SUPPLEMENT NO. 4 FOR COMPILATION OF AIR POLLUTANT EMISSION FACTORS

SECOND EDITION

U.S. ENVIRONMENTAL PROTECTION AGENCY
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INSTRUCTIONS
FOR INSERTING SUPPLEMENT NO. 4
INTO
COMPILATION OF AIR POLLUTANT EMISSION FACTORS

1. Replace page iii/iv with new page iii/iv.
2. Replace page v/vi with new page v/vi.
3. Replace page xiii/xiv with new page xiii/xiv.
4. Replace page xv/xvi with new page xv/xvi.
5. Replace page 3.2.2-1/3.2.2-2 with corrected page 3.2.2-1/3.2.2-2.
6. Replace page 3.2.3-1/3.2.3-2 dated 2/72 with new pages 3.2.3-1 through 3.2.3-7 dated 1/75.
7. Replace page 3.2.5-1/3.2.5-2 dated 4/73 with new page 3.2.5-1/3.2.5-2 dated 1/75.
8. Insert new pages 3.2.6-1 through 3.2.6-3 dated 1/75 after page 3.2.5-2.
9. Insert new pages 3.2.7-1 through 3.2.7-5 dated 1/75 after page 3.2.6-3.
10. Insert new page 3.2.8-1/3.2.8-2 dated 1/75 after page 3.2.7-5.
11. Replace page 3.3.1-1/3.3.1-2 dated 4/73 with new pages 3.3.1-1 through 3.3.1-3 dated 1/75.
12. Insert new page 3.3.3-1/3.3.3-2 dated 1/75 after page 3.3.2-2.
13. Replace page 6.10-1/6.10-2 with corrected page 6.10-1/6.10-2.
14. Insert new pages 11.1 through 11.5 dated 1/75 after page 10.3-2.
15. Insert appendices B and C after Appendix A.

PREFACE

This document reports data available on those atmospheric emissions for which sufficient information exists to establish realistic emission factors. The information contained herein is based on Public Health Service Publication 999-AP-42, *Compilation of Air Pollutant Emission Factors*, by R. L. Duprey, and on a revised and expanded version of *Compilation of Air Pollutant Emission Factors* that was published by the Environmental Protection Agency in February 1972. The scope of this second edition has been broadened to reflect expanding knowledge of emissions.

Chapters and sections of this document have been arranged in a format that permits easy and convenient replacement of material as information reflecting more accurate and refined emission factors is published and distributed. To speed dissemination of emission information, chapters or sections that contain new data will be issued—separate from the parent report—whenever they are revised.

To facilitate the addition of future materials, the punched, loose-leaf format was selected. This approach permits the document to be placed in a three-ring binder or to be secured by rings, rivets, or other fasteners; future supplements or revisions can then be easily inserted. The lower left- or right-hand corner of each page of the document bears a notation that indicates the date the information was issued.

NOTE: Those who obtained AP-42 by purchase or through special order and completed the request for future supplements are hereby advised of a change in the distribution procedure. The availability of these supplements will now be indicated in the publication *Air Pollution Technical Publications of the Environmental Protection Agency*, which is available from the Air Pollution Technical Information Center, Research Triangle Park, N. C. 27711. This listing of publications, normally published in January and July, contains instructions for obtaining the desired documents.

Comments and suggestions regarding this document should be directed to the attention of Director, Monitoring and Data Analysis Division, Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, N. C. 27711.

ACKNOWLEDGMENTS

Because this document is a product of the efforts of many individuals, it is impossible to acknowledge each person who has contributed. Special recognition is given to Environmental Protection Agency employees in the Technical Development Section, National Air Data Branch, Monitoring and Data Analysis Division, for their efforts in the production of this work. Bylines identify the contributions of individual authors who revised specific sections and chapters.

Issuance		Release Date
Compilation of Air Pollutant Emission Factors (second edition)		4/73
Supplement No. 1		7/73
Section 4.3	Storage of Petroleum Products	
Section 4.4	Marketing and Transportation of Petroleum Products	
Supplement No. 2		
Introduction		9/73
Section 3.1.1	Average Emission Factors for Highway Vehicles	
Section 3.1.2	Light-Duty, Gasoline-Powered Vehicles	
Supplement No. 3		7/74
Introduction		
Section 1.4	Natural Gas Combustion	
Section 1.5	Liquified Petroleum Gas Consumption	
Section 1.6	Wood/Bark Waste Combustion in Boilers	
Section 2.5	Sewage Sludge Incineration	
Section 7.6	Lead Smelting	
Section 7.11	Secondary Lead Smelting	
Section 10.1	Chemical Wood Pulping	
Section 10.2	Pulpboard	
Section 10.3	Plywood Veneer and Layout Operations	
Supplement No. 4		1/75
Section 3.2.3	Inboard-Powered Vessels	
Section 3.2.5	Small, General Utility Engines	
Section 3.2.6	Agricultural Equipment	
Section 3.2.7	Heavy-Duty Construction Equipment	
Section 3.2.8	Snowmobiles	
Section 3.3.1	Stationary Gas Turbines for Electric Utility Power Plants	
Section 3.3.3	Gasoline and Diesel Industrial Engines	
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3.2.2 Locomotives

by David S. Kircher

3.2.2.1 General – Railroad locomotives generally follow one of two use patterns: railyard switching or road-haul service. Locomotives can be classified on the basis of engine configuration and use pattern into five categories: 2-stroke switch locomotive (supercharged), 4-stroke switch locomotive, 2-stroke road service locomotive (supercharged), 2-stroke road service locomotive (turbocharged), and 4-stroke road service locomotive.

The engine duty cycle of locomotives is much simpler than many other applications involving diesel internal combustion engines because locomotives usually have only eight throttle positions in addition to idle and dynamic brake. Emission testing is made easier and the results are probably quite accurate because of the simplicity of the locomotive duty cycle.

3.2.2.2 Emissions – Emissions from railroad locomotives are presented two ways in this section. Table 3.2.2-1 contains average factors based on the nationwide locomotive population breakdown by category. Table 3.2.2-2 gives emission factors by locomotive category on the basis of fuel consumption and on the basis of work output (horsepower hour).

The calculation of emissions using fuel-based emission factors is straightforward. Emissions are simply the product of the fuel usage and the emission factor. In order to apply the work output emission factor, however, an

Table 3.2.2-1. AVERAGE LOCOMOTIVE EMISSION FACTORS BASED ON NATIONWIDE STATISTICS[a]

Pollutant	Average emissions[b]	
	$lb/10^3$ gal	$kg/10^3$ liter
Particulates[c]	25	3.0
Sulfur oxides[d] (SO_x as SO_2)	57	6.8
Carbon monoxide	130	16
Hydrocarbons	94	11
Nitrogen oxides (NO_x as NO_2)	370	44
Aldehydes (as HCHO)	5.5	0.66
Organic acids[c]	7	0.84

[a] Reference 1.
[b] Based on emission data contained in Table 3.2.2-2 and the breakdown of locomotive use by engine category in the United States in Reference 1.
[c] Data based on highway diesel data from Reference 2. No actual locomotive particulate test data are available.
[d] Based on a fuel sulfur content of 0.4 percent from Reference 3.

Table 3.2.2-2. EMISSION FACTORS BY LOCOMOTIVE ENGINE CATEGORY[a]
EMISSION FACTOR RATING: B

Pollutant	Engine category: 2-Stroke supercharged switch	4-Stroke switch	2-Stroke supercharged road	2-Stroke turbocharged road	4-Stroke road
Carbon monoxide					
lb/10^3 gal	84	380	66	160	180
kg/10^3 liter	10	46	7.9	19	22
g/hphr	3.9	13	1.8	4.0	4.1
g/metric hphr	3.9	13	1.8	4.0	4.1
Hydrocarbon					
lb/10^3 gal	190	146	148	28	99
kg/10^3 liter	23	17	18	3.4	12
g/hphr	8.9	5.0	4.0	0.70	2.2
g/metric hphr	8.9	5.0	4.0	0.70	2.2
Nitrogen oxides (NO_x as NO_2)					
lb/10^3 gal	250	490	350	330	470
kg/10^3 liter	30	59	42	40	56
g/hphr	11	17	9.4	8.2	10
g/metric hphr	11	17	9.4	8.2	10

[a] Use average factors (Table 3.2.2-1) for pollutants not listed in this table.

additional calculation is necessary. Horsepower hours can be obtained using the following equation:

$$w = lph$$

where: w = Work output (horsepower hour)

l = Load factor (average power produced during operation divided by available power)

p = Available horsepower

h = Hours of usage at load factor (l)

After the work output has been determined, emissions are simply the product of the work output and the emission factor. An approximate load factor for a line-haul locomotive (road service) is 0.4; a typical switch engine load factor is approximately 0.06.[1]

References for Section 3.2.2

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part 1. Locomotive Diesel Engines and Marine Counterparts. Final Report. Southwest Research Institute. San Antonio, Texas Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHA 70-108. October 1972.

2. Young, T.C. Unpublished Data from the Engine Manufacturers Association. Chicago, Ill. May 1970.

3. Hanley, G.P. Exhaust Emission Information on Electro-Motive Railroad Locomotives and Diesel Engines. General Motors Corp. Warren, Mich. October 1971.

3.2.3 Inboard-Powered Vessels

Revised by David S. Kircher

3.2.3.1 General – Vessels classified on the basis of use will generally fall into one of three categories: commercial, pleasure, or military. Although usage and population data on vessels are, as a rule, relatively scarce, information on commercial and military vessels is more readily available than data on pleasure craft. Information on military vessels is available in several study reports,[1-5] but data on pleasure craft are limited to sales-related facts and figures.[6-10]

Commercial vessel population and usage data have been further subdivided by a number of industrial and governmental researchers into waterway classifications[11-16] (for example, Great Lakes vessels, river vessels, and coastal vessels). The vessels operating in each of these waterway classes have similar characteristics such as size, weight, speed, commodities transported, engine design (external or internal combustion), fuel used, and distance traveled. The wide variation between classes, however, necessitates the separate assessment of each of the waterway classes with respect to air pollution.

Information on military vessels is available from both the U.S. Navy and the U.S. Coast Guard as a result of studies completed recently. The U.S. Navy has released several reports that summarize its air pollution assessment work.[3-5] Emission data have been collected in addition to vessel population and usage information. Extensive study of the air pollutant emissions from U.S. Coast Guard watercraft has been completed by the U.S. Department of Transportation. The results of this study are summarized in two reports.[1-2] The first report takes an in-depth look at population/usage of Coast Guard vessels. The second report, dealing with emission test results, forms the basis for the emission factors presented in this section for Coast Guard vessels as well as for non-military diesel vessels.

Although a large portion of the pleasure craft in the U.S. are powered by gasoline outboard motors (see section 3.2.4 of this document), there are numerous larger pleasure craft that use inboard power either with or without "out-drive" (an outboard-like lower unit). Vessels falling into the inboard pleasure craft category utilize either Otto cycle (gasoline) or diesel cycle internal combustion engines. Engine horsepower varies appreciably from the small "auxiliary" engine used in sailboats to the larger diesels used in yachts.

3.2.3.2 Emissions

Commercial vessels. Commercial vessels may emit air pollutants under two major modes of operation: underway and at dockside (auxiliary power).

Emissions underway are influenced by a great variety of factors including power source (steam or diesel), engine size (in kilowatts or horsepower), fuel used (coal, residual oil, or diesel oil), and operating speed and load. Commercial vessels operating within or near the geographic boundaries of the United States fall into one of the three categories of use discussed above (Great Lakes, rivers, coastline). Tables 3.2.3-1 and 3.2.3-2 contain emission information on commercial vessels falling into these three categories. Table 3.2.3-3 presents emission factors for diesel marine engines at various operating modes on the basis of horsepower. These data are applicable to any vessel having a similar size engine, not just to commercial vessels.

Unless a ship receives auxiliary steam from dockside facilities, goes immediately into drydock, or is out of operation after arrival in port, she continues her emissions at dockside. Power must be made available for the ship's lighting, heating, pumps, refrigeration, ventilation, etc. A few steam ships use auxiliary engines (diesel) to supply power, but they generally operate one or more main boilers under reduced draft and lowered fuel rates–a very inefficient process. Motorships (ships powered by internal combustion engines) normally use diesel-powered generators to furnish auxiliary power.[17] Emissions from these diesel-powered generators may also be a source of underway emissions if they are used away from port. Emissions from auxiliary power systems, in terms of the

Table 3.2.3-1. AVERAGE EMISSION FACTORS FOR COMMERCIAL MOTORSHIPS BY WATERWAY CLASSIFICATION
EMISSION FACTOR RATING: C

Emissions[a]	Class[c]		
	River	Great Lakes	Coastal
Sulfur oxides[b] (SO_x as SO_2)			
kg/10^3 liter	3.2	3.2	3.2
lb/10^3 gal	27	27	27
Carbon monoxide			
kg/10^3 liter	12	13	13
lb/10^3 gal	100	110	110
Hydrocarbons			
kg/10^3 liter	6.0	7.0	6.0
lb/10^3 gal	50	59	50
Nitrogen oxides (NO_x as NO_2)			
kg/10^3 liter	33	31	32
lb/10^3 gal	280	260	270

[a]Expressed as function of fuel consumed (based on emission data from Reference 2 and population/usage data from References 11 through 16.

[b]Calculated, not measured. Based on 0.20 percent sulfur content fuel and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

[c]Very approximate particulate emission factors from Reference 2 are 470 g/hr (1.04 lb/hr). The reference does not contain sufficient information to calculate fuel-based factors.

quantity of fuel consumed, are presented in Table 3.2.3-4. In some instances, fuel quantities used may not be available, so calculation of emissions based on kilowatt hours (kWh) produced may be necessary. For operating loads in excess of zero percent, the mass emissions (e_1) in kilograms per hour (pounds per hour) are given by:

$$e_1 = kle_f \qquad (1)$$

where: k = a constant that relates fuel consumption to kilowatt hours,[2]

that is, 3.63×10^{-4} 1000 liters fuel/kWh

or

9.59×10^{-5} 1000 gal fuel/kWh

l = the load, kW

e_f = the fuel-specific emission factor from Table 3.2.3-4, kg/10^3 liter (lb/10^3 gal)

Table 3.2.3-2. EMISSION FACTORS FOR COMMERCIAL STEAMSHIPS—ALL GEOGRAPHIC AREAS
EMISSION FACTOR RATING: D

Pollutant	Fuel and operating mode[a]											
	Residual oil[b]						Distillate oil[b]					
	Hoteling		Cruise		Full		Hoteling		Cruise		Full	
	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal
Particulates[c]	1.20[d]	10.0[d]	2.40	20.0	6.78	56.5	1.8	15	1.78	15	1.78	15
Sulfur oxides (SO_x as SO_2)[e]	19.1S	159S	19.1S	159S	19.1S	159S	17.0S	142S	17.0S	142S	17.0S	142S
Carbon monoxide[c]	Neg[d]	Neg[d]	0.414	3.45	0.872	7.27	0.5	4	0.5	4	0.5	4
Hydrocarbons[c]	0.38[d]	3.2[d]	0.082	0.682	0.206	1.72	0.4	3	0.4	3	0.4	3
Nitrogen oxides (NO_x as NO_2)	4.37	36.4	6.70	55.8	7.63	63.6	2.66	22.2	2.83	23.6	5.34	44.5

[a]The operating modes are based on the percentage of maximum available power: "hoteling" is 10 to 11 percent of available power, "full" is 100 percent of available power, and "cruise" is an intermediate power (35 to 75 percent, depending on the test organization and vessel tested).

[b]Test organizations used "Navy Special" fuel oil, which is not a true residual oil. No vessel test data were available for residual oil combustion. "Residual" oil results are from References 2, 3, and 5. "Distillate" oil results are from References 3 and 5 only. Exceptions are noted. "Navy Distillate" was used as distillate test fuel.

[c]Particulate, carbon monoxide, and hydrocarbon emission factors for distillate oil combustion are based on stationary boilers (see Section 1.3 of this document).

[d]Reference 18 indicates that carbon monoxide emitted during hoteling is small enough to be considered negligible. This reference also places hydrocarbons at 0.38 kg/10^3 liter (3.2 lb/10^3 gal) and particulate at 1.20 kg/10^3 liter (10.0 lb/10^3 gal). These data are included for completeness only and are not necessarily comparable with other tabulated data.

[e]Emission factors listed are theoretical in that they are based on all the sulfur in the fuel converting to sulfur dioxide. Actual test data from References 3 and 5 confirm the validity of these theoretical factors. "S" is fuel sulfur content in percent.

Table 3.2.3-3. DIESEL VESSEL EMISSION FACTORS BY OPERATING MODE[a]
EMISSION FACTOR RATING: C

Horsepower	Mode	Emissions[b]					
		Carbon monoxide		Hydrocarbons		Nitrogen oxides (NO_x as NO_2)	
		lb/10³ gal	kg/10³ liter	lb/10³ gal	kg/10³ liter	lb/10³ gal	kg/10³ liter
200	Idle	210.3	25.2	391.2	46.9	6.4	0.8
	Slow	145.4	17.4	103.2	12.4	207.8	25.0
	Cruise	126.3	15.1	170.2	20.4	422.9	50.7
	Full	142.1	17.0	60.0	7.2	255.0	30.6
300	Slow	59.0	7.1	56.7	6.8	337.5	40.4
	Cruise	47.3	5.7	51.1	6.1	389.3	46.7
	Full	58.5	7.0	21.0	2.5	275.1	33.0
500	Idle	282.5	33.8	118.1	14.1	99.4	11.9
	Cruise	99.7	11.9	44.5	5.3	338.6	40.6
	Full	84.2	10.1	22.8	2.7	269.2	32.3
600	Idle	171.7	20.6	68.0	8.2	307.1	36.8
	Slow	50.8	6.1	16.6	2.0	251.5	30.1
	Cruise	77.6	9.3	24.1	2.9	349.2	41.8
700	Idle	293.2	35.1	95.8	11.5	246.0	29.5
	Cruise	36.0	4.3	8.8	1.1	452.8	54.2
900	Idle	223.7	26.8	249.1	29.8	107.5	12.9
	2/3	62.2	7.5	16.8	2.0	167.2	20.0
	Cruise	80.9	9.7	17.1	2.1	360.0	43.1
1550	Idle	12.2	1.5	–	–	39.9	4.8
	Cruise	3.3	0.4	0.64	0.1	36.2	4.3
	Full	7.0	0.8	1.64	0.2	37.4	4.5
1580	Slow	122.4	14.7	–	–	371.3	44.5
	Cruise	44.6	5.3	–	–	623.1	74.6
	Full	237.7	28.5	16.8	2.0	472.0	5.7
2500	Slow	59.8	7.2	22.6	2.7	419.6	50.3
	2/3	126.5	15.2	14.7	1.8	326.2	39.1
	Cruise	78.3	9.4	16.8	2.0	391.7	46.9
	Full	95.9	11.5	21.3	2.6	399.6	47.9
3600	Slow	148.5	17.8	60.0	7.2	367.0	44.0
	2/3	28.1	3.4	25.4	3.0	358.6	43.0
	Cruise	41.4	5.0	32.8	4.0	339.6	40.7
	Full	62.4	7.5	29.5	3.5	307.0	36.8

[a]Reference 2.
[b]Particulate and sulfur oxides data are not available.

Table 3.2.3-4. AVERAGE EMISSION FACTORS FOR DIESEL-POWERED ELECTRICAL GENERATORS IN VESSELS[a]

EMISSION FACTOR RATING: C

Rated output,[b] kW	Load,[c] % rated output	Emissions: Sulfur oxides (SO_x as SO_2)[d] lb/10^3 gal	Sulfur oxides kg/10^3 liter	Carbon monoxide lb/10^3 gal	Carbon monoxide kg/10^3 liter	Hydrocarbons lb/10^3 gal	Hydrocarbons kg/10^3 liter	Nitrogen oxides (NO_x as NO_2) lb/10^3 gal	Nitrogen oxides kg/10^3 liter
20	0	27	3.2	150	18.0	263	31.5	434	52.0
	25	27	3.2	79.7	9.55	204	24.4	444	53.2
	50	27	3.2	53.4	6.40	144	17.3	477	57.2
	75	27	3.2	28.5	3.42	84.7	10.2	495	59.3
40	0	27	3.2	153	18.3	584	70.0	214	25.6
	25	27	3.2	89.0	10.7	370	44.3	219	26.2
	50	27	3.2	67.6	8.10	285	34.2	226	27.1
	75	27	3.2	64.1	7.68	231	27.7	233	27.9
200	0	27	3.2	134	16.1	135	16.2	142	17.0
	25	27	3.2	97.9	11.7	33.5	4.01	141	16.9
	50	27	3.2	62.3	7.47	17.8	2.13	140	16.8
	75	27	3.2	26.7	3.20	17.5	2.10	137	16.4
500	0	27	3.2	58.4	7.00	209	25.0	153	18.3
	25	27	3.2	53.4	6.40	109	13.0	222	26.6
	50	27	3.2	48.1	5.76	81.9	9.8	293	35.1
	75	27	3.2	43.7	5.24	59.1	7.08	364	43.6

[a]Reference 2.

[b]Maximum rated output of the diesel-powered generator.

[c]Generator electrical output (for example, a 20 kW generator at 50 percent load equals 10 kW output).

[d]Calculated, not measured, based on 0.20 percent fuel sulfur content and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

At zero load conditions, mass emission rates (e_1) may be approximated in terms of kg/hr (lb/hr) using the following relationship:

$$e_1 = k l_{rated} e_f \qquad (2)$$

where: k = a constant that relates rated output and fuel consumption,

that is, 6.93×10^{-5} 1000 liters fuel/kW

or

1.83×10^{-5} 1000 gal fuel/kW

l_{rated} = the rated output, kW

e_f = the fuel-specific emission factor from Table 3.2.3-4, kg/10^3 liter (lb/10^3 gal)

Pleasure craft. Many of the engine designs used in inboard pleasure craft are also used either in military vessels (diesel) or in highway vehicles (gasoline). Out of a total of 700,000 inboard pleasure craft registered in the United States in 1972, nearly 300,000 were inboard/outdrive. According to sales data, 60 to 70 percent of these inboard/outdrive craft used gasoline-powered automotive engines rated at more than 130 horsepower.[6] The remaining 400,000 pleasure craft used conventional inboard drives that were powered by a variety of powerplants, both gasoline and diesel. Because emission data are not available for pleasure craft, Coast Guard and automotive data[2,19] are used to characterize emission factors for this class of vessels in Table 3.2.3-5.

Military vessels. Military vessels are powered by a wide variety of both diesel and steam power plants. Many of the emission data used in this section are the result of emission testing programs conducted by the U.S. Navy and the U.S. Coast Guard.[1-3,5] A separate table containing data on military vessels is not provided here, but the included tables should be sufficient to calculate approximate military vessel emissions.

TABLE 3.2.3.-5. AVERAGE EMISSION FACTORS FOR INBOARD PLEASURE CRAFT[a]

EMISSION FACTOR RATING: D

	Based on fuel consumption				Based on operating time			
	Diesel engine[b]		Gasoline engine[c]		Diesel engine[b]		Gasoline engine[c]	
Pollutant	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/hr	lb/hr	kg/hr	lb/hr
Sulfur oxides[d] (SO_x as SO_2)	3.2	27	0.77	6.4	–	–	0.008	0.019
Carbon monoxide	17	140	149	1240	–	–	1.69	3.73
Hydrocarbons	22	180	10.3	86	–	–	0.117	0.258
Nitrogen oxides (NO_x as NO_2)	41	340	15.7	131	–	–	0.179	0.394

[a]Average emission factors are based on the duty cycle developed for large outboards (≥ 48 kilowatts or ≥ 65 horsepower) from Reference 7. The above factors take into account the impact of water scrubbing of underwater gasoline engine exhaust, also from Reference 7. All values given are for single engine craft and must be modified for multiple engine vessels.
[b]Based on tests of diesel engines in Coast Guard vessels, Reference 2.
[c]Based on tests of automotive engines, Reference 19. Fuel consumption of 11.4 liter/hr (3 gal/hr) assumed. The resulting factors are only *rough* estimates.
[d]Based on fuel sulfur content of 0.20 percent for diesel fuel and 0.043 percent for gasoline from References 7 and 17. Calculated using fuel density of 0.740 kg/liter (6.17 lb/gal) for gasoline and 0.854 kg/liter (7.12 lb/gal) for diesel fuel.

