

RD/D. DDF-P(a)

PW-ACQ-252

**VALUE OF DIRECT ENVIRONMENTAL WASTE
DISPOSAL SERVICES: 1995 UPDATE¹**



**Department of Environment
and Natural Resources**

*Philippine Economic – Environmental
and Natural Resources Accounting System*



***Environmental and Natural Resources
Accounting Project***

Supported by the



**United States Agency for
International Development**

VALUE OF DIRECT ENVIRONMENTAL WASTE DISPOSAL SERVICES: 1995 UPDATE¹

ENRAP IV TECHNICAL PAPER

by

September 1997

¹ This document was made possible through a grant provided by the United States Agency for International Development (USAID) under the terms and conditions of Contract No. 492-0465-C-00-4042-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the USAID and collaborating institutions. This document may be reproduced or quoted in other publications as long as proper reference is made to the source.

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I. Introduction

The environment acts as a receptor of waste coming from different economic activities. Thus, a polluter derives benefits from the environment when he does not pay for these services. Economic growth is usually measured through increased production and other activities. However, when waste products exceed the carrying capacity of the environment, benefits derived from incremental production are outweighed by the damages inflicted to the environment.

This exercise aims to familiarize the user in valuing the services provided by the environment by means of calculating pollution loadings on both air and water resources. The value of EWDS is equivalent to the cost of pollution abatement if the services are unavailable. The exercise closely followed the methodologies used in previous ENRAP estimates.

2. Data Collection

In line with the institutionalization process, the 1995 EWDS update team requested the DENR-RSD representatives to gather all relevant information for the current accounts update. The RSD will be one of the primary divisions at DENR that will play a key role for ENRA once it is institutionalized. On the other hand, NSCB was assigned to take care of industrial production since they are most familiar with the sector among other member-agencies in the team. The sources of data were identified from earlier ENRAP efforts to come up with environmental accounts for water and air.

2.1 Air

Air emissions come from three sources, namely: area, mobile and stationary. For area sources, the following agencies or publications were basic sources of data: Philippine Statistical Yearbook (PSY), Department of Energy (DOE), Department of Trade and Industry (DTI), Department of Public Works and Highways (DPWH), Energy Regulatory Board (ERB), Bureau of Customs and the Bureau of Fire Protection. The Land Transportation Office (LTO) which oversees vehicle registration in the country, was the source of figures for mobile sources while DOE furnished the team with information on the country's coal and bunker fuel consumption in 1995 to account for fuel-based stationary sources.

Unfortunately, no recent data was available for industrial production (process based data). The National Statistics Office (NSO), the government agency mandated by law to gather these statistics has no specific statistics to answer the need. Value of output (based on sales) can be used to estimate production with the use of statistical adjustments. However, the value of output item was deleted from NSO questionnaires in 1993. Hence, for exercise purposes, 1995 production levels was derived using annual growth rates obtained from 1988 and 1992 production figures in order to come up with process-based emissions from stationary sources.

2.2 Water

Water pollution is a result of discharges emanating from domestic and industrial water-related activities. Likewise, surface run-off results to siltation, which affects water quality. Population figures gathered from the National Statistics Office (NSO) and the Philippine Statistical Yearbook were utilised to estimate discharges coming from household activities. Due to lack of new information on erosion class and other erosion related data, the 1992 figures were

applied for agricultural and forestry run-offs. However, for urban run-off, rainfall data for 1995 from PAG-ASA was used to come up with 1995 estimates. Similar to air, the lack of production data led to the estimation of 1995 values using annual growth rates.

3. Data Gaps, Problems and Limitations

In the course of the 1995 accounts update activity, the following problems and limitations were identified. These are summarized as follows:

3.1 Data processing

1. Data problems resulted in the use of projections for some data needs. (i.e. Appendix Table 30a)
2. Discrepancies in figures/values between 1988,1992 and 1995 updates (e.g. road construction figures)
3. Unfamiliarity with the Windows environment specifically, EXCEL.
4. The current office work/task has kept the counterparts busy, which resulted to their absence in some meetings. Some of these activities are:
 - EMB - Senate Hearings
 - NSCB - PEENRA presentations
 - DENR-RSD - Annual Monitoring of Regional Offices
5. No established links (Tables and Appendix Tables) in the earlier updates i.e. 1988 and 1992.
6. The office of Laguna Lake Development Authority (LLDA) was transferred to Calauan, Laguna. This resulted to problems in accessibility (i.e. communications, etc.).
7. Lack of computers and facilities to conduct the hands-on tutorials.

3.2 Limitations

1. No actual data resulted into assumptions/projections of 1992 values (i.e. hotel occupancy, restaurants, dental services, and built-up areas).
2. The 1992 cost data was adjusted to its 1995 equivalent due the absence of cost data for 1995.

4. Data Analysis: Estimation of Physical Loads

4.1 Air Pollution

4.1.1 Area Sources

Area sources encompass 11 areas under the Philippine Standard of Industrial Classification (PSIC). The process rates and emission factors are shown in **Appendix Table 20**. Data revealed that all sources registered increases except for structural fires, surface coatings, and dry cleaning.

Table 6 summarizes emissions from area sources and shows that the level of emissions from all types of pollutants was higher in 1995 relative to 1992. This is solely attributed to the increase in the level of process rate data since the emission factors used in the 1992 estimate were applied to the 1995 update.

4.1.2 Mobile Sources

Due to the government's programs of opening the car market to foreign manufacturers and at the same time making it affordable to domestic consumers, the number of registered vehicles in 1995 (**Appendix Table 21**) exhibited a 37.4 percent increment from its 1992 volume or a 12.4 percent annual increase. In terms of fuel consumption, gas-fed vehicles registered an increment of 7.7 percent while diesel-run engines posted an increase in usage of 32 percent for the 3-year period. This translates into annual growth rates in fuel consumption of 2.6 and 3.6 percent respectively, for gas and diesel fed vehicles.

Appendix Tables 21-26 show the relevant information used in computing vehicular emissions. In general, the level of emissions increased for all pollutant types except for lead, which exhibited a dramatic decline (**Table 8**). This is explained by the reduction in lead content of gasoline (**Appendix Table 26**) in line with the government's lead reduction program.

Appendix Table 27 provides a summary of the number and percent share of registered vehicles by type of owner and vehicle. Results show that the shares of private vehicles under industries and vehicles for hire have increased slightly in contrast with the share of the household and government sector, which registered a minute decline.

Since the number of vehicles increased, a corresponding expansion in road travel is expected to ensue (**Table 9**). Likewise, an increase in total fuel consumption translated to additional mobile emissions from fisheries, railway, marine and commercial aircraft (**Table 10**). The allocation of total mobile sources and paved road travel by PSIC is summarized in **Table 11**.

4.1.3 Stationary sources

Appendix Tables 28-30 provide the emission factors and process rates from fuel combustion coming from the use of coal or bunker fuel used in manufacturing sector or in generating electricity. The sectoral shares for total bunker oil consumption in 1995 was patterned with the sectoral shares in 1992 while sectoral distribution for coal was based on data provided by the DOE. Data shows that fuel and coal consumption in 1995 posted increases of 47.2 and 11.8 percent respectively, relative to their 1992 levels or an annual average growth of 15.7 and 3.9 percent.

Table 12 provides a summary of emissions from stationary sources. All emissions registered increases with SO_x recording the highest increase of 43 percent relative to 1992 levels.

Of the total pollutants emitted by stationary sources in 1995, the manufacturing sector accounts for the following: 59% of PM, 72% PM₁₀, 31% SO_x, 48% NO_x, 93% VOC, and 96% CO.

Table 13 indicates the extent of toxic substances in the air due to production activities. However, the pollutant levels were determined using annual growth rates from 1988 to 1992. The rate of increase ranges from 1% to 3%.

4.1.4 Summary of Air Emissions

Table 14 provides a summary of air emissions from all sources. Figures show that total volume of emissions for each type of pollutant increased with the exception of lead, which was explained by the reduction of lead content in gasoline. For PM, area sources still occupied the largest share (63.51%). However relative to 1992, the share of the sector to total PM is smaller as compared to 1992 while the shares of mobile and stationary sources slightly improved relative to their 1992 shares.

The amount of SO_x registered the highest increase among the effluents (42.95%) relative to their 1992 levels while PM₁₀ posted the lowest increment at 19.14%. Aside from PM, area sources are the largest contributor to total emissions with respect to PM₁₀, VOC and CO. On the other hand, mobile sources hold the biggest share for NO_x and, as a group, is the sole contributor of lead emissions.

A summary of the top five air polluting sectors in the Philippines per effluent type is found in **Table 15**. The top five sectors account for 75% to 98% of effluents under each effluent type. Households are the largest source of pollution for all types of pollutant except for SO_x which was largely due to electricity generation activities.

4.2.1 Water Pollution

4.2.1.1 Industrial Wastewater

The current update covered all the sectors included in the 1992 accounts update. These include a total of 30 sub-sectors and 6 pollutants. The 12 toxic pollutants in the 1992 study were not considered due to the absence of actual data.

Table 16 summarizes water pollution discharges per effluent per sector. Generally, all discharges increased except for suspended solids where the volume of effluents declined by 1%. Total Dissolved Solids (63%) recorded the highest increment while the lowest positive change was registered by Nitrogen (3%).

4.2.1.2 Domestic Effluents

The main sources of domestic effluents stem from various household activities from personal hygiene to various water-requiring activities. Since "discharges" is a linear function of population, there was an increase in the volume of total effluents. Using the population data in 1995, and assuming the rural-urban distribution in the previous estimates, **Appendix Tables 3-7** reveal the results of the computations in estimating domestic effluents. **Table 17** showed that households are the leading contributors of BOD₅ (54%) and Phosphorus (78%) in 1995 as in the

previous accounting years. The same trend can be observed with other effluents as in the previous years. For instance, surface run-offs dominate the bulk of suspended solids (91.7%) and nitrogen effluents (49%) in the country.

4.2.1.3 Surface Run-off

There were no changes in the values of **Tables 8 and 9** since the update adopted the assumptions/information in the 1988 and 1992 estimates. This was done since no new information is available regarding the erosion type per region/province. As mentioned in the preceding section, surface-run-off accounted for majority of suspended solids and nitrogen.

4.2.1.4 Summary of Water Effluents

Appendix Table 31 outlines the contribution of the major water pollutive sectors by industry and process for each effluent type. The table shows that 99.27% to 100% of the discharges are accounted for by these sectors. There were no changes in the ranking of the sectors in 1995 except for BOD₅. The changes in rankings were due to contribution changes in the lower bracket of the distribution.

5. Value of Waste Disposal Services

The valuation section of 1995 accounts update resorted to price adjustments of the costs of different technologies and practices used in controlling pollution from its 1992 values. Lack of information on costs and technological innovations used by the different sectors in 1995 was the main reason for the adjustments. Nonetheless, the significance of the results cannot be undermined.

5.1 Value of Waste Disposal Services to Air

In 1995 current terms, the value of WDS to air increased by 22.7% relative to the current value in 1992, i.e. P7.6B pesos to P9.4B pesos (**Appendix Table 32**). By sector, using 1988 prices, the cost of WDS for mobile sources decreased by 14.53% while that of stationary sources exhibited an 85% increment (**Table 20**).

5.1.1 Area Sources

The cost of controlling emissions from area sources is assumed to be zero. The reason is that households will not bear additional cost in shifting from fuelwood to LPG use based on studies by UNDP/WB (1992) and the Cebu Fuelwood Study.

5.1.2 Mobile Sources

The value of controlling emissions from mobile sources is represented by the costs controlling mobile emissions. The costs of the different methods of controlling emissions (i.e. inspection and maintenance, etc.) are summarized in **Appendix Tables 10-14**. The value of mobile sources is more than 96% of total value of WDS to air in real terms (1988 prices). Using 1988 prices, the value of WDS to the mobile sector in 1995 is relatively lower the value in 1992. This

means that the cost of reducing pollution for the sector has decreased by 14.53% during the accounting periods under study (Table 20).

5.1.3 Stationary Sources

In contrast to the mobile sector, the value of WDS to stationary sources exhibited an 85% positive change, which can be attributed to the increase in both fuel-based and process-based data. Stationary sources accounted for almost 4% of WDS to air, an improvement from its 1.81% share in 1992.

5.2 Value of Waste Disposal Services to Water

Appendix Table 33 shows that at 1995 prices, the value of WDS to water rose by 46% from its 1992 value (P33.8B to P49.5B). Using 1988 prices, the increase in 1995 is 16%, from P20.3B in 1992 to P23.6B in 1995. By sector, industries showed a decline of 4%, domestic runoff increased by 64%, and surface run-off declined by 10%, respectively (Table 21).

5.2.1 Industrial Wastewater

Industries accounted for 14% of the value of WDS to water in 1995, most of which was accounted for by primary industries such as livestock and mining. Manufacturing contributes less than 1% to total WDS. The 1995 attribution is lower than what was attributed to these sectors during the 1992 update (Table 21).

5.2.2 Domestic

The household sector was responsible for 48% of the total value of WDS to water (Table 21). This is an improvement from its contribution of 34% in 1992. The reason is placed on the increase in population particularly in the rural areas where the proper sanitary facilities are usually absent.

5.2.3 Surface Run-off

Run-off, which is the main source of suspended solids, accounts for 38% of the total value of WDS for water in 1995. Table 21 shows that forestry run-off accounts for 22% while agricultural and urban run-off are responsible for 11% and 5%, respectively. The cost of controlling run-off in the country in 1995 at 1988 prices declined by 10% from 1992.

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Table 1
Revisions Incorporated in the 1988 Air Emissions Estimates

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
I.	AREA SOURCES				
11	Kalngln Land area burned (ha)	84% of total forest area burned	2,914	- used actual forest area destroyed due to kaingin reported by the Forest Management Bureau	1
501	Building Construction				
	<u>Residential</u>	31,219	30,181	- previous estimate used 1989 data	2
	No. of units constructed			- emission factors are in terms of short tons.	
	<u>Non-residential</u>	5,364	5,067	Estimated emissions were multiplied by .9072 to convert to metric ton.	
	No. of units constructed				
	Total floor area in sq m	3,218,000	3,222,000		
502	Road construction			- emission factors are in terms of short tons. Estimated emissions were multiplied by .9072 to convert to metric ton.	
628	Gasoline dispensing facilities				
	Vol. of gas sold (barrels)	10,999,000	11,072,000	- previous estimate used preliminary data from ERB	3
	Paved road travel				
	% of paved road	46	14	- previous estimate accounted for the % of paved national roads to total length of national road; - revised estimate used % of all paved roads (i.e., national and local) to total length of road	3
	Unpaved road travel				
			86	- not considered in the previous estimate due to the absence of data required in computing PM emissions from unpaved road, namely, ave. vehicle speed, ave. vehicle weight and ave. no. of wheels per vehicle (per type of road - gravel, sand or crushed limestone) - In the revision, emission factors for paved travel were used just to get an estimate of minimum emissions	

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
HH Residential fuel combustion					
	LPG consumption (1000 liter)	344,669	513,032	- previous estimate used preliminary data from ERB	4
	Fuelwood consumption (mt)	14,811,597	17,767,400	- preliminary estimate of fuelwood consumption was derived assuming an annual per capita consumption of 0.56 cu.m. multiplied by the country's rural population - revised figure was taken from the DOE Household Energy Consumption Study	4
	Emission factors for fuelwood	unit: kg/tonwood	unit: g/kg	- emission factors utilized for the preliminary estimate correspond to emissions from fuelwood fed to boilers	5
	PM ₁₀	4.4	55.08		
	SO _x	0.075	0.2	- revised emission factors correspond to emissions resulting from residential wood stoves	
	NO _x	0.87	1.4		
	VOC	0.7	87.5		
	CO	13	415.4		
	Emission factors for LPG	unit: kg/1000 liter	unit: kg/1000 liter	- emission factors are based on US-EPA AP-42, Sept. 1985 report except for PM which is the arithmetic average of the midpoints of the ranges for butane & propane	6
	PM ₁₀	0.04	0.0325		
	SO _x	0.01	.015	- for SO _x , expressed as SO ₂ , the sulfur content of the (in grams per 100 m ³) is considered	
	NO _x	1.13	1.09	- NO _x is expressed as NO ₂	
	VOC	0.06	0.09	- for VOC & NO _x , a correction is made for error in the data entry	
	CO	0.23	0.225		
II. MOBILE SOURCES					
712 Road passenger transport					
1. Fuel consumption (In '000 barrels)					
	Gasoline	8,740	11,033	- fuel consumption used in the preliminary estimate constituted the annual volume sold to resellers only, representing 79 & 55% of the total for gas & diesel, respectively	3
	Diesel	9,633	17,467		

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
				- the revision included fuel sales to resellers, industrial consumers, & the Philippine gov't. less the volume consumed by the ff. sectors: - PSIC 41 (diesel is used in the start up operations of bunker oil fueled power plants; emissions are accounted for under stationary source emissions - PSIC 14 & 713 (i.e., gas & diesel used in fishing trade and diesel used in domestic marine transport, respectively -- emissions are reflected under area source emissions)	7
2.	Attribution of fuel consumption by type of vehicle (%)				
	Cars				
	Gas	40.22	24.46	- for the preliminary estimate, allocation of fuel consumption by type of vehicle was based solely on vehicle registration;	
	Diesel	3.51	1.17		
	Utility Vehicles			- for the revised estimate, other factors are considered, namely:	
	Gas	27.44	52.85	- annual ave. distance travelled by type of vehicle	
	Diesel	64.73	34.10	- annual ave. distance travelled per gallon of fuel consumed by type of vehicle	
	Buses				
	Gas	0.09	0.85		
	Diesel	4.08	8.60		
	Trucks				
	Gas	1.64	15.84		
	Diesel	26.62	56.08		
	Motor/Tricycles				
	Gas	30.60	6.01		
	Diesel	1.06	0.05		
	Total				
	Gas	100.00	100.00		
	Diesel	100.00	100.00		

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
3.	Lead (Pb) content in gasoline (In % by weight)				
	Premium	0.6	0.89	- the data used in the previous estimate is based on the limit set by the Bureau of Product Standards of the Dept. of Trade & Industry	8
	Regular	0.4	0.6	- the revision is based on the latest information from the Dept. of Energy	9
4.	Sectoral attribution of mobile sources			- for the preliminary estimate, emissions generated by type of vehicle were attributed to the corresponding sectors based on the classification of owner of registered vehicles i.e., for hire (PSIC 712), government (PSIC 91), diplomatic (PSIC 99, and private; - the latter is allocated between households HH (i.e., cars & motorcycles/tricycles) & the industry sector (i.e., UVs, buses & trucks) - the industry share was distributed among the other sectors classified under the PSIC based on the sector's fixed asset value share reported by NSCB - for the revised estimate, the attribution for industry is based on sectoral shares to total fuel consumption (Refer to Table 1.1)	10, 9, 3
5.	Other mobile sources				
714	Air Transport			- previously classified as area source based on EMB's 1990 Air Pollution Emission Inventory for Metro Manila - reclassified as mobile source based on US-EPA classification	5 11

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
III. STATIONARY SOURCES					
1. Emissions from fuel combustion using bunker oil fuel					
	BOF consumption (In '000 liters)	4,384,519	4,726,405	<ul style="list-style-type: none"> - preliminary data were based on the 1988 annual fuel consumption of establishments reported in the Annual Survey of Establishments (ASE) - for the revised estimate, the data used were based on ERB - annual BOF sales data; - BOF consumption (in '000 liters) of the ff. sectors are excluded in the revised estimate: <ul style="list-style-type: none"> PSIC 141 - 11,157 PSIC 362 - 95,445 PSIC 363 - 80,286 PSIC 369 - 10,122 PSIC 711 - 5,543 PSIC 713 - 171,188 PSIC 714 - 11 Total - 373,752 Emissions arising from fuel combustion in these sectors are already accounted for under process emissions; - the previous sectoral shares were based on the 1988 ASE 3-digit sectoral disaggregation of BOF consumption; the latter were derived based on the combined 1988 ASE fuel consumption & DOE fuel sales data, reflecting whichever is higher 	10, 3, 9
	Sectoral allocation				

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
2.	Emissions from power generation (PSIC 41, excluding coal)				
	General basis for computing emissions	- annual fuel consumption derived by multiplying the annual gross energy generated by the ave. fuel required per kwh generated	- annual gross energy generated only	- these are dependent on the variable used in expressing the emission factors	
	Emission factors used for diesel-fueled plants	no estimate	unit: g/kwh	- the preliminary estimate did not include emissions from diesel turbines & diesel engines used for power generation;	
	PM		0.44		
	SOx		16.65		12
	NOx		8.46	- the emission factors were derived using standard reference adjusted for actual heat rates for 1988, i.e., 11,851 BTU/kwhr	
	Emission factors used for coal-based plants (PSIC 221)	unit: lb/MT coal	unit: g/kwh	- the previous emission factors were based on EPA/NEDS (Jan. 1988) factors for industrial boilers using coal	13
	PM	10	0.49		
	SOx	39	5.22		
	NOx	21	0.894	- the revised factors are based on actual operating conditions of Calaca I (coal-based power plant)	12
	VOC	0.07			
	CO	0.6		- Emissions should be attributed to mining because generation (mainly of Atlas Mining Corp.) is for own use.	
	Gross energy generation (M kwh)				
	Oil-based	9,546	10,471	- preliminary data excludes power generation by other utilities & self-generation by other firms amounting to 925 gwh for oil-based & 238 gwh for coal-based plants considered in the revised estimate	14
	Diesel-based				12
	coal-based	2,344	2,582	- in the preliminary estimate, oil-based includes oil-thermal & diesel-based generation	

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
	Fuel requirement per kwh generated				
	Oil-based (in liter/kwh)	0.26	n.a.	- these are not required in the revised computation	15
	Diesel-based				
	coal-based (lb/kwh)	0.85	n.a.		
3.	Emissions from production processes				
22	Non-metallic ore mining				
	Emission factor for coal mining				
	(kg/mt of product)				
	PM	10	10	- the previous emission factor was limited to PM	16
	SOx		0.22	arising from coal cleaning (Stone)	18
	NOx		0.07	- the revision covered other pollutants (WHO, 1992)	
	VOC		0.05		
331	Manufacture of wood and wood products				
	Log debarking and sawing (mt of logs)		2,760,287	- revised procedure & emission factors based on 1992	18
	Plywood cutting and sanding (m3 plywood)		415,253	WHO Rapid Assessment	
	Dryers (m3 veneer)		85,194		
	PM factor for log debarking and sawing (kg/unit)		0.187		
	PM factor for plywood cutting and sanding (kg/unit)		5		
	VOC factor for dryers (kg/unit)		1.2		
363	Manufacture of cement				
	Emission factors (kg/mt clinker)				
	PM	1.5	Pls. refer to Table on add'l. sectors covered.	- the revision adopted a more detailed set of emission factors for cement manufacturing; these are broken down by process, i.e., coal storage & preparation, crushing & conveying, clinker processing, & grinding & calcining; other pollutants were also included	18, 11

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
369 Manufacture of other non-metallic mineral products					
	Emission factors (kg/unit)				
	PM	65	90.365	- the previous emission factor used excludes emissions from fuel combustion;	17, 18, 12
	SOx		2.468 or .0861	- the revised factors (applicable to PSIC 361 & 369)	
	NOx		0.668	were derived averages of WHO (1993) emission	
	VOC		0.021	factors for tunnel & periodic kiln using BOF (though	
	CO		0.078	kerosene & LPG are also used to a lesser extent);	
				- for PM, the emission factor also include emissions	
				from raw materials handling	
				- for SOx, the factor assumes a 3.5% sulfur content	
				in fuel	
371 Iron and steel basic industries					
	Emission factors for sintering	unit: kg/ton of rolled products	unit: kg/ton of sinter ore		
	PM	3	8.96	- the previous factors apply to sintering as one of the	12, 19, 11
	SOx	4		processes of an integrated steel plant, thus is	
	NOx	1		reckoned in terms of rolled product	
	VOC	0.1		- the revised factors are more applicable since sinter is	
	CO	40		being produced as an independent product (Phil.	
				Sintering Corporation)	
	Billeting of scrap metal through electric arc furnaces (billet products in '000 mt)		331	- not included in the preliminary estimate; used for	11, 20
				melting, refining, charging, tapping	
	Emission factors for electric arc furnaces (kg/unit)				
	PM		25		
	Casting and rolling ('000 mt of rolled products)	1,192	1,272	- the preliminary figure was adjusted to account for	20, 12
				changes in the reported annual production of long	
				steel products, i.e., previously 645,000 mt in billet	
				equivalent; assuming an 89% yield factor, this is	
				725,000 mt, or a difference of 80,000 mt	

continued

Table 1 (continued)

PSIC	Sector/Item for Revision	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
94	Medical dental, other health and veterinary services VOC emissions	9,897	10,887	- the preliminary figure was in terms of short ton - the revised estimate was converted to metric ton	

Sources/References:

1. DENR-FMB. 1989 Philippine Forestry Statistics
2. NSCB. 1992 Philippine Statistical Yearbook
3. Energy Regulatory Board (ERB)
4. DOE. 1992 Household Energy Consumption Survey
5. EMB. 1987 Metro Manila Air Pollution Emission Inventory
6. US-EPA. 1985. Compilation of Air Pollutant Emission Factor. AP-42, 4th ed. Sept 1985
7. Environmental & Natural Resources Accounting Project (Phase II) Report (Appendix 1 - Valuation of direct Waste Disposal Services)
8. Bureau of Product Standards- Dept. of Trade & Industry
9. Dept. of Energy
10. NSO. 1988. Annual Survey of Establishments.
11. United States-Environmental Protection Agency. 1990. Supplement C to Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point & Area Sources.
12. Logarta, J. D., Jr.. 19 Comments on the Estimation of Waste Disposal Services.
13. State of California Air Resources Board, Technical Support Division. 1988. Instructions for the Emission Data System Review & Update Repo Appendix III.

Source Classification Codes & EPA/NEDS Emission Factors.

14. National Power Corporation. 1990 NPC Annual Report.
15. Based on p.c. with a technical personnel from the Mechanical Planning Department of the National Power Corporation.
16. Stone, Ralph & Co., Inc. 1977. Industrial Pollution Control: Technological Strategies.
17. WHO. 1982. Rapid Assessment of Sources of Air, Water & Land Pollution.
18. WHO. 1993. Assessment of Sources of Air, Water & Land Pollution.
19. United Nations Environment Program (UNEP). 1990. Guidelines for Environmental Management of Iron & Steel.
20. Private Devt. Corp. of the Philippines. Feb. 1992. Industry Digest. The Iron & Steel Industry: Moving Closer Towards Integration.

Table 2
Additional Sectors Included in the Revised 1988 Air Emissions Estimates: Process Rate and Emission Factors

PSIC	Sector/ Items for Inclusion	Process Rate	Emission Factor					Unit	Source/ Reference
			PM	SOx	NOx	VOC	CO		
I. AREA SOURCES									
91	Public admin. & defense								1
	LPG consumption ('000 liter)	795	0.04	0.01	1.13	0.06	0.23	kg/1000 liter	
HH	Residential Fuel Combustion								1
	Kerosene consumption ('000 liter)	376,065		1.48				kg/1000 liter	
	Charcoal consumption ('000 mt)	1,518	41.31	0.278	1.4	65.6	311.33	g/kg	
	Crop residues consumption ('000 mt)	2,493	55.08	0.278	1.4	87.5	415.4	g/kg	
PM ₁₀ emissions were computed for selected sectors (Appendix Table 20).									
II. MOBILE SOURCES									1
14	Fisheries (motorized fishing)								
	Gasoline consumption ('000 liters)	5,970		2.77	0.79	130	400	kg/1000 liter	
	Diesel consumption ('000 liters)	193,588		14.4	30.6	7.2	17	kg/1000 liter	
	Bunker consumption ('000 liters)	11,157		52.24	29.85	5.6	12.1	kg/1000 liter	
711	Railway transport								
	Bunker consumption ('000 liters)	5,543	2.8	55.5	41	10.26	14.9	kg/1000 liter	
713	Marine transport								
	Diesel consumption ('000 liters)	70,214		13.43	32	6	13	kg/1000 liter	
	Bunker consumption ('000 liters)	171,188		52.24	29.85	5.6	12.1	kg/1000 liter	
91	Public admin. & defense								
	BOF consumption ('000 liters)	4,133		52.24	29.85	5.6	12.1	kg/1000 liter	
PM ₁₀ emissions were computed for running exhaust (Appendix Table 22).									
III. STATIONARY SOURCES (PRODN. PROCESS)									
353	Petroleum refineries								2
	Emissions from BOF combustion ('000 liters)	522,315	1.25S + 0.38	19S	6.6	0.1524	5	kg/1000 liter	
	Vacuum distillation ('000 liters feedstock)	8,467,306				0.052		kg/1000 liter	
	Fluidized bed catalytic cracking	867,391	0.695	1.413	0.204	0.63	39.2	kg/1000 liter	
362	Mfr. of glass and glass products								2
	Glass containers (t)	301	0.7	1.7	3.1	0.1	0.1	kg/t	
	Flat glass (t)	95	1	1.5	4	0.1	0.1	kg/t	
	Pressed & blown glass (t)	29.84	8.7	2.8	4.3	0.2	0.1	kg/t	

continued

Table 2 (continued)

PSIC	Sector/ Items for Inclusion	Process Rate	Emission Factor					Unit	Source/ Reference
			PM	SOx	NOx	VOC	CO		
363	Manufacture of cement	4,577	5.581					kg/mt clinker	2, 3
	Coal storage & preparation (mt clinker)	5,085	5.4605					kg/mt clinker	
	Crushing & conveying (mt clinker)	5,085	14.725					kg/mt clinker	
	Clinker processing (mt clinker)	2,288	60.3	2.46	5.725			kg/mt clinker	
	Grinding & calcining, wet (mt clinker)	2,797	64.1	2.71	5.125			kg/mt clinker	
	Grinding & calcining, dry (mt clinker)								
PM ₁₀ emissions were computed for selected sectors (Appendix Tabs. 28-30).									4
IV. TOXIC AND HAZARDOUS WASTES									
311-312	Food manufacturing		H ₂ S - 0.005						
	Canning of fish (kg/mt)								
341	Mfr. of paper & allied products		H ₂ S - 7.2	Phenols - 77					
	Mfr. of sulfate kraft pulp (kg/mt)								
351,352	Mfr. of chemicals & plastic products		Flourides - 20.1						
& 358	Mfr. of phosphoric acid (kg/mt)		Flourides - .075						
	Fertilizer mfg. - NP/NPK fertilizer (kg/mt)		F ₂ - >10						
362	Mfr. of glass & glass products (kg/mt)								

Notes:

1. Emission factors correspond to uncontrolled emissions except for cement.
2. The emission factors for cement manufacturing are derived averages of uncontrolled and controlled emissions assuming half of the plants employ air pollution control measures. These factors are expressed in kg/mt of clinker. Assuming that one ton of finished cement is 95% clinker and 5% gypsum, these factors are applied to only 95% of the annual cement production. For coal storage & preparation, the emission factor is applied only to the portion of cement production for which coal is used. About 90% of production utilize coal (Logarta, 1994). These factors were derived from WHO (1993) and US-EPA (1990) emission factors.
3. Emissions from motorized bancas & boats used in fishing, trains, and vessels used for marine transport.

Sources/References:

1. US-EPA. 1985. Compilation of Air Pollutant Emission Factor, AP-42, 4th ed. Sept. 1985.
2. United States-Environmental Protection Agency. 1990. Supplement C to Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point & Area Sources.
3. WHO. 1993. Assessment of Sources of Air, Water & Land Pollution.
4. WHO. 1982. Rapid Assessment of Sources of Air, Water & Land Pollution.
5. Logarta, J. D., Jr. 199. Comments on the Estimation of Waste Disposal Services.

Table 3
Changes Incorporated in the 1988 Water Effluent Estimates

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
INDUSTRIAL PROCESSES					
12	Livestock, poultry and other animal products				
122	Poultry and poultry products				
	Effluent factor (kg/head)				
	Ducks				
	BOD	4.60	1.40	- the effluent factors for layers were used in the preliminary estimate;	1
	SS		14.60		
	N	0.51	0.51	- for the revised estimate, the effluent factors used are specific to ducks	
	Layers				
	SS		47.97	- the effluent factor for SS & N from layer prodn. was derived using the ratio of the effluent factors for layer and broiler, i.e., $(4.6/1.4)=(x/14.6)$, $x = 47.87$, where $x = SS$ for layer; and $(4.6/1.4)=(y/.51)$, $y = 1.68$, where $y = N$ for layer	
	N	0.51	1.68	- revisions in the effluent factor used were based on recommendations of Engr. F. Arellano, ENRAP Consultant	2
21	Metallic ore mining				
	Process rate: in mt tailings				
211	Gold ore mining		21.333 M	- pollution from the mining sector is reckoned in terms of the volume of tailings produced	
213	Copper ore mining	225 M	23.706 M		
215	Chromite ore mining		0.29 M	- in the preliminary estimate, the volume of tailings generated from copper production was estimated based on the assumed tailing production rate of 10 kg/mt ore (Stone)	3
219	Other base metal ore mining		3.51 M	- the revised data were based on the reported volume of tailings generated per type of ore mined by mining establishments (Mines & Geo-Science Bureau)	4

continued

Table 3 (continued)

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
223	Process rate (mt) Stone, quarrying, clay and sand pits Sand and gravel Rock aggregates		15,584,380 241,915	- considered one of the major sources of SS, these sectors were included in the revised estimate after consultation with Engr. F. Arellano	2
223	Effluent factor (SS in kg/mt) Stone, quarrying, clay and sand pits Sand and gravel Rock aggregates		0.01 0.05	- the effluent factors were generated based on actual establishment data	2
31	Manufacture of food, beverage and tobacco				
311-312	Food manufacturing				
	Process rate	unit: no. of heads	unit: t of LWK	- the preliminary estimate mistakenly used no. of heads as process rate instead of tons of liveweight of animals killed (LWK)	1
	Slaughterhouse	12,757,000	1,183,000		
	Packinghouse	1,275,700	118,300		
313	Beverage manufacturing				
	Effluent factor (kg/t of product)				
	Softdrinks		1.30	- included in the revised estimate	1
	SS	0.00	3.7		
	Alkalinity				
331	Manufacture of wood and wood products				
	Effluent factor (kg/t of product)				
	Plywood manufacturing				
	BOD ₅		4.1		
	TSS		1.1	- misreading error	1
	TDS	5.10	3.10	- included in the revised estimate	
	N		0.24		
	Phenols		5		
	Fiberboard mfg.				
	BOD ₆	125	12.5		
	TSS		20		
353	Petroleum refineries ('000 cu.m. feedstock)	8,868	11,887	- revised data include feedstock from refinery fuel loss (DBP Industrial Restructuring Study)	

continued

Table 3 (continued)

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
381	Manufacture of fabricated metal prod. Effluent factor (kg/t of iron sheet used) Home appliances (BOD ₅)		19.30	- included in the revised estimate	1
41	Electricity Oil-based (MKWH) Coal-based (MKWH) Hydro-powered	9,546 2,344	10,471 2,582	- revised data based on % share of oil & coal-based power generating capacity [i.e. coal 8% (1988) & 6% (1992); oil 44% (1988) & 49% (1992) multiplied by the total power generation 1988 24,538; 1992 25,682 MKWH) - used to be attributed to PSIC 42	
DOMESTIC EFFLUENTS					
HH	Household sector, PSIC 94 and 98 Basis for computing sanitary waste: Sanitation statistics	unit: '000 persons	unit: '000 persons		
	Population w/ sanitary toilet	34,991	43,015	- in the preliminary estimate, the population was categorized into those with and without septic tank and those served by sewer, the purpose was to determine the % of waste that is treated (septic tank provides primary treatment with up to 30% BOD reduction, however, since these are not properly maintained, the assumed efficiency was only 10%) and those that are untreated; - sewers carry waste into some waste treatment plant or into the Manila Bay through an outfall, the pollution generated by the % of population served, thus is deducted, 10% was reflected to account for leakages - the other types of toilets such as closed pit, etc. were categorized into those without toilet or without treatment; based on consultation with MWSS (Engr. Arellano), however, the closed pit type also provide primary treatment	
	served by sewerage system	1,134	7,664		
	unserved by sewerage system	33,857	35,352		
	Population with unsanitary toilet	24,684	10,594		5
	Population with no toilet facility	5,112	5,112		
	TOTAL	58,721	58,721	2	
				2	

continued

Table 3 (continued)

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
				- the preliminary estimate used the 1990 Census of Population and Housing data on toilet facilities; the % served by sewer was assumed 10% of the Metro Manila population	2, 6
				- for the revised estimate, the 1987 DOH Health Survey data was used; only the percentages of HH with toilet facilities by type was available, viz: sanitary toilet 73%, unsanitary 18%, no toilet 9%; these percentages were applied to the estimated no. of population (medium assumption) to generate the breakdown of population by type of toilet facility	7
				- the MWSS data (as of July 1989, the only record available that is closest to 1988) on population served by sewer was used	8
				- the preliminary estimate assumed leachate pollution to be 20% of domestic wastewater pollution in terms of volume and concentration (Arellano p.c.)	2
				- the effluent factors used in the revised estimate is based on the MWSS Solid Waste Study; the latter assumes a 500 g BOD/kg solid waste generated	9
				- N content of solid waste is 0.8% on a dry weight basis (generated at .626 kg/c/d) while P is assumed 20% of N)	10
				- phosphate is an inorganic substance used as builders in the manufacture of detergents and soaps; this constitutes 40% of the product; phosphate pollution causes algal bloom	11
	Pollution from leachate (solid waste)				
	Effluent factor	unit: k/c/yr	unit: k/c/yr		
	BOD	5.48	114.25		
	SS	5.48			
	N	0.15	1.83		
	P	0.88	0.37		
	Pollution from detergent use (P in g/c/d)				3

continued

Table 3 (continued)

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
SURFACE RUN-OFF					
	Agriculture run-off				
	Area eroded (ha)			- in the preliminary estimate only the areas with moderate to severe erosion were included in the valuation of environmental services by water	12, 13
	Areas subject to moderate to severe erosion			- for the revised estimate, the maximum tolerable soil loss (defined as the "volume of soil eroded through the natural process under a virtually undisturbed ecosystem) of 10 tons/ha/yr was used as a basis in determining the eroded area; note in Appendix 7 that the maximum tolerable soil loss is exceeded even in areas within the E1 slight erosion category	13
	0 8% slope	1,369,776			
	8 18% slope	2,942,073			
	Sub-total	4,311,849			
	> 18% slope	8,765,473			
	Total	13,077,322			
	Area with soil loss > 10 tons/ha				
	Slight erosion (E1)		2,342,861		
	Moderate erosion (E2)		6,730,247		
	Severe erosion (E3)		4,915,424	- for purposes of attributing the source of pollution into cropland or forestland, the BSWM data of the extent of erosion by slope category was used, viz: cropland <18% slope (33%), forestland > 18% slope (67%) (Appendix 8)	13
	Total		13,988,532		
11	Agricultural crops production (cropland and grassland)				
		unit: mt/yr	unit: mt/yr		
	N	1,034,204	592,500	- the preliminary estimates of N & P carried through agriculture run-off were based on a soil delivery ratio of 20%; estimate of total nutrient lost was done by Dr. H. Francisco's Soil Depreciation Study	12
	P	26,518	9,361		
15	Forestry (forestland)				
	N	14,168	1,202,954	- In the revised estimate, the amount of N & P carried through run-off was computed by multiplying the estimated total soil loss in areas exceeding the maximum tolerable soil loss (>10 tons/ha/yr) with the corresponding average nutrient content of the soil (Appendix 9)	13
	P	238	19,005		
	Total N	1,048,372	1,795,454		
	Total P	26,756	28,366		
	For PSIC 11 and 15		BOD5 = 1.3 x N SS = 257.99 x N		

continued

Table 3 (continued)

PSIC	Sector/ Items for Revision/Inclusion	Data Entry/Estimation		Remarks	Source/ Reference
		Preliminary	Revised		
Urban run-off					
91	Public administration and defense Total area of urban centers (in sq km)	18,803	4,211	- the preliminary estimate defined urban area as the total area of the 61 cities of the country; - In the revision, the official definition of urban area by NSO was used; this is limited to cities or municipalities with population density > 1,000/sq.km. - the revision was made based on the comment of the EMB-EQD counterpart to ENRAP that some cities still have large open areas (i.e., not populated or with low density) so that run-off in these areas may be attributed solely to nature	14 15 16

Sources/References:

1. WHO. 1982. Rapid Assessment of Sources of Air, Water and Land Pollution.
2. Engr. Francisco Aroellano, ENRAP Consultant.
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6. NCSO. 1990. Census of Population and Housing.
7. Department of Health. 1990. National Health Survey 1987.
8. Metropolitan Waterworks and Sewerage System (MWSS) Sewerage System Department. Distribution of sewer system in Metro Manila as of July 1989.
9. MWSS. 1992. Updated Solid Waste Management Plan for Metro Manila (1993-1998).
10. Sogreah. 1974. Laguna de Bay Water Resources Study.
11. Metropolitan Environmental Improvement Project World Bank. 1994. Valuation of Environmental Degradation in Laguna de Bay.
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13. BSWM-ALMED. Crop Development and Soil Conservation Frameworks for the Islands of Luzon(1993), Visayas(1990) and Mindanao(1989).
14. NSCB. 1993. Philippine Statistical Yearbook.
15. NCSO. 1990. NCSO Special Report No. 3 Philippines 1980 Population, Land Area and Density.
16. Engr. Estelito Pinlac Chiof, Water Qty. Section, Environmental Quality Division, EMB.

Table 4
Revisions Incorporated in the 1988 Valuation of Waste Disposal Services by Air

PSIC	Sector/Item for Revision	Pollution Abatement Cost		Remarks	Source/ Reference		
		Preliminary	Revised				
I. AREA SOURCES							
HH	Residential fuel combustion	P	161.9 M	P	0	<ul style="list-style-type: none"> - in the preliminary estimate, environmental service to air for HH was valued in terms of the incremental costs HH will bear for shifting from fuelwood to a cleaner fuel (LPG); - this is estimated as the difference between the unit price of LPG (P/mt) and the average price of the equivalent volume of fuelwood (based on heating value: 1mt LPG = 3.784 mt fuelwood); - value: (P3,040/mt - P75(3.748)) = P 2,758, say, P2,760 - a non-polluting target of 10% was assumed in generating the total value of environmental waste disposal services to air - for the revised estimate, HH will not incur any incremental cost in shifting from fuelwood to LPG use (UNDP/WB, 1992) & Cebu Fuelwood Study. 	1, 2
		P	2,760 /mt PM	P	0		
		P	161.9 M	P	0		3
II. MOBILE SOURCES							
	Pollution control measures	P	2.77 B	P	5.27 B		
	Inspection & maintenance (P/vehicle)					4	
	Light vehicle				118	<ul style="list-style-type: none"> - for the preliminary estimate, abatement cost in the mobile sector was based on the cost of fuel reformulation and the use of a catalytic converter by gasoline-fueled vehicles; 	
	Heavy vehicle				177		
	Engine Modification (P/vehicle)				1,720	<ul style="list-style-type: none"> - the cost of fuel reformulation is the estimated impact on fuel costs for refinery modifications required to meet changes in fuel specifications (WB), i.e., sulfur reduction in diesel from 1.0 to 0.20 weight percent and PB reduction in gasoline from .45 g/l to .15 g/l; - an average abatement cost per vehicle irrespective of the type of fuel used was derived since the number of vehicles by type of fuel per sector is not known; the latter was proxied by the sector's fixed asset value share; - the cost per vehicle (exc. motorcycles) was equal to the unit cost of reformulation multiplied by the annual volume 	
	Catalytic Converter (P/vehicle)	2,130			3,305		
	Fuel reformulation (P/vehicle)						
	Premium gasoline		405		1,032		
	Regular gasoline		405		698		
	Diesel		1,480		1,724		

continued

Table 4 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Cost		Remarks	Source/Reference
		Preliminary	Revised		
				<p>of fuel consumption (by type of fuel) plus the total annualized cost of catalytic converters for gasoline-fueled vehicles divided by the total number of vehicles, i.e., about P2,760 per vehicle per year;</p> <ul style="list-style-type: none"> - for motorcycles, the cost is limited to fuel reformulation - about P810/motorcycle/year; - considered the costs provided by WB study in 1988 prices - for the revised estimate, the annual cost of inspection and maintenance (I & M) per vehicle was added; - the efficiency of these measures are as follows: <ul style="list-style-type: none"> a. I & M is expected to reduce PM emissions by 35%, and 40% for VOC & CO; b. Fuel reformulation - 40% for PM & 35-65% for SOx; c. Catalytic converters - 80% NOx, and 50% for VOC & CO; - the total values were computed as follows: <ul style="list-style-type: none"> a. I & M = summation (no. vehicle_i inspection x cost of inspection/vehicle_i/yr); where i = vehicle type by weight category, viz: light, medium & heavy; b. Fuel ref. = summation (annual fuel consumption_i X cost of fuel reformulation_i); where i = type of fuel; c. Catalytic converter = (annualized cost of CC X no. of gasoline fueled vehicles, exc. motorcycles) d. Engine modification (EM)= (annualized cost of EM X no. of gasoline fueled vehicles manufactured before 1984); - considered the costs provided by WB study in 1992 prices; - a non-polluting target of 10% was assumed in generating the total value of environmental waste disposal services to air; - the values per sector were based on the sector's share of fuel consumption (Pls. refer to allocation of emissions). 	4, 5
	OTHER MOBILE SOURCES				
	14 Fisheries (motorized fishing)			P 40.72 M - these sectors were not covered in the preliminary estimate;	
	713 Marine transport			P 13.86 M - the value of environmental service is expressed in terms of	

continued

Table 4 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Cost		Remarks	Source/Reference
		Preliminary	Revised		
714	Air transport		P 6.48 M	the cost of reformulated fuel consumed by these sectors, i.e., annual volume of fuel consumed X cost of fuel reformulation (Pls. refer to discussion under mobile sector)	
III.	STATIONARY SOURCES	P 378.22 M	P 83.18 M		
	Pollution control technology (Cost in P/mt PM)				
	Electrostatic precipitator (ESP) (eff.: 97-98%)	13,649	265 - 1,135	- For stationary sources, value of waste disposal services to air valued in terms of controlling PM; per sector, values derived by multiplying the volume of PM emissions adjusted for existing pollution control and non-polluting target of 10% w/ unit cost of appropriate air pollution control device - for the preliminary estimate, the unit cost for the different types of air pollution control devices were derived using available information on the cost of controlling PM emissions using a baghouse in the cement industry and the cost ration of these device in relation to the other types; - for the revised estimate, the WB-OECD reported abatement cost per annual metric ton of PM avoided with adjustment using Philippine price indices was used; the technologies used are electrostatic precipitator (ESP), baghouse and mechanical collector; - in the previous estimate, wet scrubbers were considered appropriate for some sectors; since no cost is available for wet scrubbers, the cost of a baghouse was used in its place; - since the non-polluting target was set at 10%, the lower bound cost were used except for the mechanical collector.	6, 7
	High efficiency ESP (eff.: 99-99.95)		350 - 1,570		
	Baghouse (eff.: 99-99.9%)	2,700	265 - 1,135		
	Mechanical collector (eff.: 50-90%)	3,285	175 - 1,225		
	Wet scrubber	2,740	not available		
	Pollution control technology by sector				
	MANUFACTURING				
31	Food, beverage and tobacco	cyclone	mech'l collector		
32	Textile, wearing apparel and leather industries	cyclone	mech'l collector		
33	Wood and wood products	cyclone	mech'l collector		
34	Paper and allied products	wet scrubber	baghouse		
35	Chemicals and chemical products, petroleum, coal, rubber and plastic products	wet scrubber	baghouse		8
36	Non-metallic mineral products except cement	fabric filter/bh	baghouse		
363	Cement	ESP	ESP		
37	Basic Metal industries	fabric filter/bh	baghouse		
38	Fabricated metal products, machines and equip.	wet scrubber	baghouse		
	ELECTRICITY, GAS AND WATER				
411	Electricity generation	ESP	high eff. ESP		

Sources/References:

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3. Food and Agriculture Organization of the United Nations 199 Regional Wood Energy Development Programme in Asia. "Patterns of Commercial Woodfuel Supply, Distribution and Use in the City and Province of Cebu, Philippines."
4. World Bank 199 Environmental Sector Study: Towards Improved Management of Environmental Impacts.
5. AD 199 Vehicular Emissions Study.
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8. World Bank and OEC 199 The World Bank and OECD Environmental Action Plan for Central and Eastern Europe.

