	0.45	0.03	-0.47		-0.95	-1.20	-0.52	0.06	-0.12	-0.61
DE	0.69	0.80	0.37	0.31	-0.23	-0.51	-0.52	-0.28	-0.52	0.21	-0.67
FL	0.32	0.22	0.03	0.53	-0.60	-0.85	-0.53	-0.49	0.09	-0.14	-0.80
GA	-0.19	-0.18	-0.55	-0.32	-0.47	-0.57	-0.60	-0.68	-0.38	-0.46	-0.31
IA	-0.33	-0.40	-0.56	-0.31	0.09	-0.76	-0.65	0.05	•	-1.14*	•
IL	0.38	0.28	-0.05	0.04	-0.32	-0.33	-0.67	-0.20	-0.13	-0.38	-0.42
IN	0.63	0.63	0.27	0.43	-0.38	0.12	-0.58	0.05	0.34	-0.14	-0.17
KS	0.39	0.80	0.16	-0.63	-0.57	-0.91	-0.98	-0.48	-0.15	0.04	-0.75
KY	0.21	0.13	-0.21	0.03	-0.28	-0.33	-0.47	-0.24	0.25	0.10	-0.08
LA	0.50	0.25	0.13	0.17	-0.28	-0.24	-0.29	-0.10	-0.15	-0.15	-0.18
MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MD	0.57	0.06	0.03	0.00	-0.28	-0.31	-0.73	-0.23	-0.01	-0.46	-0.29
MI	0.52	0.43	0.35	0.58	0.41	-0.13	0.09	0.39	0.66	0.51	-0.01
MN	-0.10	-0.23	•					•		-0.88	
MO	-0.29	-0.39	-0.33	-0.49	-0.18	-0.96	-1.22	-0.72	-0.42	-0.66	-0.18
MS	0.23	0.05	-0.26	0.44			0.22	-0.06	-0.31	-0.05	-0.16
NC	0.22	0.39	0.02	-0.05	-0.44	-0.55	-0.62	-0.90*	-0.37	-0.40	-0.54
NE	-0.73	-0.18	0.33	-0.45							
NJ	0.21	0.29	0.02	-0.11	0.05	-0.23	-0.26	0.01	-0.17	-0.03	-0.23
NY	0.47	0.52	0.42	0.21	-0.22	-0.12	-0.49	-0.11	0.10	0.30	0.07
OH	-0.23	-0.07	-0.36	-0.22	-0.46	-0.76	-0.78	-0.33	0.06	-0.29	-0.44
OK				0.16						-0.48	
PA	0.11	0.03	-0.05	-0.06	-0.06	-0.62	-0.90	0.02	0.20	0.19	-0.13
RI		•	•	0.58	•	•		•			
SC	-0.28	0.17	-0.40	-0.21	-0.41	-0.56	-0.66	-0.68	-0.32	-0.32	-0.65
TN	0.48	0.49	0.13	-0.01	0.09	-0.10	-0.38	-0.36	0.13	0.01	-0.56
TX	-0.09	-0.05	-0.34	-0.36	-0.61	-0.51	-0.70	-0.23	-0,30	-0.37	-0.35
VÁ	-0.27	-0.20	-0.57	-0.22	-0.35	-0.31	-1.05	-0.60	-0.19	-0.50	-0.76*
WA			•	-0.73				•	-0.50	-0.55	v. , v
WI	0.76	1.15		-0.43	•	•	•	• ·	0.00	· <b>-</b> 0.02	•
WV	0.56	0.37	0.00	0.12	-0.28	-0.27	-0.21	0.24	0.19	0:02	0.19
· ·	0.00	0.07		U. 12	-0.20	-0.21	-0.21	0.47	0.17	0.05	V.17

<sup>1</sup> Truncated regressions are of log(abatement operating cost) regressed on state (dummies), 4-digit SIC code industry (dummies), the age of the plant, and log(total value of shipments) (log(tvs)). Heteroskedasticity was modeled by making the variance of the error term a function of log(tvs). The coefficient of log(tvs) in the error variance is always negative and always significant at the 99% level of confidence.

 $^{2}$  The hypothesis that the coefficient of log(tvs) is 1.0 is tested using a Wald test statistic in each separate-year analysis. The null hypothesis cannot be rejected (i.e., the coefficient is not significantly different from 1.0) in all years except 1979.

<sup>3</sup> .' signifies that the state is not included in the analysis because of insufficient observations.

\*Significantly different from zero at the 95% level of confidence.

\*\*Significantly different from zero at the 99% level of confidence.