References for Section 3.2.3

1. Walter, R. A., A. J. Broderick, J. C. Sturm, and E. C. Klaubert. USCG Pollution Abatement Program: A Preliminary Study of Vessel and Boat Exhaust Emissions. U.S. Department of Transportation, Transportation Systems Center. Cambridge, Mass. Prepared for the United States Coast Guard, Washington, D.C. Report No. DOT-TSC-USCG-72-3. November 1971. 119 p.

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3.2.5 Small, General Utility Engines

Revised by Charles C. Masser

3.2.5.1 General–This category of engines comprises small 2-stroke and 4-stroke, air-cooled, gasoline-powered motors. Examples of the uses of these engines are: lawnmowers, small electric generators, compressors, pumps, minibikes, snowthrowers, and garden tractors. This category does *not* include motorcycles, outboard motors, chain saws, and snowmobiles, which are either included in other parts of this chapter or are not included because of the lack of emission data.

Approximately 89 percent of the more than 44 million engines of this category in service in the United States are used in lawn and garden applications.[1]

3.2.5.2 Emissions–Emissions from these engines are reported in Table 3.2.5-1. For the purpose of emission estimation, engines in this category have been divided into lawn and garden (2-stroke), lawn and garden (4-stroke), and miscellaneous (4-stroke). Emission factors are presented in terms of horsepower hours, annual usage, and fuel consumption.

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Table 3.2.5-1. EMISSION FACTORS FOR SMALL, GENERAL UTILITY ENGINES[a,b]
EMISSION FACTOR RATING: B

Engine	Sulfur oxides[c] (SO_x as SO_2)	Particulate	Carbon monoxide	Hydrocarbons		Nitrogen oxides (NO_x as NO_2)	Aldehydes (HCHO)
				Exhaust	Evaporative[d]		
2-Stroke, lawn and garden							
g/hphr	0.54	7.1	486	214	–	1.58	2.04
g/metric hphr	0.54	7.1	486	214	–	1.58	2.04
g/gal of fuel	1.80	23.6	1,618	713	–	5.26	6.79
g/unit-year	38	470	33,400	14,700	113	108	140
4-Stroke, lawn and garden							
g/hphr	0.37	0.44	279	23.2	–	3.17	0.49
g/metric hphr	0.37	0.44	279	23.2	–	3.17	0.49
g/gal of fuel	2.37	2.82	1,790	149	–	20.3	3.14
g/unit-year	26	31	19,100	1,590	113	217	34
4-Stroke miscellaneous							
g/hphr	0.39	0.44	250	15.2	–	4.97	0.47
g/metric hphr	0.39	0.44	250	15.2	–	4.97	0.47
g/gal of fuel	2.45	2.77	1,571	95.5	–	31.2	2.95
g/unit-year	30	34	19,300	1,170	290	384	36

[a]Reference 2.

[b]Values for g/unit-year were calculated assuming an annual usage of 50 hours and a 40 percent load factor. Factors for g/hphr can be used in instances where annual usages, load factors, and rated horsepower are known. Horsepower hours are the product of the usage in hours, the load factor, and the rated horsepower.

[c]Values calculated, not measured, based on the use of 0.043 percent sulfur content fuel.

[d]Values calculated from annual fuel consumption. Evaporative losses from storage and filling operations are not included (see Chapter 4).

3.2.6 Agricultural Equipment

by David S. Kircher

3.2.6.1 General – Farm equipment can be separated into two major categories: wheeled tractors and other farm machinery. In 1972, the wheeled tractor population on farms consisted of 4.5 million units with an average power of approximately 34 kilowatts (45 horsepower). Approximately 30 percent of the total population of these tractors is powered by diesel engines. The average diesel tractor is more powerful than the average gasoline tractor, that is, 52 kW (70 hp) versus 27 kW (36 hp).[1] A considerable amount of population and usage data is available for farm tractors. For example, the Census of Agriculture reports the number of tractors in use for each county in the U.S.[2] Few data are available on the usage and numbers of non-tractor farm equipment, however. Self-propelled combines, forage harvesters, irrigation pumps, and auxiliary engines on pull-type combines and balers are examples of non-tractor agricultural uses of internal combustion engines. Table 3.2.6-1 presents data on this equipment for the U.S.

3.2.6.2 Emissions – Emission factors for wheeled tractors and other farm machinery are presented in Table 3.2.6-2. Estimating emissions from the time-based emission factors–grams per hour (g/hr) and pounds per hour (lb/hr)–requires an average usage value in hours. An approximate figure of 550 hours per year may be used or, on the basis of power, the relationship, usage in hours = 450 + 5.24 (kW - 37.2) or usage in hours = 450 + 3.89 (hp - 50) may be employed.[1]

The best emissions estimates result from the use of "brake specific" emission factors (g/kWh or g/hphr). Emissions are the product of the brake specific emission factor, the usage in hours, the power available, and the load factor (power used divided by power available). Emissions are also reported in terms of fuel consumed.

Table 3.2.6-1. SERVICE CHARACTERISTICS OF FARM EQUIPMENT (OTHER THAN TRACTORS)[a]

Machine	Units in service, $\times 10^3$	Typical size	Typical power		Percent gasoline	Percent diesel
			kW	hp		
Combine, self-propelled	434	4.3 m (14 ft)	82	110	50	50
Gombine, pull type	289	2.4 m (8 ft)	19	25	100	0
Corn pickers and picker-shellers	687	2-row	–[b]	–	–	–
Pick-up balers	655	5400 kg/hr (6 ton/hr)	30	40	100	0
Forage harvesters	295	3.7 m (12 ft) or 3-row	104	140	0	100
Miscellaneous	1205	–	22	30	50	50

[a]Reference 1.

[b]Unpowered.

Table 3.2.6-2. EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Diesel farm tractor	Gasoline farm tractor	Diesel farm equipment (non-tractor)	Gasoline farm equipment (non-tractor)
Carbon monoxide				
g/hr	161	3,380	95.2	4,360
lb/hr	0.355	7.46	0.210	9.62
g/kWh	4.48	192	5.47	292
g/hphr	3.34	143	4.08	218
$kg/10^3$ liter	14.3	391	16.7	492
$lb/10^3$ gal	119	3,260	139	4,100
Exhaust hydrocarbons				
g/hr	77.8	128	38.6	143
lb/hr	0.172	0.282	0.085	0.315
g/kWh	2.28	7.36	2.25	9.63
g/hphr	1.70	5.49	1.68	7.18
$kg/10^3$ liter	7.28	15.0	6.85	16.2
$lb/10^3$ gal	60.7	125	57.1	135
Crankcase hydrocarbons[b]				
g/hr	–	26.0	–	28.6
lb/hr	–	0.057	–	0.063
g/kWh	–	1.47	–	1.93
g/hphr	–	1.10	–	1.44
$kg/10^3$ liter	–	3.01	–	3.25
$lb/10^3$ gal	–	25.1	–	27.1
Evaporative hydrocarbons[b]				
g/unit-year	–	15,600	–	1,600
lb/unit-year	–	34.4	–	3.53
Nitrogen oxides (NO_x as NO_2)				
g/hr	452	157	210	105
lb/hr	0.996	0.346	0.463	0.231
g/kWh	12.6	8.88	12.11	7.03
g/hphr	9.39	6.62	9.03	5.24
$kg/10^3$ liter	40.2	18.1	36.8	11.8
$lb/10^3$ gal	335	151	307	98.5
Aldehydes (RCHO as HCHO)				
g/hr	16.3	7.07	7.23	4.76
lb/hr	0.036	0.016	0.016	0.010
g/kWh	0.456	0.402	0.402	0.295
g/hphr	0.340	0.300	0.30	0.220
$kg/10^3$ liter	1.45	0.821	1.22	0.497
$lb/10^3$ gal	12.1	6.84	10.2	4.14
Sulfur oxides[c] (SO_x as SO_2)				
g/hr	42.2	5.56	21.7	6.34
lb/hr	0.093	0.012	0.048	0.014

Table 3.2.6-2. (continued). EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Diesel farm tractor	Gasoline farm tractor	Diesel farm equipment (non-tractor)	Gasoline farm equipment (non-tractor)
g/kWh	1.17	0.312	1.23	0.377
g/hphr	0.874	0.233	0.916	0.281
kg/10^3 liter	3.74	0.637	3.73	0.634
lb/10^3 gal	31.2	5.31	31.1	5.28
Particulate				
g/hr	61.8	8.33	34.9	7.94
lb/hr	0.136	0.018	0.077	0.017
g/kWh	1.72	0.471	2.02	0.489
g/hphr	1.28	0.361	1.51	0.365
kg/10^3 liter	5.48	0.960	6.16	0.823
lb/10^3 gal	45.7	8.00	51.3	6.86

[a]Reference 1.

[b]Crankcase and evaporative emissions from diesel engines are considered negligible.

[c]Not measured. Calculated from fuel sulfur content of 0.043 percent and 0.22 percent for gasoline-powered and diesel-powered equipment, respectively.

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3.2.7 Heavy-Duty Construction Equipment

by David S. Kircher

3.2.7.1 General – Because few sales, population, or usage data are available for construction equipment, a number of assumptions were necessary in formulating the emission factors presented in this section.[1] The useful life of construction equipment is fairly short because of the frequent and severe usage it must endure. The annual usage of the various categories of equipment considered here ranges from 740 hours (wheeled tractors and rollers) to 2000 hours (scrapers and off-highway trucks). This high level of use results in average vehicle lifetimes of only 6 to 16 years. The equipment categories in this section include: tracklaying tractors, tracklaying shovel loaders, motor graders, scrapers, off-highway trucks, wheeled loaders, wheeled tractors, rollers, wheeled dozers, and miscellaneous machines. The latter category contains a vast array of less numerous mobile and semi-mobile machines used in construction, such as, belt loaders, cranes, pumps, mixers, and generators. With the exception of rollers, the majority of the equipment within each category is diesel-powered.

3.2.7.2 Emissions – Emission factors for heavy-duty construction equipment are reported in Table 3.2.7-1 for diesel engines and in Table 3.2.7-2 for gasoline engines. The factors are reported in three different forms—on the basis of running time, fuel consumed, and power consumed. In order to estimate emissions from time-based emission factors, annual equipment usage in hours must be estimated. The following estimates of use for the equipment listed in the tables should permit reasonable emission calculations.

Category	Annual operation, hours/year
Tracklaying tractors	1050
Tracklaying shovel loaders	1100
Motor graders	830
Scrapers	2000
Off-highway trucks	2000
Wheeled loaders	1140
Wheeled tractors	740
Rollers	740
Wheeled dozers	2000
Miscellaneous	1000

The best method for calculating emissions, however, is on the basis of "brake specific" emission factors (g/kWh or g/hphr). Emissions are calculated by taking the product of the brake specific emission factor, the usage in hours, the power available (that is, rated power), and the load factor (the power actually used divided by the power available).

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Table 3.2.7-1. EMISSION FACTORS FOR HEAVY-DUTY, DIESEL-POWERED CONSTRUCTION EQUIPMENT[a]

EMISSION FACTOR RATING: C

Pollutant	Tracklaying tractor	Wheeled tractor	Wheeled dozer	Scraper	Motor grader
Carbon monoxide					
g/hr	175.	973.	335.	660.	97.7
lb/hr	0.386	2.15	0.739	1.46	0.215
g/kWh	3.21	5.90	2.45	3.81	2.94
g/hphr	2.39	4.40	1.83	2.84	2.19
$kg/10^3$ liter	10.5	19.3	7.90	11.8	9.35
$lb/10^3$ gal	87.5	161.	65.9	98.3	78.0
Exhaust hydrocarbons					
g/hr	50.1	67.2	106.	284.	24.7
lb/hr	0.110	0.148	0.234	0.626	0.054
g/kWh	0.919	1.86	0.772	1.64	0.656
g/hphr	0.685	1.39	0.576	1.22	0.489
$kg/10^3$ liter	3.01	6.10	2.48	5.06	2.09
$lb/10^3$ gal	25.1	50.9	20.7	42.2	17.4
Nitrogen oxides (NO_x as NO_2)					
g/hr	665.	451.	2290.	2820.	478.
lb/hr	1.47	0.994	5.05	6.22	1.05
g/kWh	12.2	12.5	16.8	16.2	14.1
g/hphr	9.08	9.35	12.5	12.1	10.5
$kg/10^3$ liter	39.8	41.0	53.9	50.2	44.8
$lb/10^3$ gal	332.	342.	450.	419.	374.
Aldehydes (RCHO as HCHO)					
g/hr	12.4	13.5	29.5	65.	5.54
lb/hr	0.027	0.030	0.065	0.143	0.012
g/kWh	0.228	0.378	0.215	0.375	0.162
g/hphr	0.170	0.282	0.160	0.280	0.121
$kg/10^3$ liter	0.745	1.23	0.690	1.16	0.517
$lb/10^3$ gal	6.22	10.3	5.76	9.69	4.31
Sulfur oxides (SO_x as SO_2)					
g/hr	62.3	40.9	158.	210.	39.0
lb/hr	0.137	0.090	0.348	0.463	0.086
g/kWh	1.14	1.14	1.16	1.21	1.17
g/hphr	0.851	0.851	0.867	0.901	0.874
$kg/10^3$ liter	3.73	3.73	3.74	3.74	3.73
$lb/10^3$ gal	31.1	31.1	31.2	31.2	31.1
Particulate					
g/hr	50.7	61.5	75.	184.	27.7
lb/hr	0.112	0.136	0.165	0.406	0.061
g/kWh	0.928	1.70	0.551	1.06	0.838
g/hphr	0.692	1.27	0.411	0.789	0.625
$kg/10^3$ liter	3.03	5.57	1.77	3.27	2.66
$lb/10^3$ gal	25.3	46.5	14.8	27.3	22.2

[a] References 1 and 2.

Table 3.2.7-1 (continued). EMISSION FACTORS FOR HEAVY-DUTY, DIESEL-POWERED CONSTRUCTION EQUIPMENT[a]

EMISSION FACTOR RATING: C

Pollutant	Wheeled loader	Tracklaying loader	Off-Highway truck	Roller	Miscellaneous
Carbon monoxide					
g/hr	251.	72.5	610.	83.5	188.
lb/hr	0.553	0.160	1.34	0.184	0.414
g/kWh	3.51	2.41	3.51	4.89	3.78
g/hphr	2.62	1.80	2.62	3.65	2.82
$kg/10^3$ liter	11.4	7.90	11.0	13.7	11.3
$lb/10^3$ gal	95.4	65.9	92.2	114.	94.2
Exhaust hydrocarbons					
g/hr	84.7	14.5	198.	24.7	71.4
lb/hr	0.187	0.032	0.437	0.054	0.157
g/kWh	1.19	0.485	1.14	1.05	1.39
g/hphr	0.888	0.362	0.853	0.781	1.04
$kg/10^3$ liter	3.87	1.58	3.60	2.91	4.16
$lb/10^3$ gal	32.3	13.2	30.0	24.3	34.7
Nitrogen oxides (NO_x as NO_2)					
g/hr	1090.	265.	3460.	474.	1030.
lb/hr	2.40	0.584	7.63	1.04	2.27
g/kWh	15.0	8.80	20.0	21.1	19.8
g/hphr	11.2	6.56	14.9	15.7	14.8
$kg/10^3$ liter	48.9	28.8	62.8	58.5	59.2
$lb/10^3$ gal	408.	240.	524.	488.	494.
Aldehydes (RCHO as HCHO)					
g/hr	18.8	4.00	51.0	7.43	13.9
lb/hr	0.041	0.009	0.112	0.016	0.031
g/kWh	0.264	0.134	0.295	0.263	0.272
g/hphr	0.197	0.100	0.220	0.196	0.203
$kg/10^3$ liter	0.859	0.439	0.928	0.731	0.813
$lb/10^3$ gal	7.17	3.66	7.74	6.10	6.78
Sulfur oxides (SO_x as SO_2)					
g/hr	82.5	34.4	206.	30.5	64.7
lb/hr	0.182	0.076	0.454	0.067	0.143
g/kWh	1.15	1.14	1.19	1.34	1.25
g/hphr	0.857	0.853	0.887	1.00	0.932
$kg/10^3$ liter	3.74	3.74	3.74	3.73	3.73
$lb/10^3$ gal	31.2	31.2	31.2	31.1	31.1
Particulate					
g/hr	77.9	26.4	116.	22.7	63.2
lb/hr	0.172	0.058	0.256	0.050	0.139
g/kWh	1.08	0.878	0.673	1.04	1.21
g/hphr	0.805	0.655	0.502	0.778	0.902
$kg/10^3$ liter	3.51	2.88	2.12	2.90	3.61
$lb/10^3$ gal	29.3	24.0	17.7	24.2	30.1

[a]References 1 and 2.

Table 3.2.7-2. EMISSION FACTORS FOR HEAVY-DUTY GASOLINE-POWERED CONSTRUCTION EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Wheeled tractor	Motor grader	Wheeled loader	Roller	Miscel-laneous
Carbon monoxide					
g/hr	4320.	5490.	7060.	6080.	7720.
lb/hr	9.52	12.1	15.6	13.4	17.0
g/kWh	190.	251.	219.	271.	266.
g/hphr	142.	187.	163.	202.	198.
kg/10^3 liter	389.	469.	435.	460.	475.
lb/10^3 gal	3250.	3910.	3630.	3840.	3960.
Exhaust hydrocarbons					
g/hr	164.	186.	241.	277.	254.
lb/hr	0.362	0.410	0.531	0.611	0.560
g/kWh	7.16	8.48	7.46	12.40	8.70
g/hphr	5.34	6.32	5.56	9.25	6.49
kg/10^3 liter	14.6	15.8	14.9	21.1	15.6
lb/10^3 gal	122.	132.	124.	176.	130.
Evaporative hydrocarbons[b]					
g/hr	30.9	30.0	29.7	28.2	25.4
lb/hr	0.0681	0.0661	0.0655	0.0622	0.0560
Crankcase hydrocarbons[b]					
g/hr	32.6	37.1	48.2	55.5	50.7
lb/hr	0.0719	0.0818	0.106	0.122	0.112
Nitrogen oxides (NO_x as NO_2)					
g/hr	195.	145.	235.	164.	187.
lb/hr	0.430	0.320	0.518	0.362	0.412
g/kWh	8.54	6.57	7.27	7.08	6.42
g/hphr	6.37	4.90	5.42	5.28	4.79
kg/10^3 liter	17.5	12.2	14.5	12.0	11.5
lb/10^3 gal	146.	102.	121.	100.	95.8
Aldehydes (RCHO as HCHO)					
g/hr	7.97	8.80	9.65	7.57	9.00
lb/hr	0.0176	0.0194	0.0213	0.0167	0.0198
g/kWh	0.341	0.386	0.298	0.343	0.298
g/hphr	0.254	0.288	0.222	0.256	0.222
kg/10^3 liter	0.697	0.721	0.593	0.582	0.532
lb/10^3 gal	5.82	6.02	4.95	4.86	4.44
Sulfur oxides (SO_x as SO_2)					
g/hr	7.03	7.59	10.6	8.38	10.6
lb/hr	0.0155	0.0167	0.0234	0.0185	0.0234
g/kWh	0.304	0.341	0.319	0.373	0.354
g/hphr	0.227	0.254	0.238	0.278	0.264
kg/10^3 liter	0.623	0.636	0.636	0.633	0.633
lb/10^3 gal	5.20	5.31	5.31	5.28	5.28

Table 3.2.7-2. (continued). EMISSION FACTORS FOR HEAVY-DUTY GASOLINE-POWERED CONSTRUCTION EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Wheeled tractor	Motor grader	Wheeled loader	Roller	Miscel-laneous
Particulate					
g/hr	10.9	9.40	13.5	11.8	11.7
lb/hr	0.0240	0.0207	0.0298	0.0260	0.0258
g/kWh	0.484	0.440	0.421	0.527	0.406
g/hphr	0.361	0.328	0.314	0.393	0.303
$kg/10^3$ liter	0.991	0.822	0.839	0.895	0.726
$lb/10^3$ gal	8.27	6.86	7.00	7.47	6.06

[a]References 1 and 2.

[b]Evaporative and crankcase hydrocarbons based on operating time only (Reference 1).

3.2.8 Snowmobiles

by Charles C. Masser

3.2.8.1 General – In order to develop emission factors for snowmobiles, mass emission rates must be known, and operating cycles representative of usage in the field must be either known or assumed. Extending the applicability of data from tests of a few vehicles to the total snowmobile population requires additional information on the composition of the vehicle population by engine size and type. In addition, data on annual usage and total machine population are necessary when the effect of this source on national emission levels is estimated.

An accurate determination of the number of snowmobiles in use is quite easily obtained because most states require registration of the vehicles. The most notable features of these registration data are that almost 1.5 million sleds are operated in the United States, that more than 70 percent of the snowmobiles are registered in just four states (Michigan, Minnesota, Wisconsin, and New York), and that only about 12 percent of all snowmobiles are found in areas outside the northeast and northern midwest.

3.2.8.2 Emissions – Operating data on snowmobiles are somewhat limited, but enough are available so that an attempt can be made to construct a representative operating cycle. The required end products of this effort are time-based weighting factors for the speed/load conditions at which the test engines were operated; use of these factors will permit computation of "cycle composite" mass emissions, power consumption, fuel consumption, and specific pollutant emissions.

Emission factors for snowmobiles were obtained through an EPA-contracted study[1] in which a variety of snowmobile engines were tested to obtain exhaust emissions data. These emissions data along with annual usage data were used by the contractor to estimate emission factors and the nationwide emission impact of this pollutant source.

To arrive at average emission factors for snowmobiles, a reasonable estimate of average engine size was necessary. Weighting the size of the engine to the degree to which each engine is assumed to be representative of the total population of engines in service resulted in an estimated average displacement of 362 cubic centimeters (cm^3).

The speed/load conditions at which the test engines were operated represented, as closely as possible, the normal operation of snowmobiles in the field. Calculations using the fuel consumption data obtained during the tests and the previously approximated average displacement of 362 cm^3 resulted in an estimated average fuel consumption of 0.94 gal/hr.

To compute snowmobile emission factors on a gram per unit year basis, it is necessary to know not only the emission factors but also the annual operating time. Estimates of this usage are discussed in Reference 1. On a national basis, however, average snowmobile usage can be assumed to be 60 hours per year. Emission factors for snowmobiles are presented in Table 3.2.8-1.

References for Section 3.2.8

1. Hare, C. T. and K. J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 7: Snowmobiles. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. April 1974.

Table 3.2.8-1. EMISSION FACTORS FOR SNOWMOBILES
EMISSION FACTOR RATING: B

Pollutant	Emissions			
	g/unit-year[a]	g/gal[b]	g/liter[b]	g/hr[b]
Carbon monoxide	58,700	1,040.	275.	978.
Hydrocarbons	37,800	670.	177.	630.
Nitrogen oxides	600	10.6	2.8	10.0
Sulfur oxides[c]	51	0.90	0.24	0.85
Solid particulate	1,670	29.7	7.85	27.9
Aldehydes (RCHO)	552	9.8	2.6	9.2

[a]Based on 60 hours of operation per year and 362 cm^3 displacement.