Table 5 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Technology and Cost		Remarks	Source/Reference
		Preliminary	Revised		
313	Beverage manufacturing	- anaerobic facultative ponds ave: P 3,690/mt BOD	- activated sludge	fabrication of metal products, machineries and equipment); - for the revised estimate, cost equations were used to generate estimates of the prospective cost of pollution control per sector; those were derived using cost information from the WB-financed IEPC Study (for the mfg and livestock sectors) and the CDM Philippine Urban Sewerage and Sanitation Study	1, 4
32	Textile, wearing apparel and leather industries	total: P 43.805 M ave: P 3,115/mt BOD	total: P 40.036 M		
321	Textile manufacturing	- chemical treatment	- activated sludge		
323-324	Manufacture of leather and leather products	- chemical treatment	- activated sludge		
33	Manufacture of wood and wood products including furniture and fixtures	total: P 6.188 M ave: P 2,500/mt BOD	total: P 4.4727 M	- abatement costs were set as a function of BOD ₆ concentration and plant capacity (cu m/day); - the equations used are as follows:	
331	Manufacture of wood and wood products	- secondary treatment	- activated sludge	1. Activated sludge treatment: $C = \text{Exp}(-.259693) * X_1^{.560485} * X_2^{.566839}$ where: C = total annualized cost of wastewater treatment X1 = BOD ₆ concentration X2 = plant capacity (cu m/day)	1
34	Manufacture of paper and paper products; Printing and Publishing	total: P 15.401 M ave: P 2,500/mt BOD	total: P 22.728 M		
341	Manufacture of paper and allied products	- same as PSIC 331	- activated sludge	2. Chemical treatment: $PCI = PC_s (F_i/F_s)^{0.6}$ $OMI = OM_s (F_i/F_s)$ where: PC = plant cost OM = annual operating and maintenance cost I = industry s = standard F = flow (cu.m./day)	2
36	Manufacture of chem. and chem. products, petroleum, coal, rubber and plastic products	total: P 15.164 M	total: P 23.141 M		
351, 352 & 356	Manufacture of chemicals and plastic products	- same as PSIC 12	- activated sludge		
353)	Petroleum refineries	- same as PSIC 12	- activated sludge		
354)	Manufacture of misc. products of petroleum and coal	- same as PSIC 12	- activated sludge		
36	Manufacture of non-metallic mineral products	total: P 0.392 M ave: P 300/mt SS	total: P 9.068 M		
362	Manufacture of glass and glass products	- chemical treatment	- chemical treatment		
363	Manufacture of cement	- chemical treatment	- chemical treatment		
37	Basic metal industries	total: P 0.292 M ave: P 300/mt SS	total: P 10.295 M		
371	Iron and steel basic Industries	- chemical treatment	- chemical treatment		
38	Manufacture of fabricated metal products, machineries and equipment	total: P 2.048 M ave: P 300/mt SS	total: P 4.821 M		
381	Manufacture of fabricated metal products	- chemical treatment	- chemical treatment		

continued

Table 5 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Technology and Cost		Remarks	Source/Reference
		Preliminary	Revised		
382	Manufacture of machinery except electrical	- chemical treatment	- chemical treatment		
383	Manufacture of electrical machinery, etc.	- chemical treatment	- chemical treatment		
384	Manufacture of transport equipment	- chemical treatment	- chemical treatment		
ELECTRICITY, GAS & WATER					
41	Electricity	total: P 23.921 M	total: 0		
411	Electricity generation and distribution				
	Oil-based	- same as PSIC 331	- chemical treatment		
	Coal-based	- same as PSIC 331	- chemical treatment		- for the revised estimate, the value of waste disposal services by water to the energy generation sector is zero given the assurance from the energy sector that appropriate and adequate pollution control measures are being implemented.
42	Gas and steam	total: P 0.228 M	total: 0		
422	Steam heat and power plants	- same as PSIC 331	- chemical treatment		
WHOLESALE AND RETAIL TRADE					
61-62	Wholesale and retail trade (gas dispensing)	total: P 4.443 M			
628	Gasoline dispensing	primary treatment			- In the preliminary estimate, primary treatment was assumed for the gasoline stations; ideally, costing should be based on cost of oil/water separator which treats oil and grease which is a major pollutant, however, there is no available data.
COMMUNITY, SOCIAL AND PERSONAL SERVICES					
94	Medical dental, other health and veterinary services	- same as HH total: P 13.895 M	- primary treatment (s.t.) total: lumped w/ HH		- the prospective abatement costs for PSIC 94, 97, and 98 were computed based on population being served by these sectors; since the abatement cost is expressed as per capita, values were deducted from the total number of population reflected under the HH sector to avoid double counting;
97	Personal and household services	- same as HH total: P 2.010 M	- chemical treatment total: P 0.419 M		- for the revised estimate, abatement cost for PSIC 94 and 98 were lumped with the HH sector since valuation was made in terms of the number of septic tanks that are existing and the additional requirement;
98	Restaurants and hotels	- same as HH total: P 3.757 M	- primary treatment (s.t.) total: lumped w/ HH		- for PSIC 97 - commercial laundry services, secondary treatment level was used in the revised estimate;

continued

Table 5 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Technology and Cost		Remarks	Source/Reference
		Preliminary	Revised		
				number of other types of toilet facilities and those with no toilet. - the ff. alternative domestic wastewater treatment methods were also explored, viz: waste stabilization pond, aerated lagoon, and activated sludge (including pumping and sewerage cost) Wastewater pump station $C = @Exp(-3.80687146) * Cap^{.8663818306}$ $O\&M = @Exp(-6.109456553) * Cap^{.6663818306}$ Sewerage cost $PCI = PCI = PCs (FVFs)^{0.6}$ $OMI = OMI = OMs (FVFs)$ Waste stabilization pond $C = @Exp(-2.7722892276) * Cap^{.7332668917}$ $O\&M = @Exp(-5.0748743206) * Cap^{.7332668917}$ Aerated lagoon $C = @Exp(-1.7355593732) * Cap^{.67608659751}$ $O\&M = @Exp(-4.0381444862) * Cap^{.67608659751}$ Activated sludge plant $@Exp(-1.7850795561) * Cap^{.7444104253}$ $@Exp(-4.0876846491) * Cap^{.7444104253}$ - the plant cost are annualized using the ff. assumption: n = 40 years, r = 15%	4
HH	Detergent use	- not valued	- not valued	- by law, 60% of active ingredient for detergents and soaps are biodegradable (cocoactive); the other 40% which constitute builders, may be non-biodegradable or inorganic, usually phosphate; the latter is responsible for algal blooms; zeolite, its non-phosphatic substitute, is very expensive, yet little is known about its environmental effects.	10
HH	Lenchato (solid waste)	- not valued	- not valued		
11	Agriculture run-off Croplands Area valued Abatement technology and cost	2.94 M ha	4.61 M ha	- the prospective cost of controlling surface run-off from agriculture and forest lands is measured in terms of the cost of erosion control; for the pre-	

continued

Table 5 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Technology and Cost		Remarks	Source/Reference
		Preliminary	Revised		
	Unit cost (per ha)	P 600	a. P 90	liminary estimate, this is: a. for croplands - the incremental cost of adopting improved farm management technologies (Appendix 10); this is the difference between the cost of implementing sloping agricultural land technology (SALT) and the cost of upland corn farming; SALT is an erosion control farm technology for the uplands recommended by the Dept. of Agriculture; the cost was applied to agricultural lands subject to moderate to severe erosion located in areas beyond 8% slope;	11
	<8% slope (P90 - agronomic cover)		b. P 90		12
	8%<18% slope (P600 - shift to SALT)		P 600		
	Total cost				
15	Forestland				
	Area valued	8.77 M ha	9.38 M ha		
	Abatement technology and cost				
	Unit cost (per ha)	P 720	a. P 90	b. for forestlands - the cost of implementing soil and water conservation measures in forestlands (Appendix 10); i.e., cost of establishing and maintaining vegetative (e.g., wattlings) or mechanical structures (e.g., contour ditches and levee; this was applied to moderate to severely eroded forest and grasslands located in areas beyond 8% slope	11
	>18% slope (P720 - revegetating structures; P90 - agronomic cover)		b. P 720		
				- for the revised estimates, the cost is applied to areas with average soil loss > the maximum tolerable rate of 10 tons/ha; these include areas below 8% slope;	13, 14
				- based on Veracruz's study on run-off and soil loss rates agronomic cover such as sweet potato, stylo, etc. reduce soil loss rate up to 93% for as low as P90/ha (Appendix 10 shows the % reduction on surface run-off of the different erosion control measures) while vegetative and engineering structures reduce surface run-off up to 90% although at a higher cost, i.e., P720 - P1,330/ha; reforestation (estab. and maint.), on the other hand costs P12,000 - P13,000/ha	11
				- for the revised estimate, two sets of costs were used: one using P 90 for agronomic cover for all	

continued

Table 5 (continued)

PSIC	Sector/Item for Revision	Pollution Abatement Technology and Cost		Remarks	Source/Reference
		Preliminary	Revised		
91	Urban run-off Public administration and defense Abatement cost	ave.: P400/mt SS total: P 1,807 B - primary treatment- sedimentation	total: P2,865.95 M - primary treatment- sedimentation	types of slopes and the other varying by level of erosion/slope, i.e., 1. areas under E1 (slight erosion) and areas below 8% slope - P 90/ha for agronomic 2. 2. areas under E2 (moderate erosion) and areas 8% < 18% slope - P 600/ha (cost of shifting to SALT) 3. areas under E3 (severe erosion) and areas > 18% slope - In the revised estimate, abatement cost was set as a function of WWV flow rate (cu m/day) instead of SS	15,2

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6. Engr. Esterlito Pinlac - Chief, Water Quality Section - Environmental Quality Division, Environmental Mgt. Bureau.
7. Dr. Donald T. Lauria - Professor, Univ. of Carolina; Trainor, Training on Env'tal & Natural Resource Policy Development (White Rock Hotel, Subic, Zambales - Aug. 1-13, 1994).
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14. H. Francisco 1993 Upland Soil Resources of the Philippines: Resource Assessment and Accounting for Soil Depreciation. Part of the Special Studies Component of the ENRAP-II.
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Table 6
Area Source Emissions: Philippines, 1988, 1992 and 1995

PSIC	Type of Area Source/ Data Requirements	Emissions (metric tons)																		
		PM			PM ₁₀			SO _x			NO _x			VOC			CO			
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	
11	Kwagin	1,065	31	149	937	28	132	neg.	neg.	neg.	281	7	35	1,504	44	211	11,277	332	1,583	
501	Building Construction	22,856	25,889	43,785	14,028	18,669	28,023	0	0	0	0	0	0	0	0	0	0	0	0	0
	Residential	8,024	8,888	13,762	5,135	5,889	8,808	0	0	0	0	0	0	0	0	0	0	0	0	0
	Non-residential	14,832	17,000	30,023	8,493	10,880	19,215	0	0	0	0	0	0	0	0	0	0	0	0	0
501	Surface Coatings													587	650	498				
	Gloss enamel													278	259	234				
	Flatwall enamel													311	281	283				
	Adhesive & Sealants													91	238	272				
502	Road Construction	16,708	118,264	1,599	10,693	75,089	1,023							4,472	6,007	6,438				
628	Gasoline Dispensing Facilities													2,004	2,244	2,885				
	Underground tanks-working loss													2,109	2,382	3,037				
	Vehicle refueling vapor displacement													211	238	304				
	Underground tanks breathing loss													148	185	213				
	Vehicle refueling spillage										0	0	0	1	1	2	3	4	5	
712	Automobile Fires	3	3	4	2	2	3	0	0	0	4	8	7	16	29	28	184	365	323	
842	Structural Fires	12	23	21	11	22	20	0	0	0	1	0	1				0	0	0	
91	Public Admin. & Defense							1	0	1	1	0	1	272	297	259				
	LPG	0	0	0										930	1,167	1,220				
973	Dry Cleaning																			
	Industrial Degreasing				8,465	12,792	17,284													
	Paved Road Travel 1/	18,403	27,809	37,573	98,958	104,203	140,792							1,972,440	1,713,281	2,105,634	8,889,020	8,133,371	9,980,032	
	Unpaved Road Travel 1/	113,046	170,825	230,800	1,178,086	1,078,490	1,325,469	4,917	4,784	5,780	31,049	28,792	36,100	48	71	74	115	178	186	
HH	Residential Fuel Combustion 2/	1,178,696	1,078,480	1,325,469	1,178,086	1,078,490	1,325,469	4,917	8	8	559	862	902	1,654,848	1,417,008	1,828,722	7,380,578	6,727,682	8,881,728	
	LPG	17	28	27	17	28	27	5	3,239	4,180	24,874	22,874	29,260	99,579	97,129	95,347	472,693	460,961	452,604	
	Firewood	978,528	892,042	1,151,154	978,628	892,042	1,151,164	3,653	298	291	2,125	2,073	2,035	0	0	0	0	0	0	
	Charcoal	82,708	81,184	60,042	62,708	61,164	60,042	304	785	887	0	0	0	0	0	0	0	0	0	
	Kerosene	0	0	0	0	0	0	557	455	415	3,491	3,184	2,904	218,167	188,985	181,480	1,035,733	944,670	881,813	
	Crop residues	137,333	125,259	114,246	137,333	125,259	114,246	499												
	TOTAL	1,350,778	1,421,335	1,639,407	1,282,380	1,287,790	1,512,746	4,918	4,784	5,781	31,305	28,808	35,143	1,880,313	1,720,603	2,114,668	8,900,484	8,134,066	9,997,942	

Note: Zeros indicate no pollution emission as per USEPA report.

- References:
1. US-EPA. 1985. Compilation of Air Pollutant Emission Factor, AP-42, 4th ed. Sept. 1985.
 2. US-EPA. 1990. Compilation of Air Pollutant Emission Factors, AP-42 Supplement C, Sept. 1990.
 3. California Air Resources Board. 1991. Methods for Assessing Area Source Emissions in California.
 4. The emission factors used in 1992 was also applied in the 1995 update.

Table 7
Comparison of Phase II and Phase III Air Pollution Estimates: Philippines, 1988

Sector	PM		SOx		NOx		VOC		CO		Pb	
	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised
	Emissions (metric tons)											
I. AREA	108,148	1,217,779	1,244	4,917	14,741	31,305	20,108	1,880,318	208,822	8,900,484		
1. Households	65,185	1,178,686	1,111	4,917	13,276	31,049	10,389	1,872,440	192,630	8,889,020		
a. Fuel wood	65,171	978,628	1,111	3,553	12,886	24,874	10,368	1,554,648	192,551	7,380,578		
b. Other fuel types	14	200,058	0	1,364	389	6,175	21	317,793	0	1,508,442		
2. Others	42,961	39,093	133	0	1,466	256	9,717	7,877	16,192	11,465		
II. MOBILE	89,588	160,485	27,400	61,348	122,204	137,390	189,334	194,829	905,173	919,249	563	1,059
1. Households	29,871	58,818	3,183	1,870	13,885	13,885	64,305	64,305	277,555	277,555	311	283
2. For Hire	15,671	27,139	3,652	6,212	15,083	15,083	38,139	38,139	110,211	110,211	98	114
3. Government	2,757	4,761	1,042	2,217	4,890	5,013	5,676	5,699	28,727	28,777	13	36
4. Diplomatic	356	621	112	373	1,007	1,007	554	554	3,245	3,245	2	5
5. Industries	40,933	69,155	19,411	50,674	87,339	102,402	80,660	86,132	485,434	499,460	139	622
a. Food manufacturing	5,304	16,323	2,515	8,731	11,318	20,632	10,452	19,054	62,905	114,673	18	147
b. Mfr. of wood and wood prod.	276	8,297	131	4,438	589	10,487	544	9,685	3,274	58,289	1	75
c. Crude pet. & nat. gas explo.	0	5,623	0	3,008	0	7,108	0	6,564	0	39,505	0	51
d. Gen. eng'g. const.	0	4,726	0	2,528	0	5,974	0	5,517	0	33,202	0	43
e. Others	35,353	34,185	16,765	31,969	75,432	58,201	69,664	45,312	419,254	253,791	120	307
III. STATIONARY	284,901	301,778	277,888	298,596	49,738	59,891	36,489	18,198	238,617	47,172		
1. Mfr. of food, beverage & tobacco	113,606	114,103	21,837	76,904	3,402	28,086	15	4,173	224	19		
2. Basic metal industries	31,651	77,660	31,266	61,070	6,944	10,061	790	1,579	219,426	259		
3. Manufacture of paper & paper products; printing	27,772	28,219	4,474	28,091	558	10,601	3	1,218	7,844	6		
4. Mfr. of chem. & chem., petroleum, coal, rubber & plastic prod.	15,330	16,298	10,615	13,930	832	12,934	20,665	6,087	75	1,847		
5. Others	106,541	65,499	209,695	118,602	38,002	(1,791)	15,016	5,141	11,048	45,041		
TOTAL	492,834	1,680,052	306,530	364,860	186,881	228,586	245,928	2,093,344	1,352,608	9,866,905	563	1,059

continued

Table 7 (continued)

Sector	PM		SOx		NOx		VOC		CO		Pb	
	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised	Prelim.	Revised
	Emissions (metric tons)											
I. AREA	21.95	72.48	0.41	1.35	7.90	13.70	8.18	89.82	15.44	90.21		
1. Households	13.23	70.16	0.36	1.35	7.11	13.58	4.22	89.45	14.24	90.09		
a. Fuel wood	13.23	58.25	0.36	0.97	6.90	10.88	4.22	74.27	14.24	74.80		
b. Other fuel types	0.00	11.91	0.00	0.37	0.21	2.70	0.01	15.18	0.00	15.29		
2. Others	8.72	2.33	0.04	0.00	0.79	0.11	3.95	0.38	1.20	0.12		
II. MOBILE	18.19	9.55	8.94	16.81	65.48	60.10	78.99	9.31	68.92	9.32	99.93	100.00
1. Households	6.06	3.50	1.04	0.51	7.44	6.07	26.15	3.07	20.52	2.81	55.24	26.72
2. For Hire	3.18	1.62	1.19	1.70	8.08	6.60	15.51	1.82	8.15	1.12	17.39	10.76
3. Government	0.56	0.28	0.34	0.61	2.62	2.19	2.31	0.27	2.12	0.29	2.36	3.36
4. Diplomatic	0.07	0.04	0.04	0.10	0.54	0.44	0.23	0.03	0.24	0.03	0.35	0.43
5. Industries	8.31	4.12	6.33	13.89	46.79	44.80	32.80	4.11	35.89	5.06	24.59	58.73
a. Food manufacturing	1.08	0.97	0.82	2.39	6.06	9.03	4.25	0.91	4.65	1.16	3.20	13.87
b. Mfr. of wood and wood prod.	0.06	0.49	0.04	1.22	0.32	4.59	0.22	0.46	0.24	0.59	0.17	7.05
c. Crude pet. & nat. gas explo.	0.00	0.33	0.00	0.82	0.00	3.11	0.00	0.31	0.00	0.40	0.00	4.78
d. Gen. eng'g. const.	0.00	0.28	0.00	0.69	0.00	2.61	0.00	0.26	0.00	0.34	0.00	4.02
e. Others	7.18	2.03	5.47	8.76	40.41	25.46	28.33	2.16	31.00	2.57	21.23	29.01
III. STATIONARY	59.88	17.98	90.88	81.84	26.64	28.20	14.84	0.87	17.64	0.48		
1. Mfr. of food, beverage & tobacco	23.06	6.79	7.12	21.08	1.82	12.29	0.01	0.20	0.02	0.00		
2. Basic metal industries	6.42	4.62	10.20	16.74	3.72	4.40	0.32	0.08	16.22	0.00		
3. Manufacture of paper & paper products; printing	5.64	1.68	1.46	7.70	0.30	4.64	0.00	0.06	0.58	0.00		
4. Mfr. of chem. & plastic prod.	3.11	0.97	3.46	3.82	0.45	5.66	8.40	0.29	0.01	0.02		
5. Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Change from Phase II to Phase III (%)											
I. AREA	1026.06		295.35		112.37		9251.90		4162.24			
II. MOBILE	79.15		123.89		12.43		2.90		1.56		88.03	
III. STATIONARY	2.33		7.45		20.41		-50.13		-80.23			
TOTAL	241.03		19.03		22.45		751.20		629.47		87.90	

Table 8
Mobile Source Emissions by Vehicle and Fuel Type: Philippines, 1988, 1992 and 1995

Vehicle/Fuel Type	Emissions (metric tons)																				
	PM			PM ₁₀			SOx			NOx			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Cars	1,240	1,799	2,230	882	1,310	1,604	1,782	2,275	2,509	13,809	17,984	23,172	34,216	43,167	56,315	242,379	304,910	398,233	259	187	59
Gas	979	1,229	1,607	651	818	1,087	1,269	1,345	1,552	13,070	16,407	21,446	33,973	42,649	55,748	241,653	303,362	396,539	259	187	59
Diesel	267	570	623	231	492	517	494	931	957	739	1,577	1,725	243	516	567	726	1,548	1,693	0	0	0
Utility Vehicles (UV)	11,097	19,371	25,867	9,536	15,863	22,378	17,140	22,540	34,789	37,005	56,800	74,757	78,340	115,044	144,851	484,488	707,472	885,478	559	466	140
Gas	1,820	2,635	3,269	1,260	1,624	2,259	2,742	3,352	3,672	24,061	34,845	43,227	71,910	104,138	129,187	460,893	667,450	828,002	559	466	140
Diesel	9,277	15,735	22,597	8,277	14,039	20,117	14,399	19,188	31,097	12,944	21,955	31,530	6,430	10,907	15,663	23,596	40,022	57,476	0	0	0
Buses	1,232	2,127	2,366	1,094	1,690	2,101	3,677	4,989	5,948	9,085	15,064	17,355	2,710	4,605	5,153	10,301	17,343	18,216	9	7	1
Gas	10	15	8	5	7	4	44	52	25	157	219	121	67	94	52	1,444	2,022	1,120	9	7	1
Diesel	1,221	2,113	2,358	1,089	1,683	2,097	3,633	4,937	5,823	8,929	15,444	17,234	2,643	4,572	5,101	8,857	15,321	17,096	0	0	0
Trucks	8,158	11,557	15,745	7,196	10,234	13,952	24,504	27,227	36,980	61,133	85,861	116,129	18,599	25,874	34,719	84,736	107,137	131,675	168	88	16
Gas	194	177	132	100	91	88	821	632	418	2,928	2,669	2,002	1,371	1,249	937	26,997	24,811	18,461	168	88	16
Diesel	7,962	11,381	15,613	7,096	10,143	13,864	23,682	26,594	36,562	58,205	83,192	114,128	17,229	24,625	33,782	57,739	82,526	113,214	0	0	0
Motor/Tricycles	7,263	11,911	16,551	6,188	10,166	15,822	331	449	594	1,171	1,921	2,991	62,928	103,207	160,737	83,266	136,568	212,694	64	60	23
Gas	7,263	11,911	16,551	6,188	10,166	15,822	312	432	594	1,171	1,921	2,991	62,928	103,207	160,737	83,266	136,568	212,694	64	60	23
Diesel	0	0	0	0	0	0	19	18	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	28,994	45,786	64,759	24,906	39,462	55,854	47,414	57,480	82,701	122,203	178,230	234,405	196,793	291,958	401,775	905,173	1,273,430	1,646,285	1,059	807	238
Gas	10,260	15,967	23,568	8,214	12,906	19,219	5,106	5,812	6,202	41,386	56,061	69,768	170,249	251,337	346,662	614,255	1,134,013	1,456,815	1,059	807	238
Diesel	16,728	29,798	41,191	16,692	26,557	36,634	42,227	51,668	76,438	80,817	122,169	164,617	26,545	40,621	55,113	90,918	139,417	189,480	0	0	0

Total Emissions (PM, NOx, VOC & CO) = Running exhaust emissions + evaporative emissions
Note: *For the year, 40% of PM is less than 10 micrometer in size while for running exhaust gasoline and diesel, PM10 is 99.4% and 96% of the total PM.

Table 9
 Pollutant Emission Share by Type of Vehicle and by Type of Owner: Philippines, 1988, 1992 and 1995

Type of Vehicle	Emissions (metric tons)																											
	PM						PM ₁₀						SO _x			NO _x			VOC			CO			Pb			
	1988		1992		1995		1988		1992		1995		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	
	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile	Road Travel	Mobile
Private (HH)	53,705	5,115	79,149	9,085	106,940	12,855	31,817	4,191	46,619	7,541	82,989	10,673	1,870	2,355	3,388	13,895	19,158	23,879	64,305	100,042	137,071	277,555	372,331	481,350	283	213	83	
Cars	1,196	1,697		2,401		847		1,236		1,749		1,749	1,692	2,049	2,848	13,253	18,965	22,312	32,840	40,720	58,037	232,828	267,629	371,848	249	176	52	
Motor/Tricycles	3,919	7,368		10,454		3,344		6,305		8,924		8,924	440	306	440	632	1,191	1,567	31,465	58,321	81,634	44,927	84,702	109,503	34	37	11	
For Hire	21,277	5,863	32,758	8,954	44,261	12,870	12,528	5,052	19,285	7,735	28,069	10,948	6,212	8,532	12,276	15,083	25,578	33,840	38,139	55,033	75,760	110,211	171,838	221,892	114	99	29	
Cars	23	72		103		17		53		75		75	126	280	725	853	644	1,739	2,393	4,584	12,284	15,881	5	8	2			
Utility Vehicles	1,306	2,381		3,370		1,122		2,056		2,910		2,910	2,017	2,922	4,204	4,354	7,303	9,684	8,887	14,387	18,799	57,000	91,711	118,565	68	60	18	
Buses	933	1,688		2,388		828		1,590		2,123		2,123	2,784	3,059	5,696	6,879	12,429	18,348	2,052	3,702	5,094	7,800	13,781	17,791	7	6	2	
Trucks	410	590		834		362		522		738		738	1,233	1,389	1,899	3,078	4,381	5,761	933	1,318	1,814	4,263	5,468	7,067	8	4	1	
Motor/Tricycles	3,181	4,223		5,975		2,723		3,604		5,101		5,101	145	175	252	515	681	896	25,622	33,907	49,680	38,585	48,413	62,589	28	21	6	
Government	3,720	1,042	4,620	1,238	6,242	1,752	2,190	902	2,721	1,072	3,678	1,517	2,001	1,584	2,219	4,880	4,891	6,170	5,676	6,976	9,600	28,727	30,868	38,955	36	20	6	
Cars	18	18		26		12		13		19		19	23	22	31	181	180	237	449	433	595	3,180	3,055	3,950	3	2	1	
Utility Vehicles	445	545		771		382		470		660		660	887	868	861	1,483	1,884	2,215	3,027	3,201	4,528	19,414	20,975	27,117	22	14	4	
Buses	32	43		60		28		38		54		54	95	100	144	235	314	413	70	94	129	268	348	450	0	0	0	
Trucks	396	332		489		349		416		1,189		1,124	1,189	781	1,124	2,866	2,484	3,241	900	741	1,020	4,111	3,075	3,975	8	3	1	
Motor/Tricycles	153	301		426		131		257		384		384	7	12	18	25	49	64	1,230	2,418	3,328	1,758	3,453	4,464	1	2	0	
Diplomatic	492	128	345	23	468	33	289	112	203	19	274	26	373	41	58	1,007	201	284	554	301	414	3,245	2,049	2,649	5	1	0	
Cars	10	11		16		7		8		10		10	12	15	14	20	114	115	151	283	275	378	2,007	1,842	2,510	2	1	0
Trucks	119	12		16		105		10		15		15	358	27	39	893	88	113	271	28	36	1,238	107	139	2	0	0	
Private (Industries)	52,258	16,845	81,762	26,465	110,472	37,448	30,764	14,649	48,158	23,096	85,088	32,689	38,061	44,809	64,813	87,339	129,804	170,453	80,880	117,924	162,280	485,434	896,308	900,448	822	474	140	
Utility Vehicles	9,347	15,444		21,854		8,032		13,336		18,875		18,875	14,438	18,950	27,264	31,189	47,753	62,804	83,623	93,307	128,404	408,074	594,785	768,841	471	391	115	
Buses	267	397		561		237		353		499		499	798	930	1,338	1,972	2,921	3,841	588	870	1,197	2,235	3,234	4,181	2	1	0	
Trucks	7,231	10,824		15,033		6,380		9,407		13,315		13,315	21,725	25,029	36,011	54,198	78,930	103,807	16,449	23,747	32,878	75,124	98,489	127,326	149	81	24	
TOTAL	131,448	28,984	198,634	45,766	268,380	84,759	77,385	24,908	116,995	39,462	158,078	55,854	47,414	57,480	82,701	122,203	178,230	234,405	198,793	291,858	401,775	805,173	1,273,430	1,849,295	1,059	807	238	

Pollutant emission share by type of vehicle =
 Pollutant Emission by Type of Pollutant X % Share
 The following assumptions on sectoral allocation were observed:
 1. Household - cars, motorcycles/tricycles
 2. All PSIC except for 11 and the ff. - Utility vehicles, buses and trucks
 3. PSIC 712 (Transport services) - For hire
 4. PSIC 81 (Public Admin. & Defense) - Government
 5. PSIC 89 (Int'l org. and other extra-territorial bodies) - Diplomatic

Sector
 111
 Industries (by PSIC)
 PSIC 712
 PSIC 81
 PSIC 89

Notes:
 Allocation of emission from road travel was derived by multiplying the following percentage share of vehicle by type of owner to the total emission fr. road travel. The 1992 share was applied to the 1995 up

	1988 % Share	1992 % Share	1995 % Share
111	40.66%	39.85%	39.86%
Industries (by PSIC)	38.75%	41.16%	41.16%
PSIC 712	16.19%	16.49%	16.49%
PSIC 81	2.83%	2.83%	2.33%
PSIC 89	0.57%	0.17%	0.17%

Table 10
Other Mobile Emissions: Philippines, 1988, 1992 and 1995

PSIC	Sector/Data Requirements	Emissions (metric tons)														
		PM			SOx			NOx			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
14	Fisheries	0	0	0	3,387	3,943	4,581	6,262	8,011	9,200	2,232	2,587	3,067	6,814	6,813	7,888
	Gasoline consumption ('000 liters)	0	0	0	17	15	19	5	4	6	776	710	912	2,388	2,183	2,808
	Diesel consumption ('000 liters)	0	0	0	2,788	3,709	4,240	5,924	7,082	9,011	1,394	1,055	2,120	3,291	4,379	5,008
	Bunker consumption ('000 liters)	0	0	0	583	218	321	333	125	184	62	23	34	135	51	74
711	Railway Transport	18	17	26	300	338	494	227	248	365	87	82	91	83	90	133
	Diesel Consumption ('000 liters)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bunker Consumption ('000 liters)	18	17	25	308	338	494	227	248	365	57	82	91	83	90	133
713	Marine Transport	0	0	0	9,888	12,881	18,890	7,367	9,791	14,316	1,380	1,837	2,885	2,984	3,972	6,807
	Diesel Consumption ('000 liters)	0	0	0	943	1,349	1,945	2,247	3,213	4,834	421	602	869	913	1,305	1,882
	Bunker Consumption ('000 liters)	0	0	0	8,943	11,512	16,946	5,110	6,578	9,683	959	1,234	1,817	2,071	2,667	3,925
714	Commercial Aircraft	40	44	103	133	119	285	1,218	1,230	2,843	1,803	1,884	3,813	5,145	4,186	9,084
	Air bus	1	2	4	33	38	84	328	358	838	312	339	796	772	839	1,971
	BAC-III	8	7	15	7	8	18	62	67	158	298	324	781	425	462	1,088
	B707	2	3	6	3	3	7	67	73	171	5	6	14	38	39	92
	B727	1	1	1	1	2	4	13	14	32	6	8	15	24	26	61
	B737	2	2	5	6	8	15	52	58	132	24	28	60	98	108	250
	B747	28	29	68	36	40	93	423	460	1,080	493	535	1,258	1,320	1,434	3,371
	B757	0	0	0	1	1	2	15	18	38	8	9	20	1	1	3
	B741	0	0	1	1	1	1	7	7	17	8	8	20	21	22	53
	B743	0	0	0	0	0	0	1	1	3	1	2	4	4	4	10
	MC DONNELL-DOUGLAS DC-10	0	0	1	5	6	13	52	58	132	49	53	128	176	192	450
	LOCHEED L1011	0	0	0	1	1	1	64	70	164	138	150	353	189	216	508
	DC-8	0	0	0	0	0	0	2	2	4	13	15	34	18	18	41
	FOKKER 50	0	0	0	0	0	1	2	2	6	55	59	140	88	96	228
	SHORT 360	1	1	2	3	4	8	2	2	4	11	12	28	9	10	23
	General Aviation Aircraft	0	0	0	36	13	17	129	47	62	382	141	185	1,854	720	948
91	Public Admn. & Defense	0	0	0	218	75	110	123	43	63	23	8	12	50	17	25
	Annual consumption of BOF (in '000 l)	0	0	0	218	75	110	123	43	63	23	8	12	50	17	25
	TOTAL	58	61	128	13,929	17,332	24,341	15,187	19,323	28,787	5,496	8,178	9,869	14,078	14,878	22,947

- Notes.
- The emission factors used were lifted from US-EPA, 1985. Computation of Air Pollutant Emission Factor, AP-42, 4th ed. Emission = (land area burned X ave. fuel loading) X emission factor
 - PSIC 14: For gasoline powered bancas, factors for outboard motors, with an adjustment for the higher sulfur content of local gasoline were used. For diesel-powered shipping vessels, factors for 200 horsepower engines at full speed mode were used. Gasoline, diesel & bunker consumption from ERB & DOE sales data. The percentage shares of diesel and bunker consumption in 1992 were applied to the 1995 data sets.
 - PSIC 711: Diesel & bunker consumption from ERB & DOE sales data. The percentage shares of diesel and bunker consumption in 1992 were applied to the 1995 data sets.
 - PSIC 713: Factors for diesel-powered commercial motorships running on diesel with 0.2% sulfur content were chosen while BOF factors chosen while BOF factors were first adjusted from calorific values and sulfur content before computing for emissions. Diesel and bunker consumption were mainly used for both direct motive power (propulsion & mechanical drive) and for power generation. Diesel and bunker consumption from ERB & DOE sales data.
 - PSIC 714: Emission = (Annual no. of landing & takeoff operations x no. of aircraft (by type) x emission factor). In the absence of data on the number and type of aircraft, the number of flight operations (provided by Manila International Airport Authority) were broken down by aircraft type and aircraft mix estimated. The 1990 aircraft mix indicated in the 1990 Metro Manila Air Pollution Emission Inventory was used. It is assumed that the aircraft mix is the same in 1988 and 1992. Aircrafts consist of short, medium, long range jumbo jets and turbo props & aircrafts for general aviation such as Learjet, Cessna, Cessna Citation, Charlie helicopters & beachcraft. General aviation operations include media, emergency, military, non-scheduled and calamity flights. An average of the emission factors used for Cessna, Cessna Citation, Learjet and Beachcraft were used for general aviation.
 - PSIC 91: Emission factors for marine transport (PSIC 713) were used. Fuel data were from ERB.
 - PM10 of PSIC 714 is approximately 98% of PM. (1988 - 30 MT & 1992 - 43 MT) - based on 1990 EMD inventory.

Table 11
 Allocation of Total Mobile Sources and Paved Road Travel Emissions by PSIC:
 Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Sectoral Attribution			PM			PM ₁₀			SO _x			Emissions (metric tons)			VOC			CO			Pb		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
MANUFACTURING		66.08	67.74	67.74	45,803	74,300	101,291	28,988	48,744	88,850	24,425	30,831	44,113	57,718	88,978	117,838	53,303	80,958	111,728	320,793	478,168	619,558	411	325	98
31	Mfr. of food, beverages, & tobacco	27.68	28.98	28.98	19,127	31,381	42,753	12,580	20,574	28,132	10,231	13,013	18,619	24,176	37,555	49,853	22,327	34,171	47,167	134,370	201,828	281,504	172	137	40
311 - 312	Food manufacturing	23.82	24.88	24.88	16,323	26,928	38,710	10,719	17,888	24,158	8,731	11,174	15,888	20,832	32,247	42,835	18,054	28,341	40,402	114,873	173,300	224,542	147	118	35
313	Beverage manufacturing	3.31	3.27	3.27	2,285	3,643	4,831	1,501	2,325	3,179	1,222	1,470	2,104	2,888	4,243	5,610	2,887	3,881	5,328	18,054	22,804	29,647	21	18	5
314	Tobacco manufacturing	0.75	0.82	0.82	519	889	1,212	341	583	798	277	389	528	658	1,085	1,408	605	909	1,337	3,644	5,722	7,414	5	4	1
52	Textile, wearing apparel & leather industries	4.02	4.21	4.21	2,778	4,559	6,215	1,823	2,991	4,080	1,485	1,892	2,707	3,509	6,460	7,219	3,240	4,988	8,858	19,501	29,342	38,018	25	20	6
321	Textile manufacturing	2.65	2.76	2.75	1,828	2,973	4,053	1,200	1,951	2,867	978	1,234	1,785	2,310	3,500	4,707	2,134	3,240	4,471	12,842	19,134	24,792	18	13	4
322	Wearing apparel	1.18	1.24	1.24	804	1,340	1,826	628	879	1,202	430	558	795	1,018	1,804	2,121	938	1,480	2,014	5,045	8,622	11,171	7	8	2
323 - 324	Mfr. of leather & leather products	0.21	0.23	0.23	144	248	336	95	162	221	77	102	148	182	295	390	109	288	371	1,014	1,588	2,055	1	1	0
33	Mfr. of wood & wood products incl. fur & fix	12.92	12.92	12.92	8,924	14,848	19,986	5,860	9,808	13,138	4,774	6,077	8,895	11,280	17,539	23,188	10,417	15,958	22,023	82,894	94,255	122,125	80	64	19
331	Mfr. of wood & wood products	12.01	12.57	12.57	8,297	13,803	18,545	5,449	8,925	12,203	4,438	5,645	8,077	10,487	16,290	21,538	9,885	14,822	20,458	58,289	67,647	113,434	75	60	18
332	Mfr. of repair of furniture	0.91	0.98	0.98	827	1,042	1,421	412	884	935	335	432	619	792	1,248	1,660	732	1,138	1,507	4,405	6,708	8,891	8	5	1
34	Mfr. of paper & paper prod.; Print'g & pub'g	3.02	3.08	3.08	2,085	3,338	4,548	1,389	2,189	2,993	1,145	1,384	1,981	2,635	3,995	5,292	2,434	3,635	5,017	14,847	21,471	27,819	19	15	4
341	Mfr. of paper & allied products	1.97	1.97	1.97	1,391	2,131	2,905	894	1,398	1,912	728	884	1,295	1,720	2,652	3,374	1,588	2,322	3,205	9,559	13,718	17,772	12	9	3
342	Printing, publishing & allied industries	1.05	1.11	1.11	724	1,205	1,643	478	791	1,081	387	500	715	918	1,443	1,908	848	1,313	1,812	5,089	7,765	10,048	7	5	2
55	Mfr. of chem. & chem., petroleum, coal, rubber & plastic products	5.64	5.84	5.84	3,898	6,421	8,753	2,559	4,212	5,780	2,084	2,864	3,812	4,925	7,889	10,166	4,548	6,988	9,855	27,371	41,323	53,541	35	28	8
351 - 352 & 358	Mfr. of chemicals & plastic products	4.27	4.48	4.48	2,951	4,853	6,615	1,938	3,184	4,353	1,578	2,014	2,881	3,730	5,811	7,883	3,445	5,287	7,287	20,730	31,229	40,483	27	21	6
353	Petroleum refineries	0.80	0.88	0.88	414	718	977	272	470	643	221	297	425	623	858	1,134	483	781	1,077	2,907	4,810	5,973	4	3	1
354	Mfr. of misc. products of petroleum & coal	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
355	Mfr. of rubber products	0.77	0.79	0.79	832	852	1,181	349	659	764	284	354	608	872	1,020	1,349	621	928	1,281	3,735	5,483	7,104	5	4	1
58	Mfr. of non-metallic mineral products	5.12	5.05	5.05	3,535	5,462	7,448	2,322	3,583	4,898	1,891	2,288	3,243	4,489	6,640	8,847	4,127	5,951	8,213	24,837	35,149	45,542	32	24	7
361	Mfr. of pottery, china & earthenware	0.43	0.41	0.41	294	443	604	193	291	307	157	184	283	372	631	701	344	483	668	2,087	2,851	3,804	3	2	1
362	Mfr. of glass & glass products	0.98	0.93	0.93	682	1,000	1,371	435	690	902	354	417	697	837	1,204	1,692	773	1,086	1,612	4,050	6,471	8,385	6	4	1
363	Mfr. of cement	1.79	1.73	1.73	1,234	1,887	2,545	810	1,225	1,675	680	778	1,108	1,659	2,238	2,958	1,440	2,034	2,808	8,868	12,018	15,589	11	8	2
369	Mfr. of other non-metallic mineral products	1.95	1.98	1.98	1,345	2,140	2,929	884	1,408	1,926	720	890	1,274	1,701	2,570	3,398	1,871	2,338	3,227	9,452	13,811	17,895	12	9	3
57	Basic metal industries	3.45	3.38	3.38	2,381	3,838	4,857	1,584	2,388	3,282	1,274	1,509	2,159	3,010	4,355	5,757	2,779	3,982	5,468	16,728	23,402	30,321	21	16	6
371	Iron & steel basic industries	2.73	2.87	2.87	1,890	2,887	3,838	1,241	1,894	2,590	1,011	1,198	1,714	2,389	3,458	4,571	2,208	3,146	4,342	13,278	18,581	24,075	17	13	4
372	Non-ferrous metal basic industries	0.71	0.69	0.69	491	749	1,021	323	491	692	263	311	445	621	897	1,188	573	818	1,128	3,451	4,821	6,246	4	3	1
59	Mfr. of fabricated metal prod., mech. & eqpt.	3.85	4.07	4.07	2,882	4,405	6,005	1,748	2,890	3,952	1,424	1,828	2,815	3,384	5,275	6,975	3,107	4,800	6,824	18,698	28,350	38,732	24	18	6
381	Mfr. of fabricated metal products	0.87	1.05	1.05	870	1,137	1,551	440	748	1,020	358	472	675	848	1,362	1,801	782	1,239	1,710	4,705	7,320	9,485	8	6	1
382	Mfr. of machinery except electrical	0.70	0.74	0.74	484	805	1,097	318	528	722	259	334	478	612	894	1,274	565	877	1,210	3,401	6,180	8,712	4	4	1
383	Mfr. of electrical machinery, etc.	1.31	1.38	1.38	903	1,492	2,034	593	979	1,338	483	619	888	1,141	1,787	2,382	1,054	1,628	2,244	6,342	9,602	12,441	8	7	2
384	Mfr. of transport equipment	0.81	0.83	0.83	559	897	1,223	387	588	805	299	372	533	708	1,074	1,420	652	977	1,349	3,925	5,773	7,479	5	4	1
385	Mfr. of prof. & sci. & meas'g & controlling eqpt.	0.04	0.04	0.04	29	45	81	19	30	40	15	19	27	38	54	71	34	49	88	203	290	375	0	0	0
386	Mfr. of repair of metal han. & fixtures	0.03	0.03	0.03	17	29	39	11	19	20	9	12	17	22	34	46	20	31	43	122	185	240	0	0	0
39	Other manufacturing industries	0.40	0.44	0.44	277	474	646	182	311	425	148	197	282	350	508	751	323	517	713	1,945	3,052	3,954	2	2	1
390	Other manufacturing industries	0.40	0.44	0.44	277	474	646	182	311	425	148	197	282	350	508	751	323	517	713	1,945	3,052	3,954	2	2	1

continued

Table 11 (continued)

PSIC	Industry & Process	Sectoral Attribution			PM			PM ₁₀			SOx			Emission (metric tons)			VOC			CO			Pb		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
ELECTRICITY, GAS & WATER		0.88	0.82	0.82	456	873	917	289	441	804	243	279	399	375	806	1,085	651	733	1,012	3,197	4,330	5,610	4	3	1
41	Electricity	0.85	0.82	0.82	451	868	911	290	438	598	241	277	397	369	800	1,059	528	728	1,004	3,185	4,298	5,570	4	3	1
411	Electricity generation & distribution	0.85	0.82	0.82	451	868	911	290	438	598	241	277	397	369	800	1,058	528	728	1,004	3,185	4,298	5,570	4	3	1
412	Electricity distribution to consumers	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	Gas & steam	0.00	0.00	0.00	2	2	3	1	1	2	1	1	1	3	3	4	2	2	3	15	15	19	0	0	0
421	Gas mfr. & distribution through systems	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
422	Steam heat & power plants	0.00	0.00	0.00	2	2	3	1	1	2	1	1	1	3	3	4	2	2	3	15	15	19	0	0	0
43	Waterworks & supply	0.00	0.00	0.00	2	3	4	2	2	2	1	1	2	3	3	4	3	3	4	17	17	22	0	0	0
430	Waterworks & supply	0.00	0.00	0.00	2	3	4	2	2	2	1	1	2	3	3	4	3	3	4	17	17	22	0	0	0
CONSTRUCTION		9.18	9.50	9.50	6,348	10,285	14,021	4,187	6,747	9,228	3,394	4,268	6,106	8,021	12,316	16,284	7,407	11,208	16,485	44,580	86,189	85,780	57	45	13
50	Construction	9.18	9.50	9.50	6,348	10,285	14,021	4,187	6,747	9,228	3,394	4,268	6,106	8,021	12,316	16,284	7,407	11,208	16,485	44,580	86,189	85,780	57	45	13
501	Gen. building construction	1.71	1.78	1.78	1,179	1,924	2,823	774	1,202	1,726	630	798	1,142	1,490	2,304	3,049	1,376	2,006	2,893	8,280	12,382	10,043	11	8	2
502	Gen. engineering construction	0.84	0.84	0.84	4,726	7,845	10,423	3,104	5,018	6,856	2,528	3,172	4,255	5,57	8,57	11,33	5,15	7,79	10,76	33,202	49,203	63,751	43	33	10
503	Special trade construction	0.64	0.68	0.68	441	718	976	290	469	642	236	297	425	557	857	1,133	616	779	1,076	4,804	6,695	4,804	4	3	1
WHOLESALE & RETAIL TRADE		2.58	1.78	1.78	1,781	1,921	2,819	1,189	1,280	1,723	952	797	1,141	2,251	2,300	3,042	2,078	2,093	2,899	12,510	12,363	16,019	18	8	2
61	Wholesale trade	1.88	1.18	1.18	1,183	1,285	1,711	784	823	1,125	622	621	745	1,470	1,602	1,988	1,358	1,367	1,867	8,170	8,075	10,492	10	5	2
618	Petroleum & petroleum products wholesaling																								
62	Retail trade	0.89	0.62	0.62	618	660	908	406	437	598	330	277	396	781	798	1,055	721	728	1,002	4,339	4,289	5,527	8	3	1
628	Petroleum & petroleum products retailing																								
TRANSPORTATION, STORAGE & COMM.		0.85	0.53	0.53	27,778	42,343	57,728	18,038	27,402	37,487	16,851	22,084	31,598	24,823	37,831	49,821	42,001	59,258	81,779	122,529	193,659	237,835	118	102	30
71	Transportation services	0.81	0.37	0.37	27,819	42,170	57,490	17,932	27,288	37,312	16,785	22,012	31,495	24,421	37,324	49,348	41,874	59,089	81,519	121,403	192,448	236,393	118	101	30
711	Railway transport	0.00	0.00	0.00	18	17	23	10	11	16	308	338	480	227	248	328	57	82	88	83	90	117	0	0	0
712	Road passenger transport				27,139	41,712	56,884	17,578	26,944	36,842	6,212	8,532	12,208	15,083	25,578	33,817	38,139	55,033	78,976	110,211	171,838	222,368	114	99	29
713	Water transport	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
714	Air transport	0.30	0.18	0.18	251	211	288	204	182	246	245	188	209	1,484	1,431	1,892	2,049	1,887	2,877	6,265	6,266	6,823	2	1	0
719	Services allied to transport	0.31	0.21	0.21	213	230	314	140	151	207	114	98	137	270	278	385	249	251	348	1,600	1,482	1,920	2	1	0
72	Storage & warehousing	0.01	0.01	0.01	8	8	11	5	5	6	4	3	5	10	10	13	9	9	13	54	54	70	0	0	0
720	Storage & warehousing	0.01	0.01	0.01	8	8	11	5	5	6	4	3	5	10	10	13	9	9	13	54	54	70	0	0	0
73	Communication	0.22	0.15	0.15	153	185	224	190	108	148	82	88	98	193	197	261	178	178	248	1,072	1,059	1,373	1	1	0
FINANCIAL, INSURANCE, R. ESTATE & BUS. SERVICES		1.42	0.98	0.98	984	1,081	1,447	648	899	952	526	440	630	1,243	1,271	1,880	1,148	1,158	1,588	6,911	6,870	8,850	9	5	1
81	Banking institutions	0.58	0.39	0.39	388	419	571	255	278	378	208	174	249	491	801	883	463	458	630	2,727	2,895	3,491	3	2	1
82	Financial intermediaries	0.13	0.09	0.09	93	100	137	81	88	90	50	42	60	118	120	159	109	109	161	664	648	837	1	0	0
83	Insurance	0.10	0.07	0.07	88	71	97	43	46	64	38	42	60	118	120	159	109	109	161	664	648	837	1	0	0
84	Real estate	0.17	0.12	0.12	118	127	173	77	83	114	83	53	75	149	152	201	137	138	191	827	817	1,058	1	1	0
85	Business services	0.48	0.32	0.32	319	344	470	210	228	309	171	143	204	404	412	545	373	375	518	2,243	2,217	2,872	3	2	0
COMMUNITY, SOCIAL & PERSONAL SERVICES		0.33	0.23	0.23	4,889	6,103	8,321	3,643	4,183	6,390	2,711	1,802	2,519	8,308	5,229	6,849	6,519	7,563	10,008	33,822	34,554	42,116	42	22	8
91	Public admin. & defense				4,781	5,856	7,988	3,092	3,781	5,170	2,217	1,659	2,375	6,013	4,734	6,259	5,898	6,984	9,839	28,777	30,923	40,067	38	20	8
92	Sanitary & similar services	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	Education services	0.13	0.08	0.08	87	93	127	37	61	84	48	39	55	109	112	148	101	102	140	608	601	778	1	0	0
94	Med., dental, other health & vet. services	0.20	0.14	0.14	141	152	208	93	100	137	78	63	80	178	182	241	165	168	228	982	981	1,271	1	1	0
95	Other social & related community services	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	Recreational & cultural services	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	Personal & household services	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	Restaurants & hotels	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	Int'l. org. & other extra-territorial bodies				821	388	501	402	221	302	373	41	69	1,007	201	285	554	301	415	3,245	2,049	2,855	5	1	0
991	Household sector				58,818	86,232	120,284	35,808	63,934	73,772	1,870	2,355	3,369	13,885	18,156	24,005	64,305	100,042	138,063	277,555	372,331	482,424	283	213	63
NATURE																									
TOTAL		100	99	99	160,498	244,460	333,286	102,292	158,458	213,929	61,343	74,813	107,041	137,390	197,553	261,182	202,289	298,137	411,444	919,249	1,288,307	1,868,242	1,059	807	238

Notes:
 1. Percentages: Sectoral emissions as a total emission share of emissions (Tables 9 & 10) & adjusted sectoral attributions.
 2. Emissions from PSIC 714 include aircraft emissions.
 3. Attribution is based on the respective sector's fuel consumption share in relation to the total consumption. Fuel data refers were either provided by ERI or 1998 Census of Manufactures. Operating on a full-time basis. For 1995, due to lack of information, the sectoral distribution of 1992 was applied.
 4. For 1995, the sectoral distribution was based on the 1992 distribution.