Variable	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Industry											
SIC Code											
2812	0.90	1.30	1.22	1.07	0.93*	0.84	0.91	0.62	0.62	0.80	0.96*
2813	-1.42**	$-D^2$	-1.99**	-0.66	3		-2.92**	-2.31**	-0.97	-1.25**	-1.65
2816	0.90**	1.20**	0.83**	0.91**	1.35**	1.73**	0.86	1.12**	1.13*	1.07**	0.79*
2819	0.14	0.53**	0.48*	0.66**	0.68*	0.97**	0.60*	0.83**	0.88**	0.79**	0.82**
2821	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
2822	-0.17	0.10	-0.05	0.07	0.33	0.47	0.10	-0.03	0.48*	0.24	0.29
2823	-0.02	0.12	0.46	0.47	0.39	D	D	0.45			D
2824	-0.63*	-0.64*	-0.63*	-0.77**	-0.47	-0.60	-0.73*	-0.32	-0.41	-0.53*	-0.42
2831	-1.87**	-1.79**	-2.22**		-3.02**	-2.21**	-2.38**	-2.17**			
2833	0.43	0.52	0.56	0.49	0.58	0.79*	0.44	0.69	0.60*	-0.15	0.60 <b>*</b>
2834	-2.21**	-2.04**	-2.12**	-2.25**	-1.96**	-1.61**	-1.93**	-1.86**	-1.08**	-1.94**	-1.56**
2835			•			•	•		-0.57	-2.32**	-1.71**
2836				-2.73**					-D	-0.85	-1.00
2841	-1.81**	-1.65**	-1.83**	-2.01**	-1.95**	-1.49**	-1.52**	-1.60**	-1.48**	-1.59**	-1.94**
2842	-2.41**	-2.68**	-2.46**	-2.45**	-2.39**	-1.39**	-2.26**	-1.90**	-1.64**	-2.14*	
2843	-0.28	-0.33	-0.15	-0.31	0.63	0.31	0.14	0.45	0.57	-0.21	0.67
2844	-2.67**	-2.47**	-2.48**	-2.65**	-2.77**	-2.89**	-2.39**	-2.21**	-1.84**	-1.74**	-1.73**
2851	-1.25**	-1.13**	-0.90**	-1.24**	-1.55**	-1.26**	-1.21**	-1.15**	-0.81**	-0.62**	-0.61**
2861	0.35	-0.19	-0.44	-D	-0.10	0.17	-0.52	0.51		0.01	D
2865	0.75*	0.88**	0.94**	0.46*	0.60*	0.76*	0.56*	0.80**	1.06**	0.89**	0:56**
2869	0.33*	0.61**	0.55**	0.54**	0.74**	0.87**	0.63**	0.69**	0.94**	0.71**	0.74**
2873	0.64*	0.52	0.41	0.24	0.45	0.68	0.47	0.27	0.63	0.22	0.27
2874	0.74*	0.63	0.84	-0.01	0.97*	1.04**	0.93	0.85*	1.20**	0.76	•
2875	-2.26**		-D	•			•	-1.47**		-D	
2879	-0.21	-0.38	-0.04	-0.18	0.82**	0.71**	0.42 `	0.62*	0.95**	0.57**	0.72**
2891	-1.97**	-1.09*	-1.44*	-1.34**	-0.41	-0.20	-0.91*	-0.85	-0.78*	-0.42	-0.43
2892	-0.04	0.29	0.47	-0.59	0.49	0.79	1.03	0.50	0.78		
2893	- D	-D*	-D	-1.02	•	-D	-1.44	-1.37*	-0.78	-D	•
2895	0.54	0.63	0.07	-1.33**	-D	-1.73**	•	-2.02		-D	
2899	-0.42	-0.55*	-0.66**	-0.53*	-0.26	0.03	0.07	-0.14	0.04	-0.37*	-0.09

<sup>&</sup>lt;sup>1</sup> Truncated regressions are of log(abatement operating cost) regressed on state (dummies), 4-digit SIC code industry (dummies), the age of the plant, and log(total value of shipments) (log(tvs)). Heteroskedasticity was modeled by making the variance of the error term a function of log(tvs). The coefficient of log(tvs) in the error variance is always negative and always significant at the 99% level of confidence.

<sup>&</sup>lt;sup>2</sup> 'D' signifies that the number is withheld to avoid disclosing operations of individual companies.

 $<sup>^{3}</sup>$  : ' signifies that the industry is not included in the analysis because there is not more than one observation in the industry in that year.

<sup>\*</sup> Significantly different from zero at the 95% level of confidence.

<sup>\*\*</sup> Significantly different from zero at the 99% level of confidence.