[b]Based on 362 cm^3 displacement and average fuel consumption of 0.94 gal/hr.

[c]Based on sulfur content of 0.043 percent by weight.

3.3 OFF-HIGHWAY, STATIONARY SOURCES

by David S. Kircher and Charles C. Masser

In general, engines included in this category are internal combustion engines used in applications similar to those associated with external combustion sources (see Chapter 1). The major engines within this category are gas turbines and large, heavy-duty, general utility reciprocating engines. Emission data currently available for these engines are limited to gas turbines and natural-gas-fired, heavy-duty, general utility engines. Most stationary internal combustion engines are used to generate electric power, to pump gas or other fluids, or to compress air for pneumatic machinery.

3.3.1 Stationary Gas Turbines for Electric Utility Power Plants

3.3.1.1 General – Stationary gas turbines find application in electric power generators, in gas pipeline pump and compressor drives, and in various process industries. The majority of these engines are used in electrical generation for continuous, peaking, or standby power.[1] The primary fuels used are natural gas and No. 2 (distillate) fuel oil, although residual oil is used in a few applications.

3.3.1.2 Emissions – Data on gas turbines were gathered and summarized under an EPA contract.[2] The contractor found that several investigators had reported data on emissions from gas turbines used in electrical generation but that little agreement existed among the investigators regarding the terms in which the emissions were expressed. The efforts represented by this section include acquisition of the data and their conversion to uniform terms. Because many sets of measurements reported by the contractor were not complete, this conversion often involved assumptions on engine air flow or fuel flow rates (based on manufacturers' data). Another shortcoming of the available information was that relatively few data were obtained at loads below maximum rated (or base) load.

Available data on the population and usage of gas turbines in electric utility power plants are fairly extensive, and information from the various sources appears to be in substantial agreement. The source providing the most complete information is the Federal Power Commission, which requires major utilities (electric revenues of $1 million or more) to submit operating and financial data on an annual basis. Sawyer and Farmer[3] employed these data to develop statistics on the use of gas turbines for electric generation in 1971. Although their report involved only the major, publicly owned utilities (not the private or investor-owned companies), the statistics do appear to include about 87 percent of the gas turbine power used for electric generation in 1971.

Of the 253 generating stations listed by Sawyer and Farmer, 137 have more than one turbine-generator unit. From the available data, it is not possible to know how many hours *each* turbine was operated during 1971 for these multiple-turbine plants. The remaining 116 (single-turbine) units, however, were operated an average of 1196 hours during 1971 (or 13.7 percent of the time), and their average load factor (percent of rated load) during operation was 86.8 percent. This information alone is not adequate for determining a representative operating pattern for electric utility turbines, but it should help prevent serious errors.

Using 1196 hours of operation per year and 250 starts per year as normal, the resulting average operating day is about 4.8 hours long. One hour of no-load time per day would represent about 21 percent of operating time, which is considered somewhat excessive. For economy considerations, turbines are not run at off-design conditions any longer than necessary, so time spent at intermediate power points is probably minimal. The bulk of turbine operation must be at base or peak load to achieve the high load factor already mentioned.

If it is assumed that time spent at off-design conditions includes 15 percent at zero load and 2 percent each at 25 percent, 50 percent, and 75 percent load, then the percentages of operating time at rated load (100 percent) and peak load (assumed to be 125 percent of rated) can be calculated to produce an 86.8 percent load factor. These percentages turn out to be 19 percent at peak load and 60 percent at rated load; the postulated cycle based on this line of reasoning is summarized in Table 3.3.1-1.

Table 3.3.1-1. TYPICAL OPERATING CYCLE FOR ELECTRIC UTILITY TURBINES

Condition, % of rated power	Percent operating time spent at condition	Time at condition based on 4.8-hr day		Contribution to load factor at condition
		hours	minutes	
0	15	0.72	43	0.00 x 0.15 = 0.0
25	2	0.10	6	0.25 x 0.02 = 0.005
50	2	0.10	6	0.50 x 0.02 = 0.010
75	2	0.10	6	0.75 x 0.02 = 0.015
100 (base)	60	2.88	173	1.0 x 0.60 = 0.60
125 (peak)	19	0.91	55	1.25 x 0.19 = 0.238
		4.81	289	Load factor = 0.868

The operating cycle in Table 3.3.1-1 is used to compute emission factors, although it is only an estimate of actual operating patterns.

Table 3.3.1-2. COMPOSITE EMISSION FACTORS FOR 1971 POPULATION OF ELECTRIC UTILITY TURBINES
EMISSION FACTOR RATING: B

Time basis	Nitrogen oxides	Hydro-carbons	Carbon Monoxide	Partic-ulate	Sulfur oxides
Entire population					
lb/hr rated load[a]	8.84	0.79	2.18	0.52	0.33
kg/hr rated load	4.01	0.36	0.99	0.24	0.15
Gas-fired only					
lb/hr rated load	7.81	0.79	2.18	0.27	0.098
kg/hr rated load	3.54	0.36	0.99	0.12	0.044
Oil-fired only					
lb/hr rated load	9.60	0.79	2.18	0.71	0.50
kg/hr rated load	4.35	0.36	0.99	0.32	0.23
Fuel basis					
Gas-fired only					
$lb/10^6 ft^3$ gas	413.	42.	115.	14.	5.2
$kg/10^6 m^3$ gas	6615.	673.	1842.	224.	83.
Oil-fired only					
$lb/10^3$ gal oil	67.8	5.57	15.4	5.0	3.5
$kg/10^3$ liter oil	8.13	0.668	1.85	0.60	0.42

[a]Rated load expressed in megawatts.

Table 3.3.1-2 is the resultant composite emission factors based on the operating cycle of Table 3.3.1-1 and the 1971 population of electric utility turbines.

Different values for time at base and peak loads are obtained by changing the total time at lower loads (0 through 75 percent) or by changing the distribution of time spent at lower loads. The cycle given in Table 3.3.1-1 seems reasonable, however, considering the fixed load factor and the economies of turbine operation. Note that the cycle determines *only* the importance of each load condition in computing composite emission factors for each type of turbine, *not* overall operating hours.

The top portion of Table 3.3.1-2 gives separate factors for gas-fired and oil-fired units, and the bottom portion gives fuel-based factors that can be used to estimate emission rates when overall fuel consumption data are available. Fuel-based emission factors on a mode basis would also be useful but present fuel consumption data are not adequate for this purpose.

References for Section 3.3.1

1. O'Keefe, W. and R. G. Schwieger. Prime Movers. Power. *115*(11): 522-531. November 1971.
2. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 6: Gas Turbine Electric Utility Power Plants. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108, February 1974.
3. Sawyer, V. W. and R. C. Farmer. Gas Turbines in U.S. Electric Utilities. Gas Turbine International. January – April 1973.

3.3.3 Gasoline and Diesel Industrial Engines

by David S. Kircher

3.3.3-1 General – This engine category covers a wide variety of industrial applications of both gasoline and diesel internal combustion power plants, such as fork lift trucks, mobile refrigeration units, generators, pumps, and portable well-drilling equipment. The rated power of these engines covers a rather substantial range–from less than 15 kW to 186 kW (20 to 250 hp) for gasoline engines and from 34 kW to 447 kW (45 to 600 hp) for diesel engines. Understandably, substantial differences in both annual usage (hours per year) and engine duty cycles also exist. It was necessary, therefore, to make reasonable assumptions concerning usage in order to formulate emission factors.[1]

3.3.3-2 Emissions – Once reasonable usage and duty cycles for this category were ascertained, emission values from each of the test engines [1] were aggregated (on the basis of nationwide engine population statistics) to arrive at the factors presented in Table 3.3.3-1. Because of their aggregate nature, data contained in this table must be applied to a population of industrial engines rather than to an individual power plant.

The best method for calculating emissions is on the basis of "brake specific" emission factors (g/kWh or lb/hphr). Emissions are calculated by taking the product of the brake specific emission factor, the usage in hours (that is, hours per year or hours per day), the power available (rated power), and the load factor (the power actually used divided by the power available).

Table 3.3.3-1. EMISSION FACTORS FOR GASOLINE- AND DIESEL-POWERED INDUSTRIAL EQUIPMENT
EMISSION FACTOR RATING: C

Pollutant[a]	Engine category[b]	
	Gasoline	Diesel
Carbon monoxide		
g/hr	5700.	197.
lb/hr	12.6	0.434
g/kWh	267.	4.06
g/hphr	199.	3.03
kg/10^3 liter	472.	12.2
lb/10^3 gal	3940.	102.
Exhaust hydrocarbons		
g/hr	191.	72.8
lb/hr	0.421	0.160
g/kWh	8.95	1.50
g/hphr	6.68	1.12
kg/10^3 liter	15.8	4.49
lb/10^3 gal	132.	37.5
Evaporative hydrocarbons		
g/hr	62.0	–
lb/hr	0.137	–
Crankcase hydrocarbons		
g/hr	38.3	–
lb/hr	0.084	–

Table 3.3.3-1. (continued). EMISSION FACTORS FOR GASOLINE- AND DIESEL-POWERED INDUSTRIAL EQUIPMENT
EMISSION FACTOR RATING: C

Pollutant[a]	Engine category[b]	
	Gasoline	Diesel
Nitrogen oxides		
g/hr	148.	910.
lb/hr	0.326	2.01
g/kWh	6.92	18.8
g/hphr	5.16	14.0
$kg/10^3$ liter	12.2	56.2
$lb/10^3$ gal	102.	469.
Aldehydes		
g/hr	6.33	13.7
lb/hr	0.014	0.030
g/kWh	0.30	0.28
g/hphr	0.22	0.21
$kg/10^3$ liter	0.522	0.84
$lb/10^3$ gal	4.36	7.04
Sulfur oxides		
g/hr	7.67	60.5
lb/hr	0.017	0.133
g/kWh	0.359	1.25
g/hphr	0.268	0.931
$kg/10^3$ liter	0.636	3.74
$lb/10^3$ gal	5.31	31.2
Particulate		
g/hr	9.33	65.0
lb/hr	0.021	0.143
g/kWh	0.439	1.34
g/hphr	0.327	1.00
$kg/10^3$ liter	0.775	4.01
$lb/10^3$ gal	6.47	33.5

[a]References 1 and 2.

[b]As discussed in the text, the engines used to determine the results in this table cover a wide range of uses and power. The listed values do not, however, necessarily apply to some very large stationary diesel engines.

References for Section 3.3.3

1. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 5: Heavy-Duty Farm, Construction, and Industrial Engines. Southwest Research Institute. San Antonio, Texas. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. October 1973. 105 p.

2. Hare, C. T. Letter to C. C. Masser of the Environmental Protection Agency concerning fuel-based emission rates for farm, construction, and industrial engines. San Antonio, Tex. January 14, 1974.

6.10 PHOSPHATE FERTILIZERS

Nearly all phosphatic fertilizers are made from naturally occurring, phosphorus-containing minerals such as phosphate rock. Because the phosphorus content of these minerals is not in a form that is readily available to growing plants, the minerals must be treated to convert the phosphorus to a plant-available form. This conversion can be done either by the process of acidulation or by a thermal process. The intermediate steps of the mining of phosphate rock and the manufacture of phosphoric acid are not included in this section as they are discussed in other sections of this publication; it should be kept in mind, however, that large integrated plants may have all of these operations taking place at one location.

In this section phosphate fertilizers have been divided into three categories: (1) normal superphosphate, (2) triple superphosphate, and (3) ammonium phosphate. Emission factors for the various processes involved are shown in Table 6.10-1.

Table 6.10-1. EMISSION FACTORS FOR THE PRODUCTION OF PHOSPHATE FERTILIZERS
EMISSION FACTOR RATING: C

Type of product	Particulates[a]	
	lb/ton	kg/MT
Normal superphosphate[b]		
Grinding, drying	9	4.5
Main stack	–	–
Triple superphosphate[b]		
Run-of-pile (ROP)	–	–
Granular	–	–
Diammonium phosphate[c]		
Dryer, cooler	80	40
Ammoniator-granulator	2	1

[a]Control efficiencies of 99 percent can be obtained with fabric filters.
[b]References 1 through 3.
[c]References 1, 4, and 5 through 8.

6.10.1 Normal Superphosphate

6.10.1.1 General[4,9]–Normal superphosphate (also called single or ordinary superphosphate) is the product resulting from the acidulation of phosphate rock with sulfuric acid. Normal superphosphate contains from 16 to 22 percent phosphoric anhydride (P_2O_5). The physical steps involved in making superphosphate are: (1) mixing rock and acid, (2) allowing the mix to assume a solid form (denning), and (3) storing (curing) the material to allow the acidulation reaction to be completed. After the curing period, the product can be ground and bagged for sale, the cured superphosphate can be sold directly as run-of-pile product, or the material can be granulated for sale as granulated superphosphate.

6.10.1.2 Emissions – The gases released from the acidulation of phosphate rock contain silicon tetrafluoride, carbon dioxide, steam, particulates, and sulfur oxides. The sulfur oxide emissions arise from the reaction of phosphate rock and sulfuric acid.[10]

If a granulated superphosphate is produced, the vent gases from the granulator-ammoniator may contain particulates, ammonia, silicon tetrafluoride, hydrofluoric acid, ammonium chloride, and fertilizer dust. Emissions from the final drying of the granulated product will include gaseous and particulate fluorides, ammonia, and fertilizer dust.

6.10.2 Triple Superphosphate

6.10.2.1 General[4,9]–Triple superphosphate (also called double or concentrated superphosphate) is the product resulting from the reaction between phosphate rock and phosphoric acid. The product generally contains 44 to 52 percent P_2O_5, which is about three times the P_2O_5 usually found in normal superphosphates.

Presently, there are three principal methods of manufacturing triple superphosphate. One of these uses a cone mixer to produce a pulverized product that is particularly suited to the manufacture of ammoniated fertilizers. This product can be sold as run-of-pile (ROP), or it can be granulated. The second method produces in a multi-step process a granulated product that is well suited for direct application as a phosphate fertilizer. The third method combines the features of quick drying and granulation in a single step.

6.10.2.2 Emissions–Most triple superphosphate is the nongranular type. The exit gases from a plant producing the nongranular product will contain considerable quantities of silicon tetrafluoride, some hydrogen fluoride, and a small amount of particulates. Plants of this type also emit fluorides from the curing buildings.

In the cases where ROP triple superphosphate is granulated, one of the greatest problems is the emission of dust and fumes from the dryer and cooler. Emissions from ROP granulation plants include silicon tetrafluoride, hydrogen fluoride, ammonia, particulate matter, and ammonium chloride.

In direct granulation plants, wet scrubbers are usually used to remove the silicon tetrafluoride and hydrogen fluoride generated from the initial contact between the phosphoric acid and the dried rock. Screening stations and bagging stations are a source of fertilizer dust emissions in this type of process.

6.10.3 AMMONIUM PHOSPHATE

6.10.3.1 General–The two general classes of ammonium phosphates are monammonium phosphate and diammonium phosphate. The production of these types of phosphate fertilizers is starting to displace the production of other phosphate fertilizers because the ammonium phosphates have a higher plant food content and a lower shipping cost per unit weight of P_2O_5.

There are various processes and process variations in use for manufacturing ammonium phosphates. In general, phosphoric acid, sulfuric acid, and anhydrous ammonia are allowed to react to produce the desired grade of ammonium phosphate. Potash salts are added, if desired, and the product is granulated, dried, cooled, screened, and stored.

MISCELLANEOUS SOURCES

This chapter contains emission factor information on those source categories that differ substantially from -and hence cannot be grouped with—the other "stationary" sources discussed in this publication. These "miscellaneous" emitters (both natural and man-made) are almost exclusively "area sources", that is, their pollutant generating process(es) are dispersed over large land areas (for example, hundreds of acres, as in the case of forest wildfires), as opposed to sources emitting from one or more stacks with a total emitting area of only several square feet. Another characteristic these sources have in common is the nonapplicability, in most cases, of conventional control methods, such as wet/dry equipment, fuel switching, process changes, etc. Instead, control of these emissions, where possible at all, may include such techniques as modification of agricultural burning practices, paving with asphalt or concrete, or stabilization of dirt roads. Finally, miscellaneous sources generally emit pollutants intermittently, when compared with most stationary point sources. For example, a forest fire may emit large quantities of particulates and carbon monoxide for several hours or even days, but when measured against the emissions of a continuous emitter (such as a sulfuric acid plant) over a long period of time (1 year, for example), its emissions may seem relatively minor. Effects on air quality may also be of relatively short-term duration.

11.1 FOREST WILDFIRES

by William M. Vatavuk, EPA
and George Yamate, IIT (Consultant)

11.1.1 General[1]

A forest "wildfire" is a large-scale natural combustion process that consumes various ages, sizes, and types of botanical specimens growing outdoors in a defined geographical area. Consequently, wildfires are potential sources of large amounts of air pollutants that should be considered when trying to relate emissions to air quality.

The size and intensity (or even the occurrence) of a wildfire is directly dependent on such variables as the local meteorological conditions, the species of trees and their moisture content, and the weight of consumable fuel per acre (fuel loading). Once a fire begins, the dry combustible material (usually small undergrowth and forest floor litter) is consumed first, and if the energy release is large and of sufficient duration, the drying of green, live material occurs with subsequent burning of this material as well as the larger dry material. Under proper environmental and fuel conditions, this process may initiate a chain reaction that results in a widespread conflagration.

The complete combustion of a forest fuel will require a heat flux (temperature gradient), an adequate oxygen supply, and sufficient burning time. The size and quantity of forest fuels, the meteorological conditions, and the topographic features interact to modify and change the burning behavior as the fire spreads; thus, the wildfire will attain different degrees of combustion during its lifetime.

The importance of both fuel type and fuel loading on the fire process cannot be overemphasized. To meet the pressing need for this kind of information, the U.S. Forest Service is developing a country-wide fuel identification system (model) that will provide estimates of fuel loading by tree-size class, in tons per acre. Further, the environmental parameters of wind, slope, and expected moisture changes have been superimposed on this fuel model and incorporated into a National Fire Danger Rating System (NFDR). This system considers five classes of fuel (three dead and two living), the components of which are selected on the basis of combustibility, response to moisture (for the dead fuels), and whether the living fuels are herbaceous (plants) or ligneous (trees).

Most fuel loading figures are based on values for "available fuel" (combustible material that will be consumed in a wildfire under specific weather conditions). Available fuel values must not be confused with corresponding values for either "total fuel" (all the combustible material that would burn under the most severe weather and burning conditions) or "potential fuel" (the larger woody material that remains even after an extremely high intensity wildfire). It must be emphasized, however, that the various methods of fuel identification are of value only when they are related to the existing fuel quantity, the quantity consumed by the fire, and the geographic area and conditions under which the fire occurs.

For the sake of conformity (and convenience), estimated fuel loadings were obtained for the vegetation in the National Forest Regions and the wildlife areas established by the U.S. Forest Service, and are presented in Table 11.1-1. Figure 11.1-1 illustrates these areas and regions.

Table 11.1-1. SUMMARY OF ESTIMATED FUEL CONSUMED BY FOREST FIRES[a]

Area and Region[b]		Estimated average fuel loading	
		MT/hectare	ton/acre
Rocky Mountain group		83	37
Region 1:	Northern	135	60
Region 2:	Rocky Mountain	67	30
Region 3:	Southwestern	22	10
Region 4:	Intermountain	40	8
Pacific group		43	19
Region 5:	California	40	18
Region 6:	Pacific Northwest	135	60
Region 10:	Alaska	36	16
	Coastal	135	60
	Interior	25	11
Southern group		20	9
Region 8:	Southern	20	9
Eastern group		25	11
North Central group		25	11
Region 9:	Conifers	22	10
	Hardwoods	27	12

[a]Reference 1.

[b]See Figure 11.1-1 for regional boundaries.

11.1.2 Emissions and Controls[1]

It has been hypothesized (but not *proven)* that the nature and amounts of air pollutant emissions are directly related to the intensity and direction (relative to the wind) of the wildfire, and indirectly related to the rate at which the fire spreads. The factors that affect the rate of spread are (1) weather (wind velocity, ambient temperature, and relative humidity), (2) fuels (fuel type, fuel bed array, moisture content, and fuel size), and (3) topography (slope and profile). However, logistical problems (such as size of the burning area) and difficulties in safely situating personnel and equipment close to the fire have prevented the collection of any reliable experimental emission data on actual wildfires, so that it is presently impossible to verify or disprove the above-stated hypothesis. Therefore, until such measurements are made, the only available information is that

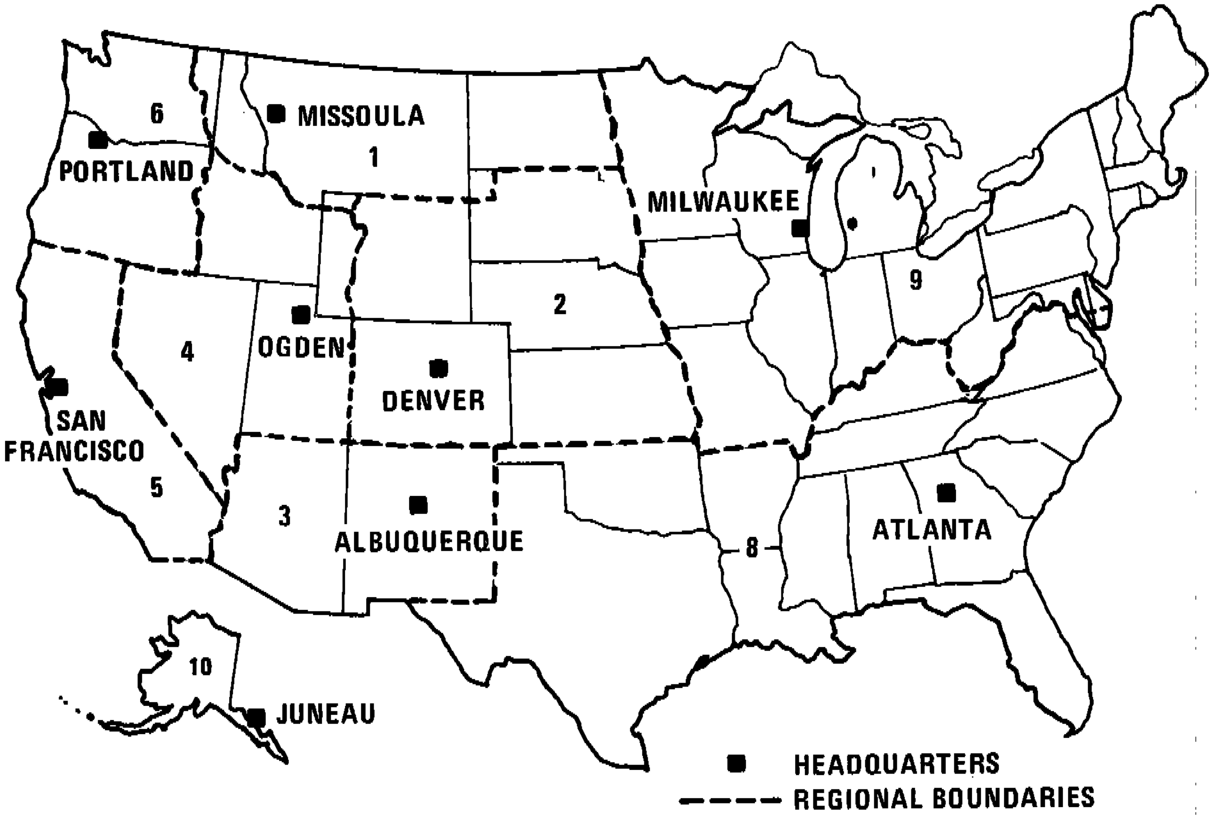

Figure 11.1-1. Forest areas and U.S. Forest Service Regions.

obtained from burning experiments in the laboratory. These data, in the forms of both emissions and emission factors, are contained in Table 11.1-2. It must be emphasized that the factors presented here are adequate for laboratory-scale emissions estimates, but that substantial errors may result if they are used to calculate actual wildfire emissions.