Table 12
Summary of Emissions from Stationary Sources: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Emissions (metric tons)																		
		PM			PM ₁₀			SO _x			NO _x			VOC			CD			
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	
AGRI, FORESTRY & FISHERY		80	25	37	57	24	35	831	350	515	88	34	54	0	6	0	8	9	5	
11	Agric'l. crops production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
111	Paddy production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
112	Corn production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
113	Vegetable production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
114	Fruits & nuts (excl. coconut) production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
115	Coconut production incl. copra-making	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
116	Sugarcane production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
117	Tobacco production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
118	Fiber crops production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
119	Agrl. crops production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	Livestock, poultry & other animals prod'n.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
121	Livestock & livestock products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
122	Poultry & poultry products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
129	Raising of other animals, incl. their products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	Agricultural Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
130	Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	Fishery	50	19	28	48	18	26	700	262	386	74	28	41	0	0	0	7	3	4	
141	Ocean (off-shore) & coastal fishing	50	19	28	48	18	26	700	262	386	74	28	41	0	0	0	7	3	4	
142	Inland fishing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
143	Operation of fish farms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
149	Other fishery activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15	Forestry	9	6	9	9	6	9	132	88	129	14	9	14	0	0	0	1	1	1	
151	Logging operations	9	6	9	9	6	9	132	88	129	14	9	14	0	0	0	1	1	1	
159	Other forestry activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	Hunting, trapping & game operation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
160	Hunting, trapping & game operation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MINING & QUARRYING		47,401	77,337	182,798	33,435	27,588	64,759	28,349	12,594	18,422	2,079	1,399	2,022	348	85	99	178	117	173	
21	Metallic ore mining	28,482	80,228	130,558	10,788	21,808	48,469	18,429	12,180	17,898	1,840	1,280	1,884	10	7	10	176	116	171	
211	Gold ore mining	1,324	874	1,286	1,261	832	1,225	18,429	12,160	17,898	1,940	1,280	1,884	10	7	10	176	116	171	
212	Other precious metal ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
213	Copper ore mining	27,158	59,354	129,270	9,505	20,774	45,244	0	0	0	0	0	0	0	0	0	0	0	0	
214	Nickel ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
215	Chromite ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
216	Iron ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
219	Other base metal ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22	Non-metallic mining & quarrying	18,919	17,109	52,240	22,669	5,982	18,290	9,920	435	524	140	119	138	338	78	99	1	1	1	
221	Coal mining	17,876	15,652	17,757	22,298	5,478	8,215	9,783	344	391	125	110	124	338	78	89	0	0	0	
222	Crude petroleum & natural gas expo & products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
223	Stone quarrying, clay & sand pits	997	872	798	355	309	285	132	87	128	14	9	13	0	0	0	1	1	1	
229	Other non-metallic mining & quarrying	47	585	33,685	16	205	11,790	5	3	5	1	0	0	0	0	0	0	0	0	

Table 12
Summary of Emissions from Stationary Sources: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Emissions (metric tons)																	
		PM			PM ₁₀			SO _x			NO _x			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Table 12 continued																			
MANUFACTURING		246,519	266,898	206,038	184,329	186,941	215,739	84,545	99,832	137,589	28,409	23,141	30,735	7,233	8,245	8,824	48,989	55,882	69,209
31	Mfr of food, beverages, & tobacco	114,103	129,350	148,318	78,904	89,297	104,804	28,088	32,961	41,742	4,173	5,660	4,638	19	24	23	285	343	401
311-312	Food manufacturing	112,897	127,962	145,102	76,176	88,082	103,889	20,683	24,980	32,330	2,937	3,936	3,403	13	17	18	208	267	309
313	Beverage manufacturing	1,155	1,322	1,120	679	662	622	6,092	7,008	8,065	1,161	1,526	991	6	8	5	70	78	79
314	Tobacco manufacturing	61	66	97	49	63	92	711	910	1,347	75	90	142	0	0	1	7	9	13
32	Textile, wearing apparel & leather industries	779	698	2,190	721	780	1,804	10,120	9,810	14,098	1,074	1,028	1,484	6	6	7	97	92	135
321	Textile manufacturing	758	677	2,150	699	760	1,605	9,804	9,315	13,662	1,040	995	1,438	5	5	7	94	89	131
322	Wearing apparel	21	19	20	20	19	27	291	271	399	31	29	42	0	0	0	3	3	4
323-324	Mfr of leather & leather products	2	2	3	2	2	2	28	24	36	3	3	4	0	0	0	0	0	0
33	Mfr. of wood & wood prod including furniture and fixtures	2,440	1,887	1,658	2,182	1,617	1,374	657	274	403	69	29	42	102	98	91	6	2	4
331	Mfr. of wood & wood products	2,638	1,866	1,557	2,160	1,618	1,372	630	258	377	66	27	40	102	98	91	6	2	4
332	Mfr. of repair of furniture	2	1	2	2	1	2	27	18	26	3	2	3	0	0	0	0	0	0
34	Mfr. of paper & paper prod. printing and publishing	28,219	28,492	30,578	28,091	29,290	30,519	10,801	12,246	16,833	1,218	1,504	1,709	8	7	9	7,903	8,235	8,524
341	Mfr. of paper & allied products	28,219	28,492	30,578	28,091	29,290	30,519	10,598	12,243	16,829	1,217	1,604	1,709	8	7	9	7,903	8,235	8,524
342	Printing, publishing & allied industries	0	0	0	0	0	0	3	3	4	0	0	0	0	0	0	0	0	0
35	Mfr. of chem & chem, petroleum, coal, rubber and plastic products	18,298	16,658	15,859	13,929	13,145	14,023	12,934	12,373	16,477	6,087	1,788	2,540	1,647	1,842	1,824	37,881	46,182	68,048
351,352 & 356	Mfr. of chemicals & plastic products	15,202	14,640	14,538	13,086	12,463	13,115	8,905	8,494	11,167	639	596	878	743	769	795	56	64	80
353)	Petroleum refineries	925	853	1,097	690	638	695	1,731	1,712	2,200	6,192	939	1,335	1,103	872	1,027	37,801	46,078	58,939
354)	Mfr. of misc. prod of petroleum & coal	8	8	4	3	3	4	52	58	64	11	15	8	0	0	0	0	0	1
355	Mfr. of rubber products	165	158	220	152	142	209	2,246	2,109	3,065	245	237	322	1	1	2	22	20	29
36	Mfr. of non-metallic mineral products	6,765	6,382	8,448	1,423	1,588	1,793	21,518	19,223	27,173	12,090	11,198	15,487	81	87	110	355	328	455
361	Mfr. of pottery, china & earthenware	94	75	110	89	71	104	1,304	1,037	1,527	137	109	161	1	1	1	12	10	15
362	Mfr. of glass & glass products	665	600	750	654	648	735	738	902	1,065	1,442	1,751	2,057	46	65	65	43	52	62
363	Mfr. of cement	5,435	4,972	6,937	410	601	688	19,474	17,283	24,680	10,508	9,331	13,265	35	31	44	299	266	378
369	Mfr. of other non-metallic mineral products	661	656	652	370	367	365	1	1	5	5	5	0	0	0	0	1	1	1
37	Basic metal industries	77,860	83,282	91,043	61,070	61,188	61,512	10,061	11,507	20,273	1,579	1,872	4,875	259	281	310	455	501	637
371	Iron & steel basic industries	63,639	63,080	65,281	60,969	61,092	61,350	8,335	9,524	17,994	1,288	1,474	4,635	258	280	308	438	479	618
372	Non-ferrous metal basic industries	14,121	19,690	25,762	101	108	156	1,725	1,983	2,278	291	397	240	1	2	1	18	22	22
38	Mfr. of fabricated metal prod., machine and equipment	66	89	42	29	27	40	589	637	693	119	189	82	4,915	6,103	7,450	6	7	8
381	Mfr. of fabricated products	48	72	18	13	12	17	321	406	253	93	144	27	2,979	3,276	3,528	4	6	2
382	Mfr. of machinery except electrical	0	0	0	0	0	0	4	4	6	0	0	1	1,853	2,709	3,759	0	0	0
383	Mfr. of electrical machinery, etc.	13	12	17	12	11	16	175	163	240	18	17	25	0	0	0	2	2	2
384	Mfr. of transport equipment	5	5	7	5	4	6	69	64	94	7	7	10	81	119	165	1	1	1
385	Mfr. of profi & ed. & mess'g & controlling eqpt.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386	Mfr. of repair of metal turn & fixtures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	Other manufacturing industries																		
390	Other manufacturing industries																		

continued

Table 12
Summary of Emissions from Stationary Sources: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Emissions (metric tons)																	
		PM			PM ₁₀			SO _x			NO _x			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Table 12 continued		continued																	
ELECTRICITY, GAS & WATER		11,161	15,292	21,846	9,940	13,017	18,160	145,283	198,286	287,695	15,293	21,403	30,780	79	103	152	1,390	1,820	2,680
41	Electricity	11,161	15,292	21,846	9,940	13,017	18,160	145,283	198,286	287,695	15,293	21,403	30,790	79	103	152	1,390	1,820	2,680
411	Electricity generation & distribution	11,161	15,292	21,846	9,940	13,017	19,160	145,283	198,286	287,695	15,293	21,403	30,790	79	103	152	1,390	1,820	2,680
412	Electricity distribution to consumers																		
42	Gas & steam																		
421	Waterworks & supply																		
422	Steam heat & power plants																		
43	Waterworks & supply																		
430	Waterworks & supply																		
CONSTRUCTION		24	49	72	23	46	88	331	877	998	35	71	105	0	0	0	3	6	10
50	Construction	24	49	72	23	46	88	331	877	998	35	71	105	0	0	0	3	6	10
501	Gen. building construction	4	8	12	4	8	12	66	115	169	6	12	18	0	0	0	1	1	2
502	Gen. engineering construction	18	37	54	17	35	52	251	514	757	28	54	80	0	0	0	2	5	7
503	Special trade construction	2	3	5	2	3	5	23	47	70	2	5	7	0	0	0	0	0	1
WHOLESALE & RETAIL TRADE																			
61	Wholesale trade																		
618	Petroleum & petroleum prod., wholesaling																		
62	Retail trade																		
628	Petroleum & petroleum prod., retailing																		
TRANSPORTATION, STORAGE & COMMUNICATIONS																			
71	Transportation services																		
711	Railway transport																		
712	Road passenger transport																		
713	Water transport																		
714	Air transport																		
719	Services allied to transport																		
72	Storage & warehousing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
720	Storage & warehousing																		
73	Communication																		
FINANCING, INSURANCE, REAL ESTATE & BUS. SERVICES		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	Banking institution																		
82	Financial intermediaries																		
83	Insurance																		
84	Real estate																		
85	Business services																		
COMMUNITY, SOCIAL & PERSONAL SERVICES		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	Public admin. & defense																		
92	Sanitary & similar services																		
93	Education services																		
94	Med., dental, other health & veterinary services																		
95	Other social & related community services																		
96	Recreational & cultural services																		
97	Personal & household services																		
98	Restaurants & hotels																		
99	Int'l org. & other extra-territorial bodies																		
HH	Household sector																		
NATURE Nature sector																			
TOTAL		305,164	359,700	500,766	227,784	237,626	299,761	269,338	310,740	445,218	43,904	48,049	63,707	7,659	8,440	10,074	48,508	57,815	72,078

Note:
 1. Blank cells indicate either no pollution emission reported as per WHO report or real zero emission depending on the source of pollution (i.e., BOF, coal or production process).
 2. PM₁₀ from coal combustion is not computed.

Table 13
Toxic Air Pollutants from Production Processes: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Pollutant (mt)								
		H2S			Phenols			Flouride		
		1988	1992	1995	1988	1992	1995	1988	1992	1995
311-312	Food manufacturing	1	1	1	0	0	0	0	0	0
341	Mfr. of paper & allied prod.	1,606	1,670	1,687	17,171	17,864	18,044	0	0	0
351, 352 & 356	Mfr. of chemicals & plastic prod.	0	0	0	0	0	0	5,186	5,175	5,172
362	Mfr. of glass & glass prod.	0	0	0	0	0	0	3,011	3,838	4,102
	Total	1,607	1,671	1,688	17,171	17,864	18,044	8,197	9,013	9,274

Notes:

1) Estimates for 1995 are based on the annual growth rates from 1988-1992.

Table 14
Sources of Air Pollution: Philippines, 1988, 1992 and 1995

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	Emissions (metric tons)																				
I. AREA	1,219,329	1,222,701	1,371,028	1,204,957	1,170,801	1,354,670	4,818	4,784	5,781	31,305	28,808	35,143	1,880,313	1,720,603	2,114,588	8,900,484	8,134,068	9,997,842	0	0	0
1. Households	1,178,888	1,078,490	1,325,468	1,178,686	1,078,490	1,325,469	4,817	4,784	5,780	31,049	28,792	35,100	1,872,440	1,713,281	2,105,834	8,889,020	8,133,371	9,998,032	0	0	0
a. Fuelwood	978,628	892,042	1,151,154	978,628	892,042	1,151,154	3,553	3,239	4,180	24,874	22,674	29,260	1,554,648	1,417,086	1,828,722	7,380,578	6,727,562	8,881,728	0	0	0
b. Other fuel types	200,058	186,449	174,315	200,058	186,449	174,315	1,364	1,545	1,800	6,175	6,119	5,840	317,793	296,185	276,812	1,508,442	1,405,809	1,314,304	0	0	0
2. Others	40,643	144,211	45,558	26,271	92,310	29,200	1	0	1	258	18	43	7,873	7,321	8,934	11,465	895	1,911	0	0	0
II. MOBILE	137,903	210,468	288,928	88,865	133,844	182,735	35,097	43,418	82,122	82,705	137,844	181,983	182,000	243,337	335,816	740,582	1,055,107	1,387,082	848	859	238
1. Households	58,818	88,232	120,284	35,808	53,854	73,772	1,870	2,355	3,369	13,885	18,158	24,005	84,305	100,042	138,063	277,555	372,331	482,424	203	213	83
2. For hire	27,139	41,712	58,864	17,578	28,944	36,842	8,212	8,532	12,708	15,083	25,578	33,817	38,139	55,053	75,975	110,211	171,836	222,386	114	99	29
3. Government	4,761	5,858	7,988	3,092	3,781	5,170	2,217	1,659	2,373	5,013	4,734	6,259	6,699	8,984	9,839	28,777	30,923	40,067	36	20	8
4. Diplomatic	621	368	501	402	221	301	373	41	59	1,007	201	284	554	301	414	3,245	2,049	2,849	5	1	0
5. Industries	45,683	74,300	101,281	29,986	48,744	88,850	24,425	30,831	44,113	57,716	88,978	117,838	53,303	80,958	111,728	320,793	478,188	618,558	411	325	140
a. Food mfg.	16,323	28,928	36,710	10,719	17,668	24,156	8,731	11,174	15,988	20,832	32,247	42,635	19,054	29,341	40,492	114,673	173,300	224,542	147	118	35
b. Mfr. of wood & wood prod.	8,287	13,603	18,545	5,449	8,925	12,203	4,438	5,645	8,077	10,487	16,290	21,538	8,685	14,822	20,458	58,289	87,547	115,434	75	60	18
c. Crude pet. & nat. gas explo.	5,623	8,581	11,898	3,893	5,829	7,897	3,008	3,561	5,095	7,108	10,278	13,588	8,564	9,350	12,903	39,505	55,224	71,552	51	38	11
d. Gen. eng'g. const.	4,726	7,645	10,423	3,104	5,016	8,858	2,528	3,172	4,539	5,874	9,155	12,105	5,517	8,330	11,498	33,202	49,203	63,751	43	33	10
e. Others	10,684	17,542	23,915	7,022	11,508	15,738	5,720	7,279	10,415	13,516	21,007	27,774	12,463	18,114	26,378	75,124	112,895	148,278	96	77	23
III. STATIONARY	305,164	359,700	500,788	227,784	237,826	299,781	289,338	310,740	445,218	43,904	48,049	63,707	18,198	19,218	10,074	47,172	55,788	72,078	0	0	0
1. Food mfg.	112,897	127,952	145,102	76,176	88,582	103,889	20,883	24,980	32,330	2,937	3,936	3,403	13	17	18	208	257	309	0	0	0
2. Iron & steel basic inds.	63,539	63,686	85,281	60,969	61,092	61,358	8,335	8,524	17,894	1,288	1,474	4,635	258	280	308	438	479	616	0	0	0
3. Mfr. of paper & allied prod.	28,219	29,482	30,575	28,091	29,290	30,519	10,598	12,243	16,829	1,217	1,504	1,709	8	7	9	7,903	8,235	8,524	0	0	0
4. Mfr. of chem. & plastic prod.	15,202	14,840	14,538	13,085	12,463	13,115	8,905	8,494	11,167	839	596	878	743	760	795	58	54	80	0	0	0
5. Others	85,307	123,921	245,280	48,463	48,199	90,901	220,817	255,498	366,898	37,822	38,539	53,083	17,177	18,145	8,944	38,585	48,762	62,547	0	0	0
TOTAL	1,661,496	1,792,870	2,158,740	1,519,807	1,542,071	1,837,186	309,354	358,941	513,121	107,914	212,501	280,834	2,060,511	1,983,158	2,460,458	9,688,238	9,244,961	11,437,100	1,059	807	238

Table 14 (continued)

Sector	PM			PM ₁₀			SOx			NOx			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	Share (%)																		Share (%)		
I. AREA	73.39%	68.20%	63.51%	79.28%	75.82%	73.74%	1.53%	1.33%	1.13%	18.04%	13.56%	12.51%	81.25%	86.76%	85.94%	91.87%	87.88%	87.42%	0.00%	0.00%	0.00%
1. Households	70.94%	60.15%	61.40%	77.57%	69.94%	72.15%	1.59%	1.35%	1.13%	18.48%	13.55%	12.50%	80.87%	86.39%	83.58%	91.75%	87.88%	87.40%	0.00%	0.00%	0.00%
a. Fuelwood	58.80%	40.75%	53.33%	64.40%	57.85%	62.08%	1.15%	0.90%	0.01%	14.81%	10.67%	10.42%	75.45%	71.46%	74.32%	78.18%	72.77%	75.91%	0.00%	0.00%	0.00%
b. Other fuel types	12.04%	10.40%	8.07%	13.17%	12.09%	9.49%	0.44%	0.43%	0.31%	3.08%	2.88%	2.08%	15.42%	14.94%	11.25%	15.57%	15.21%	11.49%	0.00%	0.00%	0.00%
2. Others	2.45%	8.04%	2.11%	1.73%	6.89%	1.58%	0.00%	0.00%	0.00%	0.16%	0.01%	0.02%	0.38%	0.37%	0.39%	0.12%	0.01%	0.02%	0.00%	0.00%	0.00%
II. MOBILE	6.25%	11.74%	13.28%	5.72%	8.67%	9.95%	11.35%	12.10%	12.11%	55.71%	64.77%	64.80%	7.86%	12.27%	13.85%	7.64%	11.41%	11.95%	80.07%	81.82%	100.00%
1. Households	3.54%	4.92%	5.57%	2.30%	3.50%	4.02%	0.80%	0.86%	0.68%	8.27%	8.54%	8.55%	3.12%	5.04%	5.81%	2.88%	4.03%	4.22%	28.72%	28.43%	28.43%
2. For Hire	1.83%	2.33%	2.83%	1.10%	1.75%	2.01%	2.01%	2.38%	2.38%	8.88%	12.04%	12.04%	1.85%	2.78%	3.09%	1.14%	1.88%	1.94%	10.78%	12.31%	12.31%
3. Government	0.20%	0.33%	0.37%	0.20%	0.25%	0.26%	0.72%	0.48%	0.48%	2.99%	2.23%	2.23%	0.28%	0.35%	0.39%	0.30%	0.33%	0.33%	0.35%	3.36%	2.48%
4. Diplomatic	0.04%	0.02%	0.02%	0.03%	0.01%	0.02%	0.12%	0.01%	0.01%	0.80%	0.09%	0.09%	0.03%	0.02%	0.02%	0.03%	0.02%	0.02%	0.43%	0.18%	0.18%
5. Industries	2.75%	4.14%	4.89%	1.97%	3.18%	3.83%	7.90%	8.59%	8.80%	34.37%	41.87%	41.89%	2.59%	4.08%	4.54%	3.31%	5.17%	5.42%	38.81%	40.28%	38.85%
a. Food mfg	0.98%	1.50%	1.70%	0.71%	1.15%	1.31%	2.82%	3.11%	3.12%	12.29%	15.17%	15.18%	0.92%	1.48%	1.85%	1.18%	1.87%	1.96%	13.87%	14.59%	14.59%
b. Mfr. of wood & wood prod.	0.50%	0.76%	0.88%	0.30%	0.58%	0.66%	1.43%	1.57%	1.57%	6.25%	7.87%	7.87%	0.47%	0.75%	0.83%	0.80%	0.95%	0.99%	7.05%	7.37%	7.37%
c. Crude pet. & nat. gas explo.	0.34%	0.46%	0.54%	0.24%	0.37%	0.42%	0.97%	0.99%	0.99%	4.23%	4.04%	4.84%	0.32%	0.47%	0.52%	0.41%	0.60%	0.83%	4.78%	4.85%	4.85%
d. Gen. eng'g const.	0.28%	0.43%	0.48%	0.20%	0.33%	0.37%	0.82%	0.88%	0.88%	3.58%	4.31%	4.31%	0.27%	0.42%	0.47%	0.34%	0.53%	0.56%	4.02%	4.14%	4.14%
e. Others	0.04%	0.98%	1.11%	0.40%	0.75%	0.88%	1.85%	2.03%	2.03%	8.05%	9.89%	9.89%	0.81%	0.89%	1.07%	0.76%	1.22%	1.28%	9.09%	9.51%	9.51%
III. STATIONARY	18.37%	20.08%	23.20%	14.99%	16.41%	18.32%	87.08%	86.57%	88.77%	28.15%	21.87%	22.89%	0.88%	0.97%	0.41%	0.49%	0.60%	0.83%	0.00%	0.00%	0.00%
1. Food mfg	8.70%	7.14%	8.72%	5.01%	5.74%	5.65%	8.89%	8.88%	8.30%	1.75%	1.85%	1.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2. Iron & steel basic inds	3.82%	3.55%	3.02%	4.01%	3.98%	3.34%	2.89%	2.85%	3.51%	0.77%	0.89%	1.65%	0.01%	0.01%	0.01%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%
3. Mfr. of paper & allied prod.	1.70%	1.84%	1.42%	1.85%	1.90%	1.68%	3.43%	3.41%	3.28%	0.72%	0.71%	0.61%	0.00%	0.00%	0.00%	0.08%	0.09%	0.07%	0.00%	0.00%	0.00%
4. Mfr. of chem. & plastic prod.	0.91%	0.82%	0.87%	0.86%	0.81%	0.71%	2.88%	2.37%	2.18%	0.38%	0.28%	0.31%	0.04%	0.04%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5. Others	5.13%	6.91%	11.36%	3.25%	3.00%	4.95%	71.38%	71.16%	71.50%	22.52%	18.14%	18.90%	0.83%	0.81%	0.38%	0.40%	0.51%	0.55%	0.00%	0.00%	0.00%
	% Change from 1988 to 1992, 1992 to 1995																		% Change from 1988 to 1992, 1992 to 1995		
I. AREA	0.28	12.13		-2.83	16.70		-2.73	20.84		-7.98	21.69		-8.49	22.90		-6.61	22.91				
II. MOBILE	53.62	22.00		53.85	22.90		23.71	43.08		46.48	32.21		50.21	36.00		42.47	29.57		-22.27	-83.85	
III. STATIONARY	17.87	29.05		4.32	29.05		15.37	43.78		4.89	38.35		5.61	-47.50		16.26	28.20				
TOTAL	7.91	20.41		1.48	19.14		10.03	42.95		26.55	32.18		-3.75	24.07		-4.58	23.71		-23.74	-70.49	

Table 14 (continued)

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Air Pollution Emissions by Sector, All Sources, Philippines, 1988 and 1992																					
AGRI, FORESTRY & FISHERY																					
11	1,792	815	815	1,414	787	787	389	325	325	1,189	948	948	2,353	906	906	16,381	5,378	5,378	7	3	3
111	6	38	38				3	3	3	8	18	18	8	54	54	45	377	377	0	0	0
112	17	19	19				9	8	8	22	23	23	20	22	22	123	121	121	0	0	0
113	0	0	0				0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
114	217	234	234				118	97	97	274	280	280	254	255	255	1,524	1,507	1,507	2	1	1
115																					
	81	88	88				43	36	36	103	105	105	95	96	96	570	564	564	1	0	0
116	263	284	284				141	118	118	333	340	340	307	310	310	1,849	1,828	1,828	2	1	1
117	-	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	-	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	141	152	152				75	63	63	178	182	182	105	168	168	991	979	979	1	1	1
12	335	361	361	220	350	350	178	150	150	423	433	433	393	396	396	2,353	2,325	2,325	3	2	2
121	86	93	93	57	90	90	46	39	39	109	112	112	102	103	103	607	600	600	1	0	0
122	249	268	268	163	280	260	133	111	111	314	321	321	291	293	293	1,746	1,725	1,725	2	1	1
129	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	100	108	108	68	104	104	53	45	45	128	129	129	117	118	118	702	694	694	1	0	0
130	100	108	108	68	104	104	53	45	45	128	129	129	117	118	118	702	694	694	1	0	0
14	-	-	-	-	-	-	3,387	3,943	3,943	6,262	8,011	8,011	2,235	2,590	2,590	5,814	6,813	6,813	-	-	-
141																					
142																					
143																					
149	1,802	2,596	2,596	1,188	2,514	2,514	1,091	1,163	1,163	2,279	3,111	3,111	2,093	2,823	2,823	12,592	18,869	18,869	18	11	11
15																					
151																					
159																					
16																					
160																					

Table 14 (continued)

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992
MINING & QUARRYING																					
21	30,870	83,779	83,779	12,334	25,045	25,045	18,708	13,833	13,833	4,959	5,533	5,533	2,857	3,950	3,950	16,955	22,972	22,972	21	16	16
211	3,020						10,338	-	-	4,004	-	-	2,024	-	-	12,092	-	-	15	-	-
212																					
213	27,158												22								
214	383						210			498			459			2,759			4		
215	298						160			377			349			2,095			3		
218																					
219	1						1			2						10			0		
22																					
221	22,117	28,885	28,885	12,272	19,900	19,900	4,558	5,321	5,321	9,881	14,221	14,221	9,101	12,842	12,842	54,210	75,785	75,785	49	52	52
222	15,862						14,446	-	-	3,894	-	-	1,537	-	-	8,851	-	-	11	-	-
223	5,823						3,008	-	-	7,108	-	-	8,584	-	-	39,505	-	-	51	-	-
229	1,750						535	-	-	806	-	-	891	-	-	5,285	-	-	7	-	-
229	127						47	-	-	101	-	-	108	-	-	500	-	-	1	-	-
MANUFACTURING																					
31																					
311-312	133,230	100,710	100,710	89,484	119,884	119,884	38,317	45,974	45,974	28,349	43,115	43,115	22,408	34,371	34,371	134,855	202,170	202,170	172	137	137
311-312	129,220	154,890	154,890	66,898	114,837	114,837	28,418	36,154	36,154	23,560	38,183	38,183	19,188	29,508	29,508	114,881	173,557	173,557	147	118	118
313	3,440	4,805	4,805	2,179	4,084	4,084	7,914	8,537	8,537	4,049	5,771	5,771	2,804	3,882	3,882	16,124	22,882	22,882	21	16	16
314	570	955	955	389	924	924	989	1,284	1,284	730	1,161	1,161	615	961	961	3,851	5,731	5,731	5	4	4
32																					
32																					
321	3,555	5,457	5,457	2,544	5,195	5,195	11,605	11,502	11,502	4,582	6,488	6,488	3,273	5,000	5,000	19,598	29,434	29,434	25	20	20
321	2,584	3,850	3,850	1,900	3,639	3,639	10,782	10,549	10,549	3,351	4,558	4,558	2,151	3,260	3,260	12,936	19,224	19,224	18	13	13
322	824	1,359	1,359	548	1,318	1,318	720	827	827	1,046	1,633	1,633	953	1,478	1,478	5,648	8,624	8,624	7	6	6
323-324																					
323-324	146	248	248	97	240	240	103	128	128	185	298	298	169	269	269	1,014	1,586	1,586	1	1	1
33																					
33																					
331	11,564	16,513	16,513	8,022	15,789	15,789	5,431	8,351	8,351	11,349	17,567	17,567	10,530	18,068	18,068	62,700	94,258	94,258	80	64	64
331	10,935	15,470	15,470	7,608	14,769	14,769	5,069	5,901	5,901	10,554	16,317	16,317	9,794	14,926	14,926	58,288	87,350	87,350	75	60	60
332	629	1,044	1,044	414	1,010	1,010	362	450	450	795	1,250	1,250	736	1,140	1,140	4,405	6,708	6,708	6	5	5

Table 14 (continued)

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	
34 Manufacture of paper & paper products; Printing and publishing	30,304	32,828	32,828	29,460	32,521	32,521	11,718	13,831	13,831	3,853	5,409	5,409	2,447	3,652	3,652	22,551	29,708	29,708	19	15	15
341 Manufacture of paper and allied products	29,579	31,623	31,623	28,984	31,354	31,354	11,328	13,128	13,128	2,837	4,058	4,058	1,598	2,333	2,333	17,462	21,951	21,951	12	9	9
342 Printing, publishing and allied industries	725	1,205	1,205	476	1,167	1,167	391	503	503	818	1,443	1,443	850	1,318	1,318	5,089	7,755	7,755	7	5	5
35 Manufacture of chemical products, petroleum, coal, rubber & plastic products	20,194	22,079	22,079	18,488	19,362	19,362	15,018	15,037	15,037	11,012	9,475	9,475	6,418	8,667	8,667	65,253	87,475	87,475	35	28	28
351,352 & 358 Manufacture of chemicals and plastic products	18,153	19,492	19,492	15,023	17,162	17,162	10,484	10,507	10,507	4,309	6,407	6,407	4,206	6,079	6,079	20,788	31,284	31,284	27	21	21
353 Petroleum refineries	1,339	1,589	1,589	901	1,231	1,231	1,952	2,010	2,010	5,715	1,780	1,780	1,568	1,652	1,652	40,708	50,888	50,888	4	3	3
354 Mfr. of miscellaneous prods of petroleum & coal	6	8	8	3	3	3	52	58	58	11	15	15	0	0	0	1	1	1	5	4	4
355 Rubber products	697	1,010	1,010	501	987	987	2,530	2,463	2,463	817	1,257	1,257	626	935	935	3,758	5,504	5,504	32	24	24
36 Manufacture of non-metallic mineral products	10,290	11,823	11,823	3,745	8,874	8,874	23,407	21,489	21,489	18,559	17,736	17,736	4,215	6,047	6,047	25,192	35,477	35,477	3	2	2
361 Mfr. of pottery, china and earthenware	388	518	518	282	500	500	1,461	1,221	1,221	509	640	640	351	492	492	2,080	2,801	2,801	8	4	4
362 Manufacture of glass and glass products	1,227	1,665	1,665	989	1,620	1,620	1,092	1,319	1,319	2,279	2,955	2,955	818	1,151	1,151	4,692	6,523	6,523	11	8	8
363 Mfr. of cement	6,669	6,838	6,838	1,220	2,308	2,308	20,133	18,058	18,058	12,085	11,567	11,567	1,475	2,065	2,065	8,987	12,281	12,281	12	9	9
369 Mfr. of other non-metallic mineral products	2,096	2,802	2,802	1,253	2,445	2,445	720	891	891	1,706	2,575	2,575	1,571	2,338	2,338	9,453	13,812	13,812	21	18	18
37 Basic metal industries	80,041	88,918	88,918	62,831	64,719	64,719	11,335	13,018	13,018	4,589	8,228	8,228	3,048	4,258	4,258	17,183	23,903	23,903	17	13	13
371 Iron & steel basic industries	65,429	66,573	66,573	62,210	63,888	63,888	9,348	10,722	10,722	3,676	4,932	4,932	2,464	3,426	3,426	13,714	18,081	18,081	4	3	3
372 Non-ferrous metal basic industries	14,612	20,345	20,345	423	831	831	1,986	2,294	2,294	812	1,294	1,294	584	830	830	3,469	4,842	4,842	24	19	19
38 Manufacture of fabricated metal products, machines and equipment	2,728	4,484	4,484	1,777	4,293	4,293	1,892	2,465	2,465	3,483	5,444	5,444	8,043	10,931	10,931	18,705	28,357	28,357	6	5	5
381 Manufacture of fabricated metal products	718	1,210	1,210	452	1,113	1,113	679	878	878	839	1,507	1,507	3,767	4,523	4,523	4,709	7,328	7,328	4	4	4
382 Manufacture of machinery except electrical	484	805	805	318	780	780	263	338	338	812	964	964	2,421	3,589	3,589	3,402	5,180	5,180	8	7	7
383 Manufacture of electrical machinery, etc.	915	1,504	1,504	605	1,456	1,456	658	782	782	1,160	1,804	1,804	1,065	1,639	1,639	6,344	9,604	9,604	5	4	4
384 Mfr. of transport eqpt.	564	902	902	372	873	873	387	436	436	713	1,081	1,081	736	1,099	1,099	3,926	5,773	5,773			

Table 14 (continued)

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	
385 Manufacture of professional and scientific measuring and controlling equipment	29	45	45	19	44	44	15	19	19	36	54	54	34	49	49	203	290	290	0	0	0
388 Mfr. & repair of metal furniture and fixtures	17	29	29	11	28	28	9	12	12	22	34	34	20	31	31	122	165	165	0	0	0
39 Other manufacturing industries	277	474	474	182	459	459	148	197	197	350	588	588	329	524	524	1,945	3,052	3,052	2	2	2
390 Other mfg. industries	277	474	474	182	459	459	148	197	197	350	588	588	329	524	524	1,945	3,052	3,052	2	2	2
ELECTRICITY, GAS & WATER																					
41 Electricity	12,795	14,738	14,738	11,348	13,927	13,927	184,971	214,134	214,134	31,855	37,123	37,123	870	907	907	3,165	4,299	4,299	4	3	3
411 Electricity generation and distribution		14,738	14,738	11,348	13,927	13,927	-	214,134	214,134	-	37,123	37,123	-	907	907	-	4,299	4,299	-	3	3
412 Electricity distribution to consumers																					
42 Gas & steam	2	2	2	1	2	2	1	1	1	3	3	3	147	182	182	15	15	15	0	0	0
421 Gas manufacture and distribution through systems														180	180					0	0
422 Steam heat & power plants		2	2	1	2	2		1	1		3	3		2	2		15	15		0	0
43 Waterworks & supply	2	3	3	2	3	3	1	1	1	3	3	3	28	32	32	17	17	17	0	0	0
430 Waterworks & supply		3	3	2	3	3		1	1		3	3		32	32		17	17		0	0
CONSTRUCTION																					
50 Construction	44,383	143,512	143,512	28,518	95,239	95,239	3,725	4,945	4,045	8,056	12,387	12,387	8,087	12,005	12,005	44,583	88,189	88,189	57	45	45
501 Gen bldg. construction		27,821	27,821	15,408	18,440	18,440		913	913		2,318	2,318		2,894	2,894		12,383	12,383		8	8
502 Gen eng'g construction		114,972	114,972	12,822	78,104	78,104		3,887	3,887		9,210	9,210		6,331	6,331		49,208	49,208		33	33
503 Special trade construction		719	719	291	808	808		344	344		862	862		780	780		4,604	4,604		3	3
WHOLESALE & RETAIL TRADE																					
61 Wholesale trade	1,183	1,255	1,255	764	1,215	1,215	822	521	521	1,470	1,502	1,502	1,368	1,378	1,378	8,170	8,075	8,075	10	5	5
618 Petroleum & petroleum products and wholesaling																					
62 Retail trade	618	686	686	406	645	645	330	277	277	781	798	798	5,233	5,782	5,782	4,339	4,289	4,289	6	3	3
628 Petroleum and petroleum products and retailing																					
TRANSPORTATION, STORAGE AND COMMUNICATIONS																					
71 Transportation services	27,622	42,174	42,174	17,934	40,982	40,982	18,785	22,012	22,012	24,421	37,324	37,324	41,948	59,158	59,158	121,406	182,450	182,450	118	101	101
711 Railway transport	16	17	17	10	16	16	308	336	336	227	248	248	57	62	62	83	90	90			
712 Road passenger transport	27,142	41,715	41,715	17,580	40,495	40,495	6,212	8,532	8,532	15,083	25,578	25,578	38,140	55,054	55,054	110,215	171,640	171,640	114	99	99
713 Water transport							9,886	12,881	12,881	7,357	9,791	9,791	1,406	1,869	1,869	2,984	3,972	3,972			
714 Air transport	251	211	211	204	248	248	245	188	188	1,484	1,431	1,431	2,059	1,880	1,880	6,625	5,268	5,268	2	1	1
719 Services allied to transport	213	230	230	140	223	223	114	90	90	270	276	276	203	293	293	1,500	1,482	1,482	2	1	1

Table 14 (continued)

Sector	PM			PM ₁₀			SO _x			NO _x			VOC			CO			Pb		
	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992	1988	1992	1992
72 Storage & warehousing	8	8	8	5	8	8	4	3	3	10	10	10	40	48	48	54	54	54	0	0	0
720 Storage & warehousing	-	8	8	5	8	8	-	3	3	-	10	10	-	48	48	-	54	54	0	0	0
73 Communication	153	165	165	100	159	159	82	68	68	193	197	197	232	240	248	1,072	1,059	1,059	1	1	1
FINANCING, INSURANCE, REAL ESTATE & BUSINESS SERVICES																					
81 Banking institution	388	419	419	255	405	405	208	174	174	491	501	501	458	462	462	2,727	2,695	2,695	3	2	2
82 Financial intermediaries	93	100	100	61	97	97	50	42	42	118	120	120	109	110	110	654	646	646	1	0	0
83 Insurance	66	71	71	43	69	69	35	29	29	83	85	85	78	79	79	461	456	456	1	0	0
84 Real estate	129	150	150	89	145	145	63	53	53	163	160	160	184	181	181	1,011	1,176	1,176	1	1	1
85 Business services	319	344	344	210	334	334	171	143	143	404	412	412	377	381	381	2,243	2,217	2,217	3	2	2
COMMUNITY, SOCIAL AND PERSONAL SERVICES																					
91 Public admin. & defense	4,761	5,858	5,858	3,092	5,692	5,692	2,217	1,659	1,659	5,014	4,734	4,734	5,699	6,984	6,904	28,778	30,923	30,923	36	20	20
92 Sanitary and similar services	-	-	-	-	-	-	-	-	-	-	-	-	28	35	35	-	-	-	-	-	-
93 Education services	87	93	93	57	90	90	48	39	39	109	112	112	102	103	103	608	601	601	1	0	0
94 Medical, dental, other health & vet. services	141	152	152	93	148	148	76	63	63	179	182	182	11,053	11,054	11,054	992	981	981	1	1	1
95 Other social and related community services	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
96 Recreational and cultural services	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
97 Personal and household services	-	-	-	-	-	-	-	-	-	-	-	-	273	299	298	-	-	-	-	-	-
98 Restaurants & hotels	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
99 International organizations and other extra-territorial bodies	621	368	368	402	303	353	373	41	41	1,007	201	201	554	301	301	3,245	2,049	2,049	5	1	1
HH Household sector	1,237,504	1,186,722	1,166,722	1,214,494	1,165,178	1,165,178	6,789	7,131	7,131	44,935	46,949	46,949	1,930,745	1,813,323	1,813,323	9,160,575	8,505,702	8,505,702	283	213	213
NATURE Nature sector	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.
TOTAL	1,680,052	1,814,841	1,814,841	1,519,678	1,642,348	1,642,348	364,860	405,577	405,577	228,688	287,304	287,304	2,093,340	2,026,300	2,026,300	9,866,905	9,478,162	9,478,162	1,059	807	807

Note: PM₁₀ from fuel combustion is not computed.

Table 15
Top Five Air Pollutive Sectors: Philippines, 1988, 1992 and 1995

PM										PM			
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995		PSIC	
		MT	% Share			MT	% Share			MT	% Share		
HH	Household sector	1,237,804	73.69	HH	Household sector	1,166,722	64.29	HH	Household sector	1,445,753	66.97	HH	
31	Mfr. of food, beverage & tobacco	133,230	7.93	31	Mfr. of food, beverage & tobacco	160,710	8.86	31	Mfr. of food, beverage & tobacco	181,812	8.42	31	
37	Basic metal industries	80,041	4.76	60	Construction	143,612	7.91	21	Metallic ore mining	130,558	6.05	37	
60	Construction	44,383	2.84	37	Basic metal industries	86,918	4.79	37	Basic metal industries	91,043	4.22	60	
21	Metallic ore mining	30,670	1.84	21	Metallic ore mining	63,779	3.51	50	Construction	10,423	0.48	21	
TOTAL		1,526,028	90.83			1,621,641	89.36			1,859,587	86.14		

PM ₁₀										PM ₁₀			
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995		PSIC	
		MT	% Share			MT	% Share			MT	% Share		
HH	Household sector	1,214,494	79.92	HH	Household sector	1,165,175	70.95	HH	Household sector	1,399,242	76.16	HH	
31	Mfr. of food, beverage & tobacco	89,464	5.89	31	Mfr. of food, beverage & tobacco	119,664	7.29	31	Mfr. of food, beverage & tobacco	232,848	12.67	31	
37	Basic metal industries	62,634	4.12	60	Construction	95,239	5.80	37	Basic metal industries	64,774	3.53	37	
34	Mfr. of paper & paper prod.; Printg & pub'g	29,480	1.94	37	Basic metal industries	64,719	3.94	71	Transportation services	37,312	2.03	34	
60	Construction	28,516	1.88	71	Transportation services	40,982	2.50	60	Construction	14,089	0.77	60	
TOTAL		1,424,570	93.74			1,598,469	97.33			1,748,265	95.16		

SO _x										SO _x			
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995		PSIC	
		MT	% Share			MT	% Share			MT	% Share		
41	Electricity	184,971	60.70	41	Electricity	214,134	62.80	41	Electricity	288,092	66.16	41	
31	Mfr. of food, beverage & tobacco	36,317	10.60	31	Mfr. of food, beverage & tobacco	45,974	11.34	31	Mfr. of food, beverage & tobacco	60,361	11.76	31	
38	Mfr. of non-metallic mineral products	23,407	6.42	71	Transportation services	22,012	5.43	71	Transportation services	31,495	6.14	38	
21	Metallic ore mining	19,706	5.40	36	Mfr. of non-metallic mineral products	21,489	5.30	36	Mfr. of non-metallic mineral products	30,415	5.93	21	
71	Transportation services	16,705	4.60	35	Mfr. of chem. & chem. prod., petroleum, coal	15,037	3.71	35	Mfr. of chem. & chem. prod., petroleum, coal	20,289	3.95	71	
TOTAL		283,107	77.81			318,647	76.97			430,653	83.93		

continued

Table 15 (continued)

		NOx									
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
HH	Household sector	44,035	19.66	HH	Household sector	46,949	16.34	HH	Household sector	59,105	21.05
41	Electricity	31,955	13.98	31	Mfr. of food, beverage & tobacco	43,115	15.01	31	Mfr. of food, beverage & tobacco	54,189	19.30
31	Mfr. of food, beverage & tobacco	28,349	12.40	71	Transportation services	37,324	12.99	71	Transportation services	49,348	17.57
71	Transportation services	24,421	10.68	41	Electricity	37,123	12.92	41	Electricity	31,848	11.34
36	Mfr. of non-metallic mineral products	18,559	7.24	36	Mfr. of non-metallic mineral products	17,736	6.17	36	Mfr. of non-metallic mineral products	24,135	8.59
	TOTAL	146,218	63.97			182,247	63.43			218,624	77.85

		VOC									
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
HH	Household sector	1,936,745	92.52	HH	Household sector	1,813,323	89.49	HH	Household sector	2,243,696	91.19
71	Transportation services	41,946	2.00	71	Transportation services	59,158	2.92	71	Transportation services	81,519	3.31
31	Mfr. of food, beverage & tobacco	22,488	1.07	31	Mfr. of food, beverage & tobacco	34,371	1.70	31	Mfr. of food, beverage & tobacco	40,492	1.65
94	Med., dental, other health & veterinary services	11,053	0.53	33	Mfr. of wood & wood products incl. fur & fixtures	16,086	0.79	33	Mfr. of wood & wood products incl. fur & fixtures	20,456	0.83
33	Mfr. of wood & wood products incl. fur & fixtures	10,630	0.50	22	Non-metallic mining & quarrying	12,942	0.64	22	Non-metallic mining & quarrying	17,796	0.72
	TOTAL	2,022,761	96.83			1,935,861	95.54			2,403,958	97.70

		CO									
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
HH	Household sector	9,166,675	92.90	HH	Household sector	8,505,702	89.74	HH	Household sector	10,134,094	88.61
31	Mfr. of food, beverage & tobacco	134,655	1.36	31	Mfr. of food, beverage & tobacco	202,170	2.13	31	Mfr. of food, beverage & tobacco	261,604	2.29
71	Transportation services	121,406	1.23	71	Transportation services	182,450	1.92	71	Transportation services	236,393	2.07
35	Mfr. of chem. & chem. prod., petroleum, coal	65,253	0.66	33	Mfr. of wood & wood products incl. fur & fixtures	94,258	0.99	33	Mfr. of wood & wood products incl. fur & fixtures	122,216	1.07
33	Mfr. of wood & wood products incl. fur & fixtures	62,700	0.64	35	Mfr. of chem. & chem. prod., petroleum, coal	87,475	0.92	35	Mfr. of chem. & chem. prod., petroleum, coal	56,365	0.48
	TOTAL	9,550,589	96.79			9,072,055	95.72			10,809,571	94.51

		Pb									
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
HH	Household sector	283	26.71	HH	Household sector	213	26.43	HH	Household sector	63	28.43
31	Mfr. of food, beverage & tobacco	172	16.28	31	Mfr. of food, beverage & tobacco	137	16.99	31	Mfr. of food, beverage & tobacco	40	16.99
71	Transportation services	118	11.12	71	Transportation services	101	12.62	71	Transportation services	30	12.62
33	Mfr. of wood & wood products incl. fur & fixtures	80	7.58	33	Mfr. of wood & wood products incl. fur & fixtures	64	7.94	33	Mfr. of wood & wood products incl. fur & fixtures	19	7.94
22	Non-metallic mining & quarrying	59	6.56	22	Non-metallic mining & quarrying	62	6.38	22	Non-metallic mining & quarrying	15	6.38
	TOTAL	722	68.23			587	70.28			167	70.26

Table 16
Water Pollution Discharges: Philippines, 1988, 1992 and 1995

P-SIC	Industry & Process	Effluents (metric tons)																		
		BOD ₅			SS			TDS			Oil & Grease			N			P			
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	
AGRI., FORESTRY & FISHERY		2,888,428	2,871,035	2,975,804	497,446,081	488,784,544	480,883,510	0	0	0	0	0	0	1,952,503	1,953,047	1,954,421	27,339	27,339	27,339	
11	Agrl. crops production (runoff)	736,237	736,237	736,237	146,108,868	146,108,868	146,108,868	0	0	0	0	0	0	568,338	568,338	568,338	9,014	9,014	9,014	
12	Livestock production	735,509	738,118	742,987	8,297,485	8,312,138	8,348,848	0	0	0	0	0	0	234,874	235,418	236,793	0	0	0	
121	Livestock & livestock prod	218,287	227,825	237,922	1,387,235	1,468,028	1,533,088	0	0	0	0	0	0	63,878	67,385	70,371	0	0	0	
	Swine feedlot	216,287	227,825	237,922	1,387,235	1,468,028	1,533,088	0	0	0	0	0	0	63,878	67,385	70,371	0	0	0	
122	Poultry & poultry products	95,222	95,793	98,099	993,029	988,984	1,023,025	0	0	0	0	0	0	34,888	34,888	35,738	0	0	0	
	Broiler feedlot	16,716	15,217	14,216	174,324	168,887	148,249	0	0	0	0	0	0	8,089	8,543	8,179	0	0	0	
	Layer houses	70,288	68,860	67,473	733,003	716,022	703,652	0	0	0	0	0	0	25,605	26,012	24,580	0	0	0	
	Duck feedlot	8,218	11,917	16,409	85,702	124,276	171,123	0	0	0	0	0	0	2,994	4,341	5,978	0	0	0	
129	Raising of other animals incl their prod.	425,000	414,500	408,867	2,917,200	2,845,128	2,792,734	0	0	0	0	0	0	138,510	133,137	130,888	0	0	0	
	Cattle feedlot	425,000	414,500	408,867	2,917,200	2,845,128	2,792,734	0	0	0	0	0	0	136,510	133,137	130,888	0	0	0	
15	Forestry (runoff)	1,488,881	1,488,881	1,488,881	297,022,047	297,022,047	297,022,047	0	0	0	0	0	0	1,151,293	1,151,293	1,151,293	18,325	18,325	18,325	
21	Metallic ore mining	0	0	0	46,838,305	38,123,377	32,188,889	0	0	0	0	0	0	0	0	0	0	0	0	0
211	Gold ore mining	0	0	0	21,332,717	18,742,811	16,825,205	0	0	0	0	0	0	0	0	0	0	0	0	0
213	Copper ore mining	0	0	0	23,705,789	16,495,279	13,063,201	0	0	0	0	0	0	0	0	0	0	0	0	0
215	Chromite ore mining	0	0	0	289,070	378,538	317,924	0	0	0	0	0	0	0	0	0	0	0	0	0
219	Other base metal ore mining	0	0	0	3,608,749	3,608,749	2,962,558	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Non-metallic ore mining	0	0	0	181,288	198,014	214,781	0	0	0	0	0	0	0	0	0	0	0	0	0
221	Coal mining	0	0	0	13,357	13,720	14,002	0	0	0	0	0	0	0	0	0	0	0	0	0
223	Stone quarrying, clay and sand pits	0	0	0	155,844	165,759	173,795	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sand and gravel	0	0	0	12,096	18,535	28,904	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rock aggregates	168,042	181,299	178,077	171,135	184,890	178,171	1,144,281	1,858,800	2,970,860	13,973	18,559	24,940	2,857	1,972	1,551	0	0	0	
MANUFACTURING		116,884	128,711	148,383	120,433	134,297	159,327	1,022,883	1,732,403	2,800,758	11,247	15,508	23,972	2,057	1,138	798	0	0	0	
31	Mfr. of food, beverage & tobacco	57,311	67,138	88,791	58,253	72,118	87,147	841,958	1,951,478	2,819,832	11,247	15,508	23,972	2,057	1,138	798	0	0	0	
311-312	Food manufacturing	7,571	4,188	2,935	6,152	3,403	2,385	0	0	0	2,368	1,309	917	1,869	1,034	725	0	0	0	
	Slaughtering, preparing & preserving meat	745	412	269	355	198	138	0	0	0	272	151	105	188	104	73	0	0	0	
	Packing-house	778	1,236	1,868	630	1,319	1,992	981	1,558	2,363	368	582	878	0	0	0	0	0	0	
	Poultry processing	23	80	329	10	33	137	14	50	205	0	0	0	0	0	0	0	0	0	
	Dairy products	2,329	3,110	3,959	801	1,070	1,362	0	0	0	0	1	1	1	1	1	0	0	0	
	Canning & preserving of fruits, & veg	1	1	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	
	Canning, preserving & processing of fish, etc.	12,852	23,220	40,294	18,339	29,520	51,227	878,893	1,587,600	2,765,008	6,476	11,700	20,303	0	0	0	0	0	0	
	Prodn. of crude coco oil, inc. cake & meal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mfr. of veg. & animal oils & fats	6,414	6,527	6,614	9,330	9,494	9,620	0	0	0	0	0	0	0	0	0	0	0	0	
	Rice milling	3,312	3,410	3,488	4,818	4,960	5,070	0	0	0	0	0	0	0	0	0	0	0	0	
	Com milling	19,720	19,728	19,728	14,279	14,279	14,279	62,268	62,268	62,268	1,768	1,768	1,768	0	0	0	0	0	0	
	Flour milling exc. cassava	3,559	5,228	7,291	5,339	7,842	10,938	0	0	0	0	0	0	0	0	0	0	0	0	
	Sugar milling & refining	59,573	59,573	59,573	62,180	62,180	62,180	80,927	80,927	80,927	0	0	0	0	0	0	0	0	0	
313	Beverage manufacturing	40,244	40,244	48,244	54,021	54,021	54,021	80,927	80,927	80,927	0	0	0	0	0	0	0	0	0	
	Alcohol distilleries	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Wine production	1,032	1,032	1,032	1,784	1,784	1,784	0	0	0	0	0	0	0	0	0	0	0	0	
	Beer production	12,297	12,297	12,297	6,394	6,394	6,394	0	0	0	0	0	0	0	0	0	0	0	0	
	Soft drinks mfr.	29,882	21,882	19,882	14,287	12,587	11,875	38,188	30,883	28,943	455	533	803	341	389	452	0	0	0	
32	Textile, wearing apparel and leather industries	23,887	12,817	10,138	7,031	6,898	4,577	23,227	18,887	13,405	0	0	0	0	0	0	0	0	0	
321	Textile manufacturing	8,105	6,105	5,105	3,135	3,135	3,135	4,850	4,950	4,950	0	0	0	0	0	0	0	0	0	
	Cotton	2,028	2,028	2,885	3,141	3,874	4,183	7,989	9,348	10,587	455	533	803	341	389	452	0	0	0	
	Polyster	2,028	2,028	2,885	3,141	3,874	4,183	7,989	9,348	10,587	455	533	803	341	389	452	0	0	0	
323-324	Mfr. of leather & leather products	2,028	2,028	2,885	3,141	3,874	4,183	7,989	9,348	10,587	455	533	803	341	389	452	0	0	0	
	Leather tanneries	0	0	0	792	67	0	203	181	0	0	0	0	16	12	0	0	0	0	
33	Mfr. of wood & wood prod.	0	0	0	792	67	0	203	181	0	0	0	0	16	12	0	0	0	0	
331	Mfr. of wood & wood prod.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Plywood manufacturing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Fiberboard mfr.	7,383	7,192	7,412	16,342	17,155	4,304	58,950	59,392	39,890	0	0	0	0	0	0	0	0	0	
34	Mfr. of paper & paper prod.	7,383	7,192	7,412	16,342	17,155	4,304	58,950	59,392	39,890	0	0	0	0	0	0	0	0	0	
341	Mfr. of paper & allied prod.	450	0	0	770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Sulfite (kraft) pulp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Sulfite pulp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Semi chemical pulp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Paper mills	6,913	7,192	7,412	4,014	4,170	4,304	37,018	38,512	39,890	0	0	0	0	0	0	0	0	0	

Table 16
Water Pollution Discharges: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Effluents (metric tons)																	
		BOD ₅			SS			TDS			Oil & Grease			N			P		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
35	Mfr. of chem. & chem. prod., petroleum, coat, rubber & plastic prod.	5,836	8,111	6,158	2,787	2,967	2,358	0	0	0	1,257	1,262	385	199	177	177	0	0	0
351, 352 & 356	Mfr. of chemicals & plastic prod.	5,178	5,311	5,311	2,107	2,273	2,273	0	0	0	365	365	365	199	177	177	0	0	0
	Basic chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-Sulfuric acid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-Hydrochloric acid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	0	0
	Fertilizer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	- Normal superphosphate	negl.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	- Phosphoric acid w/ pond	negl.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	- Pesticide	0	0	0	0	0	0	0	0	0	0	0	0	101	138	125	0	0	0
	- Chlorinated HC herbicides	0	0	0	0	0	0	0	0	0	0	0	0	38	38	38	0	0	0
	Glycerine refining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Soap fr. fatty acids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Detergents	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Liquid detergents	3,650	3,650	3,650	730	730	730	0	0	0	365	365	365	0	0	0	0	0	0
	PVC (plastics)	689	779	859	1,173	1,328	1,464	0	0	0	179	202	223	0	0	0	0	0	0
	Portland	82	82	82	144	144	144	0	0	0	82	82	82	0	0	0	0	0	0
	Pesticide	0	0	0	0	0	0	0	0	0	892	897	0	244	245	0	0	0	0
353	Petroleum refineries	758	800	848	688	694	82	0	0	0	0	0	0	0	0	0	0	0	0
	Integrated refineries	405	480	550	61	72	82	0	0	0	0	0	0	0	0	0	0	0	0
	Petrochemical refineries	353	320	298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
355	Rubber products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tire & tube manufacturing	0	0	0	2,379	2,692	0	19,191	23,284	0	0	0	0	0	0	0	0	0	0
39	Mfr. of non-metallic mineral prod.	0	0	0	211	244	0	2,409	2,786	0	0	0	0	0	0	0	0	0	0
362	Mfr. of glass & products	0	0	0	211	244	0	2,409	2,786	0	0	0	0	0	0	0	0	0	0
363	Mfr. of cement	0	0	0	211	244	0	2,409	2,786	0	0	0	0	0	0	0	0	0	0
	Cement: wet process	0	0	0	211	244	273	2,409	2,786	3,125	0	0	0	0	0	0	0	0	0
	dry process	0	0	0	1,771	1,809	0	0	0	1,268	0	0	0	0	0	0	0	0	0
37	Basic metal inds.	0	0	0	1,771	1,809	0	0	0	1,268	0	0	0	0	0	0	0	0	0
371	Iron & steel basic industries	0	0	0	1,771	1,809	0	883	1,079	1,268	0	0	0	0	0	0	0	0	0
	Sintering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Casting & rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	Mfr. of fabricated metal prod., mach. & eqpt.	167	193	217	12,414	13,004	310	8,989	10,578	0	1,014	1,258	0	0	0	0	0	0	0
381	Mfr. of fabricated products	167	193	217	1,526	1,678	310	4,155	4,569	0	625	687	0	0	0	0	0	0	0
	Appliances	167	193	217	238	276	310	0	0	0	0	0	0	0	0	0	0	0	0
382	Mfr. of machinery except electrical	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
383	Mfr. of electrical machinery, etc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ELECTRICITY, GAS & WATER		0	0	0	239,388	287,895	333,471	0	0	0	0	0	0	0	0	0	0	0	0
41	Electricity	0	0	0	239,388	287,895	333,471	0	0	0	0	0	0	0	0	0	0	0	0
411	Electricity generation & distribution	0	0	0	239,388	287,895	333,471	0	0	0	0	0	0	0	0	0	0	0	0
	Oil based	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coal	0	0	0	119,694	143,848	166,735	0	0	0	0	0	0	0	0	0	0	0	0
	Hydro-powered	0	0	0	119,694	143,848	166,735	0	0	0	0	0	0	0	0	0	0	0	0
RETAIL TRADE		0	0	0	37,873	22,663	16,478	0	0	0	0	0	0	0	0	0	0	0	0
628	Retail trade	0	0	0	37,873	22,663	16,478	0	0	0	0	0	0	0	0	0	0	0	0
	Gasoline dispensing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMMUNITY, SOCIAL & PERSONAL SERVICES		1,160,912	1,514,220	1,620,701	1,195,074	835,544	1,321,828	0	0	0	65,712	38,754	62,575	40,582	34,810	47,748	10,735	10,072	11,759
81	Public admin. & defense	0	0	0	1,124,337	782,118	1,262,860	0	0	0	65,712	38,754	62,575	12,001	2,638	13,480	2,527	1,758	2,838
92	Sanitary & similar services	1,008,338	1,394,894	1,489,443	0	0	0	0	0	0	0	0	0	16,119	22,709	23,857	3,224	4,542	4,771
94	Med., dental, other health & veterinary serv.	9,178	9,020	9,922	4,173	4,038	4,442	0	0	0	0	0	0	735	715	787	294	285	314
97	Personal & household services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	Restaurants & hotels	145,458	110,308	121,337	88,684	49,388	54,327	0	0	0	0	0	0	11,727	8,750	9,625	4,890	3,487	3,838
982	Hotels, motels & other lodging places, n.e.c.	145,458	110,308	121,337	88,684	49,388	54,327	0	0	0	0	0	0	11,727	8,750	9,625	4,890	3,487	3,838
HH	HOUSEHOLD SECTOR	3,358,167	3,809,520	5,641,116	1,536,759	1,705,653	1,678,314	0	0	0	0	0	0	270,750	302,179	381,398	100,279	120,432	137,384
TOTAL		7,643,547	8,450,073	10,416,689	500,626,410	489,800,780	484,811,572	1,144,281	1,858,800	2,970,660	69,885	57,313	87,515	2,288,693	2,282,007	2,365,119	146,353	157,843	176,492

Notes:

- 1) For hotels and restaurants, it was assumed that the number of clients increased by 10% from 1992 to 1995.
- 2) For metallic ore mining, the average annual growth rate was computed to obtain the 1995 levels.
- 3) The effluents for medical and dental services were assumed to increase by 10% in 1995.
- 4) The 1995 retail data was used to come up with estimates for public administration and defense. Bulk up areas was also assumed to increase by 8% relative to the 1992 area.

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Table 17
Sources of Water Pollution: Philippines, 1988, 1992 and 1995

Sector	BOD ₅			SS			TDS			OR			N			P		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	Effluents (metric tons)																	
I. Industries	2,052,463	2,413,836	2,542,665	64,834,289	44,182,004	38,339,393	1,144,261	1,856,800	2,970,680	13,973	16,559	24,940	266,313	268,564	272,612	8,208	8,314	8,921
1. Primary	735,509	738,118	742,887	54,315,068	43,833,530	37,752,495	0	0	0	0	0	0	234,874	235,418	236,793	0	0	0
a. Livestock	735,509	738,118	742,887	5,297,485	5,312,138	6,346,846	0	0	0	0	0	0	234,874	235,418	236,793	0	0	0
b. Mining & quarrying	0	0	0	40,017,801	38,321,391	32,403,850	0	0	0	0	0	0	0	0	0	0	0	0
2. Manufacturing	156,042	161,299	179,077	171,135	184,800	178,171	1,144,261	1,856,800	2,970,680	13,973	16,559	24,940	2,857	1,972	1,551	0	0	0
a. Food, beverages & tobacco	118,884	128,711	148,383	120,433	134,297	159,327	1,022,883	1,732,403	2,000,739	11,247	15,506	23,972	2,057	1,136	796	0	0	0
b. Textile, wearing apparel & leather industries	25,692	21,092	18,925	14,207	12,507	11,875	38,180	30,883	28,843	455	533	603	341	398	452	0	0	0
c. Mfr. of paper & paper prod.	7,383	7,192	7,412	10,342	17,155	4,304	58,850	50,392	39,690	0	0	0	0	0	0	0	0	0
d. Mfr. of fab. metal prod., mach. & eqpt.	187	103	217	12,414	13,004	310	8,989	10,578	0	1,014	1,258	0	0	0	0	0	0	0
e. Others	5,938	8,111	8,159	7,739	7,725	2,358	18,303	23,446	1,268	1,257	1,282	365	458	434	301	0	0	0
3. Services	1,160,912	1,514,220	1,620,701	348,099	383,785	408,717	0	0	0	0	0	0	28,581	32,174	34,288	8,208	8,314	8,921
a. Electricity, gas & water	0	0	0	239,388	287,685	333,471	0	0	0	0	0	0	0	0	0	0	0	0
b. Retail trade	0	0	0	37,973	22,663	16,478	0	0	0	0	0	0	0	0	0	0	0	0
c. Community, social & personal services	1,160,912	1,514,220	1,620,701	70,737	53,428	58,788	0	0	0	0	0	0	28,581	32,174	34,288	8,208	8,314	8,921
I. Sanitary & similar services	1,008,338	1,394,894	1,489,443	0	0	0	0	0	0	0	0	0	18,119	22,709	23,857	3,224	4,542	4,771
II. Others	154,578	119,326	131,258	70,737	53,428	58,788	0	0	0	0	0	0	12,462	8,465	10,431	4,984	3,772	4,149
II. Domestic (HH)	3,358,167	3,809,520	5,841,118	1,538,759	1,705,653	1,878,314	0	0	0	0	0	0	270,750	302,179	381,398	108,278	120,432	137,394
III. Surface Runoff	2,232,917	2,232,917	2,232,917	444,255,352	443,913,133	444,383,875	0	0	0	55,712	38,754	62,575	1,729,850	1,720,265	1,731,109	28,888	28,097	30,177
1. Agriculture	738,237	736,237	738,237	148,108,908	146,108,968	148,108,968	0	0	0	0	0	0	568,338	566,538	568,338	9,014	9,014	9,014
2. Forestry	1,498,681	1,496,681	1,498,681	297,022,047	297,022,047	297,022,047	0	0	0	0	0	0	1,151,283	1,151,283	1,151,283	18,325	18,325	18,325
3. Urban	0	0	0	1,124,337	782,118	1,262,800	0	0	0	55,712	38,754	62,575	12,001	2,836	13,480	2,527	1,758	2,838
TOTAL	7,843,547	8,456,073	10,418,899	500,628,410	489,800,790	484,611,572	1,144,261	1,856,800	2,970,680	69,685	57,313	87,515	2,286,893	2,292,007	2,365,119	146,353	157,843	176,492

continued

Table 17 (continued)

Sector	BOD ₅		1995	1988	SS		1995	1988	TDS		1995	1988	Oil		1995	1988	N		1995	1988	P		1995	1988			
	1988	1992			1992	1992			1992	1992			1992	1992			1992	1992			1992	1992			1992	1992	1992
% Share																											
I. Industries	26.85	28.54	24.41	10.95	9.02	7.91	100.00	100.00	100.00	20.05	32.38	28.50	11.75	11.76	11.53	5.61	5.27	5.05									
1. Primary	9.62	8.73	7.13	10.85	8.91	7.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
a. Livestock	0.00	0.00	0.00	9.79	7.82	8.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
b. Mining & quarrying	2.04	1.91	1.72	0.03	0.04	0.04	100.00	100.00	100.00	20.05	32.38	28.50	0.13	0.09	0.07	0.00	0.00	0.00									
2. Manufacturing	1.53	1.50	1.41	0.02	0.03	0.03	89.39	93.30	97.65	16.14	27.06	27.39	0.09	0.02	0.05	0.03	0.00	0.00									
a. Food, beverages & tobacco	0.34	0.25	0.18	0.00	0.00	0.00	3.16	1.67	0.97	0.65	0.93	0.69	0.00	0.00	0.00	0.00	0.00	0.00									
b. Textile, wearing apparel & leather industries	0.10	0.09	0.07	0.00	0.00	0.00	4.97	3.20	1.34	0.00	1.48	2.19	0.00	0.00	0.00	0.00	0.00	0.00									
c. Mfr. of wood & wood prod.	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.57	0.00	1.48	2.19	0.00	0.02	0.02	0.01	0.00	0.00	0.00									
d. Mfr. of paper & paper prod.	0.08	0.07	0.06	0.00	0.00	0.00	1.89	1.28	0.04	1.80	2.20	0.42	1.28	1.40	1.45	5.61	5.27	5.05									
e. Others	15.19	17.91	15.58	0.07	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
3. Services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
a. Electricity, gas & water	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
b. Retail trade	15.19	17.91	15.58	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.99	1.01	2.20	2.88	2.70									
c. Community, social & personal services	13.17	16.50	14.30	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.41	0.44	3.41	2.39	2.35									
i. Sanitary & similar services	2.02	1.41	1.26	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
ii. Others																											
II. Domestic (HH)	43.93	45.05	54.15	0.31	0.35	0.39	0.00	0.00	0.00	79.95	67.62	71.50	11.94	13.18	15.28	73.98	76.30	77.85									
III. Surface Runoff	29.21	26.41	21.44	88.74	90.63	91.70	0.00	0.00	0.00	0.00	0.00	0.00	76.31	75.05	73.19	20.41	18.43	17.10									
1. Agriculture	9.83	8.71	7.07	29.19	29.83	30.15	0.00	0.00	0.00	0.00	0.00	0.00	24.99	24.71	23.95	8.18	5.71	5.11									
2. Forestry	19.58	17.70	14.37	59.33	60.64	61.29	0.00	0.00	0.00	0.00	0.00	0.00	50.79	50.23	48.68	12.52	11.81	10.38									
3. Urban	0.00	0.00	0.00	0.22	0.16	0.26	0.00	0.00	0.00	79.95	67.62	71.50	0.53	0.12	0.57	1.73	1.11	1.81									
Change from 1988 to 1992 (%)																											
I. Industries	17.80			-19.43			62.27			32.82			1.22					1.28									
II. Domestic (HH)	13.44			10.99						-30.44			11.81					11.22									
III. Surface Runoff	0.00			-0.08			62.27			2.38			12.29					9.94									
TOTAL	31.04			-8.51																							

Note: Effluents from community, social & personal services exclude loads of urban runoff attributed to public admin. & defense (PSIC 91).

Table 18
Discharges of Toxic and Other Water Pollutants for Relevant Sectors: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Toxic Pollutants											
		Hg		Cr		Sulfides		Phenols		P ₂ O ₅		F	
		1988	1992	1988	1992	1988	1992	1988	1992	1988	1992	1988	1992
211	Gold ore mining	263	221										
323-324	Mfr. of leather & leather products			80	93	159	188						
331	Mfr. of wood & wood products							327	260				
351,352 & 358	Mfr. of chemicals & plastic products									33,365	29,668	14,829	13,188
353	Petroleum refineries					34	35	45	45				
363	Mfr. of cement												
371	Iron & steel basic industries												
381	Mfr. of fabricated metal prod.			18	20								
	TOTAL	263	221	98	113	194	221	372	308	33,365	29,668	14,829	13,188
313	Beverage mfg.	18,199	18,199										
92	Sanitary & similar services	7,552	7,552										
HH	Household	178,313,286,567	216,925,770,408										

PSIC	Industry & Process	Toxic Pollutants											
		SO ₄		TOC		NH ₃		K		Cl		Zn	
		1988	1992	1988	1992	1988	1992	1988	1992	1988	1992	1988	1992
211	Gold ore mining												
323-324	Mfr. of leather & leather products												
331	Mfr. of wood & wood products												
351,352 & 358	Mfr. of chemicals & plastic products	108,833	96,774										
353	Petroleum refineries			1,652	1,663	244	245						
363	Mfr. of cement	8,913	10,887					7,949	9,710				
371	Iron & steel basic industries	499	574							238	276	81	89
381	Mfr. of fabricated metal prod.											81	89
	TOTAL	118,244	108,234	1,652	1,663	244	245	7,949	9,710	238	276	81	89

Legend:
Hg - Mercury
Cr - Chromium
F - Flouride
SO₄ - Sulfate
P₂O₅ - Phosphorus pentoxide
TOC - Total Organic compound
K - Potasolium
Pb - Lead
NH₃ - Ammonia
Cl - Chloride

Sectors with negligible discharges:
PSIC 211: Cu - .01 MT; Fe - .38 MT
PSIC 383: Cu - .12 MT
PSIC 422: Zn - .05 MT; Ni - .23 MT; Cr - .03 MT

* Measured in terms of billion counts of coliform

Table 19
Comparison of Phase III and Phase III Water Pollution Discharges: Philippines, 1988

Sector	Effluents (metric tons)											
	BOD5		SS		TDS		Oil		N		P	
	Preliminary	Revised	Preliminary	Revised	Preliminary	Revised	Preliminary	Revised	Preliminary	Revised	Preliminary	Revised
I. Industries	1,165,592	2,056,869	7,143,291	64,736,426	1,144,924	1,144,793	40,651	13,974	230,186	266,080	141	8,161
1. Primary	906,691	735,509	6,742,116	64,315,066	0	0	0	0	206,276	234,874	0	0
a. Livestock	906,691	735,509	4,478,759	5,297,465	0	0	0	0	0	0	0	0
b. Mining & quarrying	0	0	2,263,357	49,017,601	0	0	0	0	23,062	2,867	0	0
2. Manufacturing	248,897	168,206	230,459	171,136	1,144,391	1,144,261	40,651	13,973	23,062	2,867	0	0
a. Food, beverages & tobacco	200,170	116,884	179,932	120,433	1,022,883	1,022,883	38,151	11,247	22,340	2,057	0	0
b. Textile, wearing apparel & leather industries	25,692	25,692	14,207	14,207	36,166	36,166	455	455	341	341	0	0
c. Mfr. of paper & paper prod.	11,201	11,201	16,342	16,342	56,850	56,850	0	0	0	0	0	0
d. Manufacture of fabricated metal prods., mach. & eqpt.	0	5,756	12,414	12,414	8,969	8,969	1,014	1,014	0	0	0	0
e. Others	11,833	8,672	7,564	7,739	19,524	19,393	1,030	1,257	380	458	0	0
3. Services	10,004	1,162,155	170,716	250,226	533	533	1	1	848	28,349	141	8,161
a. Electricity, gas & water	11	11	144,978	159,052	533	533	1	1	0	0	0	0
b. Retail trade	4,089	4,089	20,195	20,195	0	0	0	0	0	0	0	0
c. Community, social & personal services	5,904	1,148,055	5,542	70,978	0	0	0	0	848	28,349	141	8,161
II. Domestic (HH)	1,092,646	3,358,167	1,092,646	1,536,769	0	0	0	0	174,823	270,760	29,137	108,279
III. Surface Runoff	0	2,334,089	5,020,481	464,333,315	0	0	248,768	65,712	1,101,961	1,807,455	38,038	30,892
1. Agriculture	0	770,249	0	152,858,963	0	0	0	0	257,282	592,500	5,184	9,361
2. Forestry	0	1,563,840	0	310,350,015	0	0	0	0	791,090	1,202,954	21,572	19,005
3. Urban	0	0	5,020,481	1,124,337	0	0	248,768	55,712	53,589	12,001	11,282	2,527
TOTAL	2,268,237	7,748,126	13,266,418	620,606,600	1,144,924	1,144,793	289,419	69,685	1,506,971	2,344,285	67,317	147,333
	% Change from Preliminary to Revised Estimate											
I. Industries	76.38		666.26		-0.01		-65.63		15.59		5673.58	
II. Domestic (HH)	207.34		40.65				-77.60		54.87		271.62	
III. Surface Runoff			9148.78						64.02		-18.79	
TOTAL	243.10		3827.20		-0.01		-75.92		55.56		118.87	

Note: Effluents from community, social & personal services exclude loads of urban runoff attributed to public admin. & defense (PSIC 91).

Table 20
Value of Environmental Waste Disposal Services to Air: Philippines, 1988, 1992 and 1995

Sector	(Total Value in P'000, 1988 prices)					
	1988	1992	1995	1988	1992	1995
	Revised			Revised		
I. AREA	0	0	0	0.00	0.00	0.00
1. Households				0.00	0.00	
a. Fuelwood				0.00	0.00	
b. Other types of fuel				0.00	0.00	
2. Others						
II. MOBILE	4,184,015	5,009,197	4,281,241	98.05	98.19	95.43
1. Households	1,864,096	2,134,397	1,724,531	43.68	41.84	
2. For hire	314,790	435,192	409,275	7.38	8.53	
3. Government	133,493	110,074	97,808	3.13	2.16	
4. Diplomatic	23,290	22,393	17,666	0.55	0.44	
5. Industries	1,848,346	2,307,141	2,031,960	43.32	45.22	45.29
a. Manufacture of food and beverage	530,892	669,033	638,517	12.44	13.11	
b. Manufacture of wood and wood products	248,231	290,195	276,900	5.82	5.69	
c. Non-metallic mining and quarrying	136,433	233,121	166,430	3.20	4.57	
d. Construction	171,468	216,934	199,348	4.02	4.25	
e. Others	761,322	897,858	750,766	17.84	17.60	
III. STATIONARY	83,177	92,512	205,077	1.95	1.81	4.57
1. Manufacture of food and beverage	64,297	72,888	137,009	1.51	1.43	3.05
2. Basic metal industries	9,467	10,152	31,434	0.22	0.20	0.70
3. Manufacture of paper and paper products, printing & publishing	3,440	3,595	12,295	0.08	0.07	0.27
4. Manufacture of chemical and chemical products, petroleum, coal, rubber & plastic products	1,987	1,909	3,410	0.05	0.04	0.08
5. Others	3,986	3,968	20,929	0.00	0.00	0.00
				0.09	0.08	0.47
TOTAL	4,267,192	5,101,709	4,486,318	100	100	100
	% Change					
		Prelim.-Rev.	Prelim.-Rev.	88-92	92-95	
I. AREA		-100.00	-100.00		0.00	
II. MOBILE		52.25	52.25	18.49	-14.53	
III. STATIONARY		-78.01	-78.01	11.22	121.68	
TOTAL		29.96	29.96	18.35	-12.06	

Table 21
Value of Environmental Waste Disposal Services to Water: Philippines, 1988, 1992 and 1995

Sector	(Total Value in P'000, 1988 prices)					
	1988	1992	1995	1988	1992	1995
	Revised			Revised		
I. Industries	4,191,484	3,404,690	3,282,365	18.82	16.79	13.93
1. Primary	3,938,336	3,147,781	3,088,156	17.68	15.52	13.10
a. Livestock	274,271	283,257	223,660	1.23	1.40	0.95
b. Mining & quarrying	3,664,066	2,864,524	2,864,497	16.45	14.13	12.15
2. Manufacturing	252,728	256,490	194,208	1.13	1.26	0.82
a. Food, beverages & tobacco	137,913	145,188	114,805	0.62	0.72	0.49
b. Textile, wearing apparel and leather industries	40,036	36,901	22,667	0.18	0.18	0.10
c. Manufacture of paper and paper products	22,728	23,312	16,505	0.10	0.11	0.07
d. Manufacture of fabricated metal products, machineries and equipment	4,821	5,407	5,496	0.02	0.03	0.02
e. Others	47,231	45,623	34,735	0.21	0.23	0.15
3. Services	419	419	0	0.00	0.00	0.00
a. Electricity, gas & water	0	0	0	0.00	0.00	0.00
b. Retail trade	0	0	0	0.00	0.00	0.00
c. Community, social and personal services*	419	419	0	0.00	0.00	0.00
II. Domestic (HH)	7,427,504	6,895,798	11,305,861	33.35	34.00	47.97
III. Surface Runoff	10,654,065	9,978,864	8,981,582	47.83	49.21	38.11
1. Agriculture	2,567,893	2,567,893	2,567,658	11.53	12.66	10.89
2. Forestry	5,220,218	5,220,218	5,219,741	23.44	25.74	22.15
3. Urban	2,865,954	2,190,553	1,194,183	12.87	10.80	5.07
TOTAL	22,273,053	20,279,153	23,569,807	100	100	100
						92-95
I. Industries	156.51			-18.77		-3.59
II. Domestic (HH)	104.14			-7.16		63.95
III. Surface Runoff	17.39			-6.34		-9.99
TOTAL	55,227,404.52			-8.95		16.23

* Note: Value from community, social & personal services exclude loads of urban runoff attributed to public admin. & defense (PSIC 91)

Appendix Table 1
Sectoral Attribution of Mobile Emissions

PSC	Sector	Sectoral Share (%)		
		1993		1995
		ENRAP II	ENRAP III	ENRAP IV
AGRICULTURE, FORESTRY AND FISHERY				
11	Agricultural crops production	0.19	0.01	0.01
111	Palay production	0.08	0.03	0.03
112	Corn production	-	-	-
113	Vegetable production	0.02	0.31	0.31
114	Fruits and nuts (excluding coconut) production	0.07	0.12	0.12
115	Coconut production including copra-making	0.02	0.38	0.38
116	Sugarcane production	-	-	-
117	Tobacco production	0.28	-	-
118	Fiber crops production	-	-	-
119	Agricultural crop production not elsewhere classified	-	-	-
12	Livestock, poultry and other animal production	0.12	0.13	0.13
121	Livestock and livestock products	0.08	0.38	0.38
122	Poultry and poultry products	-	-	-
129	Raising of other animals, including their products	-	-	-
13	Agricultural Services	0.05	0.14	0.14
130	Agricultural services	-	-	-
14	Fishery	0.23	-	-
141	Ocean (off-shore) and coastal fishing	-	-	-
142	Inland fishing	-	-	-
143	Operation of fish farms	-	-	-
149	Other fishery activities	-	-	-
15	Forestry	0.08	2.59	2.59
151	Logging operations	-	-	-
159	Other forestry activities	-	-	-
16	Hunting, trapping and game operation	-	-	-
160	Hunting, trapping and game operation	-	-	-
MINING AND QUARRYING				
21	Metallic ore mining	3.71	2.45	2.45
211	Gold ore mining	-	-	-
212	Other precious metal ore mining	2.38	-	-
213	Copper ore mining	0.06	0.57	0.57
214	Nickel ore mining	0.13	0.43	0.43
215	Chromite ore mining	-	-	-
216	Iron ore mining	0.09	-	-
219	Other base metal ore mining	-	-	-
22	Non-metallic mining and quarrying	-	1.82	1.82
221	Coal mining	-	8.14	8.14
222	Crude petroleum and natural gas exploration and production	1.24	1.09	1.09
223	Stone quarrying, clay and sand pits	1.62	0.12	0.12
229	Other non-metallic mining and quarrying	-	-	-
MANUFACTURING				
31	Manufacture of food, beverages, and tobacco	12.09	23.62	23.62
311	Food manufacturing	1.29	3.31	3.31
313	Beverage manufacturing	0.99	0.75	0.75
314	Tobacco manufacturing	-	-	-
32	Textile, wearing apparel and leather industries	1.30	2.65	2.65
321	Textile manufacturing	1.55	1.18	1.16
322	Wearing apparel	0.02	0.21	0.21
323	Manufacture of leather and leather products	-	-	-
33	Manufacture of wood and wood products including furniture and fixtures	0.67	12.01	12.01
331	Manufacture of wood and wood products	0.40	0.91	0.91
332	Manufacture of repair of furniture	-	-	-
34	Manufacture of paper and paper products, printing and publishing	0.36	1.97	1.97
341	Manufacture of paper and allied products	0.48	1.05	1.05
342	Printing, publishing and allied industries	-	-	-
35	Manufacture of chemicals and chemical petroleum, coal, rubber and plastic products	1.95	4.27	4.27
351, 352 & 356	Manufacture of chemicals and plastic products	-	0.60	0.60
353)	Petroleum refineries	-	-	-
354)	Manufacture of misc. prods. of petroleum and coal	0.47	0.77	0.77
355	Manufacture of rubber products	-	-	-

continued

Appendix Table 1 (continued)

36	Manufacture of non-metallic mineral products	0.72	0.43	0.43
361	Manufacture of pottery, china and earthenware	-	0.96	0.96
362	Manufacture of glass and glass products	-	1.79	1.79
363	Manufacture of cement	-	1.95	1.95
369	Manufacture of other non-metallic mineral prods.	-	-	-
37	Basic metal industries	-	2.73	2.73
371	Iron and steel basic industries	1.05	0.71	0.71
372	Non-ferrous metal basic industries	-	-	-
38	Manufacture of fabricated metal products, machines and equipment	-	-	-
381	Manufacture of fabricated metal products	0.68	0.97	0.97
382	Manufacture of machinery except electrical	0.32	0.70	0.70
383	Manufacture of electrical machinery, etc.	1.14	1.31	1.31
384	Manufacture of transport equipment	0.28	0.81	0.81
385	Manufacture of professional and scientific and measuring and controlling equipment	-	0.04	0.04
386	Manufacture of repair of metal furn and fixtures	-	0.03	0.03
39	Other manufacturing industries	0.59	0.40	0.40
390	Other manufacturing industries	-	-	-
ELECTRICITY, GAS AND WATER				
41	Electricity	15.51	0.65	0.65
411	Electricity generation and distribution	-	-	-
412	Electricity distribution to consumers	-	-	-
42	Gas and steam	15.51	-	-
421	Gas Manufacture and distribution through systems	-	-	-
422	Steam heat and power plants	-	-	-
43	Waterworks and supply	2.49	-	-
430	Waterworks and supply	-	-	-
CONSTRUCTION				
50	Construction	1.09	1.71	1.71
501	General building construction	-	6.84	6.84
502	General engineering construction	-	0.64	0.64
503	Special trade construction	-	-	-
WHOLESALE AND RETAIL TRADE				
61	Wholesale trade	0.93	1.68	1.68
618	Petroleum and petroleum products wholesaling	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATION				
71	Transportation services	-	-	-
711	Railway transport	-	-	-
712	Road passenger transport	2.83	-	-
713	Water transport	1.11	0.30	0.30
714	Air transport	3.65	0.31	0.31
719	Services allied to transport	-	-	-
72	Storage and warehousing	3.34	0.01	0.01
720	Storage and warehousing	6.78	0.22	0.22
73	Communication	-	-	-
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES				
81	Banking institutions	0.63	0.56	0.56
82	Financial intermediaries	0.08	0.13	0.13
83	Insurance	0.16	0.10	0.10
84	Real estate	1.19	0.17	0.17
85	Business services	0.49	0.46	0.46
COMMUNITY, SOCIAL AND PERSONAL SERVICES				
91	Public administration and defense	3.03	-	-
92	Sanitary and similar services	0.13	0.13	0.13
93	Education services	0.13	0.20	0.20
94	Education services	0.13	-	-
96	Other social and related community services	0.13	-	-
96	Recreational and cultural services	0.13	-	-
97	Personal and household services	0.13	-	-
98	Restaurants and hotels	0.13	-	-
99	International organization and other extra-territorial bodies	-	-	-
HH	Household	-	-	-
TOTAL		96.14	98.91	98.91

Notes:

1. The sectoral attribution excludes sectors (namely, PSIC 712, 91, 99 and HH) which have data on fuel consumption and no. of registered vehicles.
2. The ENRAP II sectoral share is based on fixed asset value share while the ENRAP III is based on the sector's share to total gasoline and diesel consumption.

Appendix Table 2
Process Rates Used in Computing Water Pollution Loads: Philippines, 1988, 1992 and 1995

PSIC	Industry & Process	Wastewater Volume (cu m/unit)	Production per year/ Process rate			Effluent Factors (kg/unit)							
			1988	1992	1995	BOD ₅		TDS	Oil	N	P		
						65	85						
AGRICULTURE, FORESTRY AND FISHERY						1.30	x N	257.89	x N			0.20	0.20
11	Agricultural crops production (runoff)												
12	Livestock production											0.40	
121	Livestock and livestock products	1.8	7,500,520	8,022,000	8,377,520	26.40		183.00					
	Swine feedlot (heads)											0.51	
122	Poultry and poultry products	0.04	11,040,000	10,600,000	10,154,075	1.40		14.00				1.68	
	Broiler feedlot (heads)	0.13	15,260,000	14,920,000	14,608,150	4.60		47.07				0.51	
	Layer houses (heads)	0.04	5,070,000	8,512,000	11,720,783	1.4		14.6					
120	Raising of other animals including their products	20.2	1,700,000	1,658,000	1,827,468	250.00		1,716.00				80.30	
	Cattle feedlot (heads)					1.30	x N	257.89	x N				
18	Forestry (runoff)												
21	Metallic ore mining												
211	Gold ore mining												
213	Copper ore mining												
215	Chromite ore mining												
219	Other base metal ore mining												
22	Non-metallic ore mining		1,335,887,000	1,372,007,800	1,400,179,435			0.01					
221	Coal mining (kg)												
223	Stone quarrying, clay and sand pits		15,584,380	16,575,921	17,379,538			0.01					
	Sand and gravel (mt)		241,916	370,700	539,280			0.05					
	Rock aggregates (mt)												
MANUFACTURING													
31	Manufacture of food, beverage and tobacco												
311-312	Food manufacturing	5.3	1,183,000	854,350	458,830	6.40		5.20				2.00	1.58
	Slaughtering, preparing and preserving meat (mt of LWK)	9.3	118,300	85,435	45,883	6.30		3.00				2.30	1.59
	Packing house (mt of LWK)	37.5	65,370	103,870	158,838	11.80		12.70	15.00		6.80		
	Poultry processing (1000 birds)	2.4	4,380	15,000	82,153	5.30		2.20	3.30				
	Dairy products (mt of milk)	11.3	189,347	248,791	316,701	12.50		4.30					0.64
	Canning and preserving of fruits and vegetable (mt)	2.3	180	180	180	7.90		9.20				4.50	
	Canning, preserving and processing of fish, etc (mt)	0.79	980,250	1,800,000	3,123,590	12.90		16.40	882.00			6.50	
	Prodn of crude coco oil, including cake and meal (mt)	57.5	0	0	0	12.90		18.40	882.00			6.50	
	Manufacture of vegetable and animal oils and fats (mt)	0.8	5,831,150	5,933,785	6,012,461	1.10		1.60					
	Rice milling (mt)	0.8	3,011,040	3,099,918	3,189,048	1.10		1.60					
	Corn milling (mt)	33	1,472,064	1,472,064	1,472,064	13.40		9.70	42.30		1.20		
	Flour milling excluding cassava (mt)	28.8	1,388,916	2,010,845	2,604,206	2.60		3.90					
313	Sugar milling and refining (mt)												
	Beverage manufacturing	63	210,200	210,200	210,200	220.00		257.00	365.00				
	Alcohol distilleries (mt)					0.28							
	Wine production (cu m)	14.5	120,000	120,000	120,000	8.00		14.70					
	Beer production (cu m)	7.1	4,918,080	4,918,080	4,918,080	2.50		1.30					
	Soft drinks Manufacture (mt)												
32	Textile, wearing apparel and leather industries												
321	Textile manufacturing	317	113,300	81,400	85,393	155.00		70.00	205.00				
	Cotton (mt)	100	33,000	33,000	33,000	105.00		95.00	150.00				
	Polyester (mt)												
323-324	Manufacture of leather and leather products	52	72,701	20,028	30,183	89.00		138.00	351.00	20.00		15.00	
	Leather tanneries (mt of hides)												

continued

Appendix Table 2 (continued)

PSIC	Industry & Process	Wastewater Volume (cu m/unit)	Production per year/ Process rate			Effluent Factors (kg/unit)						
						BOD6	SS	TDS	Oil	N	P	
			1988	1992	1995							
33	Manufacture of wood and wood products											
331	Manufacture of wood and wood products											
	Plywood manufacturing (1000 sq m)	4.1	65,387	52,054	44,492	4.10	1.10	3.10			0.24	
	Fiberboard manufacturing (mt)	20	38,000	0	0	12.50	20.00					
34	Manufacture of paper and paper products											
341	Manufacture of paper and allied products	61.3	223,000	232,000	239,084	31.00	18.00	188.00				
	Sulfate (kraft) pulp (mt)					130.00	20.00	258.00				
	Sulfite pulp (mt)					27.00	12.50	134.00				
	Semi-chemical pulp (mt)					8.00	23.00	37.00				
	Paper mills (mt)	54	530,000	584,325	580,988							
35	Manufacture of chemical and chemical products, petroleum, coal, rubber and plastic products											
351, 352 & 358	Manufacture of chemicals and plastic products											
	Basic chemicals	1.62	248,246	248,246	248,248	negl.	negl.	negl.	negl.	negl.	negl.	
	-Sulfuric acid (mt)					negl.	negl.					
	-Hydrochloric acid (mt)										0.15	
	Fertilizer										0.15	
	- Normal superphosphate (mt)		1,070,000	923,300	831,577							
	- Phosphoric acid with pond (mt)		254,000	254,000	254,000							
	- Pesticides (mt)		0	0	0	22.70	9.00	305.00				
	- Chlorinated HC herbicides (mt)	10	182,500	182,500	182,500	20.00	4.00		2.00			
	Glycerine refining (mt)	3.1	51,000	57,738	63,848	13.50	23.00					
	Soap from fatty acids (mt)	2.8	205,000	205,000	205,000	0.40	0.70		0.40			
	Detergents (mt)		0	0	0	5.30	0.60					
	Liquid detergents (mt)		0	0	0	10.00	1.50					
	PVC (plastics) (mt)	12.5	40,500	48,000	54,980							
	Penicillin	4.5	28	25	23	12800.00						
353	Petroleum refineries											
	Integrated refineries (1000 cu m feedstock)	234	11,887	11,963	12,020	187.00	58.00		75.00	20.50		
	Petrochemical refineries (1000 cu m feedstock)		0	0	0	171.60	48.60		52.90	34.30		
355	Rubber products											
	Tire and tube manufacturing (mt)		0	0	0		1.00	12.00	0.12			
36	Manufacture of non-metallic mineral products											
362	Manufacture of glass and products (mt)	45.9	301,120	348,188	390,843		0.70	8.00				
363	Manufacture of cement											
	Cement: wet process (mt)	5.1	2,408,840	2,942,401	3,458,778		0.00	8.60				
	dry process (mt)	5.1	2,044,138	3,598,286	4,227,301		negl.	0.30				
37	Basic metal inds.											
371	Iron and steel basic industries											
	Sintering (mt)	11.8	5,475,000	5,475,000	5,475,000	0.05	0.28					
	Casting and rolling (mt)	11.8	1,182,000	1,379,000	1,547,899	0.14	0.20					
38	Mfr. of fabricated metal products, machines & eqpt.											
381	Manufacture of fabricated products											
	Appliances (mt of iron sheet)	55	183,980	202,180	217,899	19.30	8.30	22.60	3.40			
	Mfr. of machinery except electrical (mt of iron sheets)	55	114,400	167,200	232,012	19.30	8.30	22.60	3.40			
382	Mfr. of machinery except electrical (mt of iron sheets)											
383	Mfr. of electrical machinery, etc. (100 units)	0.00167	14,855,556	14,855,556	14,855,556		0.67	0.15				
ELECTRICITY, GAS AND WATER												
41	Electricity											
411	Electricity generation and distribution											
	Oil-based (liter of waste water)	1.833	17,009,143,000	20,549,872,000	23,819,335,142		7000					
	Coal (liter of wastewater)	2.101	5,424,782,000	3,237,641,000	2,353,990,358		7000.00					
	Hydro-powered (000 MWh)	129	4,842	7,878	12,187	2.20	288.00	110.00	0.15			
RETAIL TRADE												
628	Retail trade											
	Gasoline dispensing (# stations * 365 days)	9.94/cu m/d	249,880	584,000	1,388,855	16.38	80.83					

continued

Appendix Table 2 (continued)

PSIC	Industry & Process	Wastewater Volume (cu m/unit)	Production per year/ Process rate			Effluent Factors (kg/unit)							
			1988	1992	1996	BOD5	SS	TDS	Oil	N	P		
Appendix Table 2 (continued)													
COMMUNITY, SOCIAL AND PERSONAL SERVICES									178.00		8.82	1.90	0.40
91	Public administration and defense (urban runoff)												
92	Sanitary and similar services (heads)												
94	Medical, dental, other health and vet. services (heads)												
97	Personal and household services (100 kg)	2.88	63,871	63,871	63,871	9.46	3.78						
98	Restaurants and hotels												
992	Hotels, motels and other lodging places, n.e.c. (heads)												
HH	HOUSEHOLD SECTOR	0.1											

Notes on effluent factors:

- PSIC 11 & 15 Pollutants measured in terms of runoff, computed as 20% of estimated volume of nutrients lost through soil erosion from croplands, grassland and forestland.
- PSIC 91: Effluent = vol. of urban runoff (in l) x effluent factor (mg/l) where Urban runoff = Average annual rainfall (m) X Total area of urban centers (sq m) X Coefficient of urban runoff (0.04)
 - * Total area of urban centers = cities/municipalities with population greater than 1,000
 - * Coefficient of urban runoff = of the volume of rainfall that falls on urban areas, 60% is washed off, ending up in sewers, nearby rivers or creeks.
- PSIC 92 Computation is based on the volume of collected garbage which is 15% of the total wastes generated. The estimated volume of domestic waste generated per capita per day is .629 kg in 1988 and .637 kg in 1992 based on the estimates of the Updated Solid Waste Management Plan for MM (1993-1998). This is equivalent to 313 g BOD per capita and 319 g DOB per capita, respectively, based on MW98 Solid Waste Study estimates of 500 g BOD/kg of domestic solid waste. The total estimated volume of solid waste generated per capita is 1.08 kg/d in 1988 & 1.26 kg/d in 1992 based on the Solid Waste Study. This includes industrial, commercial & other sources of wastes. N content is 0.6% on a dry weight basis; equivalent to 1.63 and 1.86 kg per capita per year for 1988 & 1992, respectively while P is approximately 20% of N (Sogah. 1974. Laguna de Bay Water Resources Devt. Study).
- HH sector:
 - Domestic wastes: Computation is based on the volume of collected garbage which is 85% of the total wastes generated
 - Liquid wastes effluent factors (g/d) used were as follows: BOD₅ - 76; N - 12; P - 2 (ENRAP II Report).
 - From detergents (MEIP, 1994 Econ. Valuation of the Impact of Environmental Degradation of Laguna de Bay); leachate - 20% of pollution from sanitary waste (ENRAP II Report).
- For all other sectors: WHO Rapid Assessment (1992) method was used. Effluent = Annual volume of production X Effluent factor, except for:
 - PSIC 38, where the volume of iron sheets used as input was used as process rate & for PSIC 383 - factors were generated from the data provided by a semi-conductor company in the PH.
 - PSIC 371, where the effluent factors used were from UNEP, 1990 Guidelines for Environmental Mgt. of Iron & Steel Works.
 - PSIC 826 (Retail of petroleum prod. & other services rendered by gas stations), discharges are computed by multiplying the total no. of large gas stations (excluding petroleum & car care products and other car care services) by the appropriate effluent factors.
 - PSIC 97 (laundry services), discharges were derived by multiplying the estimated annual volume of clothes washed by the appropriate effluent factors. The volume of clothes was derived by dividing the total revenue from laundry services (NSO, 1988) by the average fee collected per kilogram of clothes (based on interviews with major laundry establishments). Effluent factors used were based on EMB data showing the ave. concentrations of pollutants in wastewater from commercial laundry establishments in MM. In 1999, discharges were assumed to increase by 10% from 1992.
 - PSIC 94, discharges were estimated based on the total # of patients & employees of the hospitals. The procedure for effluent estimation was similar to domestic source pollution. In 1999, discharges were assumed to increase by 10% from 1992.
 - PSIC 98, discharges were estimated based on the total # of hotel occupants for the given period. The procedure for effluent estimation was similar to domestic source pollution. In 1999, discharges were assumed to increase by 10% from 1992.
 - PSIC 12 (livestock & poultry), discharges were derived by multiplying the # of animal heads per type in the annual inventory by the corresponding effluent factors.
 - PSIC 21 (mining sector), SS were measured in terms of actual tailings generated per type of metal. Tailings were based on industry reports submitted to Mines and Geosciences Bureau by the different mining establishments.
 - PSIC 22, factors were computed based on actual emissions (Arelano, p. 9)
 - PSIC 41, effluents were estimated based on volume of wastewater, i.e. coal-based - 210 l/ter/MWH & coal-based - 1633 l/ter/MWH. Effluent factors are in terms of mg/liter.
- PSIC 363: 45% wet process production of cement & 65% dry process.
- Sectors with similar production data for 1988 & 1992:
 - Based on capacity:
 - PSIC 311 (canning of fish)
 - PSIC 311 (starch mfg)
 - PSIC 313 (alcohol)
 - PSIC 313 (softdrinks)
 - PSIC 313 (beer)
 - PSIC 321
 - PSIC 351, 362 & 368 which includes - sulfuric acid, phosphoric acid, detergents & glycine refining
 - PSIC 371 (slitting)
 - PSIC 383
 - Assumed vol. for 1992 as the same with 1988: PSIC 97

Sources/References:

- PSIC 11 - N & P carried by soil erosion; Isarico, H. 1993. Island Soil Resources of the Philippines: Resource Assessment and Accounting for Soil Degradation - ENRAP II, (unpublished)
- PSIC 12 - No. of heads: BAS, 1990. Selected Statistics on Agriculture and Philippine Agriculture Factbook

Abbreviations used:

l	= liter (short)
mt	= metric ton
sq m	= square meter
kg	= kilogram
LWK	= flowweight lifted
MWH	= megawatt hour
cu m	= cubic meter

Appendix Table 3
Household Toilet Facilities: Philippines, 1988, 1992 and 1995

Type of Facility	No. of Households			% HH to Total			Est. No. of Population		
	1988	1992	1995	1988	1992	1995	1988	1992	1995
Philippines	10,533,927	12,214,730	13,226,072	100.00%	100.00%	100%	58,721,307	64,258,611	68,614,200
Sanitary toilet	6,753,050	9,397,567	10,331,516	64%	77%	77%	38,335,334	48,682,121	52,789,257
Unsanitary toilet	1,917,403	1,347,508	1,381,148	18%	11%	11%	10,324,390	7,466,952	7,569,401
No toilet facility	1,863,475	1,469,655	1,513,409	18%	12%	12%	10,061,583	8,109,538	8,255,543
Urban	3,985,145	6,068,488	7,350,237	38%	50%	50%	24,416,144	28,144,256	34,088,715
Sanitary toilet	3,332,038	5,279,585	6,394,706	84%	87%	87%	20,414,694	24,485,503	29,657,182
Unsanitary toilet	315,470	364,109	441,014	8%	6%	6%	1,932,821	1,688,655	2,045,323
No toilet facility	337,637	424,794	514,517	8%	7%	7%	2,068,629	1,970,098	2,386,210
Rural	6,548,782	6,146,242	5,875,835	62%	50%	50%	34,305,163	36,114,355	34,525,485
Sanitary toilet	3,421,012	4,117,982	3,936,809	52%	67%	67%	17,920,640	24,196,618	23,132,075
Unsanitary toilet	1,601,933	983,399	940,134	24%	16%	16%	8,391,569	5,778,297	5,524,078
No toilet facility	1,525,838	1,044,861	998,892	23%	17%	17%	7,992,955	6,139,440	5,869,332
Population									
Philippines	58,721,307	64,258,611	68,614,200	100%	100%	100%			
Urban	24,416,144	28,144,256	30,051,935	42%	44%	44%			
Rural	34,305,163	36,114,355	38,562,265	58%	56%	56%			
Ave. HH size									
Philippines	5.57	5.26	5.26						
Urban	6.13	4.64	4.64						
Rural	5.24	5.88	5.88						

Notes:

- As per DOH Health Survey (1987 and 1992), the type of toilet facilities are classified as follows: sanitary toilet - includes water-sealed and sanitary pit; unsanitary toilet - includes open privy pit and drop and overhang types.
- For 1988, national breakdown by type of toilet facility is based on 1987 DOH survey while urban/rural breakdown is based on 1990 Census of Population and Housing.
- The population estimates are based on the medium assumption, i.e., moderate fertility and moderate mortality decline.
- In 1995, actual population was used to determine the no. of households in the rural and urban areas. The distribution of households for 1995 was based on 1992 percentage shares.