The emissions and emission factors displayed in Table 11.1-2 are calculated using the following formulas:

$$F_i = P_i L \tag{1}$$

$$E_i = F_i A = P_i L A \tag{2}$$

where: F_i = Emission factor (mass of pollutant/unit area of forest consumed)

P_i = Yield for pollutant "i" (mass of pollutant/unit mass of forest fuel consumed)

= 8.5 kg/MT (17 lb/ton) for total particulate

= 70 kg/MT (140 lb/ton) for carbon monoxide

= 12 kg/MT (24 lb/ton) for total hydrocarbon (as CH_4)

Table 11.1-2. SUMMARY OF EMISSIONS AND EMISSION FACTORS FOR FOREST WILDFIRES[a]
EMISSION FACTOR RATING: D

Geographic area[b]	Area consumed by wildfire, hectares	Wildfire fuel consumption, MT/hectare	Emission factors, kg/hectare				Emissions, MT			
			Particulate	Carbon monoxide	Hydrocarbons	Nitrogen oxides	Particulate	Carbon monoxide	Hydrocarbons	Nitrogen oxides
Rocky Mountain group	313,397	83	706	5,810	996	166	220,907	1,819,237	311,869	51,978
Northern, Region 1	142,276	135	1,144	9,420	1,620	269	162,628	1,339,283	229,592	38,265
Rocky Mountain, Region 2	65,882	67	572	4,710	808	135	37,654	310,086	53,157	8,860
Southwestern, Region 3	83,765	22	191	1,570	269	45	15,957	131,417	22,533	3,735
Intermountain, Region 4	21,475	40	153	1,260	215	36	3,273	26,953	4,620	770
Pacific group	469,906	43	362	2,980	512	85	170,090	1,400,738	240,126	40,021
California, Region 5	18,997	40	343	2,830	485	81	6,514	53,645	9,196	1,533
Alaska, Region 10	423,530	36	305	2,510	431	72	129,098	1,063,154	182,255	30,376
Pacific N.W. Region 6	27,380	135	1,144	9,420	1,620	269	31,296	257,738	44,183	7,363
Southern group	806,289	20	172	1,410	242	40	138,244	1,138,484	195,168	32,528
Southern, Region 8	806,289	20	172	1,410	242	40	138,244	1,138,484	195,168	32,528
North Central group	94,191	25	210	1,730	296	49	19,739	162,555	27,867	4,644
Eastern, Region 9 (Both groups are in Region 9)	141,238	25	210	1,730	296	49	29,598	243,746	41,785	6,964
Eastern group (With Region 9)	47,046	25	210	1,730	296	49	9,859	81,191	13,918	2,320
Total United States	1,730,830	38	324	2,670	458	76	560,552	4,616,317	791,369	131,895

[a]Areas consumed by wildfire and emissions are for 1971.
[b]Geographic areas are defined in Figure 11.1-1.
[c]Hydrocarbons expressed as methane.

= 2 kg/MT (4 lb/ton) for nitrogen oxides (NO_x)

= Negligible for sulfur oxides (SO_x)

L = Fuel loading consumed (mass of forest fuel/unit land area burned)

A = Land area burned

E_i = Total emissions of pollutant "i" (mass of pollutant)

For example, suppose that it is necessary to estimate the total particulate emissions from a 10,000 hectare wildfire in the Southern area (Region 8). From Table 11.1-1 it is seen that the average fuel loading is 20 MT/hectare (9 ton/acre). Further, the pollutant yield for particulates is 8.5 kg/MT (17 lb/ton). Therefore, the emissions are:

E = (8.5 kg/MT of fuel) (20 MT of fuel/hectare) (10,000 hectares)

E = 1,700,000 kg = 1,700 MT

The most effective method for controlling wildfire emissions is, of course, to prevent the occurrence of forest fires using various means at the forester's disposal. A frequently used technique for reducing wildfire occurrence is "prescribed" or "hazard reduction" burning. This type of managed burn involves combustion of litter and underbrush in order to prevent fuel buildup on the forest floor and thus reduce the danger of a wildfire. Although some air pollution is generated by this preventative burning, the net amount is believed to be a relatively smaller quantity than that produced under a wildfire situation.

Reference for Section 11.1

1. Development of Emission Factors for Estimating Atmospheric Emissions from Forest Fires. Final Report. IIT Research Institute, Chicago, Ill. Prepared for Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. 68-02-0641, October 1973. (Publication No. EPA-450/3-73-009).

APPENDIX B

EMISSION FACTORS AND NEW SOURCE PERFORMANCE STANDARDS FOR STATIONARY SOURCES

The New Source Performance Standards (NSPS) promulgated by the Environmental Protection Agency for various industrial categories and the page reference in this publication where uncontrolled emission factors for those sources are discussed are presented in Tables B-1 and B-2. Note that, in the case of steam-electric power plants, the NSPS encompass much broader source categories than the corresponding emission factors. In several instances, the NSPS were formulated on different bases than the emission factors (for example, grains per standard cubic foot versus pounds per ton). Finally, note that NSPS relating to opacity have been omitted because they cannot (at this time) be directly correlated with emission factors.

Table B-1. PROMULGATED NEW SOURCE PERFORMANCE STANDARDS —GROUP I SOURCES[a]

Source category and pollutant	New Source Performance Standard (maximum 2-hr average)	AP-42 page reference
Fossil-fuel-fired steam generators with >63 x 10^6 kcal/hr (250 x 10^6 Btu/hr) of heat input		
Coal-burning plants (excluding lignite)		
Pulverized wet bottom		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.1-3
Sulfur dioxide	2.2 g/10^6 cal heat input (1.2 lb/10^6 Btu)	1.1-3
Nitrogen oxides (as NO_2)	1.26 g/10^6 cal heat input (0.70 lb/10^6 Btu)	1.1-3
Pulverized dry bottom		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.1-3
Sulfur dioxide	2.2 g/10^6 cal heat input (1.2 lb/10^6 Btu)	1.1-3
Nitrogen oxides (as NO_2)	1.26 g/10^6 cal heat input (0.70 lb/10^6 Btu)	1.1-3
Pulverized cyclone		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.1-3
Sulfur dioxide	2.2 g/10^6 cal heat input (1.2 lb/10^6 Btu)	1.1-3
Nitrogen oxides (as NO_2)	1.26 g/10^6 cal heat input (0.70 lb/10^6 Btu)	1.1-3
Spreader stoker		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.1-3
Sulfur dioxide	2.2 g/10^6 cal heat input (1.2 lb/10^6 Btu)	1.1-3
Nitrogen oxides (as NO_2)	1.26 g/10^6 cal heat input (0.70 lb/10^6 Btu)	1.1-3
Residual-oil-burning plants		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.3-2
Sulfur dioxide	1.4 g/10^6 cal heat input (0.80 lb/10^6 Btu)	1.3-2
Nitrogen oxides (as NO_2)	0.54 g/10^6 cal heat input (0.30 lb/10^6 Btu)	1.3-2
Natural-gas-burning plants		
Particulates	0.18 g/10^6 cal heat input (0.10 lb/10^6 Btu)	1.4-2
Nitrogen oxides (as NO_2)	0.36 g/106 cal heat input (0.20 lb/10^6 Btu)	1.4-2
Municipal incinerators		
Particulates	0.18 g/Nm^3 (0.08 gr/scf) corrected to 12% CO_2	2.1-1
Portland cement plants		
Kiln—dry process		
Particulates	0.15 kg/MT (0.30 lb/ton) of feed to kiln	8.6-3

Table B-1. (continued). PROMULGATED NEW SOURCE PERFORMANCE STANDARDS —GROUP 1 SOURCES[a]

Source category and pollutant	New Source Performance Standard (maximum 2-hr average)	AP-42 page reference
Kiln—wet process Particulates	0.15 kg/MT (0.30 lb/ton) of feed to kiln	8.6-3
Clinker cooler Particulates	0.050 kg/MT (0.10 lb/ton) of feed to kiln	8.6-4
Nitric acid plants Nitrogen oxides (as NO_2)	1.5 kg/MT (3.0 lb/ton) of 100% acid produced	5.9-3
Sulfuric acid plants Sulfur dioxide	2.0 kg/MT (4.0 lb/ton) of 100% acid produced	5.17-5
Sulfuric acid mist (as H_2SO_4)	0.075 kg/MT (0.15 lb/ton) of 100% acid produced	5.17-7

[a]Title 40 – Protection of Environment. Part 60—Standards of Performance for New Stationary Sources. Federal Register. *36* (247):24876, December 23, 1971.

Table B-2. PROMULGATED NEW SOURCE PERFORMANCE STANDARDS —GROUP II SOURCES[a]

Source category and pollutant	New Source Performance Standard	AP-42 page reference
Asphalt concrete plants		
Particulates	90 mg/Nm^3 (0.040 gr/dscf)	8.1-4
Petroleum refineries: Fluid catalytic cracking units		
Particulates	60 mg/Nm^3 (0.026 gr/dscf)[b]	9.1-3
Carbon monoxide	0.050% by volume	9.1-3
Storage vessels for petroleum liquids		
"Floating roof" storage tanks		
Hydrocarbons	If true vapor pressure under storage conditions exceeds 78 mm (1.52 psia) mercury but is no greater than 570 mm (11.1 psia) mercury, the vessel must be equipped with a floating roof or its equivalent.	4.3-8
Secondary lead smelters		
Blast (cupola) furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.11-2
Reverberatory furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.11-2
Secondary brass and bronze ingot production plants		
Reverberatory furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.9-2
Electric induction furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.9-2
Blast furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.9-2
Iron and steel plants		
Basic oxygen process furnaces		
Particulates	50 mg/Nm^3 (0.022 gr/dscf)	7.5-5
Sewage treatment plants		
Sewage sludge incinerators		
Particulates	0.65 g/kg (1.30 lb/ton) of dry sludge input	2.5-2

[a]Title 40—Protection of Environment. Part 60—Standards of Performance for New Stationary Sources: Additions and Miscellaneous Amendments. Federal Register. 39 (47), March 8, 1974.

[b]The actual NSPS reads "1.0 kg/1000 kg (1.0 lb/1000 lb) of coke burn-off in the catalyst regenerator," which is approximately equivalent to an exhaust gas concentration of 60 mg/Nm^3 (0.026 gr/dscf).

APPENDIX C
NEDS SOURCE CLASSIFICATION CODES
AND
EMISSION FACTOR LISTING

The Source Classification Codes (SCC's) presented herein comprise the basic "building blocks" upon which the National Emissions Data System (NEDS) is structured. Each SCC represents a process or function within a source category logically associated with a point of air pollution emissions. In NEDS, any operation that causes air pollution can be represented by one or more of these SCC's.

Also presented herein are emission factors for the five NEDS pollutants (particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide) that correspond to each SCC. These factors are utilized in NEDS to automatically compute estimates of air pollutant emissions associated with a process when a more accurate estimate is not supplied to the system. These factors are, for the most part, taken directly from AP-42. In certain cases, however, they may be derived from better information not yet incorporated into AP-42 or be based merely on the similarity of one process to another for which emissions information does exist.

Because these emission factors are merely single representative values taken, in many cases, from a broad range of possible values and because they do not reflect all of the variables affecting emissions that are described in detail in this document, the user is cautioned not to use the factors listed in Appendix C out of context to estimate the emissions from any given source. Instead, if emission factors must be used to estimate emissions, the appropriate section of this document should be consulted to obtain the most applicable factor for the source in question. The factors presented in Appendix C are reliable only when applied to numerous sources as they are in NEDS.

NOTE: The Source Classification Code and emission factor listing presented in Appendix C was created on June 20, 1974, to replace the listing dated August 28, 1973. The listing has been updated to include several new Source Classification Codes as well as several new or revised emission factors that are considered necessary for the improvement of NEDS. The listing will be updated periodically as better source and emission factor information becomes available. Any comments regarding this listing, especially those pertaining to the need for additional SCC's, should be directed to:

Chief, Technical Development Section
National Air Data Branch
Environmental Protection Agency
Research Triangle Park, N. C. 27711

POUNDS EMITTED PER UNIT

EXTCOMB BOILER *****************	-ELECTRIC GENERATN *****************	PART	SOX	NOX	HC	CO	UNITS
ANTHRACITE COAL							
1-01-001-01	>100MMBTU PULVIZD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-01-001-02	>100MMBTU STOKERS	2.00 A	38.0 S	10.5	0.20	6.00	TONS BURNED
1-01-001-03	10-100MMBTU PULVD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-01-001-04	10-100MMBTU STOKR	2.00 A	38.0 S	10.5	0.20	6.00	TONS BURNED
1-01-001-05	<10MMBTU PULVIZED	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-01-001-06	<10MMBTU STOKER	2.00 A	38.0 S	6.00	0.20	10.0	TONS BURNED
1-01-001-99	OTHER/NOT CLASIFD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
BITUMINOUS COAL							
1-01-002-01	>100MMBTU PULVWET	13.0 A	38.0 S	30.0	0.30	1.00	TONS BURNED
1-01-002-02	>100MMBTU PULVDRY	17.0 A	38.0 S	18.0	0.30	1.00	TONS BURNED
1-01-002-03	>100MMBTU CYCLONE	2.00 A	38.0 S	55.0	0.30	1.00	TONS BURNED
1-01-002-04	>100MMBTU SPDSTKR	13.0 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-01-002-05	>100MMBTU/HR OFSK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-01-002-06	10-100MMBTU PULWT	13.0 A	38.0 S	30.0	0.30	1.00	TONS BURNED
1-01-002-07	10-100MMBTU PULDY	17.0 A	38.0 S	18.0	0.30	1.00	TONS BURNED
1-01-002-08	10-100MMBTU OFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-01-002-09	10-100MMBTU UFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-01-002-10	<10MMBTU OFSTOKER	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-01-002-11	<10MMBTU UFSTOKER	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-01-002-12	<10MMBTU PULV-DRY	17.0 A	38.0 S	18.0	0.30	1.00	TONS BURNED
1-01-002-99	OTHER/NOT CLASIFD	16.0 A	38.0 S	18.0	0.30	0.50	TONS BURNED
LIGNITE							
1-01-003-01	>100MMBTU PULVWET	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-01-003-02	>100MMBTU PULVDRY	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-01-003-03	>100MMBTU CYCLONE	6.50 A	30.0 S	17.0	0.30	1.00	TONS BURNED
1-01-003-04	>100MMBTU OF STKR	6.50 A	30.0 S	13.0	0.30	2.00	TONS BURNED
1-01-003-05	>100MMBTU UF STKR	6.50 A	30.0 S	13.0	0.30	2.00	TONS BURNED
1-01-003-06	>100MMBTU SPDSTKR	6.50 A	30.0 S	13.0	0.30	2.00	TONS BURNED
1-01-003-07	10-100MMBTU DYPUL	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-01-003-08	10-100MMBTU WTPUL	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-01-003-09	10-100MMBTU OFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-01-003-10	10-100MMBTU UFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-01-003-11	10-100MMBTUSPDSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-01-003-12	<10MMBTU PULV DRY	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-01-003-13	<10MMBTU OF STOKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-01-003-14	<10MMBTU UF STOKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-01-003-15	<10MMBTU SPDSTCKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
RESIDUAL OIL							
1-01-004-01	>100MMBTU/HR GENL	8.00	157. S	105.	2.00	3.00	1000GALLONS BURNED
1-01-004-02	10-100MMBTU/HRGNL	8.00	157. S	105.	2.00	3.00	1000GALLONS BURNED
1-01-004-03	<10MMBTU/HR GENL	8.00	157. S	105.	2.00	3.00	1000GALLONS BURNED
DISTILLATE OIL							
1-01-005-01	>100MMBTU/HR GENL	8.00	144. S	105.	2.00	3.00	1000GALLONS BURNED
1-01-005-02	10-100MMBTU/HRGNL	8.00	144. S	105.	2.00	3.00	1000GALLONS BURNED
1-01-005-03	<10MMBTU/HR GENL	8.00	144. S	105.	2.00	3.00	1000GALLONS BURNED
NATURAL GAS							
1-01-006-01	>100MMBTU/HR	10.0	0.60	600.	1.00	17.0	MILLION CUBIC FEET BURNED
1-01-006-02	10-100MMBTU/HR	10.0	0.60	230.	1.00	17.0	MILLION CUBIC FEET BURNED
1-01-006-03	<10MMBTU/HR	10.0	0.60	120.	1.00	17.0	MILLION CUBIC FEET BURNED
PROCESS GAS							
1-01-007-01	>100MMBTU/HR	15.0	950. S	600.	1.00	17.0	MILLION CUBIC FEET BURNED
1-01-007-02	10-100MMBTU/HR	15.0	950. S	230.	1.00	17.0	MILLION CUBIC FEET BURNED
1-01-007-03	<10 MMBTU/HR	15.0	950. S	120.	1.00	17.0	MILLION CUBIC FEET BURNED
COKE							
1-01-008-01	>100MMBTU/HR	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
WOOD/BARK WASTE							
1-01-009-01	BARK BOILER	75.0	1.50	10.0	2.00	2.00	TONS BURNED
1-01-009-02	WOOD/BARK BOILER	37.5	1.50	10.0	2.00	2.00	TONS BURNED
1-01-009-03	WOOD BOILER	10.0	1.50	10.0	5.00	10.0	TONS BURNED
BAGASSE							
1-01-011-01	>100MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
1-01-011-02	10-100MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
1-01-011-03	<10MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
SLD WASTE-SPECIFY							
1-01-012-01	>100 MMBTU/HR						TONS BURNED
1-01-012-02	10-100 MMBTU/HR						TONS BURNED
1-01-012-03	<10 MMBTU/HR						TONS BURNED

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

EXTCOMB BOILER -ELECTRIC GENERATN (CONTINUED)		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
LIQ WASTE-SPECIFY							
1-01-013-01	>100 MMBTU/HR						1000 GALLONS BURNED
1-01-013-02	10-100 MMBTU/HR						1000 GALLONS BURNED
1-01-013-03	<10 MMBTU/HR						1000 GALLONS BURNED
OTHER/NOT CLASIFD							
1-01-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
1-01-999-98	SPECIFY IN REMARK						1000 GALLON (LIQUID) BURNED
1-01-999-99	SPECIFY IN REMARK						TONS BURNED (SOLID)
EXTCOMB BOILER -INDUSTRIAL							
ANTHRACITE COAL							
1-02-001-01	>100MMBTU/HR PULV	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-02-001-02	>100MMBTU/HR STKR	2.00 A	38.0 S	10.5	0.20	6.00	TONS BURNED
1-02-001-03	10-100MMBTU PULVD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-02-001-04	10-100MMBTU STKR	2.00 A	38.0 S	10.5	0.20	6.00	TONS BURNED
1-02-001-05	<10MMBTU/HR PULVD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-02-001-06	<10MMBTU/HR STKR	2.00 A	38.0 S	6.00	0.20	10.0	TONS BURNED
1-02-001-07	<10MMBTU/HR HNDFR	10.0	36.0 S	3.00	2.50	90.0	TONS BURNED
1-02-001-99	OTHER/NOT CLASIFD	17.0 A	38.0 S	18.0	0.03	2.00	TONS BURNED
BITUMINOUS COAL							
1-02-002-01	>100MMBTU PULVWET	13.0 A	38.0 S	30.0	0.30	1.00	TONS BURNED
1-02-002-02	>100MMBTU PULVDRY	17.0 A	38.0 S	18.0	0.30	1.00	TONS BURNED
1-02-002-03	>100MMBTU CYCLONE	2.00 A	38.0 S	55.0	0.30	1.00	TONS BURNED
1-02-002-04	>100MMBTU SPDSTKR	13.0 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-02-002-05	10-100MMBTU OFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-02-002-06	10-100MMBTU UFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-02-002-07	10-100MMBTU PULWT	13.0 A	38.0 S	30.0	0.30	1.00	TONS BURNED
1-02-002-08	10-100MMBTU PULDY	17.0 A	38.0 S	18.0	0.30	1.00	TONS BURNED
1-02-002-09	10-100MMBTUSPDSTK	13.0 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-02-002-10	<10MMBTU OFD STKR	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-02-002-11	<10MMBTU UFD STKR	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-02-002-12	<10MMBTU PULV DRY	17.0 A	38.0 S	18.0	0.30	2.00	TONS BURNED
1-02-002-13	<10MMBTU SPD STKR	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-02-002-14	<10MMBTU HANDFIRE	20.0	38.0 S	3.00	20.0	90.0	TONS BURNED
1-02-002-99	OTHER/NOT CLASIFD	13.0 A	38.0 S	15.0	0.30	2.00	TONS BURNED
LIGNITE							
1-02-003-01	>100MMBTU PULVWET	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-02-003-02	>100MMBTU PULVDRY	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-02-003-03	>100MMBTU CYCLONE	6.50 A	30.0 S	17.0	0.30	1.00	TONS BURNED
1-02-003-04	>100MMBTU OFSTKR	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-05	>100MMBTU UFSTKR	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-06	>100MMBTU SPDSTKR	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-07	10-100MMBTU DYPUL	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-02-003-08	10-100MMBTU WTPUL	6.50 A	30.0 S	13.0	0.30	1.00	TONS BURNED
1-02-003-09	10-100MMBTU OFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-10	10-100MMBTU UFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-11	10-100MMBTUSPDSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-02-003-12	<10MMBTU PULV DRY	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-02-003-13	<10MMBTU OFSTOKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-02-003-14	<10MMBTU UFSTOKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-02-003-15	<10MMBTU HANDFIRE	6.50 A	30.0 S	13.0	20.0	90.0	TONS BURNED
1-02-003-16	<10MMBTU SPDSTKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
RESIDUAL OIL							
1-02-004-01	>100MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-02-004-02	10-100MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-02-004-03	<10MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
DISTILLATE OIL							
1-02-005-01	>100MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-02-005-02	10-100MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-02-005-03	<10MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED
NATURAL GAS							
1-02-006-01	>100MMBTU/HR	10.0	0.60	600.	3.00	17.0	MILLION CUBIC FEET BURNED
1-02-006-02	10-100MMBTU/HR	10.0	0.60	230.	3.00	17.0	MILLION CUBIC FEET BURNED
1-02-006-03	<10MMBTU/HR	10.0	0.60	120.	3.00	17.0	MILLION CUBIC FEET BURNED
PROCESS GAS							
1-02-007-01	REFINERY >100						MILLION CUBIC FEET BURNED
1-02-007-02	REFINERY 10-100						MILLION CUBIC FEET BURNED
1-02-007-03	REFINERY <10						MILLION CUBIC FEET BURNED
1-02-007-04	BLAST FNC >100						MILLION CUBIC FEET BURNED
1-02-007-05	BLAST FNC 10-100						MILLION CUBIC FEET BURNED
1-02-007-06	BLAST FNC <10						MILLION CUBIC FEET BURNED
1-02-007-07	COKE OVEN >100						MILLION CUBIC FEET BURNED
1-02-007-08	COKE OVEN 10-100						MILLION CUBIC FEET BURNED
1-02-007-09	COKE OVEN <10						MILLION CUBIC FEET BURNED
1-02-007-99	OTHER/NOT CLASIFD						MILLION CUBIC FEET BURNED