References:

- NSCB 1992, 1995. 1992, 1995 Philippine Statistical Yearbook.
- DOH. 1992 National Health Survey

Appendix Table 4
Liquid Waste from Domestic Sources: Philippines, 1988, 1992 and 1995

Type of Facility and Waste/Source	Pollutants (metric tons)												Coliform (billion counts)		
	BOD ₅			SS			N			P			1988	1992	1995
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Sanitary Waste	1,607,498	1,759,079	1,678,314	1,607,498	1,759,079	1,678,314	257,199	281,453	300,530	42,867	46,809	50,088	178,563,714,257	216,662,135,617	268,856,810,585
Sanitary toilet	1,049,430	1,332,673	1,445,100	1,049,430	1,332,673	1,445,100	167,909	213,228	231,217	27,985	35,536	38,538	136,336,407,166	179,268,640,284	222,840,091,083
Unsanitary toilet	282,630	204,408	207,212	282,630	204,408	207,212	45,221	32,705	33,154	7,637	5,451	5,020	20,972,030,568	17,613,336,986	20,674,075,388
No toilet facility	275,436	221,909	225,905	276,436	221,999	225,995	44,070	35,620	36,159	7,345	6,920	6,027	21,255,276,524	19,778,958,344	23,342,643,494
Urban	669,392	770,449	933,179	669,392	770,449	933,179	108,943	123,272	149,308	17,624	20,545	24,885	137,243,145,424	170,526,047,104	220,230,143,024
Sanitary toilet	559,852	670,291	811,885	559,852	670,291	811,885	89,410	107,247	129,898	14,903	17,874	21,650	114,750,885,847	148,357,880,980	181,600,224,430
- served by sewerage system	31,043	31,043	31,043	31,043	31,043	31,043	497	497	497	828	828	828	6,374,214,000	6,070,908,000	-
- unserved by sewerage system	527,809	539,247	780,822	527,809	639,247	780,822	88,920	106,750	129,402	14,075	17,047	20,822	108,376,762,847	141,406,754,980	191,600,224,430
Unsanitary toilet	52,911	48,227	65,991	52,911	48,227	65,991	8,408	7,396	8,959	1,411	1,233	1,493	10,864,385,782	10,231,502,026	13,213,808,581
No toilet facility	56,829	53,931	65,323	56,829	53,931	65,323	9,081	8,029	10,452	1,510	1,438	1,742	11,627,762,795	11,938,623,297	15,416,110,012
Rural	939,104	988,630	945,135	939,104	988,630	945,135	150,257	158,181	151,222	25,043	26,363	25,204	41,320,568,834	48,138,088,513	48,626,687,541
Sanitary toilet	490,878	662,382	633,241	490,878	662,382	633,241	78,492	105,961	101,318	13,082	17,864	16,986	21,685,410,319	30,811,179,303	31,239,867,253
Unsanitary toilet	229,719	196,181	151,222	229,719	168,181	151,222	38,755	25,309	24,195	6,128	4,218	4,033	10,107,644,786	7,381,774,162	7,480,266,807
No toilet facility	218,807	168,087	160,673	218,807	168,087	160,673	35,009	26,891	25,708	6,935	4,482	4,285	9,627,513,729	7,843,135,047	7,920,633,482
Detergent	-	-	-	-	-	-	-	-	-	84,300	70,383	75,133	-	-	-
Urban	-	-	-	-	-	-	-	-	-	26,736	30,618	37,327	-	-	-
Rural	-	-	-	-	-	-	-	-	-	37,564	39,545	37,805	-	-	-
SUMMARY OF DISCHARGES															
Urban	669,392	770,449	933,179	669,392	770,449	933,179	108,943	123,272	149,308	17,624	20,545	24,885	137,243,145,424	170,526,047,104	220,230,143,024
Rural	939,104	988,630	945,135	939,104	988,630	945,135	150,257	158,181	151,222	25,043	26,363	25,204	41,320,568,834	48,138,088,513	48,626,687,541
Breakdown by type															
Sanitary Waste	1,607,498	1,759,079	1,678,314	1,607,498	1,759,079	1,678,314	257,199	281,453	300,530	42,867	46,809	50,088	178,563,714,257	216,662,135,617	268,856,810,585
Detergent	-	-	-	-	-	-	-	-	-	84,300	70,383	75,133	-	-	-
TOTAL	1,607,498	1,759,079	1,678,314	1,607,498	1,759,079	1,678,314	257,199	281,453	300,530	107,166	117,272	125,221	178,563,714,257	216,662,135,617	268,856,810,585

Notes:
 1. The no. of popn. served by sewerage systems is as of mid-1988 (DAWSS).
 2. Effluent factors used (in $\mu\text{M/l}$): BOD₅ - 76, 89 - 76, N - 12, P - 2 (RTIAD II Report); P from detergents - 3 (MEHP, 1984. Econ. Valuation of the Impact of Environmental Degradation of Laguna de Bay); leachate - 70% of pollution from sanitary waste (RTIAD II Report).
 3. For the Coliform counts, these are derived using an average volume of WWTP effluent generated multiplied by the effluent factor which is 10^6 to 10^8 count/100 ml wastewater or an average per capita of 10^7 count per 100 ml (WPK), 1993. Assessment of Sources of Air, Water, & Land Pollution. The unit is MPN (most probable number). The ave. per capita WW generated/year is based on the ave. per capita intake as follows (AWTRC, 1993. LNERP Assistance to the National Water Resources Course II Framework Plan for Southern Tagalog), μl :

Ave. per capita intake (cu ml/d):	1975	1991	1998	1992	2000	2000
urban	0.115	0.154	0.164	0.189	0.190	0.190
rural	0.025	0.033	0.033	0.035	0.040	0.040

Appendix Table 5
Liquid Waste (Controlled) from Domestic Sources: Philippines, 1988, 1992 and 1995

Type of Facility and Waste/Source	Pollutants (metric tons)										Coliform (billion counts)				
	BOD ₅		SS		N		P		1988		1992	1985			
	1988	1992	1988	1992	1988	1992	1988	1992	1988	1992	1985				
Sanitary Waste	1,477,718	1,600,978	1,708,969	1,477,718	1,600,978	1,708,969	240,011	259,733	277,011	39,408	42,693	45,572	159,830,702,341	193,238,528,788	244,572,801,397
Water sealed toilet/septic tank	919,652	1,174,571	1,275,761	919,652	1,174,571	1,275,761	150,721	101,508	207,698	24,524	31,322	34,020	117,603,395,249	155,845,231,455	200,556,082,515
Other type of toilet	282,630	204,408	207,212	282,630	204,408	207,212	45,221	32,705	33,154	7,537	6,451	6,528	20,972,030,568	17,613,338,988	20,674,075,388
Without toilet/septic tank	275,436	221,999	225,995	275,436	221,999	225,995	44,070	35,520	36,159	7,345	6,027	5,920	21,255,278,524	19,779,956,344	23,342,643,494
Urban	687,672	678,585	627,157	507,872	678,585	627,157	87,604	112,180	135,821	18,871	18,099	22,058	120,668,874,939	150,193,558,208	201,070,120,580
Water sealed toilet/septic tank	478,132	678,427	705,844	478,132	678,427	705,844	80,077	08,124	118,611	18,071	18,823	18,823	08,178,525,962	128,025,170,082	172,440,201,987
- served by sewerage system	3,104	3,104	3,104	3,104	3,104	3,104	60	50	50	83	83	83	637,421,400	687,090,600	-
- unserved by sewerage system	475,028	675,323	702,740	475,028	675,323	702,740	80,028	66,075	118,462	12,867	15,342	18,740	97,539,104,662	127,338,079,482	172,440,201,987
Other type of toilet	52,911	46,227	55,991	52,911	46,227	55,991	8,466	7,396	8,059	1,411	1,233	1,493	10,804,385,782	10,231,562,828	13,213,808,581
Without toilet/septic tank	56,629	53,931	65,323	56,629	65,323	65,323	9,081	8,629	10,452	1,510	1,438	1,742	11,627,782,795	11,936,823,297	16,416,110,012
Rural	880,046	822,392	881,811	880,046	822,392	881,811	142,407	147,583	141,090	23,735	24,597	23,615	38,182,027,802	43,044,970,582	43,502,880,816
Water sealed toilet/septic tank	441,520	596,144	569,916	441,520	596,144	569,916	70,643	95,383	91,187	11,774	15,897	15,198	19,426,869,287	27,820,081,373	28,115,880,527
Other type of toilet	229,719	158,181	151,222	229,719	158,181	151,222	36,755	25,309	24,195	6,126	4,218	4,033	10,107,844,786	7,381,774,162	7,480,260,807
Without toilet/septic tank	218,807	158,067	160,673	218,807	160,673	160,673	35,009	28,891	25,708	6,835	4,482	4,285	9,627,513,729	7,843,135,047	7,926,533,482
Detergent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUMMARY OF DISCHARGES															
Urban	587,672	678,585	627,157	587,672	678,585	627,157	87,604	112,180	135,821	18,871	18,099	22,058	120,668,874,539	150,193,558,208	201,070,120,580
Rural	880,046	822,392	881,811	880,046	822,392	881,811	142,407	147,583	141,090	23,735	24,597	23,615	38,182,027,802	43,044,970,582	43,502,880,816
Breakdown by type:															
Sanitary Waste	1,477,718	1,600,978	1,708,969	1,477,718	1,600,978	1,708,969	240,011	259,733	277,011	39,408	42,693	45,572	159,830,702,341	193,238,528,788	244,572,801,397
Detergent	-	-	-	-	-	-	-	-	-	84,300	70,383	75,133	-	-	-
TOTAL	1,477,718	1,600,978	1,708,969	1,477,718	1,600,978	1,708,969	240,011	259,733	277,011	103,708	113,028	120,705	159,830,702,341	193,238,528,788	244,572,801,397

Note: Estimates assume:
a. 10% removal efficiency for septic tanks
b. 10% leakage from sewerage systems
c. no reduction of pollutants for unsanitary toilet and no toilet facility

FN: YES VALUES APPTXLSIATS!
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Appendix Table 6
MANNER OF GARBAGE DISPOSAL: PHILIPPINES, 1988, 1992 and 1995

Usual Manner of Garbage Disposal	No. of Households			% HH to Total			Est. No. of Population		
	1988	1992	1995	1988	1992	1995	1988	1992	1995
PHILIPPINES	10,533,927	12,214,730	13,226,072	100%	100%	100%	58,721,307	64,258,611	68,614,200
Collected (Municipal Garbage Truck)	1,580,089	2,320,799	2,512,954	15%	19%	19%	8,808,196	12,209,136	13,036,698
Uncollected	8,953,838	9,893,931	10,713,118	85%	81%	81%	49,913,111	52,049,475	55,577,502
Dumping	1,896,107	2,565,093	2,777,475	18%	21%	21%	10,569,835	13,494,308	14,408,982
Burning	5,056,285	5,496,629	5,951,732	48%	45%	45%	28,186,227	28,916,375	30,876,390
Composting	632,036	488,589	529,043	6%	4%	4%	3,523,278	2,570,344	2,744,568
Burying	421,357	610,737	661,304	4%	5%	5%	2,348,852	3,212,931	3,430,710
Feeding to Animals	210,679	366,442	396,782	2%	3%	3%	1,174,426	1,927,758	2,058,426
Others	737,375	366,442	396,782	7%	3%	3%	4,110,491	1,927,758	2,058,426

Note: The 1987 distribution of HH in terms of the manner of garbage disposal was adopted for 1988, 1992 and 1995.

Appendix Table 7
SOLID WASTE POLLUTION FROM DOMESTIC SOURCES: PHILIPPINES, 1988, 1992 and 1995

	Estimated Vol. of Solid Waste Generated (mt)			Pollutants (metric tons)														
	1988	1992	1995	BOD5			TDS			SY			N			P		
				1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
PHILIPPINES	13,417,231	14,940,448	16,153,493	2,951,920	3,523,942	3,762,803	0	0	0	0	0	0	47,282	57,370	60,868	9,456	11,474	12,174
Collected	2,012,585	2,836,685	3,069,165	1,006,336	1,394,894	1,489,443							16,119	22,709	23,857	3,224	4,542	4,771
Uncollected	11,404,647	12,101,763	13,084,333	1,945,584	2,129,048	2,273,360	0	0	0	0	0	0	31,163	34,661	37,010	6,233	6,932	7,402
Dumped, buried, others	3,890,997	4,332,730	4,684,514	1,945,584	2,129,048	2,273,360							n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Composted, fed to animals	1,073,379	1,045,831	1,130,745	n.a.	n.a.	n.a.							n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Burned	6,440,271	6,723,202	7,269,074	n.a.	n.a.	n.a.							n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
URBAN	5,578,845	6,543,680	7,074,977															
	41.58%	43.80%	43.80%															
RURAL	7,838,387	8,396,768	9,078,521															
	58.42%	56.20%	56.20%															

Notes:

- 1 Percentage of solid waste that are either burned, composted or fed to animals is deducted from volume uncollected.
- 2 Est. vol. of domestic waste generated per capita per day is .626 kg/d in 1988 & .637 kg/d in 1992 based on the est. of the Updated Solid Waste Mgt. Plan for MM (1993-1998).
- 3 Est. vol. of domestic waste generated per capita per day is .626 kg/d in 1988 & .637 kg/d in 1992 based on the est. of the Updated Solid Waste Mgt. Plan for MM (1993-1998). This is equivalent to 313 g BOD₅/d and 319 g BOD₅/d, respectively based on MWSS Solid Waste Study est. of 500g BOD₅/kg of dom. solid waste. The total estimated volume of solid waste generated per capita is 1.06 kg/d in 1988 & 1.26 kg/d in 1992 based on the Solid Waste Study. This includes industrial, commercial and other sources of wastes.
- 4 N content is 0.8% on dry weight basis, equivalent to 1.83 & 1.86 kg/yr for 1988 & 1992, respectively. P is approx 20% of N (Sogreah, 1974; Laguna de Bay Water Res. Dev't. Study).
- 5 Est. vol. of domestic waste generated per capita per day is .645 kg/d in 1995 based on the estimated growth rate of domestic waste generated per capita from 1988 to 1992.

Appendix Table 8
ESTIMATED AREA WITH AVERAGE SOIL LOSS > 10 TONS PER HECTARE BY REGION: PHILIPPINES, 1988

Region	Total Area (Ha)	Erosion Class						Total Eroded Area	
		Slight Erosion (E1) Area (Ha)	Ave. Soil Loss (t/Ha)	Moderate Erosion (E2) Area (Ha)	Ave. Soil Loss (t/Ha)	Severe Erosion (E3) Area (Ha)	Ave. Soil Loss (t/Ha)	(Ha)	% to Total Area
CAR	1,829,368			737,134	17.70	412,729	59.40	1,149,863	62.86%
I	1,284,019	242,342	26.80	262,226	36.30	264,569	54.00	769,137	59.90%
II	2,683,758	374,153	26.80	1,158,953	36.30	416,644	54.03	1,949,750	72.65%
III	1,823,082			323,659	17.70	143,297	53.40	466,956	25.61%
IV	4,756,016			649,304	17.70	152,782	59.40	802,086	16.86%
V	1,763,249	635,856	26.80	511,197	36.30	153,579	54.00	1,300,632	73.76%
VI	2,022,311			497,893	25.24	391,721	69.64	889,614	43.99%
VII	1,495,142					328,733	26.21	328,733	21.99%
VIII	2,143,169			387,706	25.24	404,442	18.87	792,148	36.96%
IX	1,868,514					212,343	54.72	212,343	11.36%
X	2,832,774			920,531	17.50	603,451	61.50	1,523,982	53.80%
XI	3,169,275	1,090,510	12.40	574,877	18.70	966,174	57.40	2,631,561	83.03%
XII	2,329,323			706,767	50.80	464,960	222.30	1,171,727	50.30%
TOTAL	30,000,000	2,342,861 16.75%		6,730,247 48.11%		4,915,424 35.14%		13,988,532 100.00%	46.63%

Notes:

- Blank area means area eroded is less than 10 tons/ha.
- For Regions VI & IX, ave. soil loss and area covered under E2 are: 6.97 t/ha (558,010 ha) and 8.10 t/ha (705,116 ha), respectively.
- For 1995, the same values were used as that of 1988 and 1992.

Reference:

BSWM, ALMED. Crop Development and Soil Conservation Framework for the Islands of Luzon (1990), Visayas (1990) and Mindanao (1989).

Appendix Table 9
ESTIMATED EQUIVALENT NUTRIENT CONTENT OF ERODED SOIL WITH EROSION
RATE > 10 TONS PER HECTARE, BY REGION: 1988

Region	Eroded Area a (Ha)	Estimated Total Soil Loss b (Kg)	Average NPK Content Per Ton of Soil (MT)			Estimated Nutrient Content (Metric Tons)		
			c			b x c		
			N	P	K	N	P	K
CAR	1,149,863	37,563,374	2.22	0.07	0.04	83,391	2,629	1,503
I	769,137	30,300,295	1.68	0.04	0.12	50,904	1,212	3,636
II	1,949,750	74,608,570	2.00	0.04	0.17	149,217	2,984	12,683
III	466,956	13,380,824	2.41	0.05	0.18	32,248	669	2,409
IV	802,086	20,567,932	2.21	0.06	0.68	45,455	1,234	13,986
V	1,300,632	43,890,658	3.38	0.04	0.22	148,350	1,736	9,656
VI	889,614	39,846,270	3.25	0.11	0.80	129,500	4,383	31,877
VII	328,733	8,616,092	3.79	0.05	1.11	32,655	431	9,564
VIII	792,148	17,417,520	3.79	0.05	1.11	66,012	871	19,333
IX	212,343	11,619,409	2.29	0.07	0.16	26,608	813	1,859
X	1,523,982	53,221,529	2.64	0.03	0.18	140,505	1,597	9,580
XI	2,631,561	79,730,912	1.81	0.04	0.48	144,313	3,189	38,271
XII	1,171,727	139,264,372	4.80	0.04	0.25	668,469	5,571	34,816
TOTAL	13,988,532	570,027,756				1,717,629	27,339	189,173

Breakdown:

Cropland (<18% slope)	4,612,293	187,949,307	566,336	9,014	62,374
Forestland (>18% slope)	9,376,239	382,078,449	1,151,293	18,325	126,799

Notes:

1. The nutrients are expressed in N - Urea (45-0-0), P - P₂O₅ (0-20-0), and K - K₂O (0-0-60).
2. The breakdown of estimated nutrient lost between cropland and forestland is based on the figures below.

Appendix Table 10
INSPECTION AND MAINTENANCE COST FOR THE MOBILE SECTOR: PHILIPPINES, 1988, 1992 and 1995

SIC	Industry & Process	No. of Inspection						Total Cost (P'000)			
		Light			Heavy			1988	1992	1992	1995
		1988	1992	1995	1988	1992	1995	(in 88 prices)			
		15,394	19,993	31,795	3,936	4,617	5,716	2,277	5,603	3,173	8,390
	AGRI., FORESTRY AND FISHERY	3,786	4,077	6,484	968	942	1,166	560	1,143	647	1,714
11	Agricultural crops production	33	36	57	9	8	10	5	10	6	19
111	Palay production	91	98	156	23	23	28	13	28	16	41
112	Corn production	-	-	-	-	-	-	-	-	-	-
113	Vegetable production	-	-	-	-	-	-	-	-	-	-
114	Fruits and nuts (excluding coconut) production	1,131	1,218	1,937	289	281	348	167	341	193	511
115	Coconut production including copra-making	423	456	725	108	105	130	63	128	72	191
116	Sugarcane production	1,372	1,478	2,350	351	341	422	203	414	234	620
117	Tobacco production	-	-	-	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-	-	-	-
119	Agri crops production not elsewhere classified	735	792	1,259	188	183	226	109	222	126	332
12	Livestock, poultry and other animal products	1,746	1,880	2,989	446	434	537	258	527	298	788
121	Livestock and livestock products	450	485	771	115	112	139	67	136	77	203
122	Poultry and poultry products	1,295	1,395	2,218	331	322	399	192	391	221	585
129	Raising of other animals, including their products	-	-	-	-	-	-	-	-	-	-
13	Agricultural services	521	561	893	133	130	160	77	157	89	235
130	Agricultural services	521	561	893	133	130	160	77	157	89	235
14	Fishery	-	-	-	-	-	-	-	-	-	-
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-	-	-	-
15	Forestry	9,341	13,475	21,430	2,388	3,112	3,852	1,382	3,776	2,138	5,652
151	Logging operations	9,341	13,475	21,430	2,388	3,112	3,852	1,382	3,776	2,138	5,652
159	Other forestry activities	-	-	-	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-
	MINING AND QUARRYING	52,667	79,744	126,816	13,466	18,415	22,797	7,790	16,311	18,441	33,447
21	Metalliferous ore mining	12,449	18,477	29,384	3,183	4,267	5,282	1,841	5,178	2,932	7,750
211	Gold ore mining	8,840	13,077	20,796	2,260	3,020	3,738	1,308	3,665	2,075	5,485
212	Other precious metal ore mining	-	-	-	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-	-	-	-
214	Nickel ore mining	2,047	3,021	4,804	523	698	864	303	847	479	1,267
215	Chromite ore mining	1,554	2,367	3,765	397	547	677	230	663	376	993
216	Iron ore mining	-	-	-	-	-	-	-	-	-	-
219	Other base metal ore mining	7	12	19	2	3	3	1	3	2	5
22	Non-metalliferous mining and quarrying	40,218	61,267	97,432	10,283	14,148	17,515	5,949	11,133	12,809	25,697
221	Coal mining	6,566	10,002	15,906	1,679	2,310	2,859	971	2,803	1,587	4,195
222	Crude petrol and nat gas explor. and prod.	29,309	44,645	70,998	7,494	10,310	12,763	4,335	6,474	9,871	18,725
223	Stone quarrying, clay and sand pits	3,927	5,986	9,520	1,004	1,382	1,711	581	1,678	950	2,511
229	Other non-metalliferous mining and quarrying	416	634	1,008	106	146	181	61	178	101	266

Appendix Table 10 (continued)

SIC	Industry & Process	No. of Inspection						Total Coal ('000)			
		Light			Heavy			1988	1992	1992	1995
		1988	1992	1995	1988	1992	1995		(in 88 prices)		
MANUFACTURING		238,000	386,574	614,760	60,855	89,270	110,511	35,204	108,335	61,346	162,139
31	Manufacture of food, beverage and tobacco	99,691	163,166	259,479	25,490	37,679	46,645	14,746	45,726	25,893	68,436
311-312	Food manufacturing	85,077	140,104	222,804	21,753	32,354	40,052	12,584	39,263	22,233	58,763
313	Beverage manufacturing	11,910	18,436	29,318	3,045	4,257	5,270	1,762	5,167	2,926	7,733
314	Tobacco manufacturing	2,704	4,626	7,357	691	1,068	1,322	400	1,296	734	1,940
32	Textile, wearing apparel and leather industries	14,468	23,721	37,723	3,699	5,478	6,781	2,140	6,648	3,764	9,949
321	Textile manufacturing	9,527	15,469	24,600	2,436	3,572	4,422	1,409	4,335	2,455	6,488
322	Wearing apparel	4,188	6,970	11,081	1,071	1,610	1,993	620	1,953	1,106	2,923
323-324	Manufacture of leather and leather products	752	1,282	2,039	192	296	366	111	359	203	538
33	Manufacture of wood and wood products including furnitures and fixtures	46,514	76,200	121,180	11,893	17,597	21,784	6,880	21,355	12,092	31,960
331	Manufacture of wood and wood products	43,246	70,777	112,556	11,058	16,344	20,233	6,397	19,835	11,232	29,686
332	Manufacture of repair of furniture	3,268	5,423	8,624	836	1,252	1,550	483	1,520	861	2,274
34	Manufacture of paper and paper products; printing and publishing	10,867	17,358	27,604	2,779	4,000	4,962	1,607	4,864	2,755	7,280
341	Manufacture of paper and allied products	7,092	11,089	17,634	1,813	2,561	3,170	1,049	3,108	1,760	4,651
342	Printing, publishing and allied industries	3,775	6,269	9,970	965	1,448	1,792	558	1,757	995	2,629
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	20,307	33,407	53,127	5,192	7,715	9,550	3,004	9,362	5,301	14,012
351, 352 & 356	Manufacture of chemicals and plastic products	15,380	25,247	40,150	3,933	5,830	7,218	2,275	7,075	4,007	10,589
353	Petroleum refineries	2,156	3,727	5,927	551	861	1,065	319	1,044	591	1,563
354	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-	-	-	-	-
355	Manufacture of rubber products	2,771	4,433	7,049	708	1,024	1,267	410	1,242	703	1,859
36	Manufacture of non-metallic mineral products	18,427	28,416	45,120	4,712	6,562	8,123	2,726	7,963	4,509	11,918
361	Manufacture of pottery, china and earthenware	1,534	2,305	3,665	392	532	659	227	646	366	967
362	Manufacture of glass and glass products	3,450	5,232	8,320	882	1,208	1,496	510	1,466	830	2,194
363	Manufacture of cement	6,431	9,714	15,448	1,644	2,243	2,777	951	2,722	1,542	4,074
369	Manufacture of other non-metallic mineral products	7,013	11,165	17,756	1,793	2,578	3,192	1,037	3,129	1,772	4,683
37	Basic metal industries	12,410	18,919	30,087	3,173	4,369	5,408	1,836	5,302	3,002	7,935
371	Iron and steel basic industries	9,850	15,022	23,889	2,519	3,469	4,294	1,457	4,210	2,384	6,301
372	Non-ferrous metal basic industries	2,560	3,897	6,198	655	900	1,114	379	1,092	618	1,635

Appendix Table 10 (continued)

SIC	Industry & Process	No. of Inspection					Total Cost (P'000)				
		Light			Heavy		1988	1992		1995	
		1988	1992	1995	1988	1992		(in 88 prices)			
38	Manufacture of fabricated metal products, machineries and equipment	13,873	22,919	36,448	3,547	5,293	6,552	2,052	6,423	3,637	9,613
381	Manufacture of fabricated metal products	3,491	5,918	9,411	893	1,367	1,692	516	1,659	939	2,482
382	Manufacture of machinery except electrical	2,524	4,188	6,660	645	967	1,197	373	1,174	665	1,756
383	Manufacture of electrical machinery, etc.	4,706	7,763	12,345	1,203	1,793	2,219	696	2,175	1,232	3,256
384	Manufacture of transport equipment	2,912	4,667	7,421	745	1,078	1,334	431	1,308	741	1,957
385	Manufacture of professional and scientific and measuring and controlling equipment	150	234	372	38	54	67	22	66	37	98
386	Manufacture of repair of metal furnitures and fixtures	90	150	238	23	35	43	13	42	24	63
39	Other manufacturing industries	1,443	2,467	3,923	369	570	705	213	691	391	1,035
390	Other manufacturing industries	1,443	2,467	3,923	369	570	705	213	691	391	1,035
	ELECTRICITY, GAS AND WATER	2,372	3,501	5,567	606	808	1,001	351	981	556	1,468
41	Electricity	2,348	3,475	5,527	600	803	993	347	974	551	1,458
411	Electricity generation and distribution	2,348	3,475	5,527	600	803	993	347	974	551	1,458
412	Electricity distribution to consumers	-	-	-	-	-	-	-	-	-	-
42	Gas and steam	11	12	19	3	3	3	2	3	2	5
421	Gas manufacture and distribution through systems	11	-	-	3	-	-	2	-	-	-
422	Steam heat and power plants	-	12	19	-	3	3	-	3	2	5
43	Waterworks and supply	13	14	22	3	3	4	2	4	2	6
430	Waterworks and supply	13	14	22	3	3	4	2	4	2	6
	CONSTRUCTION	33,075	53,510	85,096	8,457	12,357	15,297	4,892	14,996	8,492	22,444
50	Construction	33,075	53,510	85,096	8,457	12,357	15,297	4,892	14,996	8,492	22,444
501	General building construction	6,143	10,010	15,919	1,571	2,312	2,862	909	2,805	1,589	4,199
502	General engineering construction	24,633	39,778	63,258	6,298	9,186	11,371	3,644	11,147	6,312	16,684
503	Special trade construction	2,298	3,722	5,919	588	860	1,064	340	1,043	591	1,561
	WHOLESALE AND RETAIL TRADE	9,281	9,995	16,895	2,373	2,308	2,857	1,373	2,801	1,586	4,192
61	Wholesale trade	6,062	6,528	10,381	1,550	1,507	1,866	897	1,829	1,036	2,738
618	Petroleum and petroleum products wholesaling	-	-	-	-	-	-	-	-	-	-
62	Retail trade	3,219	3,467	5,514	823	801	991	476	972	550	1,454
628	Petroleum and petroleum products retailing	-	-	-	-	-	-	-	-	-	-
	TRANSPORTATION, STORAGE AND COMMUNICATIONS	227,499	358,115	569,503	26,226	44,309	54,852	29,925	88,390	50,035	150,203
71	Transportation services	226,663	357,215	568,072	26,013	44,101	54,595	29,790	88,137	49,892	149,025
711	Railway transport	-	-	-	-	-	-	-	-	-	-
712	Road passenger transport	224,453	355,144	564,778	25,448	43,623	54,003	29,463	87,557	49,563	148,957
713	Water transport	-	-	-	-	-	-	-	-	-	-
714	Air transport	1,098	873	1,389	281	202	250	162	245	139	366
719	Services allied to transport	1,113	1,198	1,905	284	277	343	165	336	190	503
72	Storage and warehousing	40	44	69	10	10	12	6	12	7	18
720	Storage and warehousing	40	44	69	10	10	12	6	12	7	18
73	Communication	795	857	1,362	203	198	245	130	240	136	359

Appendix Table 10 (continued)

SIC	Industry & Process	No. of Inspection						Total Cost (P' 000)			
		Light			Heavy			1988	1992		1995
		1988	1992	1995	1988	1992	1995		(in 88 prices)		
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES											
		5,128	5,522	8,781	1,211	1,275	1,579	758	1,547	876	2,316
		2,023	2,179	3,464	517	503	623	299	611	346	914
81	Banking institution	485	522	831	124	121	149	72	146	83	219
82	Financial intermediaries	342	368	586	87	85	105	61	103	58	155
83	Insurance	613	661	1,051	157	153	189	91	185	105	277
84	Real estate	1,664	1,792	2,850	425	414	512	246	502	284	752
85	Business services										
COMMUNITY, SOCIAL AND PERSONAL SERVICES											
		30,907	38,712	61,863	7,143	5,149	6,374	4,483	9,667	5,472	16,237
		26,913	34,662	55,122	5,419	4,721	5,845	3,810	8,690	4,919	14,538
91	Public admin. and defense	-	-	-	-	-	-	-	-	-	-
92	Sanitary and similar services	-	-	-	115	112	139	67	136	77	204
93	Education services	451	486	772	-	-	-	-	-	-	-
94	Medical dental, other health and veterinary services	736	793	1,261	188	183	227	109	222	126	333
95	Other social and related community services	-	-	-	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	2,897	2,772	4,408	1,420	132	164	497	618	350	1,163
III	Household sector	461,749	666,768	1,060,347	-	-	-	51,486	138,948	78,556	279,660
NATURE Nature sector											
TOTAL		1,076,071	1,622,434	2,580,124	124,374	178,509	220,984	141,540	387,478	225,533	680,496

Notes:

- The valuation is based on inspection and maintenance cost provided by the ADM study (Engineering Science, Inc. Vehicular Emissions Control in Metro Manila, Final Report).
- The distribution of vehicle per P3IC in 1995 was assumed to follow the distribution in 1992. For light vehicles cost per inspection is P208 & for heavy it's P312 (in 1993 prices). To bring them to 1988 prices CPI for 1993 (1.74) was used, the costs incurred in 1992 was inflated to arrive at the 1993 levels.
- Cost of inspection per vehicle:

	Light	Heavy
1988	118	117
1992	208	312
1995	264	396

- No. of inspections required per vehicle type per year:

Type of Vehicle	Inspection/Yr
Car	1
Car	1
UVe	1
MCCTC	1
Large Vehicles	2
Bus	1
Truck	1
Diesel	2
Jeepney	1
UVs	2
Taxi	2

- Based on studies conducted by USEPA, as a general rule, the costs of repairs required as a result of emission testing are recovered by subsequent savings derived from improved fuel efficiency and greater durability. Hence, maintenance cost is assumed to be negligible or zero.

Appendix Table 11
 FUEL REFORMULATION COST FOR THE MOBILE SECTOR: PHILIPPINES, 1988, 1992 and 1995

PSIC	Industry & Process	1988					Total	
		Fuel Consumption		Diesel (gallons)	Cost (P '000)			
		Gasoline (liters)			Diesel	Gasoline		
		Premium	Regular	Premium	Regular			
AGRICULTURE, FORESTRY AND FISHERY								
		16,401,831	8,662,914	73,862,668	8,736	3,618	60,742	73,096
11	Agricultural crops production	6,323,090	2,629,239	5,760,388	3,368	948	4,737	9,053
111	Palay production	55,718	23,169	30,760	30	8	42	80
112	Corn production	152,273	63,317	138,722	81	23	114	218
113	Vegetable production	663	276	604	0	0	0	1
114	Fruits and nuts (excluding coconut) production	1,888,756	785,374	1,720,673	1,006	283	1,415	2,704
115	Coconut production including copra-making	706,805	293,900	643,905	376	106	530	1,012
116	Sugarcane production	2,291,182	952,709	2,087,286	1,220	343	1,717	3,280
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	1,227,693	510,494	1,118,439	654	184	920	1,758
12	Livestock, poultry & other animal products	2,915,022	1,212,112	2,655,609	1,553	437	2,184	4,173
121	Livestock and livestock products	751,883	312,645	684,972	400	113	563	1,076
122	Poultry and poultry products	2,163,139	899,467	1,970,638	1,152	324	1,621	3,097
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	870,314	361,890	792,863	464	130	652	1,246
130	Agricultural services	870,314	361,890	792,863	464	130	652	1,246
14	Fishery	2,493,633	2,879,668	46,028,606	1,328	1,534	37,853	40,715
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	3,799,773	1,580,005	18,625,201	2,024	569	15,317	17,910
151	Logging operations	3,799,773	1,580,005	18,625,201	2,024	569	15,317	17,910
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING								
		18,502,715	7,693,718	106,103,293	9,855	2,773	87,256	99,884
21	Metallic ore mining	4,767,205	1,982,278	24,931,823	2,539	714	20,503	23,757
211	Gold ore mining	3,336,867	1,387,521	17,722,966	1,777	500	14,575	16,852
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	887,003	368,830	4,061,262	472	133	3,340	3,945
215	Chromite ore mining	526,431	218,898	3,138,592	280	79	2,581	2,910
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	16,904	7,029	9,003	9	3	7	19

		1988					Cost (P '000)		
PSIC	Industry & Process	Fuel Consumption		Diesel (gallons)	Gasoline		Diesel	Total	
		Premium	Regular		Premium	Regular			
22	Non-metallic mining and quarrying	13,735,510	5,711,439	81,171,470	7,316	2,058	66,753	76,127	
221	Coal mining	2,324,051	924,795	13,259,830	1,185	333	10,904	12,422	
222	Crude petroleum and natural gas exploration and production	9,958,727	4,140,994	59,172,533	5,304	1,492	48,662	55,458	
223	Stone, quarrying, clay and sand pits	1,400,597	582,390	7,904,068	746	210	6,500	7,456	
229	Other non-metallic mining and quarrying	152,134	63,260	835,038	81	23	687	791	
	MANUFACTURING	484,081,324	201,288,576	329,686,897	257,833	72,539	271,125	601,497	
31	Mfr. of food, beverage and tobacco	223,445,929	92,912,308	150,360,915	119,012	33,483	107,205	259,701	
311-312	Food manufacturing	205,049,813	85,262,915	105,880,208	109,214	30,727	87,073	227,014	
313	Beverage manufacturing	8,963,821	3,727,297	22,206,903	4,774	1,343	18,262	24,380	
314	Tobacco manufacturing	9,432,296	3,922,096	2,273,803	5,024	1,413	1,870	8,307	
32	Textile, wearing apparel and leather industries	33,116,874	13,770,514	18,661,801	17,639	4,963	15,347	37,948	
321	Textile manufacturing	19,265,453	8,010,876	13,240,116	10,261	2,887	10,888	24,036	
322	Wearing apparel	11,318,272	4,706,314	4,734,478	6,028	1,696	3,910	11,634	
323-324	Manufacture of leather and leather products	2,533,149	1,053,323	667,207	1,349	380	549	2,277	
33	Manufacture of wood and wood products including furnitures and fixtures	105,438,389	43,842,929	68,380,843	56,159	15,800	49,655	121,614	
331	Manufacture of wood and wood products	96,868,185	40,279,304	56,573,587	51,594	14,516	46,524	112,634	
332	Manufacture and repair of furniture	8,570,205	3,563,625	3,807,256	4,565	1,284	3,131	8,980	
34	Manufacture of paper and paper products; printing and publishing	17,174,217	7,141,308	16,897,153	9,147	2,574	13,896	25,617	
341	Manufacture of paper and allied products	7,201,000	2,994,288	12,525,795	3,835	1,079	10,301	15,215	
342	Printing, publishing and allied industries	9,973,216	4,147,019	4,371,359	5,312	1,494	3,595	10,401	
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	48,366,477	20,111,537	25,488,503	25,761	7,248	20,961	53,970	
351,352	Mfr. of chemicals and plastic products	35,722,467	14,853,960	19,644,107	19,027	5,353	16,155	40,334	
356	Petroleum refineries	8,145,196	3,386,900	1,581,071	4,338	1,221	1,300	6,859	
354)	Manufacture of miscellaneous products of petroleum and coal	4,498,814	1,870,677	4,263,325	2,396	674	3,506	6,576	
355	Rubber products								
36	Manufacture of non-metallic mineral products	12,498,558	5,159,672	34,903,317	6,609	1,859	28,703	37,172	
361	Mfr. of pottery, china and earthenware	324,787	135,051	3,170,252	173	49	2,607	2,829	
362	Manufacture of glass and glass products	784,817	326,339	7,109,411	418	118	5,847	6,382	
363	Manufacture of cement	816,210	339,393	13,493,195	435	122	11,098	11,635	
369	Manufacture of other non-metallic mineral products	10,482,744	4,358,889	11,128,459	5,583	1,571	9,152	16,306	
37	Basic metal industries	4,465,007	1,856,619	24,962,760	2,378	669	20,529	23,576	
371	Iron and steel basic industries	3,646,382	1,516,223	19,774,147	1,912	546	16,262	18,750	
372	Non-ferrous metal basic industries	818,625	340,397	5,188,613	436	123	4,267	4,826	

		1988						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)		Total	
		Gasoline (liters)		Diesel (gallons)	Gasoline			
		Premium	Regular		Premium	Regular		
38	Mfr. of fabricated metal products, machineries and equipment	34,676,849	14,419,176	16,800,223	18,470	5,196	13,816	37,482
381	Manufacture of fabricated metal products	11,260,317	4,682,216	3,729,019	5,998	1,687	2,697	10,381
382	Manufacture of machinery except electrical	6,619,028	2,752,295	2,939,914	3,525	992	2,418	6,935
383	Manufacture of electrical machinery, etc.	11,571,829	4,811,747	5,769,794	6,163	1,734	4,745	12,642
384	Manufacture of transport equipment	4,853,793	2,018,283	4,434,378	2,585	727	3,647	6,959
385	Mfr. of professional and scientific and measuring and controlling equipment	135,230	56,231	272,085	72	20	224	316
386	Mfr. and repair of metal furniture and fixtures	236,653	98,404	105,033	126	35	86	248
39	Other manufacturing industries	4,989,023	2,074,514	1,231,383	2,657	748	1,013	4,418
390	Other manufacturing industries	4,989,023	2,074,514	1,231,383	2,657	748	1,013	4,418
	ELECTRICITY, GAS AND WATER	13,512,010	5,618,505	35,994	7,197	2,025	30	9,251
41	Electricity	13,472,500	5,602,076	-	7,176	2,019	-	9,195
411	Electricity generation and distribution	13,472,500	5,602,076	-	7,176	2,019	-	9,195
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	18,330	7,622	16,699	10	3	14	26
421	Gas Manufacture and distribution through systems	18,330	7,622	16,699	10	3	14	26
422	Steam heat and power plants	-	-	-	-	-	-	-
43	Waterworks and supply	21,180	8,807	19,295	11	3	16	30
430	Waterworks and supply	21,180	8,807	19,295	11	3	16	30
	CONSTRUCTION	63,681,281	26,479,671	47,159,300	33,918	9,543	38,782	82,243
50	Construction	63,681,281	26,479,671	47,159,300	33,918	9,543	38,782	82,243
501	General building construction	13,020,722	5,414,220	8,313,584	6,935	1,951	6,837	15,723
502	General engineering construction	46,166,574	19,196,783	35,595,065	24,589	6,918	29,272	60,780
503	Special trade construction	4,493,984	1,868,669	3,250,651	2,394	673	2,673	5,740
	WHOLESALE AND RETAIL TRADE	15,499,317	6,444,858	14,120,009	8,255	3,433	11,612	23,300
61	Wholesale trade	10,122,843	4,209,236	9,221,995	5,392	2,242	7,584	15,217
618	Petroleum & petroleum products, wholesaling	-	-	-	-	-	-	-
62	Retail trade	5,376,474	2,235,622	4,898,013	2,864	1,191	4,028	8,082
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
	TRANSPORTATION, STORAGE AND COMMUNICATIONS	121,581,978	50,641,655	116,967,102	64,757	18,250	96,190	179,198
71	Transportation services	120,186,267	50,061,297	115,695,598	64,014	18,041	95,145	177,199
711	Railway transport	-	-	-	-	-	-	-
712	Road passenger transport	114,799,798	47,735,549	95,973,052	61,145	17,203	78,925	157,273
713	Water transport	113,607	133,209	16,694,408	61	48	13,729	13,838
714	Air transport	3,414,866	1,419,955	1,335,488	1,819	512	1,098	3,429
719	Services allied to transport	1,857,997	772,584	1,692,651	990	278	1,392	2,660
72	Storage and warehousing	67,518	28,075	61,510	36	10	51	97
720	Storage and warehousing	67,518	28,075	61,510	36	10	51	97

PSIC	Industry & Process	1988					Total	
		Fuel Consumption		Diesel (gallons)	Cost (P '000)			
		Premium	Regular		Premium	Regular		
73	Communication	1,328,192	552,283	1,209,994	707	199	995	1,902
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		8,562,895	3,560,585	7,800,869	4,561	1,283	6,415	12,259
81	Banking institution	3,378,236	1,404,724	3,077,602	1,799	506	2,531	4,836
82	Financial intermediaries	809,888	336,764	737,815	431	121	607	1,159
83	Insurance	571,403	237,598	520,553	304	86	428	818
84	Real estate	1,024,442	425,979	933,276	546	154	767	1,467
85	Business services	2,778,924	1,155,520	2,531,623	1,480	416	2,082	3,978
COMMUNITY, SOCIAL & PERSONAL SERVICES		72,753,554	30,252,064	27,324,582	38,750	10,902	22,471	72,123
91	Public administration and defense	65,890,970	27,398,494	20,109,600	35,095	9,874	16,538	61,506
92	Sanitary and similar services	-	-	-	-	-	-	-
93	Education services	753,043	313,127	686,029	401	113	564	1,078
94	Medical, dental, other health and veterinary services	1,229,384	511,197	1,119,979	655	184	921	1,760
95	Other social & related community services	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	4,880,158	2,029,246	4,408,974	2,599	731	4,448	7,779
HHH	Household sector	302,893,516	125,947,855	162,036	161,328	45,389	133	206,850
TOTAL		1,117,470,420	466,590,402	723,222,751	595,190	169,754	594,757	1,359,701

Note: PSIC 14 and 713 gasoline and diesel consumption were directly based on DOE data.
Cost of gas reformulation (P/liter):

	1988	1992	1995
Premium Gas	0.5326	0.892	1.131
Regular Gas	0.3604	1.506	1.909
Diesel (P/gallon)	0.8224	0.595	0.754

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors (except for some) based on ERH/RSO/DOE data.
3. A 90% adjustment is applied to fuel consumption.
4. Cost of fuel reformulation per gallon is provided by WHO Environmental Sector Study.

Mobile Coring: The cost of catalytic converter, fuel reformulation and inspection & maintenance were added and consequently applied to all sectors.

		1992						
PSIC	Industry & Process	Fuel Consumption			Cost (P'000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
		9,284,983	5,043,041	97,544,347	8,283	5,231	113,809	127,323
	AGRICULTURE, FORESTRY AND FISHERY							
11	Agricultural crops production	3,266,640	1,148,207	6,498,199	2,914	1,729	3,865	8,508
111	Palay production	28,783	10,118	57,261	26	15	34	75
112	Corn production	78,667	27,651	156,490	70	42	93	205
113	Vegetable production	342	120	681	0	0	0	1
114	Fruits and nuts (excluding coconut) production	973,771	342,979	1,941,063	870	516	1,155	2,541
115	Coconut production including copra-making	363,150	128,348	726,378	326	193	432	951
116	Sugarcane production	1,183,672	416,053	2,354,633	1,056	626	1,401	3,083
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	634,252	222,936	1,261,693	566	336	750	1,652
12	Livestock, poultry & other animal products	1,505,961	529,338	2,995,749	1,343	797	1,782	3,922
121	Livestock and livestock products	388,438	136,534	772,703	346	206	460	1,012
122	Poultry and poultry products	1,117,523	392,803	2,223,044	997	591	1,322	2,911
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	449,622	158,040	894,416	401	238	532	1,171
130	Agricultural services	449,622	158,040	894,416	401	238	532	1,171
14	Fishery	2,318,501	2,594,007	61,241,708	2,068	1,543	92,215	95,826
141	Ocean (off-shore) and onastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	1,745,249	613,450	25,914,276	1,557	924	15,414	17,895
151	Logging operations	1,745,259	613,450	25,914,276	1,557	924	15,414	17,895
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
	MINING AND QUARRYING	22,007,057	7,735,369	147,627,399	19,630	11,648	87,812	119,089
21	Metallic ore mining	4,114,778	1,446,324	34,689,028	3,670	2,178	20,634	26,482
211	Gold ore mining	2,691,549	946,066	24,658,945	2,401	1,425	14,668	18,493
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	713,465	251,482	3,650,660	638	379	3,361	4,378
215	Chromite ore mining	685,745	241,036	4,366,897	612	363	2,594	3,572
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	22,019	7,740	12,526	20	12	7	39

		1992			Cost (P '000)			
PSIC	Industry & Process	Fuel Consumption			Gasoline		Diesel	Total
		Gasoline (liters)		Diesel (gallons)	Premium	Regular		
		Premium	Regular					
		17,892,279	6,289,045	112,938,370	15,960	9,470	67,178	92,608
22	Non-metallic mining and quarrying	2,897,115	1,018,321	18,449,138	2,584	1,533	10,974	15,091
221	Coal mining							
222	Crude petroleum and natural gas exploration and production	12,972,532	4,559,779	82,330,029	11,571	6,866	48,972	67,409
223	Stone, quarrying, clay and sand pits	1,824,439	641,288	10,997,369	1,627	966	6,541	9,134
229	Other non-metallic mining and quarrying	198,174	69,637	1,161,835	177	105	691	973
	MANUFACTURING	630,498,066	221,616,869	458,711,672	562,402	333,702	272,851	1,168,958
31	Mfr. of food, beverage and tobacco	291,067,245	102,308,659	181,378,573	259,631	154,052	107,887	521,571
311-312	Food manufacturing	267,103,921	93,885,672	147,317,009	238,256	141,369	87,627	467,252
313	Beverage manufacturing	11,676,537	4,104,243	30,897,697	10,415	6,180	18,379	34,974
314	Tobacco manufacturing	12,286,787	4,318,743	3,163,668	10,960	6,503	1,882	19,345
32	Textile, wearing apparel and leather industries	43,139,015	15,163,145	25,965,200	38,480	22,832	15,445	76,757
321	Textile manufacturing	25,095,746	8,821,027	18,421,708	22,385	13,282	10,958	46,625
322	Wearing apparel	14,743,513	5,182,271	6,615,169	13,151	7,803	3,935	24,889
323-324	Manufacture of leather and leather products	3,299,754	1,159,847	928,323	2,943	1,746	552	5,242
33	Manufacture of wood and wood products including furnitures and fixtures	137,347,150	48,276,826	84,011,217	122,513	72,693	49,972	245,178
331	Manufacture of wood and wood products	126,183,349	44,352,806	78,713,970	112,555	66,785	46,821	226,160
332	Manufacture and repair of furniture	11,163,801	3,924,019	5,297,247	9,958	5,909	3,151	19,018
34	Manufacture of paper and paper products; printing and publishing	22,371,640	7,863,518	23,509,947	19,955	11,841	13,984	45,780
341	Manufacture of paper and allied products	9,380,235	3,297,105	17,427,833	8,367	4,965	10,366	23,698
342	Printing, publishing and allied industries	12,991,405	4,566,413	6,082,114	11,588	6,876	3,618	22,082
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	63,003,597	22,145,444	35,463,568	56,199	33,346	21,094	110,639
351,352	Mfr. of chemicals and plastic products	46,533,138	16,356,162	27,331,935	41,507	24,628	16,258	82,393
& 356		10,610,172	3,729,422	2,199,831	9,464	5,616	1,309	16,388
353)	Petroleum refineries							
354)	Manufacture of miscellaneous products of petroleum and coal							
355	Rubber products	5,860,288	2,039,861	5,931,801	5,227	3,102	3,528	11,857
36	Manufacture of non-metallic mineral products	16,083,238	5,653,176	48,562,922	14,346	8,512	28,886	51,745
361	Mfr. of pottery, china and earthenware	342,562	120,409	4,410,947	306	181	2,624	3,111
362	Manufacture of glass and glass products	1,022,326	339,342	9,891,718	912	541	5,884	7,337
363	Manufacture of cement	1,063,219	373,716	18,776,614	948	563	11,169	12,680
369	Manufacture of other non-metallic mineral products	13,655,131	4,799,709	15,483,643	12,180	7,227	9,210	28,618
37	Basic metal industries	5,816,249	2,044,382	34,732,073	5,188	3,078	20,659	28,926
371	Iron and steel basic industries	4,749,884	1,669,360	27,512,868	4,237	2,514	16,365	23,116
372	Non-ferrous metal basic industries	1,066,365	374,822	7,219,205	951	564	4,294	5,810

		1992						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
38	Mfr. of fabricated metal products, machinery and equipment	45,171,085	15,877,407	23,375,082	40,292	23,908	13,904	78,104
381	Manufacture of fabricated metal products	14,668,020	5,155,735	4,562,282	13,084	7,763	2,714	23,561
382	Manufacture of machinery except electrical	8,622,141	3,030,639	4,090,465	7,691	4,563	2,433	14,687
383	Manufacture of electrical machinery, etc.	15,073,805	5,298,366	8,027,834	13,446	7,978	4,775	26,199
384	Manufacture of transport equipment	6,322,694	2,222,395	6,169,797	5,640	3,346	3,670	12,656
385	Mfr. of professional and scientific and measuring and controlling equipment	176,155	61,917	328,566	157	93	225	476
386	Mfr. and repair of metal furniture and fixtures	308,271	108,356	146,138	275	163	87	525
39	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	3,440	1,019	10,256
390	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	3,440	1,019	10,256
ELECTRICITY, GAS AND WATER		14,095,458	4,954,482	40,604	12,573	7,460	24	20,058
41	Electricity	14,075,046	4,947,307	-	12,555	7,449	-	20,004
411	Electricity generation and distribution	14,075,046	4,947,307	-	12,555	7,449	-	20,004
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	9,470	3,328	18,837	8	5	11	25
421	Gas manufacture and distribution through systems	-	-	-	-	-	-	-
422	Steam heat and power plants	9,470	3,328	18,837	8	5	11	25
43	Waterworks and supply	10,942	3,846	21,767	10	6	13	28
430	Waterworks and supply	10,942	3,846	21,767	10	6	13	28
CONSTRUCTION		82,953,111	29,157,597	65,615,351	73,994	43,904	39,029	156,928
50	Construction	82,953,111	29,157,597	65,615,351	73,994	43,904	39,029	156,928
501	General building construction	16,961,176	5,961,767	11,567,151	15,129	8,977	6,880	30,987
502	General engineering construction	60,137,938	21,138,180	49,323,389	53,643	31,829	29,459	114,931
503	Special trade construction	5,853,996	2,057,650	4,522,811	5,222	3,098	2,690	11,010
WHOLESALE AND RETAIL TRADE		8,007,270	2,814,515	15,928,549	7,142	1,674	23,985	32,801
61	Wholesale trade	5,229,672	1,838,203	10,403,181	4,665	1,093	15,665	21,423
618	Petroleum & petroleum products, wholesaling	-	-	-	-	-	-	-
62	Retail trade	2,777,599	976,312	5,525,368	2,478	581	8,320	11,378
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATIONS		136,950,653	48,691,492	160,628,793	122,160	73,318	95,545	291,022
71	Transportation services	136,229,600	48,438,045	159,194,431	121,516	72,936	94,692	289,144
711	Railway transport	-	-	-	-	-	-	-
712	Road passenger transport	134,711,146	47,350,284	131,846,761	120,162	71,298	78,425	269,885
713	Water transport	82,988	583,202	23,874,026	74	878	14,201	15,153
714	Air transport	475,586	167,166	1,564,192	424	252	930	1,606
719	Services allied to transport	959,880	337,393	1,009,452	856	508	1,136	2,500
72	Storage and warehousing	34,881	12,261	69,388	31	18	41	91
720	Storage and warehousing	34,881	12,261	69,388	31	18	41	91

PSIC	Industry & Process	1992						Total
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
73	Communication	686,172	241,186	1,364,974	612	363	812	1,787
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		4,423,770	1,554,933	8,800,032	3,946	2,341	5,234	11,522
81	Banking institution	1,745,267	613,453	3,471,792	1,557	924	2,065	4,546
82	Financial intermediaries	418,405	147,067	832,317	373	221	495	1,090
83	Insurance	295,199	103,761	587,227	263	156	349	769
84	Real estate	529,248	186,028	1,052,813	472	280	626	1,378
85	Business services	1,435,650	504,624	2,855,883	1,281	760	1,699	3,739
COMMUNITY, SOCIAL & PERSONAL SERVICES		46,981,140	16,513,632	37,094,474	41,907	24,866	22,065	88,837
91	Public administration and defense	40,230,384	14,140,776	27,626,355	35,885	21,293	16,433	73,611
92	Sanitary and similar services	-	-	-	-	-	-	-
93	Education services	389,038	136,745	773,898	347	206	460	1,013
94	Medical, dental, other health and veterinary services	635,125	223,243	1,263,430	567	336	752	1,654
95	Other social & related community services	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	5,726,592	2,012,868	7,430,792	5,108	3,031	4,420	12,559
III	Household sector	355,428,612	124,931,353	222,604	317,041	188,117	132	505,290
IATUR Nature sector		-	-	-	-	-	-	-
TOTAL		1,310,631,120	463,013,282	992,213,825	1,169,079	692,260	660,486	2,521,825

Note: PSIC 14 and 713 gasoline and diesel consumption were directly based on DC Cost of gas reformulation (P/liter):

	1988	1992	1995
Premium Gas	0.5326	0.892	1.131
Regular Gas	0.3604	1.506	1.909
Diesel (P/gallon)	0.8224	0.595	0.754

Fuel reformulation cost:

- Fuel consumption x cost/gallon (by type of fuel)
 - Fuel consumption is computed and allocated across all sectors (except for some)
 - A 90% adjustment is applied to fuel consumption.
 - Cost of fuel reformulation per gallon is provided by WIIO Environmental Sector.
- Motors Corbin: The cost of catalytic converter, fuel reformulation and isop were added and consequently applied to all sectors.

		1992 (in 1988 Prices)						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
AGRICULTURE, FORESTRY AND FISHERY		9,285,983	5,043,041	97,544,347	8,283	5,231	113,809	127,323
11	Agricultural crops production	3,266,640	1,148,207	6,498,199	2,914	1,729	3,865	8,508
111	Palay production	28,783	10,118	57,261	26	15	34	75
112	Com production	78,667	27,631	156,490	70	42	93	205
113	Vegetable production	342	120	681	0	0	0	1
114	Fruits and nuts (excluding coconut) production	975,771	342,979	1,941,063	870	516	1,155	2,541
115	Coconut production including copra-making	365,150	128,348	726,378	326	193	432	951
116	Sugarcane production	1,183,672	416,055	2,354,633	1,056	626	1,401	3,083
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	634,252	222,936	1,261,693	566	336	750	1,652
12	Livestock, poultry & other animal products	1,505,961	529,338	2,995,749	1,343	797	1,782	3,922
121	Livestock and livestock products	388,438	136,534	772,705	346	206	460	1,012
122	Poultry and poultry products	1,117,523	392,803	2,223,044	997	591	1,322	2,911
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	449,622	158,040	894,416	401	238	532	1,171
130	Agricultural services	449,622	158,040	894,416	401	238	532	1,171
14	Fishery	2,318,501	2,594,007	61,241,708	2,068	1,543	92,215	95,826
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	1,745,259	613,450	25,914,276	1,557	924	15,414	17,895
151	Logging operations	1,745,259	613,450	25,914,276	1,557	924	15,414	17,895
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING		22,007,057	7,735,369	147,627,399	19,630	11,648	87,812	119,089
21	Metallic ore mining	4,114,778	1,446,324	34,689,028	3,670	2,178	20,634	26,482
211	Gold ore mining	2,691,549	946,066	24,658,945	2,401	1,425	14,668	18,493
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	715,465	251,482	5,630,660	638	379	3,361	4,378
215	Chromite ore mining	685,745	241,036	4,366,897	612	363	2,598	3,572
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	22,019	7,740	12,526	20	12	7	39

		1992 (in 1988 Prices)						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)		Total	
		Gasoline (liters)		Diesel (gallons)	Gasoline	Diesel		
		Premium	Regular		Premium	Regular		
22	Non-metallic mining and quarrying	17,892,279	6,289,045	112,938,370	15,960	9,470	67,178	92,608
221	Coal mining	2,897,115	1,018,321	18,449,138	2,584	1,533	10,974	13,091
222	Crude petroleum and natural gas exploration and production	12,972,532	4,559,779	82,330,029	11,571	6,866	48,972	67,409
223	Stone, quarrying, clay and sand pits	1,824,439	641,288	10,997,369	1,627	966	6,541	9,134
229	Other non-metallic mining and quarrying	198,174	69,657	1,161,835	177	105	691	973
	MANUFACTURING	630,498,066	221,616,869	458,711,672	562,402	333,702	272,851	1,168,955
31	Mfr. of food, beverage and tobacco	291,067,245	102,308,659	181,378,373	259,631	154,052	107,887	521,571
311-312	Food manufacturing	267,103,921	93,885,672	147,317,009	238,256	141,369	87,627	467,252
313	Beverage manufacturing	11,676,537	4,104,243	30,897,697	10,415	6,180	18,379	34,974
314	Tobacco manufacturing	12,286,787	4,318,743	3,163,668	10,960	6,503	1,882	19,345
32	Textile, wearing apparel and leather industries	43,139,015	15,163,145	25,965,200	38,480	22,832	15,445	76,757
321	Textile manufacturing	25,095,746	8,821,027	18,421,708	22,385	13,282	10,958	46,625
322	Wearing apparel	14,743,515	5,182,271	6,615,169	13,151	7,803	3,935	24,889
323-324	Manufacture of leather and leather products	3,299,754	1,159,847	928,323	2,943	1,746	552	5,242
33	Manufacture of wood and wood products including furnitures and fixtures	137,347,150	48,276,826	84,011,217	122,513	72,693	49,972	245,178
331	Manufacture of wood and wood products	126,183,349	44,352,806	78,713,970	112,555	66,785	46,821	226,160
332	Manufacture and repair of furniture	11,163,801	3,924,019	5,297,247	9,958	5,909	3,151	19,018
34	Manufacture of paper and paper products; printing and publishing	22,371,640	7,863,518	23,509,947	19,955	11,841	13,984	45,780
341	Manufacture of paper and allied products	9,380,235	3,297,105	17,427,833	8,367	4,965	10,366	23,698
342	Printing, publishing and allied industries	12,991,405	4,566,413	6,082,114	11,588	6,876	3,618	22,082
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	63,003,597	22,145,444	35,463,568	56,199	33,346	21,094	110,639
351,352	Mfr. of chemicals and plastic products & 356	46,533,138	16,356,162	27,331,935	41,507	24,628	16,258	82,393
353)	Petroleum refineries	10,610,172	3,729,422	2,199,831	9,464	5,616	1,309	16,388
354)	Manufacture of miscellaneous products of petroleum and coal	5,860,288	2,059,861	5,931,801	3,227	3,102	3,528	11,857
355	Rubber products							
36	Manufacture of non-metallic mineral products	16,083,238	5,653,176	48,562,922	14,346	8,512	28,886	51,745
361	Mfr. of pottery, china and earthenware	342,562	120,409	4,410,947	306	181	2,624	3,111
362	Manufacture of glass and glass products	1,022,326	359,342	9,891,718	912	541	5,884	7,337
363	Manufacture of cement	1,063,219	373,716	18,776,614	948	563	11,169	12,680
369	Manufacture of other non-metallic mineral products	13,655,131	4,799,709	15,483,643	12,180	7,227	9,210	28,618
37	Basic metal industries	5,816,249	2,044,382	34,732,073	5,188	3,078	20,659	28,926
371	Iron and steel basic industries	4,749,884	1,669,560	27,512,868	4,237	2,514	16,365	23,116
372	Non-ferrous metal basic industries	1,066,365	374,822	7,219,205	951	564	4,294	5,810

		1992 (in 1988 Prices)						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
38	Mfr. of fabricated metal products, machinery and equipment	45,171,085	15,877,407	23,375,082	40,292	23,908	13,904	78,104
381	Manufacture of fabricated metal products	14,668,020	5,155,735	4,562,282	13,084	7,763	2,714	23,561
382	Manufacture of machinery except electrical	8,622,141	3,030,639	4,090,465	7,691	4,563	2,433	14,687
383	Manufacture of electrical machinery, etc.	15,073,805	5,298,366	8,027,834	13,446	7,978	4,775	26,199
384	Manufacture of transport equipment	6,322,694	2,222,395	6,169,797	5,640	3,346	3,670	12,656
385	Mfr. of professional and scientific and measuring and controlling equipment	176,155	61,917	378,566	157	93	225	476
386	Mfr. and repair of metal furniture and fixtures	308,271	108,356	146,138	275	163	87	525
39	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	3,440	1,019	10,256
390	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	3,440	1,019	10,256
	ELECTRICITY, GAS AND WATER	14,095,458	4,954,482	40,604	12,573	7,460	24	20,058
41	Electricity	14,075,046	4,947,307	-	12,555	7,449	-	20,004
411	Electricity generation and distribution	14,075,046	4,947,307	-	-	-	-	-
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	9,470	3,328	18,837	8	5	11	25
421	Gas Manufacture and distribution through systems	-	-	-	-	-	-	-
422	Steam heat and power plants	9,470	3,328	18,837	8	5	11	25
43	Waterworks and supply	10,942	3,846	21,767	10	6	13	28
430	Waterworks and supply	10,942	3,846	21,767	10	6	13	28
	CONSTRUCTION	82,953,111	29,157,597	65,615,351	73,994	43,904	39,029	156,928
50	Construction	82,953,111	29,157,597	65,615,351	73,994	43,904	39,029	156,928
501	General building construction	16,961,176	5,961,767	11,567,151	15,129	8,977	6,880	30,987
502	General engineering construction	60,137,938	21,138,180	49,525,389	53,643	31,829	29,459	114,931
503	Special trade construction	5,853,996	2,057,650	4,522,811	5,222	3,098	2,690	11,010
	WHOLESALE AND RETAIL TRADE	8,007,270	2,814,515	15,928,549	7,142	1,674	23,985	32,801
61	Wholesale trade	5,229,672	1,838,203	10,403,181	4,665	1,093	15,665	21,423
618	Petroleum & petroleum products, wholesaling	-	-	-	-	-	-	-
62	Retail trade	2,777,599	976,312	5,525,368	2,478	581	8,320	11,378
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
	TRANSPORTATION, STORAGE AND COMMUNICATIONS	136,950,653	48,691,492	160,628,793	122,160	73,318	95,545	291,022
71	Transportation services	136,229,600	48,438,045	159,194,431	121,516	72,936	94,692	289,144
711	Railway transport	-	-	-	-	-	-	-
712	Road passenger transport	134,711,146	47,350,284	131,846,761	120,162	71,298	78,425	269,885
713	Water transport	82,988	583,202	23,874,026	74	878	14,201	15,153
714	Air transport	475,586	167,166	1,564,192	424	252	930	1,606
719	Services allied to transport	959,880	337,393	1,909,452	856	308	1,136	2,500
72	Storage and warehousing	34,881	12,261	69,388	31	18	41	91
720	Storage and warehousing	34,881	12,261	69,388	31	18	41	91

		1992 (in 1988 Prices)						
PSIC	Industry & Process	Fuel Consumption			Cost (P'000)		Total	
		Gasoline (liters)		Diesel (gallons)	Gasoline	Diesel		
		Premium	Regular		Premium	Regular		
73	Communication	686,172	241,186	1,364,974	612	363	812	1,787
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		4,423,770	1,554,933	8,800,032	3,946	2,341	5,234	11,522
81	Banking institution	1,745,267	613,453	3,471,792	1,557	924	2,065	4,546
82	Financial intermediaries	418,405	147,067	832,317	373	221	495	1,090
83	Insurance	295,199	103,761	587,227	263	156	349	769
84	Real estate	529,248	186,028	1,052,813	472	280	626	1,378
85	Business services	1,435,650	504,624	2,855,883	1,281	760	1,699	3,739
COMMUNITY, SOCIAL & PERSONAL SERVICES		46,981,140	16,513,632	37,094,474	41,907	24,866	22,065	88,837
91	Public administration and defense	40,230,384	14,140,776	27,626,355	35,885	21,293	16,433	73,611
92	Sanitary and similar services	-	-	-	-	-	-	-
93	Education services	389,038	136,745	773,898	347	206	460	1,013
94	Medical, dental, other health and veterinary services	635,125	223,243	1,263,430	567	336	752	1,654
95	Other social & related community services	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	5,726,592	2,012,868	7,430,792	5,108	3,031	4,420	12,559
HH	Household sector	355,428,612	124,931,353	222,604	317,041	188,117	132	505,290
IATUR	Nature sector	-	-	-	-	-	-	-
TOTAL		1,310,631,120	463,013,282	992,213,825	1,169,079	692,260	660,486	2,521,825

Note: PSIC 14 and 713 gasoline and diesel consumption were directly based on DC Cost of gas reformulation (P/liter):

	1988	1992	1995
Premium Gas	0.5326	0.892	1.131
Regular Gas	0.3604	1.306	1.909
Diesel (P/gallon)	0.8224	0.595	0.754

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors (except for some)
3. A 90% adjustment is applied to fuel consumption.
4. Cost of fuel reformulation per gallon is provided by WHO Environmental Sector

Mobile Coating: The cost of catalytic converter, fuel reformulation and taxes were added and consequently applied to all sectors.

1995

PSIC	Industry & Process	Fuel Consumption			Cost (P '000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
AGRICULTURE, FORESTRY AND FISHERY								
		11,253,206	5,766,426	130,552,089	12,728	11,010	98,466	122,204
11	Agricultural crops production	3,958,673	1,312,909	8,697,103	4,477	2,507	6,560	13,544
111	Palay production	34,883	11,569	76,638	39	22	58	119
112	Corn production	95,333	31,617	209,444	108	60	158	326
113	Vegetable production	415	138	912	0	0	1	1
114	Fruits and nuts (excluding coconut) production	1,182,487	392,176	2,597,893	1,337	749	1,959	4,046
115	Coconut production including copra-making	442,506	146,759	972,175	500	280	733	1,514
116	Sugarcane production	1,434,432	475,733	3,151,409	1,622	908	2,377	4,908
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	768,617	254,915	1,688,633	869	487	1,274	2,630
12	Livestock, poultry & other animal products	1,824,997	605,267	4,009,471	2,064	1,156	3,024	6,244
121	Livestock and livestock products	470,729	156,119	1,034,179	532	298	780	1,611
122	Poultry and poultry products	1,354,268	449,148	2,975,292	1,532	858	2,244	4,633
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	544,874	180,709	1,197,074	616	345	903	1,864
130	Agricultural services	544,874	180,709	1,197,074	616	345	903	1,864
14	Fishery	2,809,672	2,966,097	81,965,089	3,178	5,663	61,821	70,662
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	2,114,990	701,444	34,683,322	2,392	1,339	26,159	29,891
151	Logging operations	2,114,990	701,444	34,683,322	2,392	1,339	26,159	29,891
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING								
		26,669,225	8,844,947	197,582,550	30,164	16,888	149,023	196,075
21	Metallic ore mining	4,986,489	1,653,787	46,427,335	5,640	3,158	35,017	43,815
211	Gold ore mining	3,261,750	1,041,772	33,003,205	3,689	2,065	24,892	30,647
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	867,035	247,555	7,562,768	981	540	5,704	7,234
215	Chromite ore mining	831,019	275,611	5,844,597	940	526	4,408	5,874
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	26,684	8,850	16,765	30	17	13	60

		1995			Cost (P '000)			
PSIC	Industry & Process	Fuel Consumption		Diesel (gallons)	Gasoline		Diesel	Total
		Premium	Regular		Premium	Regular		
		21,682,736	7,191,159	151,155,215	24,524	13,730	114,006	152,260
22	Non-metallic mining and quarrying	3,510,865	1,164,391	24,692,081	3,971	2,223	18,624	24,818
221	Coal mining	-	-	-	-	-	-	-
222	Crude petroleum and natural gas exploration and production	15,720,746	5,213,843	110,189,417	17,781	9,955	83,108	110,844
		2,210,968	733,276	14,718,732	2,501	1,400	11,101	15,002
223	Stone, quarrying, clay and sand pits	240,157	79,649	1,554,984	272	152	1,173	1,597
229	Other non-metallic mining and quarrying	764,068,303	253,406,068	613,933,611	864,201	483,829	463,048	1,811,078
MANUFACTURING		352,729,481	116,984,032	242,754,406	398,955	223,358	183,093	805,406
31	Mfr. of food, beverage and tobacco	323,689,357	107,352,834	197,167,128	366,110	204,969	148,710	719,789
311-312	Food manufacturing	14,150,197	4,692,965	41,353,067	16,005	8,960	31,190	56,155
313	Beverage manufacturing	14,889,727	4,938,233	4,234,211	16,841	9,429	3,194	29,463
314	Tobacco manufacturing	-	-	-	-	-	-	-
32	Textile, wearing apparel and leather industries	52,277,962	17,338,179	34,751,478	59,129	33,104	26,211	118,444
		30,412,249	10,086,334	24,655,369	34,398	19,258	18,596	72,252
321	Textile manufacturing	17,866,910	5,925,627	8,853,654	20,208	11,314	6,678	38,200
322	Wearing apparel	3,998,803	1,326,218	1,242,455	4,523	2,532	937	7,992
323-324	Manufacture of leather and leather products	-	-	-	-	-	-	-
33	Manufacture of wood and wood products including furnitures and fixtures	166,443,974	55,201,757	112,439,497	188,257	105,397	84,805	378,459
331	Manufacture of wood and wood products	152,913,135	50,714,868	105,349,732	172,955	96,830	79,438	349,243
332	Manufacture and repair of furniture	13,528,838	4,486,889	7,089,765	15,302	8,567	5,347	29,216
34	Manufacture of paper and paper products; printing and publishing	27,111,045	8,991,478	31,465,401	30,664	17,167	23,732	71,564
341	Manufacture of paper and allied products	11,367,426	3,770,049	23,325,180	12,857	7,198	17,593	37,648
342	Printing, publishing and allied industries	15,743,618	5,221,429	8,140,221	17,807	9,969	6,140	33,916
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	76,350,831	25,322,035	47,463,968	86,357	48,347	35,799	170,503
351,352	Mfr. of chemicals and plastic products & 356	56,391,125	18,702,324	36,580,699	63,781	35,708	27,590	127,080
353)	Petroleum refineries	12,857,924	4,264,378	2,944,225	14,543	8,142	2,221	24,906
354)	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-	-
355	Rubber products	7,101,782	2,355,332	7,939,044	8,032	4,497	5,988	18,517
36	Manufacture of non-metallic mineral products	19,490,452	6,464,080	64,995,970	22,045	12,342	49,022	83,409
		415,133	137,680	5,903,553	470	263	4,453	5,185
361	Mfr. of pottery, china and earthenware	1,238,905	410,887	13,238,944	1,401	785	9,985	12,171
362	Manufacture of glass and glass products	1,288,461	427,323	25,130,371	1,457	816	18,954	21,227
363	Manufacture of cement	-	-	-	-	-	-	-
369	Manufacture of other non-metallic mineral products	16,547,953	5,488,190	20,723,102	18,717	10,479	15,630	44,825
		7,048,414	2,337,633	46,484,945	7,972	4,463	35,060	47,496
37	Basic metal industries	5,736,141	1,909,045	36,822,857	6,510	3,645	27,773	37,928
371	Iron and steel basic industries	1,292,273	428,587	9,662,088	1,462	818	7,287	9,567
372	Non-ferrous metal basic industries	-	-	-	-	-	-	-

		1995						
PSIC	Industry & Process	Fuel Consumption			Cost (P'000)			Total
		Gasoline (liters)		Diesel	Gasoline		Diesel	
		Premium	Regular	(gallons)	Premium	Regular		
38	Mfr. of fabricated metal products, machinery and equipment	54,740,523	18,154,896	31,284,899	61,914	34,663	23,596	120,174
381	Manufacture of fabricated metal products	17,775,422	5,895,284	6,106,097	20,105	11,256	4,605	35,966
382	Manufacture of machinery except electrical	10,448,731	3,465,360	5,174,624	11,818	6,616	4,129	22,564
383	Manufacture of electrical machinery, etc.	18,267,172	6,058,375	10,744,346	20,661	11,567	8,104	40,332
384	Manufacture of transport equipment	7,662,148	2,541,180	8,257,574	8,666	4,852	6,228	19,746
385	Mfr. of professional and scientific and measuring and controlling equipment	213,473	70,799	506,668	241	135	382	759
386	Mfr. and repair of metal furnitures and fixtures	373,577	123,898	193,589	423	237	148	807
39	Other manufacturing industries	7,875,621	2,611,979	2,293,046	8,908	4,987	1,729	15,624
390	Other manufacturing industries	7,875,621	2,611,979	2,293,046	8,908	4,987	1,729	15,624
ELECTRICITY, GAS AND WATER		17,081,563	5,665,163	54,344	19,320	10,817	41	30,178
41	Electricity	17,056,827	5,656,960	-	19,292	10,801	-	30,093
411	Electricity generation and distribution	17,056,827	5,656,960	-	19,292	10,801	-	30,093
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	11,476	3,806	25,212	13	7	19	39
421	Gas Manufacture and distribution through systems	-	-	-	-	-	-	-
422	Steam heat and power plants	11,476	3,806	25,212	13	7	19	39
43	Waterworks and supply	13,260	4,398	29,132	15	8	22	45
430	Waterworks and supply	13,260	4,398	29,132	15	8	22	45
CONSTRUCTION		100,526,625	33,340,026	87,818,715	113,701	63,656	66,236	243,593
50	Construction	100,526,625	33,340,026	87,818,715	113,701	63,656	66,236	243,593
501	General building construction	20,554,380	6,816,936	15,481,322	23,248	13,016	11,676	47,940
502	General engineering construction	72,878,086	24,170,286	66,284,123	82,429	46,148	49,994	178,571
503	Special trade construction	7,094,158	2,352,804	6,053,270	8,024	4,492	4,566	17,082
WHOLESALE AND RETAIL TRADE		9,703,601	3,218,235	21,318,559	10,975	6,145	16,079	33,199
61	Wholesale trade	6,337,571	2,101,879	13,923,480	7,168	4,013	10,502	21,683
618	Petroleum & petroleum products, wholesaling	-	-	-	-	-	-	-
62	Retail trade	3,366,029	1,116,356	7,395,079	3,807	2,131	5,578	11,516
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATIONS		165,963,479	55,675,904	214,983,444	187,713	106,302	162,147	456,163
71	Transportation services	165,089,672	55,386,102	213,063,712	186,725	105,749	160,699	453,173
711	Railway transport	-	-	-	-	-	-	-
712	Road passenger transport	163,249,536	54,142,310	176,461,954	184,644	103,374	133,093	421,111
713	Water transport	100,368	666,838	31,952,680	114	1,273	24,100	25,487
714	Air transport	576,338	191,145	2,093,494	652	365	1,579	2,596
719	Services allied to transport	1,163,229	385,789	2,555,585	1,316	737	1,928	3,980
72	Storage and warehousing	42,271	14,019	92,868	48	27	70	145
720	Storage and warehousing	42,271	14,019	92,868	48	27	70	145

PSIC	Industry & Process	1995					Total	
		Fuel Consumption		Diesel (gallons)	Cost (P '000)			
		Gasoline (liters) Premium	Regular		Gasoline Premium	Regular		Diesel
73	Communication	831,536	275,782	1,826,863	941	527	1,378	2,845
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		5,360,940	1,777,976	11,777,846	6,064	3,395	8,883	18,341
81	Banking institution	2,115,000	701,448	4,646,600	2,392	1,339	3,505	7,236
82	Financial intermediaries	507,044	168,163	1,113,962	573	321	840	1,735
83	Insurance	357,736	118,645	785,937	405	227	593	1,224
84	Real estate	641,369	212,712	1,409,071	725	406	1,063	2,194
85	Business services	1,739,791	577,008	3,822,276	1,968	1,102	2,863	5,952
COMMUNITY, SOCIAL & PERSONAL SERVICES		56,934,036	18,882,383	49,646,752	64,395	36,052	37,445	137,893
91	Public administration and defense	48,753,141	16,169,159	36,974,747	55,142	30,872	27,888	113,902
92	Sanitary and similar services	-	-	-	-	-	-	-
93	Education services	471,455	156,360	1,035,774	533	299	781	1,613
94	Medical, dental, other health and veterinary services	769,676	255,266	1,690,958	871	487	1,275	2,633
95	Other social & related community services	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	6,939,764	2,301,598	9,945,273	7,849	4,394	7,501	19,745
III	Household sector	430,725,725	142,851,774	297,930	487,173	272,747	225	760,145
IATUR	Nature sector	-	-	-	-	-	-	-
TOTAL		1,588,286,703	529,428,901	1,327,965,809	1,796,435	1,010,841	1,001,593	3,808,869

Note: PSIC 14 and 713 gasoline and diesel consumption were directly based on DC Cost of gas reformulation (P/liter):

	1988	1992	1995
Premium Gas	0.5326	0.892	1.131
Regular Gas	0.3604	1.506	1.909
Diesel (P/gallon)	0.8224	0.595	0.754

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors (except for some)
3. A 90% adjustment is applied to fuel consumption
4. Cost of fuel reformulation per gallon is provided by WHO Environmental Sector Mobile Counting. The cost of catalytic converter, fuel reformulation and other were added and consequently applied to all sectors.

Appendix Table 12.
FUEL REFORMULATION COST FOR THE MOBILE SECTOR: PHILIPPINES

TSIC	Industry & Process	1992					Total	
		Fuel Consumption			Cost (P. '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline			Diesel
Premium	Regular		Premium	Regular				
AGRICULTURE, FORESTRY AND FISHERY								
		9,285,983	5,043,041	97,544,347	8,283	3,000	146,878	158,161
		3,266,640	1,148,207	6,498,199	2,914	683	9,785	13,382
11	Agricultural crops production						86	118
111	Rubber production	28,785	10,118	57,261	26	6		
112	Corn production	78,667	27,651	156,490	70	16	236	322
113	Vegetable production	342	120	681	0	0	1	1
114	Fruits and nuts (excluding coconut) production	975,771	342,979	1,941,063	870	204	2,923	3,997
115	Coconut production including copra-making	365,150	128,348	726,378	326	76	1,094	1,496
116	Sugarcane production	1,183,672	416,055	2,354,633	1,056	247	3,546	4,849
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	1,900	2,598
119	Agri. crops production	634,252	222,936	1,261,693	566	133	4,511	6,169
12	Livestock, poultry & other animal products	1,505,961	529,338	2,995,749	1,343	315	1,164	1,591
121	Livestock and livestock products	388,438	136,534	772,705	346	81	3,317	4,578
122	Poultry and poultry products	1,117,523	392,803	2,223,044	997	234	-	-
129	Raising of other animals, incl. their products	-	-	-	-	-	1,347	1,842
13	Agricultural services	449,622	158,040	894,416	401	94	1,347	1,842
130	Agricultural services	449,622	158,040	894,416	401	94	1,347	1,842
14	Fishery	2,318,501	2,594,807	61,241,708	2,068	1,543	92,215	95,826
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	1,745,259	613,450	25,914,276	1,557	365	39,021	40,942
15	Forestry	1,745,259	613,450	25,914,276	1,557	365	39,021	40,942
151	Logging operations	-	-	-	-	-	-	-
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING								
21	Metallic ore mining	22,007,057	7,735,369	147,627,399	19,630	4,601	222,291	246,523
211	Gold ore mining	4,114,778	1,446,324	34,689,018	3,670	860	52,233	56,764
212	Other precious metal ore mining	2,691,549	946,066	24,658,945	2,401	563	37,130	40,094
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	715,465	251,482	5,650,660	638	150	8,509	9,296
215	Chromite ore mining	683,745	241,036	4,366,897	612	143	6,575	7,331
216	Iron ore mining	-	-	-	-	-	19	43
219	Other base metal ore mining	22,019	7,740	12,526	20	5		
22	Non-metallic mining and quarrying	17,892,279	6,289,045	112,938,379	15,960	3,741	170,058	189,759
221	Coal mining	2,897,115	1,018,321	18,449,138	2,584	606	27,780	30,070
222	Crude petroleum and natural gas exploration and production	12,972,532	4,559,779	82,330,020	11,571	2,712	123,969	138,253
223	Stone, quarrying, clay and sand pits	1,824,459	641,288	10,997,369	1,627	381	16,559	18,368
229	Other non-metallic mining and quarrying	198,174	69,657	1,161,835	177	41	1,749	1,968

Appendix Table 12 (continued)

		1992						
PSIC	Industry & Process	Fuel Consumption			Cost (P '000)			Total
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
MANUFACTURING		630,498,066	221,616,869	458,711,672	562,402	131,822	690,710	1,284,934
31	Manufacture of food, beverage and tobacco	291,067,245	102,308,659	191,378,373	259,631	60,855	273,112	593,599
311-312	Food manufacturing	267,103,921	93,885,672	147,317,009	238,256	55,845	221,824	515,925
313	Beverage manufacturing	11,676,537	4,104,243	30,897,697	10,415	2,441	46,525	59,381
314	Tobacco manufacturing	12,286,787	4,318,743	3,163,668	10,960	2,569	4,764	18,292
32	Textile, wearing apparel and leather industries	43,139,015	15,163,145	25,965,200	38,480	9,019	39,097	86,597
321	Textile manufacturing	25,095,746	8,821,027	18,421,708	22,385	5,247	27,739	55,371
322	Wearing apparel	14,743,515	5,182,271	6,615,169	13,151	3,083	9,961	26,195
323-324	Manufacture of leather and leather products	3,299,754	1,159,847	928,323	2,943	690	1,398	5,031
33	Manufacture of wood and wood products including furniture and fixtures	137,347,150	48,276,826	84,011,217	122,513	28,716	126,501	277,730
331	Manufacture of wood and wood products	126,183,349	44,352,806	78,713,970	112,555	26,382	118,524	257,461
332	Manufacture and repair of furniture	11,163,801	3,924,019	5,297,247	9,958	2,334	7,976	20,269
34	Manufacture of paper and paper product; printing and publishing	22,371,640	7,863,518	23,509,947	19,355	4,677	35,400	60,033
341	Manufacture of paper and allied products	9,380,235	3,297,105	17,427,833	8,367	1,961	26,242	36,570
342	Printing, publishing and allied industries	12,991,405	4,566,413	6,082,114	11,588	2,716	9,158	23,463
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	63,003,597	22,145,444	35,463,568	56,199	13,173	53,400	122,771
351,352	Manufacture of chemicals and plastic products	46,533,138	16,356,162	27,331,935	41,507	9,729	41,155	92,392
AND 356								
353)	Petroleum refineries	10,610,172	3,729,422	2,199,831	9,464	2,218	3,312	14,995
354)	Manufacture of miscellaneous products of petroleum and coal							
355	Rubber products	5,860,288	2,059,861	5,931,801	5,227	1,225	8,932	15,384
36	Manufacture of non-metallic mineral products	16,003,238	5,651,176	48,562,922	14,346	3,163	73,124	90,833
361	Manufacture of pottery, china and earthenware	342,562	120,409	4,410,947	306	72	6,642	7,019
362	Manufacture of glass and glass products	1,022,326	359,342	9,891,718	912	214	14,895	16,020
363	Manufacture of cement	1,063,219	373,716	18,776,614	948	222	28,273	29,444
369	Manufacture of other non-metallic mineral products	13,655,131	4,799,709	15,483,643	12,180	2,855	23,315	38,350
37	Basic metal industries	5,816,249	2,044,182	34,732,073	5,188	1,216	52,298	58,702
371	Iron and steel basic industries	4,749,884	1,669,560	27,512,868	4,237	993	41,428	46,658
372	Non-ferrous metal basic industries	1,066,365	374,822	7,219,205	951	223	10,870	12,045
38	Manufacture of fabricated metal products, machines and equipment	45,171,085	15,877,407	23,375,082	40,292	9,444	35,197	84,934
381	Manufacture of fabricated metal products	14,668,020	5,155,735	4,562,282	13,084	3,067	6,870	23,020
382	Manufacture of machinery except electrical	8,622,141	3,030,639	4,090,465	7,691	1,803	6,159	15,653
383	Manufacture of electrical machinery, etc.	15,073,805	5,298,366	8,027,834	13,446	3,152	12,088	28,685
384	Manufacture of transport equipment	6,322,694	2,222,395	6,169,797	5,640	1,322	9,290	16,252
385	Manufacture of professional and scientific and measuring and controlling equipment	176,155	61,917	378,566	157	37	570	764
386	Manufacture and repair of metal furniture and fixtures	308,271	108,356	146,138	275	64	220	559
39	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	1,359	2,580	9,736
390	Other manufacturing industries	6,498,848	2,284,312	1,713,291	5,797	1,359	2,580	9,736

Appendix Table 12 (continued)

PSIC	Industry & Process	1992						Total
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
ELECTRICITY, GAS AND WATER								
41	Electricity	14,095,458	4,954,182	40,604	12,573	2,947	61	15,581
411	Electricity generation and distribution	14,075,046	4,947,307	-	12,555	2,943	-	15,498
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	9,470	3,328	18,837	8	2	28	39
421	Gas Manufacture and distribution through systems	-	-	-	-	-	-	-
422	Steam heat and power plants	9,470	3,328	18,837	8	2	28	39
43	Waterworks and supply	10,942	3,846	21,767	10	2	33	45
430	Waterworks and supply	10,942	3,846	21,767	10	2	33	45
CONSTRUCTION								
50	Construction	82,953,111	29,157,597	65,645,351	73,994	17,344	98,801	190,138
501	General building construction	16,961,176	5,961,767	11,567,151	15,129	3,546	17,417	36,093
502	General engineering construction	60,137,938	21,138,180	49,525,389	53,643	12,573	74,573	140,790
503	Special trade construction	5,853,996	2,057,650	4,522,811	5,222	1,224	6,810	13,256
WHOLESALE AND RETAIL TRADE								
61	Wholesale trade	1,007,270	2,814,515	15,928,549	7,142	1,674	23,985	32,801
618	Petroleum and petroleum products, wholesaling	5,229,672	1,838,203	10,403,181	4,665	1,093	15,665	21,423
62	Retail trade	2,777,599	976,312	5,525,368	2,478	581	8,320	11,378
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATIONS								
71	Transportation services	136,950,653	48,691,492	160,628,793	122,160	28,963	241,868	392,991
711	Railway transport	136,229,600	48,438,045	159,194,431	121,516	28,812	239,709	390,037
712	Road passenger transport	-	-	-	-	-	-	-
713	Water transport	131,711,146	47,350,284	131,846,761	120,162	28,165	198,530	346,856
714	Air transport	82,988	583,202	23,874,026	74	347	35,949	36,369
719	Services allied to transport	475,586	167,166	1,564,192	424	99	2,355	2,879
72	Storage and warehousing	959,880	337,393	1,909,452	856	201	2,875	3,932
720	Storage and warehousing	34,881	12,261	69,388	31	7	104	143
73	Communication	34,881	12,261	69,388	31	7	104	143
73	Communication	686,172	241,186	1,364,974	612	143	2,055	2,811

Appendix Table 12 (continued)

PSIC	Industry & Process	1992					Total	
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline			Diesel
Premium	Regular		Premium	Regular				
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES								
		4,423,770	1,554,933	8,800,032	3,946	925	13,251	18,122
		1,745,267	613,453	3,471,792	1,557	365	5,228	7,149
81	Banking institution	418,405	147,067	832,317	373	87	1,253	1,714
82	Financial intermediaries	295,199	103,761	587,227	263	62	884	1,209
83	Insurance	529,248	186,028	1,052,813	472	111	1,585	2,168
84	Real estate	1,435,650	504,624	2,855,883	1,281	300	4,300	5,881
85	Business services							
COMMUNITY, SOCIAL AND PERSONAL SERVICE								
		46,981,140	16,513,632	37,094,474	41,907	9,823	55,855	107,585
		40,230,384	14,140,776	27,626,355	35,885	8,411	41,599	85,895
91	Public administration and defense	-	-	-	-	-	-	-
92	Sanitary and similar services	-	-	-	-	-	-	-
93	Education services	389,038	136,745	773,898	347	81	1,165	1,594
94	Medical, dental, other health and veterinary services	635,125	223,243	1,263,410	567	133	1,902	2,602
95	Other social and related community service	-	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	5,726,592	2,012,868	7,430,792	5,108	1,197	11,189	17,494
III	Household sector	355,428,632	124,931,353	222,604	317,041	74,312	335	391,688
NATURE Nature sector								
TOTAL		1,310,631,320	463,013,282	992,213,825	1,169,879	275,409	1,494,036	2,938,524

Note: PSIC 14 & 713 gasoline & diesel consumption were directly based on DOE data.

Cost of gas reformulation (P/liter):

1. Premium Gas 0.892
2. Diesel (P/gallon) 1.506
3. Regular gas 0.595

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors (except for some) based on ERB/NSO/DOH data.
3. A 90% adjustment is applied to fuel consumption.
4. Cost of fuel reformulation per gallon is provided by WIO Environmental Sector Study.

INSTRUCTIONS:

1. From your fuel consumption computations from Appendix Table 21, add all gasoline consumptions regardless of vehicle type. Do the same thing for diesel consumption.
2. For gasoline, assume that 50% are of premium type and the remaining 50% as regular.
3. Convert diesel from liters to gallons. See Appendix Table 27.
4. Input the fuel consumption values in the TOTAL rows.
5. Multiply the total values with the sectoral attribution at the right-hand side of the table to get the sectoral distribution.
6. Convert diesel from liters to gallons. See Appendix Table 27.
7. Use the cost of gas reformulation values above to compute for the cost.