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

EXTCOMB BOILER -INDUSTRIAL (CONTINUED) POUNDS EMITTED PER UNIT

		PART	SOX	NOX	HC	CO	UNITS
COKE							
1-02-008-02	10-100MMBTU/HR	2.00 A	38.0 S	15.0	0.20	2.00	TONS BURNED
1-02-008-03	<10MMBTU/HR	2.00 A	38.0 S	6.00	0.20	10.0	TONS BURNED
WOOD/BARK WASTE							
1-02-009-01	BARK BOILER	75.0	1.50	10.0	2.00	2.00	TONS BURNED
1-02-009-02	WOOD/BARK BOILER	37.5	1.50	10.0	2.00	2.00	TONS BURNED
1-02-009-03	WOOD BOILER	10.0	1.50	10.0	5.00	10.0	TONS BURNED
LIQ PETROLEUM GAS							
1-02-010-02	10-100MMBTU/HR	1.75	86.5 S	11.7	0.30	1.55	1000GALLONS BURNED
1-02-010-03	<10MMBTU/HR	1.75	86.5 S	11.7	0.30	1.55	1000GALLONS BURNED
BAGASSE							
1-02-011-01	>100 MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
1-02-011-02	10-100MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
1-02-011-03	<10MMBTU/HR	22.0	0.	2.00	2.00	2.00	TONS BURNED
SLD WASTE-SPECIFY							
1-02-012-01	>100 MMBTU/HR						TONS BURNED
1-02-012-02	100-100 MMBTU/HR						TONS BURNED
1-02-012-03	<10 MMBTU/HR						TONS BURNED
LIQ WASTE-SPECIFY							
1-02-013-01	>100 MMBTU/HR						1000 GALLONS BURNED
1-02-013-02	10-100 MMBTU/HR						1000 GALLONS BURNED
1-02-013-03	<10 MMBTU/HR						1000 GALLONS BURNED
OTHER/NOT CLASIFD							
1-02-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
1-02-999-98	SPECIFY IN REMARK						1000 GALLON BURNED (LIQUID)
1-02-999-99	SPECIFY IN REMARK						TONS BURNED (SOLID)

EXTCOMB BOILER -COMMERCL-INSTUTNL

		PART	SOX	NOX	HC	CO	UNITS
ANTHRACITE COAL							
1-03-001-05	10-100MMBTU PULWT	13.0 A	38.0 S	30.0	0.03	1.00	TONS BURNED
1-03-001-06	10-100MMBTU PULDY	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-03-001-07	10-100MMBTUSPDSTK	13.0 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-03-001-08	<10MMBTU PULVIZED	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-03-001-09	<10MMBTU STOKER	2.00 A	38.0 S	6.00	0.20	10.0	TONS BURNED
1-03-001-10	<10MMBTU SPDSTOKR	2.00 A	38.0 S	15.0	1.00	10.0	TONS BURNED
1-03-001-99	OTHER/NOT CLASIFD	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
BITUMINOUS COAL							
1-03-002-05	10-100MMBTU PULWT	13.0 A	38.0 S	30.0	0.03	1.00	TONS BURNED
1-03-002-06	10-100MMBTU PULDY	17.0 A	38.0 S	18.0	0.03	1.00	TONS BURNED
1-03-002-07	10-100MMBTU OFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-03-002-08	10-100MMBTU UFSTK	5.00 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-03-002-09	10-100MMBTUSPDSTK	13.0 A	38.0 S	15.0	1.00	2.00	TONS BURNED
1-03-002-10	10-100MMBTU HANFR	20.0	38.0 S	3.00	20.0	90.0	TONS BURNED
1-03-002-11	<10MMBTU OFSTOKER	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-03-002-12	<10MMBTU UFSTOKER	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-03-002-13	<10MMBTU SPDSTOKR	2.00 A	38.0 S	6.00	3.00	10.0	TONS BURNED
1-03-002-14	<10MMBTU HANDFIRE	20.0	38.0 S	3.00	20.0	90.0	TONS BURNED
1-03-002-99	OTHER/NOT CLASIFD	13.0 A	38.0 S	15.0	0.30	2.00	TONS BURNED
LIGNITE							
1-03-003-05	10-100MMBTU PULWT	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-03-003-06	10-100MMBTU PULDY	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-03-003-07	10-100MMBTU OFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-03-003-08	10-100MMBTU UFSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-03-003-09	10-100MMBTUSPDSTK	6.50 A	30.0 S	13.0	1.00	2.00	TONS BURNED
1-03-003-10	<10MMBTU PULV-DRY	6.50 A	30.0 S	13.0	1.00	10.0	TONS BURNED
1-03-003-11	<10MMBTU OFSTOKER	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-03-003-12	<10MMBTU UFSTOKER	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-03-003-13	<10MMBTU SPDSTOKR	6.50 A	30.0 S	13.0	3.00	10.0	TONS BURNED
1-03-003-14	<10MMBTU HANDFIRE	6.50 A	30.0 S	13.0	20.0	90.0	TONS BURNED
RESIDUAL OIL							
1-03-004-01	>100MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-03-004-02	10-100MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-03-004-03	<10MMBTU/HR	23.0	157. S	60.0	3.00	4.00	1000 GALLONS BURNED
DISTILLATE							
1-03-005-01	>100MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-03-005-02	10-100MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED
1-03-005-03	<10MMBTU/HR	15.0	142. S	60.0	3.00	4.00	1000 GALLONS BURNED

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

EXTCOMB BOILER -COMMERCL-INSTUTNL (CONTINUED)		PART	SOX	NOX	HC	CO	UNITS
		POUNDS EMITTED PER UNIT					
NATURAL GAS							
1-03-006-01	>100MMBTU/HR	10.0	0.60	230.	8.00	20.0	MILLION CUBIC FEET BURNED
1-03-006-02	10-100MMBTU/HR	10.0	0.60	120.	8.00	20.0	MILLION CUBIC FEET BURNED
1-03-006-03	<10MMBTU/HR	10.0	0.60	80.0	8.00	20.0	MILLION CUBIC FEET BURNED
PROCESS GAS							
1-03-007-01	SEWAGE>100MMBTUHR						MILLION CUBIC FEET BURNED
1-03-007-02	SEWAGE 10-100						MILLION CUBIC FEET BURNED
1-03-007-03	SEWAGE<10MMBTU/HR						MILLION CUBIC FEET BURNED
1-03-007-99	OTHER/NOT CLASIFD						MILLION CUBIC FEET BURNED
WOOD/BARK WASTE							
1-03-009-01	BARK BOILER	75.0	1.50	10.0	2.00	2.00	TONS BURNED
1-03-009-02	WOOD/BARK BOILER	37.5	1.50	10.0	2.00	2.00	TONS BURNED
1-03-009-03	WOOD BOILER	10.0	1.50	10.0	5.00	10.0	TONS BURNED
LIQ PETROLEUM GAS							
1-03-010-02	10-100MMBTU/HR	1.85	86.5 S	9.50	0.75	1.95	1000 GALLONS BURNED
1-03-010-03	<10MMBTU/HR	1.85	86.5 S	9.50	0.75	1.95	1000 GALLONS BURNED
SLD WASTE-SPECIFY							
1-03-012-01	>100 MMBTU/HR						TONS BURNED
1-03-012-02	10-100 MMBTU/HR						TONS BURNED
1-03-012-03	<10 MMBTU/HR						TONS BURNED
LIQ WASTE-SPECIFY							
1-03-013-01	>100 MMBTU/HR						1000 GALLONS BURNED
1-03-013-02	10-100 MMBTU/HR						1000 GALLONS BURNED
1-03-013-03	<10 MMBTU/HR						1000 GALLONS BURNED
OTHER/NOT CLASIFD							
1-03-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
1-03-999-98	SPECIFY IN REMARK						1000 GALLON BURNED (LIQUID)
1-03-999-99	SPECIFY IN REMARK						TONS BURNED (SOLID)
INTERNLCOMBUSTION -ELECTRIC GENERATN							
DISTILLATE OIL							
2-01-001-01	TURBINE	5.00	144. S	68.0	5.60	15.4	1000 GALLONS BURNED
2-01-001-02	RECIPROCATING		144. S				1000 GALLONS BURNED
NATURAL GAS							
2-01-002-01	TURBINE	14.0	0.60	413.	42.0	115.	MILLION CUBIC FEET
2-01-002-02	RECIPROCATING		0.60				MILLION CUBIC FEET
DIESEL							
2-01-003-01	RECIPROCATING	13.0	144. S	370.	37.0	225.	THOUSANDS OF GALLONS
2-01-003-02	TURBINE	5.00	144. S	68.0	5.60	15.4	1000 GALLONS BURNED
RESIDUAL OIL							
2-01-004-01	TURBINE		159. S				1000 GALLONS BURNED
JET FUEL							
2-01-005-01	TURBINE		6.20				1000 GALLONS BURNED
CRUDE OIL							
2-01-006-01	TURBINE		146. S				1000 GALLONS BURNED
PROCESS GAS							
2-01-007-01	TURBINE		950. S				MILLION CUBIC FEET
OTHER/NOT CLASIFD							
2-01-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
2-01-999-98	SPECIFY IN REMARK						1000 GALLONS BURNED
INTERNLCOMBUSTION -INDUSTRIAL							
DISTILLATE OIL							
2-02-001-01	TURBINE	16.8	144. S	118.			1000 GALLONS BURNED
2-02-001-02	RECIPROCATING	33.5	144. S	469.	37.5	102.	1000 GALLONS BURNED
NATURAL GAS							
2-02-002-01	TURBINE		0.60	598.			MILLION CUBIC FEET
2-02-002-02	RECIPROCATING		0.60	770.			MILLION CUBIC FEET
GASOLINE							
2-02-003-01	RECIPROCATING	6.50	5.30	102.	161.	3,940.	1000 GALLONS BURNED

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

INTERNLCOMBUSTION -INDUSTRIAL (CONTINUED)		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
DIESEL FUEL							
2-02-004-01	RECIPROCATING	33.5	144. S	469.	37.5	102.	1000 GALLONS BURNED
2-02-004-02	TURBINE	13.0	144. S	370.	37.0	225.	1000 GALLONS BURNED
RESIDUAL OIL							
2-02-005-01	TURBINE		159. S				1000 GALLONS BURNED
JET FUEL							
2-02-006-01	TURBINE		6.20				1000 GALLONS BURNED
CRUDE OIL							
2-02-007-01	TURBINE		146. S				1000 GALLONS BURNED
PROCESS GAS							
2-02-008-01	TURBINE		950. S				MILLION CUBIC FEET
2-02-008-02	RECIPROCATING		950. S				MILLION CUBIC FEET BURNED
OTHER/NOT CLASIFD							
2-02-999-97	SPECIFY IN REMARK.						MILLION CUBIC FEET BURNED
2-02-999-98	SPECIFY IN REMARK						1000 GALLONS BURNED
INTERNLCOMBUSTION -CCMMERCL-INSTUTNL							
DIESEL							
2-03-001-01	RECIPROCATING	33.5	144. S	469.	37.5	102.	THOUSANDS OF GALLONS
OTHER/NOT CLASIFD							
2-03-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
2-03-999-98	SPECIFY IN REMARK						1000 GALLONS BURNED
INTERNLCCMBUSTION -ENGINE TESTING							
AIRCRAFT							
2-04-001-01	TURBOJET	11.8	13.0	14.6	46.0	32.7	THOUSANDS OF GALLON/FUEL
ROCKET MOTOR							
2-04-002-01	SOLID PROPELLANT						TONS OF FUEL
OTHER/NOT CLASIFD							
2-04-999-97	SPECIFY IN REMARK						MILLION CUBIC FEET BURNED
2-04-999-98	SPECIFY IN REMARK						1000 GALLONS BURNED
2-04-999-99	SPECIFY IN REMARK						TONS BURNED
INDUSTRIAL PROCES -CHEMICAL MFG							
ADIPIC ACID PROD							
3-01-001-01	GENERAL-CYCLOHEX	0.	0.	12.0	0.	0.	TONS PRODUCED
3-01-001-99	OTHER/NOT CLASIFD						TONS PRODUCED
AMMCNIA W/METHNTR							
3-01-002-01	PURGE GAS	0.	0.	0.	90.0	0.	TONS PRODUCED
3-01-002-02	STORAGE/LOADING	0.	0.	0.	0.	0.	TONS PRODUCED
AMMCNIA W/COABSRB							
3-01-003-01	REGENERATOR EXIT	0.	0.	0.	0.	200.	TONS PRODUCED
3-01-003-02	PURGE GAS	0.	0.	0.	90.0	0.	TONS PRODUCED
3-01-003-03	STORAGE/LOACING	0.	0.	0.	0.	0.	TONS PRODUCED
3-01-003-99	OTHER/NOT CLASIFD						TONS PRODUCED
AMMONIUM NITRATE							
3-01-004-01	GENERAL		0.				TONS PRODUCED
3-01-004-99	OTHER/NOT CLASIFD						TONS PRODUCED
CARBON BLACK							
3-01-005-01	CHANNEL PROCESS	2,300.	0.	0.	11,500.	33,500.	TONS PRODUCED
3-01-005-02	THERMAL PROCESS	0.	0.	0.	0.	0.	TONS PRODUCED
3-01-005-03	FURNACE PROC GAS				1,800.	5,300.	TONS PRODUCED
3-01-005-04	FURNACE PROC OIL				400.	4,500.	TONS PRODUCED
3-01-005-05	FURNACE W/GAS/OIL	220.					TONS PRODUCED
3-01-005-99	OTHER/NOT CLASFD						TONS PRODUCT
CHARCOAL MFG							
3-01-006-01	PYROL/DISTIL/GENL	400.			100.	320.	TONS PRODUCED
3-01-006-99	OTHER/NOT CLASFD						TONS PRODUCT
CHLCRINE							
3-01-007-01	GENERAL		0.				TONS PRODUCED
3-01-007-99	OTHER/NOT CLASIFD						TONS PRODUCED

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

INDUSTRIAL PROCES'-CHEMICAL MFG (CONTINUED)		POUNDS EMITTED PER UNIT PART	SOX	NOX	HC	CO	UNITS
CHLOR-ALKALI							
3-01-008-01	LIQUIFTN-DIAPHRGM		0.				100 TONS CHLORINE LIQUEFIED
3-01-008-02	LIQUIFTN-MERC CEL		0.				100 TONS CHLORINE LIQUEFIED
3-01-008-03	LOADING TNKCARVNT	0.	0.	0.	0.	0.	100 TONS CHLORINE LIQUEFIED
3-01-008-04	LOADING STGTNKVNT	0.	0.	0.	0.	0.	100 TONS CHLORINE LIQUEFIED
3-01-008-05	AIR-BLOW MC BRINE	0.	0.	0.	0.	0.	100 TONS CHLORINE LIQUEFIED
3-01-008-99	OTHER/NOT CLASIFD						100 TONS CHLORINE LIQUEFIED
CLEANING CHEMICLS							
3-01-009-01	SOAP/DET SPRYDRYR	90.0					TONS PRODUCED
3-01-009-10	SPECIALTY CLEANRS		0.				TONS PRODUCT
3-01-009-99	OTHERS/NOT CLASFD						TONS PRODUCED
EXPLCSIVES-TNT							
3-01-010-01	NITRATION REACTRS	0.	0.	160.	0.	0.	TONS PRODUCED
3-01-010-02	HNO3 CONCTRTRS	0.	0.	4.00	0.	0.	TONS PRODUCED
3-01-010-03	H2SO4 REGENERATR	0.	15.0	2.00	0.	0.	TONS PRODUCED
3-01-010-04	RED WATER INCIN	32.0	2.00	30.0	0.	0.	TONS PRODUCED
3-01-010-05	OPEN WASTE BURN						TONS BURNED
3-01-010-06	SELLITE EXHAUST	0.	0.70	0.	0.	0.	TONS PRODUCED
3-01-010-99	OTHER/NOT CLASIFD						TONS PRODUCED
HYDRCCHLORIC ACID							
3-01-011-01	BYPRODUCTW/OSCRUB		0.				TONS FINAL ACID
3-01-011-02	BYPRODUCT W/SCRUB		0.				TONS FINAL ACID
3-01-011-99	OTHER/NOT CLASIFD						TONS FINAL ACID
HYDROFLUORIC ACIC							
3-01-012-01	ROTRYKILNW/SCRUBR	0.					TONS ACID
3-01-012-02	ROTRYKILNW/OSCRUB	0.					TONS ACID
3-01-012-03	GRIND/DRY FLUOSPR	200.					TONS FLUORSPAR
3-01-012-99	OTHER/NOT CLASIFD						TONS ACID
NITRIC ACID							
3-01-013-01	AMMONIAOXIDATNOLD			52.5			TONS PURE ACID PRODUCED
3-01-013-02	AMMONIAOXIDATNNEW			4.50			TONS PURE ACID PRODUCED
3-01-013-03	NITACD CONCTR OLD			5.00			TONS PURE ACID PRODUCED
3-01-013-04	NITACD CONCTR NEW			0.20			TONS PURE ACID PRODUCED
3-01-013-05	UNCONTROLLED						TONS PURE ACID PRODUCED
3-01-013-06	W/CATYL/COMBUSTER						TONS PURE ACID PRODUCED
3-01-013-07	UNCONTROLLED						TONS PURE ACID PRODUCED
3-01-013-08	W/ABSORBERS						TONS PURE ACID PRODUCED
3-01-013-99	OTHER/NOT CLASIFD						TONS PURE ACID PRODUCED
PAINT MFG							
3-01-014-01	GENERAL	2.00			30.0		TONS PRODUCED
3-01-014-02	PIGMENT KILN						TONS PRODUCT
3-01-014-99	OTHER/NOT CLASFD						TONS PRODUCT
VARNISH MFG							
3-01-015-01	BODYING OIL GENL	0.			40.0		TONS PRODUCED
3-01-015-02	OLEORESINOUS GENL	0.			150.		TONS PRODUCED
3-01-015-03	ALKYD GENERAL	0.			160.		TONS PRODUCED
3-01-015-05	ACRYLIC GENERAL	0.			20.0		TONS PRODUCED
3-01-015-99	OTHER/NOT CLASFD						TONS PRODUCED
PHOS-ACID WETPROC							
3-01-016-01	REACTOR-UNCONTLD	0.					TONS PHOSPHATE ROCK
3-01-016-02	GYPSUM POND	0.					TONS PHOSPHATE ROCK
3-01-016-03	CONDENSR-UNCONTLD	0.					TONS PHOSPHATE ROCK
3-01-016-99	OTHER/NOT CLASFD						TONS PRODUCED
PHOS-ACID THERMAL							
3-01-017-01	GENERAL						TONS PHOSPHOROUS BURNED
3-01-017-99	OTHER/NOT CLASFD						TONS PRODUCED
PLASTICS							
3-01-018-01	PVC-GENERAL	35.0					TONS PRODUCED
3-01-018-02	POLYPROD-GENERAL	3.00					TONS PRODUCED
3-01-018-05	BAKELITE-GENERAL						TONS PRODUCT
3-01-018-99	OTHER/NOT CLASFD						TONS PRODUCED
PHTHALIC ANHYDRID							
3-01-019-03	UNCONTROLLED-GENL				32.0		TONS PRODUCED
PRINTING INK							
3-01-020-01	COOKING-GENERAL	0.			120.		TONS PRODUCED
3-01-020-02	COOKING-OILS	0.			40.0		TONS PRODUCED
3-01-020-03	COOKING-OLEORESIN	0.			150.		TONS PRODUCED
3-01-020-04	COOKING-ALKYDS	0.			160.		TONS PRODUCED
3-01-020-05	PIGMENT MIXINGGEN	2.00					TONS PIGMENT
3-01-020-99	OTHER/NOT CLASFD						TONS PRODUCED

		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
SODIUM CARBONATE							
3-01-021-01	AMMONIA RECOVERY	0.					TONS PRODUCED
3-01-021-02	HANDLING	6.00					TONS PRODUCED
3-01-021-99	OTHER/NOT CLASFD						TONS PRODUCED
H2SO4 -CHAMBER							
3-01-022-01	GENERAL				0.		TONS PURE ACID PRODUCED
H2SO4-CONTACT							
3-01-023-01	99.7 CONVERSION	2.50	4.00				TONS PURE ACID PRODUCED
3-01-023-04	99.5 CONVERSION	2.50	7.00				TONS PURE ACID PRODUCED
3-01-023-06	99.0 CONVERSION	2.50	14.0				TONS PURE ACID PRODUCED
3-01-023-08	98.0 CONVERSION	2.50	27.0				TONS PURE ACID PRODUCED
3-01-023-10	97.0 CONVERSION	2.50	40.0				TONS PURE ACID PRODUCED
3-01-023-12	96.0 CONVERSION	2.50	55.0				TONS PURE ACID PRODUCED
3-01-023-14	95.0 CONVERSION	2.50	70.0				TONS PURE ACID PRODUCED
3-01-023-16	94.0 CONVERSION	2.50	82.0				TONS PURE ACID PRODUCED
3-01-023-18	93.0 CONVERSION	2.50	96.0				TONS PURE ACID PRODUCED
3-01-023-99	OTHER/NOT CLASFD						TONS PRODUCED
SYNTHETIC FIBERS							
3-01-024-01	NYLON GENERAL				7.00		TONS FIBER
3-01-024-02	DACRON GENERAL				0.		TONS FIBER
3-01-024-03	ORLON						TONS PRODUCT
3-01-024-04	ELASTIC						TONS PRODUCT
3-01-024-05	TEFLON						TONS PRODUCT
3-01-024-06	POLYESTER						TONS PRODUCT
3-01-024-08	NOMEX						TONS PRODUCT
3-01-024-10	ACRYLIC						TONS PRODUCT
3-01-024-12	TYVEX						TONS PRODUCT
3-01-024-14	OLEFINS						TONS PRODUCT
3-01-024-99	OTHERS/NOT CLASFD						TONS PRODUCED
SEMISYNTHTICFIBR							
3-01-025-01	RAYON GENERAL				0.		TONS FIBER
3-01-025-05	ACETATE						TONS PRODUCED
3-01-025-10	VISCOSE						TONS PRODUCED
3-01-025-99	OTHERS/NOT CLASFD						TONS PRODUCED
SYNTHETIC RUBBER							
3-01-026-01	BUTADIENE-GENERAL						TONS PRODUCT
3-01-026-02	METHYLPROPENE-GNL						TONS PRODUCT
3-01-026-03	BUTYNE GENERAL						TONS PRODUCT
3-01-026-04	PENTADIENE-GENRL						TONS PRODUCT
3-01-026-05	DIMETHHEPTNE GENL						TONS PRODUCT
3-01-026-06	PENTANE-GENERAL						TONS PRODUCT
3-01-026-07	ETHANENITRILE-GEN						TONS PRODUCT
3-01-026-08	ACRYLONITRILE-GEN						TONS PRODUCT
3-01-026-09	ACROLEIN-GENERAL						TONS PRODUCT
3-01-026-20	AUTO TIRES GENERAL						TONS PRODUCT
3-01-026-99	OTHER/NOT CLASFD						TONS PRODUCT
FERTILIZ AMONNITR							
3-01-027-01	PRILTWR-NEUTRLIZR	0.		0.			TONS PRODUCED
3-01-027-02	PRILLING TOWER	0.90		0.			TONS PRODUCED
3-01-027-03	PRILTWR-DRYCOOLRS	12.0		0.			TONS PRODUCED
3-01-027-04	GRANULAT-NEUTLIZR	0.		0.			TONS PRODUCED
3-01-027-05	GRANULATOR	0.40		0.45			TONS PRODUCED
3-01-027-06	GRANULAT-DRYCOOLR	7.00		3.00			TONS PRODUCED
FERTILIZ-NSUPPHOS							
3-01-028-01	GRIND-DRY	9.00					TONS PRODUCED
3-01-028-02	MAIN STACK	0.					TONS PRODUCED
FERTILIZ-TRPSPHOS							
3-01-029-01	RUN OF PILE	0.					TONS PRODUCED
3-01-029-02	GRANULAR	0.					TONS PRODUCED
FERTILIZ-DIAMPHOS							
3-01-030-01	DRYER-COOLERS	80.0					TONS PRODUCED
3-01-030-02	AMONIAT-GRANULATE	2.00					TONS PRODUCED
3-01-030-99	OTHER/NOT CLASIFD						TONS PRODUCED
TEREPTHALIC ACID							
3-01-031-01	HNO3+PARAXYLENGEN			13.0			TONS PRODUCED
3-01-031-99	OTHER/NOT CLASIFD						TONS PRODUCED
SULFUR(ELEMENTAL)							
3-01-032-01	MOD-CLAUS 2STAGE		280.				TONS PRODUCT
3-01-032-02	MOD-CLAUS 3STAGE		189.				TONS PRODUCT
3-01-032-03	MOD-CLAUS 4STAGE		146.				TONS PRODUCT
3-01-032-99	OTHER/NOT CLASIFD						TONS PRODUCT