Appendix Table 12 (continued)

ISIC	Industry & Process	1992 (in 1988 Prices)						Total
		Fuel Consumption			Cost (P. '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
AGRICULTURE, FORESTRY AND FISHERY		9,285,983	5,043,041	97,544,347	5,462	2,319	122,070	129,871
11	Agricultural crops production	3,266,640	1,148,207	6,498,199	1,591	373	5,144	7,308
111	Palay production	28,785	10,118	57,261	14	3	47	64
112	Corn production	78,667	27,631	156,490	38	9	129	176
113	Vegetable production	342	120	681	0	0	1	1
114	Fruits and nuts (excluding coconut) production	975,771	342,979	1,941,063	475	111	1,596	2,183
115	Coconut production including copra-making	365,150	128,348	726,378	178	42	597	817
116	Sugarcane production	1,183,672	416,055	2,354,633	577	135	1,936	2,648
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	634,252	222,936	1,261,693	309	72	1,038	1,419
12	Livestock, poultry & other animal products	1,505,961	529,338	2,995,749	734	172	2,464	3,369
121	Livestock and livestock products	188,438	136,534	772,705	189	44	635	869
122	Poultry and poultry products	1,117,523	392,803	2,223,044	544	128	1,828	2,500
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	449,622	158,040	894,416	219	51	736	1,006
130	Agicultural services	449,622	158,040	894,416	219	51	736	1,006
14	Fishery	2,318,501	2,594,007	61,241,708	2,068	1,543	92,215	95,826
141	Coastal (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	1,745,259	613,450	25,914,276	850	199	21,311	22,361
151	Logging operations	1,745,259	613,450	25,914,276	850	199	21,311	22,361
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING		22,007,057	7,735,369	147,627,399	10,721	2,513	121,404	134,638
21	Metallic ore mining	4,114,778	1,446,324	34,689,028	2,005	470	28,527	31,002
211	Gold ore mining	2,691,549	946,066	24,658,945	1,311	307	20,279	21,897
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	715,465	251,482	5,650,660	349	82	4,647	5,077
215	Chromite ore mining	685,745	241,036	4,366,897	334	78	3,591	4,004
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	22,019	7,740	12,526	11	3	10	24
22	Non-metallic mining and quarrying	17,892,279	6,289,045	112,938,170	8,716	2,043	92,877	103,637
221	Coal mining	2,897,115	1,018,321	18,449,138	1,411	331	15,172	16,914
222	Crude petroleum and natural gas exploration and production	12,972,532	4,559,779	82,330,029	6,320	1,481	67,706	75,507
223	Stone, quarrying, clay and sand pits	1,824,459	641,288	10,997,369	889	208	9,044	10,141
229	Other non-metallic mining and quarrying	198,174	69,657	1,161,835	97	23	955	1,075

Appendix Table 12 (continued)

PSIC	Industry & Process	1992 (in 1988 Prices)						Total
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
MANUFACTURING		630,498,066	221,616,869	458,711,672	307,156	71,995	377,231	756,381
31	Manufacture of food, beverage and tobacco	291,067,245	102,308,659	181,378,373	141,797	33,236	149,160	324,194
311-312	Food manufacturing	267,103,921	93,885,672	147,317,009	130,123	30,500	121,149	281,772
313	Beverage manufacturing	11,676,537	4,104,243	30,897,697	5,688	1,333	25,409	32,431
314	Tobacco manufacturing	12,286,787	4,318,743	3,163,668	5,986	1,403	2,602	9,990
32	Textile, wearing apparel and leather industries	43,139,015	15,163,145	25,965,200	21,016	4,926	21,353	47,295
321	Textile manufacturing	25,095,746	8,821,027	18,421,708	12,226	2,866	15,149	30,241
322	Wearing apparel	14,743,515	5,182,271	6,615,169	7,183	1,684	5,440	14,306
323-324	Manufacture of leather and leather products	3,299,754	1,159,847	928,323	1,608	377	763	2,748
33	Manufacture of wood and wood products including furnitures and fixtures	137,347,150	48,276,826	84,011,217	66,911	15,683	69,088	151,682
331	Manufacture of wood and wood products	126,183,349	44,352,806	78,713,970	61,472	14,408	64,732	140,612
332	Manufacture and repair of furniture	11,163,801	3,924,019	5,297,247	5,439	1,275	4,356	11,070
34	Manufacture of paper and paper products; printing and publishing	22,371,640	7,863,518	23,509,947	10,899	2,555	19,334	32,787
341	Manufacture of paper and allied products	9,380,235	3,297,105	17,427,833	4,570	1,071	14,332	19,973
342	Printing, publishing and allied industries	12,991,405	4,566,413	6,082,114	6,329	1,483	5,002	12,814
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	63,003,597	22,145,444	35,463,568	30,693	7,194	29,164	67,051
351,352	Manufacture of chemicals and plastic products	46,533,138	16,356,162	27,331,935	22,669	5,313	22,477	50,460
AND 356								
353)	Petroleum refineries	10,610,172	3,729,422	2,199,831	5,169	1,212	1,809	8,190
354)	Manufacture of miscellaneous products of petroleum and coal							
355	Rubber products	5,860,288	2,039,861	5,931,801	2,855	669	4,878	8,402
36	Manufacture of non-metallic mineral products	16,083,238	5,653,176	48,562,922	7,835	1,836	39,937	49,608
361	Manufacture of pottery, china and earthenware	342,562	120,409	4,410,947	167	39	3,627	3,833
362	Manufacture of glass and glass products	1,022,326	359,342	9,891,718	498	117	8,135	8,749
363	Manufacture of cement	1,063,219	373,716	18,776,614	518	121	15,441	16,081
369	Manufacture of other non-metallic mineral products	13,655,131	4,799,709	15,483,643	6,652	1,559	12,733	20,945
37	Basic metal industries	5,816,249	2,044,382	34,732,073	2,833	664	28,563	32,060
371	Iron and steel basic industries	4,749,884	1,669,560	27,512,868	2,314	542	22,626	25,482
372	Non-ferrous metal basic industries	1,066,365	374,822	7,219,205	519	122	5,937	6,578
38	Manufacture of fabricated metal products, machinery and equipment	45,171,085	15,877,407	23,375,882	22,006	5,158	19,223	46,387
381	Manufacture of fabricated metal products	14,668,020	5,155,735	4,562,282	7,146	1,675	3,752	12,573
382	Manufacture of machinery except electrical	8,622,141	3,030,639	4,090,465	4,200	985	3,364	8,549
383	Manufacture of electrical machinery, etc.	15,073,805	5,298,366	8,027,834	7,343	1,721	6,602	15,666
384	Manufacture of transport equipment	6,322,694	2,222,395	6,169,797	3,080	722	5,074	8,876
385	Manufacture of professional and scientific and measuring and controlling equipment	176,155	61,917	378,566	86	20	311	417
386	Manufacture and repair of metal furnitures and fixtures	308,271	108,356	146,138	150	35	120	306
39	Other manufacturing industries	6,498,848	2,284,312	1,713,291	3,166	742	1,409	5,317
390	Other manufacturing industries	6,498,848	2,284,312	1,713,291	3,166	742	1,409	5,317

Appendix Table 12 (continued)

FISC	Industry & Process	1992 (in 1988 Prices)						
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	Total
Premium	Regular		Premium	Regular				
ELECTRICITY, GAS AND WATER								
41	Electricity	14,095,458	4,954,482	40,604	6,867	1,610	33	8,510
411	Electricity generation and distribution	14,075,046	4,947,307	-	6,857	1,607	-	8,464
412	Electricity distribution to consumers	-	-	-	-	-	-	-
42	Gas and steam	9,470	3,328	18,837	5	1	15	21
421	Gas manufacture and distribution through systems	-	-	-	-	-	-	-
422	Steam heat and power plants	9,470	3,328	18,837	5	1	15	21
43	Waterworks and supply	10,942	3,846	21,767	5	1	18	24
430	Waterworks and supply	10,942	3,846	21,767	5	1	18	24
CONSTRUCTION								
50	Construction	82,953,111	29,157,597	65,615,351	40,412	9,472	53,960	103,844
501	General building construction	16,961,176	5,961,767	11,567,151	8,263	1,937	9,512	19,712
502	General engineering construction	60,137,938	21,138,180	49,523,389	29,297	6,867	40,728	76,892
503	Special trade construction	5,853,996	2,057,650	4,522,811	2,852	668	3,719	7,240
WHOLESALE AND RETAIL TRADE								
61	Wholesale trade	8,007,270	2,814,515	15,928,549	3,901	914	13,099	17,914
618	Wholesale trade	5,229,672	1,838,203	10,403,181	2,548	597	8,555	11,700
618	Petroleum and petroleum products, wholesaling	-	-	-	-	-	-	-
62	Retail trade	2,777,599	976,312	5,525,368	1,353	317	4,544	6,214
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATIONS								
71	Transportation services	136,950,653	48,691,492	160,628,793	66,717	15,818	132,096	214,632
711	Transportation services	136,229,600	48,438,045	159,194,431	66,366	15,736	130,917	213,019
711	Railway transport	-	-	-	-	-	-	-
712	Road passenger transport	134,711,146	47,350,284	131,846,761	65,626	15,382	108,327	189,435
713	Water transport	82,988	583,202	23,874,026	40	189	19,633	19,863
714	Air transport	475,586	167,166	1,564,192	232	54	1,286	1,572
719	Services allied to transport	959,880	137,393	1,909,452	468	110	1,570	2,148
72	Storage and warehousing	34,881	12,261	69,388	17	4	57	78
720	Storage and warehousing	34,881	12,261	69,388	17	4	57	78
73	Communication	686,172	241,186	1,161,974	334	78	1,123	1,535

Appendix Table 12 (continued)

PSIC	Industry & Process	1992 (in 1988 Prices)						Total
		Fuel Consumption			Cost (P '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES								
		4,423,770	1,554,933	8,800,032	2,155	505	7,237	9,897
		1,745,267	613,453	3,471,792	850	199	2,855	3,905
81	Banking institutions	418,405	147,067	832,317	204	48	684	936
82	Financial intermediaries	295,199	103,761	587,327	144	34	483	660
83	Insurance	529,248	186,028	1,052,813	258	60	866	1,184
84	Real estate	1,435,630	504,624	2,855,883	699	164	2,349	3,212
85	Business services							
COMMUNITY, SOCIAL AND PERSONAL SERVICE								
		46,981,140	16,513,632	37,094,474	22,888	5,365	30,505	58,758
91	Public administration and defense	40,230,384	14,140,776	27,626,355	19,599	4,594	22,719	46,912
92	Sanitary and similar services							
93	Education services	389,038	136,745	773,898	190	44	636	870
94	Medical, dental, other health and veterinary services	635,125	223,243	1,263,430	309	73	1,039	1,421
95	Other social and related community service							
96	Recreational and cultural services							
97	Personal and household services							
98	Restaurants and hotels							
99	International organizations and other extra-territorial bodies	5,726,592	2,012,868	7,430,792	2,790	654	6,111	9,555
III	Household sector	355,428,612	124,931,353	222,604	173,152	40,585	183	213,920
NATURE Nature sector								
TOTAL		1,310,631,120	463,013,352	992,213,825	638,492	150,415	815,967	1,648,365

Note: PSIC 14 & 713 gasoline & diesel consumption were directly 1

Cost of gas reformulation (P/liter):

1. Premium Gas 0.892
2. Diesel (P/gallon) 1.506
3. Regular gas 0.595

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors
3. A 90% adjustment is applied to fuel consumption.
4. Cost of fuel reformulation per gallon is provided by WHO Envi

INSTRUCTIONS:

1. From your fuel consumption computations from Appendix Table 27
2. For gasoline, assume that 50% are of premium type and the rest regular
3. Convert diesel from liters to gallons. See Appendix Table 27.
4. Input the fuel consumption values in the TOTAL rows.
5. Multiply the total values with the sectoral distribution at the top.
6. Convert diesel from liters to gallons. See Appendix Table 27.
7. Use the cost of gas reformulation values above to compute for 1

Appendix Table 12. (continued)

FNIC	Industry & Process	1995						Total
		Fuel Consumption			Cost (P. '000)			
		Gasoline (liters)		Diesel (gallons)	Gasoline		Diesel	
Premium	Regular		Premium	Regular				
AGRICULTURE, FORESTRY AND FISHERY		2,318,501	2,594,007	61,241,708	2,068	1,543	92,215	95,826
11	Agricultural crops production	-	-	-	-	-	-	-
111	Palay production	-	-	-	-	-	-	-
112	Corn production	-	-	-	-	-	-	-
113	Vegetable production	-	-	-	-	-	-	-
114	Fruits and nuts (excluding coconut) production	-	-	-	-	-	-	-
115	Coconut production including copra making	-	-	-	-	-	-	-
116	Sugarcane production	-	-	-	-	-	-	-
117	Tobacco production	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-
119	Agri. crops production	-	-	-	-	-	-	-
12	Livestock, poultry & other animal products	-	-	-	-	-	-	-
121	Livestock and livestock products	-	-	-	-	-	-	-
122	Poultry and poultry products	-	-	-	-	-	-	-
129	Raising of other animals, incl. their products	-	-	-	-	-	-	-
13	Agricultural services	-	-	-	-	-	-	-
130	Agricultural services	-	-	-	-	-	-	-
14	Fishery	2,318,501	2,594,007	61,241,708	2,068	1,543	92,215	95,826
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-
15	Forestry	-	-	-	-	-	-	-
151	Logging operations	-	-	-	-	-	-	-
159	Other forestry activities	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-
MINING AND QUARRYING								
21	Metallie ore mining	-	-	-	-	-	-	-
211	Gold ore mining	-	-	-	-	-	-	-
212	Other precious metal ore mining	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-
214	Nickel ore mining	-	-	-	-	-	-	-
215	Chromite ore mining	-	-	-	-	-	-	-
216	Iron ore mining	-	-	-	-	-	-	-
219	Other base metal ore mining	-	-	-	-	-	-	-
22	Non-metallie mining and quarrying	-	-	-	-	-	-	-
221	Coal mining	-	-	-	-	-	-	-
222	Crude petroleum and natural gas exploration and production	-	-	-	-	-	-	-
223	Stone, quarrying, clay and sand pits	-	-	-	-	-	-	-
229	Other non-metallie mining and quarrying	-	-	-	-	-	-	-

Appendix Table 12 (continued)

PSIC	Industry & Process	1995					Total
		Fuel Consumption			Cost (P '000)		
		Gasoline (liters)		Diesel (gallons)	Gasoline		
Premium	Regular		Premium	Regular			
MANUFACTURING							
31	Manufacture of food, beverage and tobacco	-	-	-	-	-	-
311-312	Food manufacturing	-	-	-	-	-	-
313	Beverage manufacturing	-	-	-	-	-	-
314	Tobacco manufacturing	-	-	-	-	-	-
32	Textile, wearing apparel and leather industries	-	-	-	-	-	-
321	Textile manufacturing	-	-	-	-	-	-
322	Wearing apparel	-	-	-	-	-	-
323-324	Manufacture of leather and leather products	-	-	-	-	-	-
33	Manufacture of wood and wood products including furnitures and fixtures	-	-	-	-	-	-
331	Manufacture of wood and wood products	-	-	-	-	-	-
332	Manufacture and repair of furniture	-	-	-	-	-	-
34	Manufacture of paper and paper product; printing and publishing	-	-	-	-	-	-
341	Manufacture of paper and allied products	-	-	-	-	-	-
342	Printing, publishing and allied industries	-	-	-	-	-	-
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	-	-	-	-	-	-
351,352 AND 356	Manufacture of chemicals and plastic products	-	-	-	-	-	-
353	Petroleum refineries	-	-	-	-	-	-
354	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-
355	Rubber products	-	-	-	-	-	-
36	Manufacture of non-metallic mineral products	-	-	-	-	-	-
361	Manufacture of pottery, china and earthenware	-	-	-	-	-	-
362	Manufacture of glass and glass products	-	-	-	-	-	-
363	Manufacture of cement	-	-	-	-	-	-
369	Manufacture of other non-metallic mineral products	-	-	-	-	-	-
37	Basic metal industries	-	-	-	-	-	-
371	Iron and steel basic industries	-	-	-	-	-	-
372	Non-ferrous metal basic industries	-	-	-	-	-	-
38	Manufacture of fabricated metal products, machineries and equipment	-	-	-	-	-	-
381	Manufacture of fabricated metal products	-	-	-	-	-	-
382	Manufacture of machinery except electrical	-	-	-	-	-	-
383	Manufacture of electrical machinery, etc.	-	-	-	-	-	-
384	Manufacture of transport equipment	-	-	-	-	-	-
385	Manufacture of professional and scientific and measuring and controlling equipment	-	-	-	-	-	-
386	Manufacture and repair of metal furnitures and fixtures	-	-	-	-	-	-
39	Other manufacturing industries	-	-	-	-	-	-
390	Other manufacturing industries	-	-	-	-	-	-

Appendix Table 12 (continued)

PSIC	Industry & Process	1995					Total
		Fuel Consumption			Cost (P. '000)		
		Gasoline (liters)		Diesel (gallons)	Gasoline	Diesel	
Premium	Regular		Premium	Regular			
ELECTRICITY, GAS AND WATER							
41	Electricity	-	-	-	-	-	-
411	Electricity generation and distribution	-	-	-	-	-	-
412	Electricity distribution to consumers	-	-	-	-	-	-
42	Gas and steam	-	-	-	-	-	-
421	Gas manufacture and distribution through systems	-	-	-	-	-	-
422	Steam heat and power plants	-	-	-	-	-	-
43	Waterworks and supply	-	-	-	-	-	-
430	Waterworks and supply	-	-	-	-	-	-
CONSTRUCTION							
50	Construction	-	-	-	-	-	-
501	General building construction	-	-	-	-	-	-
502	General engineering construction	-	-	-	-	-	-
503	Special trade construction	-	-	-	-	-	-
WHOLESALE AND RETAIL TRADE							
61	Wholesale trade	9,007,270	2,814,515	15,928,549	3,901	914	13,099
618	Petroleum and petroleum products, wholesaling	5,229,672	1,838,203	10,403,181	2,548	597	8,555
62	Retail trade	-	-	-	-	-	-
628	Petroleum and petroleum products, retailing	2,777,599	976,312	5,525,368	1,353	317	4,544
TRANSPORTATION, STORAGE AND COMMUNICATIONS							
71	Transportation services	686,172	241,186	1,364,974	334	78	1,123
711	Railway transport	-	-	-	-	-	-
712	Road passenger transport	-	-	-	-	-	-
713	Water transport	-	-	-	-	-	-
714	Air transport	-	-	-	-	-	-
719	Services allied to transport	-	-	-	-	-	-
72	Storage and warehousing	-	-	-	-	-	-
720	Storage and warehousing	-	-	-	-	-	-
73	Communication	686,172	241,186	1,364,974	334	78	1,123

Appendix Table 12 (continued)

PSIC	Industry & Process	1995				Cost (P '000)		Total
		Fuel Consumption		Diesel (gallons)	Gasoline		Diesel	
		Premium	Regular		Premium	Regular		
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES								
81	Banking institution	-	-	-	-	-	-	
82	Financial intermediaries	-	-	-	-	-	-	
83	Insurance	-	-	-	-	-	-	
84	Real estate	-	-	-	-	-	-	
85	Business services	-	-	-	-	-	-	
COMMUNITY, SOCIAL AND PERSONAL SERVICE								
91	Public administration and defense	-	-	-	-	-	-	
92	Sanitary and similar services	-	-	-	-	-	-	
93	Education services	-	-	-	-	-	-	
94	Medical, dental, other health and veterinary services	-	-	-	-	-	-	
95	Other social and related community service	-	-	-	-	-	-	
96	Recreational and cultural services	-	-	-	-	-	-	
97	Personal and household services	-	-	-	-	-	-	
98	Restaurants and hotels	-	-	-	-	-	-	
99	International organizations and other extra-territorial bodies	-	-	-	-	-	-	
III	Household sector	-	-	-	-	-	-	
NATURE	Nature sector	-	-	-	-	-	-	
TOTAL		11,011,943	463,013,352	992,213,825	638,492	150,415	815,967	115,276

Note: PSIC 14 & 713 gasoline & diesel consumption were directly 1

Cost of gas reformulation (P/liter):

1. Premium Gas 0.892
2. Diesel (P/gallon) 1.506
3. Regular gas 0.595

Fuel reformulation cost:

1. Fuel consumption x cost/gallon (by type of fuel)
2. Fuel consumption is computed and allocated across all sectors
3. A 90% adjustment is applied to fuel consumption.
4. Cost of fuel reformulation per gallon is provided by WIIO Bhvi

INSTRUCTIONS:

1. From your fuel consumption computations from Appendix Table 27.
2. For gasoline, assume that 50% are of premium type and the rest regular.
3. Convert diesel from liters to gallons. See Appendix Table 27.
4. Input the fuel consumption values in the TOTAL row.
5. Multiply the total values with the sectoral distribution at the right.
6. Convert diesel from liters to gallons. See Appendix Table 27.
7. Use the cost of gas reformulation values above to compute for 1

Appendix Table 13
 COST OF ENGINE MODIFICATION AND CATALYTIC CONVERTER: PHILIPPINES

PSIC	Industry & Process	No. of Motor Vehicles Requiring Engine Modification			Cost of Modification (P'000)			No. of Motor Vehicles Requiring Catalytic Converters			Cost of Catalytic Converter (P'000)				
		1988	1992	1995	1992		1995	1988	1992	1995	1992				
					Current	88 price					Current	88 price	1995		
AGRICULTURE, FORESTRY AND FISHERY		6,633	5,483	5,267	11,411	11,920	9,434	11,754	7,713	8,973	9,389	25,485	39,217	29,649	42,038
11	Agricultural crops production	1,631	1,118	1,030	2,807	2,431	1,924	2,299	1,897	1,830	1,814	6,268	7,998	6,047	8,121
111	Palay production	14	10	9	25	21	17	20	17	16	16	55	70	53	72
112	Com production	39	27	25	68	59	46	55	46	44	44	151	193	146	196
113	Vegetable production	0	0	0	0	0	0	0	0	0	0	1	1	1	1
114	Fruits and nuts (excluding coconut) production	487	334	308	838	726	575	687	567	547	542	1,872	2,389	1,806	2,426
115	Coconut production including copra-making	182	125	115	314	272	215	257	212	205	203	701	894	676	908
116	Sugarcane production	591	405	373	1,017	861	697	833	687	663	657	2,271	2,898	2,191	2,943
117	Tobacco production	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	Agri. crops production	317	217	200	545	472	374	446	368	355	352	1,217	1,553	1,174	1,577
12	Livestock, poultry and other animal products	752	516	475	1,294	1,121	887	1,060	875	844	836	2,890	3,687	2,788	3,744
121	Livestock and livestock products	194	133	123	314	289	229	273	226	218	216	745	951	719	966
122	Poultry and poultry products	558	383	352	960	832	658	787	649	626	620	2,144	2,736	2,069	2,778
129	Raising of other animals, including their products	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Agricultural services	225	154	142	386	335	265	316	261	252	250	863	1,101	832	1,118
130	Agricultural services	225	154	142	386	335	265	316	261	252	250	863	1,101	832	1,118
14	Fishery	-	-	-	-	-	-	-	-	-	-	-	-	-	-
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	Other fishery activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Forestry	4,925	3,496	3,620	6,924	8,033	6,358	8,079	4,680	6,047	6,489	15,464	26,431	19,983	29,056
151	Logging operations	4,025	3,696	3,620	6,924	8,033	6,358	8,079	4,680	6,047	6,489	15,464	26,431	19,983	29,056
159	Other forestry activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MINING AND QUARRYING		22,692	21,870	21,673	39,040	47,540	37,626	48,365	26,386	35,788	38,978	87,188	156,415	118,254	174,522
21	Metallic ore mining	5,364	5,068	4,998	9,228	11,015	8,718	11,153	6,237	8,292	8,976	20,608	36,242	27,400	40,189
211	Gold ore mining	3,809	3,586	3,534	6,553	7,796	6,170	7,887	4,429	5,869	6,346	14,635	25,650	19,392	28,413
212	Other precious metal ore mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-
214	Nickel ore mining	882	829	816	1,517	1,801	1,425	1,821	1,026	1,356	1,465	3,389	5,926	4,480	6,559
215	Chromite ore mining	670	649	644	1,152	1,411	1,117	1,438	779	1,062	1,159	2,573	4,644	3,511	5,191
216	Iron ore mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-
219	Other base metal ore mining	3	3	3	5	7	6	7	4	5	6	12	23	17	26
22	Non-metallic mining and quarrying	17,329	16,803	16,675	29,812	36,525	28,908	37,212	20,149	27,496	30,002	66,580	120,173	98,854	134,333
221	Coal mining	2,829	2,743	2,722	4,867	5,963	4,719	6,075	3,290	4,489	4,898	10,871	19,618	14,832	21,929
222	Crude petroleum and natural gas exploration and production	12,628	12,244	12,151	21,725	26,616	21,065	27,116	14,684	20,036	21,862	48,520	87,570	66,205	97,886
223	Stone, quarrying, clay and sand pits	1,692	1,642	1,630	2,911	3,569	2,824	3,636	1,968	2,686	2,932	6,501	11,742	8,877	13,128
229	Other non-metallic mining and quarrying	179	174	173	308	378	299	385	208	284	310	688	1,243	940	1,390

PSIC	Industry & Process	# of Motor Vehicles Requiring Engine Modification			Cost of Modification (P'000)			No. of Motor Vehicles Requiring Catalytic Converters			Cost of Catalytic Converter (P'000)				
		1988	1992	1995	1988	1992		1995	1988	1992	1995	1992			
						Current	88 price					1988	Current	88 price	1995
MANUFACTURING															
31	Manufacture of food, beverage and tobacco	85,906	89,498	90,444	147,793	194,545	153,973	201,830	99,891	146,451	163,541	330,068	640,083	483,919	732,255
311-312	Food manufacturing	42,953	44,749	45,222	73,897	97,273	76,987	180,915	49,945	73,226	81,771	165,034	320,041	241,960	366,128
313	Beverage manufacturing	36,656	38,424	38,887	63,064	83,524	66,105	86,779	42,624	62,876	70,345	140,841	274,806	207,761	314,968
314	Tobacco manufacturing	5,132	5,056	5,038	8,829	10,991	8,699	11,242	5,967	8,274	9,073	19,717	36,161	27,339	40,625
32	Textile, wearing apparel and leather industries	1,165	1,269	1,297	2,004	2,758	2,183	2,894	1,354	2,076	2,353	4,476	9,074	6,860	10,534
321	Textile manufacturing	6,234	6,506	6,577	10,725	14,142	11,192	14,677	7,249	10,646	11,894	23,951	46,528	35,176	53,254
322	Wearing apparel	4,105	4,242	4,278	7,062	9,222	7,299	9,547	4,773	6,942	7,731	15,772	30,342	22,939	34,615
322	Wearing apparel	1,805	1,912	1,940	3,105	4,155	3,289	4,329	2,098	3,128	3,512	6,933	13,671	10,336	15,724
323-324	Manufacture of leather and leather products	324	352	359	558	764	605	801	377	575	651	1,246	2,515	1,901	2,915
33	Manufacture of wood and wood products including furniture and fixtures	20,041	20,898	21,122	34,478	45,427	35,954	47,135	23,303	34,197	38,194	77,001	149,463	112,998	171,014
331	Manufacture of wood and wood products	18,633	19,411	19,614	32,056	42,194	33,395	43,769	21,666	31,764	35,464	71,591	138,826	104,956	158,791
332	Manufacture and repair of furniture	1,408	1,487	1,508	2,422	3,233	2,559	3,366	1,637	2,434	2,730	5,410	10,637	8,042	12,222
34	Manufacture of paper and paper products: printing and publishing	4,682	4,760	4,781	8,055	10,348	8,190	10,670	5,444	7,790	8,631	17,990	34,046	25,740	38,646
341	Manufacture of paper and allied products	3,056	3,041	3,038	5,257	6,611	5,232	6,778	3,553	4,976	5,475	11,740	21,750	16,443	24,513
342	Printing, publishing and allied industries	1,627	1,719	1,744	2,798	3,737	2,958	3,892	1,891	2,813	3,156	6,250	12,297	9,297	14,133
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	8,750	9,162	9,271	15,053	19,916	15,762	20,689	10,174	14,992	16,770	33,618	65,526	49,540	75,087
351,352	Manufacture of chemicals and plastic products	6,627	6,924	7,002	11,401	15,051	11,912	15,625	7,705	11,330	12,663	25,461	49,521	37,439	56,699
353	Petroleum refineries	929	1,022	1,048	1,598	2,222	1,759	2,338	1,080	1,673	1,902	3,570	7,310	5,527	8,516
354	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-	-	-	-	-	4,587	8,695	6,573	9,872
355	Rubber products	1,194	1,216	1,221	2,054	2,643	2,092	2,725	1,388	1,989	2,205	-	-	-	-
36	Manufacture of non-metallic mineral products	7,939	7,793	7,759	13,659	16,940	13,408	17,314	9,232	12,753	13,971	30,505	55,737	42,138	62,556
361	Manufacture of pottery, china and earthenware	661	632	625	1,137	1,374	1,088	1,395	768	1,034	1,124	2,539	4,521	3,418	5,032
362	Manufacture of glass and glass products	1,486	1,435	1,422	2,557	3,119	2,468	3,174	1,728	2,348	2,558	5,711	10,262	7,758	11,455
363	Manufacture of cement	2,771	2,664	2,639	4,767	5,791	4,583	5,888	3,222	4,359	4,744	10,646	19,054	14,405	21,243
369	Manufacture of other non-metallic mineral products	3,022	3,062	3,072	5,198	6,656	5,268	6,856	3,513	5,011	5,545	11,609	21,901	16,557	24,827
37	Basic metal industries	5,347	5,189	5,150	9,199	11,279	8,927	11,493	6,218	8,491	9,266	20,545	37,109	28,055	41,491
371	Iron and steel basic industries	4,244	4,120	4,090	7,301	8,955	7,088	9,126	4,935	6,742	7,359	16,306	29,465	22,276	32,948
372	Non-ferrous metal basic industries	1,103	1,069	1,061	1,898	2,323	1,839	2,367	1,283	1,749	1,908	4,239	7,644	5,779	8,543

PSIC	Industry & Process	# of Motor Vehicles Requiring Engine Modifications			Cost of Modification (P'000)			No. of Motor Vehicles Requiring Catalytic Converters			Cost of Catalytic Converter (P'000)				
					1992		1995	1988	1992	1995	1992			1995	
		1988	1992	1995	Current	88 price					1995				
38	Manufacture of lubricated metal products, machinery and equipment	5,977	6,286	6,368	10,283	13,663	10,814	14,209	6,950	10,286	11,521	22,965	44,955	33,987	54,587
381	Manufacture of fabricated metal products	1,504	1,623	1,655	2,587	3,528	2,792	3,694	1,749	2,656	3,000	5,778	11,608	8,776	13,434
382	Manufacture of machinery except electrical	1,087	1,149	1,165	1,871	2,497	1,976	2,599	1,264	1,870	2,108	4,178	8,214	6,210	9,439
383	Manufacture of electrical machinery, etc	2,027	2,129	2,156	3,108	4,678	3,663	4,810	2,357	3,484	3,900	7,200	15,226	11,511	17,462
384	Manufacture of transport equipment	1,255	1,280	1,286	2,159	2,782	2,202	2,870	1,459	2,094	2,322	4,821	9,154	6,920	10,398
385	Manufacture of professional and scientific and measuring and controlling equipment	65	64	64	111	140	110	143	75	105	115	249	459	347	517
386	Manufacture and repair of metal furnitures and fixtures	39	41	42	67	89	71	93	45	67	75	149	294	222	337
39	Other manufacturing industries	622	677	691	1,070	1,471	1,164	1,543	723	1,107	1,254	2,389	4,839	3,658	5,615
390	Other manufacturing industries	622	677	691	1,070	1,471	1,164	1,543	723	1,107	1,254	2,389	4,839	3,658	5,615
ELECTRICITY, GAS AND WATER		1,022	960	946	1,758	2,087	1,652	2,110	1,188	1,571	1,687	3,926	6,866	5,191	7,603
41	Electricity	1,012	953	939	1,741	2,072	1,640	2,096	1,176	1,560	1,687	3,887	6,816	5,153	7,552
411	Electricity generation and distribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
412	Electricity distribution to consumers	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Gas and steam	5	3	3	8	7	6	7	5	5	5	18	23	18	24
421	Gas Manufacture and distribution through systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-
422	Steam heat and power plants	5	3	3	8	7	6	7	5	5	5	18	23	18	24
43	Waterworks and supply	5	4	3	9	8	6	8	6	6	6	21	27	20	27
430	Waterworks and supply	5	4	3	9	8	6	8	6	6	6	21	27	20	27
CONSTRUCTION		14,251	14,675	14,785	24,517	31,900	25,248	32,993	16,570	24,014	26,711	54,754	104,957	79,351	119,601
50	Construction	14,251	14,675	14,785	24,517	31,900	25,248	32,993	16,570	24,014	26,711	54,754	104,957	79,351	119,601
501	General building construction	2,647	2,745	2,771	4,554	5,968	4,723	6,183	3,078	4,492	5,009	10,170	19,635	14,844	22,426
502	General engineering construction	10,613	10,909	10,985	18,259	23,714	18,768	24,514	12,311	17,852	19,841	40,779	78,022	58,987	88,852
503	Special trade construction	990	1,021	1,029	1,703	2,219	1,756	2,296	1,151	1,670	1,859	3,804	7,301	5,519	8,322
WHOLESALE AND RETAIL TRADE		3,999	2,741	2,524	6,880	5,959	4,716	5,636	4,650	4,486	4,466	15,364	19,605	14,822	19,907
61	Wholesale trade	2,612	1,790	1,650	4,493	3,892	3,080	3,681	3,037	2,930	2,904	10,035	12,804	9,680	13,001
618	Petroleum and petroleum products, wholesaling	1,387	951	876	2,386	2,067	1,636	1,955	1,613	1,556	1,542	5,330	6,801	5,141	6,905
62	Retail trade	-	-	-	-	-	-	-	-	-	-	-	-	-	-
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRANSPORTATION, STORAGE AND COMMUNICATIONS		22,588	24,418	24,989	38,860	53,079	42,010	55,765	26,265	39,957	45,341	86,787	174,639	132,031	203,013
71	Transportation services	22,228	24,172	24,762	38,241	52,543	41,585	55,258	25,846	39,554	44,940	85,403	172,873	130,697	201,221
711	Railway transport	21,275	23,604	24,249	36,602	51,308	40,608	54,114	24,739	38,624	44,034	81,744	168,811	127,625	197,206
712	Road passenger transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-
713	Water transport	-	-	210	814	521	412	468	550	392	364	1,818	1,713	1,295	1,628
714	Air transport	473	239	303	825	714	565	626	557	538	533	1,842	2,350	1,777	2,386
719	Services allied to transport	479	329	303	825	714	565	626	557	538	533	1,842	2,350	1,777	2,386
72	Storage and warehousing	17	12	11	30	26	21	25	20	20	19	67	85	65	87
720	Storage and warehousing	17	12	11	30	26	21	25	20	20	19	67	85	65	87
73	Communication	343	235	216	590	511	404	483	398	384	381	1,317	1,680	1,270	1,706

PSIC	Industry & Process	# of Motor Vehicles Requiring Engine Modification			Cost of Modification (P'000)			No. of Motor Vehicles Requiring Catalytic Converters			Cost of Catalytic Converter (P'000)				
					1992		1995				1992		1995		
		1988	1992	1995	1988	Current		88 price	1988	Current	88 price	1995			
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		2,209	1,514	1,395	3,801	3,292	2,605	3,114	2,569	2,478	2,456	8,488	10,831	8,188	10,998
	81 Banking institutions	872	597	550	1,499	1,299	1,028	1,228	1,013	978	969	3,349	4,273	3,231	4,339
	82 Financial intermediaries	209	143	132	359	311	246	295	243	234	232	803	1,024	774	1,040
	83 Insurance	147	101	93	254	220	174	208	171	165	164	566	723	546	734
	84 Real estate	264	181	167	455	394	312	373	307	296	294	1,016	1,296	980	1,316
	85 Business services	717	491	453	1,233	1,068	846	1,011	834	804	797	2,755	3,515	2,457	3,569
COMMUNITY, SOCIAL AND PERSONAL SERVICES		14,704	10,684	9,954	25,297	23,225	18,382	22,215	16,725	16,599	16,572	55,264	72,549	54,849	74,202
	91 Public administration and defense	11,486	8,422	7,861	19,761	18,308	14,490	17,542	13,127	13,241	13,270	43,376	57,872	43,753	59,416
	92 Sanitary and similar services	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	93 Education services	194	133	123	334	290	229	274	226	218	216	746	953	720	967
	94 Medical, dental, other health and veterinary services	317	217	200	546	473	374	447	369	356	353	1,219	1,555	1,176	1,579
	95 Other social and related community services	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96 Recreational and cultural services	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	97 Personal and household services	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	98 Restaurants and hotels	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	99 International organization and other extra-territorial bodies	2,707	1,912	1,771	4,657	4,155	3,289	3,952	3,003	2,784	2,734	9,923	12,169	9,200	12,239
	III Household sector	294,184	282,030	279,117	506,116	613,059	485,207	622,864	325,345	410,591	437,486	1,075,035	1,794,534	1,356,714	1,958,845
	NATURE Nature sector	468,187	453,876	451,097	895,473	986,606	780,852	###	527,301	690,909	746,607	1,742,359	3,019,695	2,282,967	3,342,984
	TOTAL														

Computation of engine modification and catalytic converter cost:

Formula = # of registered motor vehicles x cost/vehicle

- Adjusted sectoral attribution based on NBO/HRB/DOE fuel consumption (whichever is higher) was used to determine the no. of motor vehicles requiring engine modification and subsequently catalytic converter per sector.
- The number of vehicles in 1995 requiring engine modification and the use of catalytic converter was obtained using the average annual growth rate from 1988 to 1992.
- The total no. of registered vehicles requiring engine modification were based on the assumption that only vehicles manufactured later than 1984 are equipped with the required valves.
- While the number of vehicles that need catalytic converter is based on the total no. of registered gasoline-run vehicles except motorcycles & bicycles for 1988 & 1992.
- A ten percent adjustment was applied to the no. of registered motor vehicles requiring catalytic converter.
- Cost per vehicle: (WHO Environmental Sector Study & Logarta, 1995)
 - Based on the report of the Technical Working Group on the Economic Impact of the Phaseout of Leaded Gasoline, the cost of modification is P7,450 (1995), while the cost of the catalytic converter according to the Environmental Sector Study of the World Bank is \$ 500 (1992) plus \$ 25 as yearly operating expense.
 - To deflate for 1988 and 1992:

PSIC	Industry & Process	# of Motor Vehicle Requiring Engine Modification			Cost of Modification (P'000)			No. of Motor Vehicle Requiring Catalytic Converters			Cost of Catalytic Converter (P'000)		
					1988		1992		1995		1988		1992
		1988	1992	1995	Current	88 price		1988	1992	1995	Current	88 price	1995

W11 for transport eqpt.; CFI for service
 1988 = 100 1988 = 100
 1992 = 126.55 1992 = 181.6
 1995 = 129.18 1995 = 229.4

k. Engine Modification
 To deflate to 1988 and 1992: To annualize cost at $r=15\%$, $n=5$ yrs, discount factor = 3.3522:
 1988: 1988: 1992: 1992: 1995: 1995:

7,450	= P 3,747.15	5,787.15	= Pesos	1720.41	
(716,141.00)		1,1522			
7,450	= P 7,286.79	7,286.79	= Pesos	2,174	
(137,187,26.15)		3,3522			
7,450	= P 7,480.60	7,480.60	= Pesos	2,232	
(137,187,26.15)		1,1522			

k. Catalytic converter
 To deflate in 1988 To annualize cost at $r=15\%$, $n=5$ yrs, discount factor = 3.3522, exchange rate for 1992 is P25.00 = \$1.00

1988	1995	1988	1992	1995
Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost
(500 x 25.09) = P 9,911	(500 x 25.71) = P 9,910.6	9,911	(500 x 25.096) = P 3,743.21	(500 x 25.71) = P 3,814.8
(136,337.00)	(136,337.00)	3,3522	3,3522	3,3522
O & M Cost	O & M Cost			
(25 x 25.096) = P 342	(25 x 25.71) = P 280.19			
(183,670.00)	(229,410.00)			
Total Cost				
1988	1995			
2,942.51 + 342 = P 3,304.51				
1992				
3,743.21 + (25 x 25.096) = P 4,370.61				
1995				
3,834.80 + 443.75 = P 4,477.50				

INSTRUCTIONS
 Compute for 1995 values using 1995 cost data.
 Compute for no. of vehicles requiring catalytic converters. Use growth rates ratio, 1988-1992 costs
 1995 EM 2231.55
 CC 4477.5

Appendix Table 14
 VALUES OF MOBILF I & M, FUEL REFORMULATION, CATALYTIC CONVERTER AND ENGINE MODIFICATION: PHILIPPINES, 1988, 1992 (in 1988 prices) and 1995

PSIC	Industry & Process	Technology Cost (P'000)												Total Cost (P'000)		
		Inspection and Maintenance			Fuel Reformulation			Catalytic Converter			Engine Modification			1988	1992	1995
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995			
AGRICULTURE, FORESTRY AND FISHERY		2,510	5,173	8,390	74,089	86,380	122,204	25,485	29,649	42,038	11,411	9,434	11,754	113,495	128,635	184,587
11	Agricultural crops production	617	647	1,714	9,501	7,308	13,544	6,268	6,047	8,121	2,807	1,924	2,299	19,194	15,926	25,678
111	Paddy production	5	6	19	80	64	119	55	53	72	25	17	20	165	140	230
112	Corn production	15	16	41	229	176	326	151	146	196	68	46	55	462	384	618
113	Vegetable production	0	0	-	1	1	1	1	1	1	0	0	0	2	2	3
114	Fruits and nuts (excluding coconut) production	184	193	511	2,839	2,183	4,046	1,872	1,806	2,426	838	575	687	5,734	4,757	7,669
115	Coconut production including copra-making	69	72	191	1,063	817	1,514	701	676	908	314	213	257	2,146	1,780	2,870
116	Sugarcane production	234	234	620	3,444	2,648	4,908	2,271	2,191	2,943	1,017	697	833	6,956	5,771	9,303
117	Tobacco production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	Fiber crops production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	Agricultural crops production	120	126	332	1,846	1,419	2,630	1,217	1,174	1,377	545	374	446	3,727	3,092	4,985
12	Livestock, poultry and other animal products	285	298	788	4,382	3,369	6,244	2,890	2,788	3,744	1,294	887	1,060	8,850	7,342	11,836
121	Livestock and livestock products	73	77	203	1,130	869	1,611	745	719	966	334	229	273	2,283	1,894	3,053
122	Poultry and poultry products	211	221	585	3,252	2,500	4,633	2,144	2,069	2,778	960	658	787	6,568	5,448	8,783
129	Raising of other animals, including their products	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Agricultural services	85	89	235	1,308	1,006	1,864	863	832	1,118	386	265	316	2,642	2,192	3,534
130	Agricultural services	85	89	235	1,308	1,006	1,864	863	832	1,118	386	265	316	2,642	2,192	3,534
14	Fishery	-	-	-	40,715	52,336	70,662	-	-	-	-	-	-	40,715	52,336	70,662
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	Other fishery activities	1,522	2,138	5,652	18,182	22,361	29,891	15,464	19,983	29,056	6,924	6,358	8,079	42,094	50,840	72,677
15	Forestry	1,323	2,138	5,652	18,182	22,361	29,891	15,464	19,983	29,056	6,924	6,358	8,079	42,094	50,840	72,677
151	Logging operations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
159	Other forestry activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MINING AND QUARRYING		8,589	12,655	33,447	101,209	134,639	196,075	38,668	57,049	174,522	43,930	37,626	48,365	192,397	236,968	452,408
21	Metallic ore mining	2,030	2,932	7,750	24,098	31,002	43,815	20,608	27,400	40,189	9,228	8,718	11,153	55,964	70,052	102,906
211	Gold ore mining	1,442	2,075	5,485	17,091	21,897	30,647	14,635	19,392	28,413	6,533	6,170	7,887	39,720	49,535	72,431
212	Other precious metal ore mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
213	Copper ore mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
214	Nickel ore mining	334	479	1,267	4,009	5,077	7,234	3,389	4,480	6,559	1,517	1,423	1,821	9,249	11,462	16,881
215	Chromite ore mining	253	376	993	2,978	4,004	5,874	2,573	3,511	5,191	1,152	1,117	1,438	6,957	9,007	13,496
216	Iron ore mining	-	-	-	-	-	60	12	17	26	5	6	7	38	48	98
219	Other base metal ore mining	1	2	5	20	24	60	18,060	24,649	134,333	34,702	28,908	37,212	136,433	166,916	349,502
22	Non-metallic mining and quarrying	6,559	9,723	25,697	77,111	103,637	152,260	18,060	24,649	134,333	34,702	28,908	37,212	136,433	166,916	349,502
221	Coal mining	1,071	1,587	4,195	12,582	16,914	24,818	10,871	14,832	21,929	4,867	4,719	6,075	29,390	38,053	57,017
222	Crude petroleum and natural gas exploration and prod.	4,780	7,085	18,725	56,172	75,507	110,814	6,501	8,877	13,128	2,911	2,834	3,636	17,609	22,792	34,277
223	Stone, quarrying, clay and sand pits	640	950	2,511	7,556	10,141	15,002	688	940	1,390	308	299	385	1,865	2,414	3,637
229	Other non-metallic mining and quarrying	68	101	266	801	1,597	2,500	688	940	1,390	308	299	385	1,865	2,414	3,637
MANUFACTURING		38,812	61,346	162,139	636,169	756,381	1,811,078	393,999	573,252	865,377	HNHNHN	HNHNHN	238,644	1,245,399	1,573,377	3,077,239
31	Manufacture of food, beverage and tobacco	16,237	25,893	68,434	275,705	324,194	805,406	165,034	241,960	366,128	73,897	76,987	100,915	530,892	669,033	1,340,885
311-312	Food manufacturing	13,874	22,233	58,763	241,700	291,772	719,789	140,841	207,761	314,968	63,064	66,103	86,779	459,479	577,872	1,180,299
313	Beverage manufacturing	1,942	2,926	7,733	25,022	32,431	56,155	19,717	27,339	40,625	8,829	8,699	11,242	55,510	71,394	115,754
314	Tobacco manufacturing	441	734	1,940	8,983	9,990	29,463	4,476	6,860	10,534	2,004	2,183	2,894	15,903	19,767	44,832
32	Textile, wearing apparel and leather industries	2,359	3,764	9,949	40,320	47,295	118,444	23,951	35,176	53,254	10,725	11,192	14,677	77,356	97,428	196,324

APPENDIX Table 14 (continued)

FNIC	Industry & Process	Technology Cost (\$'000)											Total Cost (\$'000)			
		Inspection and Maintenance			Furl Refurbishment			Catalytic Converter			Engine Modification		1988	1992	1995	
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992				1995
321	Textile manufacturing	1,554	2,455	6,488	25,416	30,241	72,252	15,772	22,939	34,615	7,062	7,399	9,547	49,805	62,934	122,901
322	Wooling apparel	683	1,106	2,923	12,445	14,306	38,200	4,933	10,336	15,724	3,105	3,289	4,329	23,166	29,037	61,177
123-324	Manufacture of leather and leather products	175	203	538	2,459	2,748	7,992	1,246	1,901	2,915	558	605	801	4,385	5,457	12,216
33	Manufacture of wood and wood products including furniture and fixtures	7,985	12,092	31,960	129,166	151,682	378,459	77,001	112,598	173,014	34,478	35,954	47,135	248,331	312,728	628,568
331	Manufacture of wood and wood products	7,052	11,212	29,684	119,572	140,612	349,243	71,591	104,956	158,791	32,056	33,395	43,769	230,272	290,195	581,389
332	Manufacture and repair of furniture	533	861	2,274	9,594	11,070	29,216	5,410	8,642	12,222	2,422	2,559	3,366	17,959	22,530	47,078
34	Manufacture of paper and paper products: printing and publishing	1,772	2,785	7,280	26,847	32,787	71,564	17,990	25,740	38,646	8,055	8,190	10,670	54,664	69,472	128,160
341	Manufacture of paper and allied products	1,157	1,760	4,651	15,731	19,973	37,648	11,740	16,445	24,513	5,257	5,232	6,778	33,885	43,408	73,590
342	Printing, publishing, and allied industries	616	995	2,629	11,116	12,814	33,916	6,250	9,297	14,133	2,798	2,958	3,892	20,779	26,064	54,569
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	3,312	5,301	14,012	57,434	67,051	170,503	33,618	49,540	75,087	15,053	15,762	20,689	109,416	137,655	280,290
351,352	Manufacture of chemicals and plastic products	2,508	4,007	10,589	43,093	50,460	127,080	25,461	37,439	56,699	11,401	11,912	15,623	82,462	103,818	209,994
356	Petroleum refineries	352	591	1,563	7,442	8,190	21,906	3,570	5,327	8,516	1,598	1,759	2,318	12,962	16,066	37,522
354	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	Rubber products	452	703	1,859	6,899	8,402	18,517	4,587	6,373	9,872	2,054	2,092	2,725	13,991	17,771	32,974
36	Manufacture of non-metallic mineral products	3,005	4,509	11,918	38,061	49,608	83,409	30,505	42,138	62,556	13,659	13,408	17,314	85,230	109,664	175,197
361	Manufacture of pottery, china and earthenware	250	366	967	2,852	3,833	5,185	2,539	3,418	5,032	1,137	1,088	1,395	6,778	8,705	12,579
362	Manufacture of glass and glass products	363	830	2,194	6,438	8,749	12,171	5,711	7,758	11,455	2,557	2,468	3,174	15,269	19,806	28,991
363	Manufacture of cement	1,049	1,542	4,074	11,714	16,081	21,227	10,646	14,405	21,243	4,767	4,583	5,888	28,175	36,611	52,432
369	Manufacture of other non-metallic mineral products	1,144	1,772	4,683	17,057	20,945	44,825	11,609	16,557	24,827	5,198	5,268	6,856	35,008	44,542	81,192
37	Basic metal industries	2,024	3,002	7,935	23,896	32,060	47,496	20,545	28,055	41,491	9,199	8,927	11,493	55,664	72,044	108,415
371	Iron and steel basic industries	1,606	2,384	6,301	19,011	25,482	37,928	16,306	22,376	32,948	7,301	7,088	9,126	44,225	57,230	86,303
372	Non-ferrous metal basic industries	418	618	1,635	4,884	6,578	9,567	4,239	5,779	8,543	1,898	1,839	2,367	11,439	14,815	22,111
38	Manufacture of fabricated metal products, machinery and equipment	2,262	3,637	9,412	39,966	46,387	120,174	22,965	33,987	51,587	10,283	10,814	14,209	75,476	94,825	195,583
381	Manufacture of fabricated metal products	369	939	2,482	11,188	12,573	35,966	5,778	8,776	13,434	2,587	2,792	3,694	20,123	25,080	55,576
382	Manufacture of machinery except electrical	412	665	1,754	7,409	8,349	22,564	4,178	6,210	9,439	1,871	1,976	2,599	13,869	17,400	36,358
383	Manufacture of electrical machinery, etc.	767	1,232	3,254	13,471	15,666	40,332	7,790	11,511	17,462	3,488	3,663	4,810	25,516	32,072	65,860
384	Manufacture of transport equipment	475	761	1,957	7,307	8,876	19,746	4,821	6,920	10,398	2,159	2,202	2,870	14,762	18,739	34,972
385	Manufacture of professional and scientific and measuring and controlling equipment	25	37	98	326	417	759	249	347	517	111	110	143	711	912	1,517
386	Manufacture and repair of metal furniture and fixtures	15	24	63	265	306	807	149	222	337	67	71	93	496	622	1,300
39	Other manufacturing industries	235	391	1,035	4,775	5,317	15,624	2,389	3,658	5,615	1,070	1,164	1,543	8,470	10,531	23,817
390	Other manufacturing industries	235	391	1,035	4,775	5,317	15,624	2,389	3,658	5,615	1,070	1,164	1,543	8,470	10,531	23,817
40	Other manufacturing industries	387	557	1,468	10,219	8,492	30,178	3,926	5,177	7,602	1,758	1,649	2,110	16,290	15,875	41,359
41	Electricity, gas and water	383	551	1,458	10,160	8,464	30,093	3,887	5,153	7,582	1,741	1,640	2,096	16,170	15,809	41,198
411	Electricity generation and distribution	383	551	1,458	10,160	8,464	30,093	3,887	5,153	7,582	1,741	1,640	2,096	16,170	15,809	41,198
412	Electricity distribution to consumers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Gas and steam	2	3	5	28	3	39	18	3	24	8	3	7	26	46	74
421	Gas manufacture and distribution through systems	2	-	-	28	-	39	18	18	24	8	6	8	64	83	86
422	Steam heat and power plants	-	2	5	-	21	45	21	20	27	9	6	8	64	83	86
43	Waterworks and supply	2	2	6	32	24	45	21	20	27	9	6	8	64	83	86
430	Waterworks and supply	2	2	6	32	24	45	21	20	27	9	6	8	64	83	86
CONSTRUCTION		5,394	8,492	22,444	86,804	103,844	243,593	54,754	79,351	119,601	24,517	25,248	32,993	171,468	216,934	418,630
50	Construction	5,394	8,492	22,444	86,804	103,844	243,593	54,754	79,351	119,601	24,517	25,248	32,993	171,468	216,934	418,630
501	General building construction	1,002	1,589	4,199	16,656	19,712	47,940	10,170	14,814	22,426	4,554	4,723	6,183	32,382	40,868	80,748
502	Classical engineering construction	4,017	6,712	14,681	64,086	76,892	178,371	40,779	58,987	88,852	18,259	18,768	24,514	127,142	160,960	308,621
503	Special trade construction	375	591	1,561	6,062	7,240	17,082	3,804	5,519	8,322	1,703	1,756	2,296	11,915	15,106	29,260