INDUSTRIAL PROCES -CHEMICAL MFG (CONTINUED)		POUNDS EMITTED PER UNIT PART	SOX	NOX	HC	CO	UNITS
PESTICIDES							
3-01-033-01	MALATHION						GALLONS OF PRODUCT
3-01-033-99	OTHER/NOT CLASIFD						TONS PRODUCED
AMINES/AMIDES							
3-01-034-01	GENERAL/OTHER						TONS PRODUCT
PIGMENT-INORGAN							
3-01-035-01	CALCINATION						TONS OF PRODUCT
3-01-035-99	OTHER/NOT CLASIFD						TONS OF PRODUCT
SODIUM SULFATE							
3-01-036-01	GENERAL/OTHER						TONS PRODUCT
3-01-036-02	KILNS						TONS PRODUCT
SODIUM SULFITE							
3-01-037-01	GENERAL/OTHER						TONS PRODUCT
3-01-037-02	KILNS						TONS PRODUCT
SODIUM BICARB							
3-01-038-01	GENERAL						TONS PRODUCT
LITHIUM HYDROXIDE							
3-01-039-01	GENERAL						TONS PRODUCT
FERTILIZER UREA							
3-01-040-01	GENERAL						TONS PRODUCT
NITROCELLULOSE							
3-01-041-01	REACTOR POTS	0.	1.30	21.0	0.	0.	TONS PRODUCED
3-01-041-02	H2SO4 CONCENTRTRS	0.	65.0	29.0	0.	0.	TONS PRODUCED
3-01-041-03	BOILING TUBS	0.	0.	2.00	0.	0.	TONS PRODUCED
3-01-041-99	OTHER/NOT CLASIFD				0.	0.	TONS PRODUCED
ADHESIVES							
3-01-050-01	GENL/COMPND UNKWN						TONS PRODUCT
ACETATE FLAKE							
3-01-050-99	OTHER/NOT CLASFD						TONS PRODUCT
ACETONE							
3-01-091-01	OTHER/NOT CLASFD						TONS PRODUCT
MALEIC ANHYDRIDE							
3-01-100-01	GENERAL/OTHER						TONS PRODUCT
POLVINL PYRILIDON							
3-01-101-01	GENERAL/OTHER						TONS PRODUCT
SULFONIC ACID/ATS							
3-01-110-01	GENERAL/OTHER						TONS PRODUCT
ASBESTOS CHEMICAL							
3-01-111-01	CAULKING		0.	0.	0.	0.	TONS PRODUCT
3-01-111-02	SEALANTS		0.	0.	0.	0.	TONS PRODUCT
3-01-111-03	BRAKE LINE/GRIND		0.	0.	0.	0.	TONS PRODUCT
3-01-111-04	FIRE PROOF MFG		0.	0.	0.	0.	TONS PRODUCT
3-01-111-99	OTHERS/NOT CLASFD						TONS PRODUCT
WASTE GAS FLARES							
3-01-900-99	OTHER/NOT CLASIFD						MILLION CUBIC FEET BURNED
OTHER/NOT CLASIFD							
3-01-999-99	SPECIFY IN REMARK						TONS PRODUCT
INDUSTRIAL PROCES -FOOD/AGRICULTURAL							
ALFALFA DEHYDRATN							
3-02-001-01	GENERAL	60.0					TONS MEAL PRODUCED
3-02-001-99	OTHER/NOT CLASFD						TONS PRODUCT
COFFEE ROASTING							
3-02-002-01	DIRECTFIRE ROASTR	7.60		0.10			TONS GREEN BEANS
3-02-002-02	INDIRCTFIREROASTR	4.20		0.10			TONS GREEN BEANS
3-02-002-03	STONER/COOLER	1.40		0.			TONS GREEN BEANS
3-02-002-99	OTHER/NOT CLASFD						TONS PRODUCT

INDUSTRIAL PROCES -FOOD/AGRICULTURE (CONTINUED)

		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
COFFEE- INSTANT							
3-02-003-01	SPRAY DRIER	1.40		0.			TONS GREEN BEANS
COTTON GINNING							
3-02-004-01	UNLOADING FAN	5.00	0.	0.	0.	0.	BALES COTTON
3-02-004-02	CLEANER	1.00	0.	0.	0.	0.	BALES COTTON
3-02-004-03	STICK/BURR MACHNE	3.00	0.	0.	0.	0.	BALES COTTON
3-02-004-99	OTHER/NOT CLASFD						BALES COTTON
FEED/GRAIN TERMEL							
3-02-005-01	SHIPING/RECEIVING	1.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-005-02	TRANSFER/CONVEYNG	2.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-005-03	SCREENING/CLEANNG	5.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-005-04	DRYING	6.00					TONS GRAIN PROCESSED
FEED/GRAIN CNTRYE							
3-02-006-01	SHIPNG/RECEIVNG	5.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-006-02	TRANSFER/CONVEYNG	3.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-006-03	SCREENING/CLEANNG	8.00	0.	0.	0.	0.	TONS GRAIN PROCESSED
3-02-006-04	DRYING	7.00					TONS GRAIN PROCESSED
3-02-006-99	OTHER/NOT CLASIFD						TONS GRAIN PROCESSED
GRAIN PROCESSING							
3-02-007-01	CORN MEAL	5.00					TONS GRAIN PROCESSED
3-02-007-02	SOY BEAN	7.00					TONS GRAIN PROCESSED
3-02-007-03	BARLEY/WHEATCLEAN	0.20					TONS GRAIN PROCESSED
3-02-007-04	MILO CLEANER	0.40					TONS GRAIN PROCESSED
3-02-007-05	BARLEYFLOUR MILL	3.00					TONS GRAIN PROCESSED
3-02-007-06	WET CORN MILLING		0.				TONS OF PRODUCT
3-02-007-30	WHEAT FLOUR MILL		0.				TONS PRODUCT
3-02-007-99	OTHER/NOT CLASFD						TONS PROCESSED
FEED MANUFACTURE							
3-02-008-01	BARLEY FEED-GENL	3.00					TONS GRAIN PROCESSED
3-02-008-99	OTHER/NOT CLASFD						TONS PROCESSED
FERMENTATN-BEER							
3-02-009-01	GRAIN HANDLING	3.00			0.		TONS GRAIN PROCESSED
3-02-009-02	DRYING SPNT GRAIN	5.00					TONS GRAIN PROCESSED
3-02-009-03	BREWING						THOUSANDS OF GALLONS
3-02-009-98	OTHER/NOT CLASFD						GALLONS PRODUCT
3-02-009-99	OTHER/NOT CLASFD						TONS GRAIN PROCESSED
FERMENTATN-WHISKY							
3-02-010-01	GRAIN HANDLING	3.00			0.		TONS GRAIN PROCESSED
3-02-010-02	DRYING SPNT GRAIN	5.00					TONS GRAIN PROCESSED
3-02-010-03	AGING	0.			10.		BARREL(50 GAL)
3-02-010-99	OTHER/NOT CLASFD						GALLONS PRODUCT
FERMENTATN-WINE							
3-02-011-01	GENERAL	0.			0.		GALLONS PRODUCT
FISH MEAL							
3-02-012-01	COOKERS-FRESHFISH	0.					TONS FISH MEAL PRODUCED
3-02-012-02	COOKERS-STALEFISH	0.					TONS FISH MEAL PRODUCED
3-02-012-03	DRIERS	0.10					TONS FISH SCRAP
3-02-012-99	OTHER/NOT CLASIFD						TONS PROCESSED
MEAT SMOKING							
3-02-013-01	GENERAL	0.30			0.07	0.60	TONS MEAT SMOKED
STARCH MFG							
3-02-014-01	GENERAL	8.00					TONS STARCH PRODUCED
SUGAR CANE PROCES							
3-02-015-01	GENERAL						TONS SUGAR PRODUCED
3-02-015-99	OTHER/NOT CLASIFD						TONS PROCESSED
SUGAR BEET PROCES							
3-02-016-01	DRYER ONLY						TONS RAW BEETS
3-02-016-99	OTHER/NOT CLASIFD						TONS RAW BEETS
PEANUT PROCESSING							
3-02-017-20	OIL/NOT CLASFD						TONS PRODUCT
3-02-017-99	OTHER/NOT CLASFD						TONS PROCESSED
CANDY/CONFECTNRY							
3-02-018-99	OTHER/NOT CLASFD						TONS PRODUCT
DAIRY PRODUCTS							
3-02-030-01	MILK SPRAY-DRYER		0.				TONS PRODUCT
3-02-030-99	OTHER/NOT CLASFD						TONS PRODUCT

INDUSTRIAL PROCES -FOOD/AGRICULTURE (CONTINUED)		POUNDS EMITTED PER UNIT PART	SOX	NOX	HC	CO	UNITS
OTHER/NOT CLASIFD							
3-02-999-98	SPECIFY IN REMARK						TONS PROCESSED (INPUT)
3-02-999-99	SPECIFY IN REMARK						TONS PRODUCED (FINISHED)
INDUSTRIAL PROCES -PRIMARY METALS							
ALUMINUM ORE-BAUX							
3-03-000-01	CRUSHING/HANDLING	6.00					TONS OF ORE
AL ORE-ELECRDREDN							
3-03-001-01	PREBAKE CELLS	81.3					TONS ALUMINUM PRODUCED
3-03-001-02	HORIZSTD SODERBRG	98.4					TONS ALUMINUM PRODUCED
3-03-001-03	VERTSTD SODERBERG	78.4					TONS ALUMINUM PRODUCED
3-03-001-04	MATERIALS HANDLNG	10.0					TONS ALUMINUM PRODUCED
3-03-001-05	ANODE BAKE FURNCE	3.00					TONS ALUMINUM PRODUCED
3-03-001-99	OTHER/NOT CLASFD						TONS ALUMINUM PRODUCED
AL ORE-CALC ALHYD							
3-03-002-01	GENERAL	200.					TONS ALUMINUM PRODUCED
COKE MET BYPRODUC							
3-03-003-01	GENERAL	3.50	4.00	0.04	4.20	1.27	TONS COAL CHARGED
3-03-003-02	OVEN CHARGING	1.50	0.02	0.03	2.50	0.60	TONS COAL CHARGED
3-03-003-03	OVEN PUSHING	0.60			0.20	0.07	TONS COAL CHARGED
3-03-003-04	QUENCHING	0.90					TONS COAL CHARGED
3-03-003-05	UNLOADING	0.40					TONS COAL CHARGED
3-03-003-06	UNDERFIRING		4.00				TONS COAL CHARGED
3-03-003-07	COAL CRUSH/HANDL						TONS COAL CHARGED
3-03-003-99	OTHER/NOT CLASFD						TONS COAL CHARGED
COKE MET-BEEHIVE							
3-03-004-01	GENERAL	200.	0.	0.	8.00	1.00	TONS COAL CHARGED
COPPER SMELTER							
3-03-005-01	TOTAL/GENERAL	135.	1,250.				TONS CONCENTRATED ORE
3-03-005-02	ROASTING	45.0	60.0				TONS CONCENTRATED ORE
3-03-005-03	SMELTING	20.0	320.				TONS CONCENTRATED ORE
3-03-005-04	CONVERTING	60.0	870.				TONS CONCENTRATED ORE
3-03-005-05	REFINING	10.0	0.				TONS CONCENTRATED ORE
3-03-005-06	ORE DRYER						TONS OF ORE
3-03-005-08	FINISH OPER-GENL						TONS PRODUCED
3-03-005-99	OTHER/NOT CLASFD						TONS CONCENTRATED ORE
FERALLOY OPEN FNC							
3-03-006-01	50% FESI	200.					TONS PRODUCED
3-03-006-02	75% FESI	315.					TONS PRODUCED
3-03-006-03	90% FESI	565.					TONS PRODUCED
3-03-006-04	SILICON METAL	625.					TONS PRODUCED
3-03-006-05	SILICOMANGANESE	195.					TONS PRODUCED
3-03-006-10	SCREENING			0.			TONS PROCESSED
3-03-006-11	ORE DRYER						TONS PROCESSED
3-03-006-12	LOWCARB CR-REACTR						TONS PROCESSED
3-03-006-99	OTHER/NOT CLASFD						TONS PRODUCED
FERALOY SEMCOVFNC							
3-03-007-01	FEROMANGANESE	45.0					TONS PRODUCED
3-03-007-02	GENERAL						TONS PRODUCED
IRON PRODUCTION							
3-03-008-01	BLAST FNC-ORECHG	121.	0.	0.	0.	1,750.	TONS PRODUCED
3-03-008-02	BLAST FNC-AGLCHG	44.0	0.	0.	0.	0.	TONS PRODUCED
3-03-008-03	SINTERING GENERAL	42.0				44.0	TONS PRODUCED
3-03-008-04	ORE-CRUSH/HANDLE			0.	0.		TONS OF ORE
3-03-008-05	SCARFING	1.00	0.	0.	0.	0.	TONS PROCESSED
3-03-008-06	SAND HANDLING OPN		0.				TONS HANDLED
3-03-008-07	MOLD OVENS						TONS SAND BAKED
3-03-008-08	SLAG CRUSH/HANDL						TONS HANDLED
3-03-008-99	OTHER/NOT CLASFD						TONS PRODUCED
STEEL PRODUCTION							
3-03-009-01	OPNHEARTH OXLANCE	17.4				0.	TONS PRODUCED
3-03-009-02	OPNHEARTH NOXLNCE	8.30				0.	TONS PRODUCED
3-03-009-03	BOF-GENERAL	51.0				139.	TONS PRODUCED
3-03-009-04	ELECT ARC W/LANCE	11.0				18.0	TONS PRODUCED
3-03-009-05	ELECT ARC NOLANCE	9.20				18.0	TONS PRODUCED
3-03-009-10	FINISH/PICKLING						TONS PRODUCED
3-03-009-11	FINISH/SOAK PITS						TONS PRODUCED
3-03-009-12	FINISH/GRIND,ETC						TONS PRODUCED
3-03-009-20	FINISH/OTHER						TONS PRODUCED
3-03-009-99	OTHER/NOT CLASFD						TONS PRODUCED
LEAD SMELTERS							
3-03-010-01	SINTERING	164.	423.	0.	0.	0.	TONS CONCENTRATED ORE
3-03-010-02	BLAST FURNACE	278.	34.9	0.	0.	0.	TONS CONCENTRATED ORE
3-03-010-03	REVERB FURNACE	15.4	0.	0.	0.	0.	TONS CONCENTRATED ORE
3-03-010-04	ORE CRUSHING	2.00	0.	0.	0.	0.	TONS OF ORE CRUSHED

LEAD SMELTERS (CONTINUED)

		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
3-03-010-05	MATERIALS HANDLNG	5.00	0.	0.	0.	0.	TONS OF LEAD PRODUCT
3-03-010-99	OTHER/NOT CLASFD						TONS CONCENTRATED ORE
MOLYBDENUM							
3-03-011-01	MINING-GENERAL			0.			HUNDREDS OF TONS MINED
3-03-011-02	MILLING-GENERAL			0.			TONS PRODUCT
3-03-011-99	PROCESS-OTHER						TONS PROCESSED
TITANIUM PROCESS							
3-03-012-01	CHLORINATION STAT		0.	0.	0.		TONS PRODUCT
3-03-012-99	OTHER/NOT CLASIFD						TONS PROCESSED
GOLD							
3-03-013-01	MINING/PROCESSING				0.		TONS ORE
BARIUM							
3-03-014-01	ORE GRIND			0.			TONS PROCESSED
3-03-014-02	REDUCTN KILN						TONS PROCESSED
3-03-014-03	DRIERS/CALCINERS						TONS PROCESSED
3-03-014-99	OTHER/NOT CLASFD						TONS PROCESSED
BERYLLIUM ORE							
3-03-015-01	STORAGE		0.	0.	0.	0.	TONS OF ORE
3-03-015-02	CRUSHING		0.	0.	0.	0.	TONS PROCESSED
3-03-015-03	MELTING				0.		TONS PROCESSED
3-03-015-04	QUENCH/HEAT TREAT		0.	0.	0.	0.	TONS PROCESSED
3-03-015-05	GRINDING		0.	0.	0.	0.	TONS PROCESSED
3-03-015-06	SULFATION/DISSOLV			0.	0.	0.	TONS PROCESSED
3-03-015-07	SINTERING				0.		TONS PROCESSED
3-03-015-08	VENTILATION				0.		TONS PROCESSED
3-03-015-09	LEACH/FILTER		0.	0.	0.	0.	TONS PROCESSED
3-03-015-99	OTHER/NOT CLASFD				0.		TONS PROCESSED
MERCURY MINING							
3-03-025-01	SURFACE BLASTING		0.	0.	0.	0.	TONS OF ORE
3-03-025-02	SURFACE DRILLING		0.	0.	0.	0.	TONS OF ORE
3-03-025-03	SURFACE HANDLING		0.	0.	0.	0.	TONS OF ORE
3-03-025-04	NATURAL VAPOR	0.	0.	0.	0.	0.	TONS OF ORE
3-03-025-05	STRIPPING		0.	0.	0.	0.	TONS REMOVED
3-03-025-06	LOADING		0.	0.	0.	0.	TONS OF ORE
3-03-025-07	CONVEY/HAULING		0.	0.	0.	0.	TONS OF ORE
3-03-025-08	UNLOADING		0.	0.	0.	0.	TONS OF ORE
3-03-025-09	CONV/HAUL WASTE		0.	0.	0.	0.	TONS OF ORE
3-03-025-99	OTHER/NOT CLASFD						TONS OF ORE
MERCURY ORE PROCS							
3-03-026-01	CRUSHING		0.	0.	0.	0.	TONS PROCESSED
3-03-026-02	ROTARY FURNACE				0.		TONS PROCESSED
3-03-026-03	RETORT FURNACE				0.		TONS PROCESSED
3-03-026-04	CALCINE		0.	0.	0.	0.	TONS PROCESSED
3-03-026-05	BURNT ORE BIN		0.	0.	0.	0.	TONS PROCESSED
3-03-026-06	MOEING PROCESS		0.	0.	0.	0.	TONS PROCESSED
3-03-026-99	OTHER/NOT CLASFD						TONS PROCESSED
ZINC SMELTING							
3-03-030-01	GENERAL				0.		TONS PROCESSED
3-03-030-02	ROASTNG/MULT-HRTH	120.	1,100.				TONS PROCESSED
3-03-030-03	SINTERING	90.0					TONS PROCESSED
3-03-030-04	HORIZ RETORTS	8.00					TONS PROCESSED
3-03-030-05	VERT RETORTS	100.					TONS PROCESSED
3-03-030-06	ELECTROLYTIC PROC	3.00					TONS PROCESSED
3-03-030-99	OTHER/NOT CLASFD						TONS PROCESSED
OTHER/NOT CLASFD							
3-03-999-99	SPECIFY IN REMARK						TONS PRODUCED
INDUSTRIAL PROCES - SECONDARY METALS							
ALUMINUM OPERATN							
3-04-001-01	SWEATINGFURNACE	14.5					TONS PRODUCED
3-04-001-02	SMELT-CRUCIBLE	1.90					TONS METAL PRODUCED
3-04-001-03	SMELT-REVERB FNC	4.30					TONS METAL PRODUCED
3-04-001-04	CHLORINATN STATN	12.5	0.	0.	0.	0.	TONS METAL PRODUCED
3-04-001-10	FOIL ROLLING					0.	TONS PRODUCT
3-04-001-11	FOIL CONVERTING					0.	TONS PRODUCED
3-04-001-20	CAN MANUFACTURE					0.	TONS PRODUCED
3-04-001-50	ROLL-DRAW-EXTRUDE					0.	TONS PRODUCED
3-04-001-99	OTHER/NOT CLASFD						TONS PRODUCED
BRASS/BRONZ MELT							
3-04-002-01	BLAST FNC	18.0					TONS CHARGE
3-04-002-02	CRUCIBLE FNC	12.0					TONS CHARGE
3-04-002-03	CUPOLA FNC	73.0					TONS CHARGE
3-04-002-04	ELECT INDUCTION	2.00					TONS CHARGE

BRASS/BRONZ MELT (CONTINUED)		POUNDS EMITTED PER UNIT PART	SOX	NOX	HC	CO	UNITS
3-04-002-05	REVERB FNC	70.0					TONS CHARGE
3-04-002-06	ROTARY FNC	60.0					TONS CHARGE
3-04-002-99	OTHER/NOT CLASIFD						TONS PRODUCED
GRAY IRON							
3-04-003-01	CUPOLA	17.0				145.	TONS METAL CHARGE
3-04-003-02	REVERB FNC	2.00				0.	TONS METAL CHARGE
3-04-003-03	ELECT INDUCTION	1.50				0.	TONS METAL CHARGE
3-04-003-05	ANNEALING OPERATN						TONS METAL CHARGE
3-04-003-30	MISC CAST-FABCTN						TONS PROCESSED
3-04-003-40	GRINDING-CLEANING		0.	0.	0.	0.	TONS PROCESSED
3-04-003-50	SAND HANDL-GENL						TONS HANDLED
3-04-003-99	OTHER/NOT CLASIFD						TONS METAL CHARGE
LEAD SMELT SEC							
3-04-004-01	POT FURNACE	0.80	0.	0.	0.	0.	TONS METAL CHARGED
3-04-004-02	REVERB FNC	147.	80.0	0.	0.	0.	TONS METAL CHARGED
3-04-004-03	BLAST/CUPOLA FNC	193.	53.0	0.	0.	0.	TONS METAL CHARGED
3-04-004-04	ROTARY REVERB FNC	70.0	0.	0.	0.	0.	TONS METAL CHARGED
3-04-004-08	LEAD OXIDE MFG						TONS PROCESSED
3-04-004-99	OTHER/NOT CLASIFD						TONS PROCESSED
LEAD BATTERY							
3-04-005-01	TOTAL-GENERAL	0.90	0.	0.	0.	0.	TONS OF BATTERIES PRODUCED
3-04-005-02	CASTING FURNACE	0.04	0.	0.	0.	0.	TONS OF BATTERIES PRODUCED
3-04-005-03	PASTE MIXER	0.21	0.	0.	0.	0.	TONS OF BATTERIES PRODUCED
3-04-005-04	THREE PROCES OPER	0.64	0.	0.	0.	0.	TONS OF BATTERIES PRODUCED
3-04-005-99	OTHER/NOT CLASIFD						TONS PROCESSED
MAGNESIUM SEC							
3-04-006-01	POT FURNACE	4.00					TONS PROCESSED
3-04-006-99	OTHER/NOT CLASIFD						TONS PROCESSED
STEEL FOUNDRY							
3-04-007-01	ELECTRIC ARC FNC	13.0		0.20			TONS PROCESSED
3-04-007-02	OPEN HEARTH FNC	11.0		0.01			TONS PROCESSED
3-04-007-03	OPEN HEARTH LANCD	10.0		0.			TONS PROCESSED
3-04-007-04	HEAT-TREAT FNC						TONS PROCESSED
3-04-007-05	INDUCTION FURNACE	0.10	0.	0.	0.	0.	TONS PROCESSED
3-04-007-06	SAND GRIND/HANDL						TONS HANDLED
3-04-007-10	FINISH/SOAK PITS						TONS PROCESSED
3-04-007-15	FINISH/NOT CLASFD						TONS PROCESSED
3-04-007-99	OTHER/NOT CLASIFD						TONS PROCESSED
ZINC SEC							
3-04-008-01	RETORT FNC	47.0					TONS PRODUCED
3-04-008-02	HORIZ MUFFLE FNC	45.0					TONS PRODUCED
3-04-008-03	POT FURNACE	0.10					TONS PRODUCED
3-04-008-04	KETTLE-SWEAT FNC	11.0					TONS PRODUCED
3-04-008-05	GALVANIZING KETTL	5.00					TONS PRODUCED
3-04-008-06	CALCINING KILN	89.0					TONS PRODUCED
3-04-008-07	CONCENTRATE DRYER						TONS PROCESSED
3-04-008-08	REVERB-SWEAT FNC	13.0					TONS PRODUCED
3-04-008-99	OTHER/NOT CLASIFD						TONS PROCESSED
MALLEABLE IRON							
3-04-009-01	ANNEALING OPERATN						TONS METAL CHARGE
3-04-009-99	OTHER/NOT CLASIFD						TONS METAL CHARGE
NICKEL							
3-04-010-01	FLUX FURNACE						TONS PROCESSED
3-04-010-99	OTHER/NOT CLASIFD						TONS PROCESSED
ZIRCONIUM							
3-04-011-01	OXIDE KILN						TONS PROCESSED
3-04-011-99	OTHER/NOT CLASIFD						TONS PROCESSED
FURNACE ELECTRODE							
3-04-020-01	CALCINATION						TONS PROCESSED
3-04-020-02	MIXING		0.	0.	0.	0.	TONS PROCESSED
3-04-020-03	PITCH TREATING		0.	0.			TONS PROCESSED
3-04-020-04	BAKE FURNACES						TONS PROCESSED
3-04-020-99	OTHER/NOT CLASIFD						TONS PROCESSED
MISC CAST&FABRCTN							
3-04-050-01	SPECIFY IN REMARK						TONS PRODUCED
OTHER/NOT CLASIFD							
3-04-999-99	SPECIFY IN REMARK						TONS PROCESSED

		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
ASPHALT ROOFING							
3-05-001-01	BLOWING OPERATION	2.50			1.50	0.90	TONS SATURATED FELT PRODUCED
3-05-001-02	DIPPING ONLY	1.00			0.	0.	TONS SATURATED FELT PRODUCED
3-05-001-03	SPRAYING ONLY	3.00			0.	0.	TONS SATURATED FELT PRODUCED
3-05-001-04	DIPPING/SPRAYING	2.00			0.	0.	TONS SATURATED FELT PRODUCED
3-05-001-99	OTHER/NOT CLASIFD						TONS SATURATED FELT PRODUCED
ASPHALTIC CONCRET							
3-05-002-01	ROTARY DRYER	35.0					TONS PRODUCED
3-05-002-02	OTHER SOURCES	10.0	0.	0.	0.	0.	TONS PRODUCED
3-05-002-99	OTHER/NOT CLASIFD						TONS PRODUCED
BRICK MANUFACTURE							
3-05-003-01	DRYING-RAW MTL	70.0		0.			TONS PRODUCED
3-05-003-02	GRINDING-RAW MTL	76.0		0.			TONS PRODUCED
3-05-003-03	STORAGE-RAW MTL	34.0		0.			TONS PRODUCED
3-05-003-04	CURING GAS FIRED	0.07	0.02	0.29	0.03	0.07	TONS PRODUCED
3-05-003-05	CURING OIL FIRED	0.07	5.00 S	1.40	0.10	0.	TONS PRODUCED
3-05-003-06	CURING COAL FIRED	1.30 A	9.60 S	1.10	0.70	2.60	TONS PRODUCED
3-05-003-99	OTHER/NOT CLASIFD						TONS PRODUCED
CALCIUM CARBIDE							
3-05-004-01	ELECTRIC FNC	38.0	3.00				
3-05-004-02	COKE DRYER	2.00	3.00				TONS PRODUCED
3-05-004-03	FNC ROOM VENTS	26.0	0.				TONS PRODUCED
3-05-004-99	OTHER/NOT CLASIFD						TONS PRODUCED
							TONS PROCESSED
CASTABLE REFRACTY							
3-05-005-01	RAWMATL DRYER	30.0					
3-05-005-02	RAWMATL CRUSH/PRC	120.					TONS FEED MATERIAL
3-05-005-03	ELECTRIC ARC MELT	50.0					TONS FEED MATERIAL
3-05-005-04	CURING OVEN	0.20					TONS FEED MATERIAL
3-05-005-05	MOLD/SHAKEOUT	25.0					TONS FEED MATERIAL
3-05-005-99	OTHER/NOT CLASIFD						TONS FEED MATERIAL
							TONS FEED MATERIAL
CEMENT MFG DRY							
3-05-006-01	KILNS	46.0	3.00	0.50			BARRELS CEMENT PRODUCED
3-05-006-02	DRYERS/GRINDERETC	18.0					BARRELS CEMENT PRODUCED
3-05-006-03	KILNS-OIL FIRED	245.	14.4	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-006-04	KILNS-GAS FIRED	245.	10.2	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-006-05	KILNS-COAL FIRED	245.	23.8	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-006-99	OTHER/NOT CLASIFD						TONS CEMENT PRODUCED
CEMENT MFG WET							
3-05-007-01	KILNS	43.0	3.00	0.50	0.	0.	BARRELS CEMENT PRODUCED
3-05-007-02	DRYERS/GRINDERETC	6.00					BARRELS CEMENT PRODUCED
3-05-007-03	KILNS-OIL FIRED	228.	14.4	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-007-04	KILNS GAS FIRED	228.	10.2	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-007-05	KILNS-COAL FIRED	228.	23.8	2.60	0.	0.	TONS CEMENT PRODUCED
3-05-007-99	OTHER/NOT CLASIFD						TONS CEMENT PRODUCED
CERAMIC/CLAY MFG							
3-05-008-01	DRYING	70.0					TONS INPUT TO PROCESS
3-05-008-02	GRINDING	76.0					TONS INPUT TO PROCESS
3-05-008-03	STORAGE	34.0					TONS INPUT TO PROCESS
3-05-008-99	OTHER/NOT CLASIFD						TONS PRODUCED
CLAY/FLYASHSINTER							
3-05-009-01	FLYASH	110.					TONS FINISHED PRODUCT
3-05-009-02	CLAY/COKE	55.0					TONS FINISHED PRODUCT
3-05-009-03	NATURAL CLAY	24.0					TONS FINISHED PRODUCT
3-05-009-99	OTHER/NOT CLASIFD						TONS PRODUCED
COAL CLEANING							
3-05-010-01	THERM/FLUID BED	20.0					TONS COAL DRIED
3-05-010-02	THERM/FLASH	16.0					TONS COAL DRIED
3-05-010-03	THERM/MULTILOUVRD	25.0					TONS COAL DRIED
3-05-010-99	OTHER/NOT CLASIFD						TONS COAL CLEANED
CONCRETE BATCHING							
3-05-011-01	GENERAL	0.20					CUBIC YARDS CONCRETE PRODUCED
3-05-011-20	ASBEST/CEMNT POTS	0.20	0.	0.	0.	0.	TONS PRODUCT
3-05-011-21	ROAD SURFACE		0.	0.	0.	0.	TONS PRODUCT
3-05-011-99	OTHER/NOT CLASFD						TONS PRODUCT
FIBERGLASS MFG							
3-05-012-01	REVERBFNC-REGENEX	3.00					TONS MATERIAL PROCESSED
3-05-012-02	REVERBFNC-RECUPEX	1.00					TONS MATERIAL PROCESSED

A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

FIBERGLASS MFG (CONTINUED)		POUNDS EMITTED PER UNIT: PART	SOX	NOX	HC	CO	UNITS
3-05-012-03	ELECTRIC IND FNC	0.					TONS MATERIAL PROCESSED
3-05-012-04	FORMING LINE	50.0					TONS MATERIAL PROCESSED
3-05-012-05	CURING OVEN	7.00					TONS MATERIAL PROCESSED
3-05-012-99	OTHER/NOT CLASIFD						TONS PROCESSED
FRIT MFG							
3-05-013-01	ROTARY FNC GENL	16.0					TONS CHARGE
3-05-013-99	OTHER/NOT CLASIFD						TONS CHARGED
GLASS MFG							
3-05-014-01	SODALINE GENL FNC	2.00					TONS GLASS PRODUCED
3-05-014-10	RAW MAT REC/STORG						TONS PROCESSED
3-05-014-11	BATCHING/MIXING		0.	0.	0.	0.	TONS PROCESSED
3-05-014-12	MOLTEN HOLD TANKS		0.				TONS PROCESSED
3-05-014-99	OTHER/NOT CLASIFD						TONS PRODUCED
GYPSUM MFG							
3-05-015-01	RW MTL DRYER	40.0					TONS THROUGHPUT
3-05-015-02	PRIMARY GRINDER	1.00					TONS THROUGHPUT
3-05-015-03	CALCINER	90.0					TONS THROUGHPUT
3-05-015-04	CONVEYING	0.70					TONS THROUGHPUT
3-05-015-99	OTHER/NOT CLASIFD						TONS THROUGHPUT
LIME MFG							
3-05-016-01	PRIMARY CRUSHING	31.0	0.	0.	0.	0.	TONS PROCESSED
3-05-016-02	SECNDRY CRUSHING	2.00	0.	0.	0.	0.	TONS PROCESSED
3-05-016-03	CALCINNG-VERTKILN	8.00					TONS PROCESSED
3-05-016-04	CALCINNG-ROTYKILN	200.					TONS PROCESSED
3-05-016-99	OTHER/NOT CLASIFD						TONS PROCESSED
MINERAL WOOL							
3-05-017-01	CUPOLA	22.0	0.02				TONS CHARGE
3-05-017-02	REVERB FNC	5.00					TONS CHARGE
3-05-017-03	BLOW CHAMBER	17.0					TONS CHARGE
3-05-017-04	CURING OVEN	4.00					TONS CHARGE
3-05-017-05	COOLER	2.00					TONS CHARGE
3-05-017-99	OTHER/NOT CLASIFD						TONS PROCESSED
PERLITE MFG							
3-05-018-01	VERTICAL FNC GEN	21.0					TONS CHARGE
3-05-018-99	OTHER/NOT CLASIFD						TONS PROCESSED
PHOSPHATE ROCK							
3-05-019-01	DRYING	15.0					TONS PHOSPHATE ROCK
3-05-019-02	GRINDING	20.0					TONS PHOSPHATE ROCK
3-05-019-03	TRANSFER/STORAGE	2.00					TONS PHOSPHATE ROCK
3-05-019-04	OPEN STORAGE	40.0					TONS PHOSPHATE ROCK
3-05-019-99	OTHER/NOT CLASIFD						TONS PROCESSED
STONE QUARY/PROC							
3-05-020-01	PRIMARY CRUSHING	0.50	0.	0.	0.	0.	TONS RAW MATERIAL
3-05-020-02	SEC CRUSH/SCREEN	1.50	0.	0.	0.	0.	TONS RAW MATERIAL
3-05-020-03	TERT CRUSH/SCREEN	6.00	0.	0.	0.	0.	TONS RAW MATERIAL
3-05-020-04	RECRUSH/SCREENING	5.00	0.	0.	0.	0.	TONS RAW MATERIAL
3-05-020-05	FINES MILL	6.00	0.	0.	0.	0.	TONS RAW MATERIAL
3-05-020-06	SCREEN/CONVY/HNDL	2.00	0.	0.	0.	0.	TONS PRODUCT
3-05-020-07	OPEN STORAGE	10.0	0.	0.	0.	0.	TONS PRODUCT STORED
3-05-020-08	CUT STONE-GENERAL		0.	0.	0.	0.	TONS PROCESSED
3-05-020-09	BLASTING-GENERAL		0.	0.	0.	0.	TONS PROCESSED
3-05-020-99	OTHER/NOT CLASIFD						TONS PROCESSED
SALT MINING							
3-05-021-01	GENERAL		0.				TONS MINED
POTASH PRODUCTION							
3-05-022-01	MINE-GRIND/DRY		0.				TONS ORE
3-05-022-99	OTHER/NOT CLASIFD						TONS PROCESSED
CALCIUM BORATE							
3-05-023-01	MINING/PROCESSING				0.		TONS PRODUCT
3-05-023-99	OTHER/NOT CLASIFD						TONS PROCESSED
MG CARBONATE							
3-05-024-01	MINE/PROCESS				0.		TONS PRODUCT
3-05-024-99	OTHER/NOT CLASIFD						TONS PROCESSED
SAND/GRAVEL							
3-05-025-01	CRUSHING/SCREEN	0.10	0.	0.	0.	0.	TONS PRODUCT
3-05-025-99	OTHER/NOT CLASIFD						TONS PROCESSED
DIATOMACOUSERTH							
3-05-026-01	HANDLING		0.	0.	0.	0.	TONS PRODUCT
3-05-026-99	OTHER/NOT CLASIFD						TONS PROCESSED

INDUSTRIAL PROCES -MINERAL PRODUCTS (CONTINUED)
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		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
CERAMIC ELECT PTS							
3-05-030-99	OTHER/NOT CLASIFD						TONS PROCESSED
ASBESTOS MINING							
3-05-031-01	SURFACE BLASTING		0.	0.	0.	0.	TONS OF ORE
3-05-031-02	SURFACE DRILLING		0.	0.	0.	0.	TONS OF ORE
3-05-031-03	COBBING		0.	0.	0.	0.	TONS OF ORE
3-05-031-04	LOADING		0.	0.	0.	0.	TONS OF ORE
3-05-031-05	CONVEY/HAUL ASBES		0.	0.	0.	0.	TONS OF ORE
3-05-031-06	CONVEY/HAUL WASTE		0.	0.	0.	0.	TONS OF ORE
3-05-031-07	UNLOADING		0.	0.	0.	0.	TONS OF ORE
3-05-031-08	STRIPPING		0.	0.	0.	0.	TONS OF ORE
3-05-031-09	VENTILATION		0.	0.	0.	0.	TONS REMOVED
3-05-031-10	STOCKPILING		0.	0.	0.	0.	TONS OF ORE
3-05-031-11	TAILINGS		0.	0.	0.	0.	TONS OF ORE
3-05-031-99	OTHER/NOT CLASFD						TINS OF MATERIAL
							TONS PROCESSED
ASBESTOS MILLING							
3-05-032-01	CRUSHING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-02	DRYING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-03	RECRUSHING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-04	SCREENING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-05	FIBERIZING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-06	BAGGING		0.	0.	0.	0.	TONS PROCESSED
3-05-032-99	OTHER/NOT CLASFD						TONS PROCESSED
MINING-SPEC MATL							
3-05-040-01	OPEN PIT-BLASTING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-02	OPEN PIT-DRILLING		0.	0.	0.	0.	TONS OR MATERIAL
3-05-040-03	OPEN PIT-COBBING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-10	UNDERGRD-VENTILAT		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-20	LOADING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-21	CONVEY/HAUL MATL		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-22	CONVEY/HAUL WASTE		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-23	UNLOADING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-24	STRIPPING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-25	STOCKPILE		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-30	PRIMARY CRUSHER		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-31	SECONDARY CRUSHER		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-32	ORE CONCENTRATOR		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-33	ORE DRYER		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-34	SCREENING		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-36	TAILING PILES		0.	0.	0.	0.	TONS OF MATERIAL
3-05-040-99	OTHER/NOT CLASIFD						TONS OF MATERIAL
							TONS OF MATERIAL
OTHER/NOT CLASIFD							
3-05-999-99	SPECIFY IN REMARK						TONS PRODUCT

INDUSTRIAL PROCES -PETROLEUM INDRY
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		PART	SOX	NOX	HC	CO	UNITS
PROCESS HEATER							
3-06-001-01	OIL	840.	6,720. S	2,900.	140.	0.	1000 BARRELS OIL BURNED
3-06-001-02	GAS	0.02	0.83 S	0.23	0.03	0.	1000 CUBIC FEET GAS BURNED
3-06-001-03	OIL	20.0	160. S	69.0	3.34	0.	1000 GALLONS OIL BURNED
3-06-001-04	GAS	20.0	830. S	230.	30.0	0.	MILLION CUBIC FEET BURNED
FLUID CRACKERS							
3-06-002-01	GENERAL (FCC)	242.	493.	71.0	220.	13,700.	1000 BARRELS FRESH FEED
MOV-BED CAT-CRACK							
3-06-003-01	GENERAL (TCC)	17.0	60.0	5.00	87.0	3,800.	1000 BARRELS FRESH FEED
BLOW-DOWN SYSTM							
3-06-004-01	W/CONTROLS	0.	0.	0.	5.00	0.	1000 BARRELS REFINERY CAPACITY
3-06-004-02	W/O CONTROLS	0.	0.	0.	300.	0.	1000 BARRELS REFINERY CAPACITY
PROCESS DRAINS							
3-06-005-01	GEN W/CONTROL	0.	0.	0.	8.00	0.	1000 BARRELS WASTE WATER
3-06-005-02	GEN W/O CONTROL	0.	0.	0.	210.	0.	1000 BARRELS WASTE WATER
VACUUM JETS							
3-06-006-01	W/CONTROL	0.	0.	0.	0.	0.	1000 BARRELS VACUUM DISTILLATION
3-06-006-02	W/O CONTROL	0.	0.	0.	130.	0.	1000 BARRELS VACUUM DISTILLATION
COOLING TOWERS							
3-06-007-01		0.	0.	0.	6.00	0.	MILLION GALLONS COOLING WATER
MISCELLANEOUS							
3-06-008-01	PIPE/VALVE-FLANGE	0.	0.	0.	28.0	0.	1000 BARRELS REFINERY CAPACITY
3-06-008-02	VESL RELIEF VALVE	0.	0.	0.	11.0	0.	1000 BARRELS REFINERY CAPACITY
3-06-008-03	PUMP SEALS	0.	0.	0.	17.0	0.	1000 BARRELS REFINERY CAPACITY
3-06-008-04	COMPRESR SEALS	0.	0.	0.	5.00	0.	1000 BARRELS REFINERY CAPACITY
3-06-008-05	OTHER-GENL	0.	0.	0.	10.0	0.	1000 BARRELS REFINERY CAPACITY

'A' INDICATES ASH CONTENT AND 'S' INDICATES SULFUR CONTENT OF THE FUEL, ON A PERCENT BASIS (BY WEIGHT)

SCC	Process	PART	SOX	NOX	HC	CO	UNITS
		POUNDS EMITTED PER UNIT					
FLARES							
3-06-009-01	NATURAL GAS			0.			MILLIONS OF CUBIC FEET
3-06-009-99	OTHER/NOT CLASIFD						MILLIONS OF CUBIC FEET
SLUDGE CONVERTER							
3-06-010-01	GENERAL						TONS PROCESSED
ASPHALT OXIDIZER							
3-06-011-01	GENERAL						TONS PROCESSED
3-06-011-99	OTHER/NOT CLASIFD						TONS PROCESSED
FLUID COKING							
3-06-012-01	GENERAL	523.					1000 BARRELS FRESH FEED
3-06-012-02	COOLING OPER						1000 BARRELS FRESH FEED
3-06-012-03	TRANSPORTATION						1000 BARRELS FRESH FEED
3-06-012-04	STORAGE						1000 BARRELS FRESH FEED
CATALYTIC REFORM							
3-06-013-01	GENERAL						1000 BARRELS FRESH FEED
OTHER/NOT CLASIFD							
3-06-999-98	SPECIFY IN REMARK						TONS PROCESSED
3-06-999-99	SPECIFY IN REMARK						BARRELS-PROCESSED

INDUSTRIAL PROCES -WOOD PRODUCTS

SCC	Process	PART	SOX	NOX	HC	CO	UNITS
SULFATE PULPNG							
3-07-001-01	BLOWTNK ACCUMULTR	0.	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-02	WASHRS/SCREENS	0.	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-03	MULT-EFFECT EVAP	0.	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-04	RECVY BOLR/DCEVAP	151.	5.00			60.0	AIR-DRY TONS UNBLEACHED PULP
3-07-001-05	SMELT DISSOLV TNK	2.00	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-06	LIME KILNS	45.0	0.			10.0	AIR-DRY TONS UNBLEACHED PULP
3-07-001-07	TURPENTINE CONDSR	0.	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-08	FLUIDBED CALCINER	72.0	0.			0.	AIR-DRY TONS UNBLEACHED PULP
3-07-001-09	LIQUOR OXION TOWR						AIR-DRY TONS UNBLEACHED PULP
3-07-001-99	OTHER/NOT CLASIFC						AIR-DRY TONS UNBLEACHED PULP
SULFITE PULPING							
3-07-002-01	LIQUOR RECOVERY						AIR-DRY TONS UNBLEACHED PULP
3-07-002-02	SULFITE TOWER						AIR-DRY TONS UNBLEACHED PULP
3-07-002-03	DIGESTER				0.		AIR-DRY TONS UNBLEACHED PULP
3-07-002-04	SMELT TANK				0.		AIR-DRY TONS UNBLEACHED PULP
3-07-002-05	EVAPORATORS				0.		AIR-DRY TONS UNBLEACHED PULP
3-07-002-06	PULP DIGESTER				0.		TONS AIR DRY PULP
3-07-002-99	OTHER/NOT CLASIFD						TONS AIR DRY PULP
PULPBOARD MFG							
3-07-004-01	PAPERBOARD-GEN	0.					TONS FINISHED PRODUCT
3-07-004-02	FIBERBOARD-GEN	0.60					TONS FINISHED PRODUCT
3-07-004-99	OTHER/NOT CLASIFD						TONS FINISHED PRODUCT
PRESSURE TREATING							
3-07-005-01	CREOSOTE						TONS OF WOOD TREATED
3-07-005-99	OTHER/NOT CLASIFD						TONS OF WOOD TREATED
TALLOIL/ROSIN							
3-07-006-01	GENERAL						TONS OF PRODUCT
PLYWOOD/PARTBOARD							
3-07-007-01	VENEER DRYER	0.	0.		1.20	0.	TONS PROCESSED
3-07-007-02	SANDING		0.	0.	0.	0.	TONS PROCESSED
3-07-007-99	OTHER/NOT CLASIFD						TONS PROCESSED
SAWMILL OPERATNS							
3-07-008-99	OTHER/NOT CLASIFD						TONS PROCESSED
EXCELSIOR MFG							
3-07-009-99	OTHER/NOT CLASIFD						TONS PROCESSED
CORK PROCESSING							
3-07-010-99	OTHER/NOT CLASIFD						TONS PROCESSED
FURNITURE MFG							
3-07-020-99	OTHER/NOT CLASIFD						TONS PROCESSED
OTHER/NOT CLASIFD							
3-07-999-99	SPECIFY IN REMARK						TONS PROCESSED

INDUSTRIAL PROCES -METAL FABRICATION		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
IRON/STEEL							
3-09-001-01	MISC HARDWARE		0.	0.		0.	TONS OF PRODUCT
3-09-001-02	FARM MACHINERY		0.	0.			TONS OF PRODUCT
3-09-001-99	OTHER/NOT CLASIFD						TONS PROCESSED
PLATING OPERATONS							
3-09-010-99	OTHER/NOT CLASIFD						TONS PLATED
CAN MAKING OPRNS							
3-09-020-99	OTHER/NOT CLASIFD						TONS PRODUCT
MACHINING OPER							
3-09-030-01	DRILLING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-02	MILLING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-03	REAMING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-04	GRINDING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-05	SAWING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-06	HONING-SP MATL		0.	0.	0.	0.	TONS PROCESSED
3-09-030-99	OTHER-SP MATL						TONS PROCESSED
OTHER/NOT CLASIFD							
3-09-999-99	SPECIFY IN REMARK						TONS PROCESSED
INDUSTRIAL PROCES -LEATHER PRODUCTS							
OTHER/NOT CLASIFD							
3-20-999-99	SPECIFY IN REMARK						TONS PROCESSED
INDUSTRIAL PROCES -TEXTILE MFG							
GENERAL FABRICS							
3-30-001-01	YARN PREP/BLEACH						TONS PROCESSED
3-30-001-99	OTHER/NOT SPECIFD						TONS PROCESSED
RUBERIZED FABRICS							
3-30-002-99	OTHER/NOT SPECIFD						TONS PROCESSED
CARPET OPERATNS							
3-30-003-99	OTHER/NOT SPECIFD						TONS PROCESSED
INDUSTRIAL PROCES -INPROCESS FUEL							
ANTHRACITE COAL							
3-90-001-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS BURNED
BITUMINOUS COAL							
3-90-002-01	CEMENT KILN/DRYER	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-03	LIME KILN	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-04	KAOLIN KILN	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-06	BRICK KILN/DRY	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-07	GYPSUM KILN/ETC	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-08	COAL DRYERS	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-09	ROCK/GRAVEL DRYER	0.	0.	0.	0.	0.	TONS BURNED
3-90-002-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS BURNED
RESIDUAL OIL							
3-90-004-01	ASPHALT DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-02	CEMENT KILN/DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-03	LIME KILN	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-04	KAOLIN KILN	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-05	METAL MELTING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-06	BRICK KILN/DRY	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-07	GYPSUM KILN/ETC	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-08	GLASS FURNACE	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-09	ROCK/GRAVEL DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-10	FRIT SMELTER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-11	PERLITE FURNACE	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-30	FEED/GRAIN DRYING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-31	FOOD-DRY/COOK/ETC	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-32	FERTILIZER DRYING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-50	PULPBOARD-DRYERS	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-51	PLYWOOD-DRYERS	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-52	PULP-RECOV BOILER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-004-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS BURNED
DISTILLATE OIL							
3-90-005-01	ASPHALT DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-02	CEMENT KILN/DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-03	LIME KILN	0.	0.	0.	0.	0.	1000 GALLONS BURNED

		POUNDS EMITTED PER UNIT					
DISTILLATE OIL (CONTINUED)		PART	SOX	NOX	HC	CO	UNITS
3-90-005-04	KAOLIN KILN	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-05	METAL MELTING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-06	BRICK KILN/DRY	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-07	GYPSUM KILN/ETC	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-08	GLASS FURNACE	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-09	ROCK/GRAVEL DRYER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-10	FRIT SMELTER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-11	PERLITE FURNACE	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-30	FEED/GRAIN DRYING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-31	FOOD-DRY/COOK/ETC	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-32	FERTILIZER DRYING	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-50	PULPBOARD-DRYERS	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-51	PLYWOOD-DRYERS	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-52	PULP-RECOV BOILER	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-005-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS BURNED
NATURAL GAS							
3-90-006-01	ASPHALT DRYER	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-02	CEMENT KILN/DRYER	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-03	LIME KILN	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-04	KAOLIN KILN	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-05	METAL MELTING	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-06	BRICK KILN/DRYS	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-07	GYPSUM KILN ETC	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-08	GLASS FURNACE	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-09	ROCK/GRAVEL DRYER	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-10	FRIT SMELTER	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-11	PERLITE FURNACE	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-30	FEED/GRAIN DRYING	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-31	FOOD-DRY/COOK/ETC	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-32	FERTILIZER DRYING	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-50	PULPBOARD-DRYERS	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-51	PLYWOOD-DRYERS	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-52	PULP-RECOV BOILER	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-006-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
PROCESS GAS							
3-90-007-01	CO/BLAST FURNACE	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-007-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
COKE							
3-90-008-01	MINERAL WOOL FURN	0.	0.	0.	0.	0.	TONS BURNED
3-90-008-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS
WOOD							
3-90-009-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS BURNED
LIQ PET GAS (LPG)							
3-90-010-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS BURNED
OTHER/NOT CLASIFD							
3-90-999-97	SPECIFY IN REMARK	0.	0.	0.	0.	0.	MILLION CUBIC FEET BURNED
3-90-999-98	SPECIFY IN REMARK	0.	0.	0.	0.	0.	1000 GALLONS BURNED
3-90-999-99	SPECIFY IN REMARK	0.	0.	0.	0.	0.	TONS BURNED
INDUSTRIAL PROCES -OTHER/NOT CLASIFD							
SPECIFY IN REMARK							
3-99-999-99							TONS PROCESSED
POINT SC EVAP -CLEANING SOLVENT							
DRYCLEANING							
4-01-001-01	PERCHLORETHYLENE	0.	0.	0.	210.	0.	TONS CLOTHES CLEANED
4-01-001-02	STODDARD	0.	0.	0.	305.	0.	TONS CLOTHES CLEANED
DEGREASING							
4-01-002-01	STODDARD	0.	0.	0.		0.	TONS SOLVENT USED
4-01-002-02	TRICHLOROETHANE						TONS SOLVENT USED
4-01-002-03	PERCHLOROETHYLENE						TONS SOLVENT USED
4-01-002-04	METHYLENE CHLORDE						TONS SOLVENT USED
4-01-002-05	TRICHLOROETHYLENE						TONS SOLVENT USED
4-01-002-99	OTHER/NOT CLASIFD						TONS SOLVENT USED
OTHER/NOT CLASIFD							
4-01-999-99	SPECIFY IN REMARK						TONS SOLVENT USED
POINT SC EVAP -SURFACE COATING							
PAINT							
4-02-001-01	GENERAL	0.	0.	0.	1,120.	0.	TONS COATING

POINT SC EVAP -SURFACE COATING (CONTINUED)

		POUNDS EMITTED PER UNIT					
		PART	SOX	NOX	HC	CO	UNITS
VARNISH/SHELLAC							
4-02-003-01	GENERAL				1,000.		TONS COATING
LAQUER							
4-02-004-01	GENERAL				1,540.		TONS COATING
ENAMEL							
4-02-005-01	GENERAL	0.	0.	0.	840.	0.	TONS COATING
PRIMER							
4-02-006-01	GENERAL				1,320.		TONS COATING
COATING OVEN							
4-02-008-01	GENERAL						TONS COATING
SOLVENT							
4-02-009-01	GENERAL						TONS COATING
OTHER/NOT CLASIFD							
4-02-999-99	SPECIFY IN REMARK						TONS COATING
POINT SC EVAP	-PETROL PROD STG						
FIXED ROOF							
4-03-001-01	BREATH-GASOLINE	0.	0.	0.	80.3	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-02	BREATH-CRUDE	0.	0.	0.	54.8	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-03	WORKING-GASOLINE	0.	0.	0.	9.00	0.	1000 GALLONS THROUGHPUT
4-03-001-04	WORKING-CRUDE	0.	0.	0.	7.30	0.	1000 GALLONS THROUGHPUT
4-03-001-05	BREATH-JET FUEL	0.	0.	0.	25.2	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-06	BREATH-KEROSENE	0.	0.	0.	13.1	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-07	BREATH-DIST FUEL	0.	0.	0.	13.1	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-08	BREATH-BENZENE	0.	0.	0.	18.3	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-09	BREATH-CYCLOHEX	0.	0.	0.	20.8	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-10	BREATH-CYCLOPENT	0.	0.	0.	58.4	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-11	BREATH-HEPTANE	0.	0.	0.	11.3	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-12	BREATH-HEXANE	0.	0.	0.	32.1	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-13	BREATH-ISOOCTANE	0.	0.	0.	13.9	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-14	BREATH-ISOPENTANE	0.	0.	0.	142.	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-15	BREATH-PENTANE	0.	0.	0.	94.9	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-16	BREATH-TOLUENE	0.	0.	0.	5.84	0.	1000 GALLONS STORAGE CAPACITY
4-03-001-50	WORKING-JET FUEL	0.	0.	0.	2.40	0.	1000 GALLONS THROUGHPUT
4-03-001-51	WORKING-KEROSENE	0.	0.	0.	1.00	0.	1000 GALLONS THROUGHPUT
4-03-001-52	WORKING-DIST FUEL	0.	0.	0.	1.00	0.	1000 GALLONS THROUGHPUT
4-03-001-53	WORKING-BENZENE	0.	0.	0.	2.00	0.	1000 GALLONS THROUGHPUT
4-03-001-54	WORKING-CYCLOHEX	0.	0.	0.	2.30	0.	1000 GALLONS THROUGHPUT
4-03-001-55	WORKING-CYCLOPENT	0.	0.	0.	6.40	0.	1000 GALLONS THROUGHPUT
4-03-001-56	WORKING-HEPTANE	0.	0.	0.	1.20	0.	1000 GALLONS THROUGHPUT
4-03-001-57	WORKING-HEXANE	0.	0.	0.	3.60	0.	1000 GALLONS THROUGHPUT
4-03-001-58	WORKING-ISOOCTANE	0.	0.	0.	1.50	0.	1000 GALLONS THROUGHPUT
4-03-001-59	WORKING-ISOPENT	0.	0.	0.	15.7	0.	1000 GALLONS THROUGHPUT
4-03-001-60	WORKING-PENTANE	0.	0.	0.	10.6	0.	1000 GALLONS THROUGHPUT
4-03-001-61	WORKING-TOLUENE	0.	0.	0.	0.64	0.	1000 GALLONS THROUGHPUT
FLOATING ROOF							
4-03-002-01	STAND STG-GASOLN	0.	0.	0.	12.0	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-02	WORKING-PRODUCT				0.		1000 GALLONS THROUGHPUT
4-03-002-03	STANC STG-CRUDE	0.	0.	0.	10.6	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-04	WORKING-CRUDE				0.		1000 GALLONS THROUGHPUT
4-03-002-05	STAND STG-JETFUEL	0.	0.	0.	4.38	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-06	STAND STG-KEROSNE	0.	0.	0.	1.90	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-07	STAND STG-DIST FL	0.	0.	0.	1.90	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-08	STAND STG-BENZENE	0.	0.	0.	2.70	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-09	STAND STG-CYCLHEX	0.	0.	0.	3.03	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-10	STAND STG-CYCLPEN	0.	0.	0.	8.76	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-11	STAND STG-HEPTANE	0.	0.	0.	1.64	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-12	STAND STG-HEXANE	0.	0.	0.	4.75	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-13	STANC STG-ISOCCTN	0.	0.	0.	2.01	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-14	STAND STG-ISOPENT	0.	0.	0.	20.8	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-15	STAND STG-PENTANE	0.	0.	0.	13.9	0.	1000 GALLONS STORAGE CAPACITY
4-03-002-16	STAND STG-TOLUENE	0.	0.	0.	0.88	0.	1000 GALLONS STORAGE CAPACITY
VAR-VAPCR SPACE							
4-03-003-02	WORKING-GASOLINE	0.	0.	0.	10.2	0.	1000 GALLONS THROUGHPUT
4-03-003-03	WORKING-JET FUEL	0.	0.	0.	2.30	0.	1000 GALLONS THROUGHPUT
4-03-003-04	WORKING-KEROSENE	0.	0.	0.	1.00	0.	1000 GALLONS THROUGHPUT
4-03-003-05	WORKING-DIST FUEL	0.	0.	0.	1.00	0.	1000 GALLONS THROUGHPUT
4-03-003-06	WORKING-BENZENE	0.	0.	0.	2.30	0.	1000 GALLONS THROUGHPUT
4-03-003-07	WORKING-CYCLOHEX	0.	0.	0.	2.60	0.	1000 GALLONS THROUGHPUT
4-03-003-08	WORKING-CYCLOPENT	0.	0.	0.	7.20	0.	1000 GALLONS THROUGHPUT
4-03-003-09	WORKING-HEPTANE	0.	0.	0.	1.40	0.	1000 GALLONS THROUGHPUT
4-03-003-10	WORKING-HEXANE	0.	0.	0.	4.00	0.	1000 GALLONS THROUGHPUT
4-03-003-11	WORKING-ISOOCTANE	0.	0.	0.	1.70	0.	1000 GALLONS THROUGHPUT
4-03-003-12	WORKING-ISOPENT	0.	0.	0.	17.8	0.	1000 GALLONS THROUGHPUT
4-03-003-13	WORKING-PENTANE	0.	0.	0.	12.0	0.	1000 GALLONS THROUGHPUT
4-03-003-14	WORKING-TOLUENE	0.	0.	0.	0.73	0.	1000 GALLONS THROUGHPUT
OTHER/NOT CLASIFD							
4-03-999-99	SPECIFY IN REMARK						1000 GAL STORED

POINT SC EVAP -MISC ORGANIC STOR		POUNDS EMITTED PER UNIT PART	SOX	NOX	HC	CO	UNITS
OTHER/NOT CLASIFD							
4-04-001-99	SPECIFY IN REMARK						TONS STORED
POINT SC EVAP -PRINTING PRESS							
DRYERS							
4-05-001-01	GENERAL			0.			TONS SOLVENT
POINT SC EVAP -PETRCL MRKT-TRANS							
TANK CARS/TRUCKS							
4-06-001-01	LOAD(SPLASH)-GASO	0.	0.	0.	12.4	0.	1000 GALLONS TRANSFERRED
4-06-001-02	LOAD(SPLASH)-CRUD	0.	0.	0.	10.6	0.	1000 GALLONS TRANSFERRED
4-06-001-03	LOAD(SPLASH)-JET	0.	0.	0.	1.84	0.	1000 GALLONS TRANSFERRED
4-06-001-04	LOAD(SPLASH)-KERO	0.	0.	0.	0.88	0.	1000 GALLONS TRANSFERRED
4-06-001-05	LOAD(SPLASH)-DIST	0.	0.	0.	0.93	0.	1000 GALLONS TRANSFERRED
4-06-001-26	LOAD(SUBM)-GASOLN	0.	0.	0.	4.10	0.	1000 GALLONS TRANSFERRED
4-06-001-27	LOAD(SUBM)-CRUDE	0.	0.	0.	3.80	0.	1000 GALLONS TRANSFERRED
4-06-001-28	LOAD(SUBM)-JET FL	0.	0.	0.	0.91	0.	1000 GALLONS TRANSFERRED
4-06-001-29	LOAD(SUBM)-KEROSN	0.	0.	0.	0.45	0.	1000 GALLONS TRANSFERRED
4-06-001-30	LOAD(SUBM)-DIST	0.	0.	0.	0.48	0.	1000 GALLONS TRANSFERRED
4-06-001-51	UNLOAD-GASOLINE	0.	0.	0.	2.10	0.	1000 GALLONS TRANSFERRED
4-06-001-52	UNLOAD-CRUDE OIL	0.	0.	0.	1.98	0.	1000 GALLONS TRANSFERRED
4-06-001-53	UNLOAD-JET FUEL	0.	0.	0.	0.45	0.	1000 GALLONS TRANSFERRED
4-06-001-54	UNLOAD-KEROSENE	0.	0.	0.	0.23	0.	1000 GALLONS TRANSFERRED
4-06-001-55	UNLOAD-DIST OIL	0.	0.	0.	0.24	0.	1000 GALLONS TRANSFERRED
MARINE VESSELS							
4-06-002-01	LOADING-GASOLINE	0.	0.	0.	2.88	0.	1000 GALLONS TRANSFERRED
4-06-002-02	LOADING-CRUDE OIL	0.	0.	0.	2.58	0.	1000 GALLONS TRANSFERRED
4-06-002-03	LOADING-JET FUEL	0.	0.	0.	0.60	0.	1000 GALLONS TRANSFERRED
4-06-002-04	LOADING-KEROSENE	0.	0.	0.	0.27	0.	1000 GALLONS TRANSFERRED
4-06-002-05	LOADING-DIST OIL	0.	0.	0.	0.29	0.	1000 GALLONS TRANSFERRED
4-06-002-26	UNLOAD-GASOLINE	0.	0.	0.	2.52	0.	1000 GALLONS TRANSFERRED
4-06-002-27	UNLOAD-CRUDE OIL	0.	0.	0.	2.25	0.	1000 GALLONS TRANSFERRED
4-06-002-28	UNLOAD-JET FUEL	0.	0.	0.	0.52	0.	1000 GALLONS TRANSFERRED
4-06-002-29	UNLOAD-KEROSENE	0.	0.	0.	0.24	0.	1000 GALLONS TRANSFERRED
4-06-002-30	UNLOAD-DIST OIL	0.	0.	0.	0.25	0.	1000 GALLONS TRANSFERRED
UNDERGRD GASO STG							
4-06-003-01	SPLASH LOADING	0.	0.	0.	11.5	0.	1000 GALLONS TRANSFERRED
4-06-003-02	SUB LOAD-UNCONT	0.	0.	0.	7.30	0.	1000 GALLONS TRANSFERRED
4-06-003-03	SUB LOAD-OPN SYS	0.	0.	0.	0.80	0.	1000 GALLONS TRANSFERRED
4-06-003-04	SUB LOAD-CLS SYS	0.	0.	0.	0.	0.	1000 GALLONS TRANSFERRED
4-06-003-05	UNLOADING	0.	0.	0.	1.00	0.	1000 GALLONS TRANSFERRED
FILL VEH GAS TANK							
4-06-004-01	VAP DISP LOSS	0.	0.	0.	11.0	0.	1000 GALLONS PUMPED
4-06-004-02	LIQ SPILL LOSS	0.	0.	0.	0.67	0.	1000 GALLONS PUMPED
POINT SC EVAP -MISC HC EVAP							
OTHER/NOT CLASIFC							
4-90-999-99	SPECIFY IN REMARK						TONS PROCESSED
SOLID WASTE -GOVERNMENT							
MUNICIPAL INCIN							
5-01-001-01	MULTIPLE CHAMBER	30.0	2.50	2.00	1.50	35.0	TONS BURNED
5-01-001-02	SINGLE CHAMBER	15.0	2.50	2.00	15.0	20.0	TONS BURNED
OPEN BURNING DUMP							
5-01-002-01	GENERAL	16.0	1.00	6.00	30.0	85.0	TONS BURNED
5-01-002-02	LANDSCAPE/PRUNING	17.0		2.00	20.0	60.0	TONS BURNED
5-01-002-03	JET FUEL						HUNDREDS OF GALLONS
INCINERATOR							
5-01-005-05	PATHOLOGICAL	8.00	0.	3.00	0.	0.	TONS BURNED
5-01-005-06	SLUDGE	100.	1.00	5.00	1.00	0.	TONS DRY SLUDGE
5-01-005-07	CONICAL	20.0	2.00	5.00	20.0	60.0	TONS BURNED
5-01-005-99	OTHER/NOT CLASIFD						TONS BURNED
AUX.FUEL/NO EMSNS							
5-01-900-04	RESIDUAL OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-01-900-05	DISTILLATE OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-01-900-06	NATURAL GAS	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-01-900-10	LPG	0.	0.	0.	0.	0.	1000 GALLONS

AUX.FUEL/NO EMSNS (CONTINUED)		PART	SOX	NOX	HC	CO	UNITS
		POUNDS EMITTED PER UNIT					
5-01-900-97	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-01-900-98	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS
5-01-900-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS
SOLID WASTE	**-COMM-INST**						
INCINERATOR GEN							
5-02-001-01	MULTIPLE CHAMBER	7.00	2.50	3.00	3.00	10.0	TONS BURNED
5-02-001-02	SINGLE CHAMBER	15.0	2.50	2.00	15.0	20.0	TONS BURNED
5-02-001-03	CONTROLLED AIR	1.40	1.50	10.0	0.	0	TONS BURNED
5-02-001-04	CONICAL FEFUSE	20.0	2.00	5.00	20.0	60.0	TONS BURNED
5-02-001-05	CONICAL WOOD	7.00	0.10	1.00	11.0	130.	TONS BURNED
OPEN BURNING							
5-02-002-01	WOOD	17.0		2.00	4.00	50.0	TONS BURNED
APARTMENT INCIN							
5-02-003-01	FLUE FED	30.0	0.50	3.00	15.0	20.0	TONS BURNED
5-02-003-02	FLUE, FED-MODIFIED	6.00	0.50	10.0	3.00	10.0	TONS BURNED
INCINERATOR							
5-02-005-05	PATHOLOGICAL	8.00	0.	3.00	0.	0.	TONS BURNED
5-02-005-06	SLUDGE	100.	1.00	5.00	1.00	0.	TONS DRY SLUDGE
5-02-005-99	OTHER/NOT CLASIFD						TONS BURNED
AUX.FUEL/NO EMSNS							
5-02-900-04	RESIDUAL OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-02-900-05	DISTILLATE OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-02-900-06	NATURAL GAS	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-02-900-10	LPG	0.	0.	0.	0.	0.	1000 GALLONS
5-02-900-97	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-02-900-98	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS
5-02-900-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS
SOLID WASTE	**-INDUSTRIAL**						
INCINERATOR							
5-03-001-01	MULTIPLE CHAMBER	7.00	2.50	3.00	3.00	10.0	TONS BURNED
5-03-001-02	SINGLE CHAMBER	15.0	2.50	2.00	15.0	20.0	TONS BURNED
5-03-001-03	CONTROLLED AIR	1.40	1.50	10.0	0.	0.	TONS BURNED
5-03-001-04	CONICAL REFUSE	20.0	2.00	5.00	20.0	60.0	TONS BURNED
5-03-001-05	CONICAL WOOD	7.00	0.10	1.00	11.0	130.	TONS BURNED
5-03-001-06	OPEN PIT	13.0	0.10	4.00	0.	0.	TONS OF WASTE
OPEN BURNING							
5-03-002-01	WOOD	17.0	0.	2.00	4.00	50.0	TONS BURNED
5-03-002-02	REFUSE	16.0	1.00	6.00	30.0	85.0	TONS BURNED
5-03-002-03	AUTO BODY COMPTS	100.	0.	4.00	30.0	125.	TONS BURNED
5-03-002-04	COAL REFUSE PILES	0.90	1.10	0.10	0.50	2.50	CUBIC YARDS OF PILE
AUTO BODY INCINAT							
5-03-003-01	W/O AFTERBURNER	2.00		0.10	0.50	2.50	AUTOS BURNED
5-03-003-02	W/ AFTERBURNER	1.50		0.02	0.	0.	AUTOS BURNED
RAIL CAR BURNING							
5-03-004-01	OPEN						CARS BURNED
INCINERATOR							
5-03-005-06	SLUDGE	100.	1.00	5.00	1.00	0.	TONS DRY SLUDGE
5-03-005-99	OTHER/NOT CLASIFD						TONS BURNED
AUX.FUEL/NO EMSNS							
5-03-900-04	RESIDUAL OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-03-900-05	DISTILLATE OIL	0.	0.	0.	0.	0.	1000 GALLONS
5-03-900-06	NATURAL GAS	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-03-900-07	PROCESS GAS	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-03-900-10	L P G	0.	0.	0.	0.	0.	1000 GALLONS
5-03-900-97	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	MILLION CUBIC FEET
5-03-900-98	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	1000 GALLONS
5-03-900-99	OTHER/NOT CLASIFD	0.	0.	0.	0.	0.	TONS
MISCELLANEOUS	**-FEDRL NONEMITTERS**						
OTHER/NOT CLASIFD							
6-01-999-98	SPECIFY IN REMARK						INSTALLATIONS (EACH)
6-01-999-99	SPECIFY IN REMARK						AREA/ACRES

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(Please read Instructions on the reverse before completing)

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report is a supplement for Compilation of Air Pollutant Emission Factors, AP-42. It contains revised and updated emission factors for various categories of internal combustion engine sources and for miscellaneous sources.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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