APPENDIX Table 14 (continued)

PSIC	Industry & Process	Technology Cost (P'000)									Total Cost (P'000)					
		Inspection and Maintenance			Fuel Reformulation			Catalytic Converter			Engine Modification					
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995			
WHOLESALE AND RETAIL TRADE																
	61 Wholesale trade	1,514	1,586	4,192	23,300	17,914	33,199	13,364	14,822	19,907	6,880	4,716	5,636	47,058	39,038	62,934
	618 Petroleum and petroleum products, wholesaling	989	1,036	2,738	15,217	11,700	21,683	10,035	9,680	13,001	4,493	3,080	3,681	30,734	25,496	41,103
	62 Retail trade	525	550	1,454	8,082	6,214	11,516	5,330	5,141	6,905	2,386	1,636	1,955	16,324	13,542	21,831
	628 Petroleum and petroleum products, retailing															
TRANSPORTATION, STORAGE AND COMMUNICATIONS																
	71 Transportation services	31,445	50,035	150,203	187,921	214,632	456,163	86,787	132,031	203,013	38,860	42,010	55,745	345,013	438,708	865,144
	711 Railway transport	31,309	49,892	149,823	185,822	213,019	453,173	85,403	130,697	201,221	38,241	41,585	55,258	340,775	435,192	869,477
	712 Road passenger transport															
	713 Water transport	30,949	49,563	148,957	165,495	189,435	421,111	81,744	127,625	197,206	36,602	40,608	54,114	314,790	407,232	821,387
	714 Air transport				13,860	19,863	25,487							13,860	19,863	25,487
	719 Services allied to transport	179	139	366	3,673	1,572	2,596	1,818	1,293	1,628	814	412	468	6,484	3,418	5,059
	72 Storage and warehousing	181	190	503	2,793	2,148	3,980	1,842	1,777	2,386	825	565	676	5,641	4,680	7,544
	720 Storage and warehousing	7	7	18	101	78	145	67	65	87	30	21	25	205	170	274
	73 Communication	7	7	18	101	78	145	67	65	87	30	21	25	205	170	274
	730 Communication	130	136	359	1,997	1,535	2,845	1,317	1,270	1,706	590	404	483	4,033	3,345	5,393
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES																
	81 Banking institution	836	874	2,316	12,872	9,897	18,341	8,488	8,188	10,998	3,801	2,603	3,114	25,998	21,567	34,769
	82 Financial intermediaries	330	346	914	5,078	3,905	7,236	3,349	3,231	4,339	1,499	1,028	1,228	10,257	8,509	13,717
	83 Insurance	79	83	219	1,217	936	1,735	803	774	1,040	359	246	295	2,439	2,040	3,288
	84 Real estate	56	58	155	859	660	1,224	566	546	734	254	174	268	1,735	1,439	2,320
	85 Business services	100	105	277	1,540	1,184	2,194	1,016	980	1,316	455	312	373	3,110	2,580	4,160
	850 Business services	271	284	752	4,178	3,212	5,932	2,755	2,457	3,569	1,233	846	1,011	8,437	6,999	11,284
COMMUNITY, SOCIAL AND PERSONAL SERVICES																
	91 Public administration and defense	4,906	5,472	16,237	77,334	98,758	137,893	55,264	54,849	74,202	25,297	18,382	22,215	162,801	137,460	250,546
	92 Sanitary and similar services	4,130	4,919	14,538	66,226	46,912	113,902	43,376	43,753	59,416	19,761	14,490	17,542	133,493	110,074	205,397
	93 Education services	74	77	204	1,132	870	1,613	746	720	967	334	229	274	2,286	1,897	3,058
	94 Medical, dental, other health and veterinary services	120	126	333	1,848	1,421	2,633	1,219	1,176	1,579	546	374	447	3,733	3,096	4,992
	95 Other social and related community services															
	96 Recreational and cultural services															
	97 Personal and household services															
	98 Restaurants and hotels															
	99 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
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	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289	3,952	23,290	22,393	37,099
	999 International organizations and other extra-territorial bodies															
	990 International organizations and other extra-territorial bodies	582	350	1,163	8,128	9,555	19,745	9,923	9,200	12,239	4,657	3,289				

Appendix Table 15
VALUES OF MOBILE I & M, FUEL REFORMULATION, CATALYTIC CONVERTER AND ENGINE
MODIFICATION: PHILIPPINES

PSIC	Industry & Process	1992 (Current Prices)					1995				
		Cost (P'000)					Cost (P'000)				
		Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost	Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost
		5,603	158,161	39,217	11,920	214,901	8,390	122,204	42,038	11,754	184,387
AGRI., FORESTRY & FISHERY		1,143	13,382	7,998	2,431	24,953	1,714	13,544	8,121	2,299	25,678
11	Agricultural crops production	10	118	70	21	220	19	119	72	20	230
111	Palay production	28	322	193	59	601	41	326	196	55	618
112	Corn production	0	1	1	0	3	-	1	1	0	3
113	Vegetable production	341	3,997	2,389	726	7,454	511	4,046	2,426	687	7,669
114	Fruits and nuts (excluding coconut) production	128	1,496	894	272	2,789	191	1,514	908	257	2,870
115	Coconut production including copra-making	414	4,849	2,898	881	9,042	620	4,908	2,943	833	9,303
116	Sugarcane production	-	-	-	-	-	-	-	-	-	-
117	Tobacco production	-	-	-	-	-	-	-	-	-	-
118	Fiber crops production	222	2,598	1,553	472	4,845	332	2,630	1,577	446	4,985
119	Agri. crops production	527	6,169	3,687	1,121	11,504	788	6,244	3,744	1,060	11,836
12	Livestock, poultry and other animal products	136	1,591	951	289	2,967	203	1,611	966	273	3,053
121	Livestock and livestock products	391	4,578	2,736	832	8,536	585	4,633	2,778	787	8,783
122	Poultry and poultry products	-	-	-	-	-	-	-	-	-	-
129	Raising of other animals, including their products	157	1,842	1,101	335	3,435	235	1,864	1,118	316	3,534
13	Agricultural services	157	1,842	1,101	335	3,435	235	1,864	1,118	316	3,534
130	Agricultural services	-	95,826	-	-	95,826	-	70,662	-	-	70,662
14	Fishery	-	-	-	-	-	-	-	-	-	-
141	Ocean (off-shore) and coastal fishing	-	-	-	-	-	-	-	-	-	-
142	Inland fishing	-	-	-	-	-	-	-	-	-	-
143	Operation of fish farms	-	-	-	-	-	-	-	-	-	-
149	Other fishery activities	3,776	40,942	26,431	8,033	79,183	5,652	29,891	29,056	8,079	72,677
15	Forestry	3,776	40,942	26,431	8,033	79,183	5,652	29,891	29,056	8,079	72,677
151	Logging operations	-	-	-	-	-	-	-	-	-	-
159	Other forestry activities	-	-	-	-	-	-	-	-	-	-
16	Hunting, trapping and game operation	-	-	-	-	-	-	-	-	-	-
160	Hunting, trapping and game operation	22,348	246,523	156,415	47,540	472,826	33,447	390,494	174,522	48,365	646,827
MINING AND QUARRYING		5,178	56,764	36,242	11,015	109,200	7,750	87,569	40,189	11,153	146,661
21	Metalliferous ore mining	3,665	40,094	25,650	7,796	77,205	5,485	43,815	28,413	7,887	85,599
211	Gold ore mining	-	-	-	-	-	-	30,647	-	-	30,647
212	Other precious metal ore mining	-	-	-	-	-	-	-	-	-	-
213	Copper ore mining	847	9,296	5,926	1,801	17,870	1,267	-	6,359	1,821	9,647
214	Nickel ore mining	663	7,331	4,644	1,411	14,049	993	7,234	5,191	1,438	14,855
215	Chromite ore mining	-	-	-	-	-	-	5,874	-	-	5,874
216	Iron ore mining	-	-	-	7	76	5	-	26	7	39
219	Other base metal ore mining	3	43	21	7	76	5	-	26	7	39
22	Non metalliferous mining and quarrying	17,170	189,759	120,173	36,528	363,626	25,697	302,924	134,333	37,212	500,166
221	Coal mining	2,803	30,970	19,618	5,963	59,354	4,195	152,260	21,929	6,075	184,460
222	Crude petroleum and natural gas exploration and production	12,512	138,253	87,570	26,616	264,950	2,511	-	97,886	27,116	127,513

PSIC	Industry & Process	1992 (Current Prices)					1995				
		Cost (P'000)					Cost (P'000)				
		Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost	Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost
223	Stone, quarrying, clay and sand pits	1,678	18,568	11,742	3,569	35,556	266	110,844	13,128	3,636	127,874
229	Other non-metallic mining and quarrying	178	1,968	1,243	378	3,766	-	15,002	1,390	385	16,777
MANUFACTURING		91,452	1,187,197	640,083	194,545	2,113,278	162,139	3,162,699	732,255	201,830	4,258,924
31	Manufacture of food, beverage and tobacco	45,726	593,599	320,041	97,273	1,056,639	68,436	1,581,350	366,128	100,915	2,116,829
311-312	Food manufacturing	39,263	515,925	274,806	83,524	913,519	58,763	805,406	314,968	86,779	1,265,917
313	Beverage manufacturing	5,167	59,381	36,161	10,991	111,700	7,733	719,789	40,625	11,242	779,388
314	Tobacco manufacturing	1,296	18,292	9,074	2,758	31,421	1,940	56,155	10,534	2,894	71,523
32	Manufacture of textile, wearing apparel and leather industries	6,648	86,597	46,528	14,142	153,914	9,949	228,895	53,254	14,677	306,776
321	Textile manufacturing	4,335	55,371	30,342	9,222	99,270	6,488	118,444	34,615	9,547	169,093
322	Wearing apparel	1,953	26,195	13,671	4,155	45,975	2,923	72,252	15,724	4,329	95,228
323-324	Manufacture of leather and leather products	359	5,031	2,515	764	8,669	538	38,200	2,915	801	42,454
33	Manufacture of wood and wood products including furniture and fixtures	21,355	277,730	149,463	45,427	493,975	31,960	727,702	171,014	47,135	977,811
331	Manufacture of wood and wood products	19,835	257,461	138,826	42,194	438,317	29,686	378,459	158,791	43,769	610,705
332	Manufacture and repair of furniture	1,520	20,269	10,637	3,233	35,658	2,274	349,243	12,222	3,366	367,105
34	Manufacture of paper and paper products; printing and publishing	4,864	60,033	34,046	10,348	109,292	7,280	109,212	38,646	10,670	165,808
341	Manufacture of paper and allied products	3,108	36,570	21,750	6,611	68,038	4,651	71,564	24,513	6,778	107,506
342	Printing, publishing and allied industries	1,757	23,463	12,297	3,737	41,254	2,629	37,648	14,133	3,892	58,302
35	Manufacture of chemicals, and chemical products, petroleum, coal, rubber and plastic products	9,362	122,771	65,526	19,916	217,575	14,012	322,489	75,087	20,689	432,276
351,352 & 356	Manufacture of chemicals and plastic products	7,075	92,392	49,521	15,051	164,040	10,589	170,503	56,699	15,625	253,417
353)	Petroleum refineries	1,044	14,995	7,310	2,222	25,572	1,563	127,080	8,516	2,338	12,417
354)	Manufacture of miscellaneous products of petroleum and coal	-	-	-	-	-	-	24,906	-	-	-
355	Rubber products	1,242	15,384	8,695	2,643	27,964	1,859	-	9,872	2,725	14,456
36	Manufacture of non-metallic mineral products	7,963	90,833	55,737	16,940	171,473	11,918	121,992	37,730	10,457	182,097
361)	Manufacture of pottery, china and earthenware	646	7,019	4,521	1,374	13,560	967	83,409	5,032	1,395	90,803
362)	Manufacture of glass and glass products	1,466	16,020	10,262	3,119	30,867	2,194	5,185	11,455	3,174	22,008
363)	Manufacture of cement	2,722	29,444	19,054	5,791	57,011	4,074	12,171	21,243	5,888	43,376
369)	Manufacture of other non-metallic mineral products	3,129	38,350	21,901	6,656	70,036	-	21,227	-	-	21,227
37	Basic metal industries	5,302	58,702	37,109	11,279	112,392	7,935	85,424	41,491	11,493	146,343
371)	Iron and steel basic industries	4,210	46,658	29,465	8,955	89,288	6,301	47,496	32,948	9,126	89,288
372)	Non-ferrous metal basic industries	1,092	12,045	7,644	2,323	23,104	1,635	37,928	8,543	2,367	23,104

PSIC	Industry & Process	1992 (Current Prices)					1995				
		Cost (P'000)					Cost (P'000)				
		Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost	Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost
38	Manufacture of fabricated metal products machineries and equipment	6,423	84,934	44,955	13,663	149,975	9,613	239,541	51,587	14,209	314,950
381	Manufacture of fabricated metal products	1,659	23,020	11,608	3,528	39,815	2,482	120,174	13,434	3,694	139,784
382	Manufacture of machinery except electrical	1,174	15,653	8,214	2,497	27,537	1,256	35,966	9,439	2,599	49,760
383	Manufacture of electrical machinery, etc.	2,175	28,685	15,226	4,628	50,715	3,256	22,564	17,462	4,810	48,092
384	Manufacture of transport equipment	1,308	16,252	9,154	2,782	29,496	1,957	40,332	10,398	2,870	55,558
385	Manufacture of professional and scientific and measuring and controlling equipment	66	764	459	140	1,428	98	19,746	517	143	758
386	Manufacture and repair of metal furniture and fixtures	42	559	294	89	984	63	759	337	93	493
39	Other manufacturing industries	691	9,736	4,839	1,471	16,737	1,035	15,624	5,615	1,543	23,817
390	Other manufacturing industries	691	9,736	4,839	1,471	16,737	1,035	15,624	5,615	1,543	23,817
	ELECTRICITY, GAS AND WATER	981	15,581	6,866	2,087	25,516	1,468	60,310	7,602	2,110	71,491
41	Electricity	974	15,498	6,816	2,072	25,360	1,458	60,271	7,552	2,096	71,376
411	Electricity generation and distribution	974	15,498	6,816	2,072	25,360	1,458	30,178	7,552	2,096	41,283
412	Electricity distribution to consumers	-	-	-	-	-	-	30,093	-	-	30,093
42	Gas and steam	3	39	23	7	72	5	39	24	7	74
421	Gas Manufacture and distribution through systems	-	-	-	-	-	-	-	-	-	-
422	Steam heat and power plants	3	39	23	7	72	5	39	24	7	74
43	Waterworks and supply	4	45	27	8	84	6	-	27	8	41
430	Waterworks and supply	4	45	27	8	84	6	-	27	8	41
	CONSTRUCTION	14,996	190,138	104,957	31,900	341,992	22,444	#REF!	119,601	32,993	#REF!
50	Construction	14,996	190,138	104,957	31,900	341,992	22,444	#REF!	119,601	32,993	#REF!
501	General building construction	2,805	36,093	19,635	5,968	64,501	4,199	#REF!	22,426	6,183	#REF!
502	General engineering construction	11,147	140,790	78,022	23,714	253,673	16,684	243,593	88,852	24,514	373,643
503	Special trade construction	1,043	13,256	7,301	2,219	23,818	1,561	243,593	8,322	2,296	255,771
	WHOLESALE & RETAIL TRADE	2,801	32,801	19,605	5,959	61,165	4,192	50,281	19,907	5,636	80,016
61	Wholesale trade	1,829	21,423	12,804	3,892	39,948	2,738	17,082	13,001	3,681	36,502
618	Petroleum and petroleum products, wholesaling	-	-	-	-	-	-	-	-	-	-
62	Retail trade	972	11,378	6,801	2,067	21,217	1,454	33,199	6,905	1,955	43,514
628	Petroleum and petroleum products, retailing	-	-	-	-	-	-	-	-	-	-
	TRANSPORTATION, STORAGE AND COMMUNICATIONS	88,390	392,991	174,639	53,079	709,098	150,203	1,337,023	203,013	55,765	1,746,004
71	Transportation services	88,137	390,037	172,873	52,543	703,590	149,825	1,330,447	201,221	55,258	1,736,751
711	Railway transport	-	-	-	-	-	-	-	-	-	-
712	Road passenger transport	87,557	346,856	168,811	51,308	654,532	148,957	456,163	197,206	54,114	856,439
713	Water transport	-	36,369	-	-	36,369	-	453,173	-	-	453,173
714	Air transport	245	2,879	1,713	521	5,357	366	-	1,628	468	2,463
719	Services allied to transport	336	3,932	2,350	714	7,332	503	421,111	2,386	676	424,675
72	Storage and warehousing	12	143	85	26	266	18	2,596	87	25	2,725
720	Storage and warehousing	12	143	85	26	266	18	2,596	87	25	2,725
73	Communication	240	2,811	1,680	511	5,241	359	3,980	1,706	483	6,528

PSIC	Industry & Process	1992 (Current Prices)					1995				
		Cost (P'000)					Cost (P'000)				
		Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost	Inspection and Maint.	Fuel Ref.	Catalytic Conv.	Engine Modif'n	Total Cost
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES											
		1,547	18,122	10,831	3,292	33,792	2,316	28,536	6,659	1,885	39,396
		611	7,149	4,273	1,299	13,332	914	-	1,040	293	2,248
81	Banking institution	146	1,714	1,024	311	3,196	219	18,341	734	208	19,502
82	Financial intermediaries	103	1,209	723	220	2,255	155	7,236	1,316	373	9,079
83	Insurance	185	2,168	1,296	394	4,043	277	1,735	3,569	1,011	6,591
84	Real estate	502	5,881	3,515	1,068	10,967	752	1,224	-	-	1,976
85	Business services										
COMMUNITY, SOCIAL AND PERSONAL SERVICES											
		9,667	107,585	72,549	23,225	213,026	16,237	256,041	1,973,631	627,538	2,873,446
		8,690	85,895	57,872	18,308	170,765	14,538	-	-	-	14,538
91	Public administration and defense	-	-	-	-	-	-	137,893	967	274	139,134
92	Sanitary and similar services	136	1,594	953	290	2,972	204	113,902	-	-	114,105
93	Education services	-	-	-	-	-	-	-	1,579	447	2,026
94	Medical, dental, other health and veterinary services	222	2,602	1,555	473	4,852	333	1,613	-	-	1,946
95	Other social and related community services	-	-	-	-	-	-	2,633	-	-	2,633
96	Recreational and cultural services	-	-	-	-	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-	-	-	-
98	Restaurants and hotels	-	-	-	-	-	-	-	12,239	3,952	16,192
99	International organizations and other extra-territorial bodies	618	17,494	12,169	4,155	34,437	1,163	-	1,958,845	622,864	2,582,872
		138,848	391,688	1,794,534	613,059	2,938,128	279,660	19,745	-	-	299,405
IH	Household sector										
NATURE	Nature sector										
		376,633	2,740,787	3,019,695	986,606	7,123,722	680,496	#REF!	3,279,228	987,877	#REF!
		5.29	38.47	42.39	13.85		9.55	#REF!	46.03	13.87	
	TOTAL										
	% Share										

Appendix Table 16
TYPICAL COST OF CONTROLLING EMISSION FROM STATIONARY SOURCES

Pollutant	Abatement Technology	Removal Efficiency (%)	Annual Abatement Cost per Metric Ton Emission Avoided (pesos)		
			1988	1992	1995
PM	ESP	97 - 98	265 - 1,135	370 - 1,590	469 - 2,016
	High efficiency ESP	99 - 99.9	350 - 1,570	490 - 2,200	621 - 2,790
	Baghouse	99 - 99.9	265 - 1,135	370 - 1,590	469 - 2,016
	Mechanical collector	50 - 90	175 - 1,225	250 - 1,710	317 - 2,168
SO ₂	Dry Sorbet	50 - 80	6,985 - 61,110	9,760 - 85,400	12,376 - 108,287
	Semi-dry FGD	80 - 95	10,480 - 69,840	14,640 - 97,600	18,564 - 123,757
	Wet FGD	96 - 98	13,970 - 87,295	19,250 - 122,000	24,409 - 154,696
NO _x	Low-NO _x burners	80 - 90	13,095 - 122,215	18,300 - 170,800	23,204 - 216,574
	SCR	30 - 70	2,367,455 - 21,307,065	3,308,635 - 29,777,705	4,195,349 - 37,758,130

Notes: ESP - Electrostatic precipitator
 FGD - Flue Gas Desulphurization
 SCR - Selective catalytic converter

Appendix Table 17a
TOTAL ANNUAL COST OF ALTERNATIVE DOMESTIC WASTEWATER TREATMENT METHODS: PHILIPPINES, 1988, 1992 and 1995 (in million pesos)

Waste Treatment Facility	Total			Urban			Rural					
	1988	1992	1995	1988	1992	1995	1988	1992	1995			
		current	1988 prices		current	1988 prices		current	1988 prices			
Septic tank 5	6,457	10,545	5,752	13,371	1,399	3,729	2,033	4,728	5,059	6,816	3,719	8,643
Septic tank 2	7,428	12,645	6,896	16,033	1,693	4,664	2,543	5,914	5,735	7,981	4,353	10,120
Wastewater pump station	122	179	129	227	122	179	129	227				
Piped Sewerage	1,635	2,374	1,711	3,010	1,635	2,374	1,711	3,010				
Primary treatment plant	778	1,144	822	1,451	778	1,144	822	1,451				
Waste stabilization pond	954	1,403	1,008	1,779	954	1,403	1,008	1,779				
Aerated lagoon	1,125	1,648	1,184	2,090	1,125	1,648	1,184	2,090				
Activated sludge plant	3,034	4,466	3,209	5,663	3,034	4,466	3,209	5,663				

Notes:

1. The following are the cost functions used in generating the annual capital and maintenance cost estimates:

WW Treatment Facility	Annual Capital Cost function	Annual Maintenance Cost function
Wastewater pump station	@Exp(-3.80687146)*Cap ^{0.6663618306}	@Exp(-6.109456533)*Cap ^{0.6663618306}
Primary treatment plant	@Exp(-3.086324836)*Cap ^{0.7404653395}	@Exp(-5.388909929)*Cap ^{0.7404653395}
Waste stabilization pond	@Exp(-2.7722892276)*Cap ^{0.7332668917}	@Exp(-5.0748743206)*Cap ^{0.7332668917}
Aerated lagoon	@Exp(-1.7355593732)*Cap ^{0.676086597510}	@Exp(-4.0381444662)*Cap ^{0.676086597510}
Activated sludge plant	@Exp(-1.7850795361)*Cap ^{0.7444104253}	@Exp(-4.0876646491)*Cap ^{0.7444104253}

2. Other relevant information used:

	Population		Total Wastewater Generated		WW Gen. by Popn. Served		Net WW Generated	
	1988	1992	1988	1992	1988	1992	1988	1992
Phil	58,721,307	64,258,611	1,992,690,041	2,169,257,704	63,742,140	68,709,060	1,928,947,901	2,100,548,644
Urban	24,416,144	24,416,144	1,581,988,630	1,705,260,471	63,742,140	68,709,060	1,518,246,490	1,636,551,411
Rural	34,305,163	36,114,355	410,701,411	463,997,233			410,701,411	463,997,233

	Total Capacity (cu m/day)		WW Gen./Capita (cum/o/d)		Population Served	
	1988	1992	1988	1992	1988	1992
Phil	5,284,789	5,754,928		0.166	1,134,000	1,134,000
Urban	4,159,579	4,483,702	0.154			
Rural	1,125,209	1,271,225	0.0328	0.0352		

3. Septic tanks: 5 - desludged every five years; 2 - desludged every two years

Appendix Table 17b
**ALTERNATIVE COMBINATIONS AND COSTS OF WASTEWATER TREATMENT METHODS
 FOR URBAN AND RURAL AREAS: PHILIPPINES, 1988, 1992 and 1995**

	Combination 1		Combination 2		Combination 3				
	Urban	Rural	Urban	Rural	Urban	Rural			
Septic tank		x	x	x	x	x			
Waste stabilization pond	x								
Aerated lagoon			x						
Activated sludge					x				
Total Annual Costs (P '000)									
			Set A				Set B		
	1988		1992	1995	1988	1992	1995		
		current	1988 prices			current	1988 prices		
Combination 0	7,427,504	12,644,709	6,895,798	16,033,491	6,457,451	10,545,229	5,752,290	13,371,350	
Combination 1	8,446,315	11,936,314	7,200,367	15,135,246	7,770,494	10,771,778	6,566,088	13,658,614	
Combination 2	8,617,742	12,181,332	7,376,400	15,445,929	7,941,922	11,016,796	6,742,121	13,969,297	
Combination 3	12,039,739	17,194,027	10,983,181	21,802,026	11,363,919	16,029,490	10,348,902	20,325,394	

Notes:

1. For the total annual costs, Set A - assumes septic tanks are desludged every 2 years while Set B - assumes desludging every 5 years
2. The cost of waste treatment for urban areas include the cost of pumping and piped sewerage.

Appendix Table 17c
ANNUAL COST OF SEPTIC TANK (in million pesos)

	Number of Households	Desludged Every 2 Years			Desludged Every 5 Years		
		Cap. Cost (Annualized)	Maint. Cost	Total Annual Cost	Capital Cost (Annualized)	Maint. Cost	Total Annual Cost
Rural							
1988	6,548,782	3,547	2,187	5,735	3,547	1,511	5,059
Sanitary toilet	3,421,012		1,143	1,143	-	789	789
Unsanitary toilet	1,601,933	1,817	535	2,352	1,817	370	2,187
No toilet facility	1,525,838	1,731	510	2,240	1,731	352	2,083
1992	6,146,242	4,212	3,769	7,981	4,212	2,604	6,816
Sanitary toilet	4,117,982		2,525	2,525	-	1,745	1,745
Unsanitary toilet	983,399	2,042	603	2,645	2,042	417	2,459
No toilet facility	1,044,861	2,170	641	2,811	2,170	443	2,613
1992 (at 1988 prices)	6,146,242	2,300	2,053	4,353	2,300	1,418	3,719
Sanitary toilet	4,117,982		1,375	1,375	-	950	950
Unsanitary toilet	983,399	1,115	328	1,444	1,115	227	1,342
No toilet facility	1,044,861	1,185	349	1,534	1,185	241	1,426
1995	5,875,835	5,341	4,779	10,120	5,341	3,302	8,643
Sanitary toilet	3,936,809		3,202	3,202	-	2,212	2,212
Unsanitary toilet	940,134	2,590	765	3,354	2,590	528	3,118
No toilet facility	998,892	2,751	812	3,564	2,751	561	3,313
Urban							
1988	2,851,145	741	952	1,693	741	658	1,399
Sanitary toilet	2,198,038		734	734	-	507	507
Unsanitary toilet	315,470	358	105	463	358	73	431
No toilet facility	337,637	383	113	496	383	78	461
1992	4,934,488	1,638	3,026	4,664	1,638	2,091	3,729
Sanitary toilet	4,145,585		2,542	2,542	-	1,756	1,756
Unsanitary toilet	364,109	756	223	979	756	154	910
No toilet facility	424,794	882	260	1,143	882	180	1,062
1992 (at 1988 prices)	4,934,488	895	1,648	2,543	895	1,139	2,033
Sanitary toilet	4,145,585		1,384	1,384	-	957	957
Unsanitary toilet	364,109	413	122	535	413	84	497
No toilet facility	424,794	482	142	624	482	98	580
1995	7,350,237	895	1,648	5,914	895	1,139	4,728
Sanitary toilet	6,394,706		1,384	3,223	-	957	2,227
Unsanitary toilet	441,014	413	122	1,242	413	84	1,154
No toilet facility	998,892	482	142	1,449	482	98	1,347
Cost per HH. (pesos):							
1988		4,288	3,139	7,428	4,288	2,169	6,457
1992		5,850	6,794	12,645	5,850	4,695	10,545
1995		6,236	6,427	16,833	6,236	4,441	13,371

Note: For valuation purpose, the number of urban households with sanitary toilets is deducted by the number (1,134,000) serviced by sewerage system.

Appendix Table 18a
MEASURES TO CONTROL EROSION DUE TO SURFACE RUN-OFF

Erosion Control Measure/ Description	Efficiency in Reducing Erosion due to Surface Run-off									Estab. & Maint. Cost Pesos/ha at 1988 prices		
	Average Sediment Yield		Average Volume of Surface Run-off		Percent Reduction Surface Run-off (%)	Depth of Surface Run-off		Average Infiltration Rate		Labor	Material	Total
	Initial (kg/ha)	Final (kg/ha)	Initial (l/ha)	Final (l/ha)		Initial (mm)	Final (mm)	Initial (mm)	Final (mm)			
<u>Vegetative structures //</u>												
1. Hedgerow - Involves the planting of nitrogen fixing leguminous plants along the contour - use kakawate	87.73	7.13	142.95	17.21	(87.96)	3.16	0.43	1.99	86.00	700	192	892
2. Wattling - involves the use of interwoven brushwood in shallow ditches dug about 25 cm deep & laid out at 1.5 m to 2 m interval - use binatang hanibog	94.86	7.21	142.95	19.20	(86.57)	3.41	0.48	2.19	65.09	700	20	720
3. Fascine - involves the use of bundles of long & dense brushwoods laid & firmly & anchored on trenches overlaid with soil - use kakawate	74.81	7.60	138.78	19.73	(85.78)	3.18	0.50	1.72	83.88	700	630	1,330
<u>Engineering structures //</u>												
4. Bench terracing - for steep slopes of up to 55%; consists of a series of level or nearly level strips or platforms built along contour at suitable interval - use Napier grass	92.73	7.43	-	-	-	-	0.47	1.08	47.00	700	200	900
5. Contour trenching/ditches - involves the establishment of trenches/ditches along the contour to a depth of 30 to 50 cm. planted with low growing plants - use Napier grass	86.72	3.95	142.86	14.58	(89.79)	-	0.36	1.88	67.98	700	20	720
6. Earth plug (contour levee) - involves the construction of dikes or embankment ranging from 30 to 50 cm. - use Centronilla odorata	84.10	2.16	140.49	14.56	(89.64)	-	0.22	2.00	66.95	700	20	720
<u>Agronomic cover //</u>												
7. Agronomic cover - no structures with agronomic crop (sweet potato, natural vegetation, etc.) - Without cover (no structures & remain undisturbed throughout the study)	101.12	5.66	140.36	9.26	(93.40)	3.23	0.36	2.30	98.10	70	20	90
	108.85	22.51	143.82	42.59	(70.39)	3.36	1.06	2.55	90.07	-	-	-

Appendix Table 18a (continued)

<u>Contract Reforestation 2/</u>		
- Cost of estab. & maint. vary by type of land use & slope as follows:		
a.	production forest	12,850
-	timber	13,142
-	horticultural crops	11,513
-	bamboo	8,810
-	ratlam	6,770
-	mangrove trees	5,670
-	riipa	10,942
b.	limited production forest	3,723
c.	income enhancement planting	8,937
d.	enrichment planting	
e.	protection forest	3,430
-	ANR & cover crop	3,007
-	cover crop only	
<u>Sloping Agri. Land Technology (SALT) 3/</u>		
1.	SALT - 1 an agroforestry technology w/ agro-forestry crops planted at 75:25 ratio	- compared to corn, can reduce soil erosion by 4x and inc rease corn yield by 5x
2.	SALT2 a goat-based agro-silvi-pastoral scheme with a land use allocation of 40% agriculture, 20% forestry, & 40% livestock	
3.	SALT3 a small-scale reforestation integrated w/ food production; the land use ratio is 40% agriculture & 50% forestry	

Ave. annual cost: P 2,765/ha
 Ave. gross income: P 13,870/ha
 Ave. net income: P 11,105/ha
 (the difference bet. the ave. annual cost of corn prod. & SALT):
 P 600/ha

Notes:

- Problems concomitant to the establishment of the above-mentioned soil (erosion) & water control measures (Version, et al., 1991)
 - Hedgerow - drying of lakawate cutting as a result of wrong planting time; washout of cuttings during its early growth by heavy rainshowers; canal maintenance; failure to replant the gap line; contour not properly determined due to variability of slope which cause water to flow towards the low area; and susceptibility of cuttings to white ants.
 - Wattling and fascine- failure of the rod & brushwoods to sprout, not easy to replant
 - Mechanical structures - require intensive manual labor and regular maintenance of canal dikes; failure of stabilizer to sprout
- Cost data are based on the Dept. Administrative Order 31 s 1990 of the DENR for contract reforestation. These are adjusted to reflect cost of maintenance & management for one year only instead of 3 years as estimated by DENR. Reforestation is expected to reduce sediment yield to 11 tons/ha/yr (ENRAP I).
- Cost data on SALT are based on DA-BSWM report.
- The development directions for upland areas to reduce erosion & run-off based on the Master Plan for Forestry Devt. (DENR - ADB, 1990), induced reforestation, implementation of vegetative (e.g. SALT) and engineering soil conservation measures, & the staged approach where farmers are allowed to select from a menu of measures that are suitable to them -- Grassland, bushland and kaingin areas are proposed to be converted into plantation forest.

References:

- Verardon, V.P. 1991. Evaluation of Diff. Sort's Water Conservation Measures in Luzon - Camarines Sur.
- DENR. 1990. Department Administrative Order 31 s 1990 on contract reforestation.
- BSWM. Cost Data on Sloping Agriculture Land Technology.

Appendix Table 18b
 AREA REFORESTED BY THE GOVERNMENT AND PRIVATE SECTORS: PHILIPPINES, FY 1960-61 TO CY 1995
 (in hectares)

Year	Government Sector					Non-Government Sector			
	Grand Total	Total	DENR	Others	Total	Timber Licensees	ITP/TF/ AFF	PD 1153	Others
Area Reforested as of 1995	1,356,408	948,204	861,088	87,116	408,204	311,945	56,118	32,686	7,455
CY									
1995	-								
1994	-								
1993	-								
1992	40,593	24,304	24,304	-	16,289	11,683	4,606	-	-
1991	93,039	73,602	72,238	1,364	19,437	18,089	1,348	-	-
1990	191,663	153,949	146,718	7,231	37,714	33,443	3,749	-	522
1989	131,404	89,452	82,966	6,486	41,952	32,087	6,526	-	3,339
1988	64,183	31,226	30,890	336	32,957	23,126	9,831	-	-
1987	39,811	28,843	27,558	1,285	10,968	7,956	1,118	1,296	598
1986	32,998	24,426	22,495	1,931	8,572	6,572	1,625	368	7
1985	24,231	12,684	12,201	483	11,547	8,148	1,500	1,228	671
1984	38,935	16,088	15,520	568	22,847	14,186	7,011	1,650	-
1983	78,538	42,239	27,155	15,084	36,299	31,703	3,554	1,042	-
1982	63,262	35,201	31,202	3,999	28,061	21,588	972	5,501	-
1981	64,541	33,296	30,707	2,589	31,245	20,096	6,482	4,667	-
1980	60,516	39,881	32,956	6,925	29,635	15,579	1,162	3,894	-
1979	79,397	51,858	35,305	16,553	27,539	20,132	545	6,017	845
1978	78,425	44,685	34,343	10,343	33,739	22,005	5,001	6,523	209
1977	53,263	33,365	23,677	9,688	19,898	17,276	1,088	500	1,034
1976	31,733	23,228	20,977	2,251	8,505	8,275	-	-	230
FY									
1974 - 75	15,280	15,280	15,280	-	-	-	-	-	-
1973 - 74	4,994	4,994	4,994	-	-	-	-	-	-
1972 - 73	5,787	5,787	5,787	-	-	-	-	-	-
1971 - 72	4,831	4,831	4,831	-	-	-	-	-	-
1970 - 71	6,458	6,458	6,458	-	-	-	-	-	-
1969 - 70	11,801	11,801	11,801	-	-	-	-	-	-
1968 - 69	7,511	7,511	7,511	-	-	-	-	-	-
1967 - 68	6,869	6,869	6,869	-	-	-	-	-	-
1966 - 67	5,327	5,327	5,327	-	-	-	-	-	-
1965 - 66	7,396	7,396	7,396	-	-	-	-	-	-
1964 - 65	11,709	11,709	11,709	-	-	-	-	-	-
1963 - 64	16,822	16,822	16,822	-	-	-	-	-	-
1962 - 63	11,543	11,543	11,543	-	-	-	-	-	-
1961 - 62	7,474	7,474	7,474	-	-	-	-	-	-
1960 - 61	11,543	11,543	11,543	-	-	-	-	-	-
as of 1960	54,531	54,531	54,531	-	-	-	-	-	-

Source: DENR - FMB, Philippine Forestry Statistics, 1992

Appendix Table 19
ESTIMATED POLLUTION CONTROL COST FOR DEGRADED AGRICULTURAL AND
FORESTLAND AREAS: PHILIPPINES, 1988

	Affected Area (Ha)	Estimated Cost of Reducing Soil Erosion* (Pesos)	
		(1)	(2)
Total area with average soil loss >10 tons/ha	13,988,532	1,258,967,880	7,788,110,970
Slight erosion (E1)	2,342,861	210,857,490	210,857,490
Moderate erosion (E2)	6,730,247	605,722,230	4,038,148,200
Severe erosion (E3)	4,915,424	442,388,160	3,539,105,280
Cropland	0.329719571	415,106,349	2,567,892,608
Forestland	0.670280429	843,861,531	5,220,218,362

Notes:

1. *Erosion Control :

(1) Agronomic cover @ P90/ha.

(2) Varies by slope/level of erosion

0 - 8% slope and/or E1 - agronomic cover, @ P90/ha.

8 - 18% and/or E3 - cost of shifting from corn only to SALT, @ P600/ha.

> 18% and/or E3 - vegencering structures, @ P720/ha.

2. Based on area with soil loss > 10t/ha and agronomic cover as erosion control measure. The total affected area is assumed to be within the > 18% slope.

Reference:

BSWM, ALMED. Crop Development and Soil Conservation Framework for the Islands of Luzon (1990), Visayas (1990) and Mindanao (1990)

Appendix Table 20
PROCESS RATE DATA AND EMISSION FACTORS USED IN COMPUTING EMISSIONS FROM AREA SOURCES: PHILIPPINES, 1988, 1992 and 1995

PSIC	Type of Area Source/ Data Requirements	Process Rate/Data			Kinetic Factors			SOx	NOx	VOC	CO
		1988	1992	1995	PM	PM10*	PM				
11	Kalngin 1/ Land area burned (ha.) Ave. fuel loading (mega grams/ha.)	2,914 43	86 43	409 43	8.50 kg/mg	7.48	PM	neg.	2.00 kg/mg	12.00 kg/mg	90.00 kg/mg
501	Building Construction 2/ Residential No. of units constructed Total floor area in sq m Construction period	30,181 3,486,000 6	36,063 3,861,950 6	57,777 5,979,000 6	2.96 tons/ha-mo	1.8944	PM				
	Non-residential No. of units constructed Total floor area in sq m Construction period	5,047 3,222,000 12	6,425 3,492,505 12	9,998 6,522,000 12	2.96 tons/ha-mo	1.8914	PM				
501	Surface Coatings 2/ Gloss enamel Sales Vol. of paints (li) assumed 40% Flat wall enamel Sales Vol. of paints (li) assumed 60%	13,821,075 20,731,613	12,945,043 19,417,565	11,680,312 17,520,467					20.00 g/li 15.00 g/li		
501	Adhesive & Resin 2/ Vol. of consumption (kg)	914,417	2,351,262	2,721,880					0.10 kg/kg		
502	Road Construction 2/ Length of road constructed (km) Affected area/ha/km road constructed Construction period (in months)	240 2 12	1,699 2 12	23 2 12	2.96 tons/ha-mo	1.8944	PM				
628	Gasoline Dispensing Facilities 2/ Underground tanks leaking loss Vol. of gasoline sold (in barrels) Vehicle refueling vapor displacement Vol. of gasoline sold (in barrels) Underground tanks breathing loss Vol. of gasoline sold (in barrels) Vehicle refueling spillage Vol. of gasoline sold (in barrels)	11,072,000 11,072,000 11,072,000 11,072,000	12,396,000 12,396,000 12,396,000 12,396,000	15,940,000 15,940,000 15,940,000 15,940,000					9.50 lbs/1000 gal 10.00 lbs/1000 gal 1.00 lbs/1000 gal 0.70 lbs/1000 gal		
712	Automobile Fires 2/ No. of automobile fires	360	430	514	17.00 lbs/fire	11.9	PM		0.70 lbs/fire	7.21 lbs/fire	21.25 lbs/fire
842	Structural Fires 2/ No. of structural fires	1,843	3,591	3,236	14.00 lbs/fire	13.72	PM		5.00 lbs/fire	18.00 lbs/fire	220.00 lbs/fire
91	Public Admin. & Defense 3/ LPG consumption ('000 liter)	793	0	480	0.04 kg/1000 li			0.01 kg/1000 li	1.13 kg/1000 li	0.06 kg/1000 li	0.23 kg/1000 li
973	Dry Cleaning 3/ Annual vol. of sales (kg) Perchloroethylene % recycled (30%) Industrial Degreasing 3/ Annual vol. of sales (kg) halogenated solvents (Trichloroethylene and 1,1,1 Trichloroethane) - recycled (7%) Paved/Unpaved Road Travel 2/ No. of motor vehicles registered by type Ave. dist. travelled by vehicle type/year	388,568 1,000,254	423,945 1,244,535	383,560 1,311,742	0.0096 lbs/VKT					0.93 kg/kg	
	Residential Fuel Combustion 3/ LPG consumption ('000 liter) Fuelwood consumption (mt) Charcoal consumption (mt) Kerosene consumption ('000 li) Crop residue consumption (mt)	513,032 17,767,400 1,517,980 376,065 2,493,340	790,844 16,195,383 1,480,619 531,081 2,274,122	827,234 20,899,682 1,453,456 598,988 2,074,127	0.03 kg/1000 li 55.08 g/kg 41.31 g/kg 55.08 g/kg	0.03 kg/1000 li 55.08 g/kg 41.31 g/kg 55.08 g/kg		0.01 kg/1000 li 0.20 g/kg 0.20 g/kg 0.20 g/kg	1.09 kg/1000 li 1.40 g/kg 1.40 g/kg 1.40 g/kg	0.09 kg/1000 li 87.50 g/kg 65.60 g/kg 87.50 g/kg	0.23 kg/1000 li 415.40 g/kg 311.33 g/kg 415.40 g/kg

Note:

1. Blank cells indicate no pollution reduction so per US EPA report
2. * PM₁₀ is in terms of percentage of total PM, for paved road travel emissions, 46% of PM is PM₁₀. For unpaved road, 61% of PM is PM₁₀.
3. AirShades and shades (7317-501) was assumed to increase air flow speed by 75%.

Reference:

1. US EPA, 1990. Compilation of Air Pollutant Emission Factors, AP-42 Revisions C, Sept. 1990
2. California Air Resources Board, 1991. Methods for Assessing Area Source Emissions in California
3. US EPA, 1981. Compilation of Air Pollutant Emission Factors, AP-42, 2nd ed. Sept. 1981.

Appendix Table 21
SUMMARY OF PROCESS RATE DATA USED IN COMPUTING MOTOR VEHICLE EMISSIONS: PHILIPPINES, 1988, 1992 AND 1995

Vehicle/Fuel Type	Distance Travelled/ Vehicle Type/Year (km/vehicle) 1/	No. of Registered Motor Vehicles 2/			Number of Starts/Day 1/			% Share of Fuel Consumption 3/			Fuel Consumption (barrels) 4/		
		1988	1992	1995	Cold Start	Hot Start	Evaporative	1988	1992	1995	1988	1992	1995
Cars		376,646	483,622	626,571							2,902,696	3,244,798	3,696,835
Gas	12,000	364,355	457,397	597,886	2	1	1	24.46%	23.13%	24.78%	2,698,558	2,859,807	3,300,912
Diesel	30,000	12,291	26,225	28,685	1	2		1.17%	1.60%	1.25%	204,138	384,991	395,923
Utility Vehicles		475,099	744,190	998,331							11,786,801	16,057,618	20,673,043
Gas	30,000	248,612	360,032	446,636	1	4	4	52.85%	57.66%	58.64%	5,830,845	7,128,314	7,810,097
Diesel	40,000	226,487	384,158	551,695	1	5		34.10%	37.21%	40.68%	5,955,956	8,929,305	12,862,947
Buses		15,083	25,827	28,192							1,596,185	2,407,993	2,462,614
Gas	50,000	797	1,116	618				0.85%	0.89%	0.41%	93,463	110,479	53,983
Diesel	50,000	14,286	24,711	27,574				8.60%	9.57%	7.62%	1,502,723	2,297,513	2,408,630
Trucks		108,027	146,689	192,792							11,543,168	13,720,225	16,840,671
Gas	50,000	14,899	13,582	10,188			2	15.84%	10.88%	6.68%	1,747,176	1,344,558	889,937
Diesel	50,000	93,128	133,107	182,604				56.08%	51.57%	50.45%	9,795,992	12,375,668	15,950,734
Motor/Tricycles		280,902	458,938	708,059							671,349	926,672	1,264,037
Gas	10,000	277,201	454,636	708,059	1	10	10	6.01%	7.43%	9.49%	663,404	918,509	1,264,037
Diesel	-	3,701	4,302	-				0.05%	0.03%	0.00%	7,945	8,163	-
Total		1,255,757	1,859,266	2,533,945							28,500,199	36,357,306	44,937,200
Gas		905,864	1,286,763	1,763,387				100.00%	100.00%	100.00%	11,033,446	12,361,666	13,318,966
Diesel		349,893	572,503	790,558				100.00%	100.00%	100.00%	17,466,753	23,995,640	31,618,234

Sources:

1. EMB, 1995, 1990 Air Pollution Emission Inventory for Metro Manila.
2. NSCB, 1993 Philippine Statistical Yearbook.
3. The percent share was based on annual ave. distance travelled by type of vehicle, annual ave. fuel consumed/distance travelled and no. of registered vehicles.
4. Energy Regulatory Board sales data.
5. Land Transportation Office, 1995.

Notes:

1. The fuel consumption figures adopted the fuel economy figures from an ADB study. These are as follows (km/liter):
Cars 13.67, UV 10.47, Bus and Trucks 3.6, and M/T 33.33

Appendix Table 22
 RUNNING EXHAUST EMISSION FACTORS AND POLLUTANT EMISSIONS: PHILIPPINES, 1988, 1992 AND 1995

Vehicle/ Fuel Type	Emission Factors (g/km)					Emissions (metric tons)								
	PMex	PM10	NOx	VOC	CO	PM ₁₀ ^a			PMex			PM10		
						1988	1992	1995	1988	1992	1995	1988	1992	1995
Cars						882	1,310	1,604	658	1,021	1,234	588	778	996
Gas	0.10	0.12	2.70	6.00	49.50	651	818	1,067	437	549	717	542	681	890
Diesel	0.60	0.12	2.00	0.65	1.90	231	492	537	221	472	516	46	98	107
Utility Vehicles						9,536	15,863	22,376	9,049	15,126	21,469	2,048	3,245	4,398
Gas	0.12	0.12	3.00	8.00	60.00	1,260	1,824	2,259	895	1,296	1,608	925	1,339	1,661
Diesel	0.90	0.12	1.40	0.70	2.30	8,277	14,039	20,117	8,154	13,830	19,861	1,123	1,905	2,736
Buses						1,094	1,890	2,101	1,073	1,856	2,070	158	271	296
Gas	0.05	0.21	3.93	1.68	36.24	5	7	4	2	3	2	8	12	6
Diesel	1.50	0.21	12.50	3.70	12.40	1,089	1,883	2,097	1,071	1,853	2,068	150	259	290
Trucks						7,196	10,234	13,952	7,022	10,017	13,721	1,134	1,540	2,024
Gas	0.05	0.21	3.93	1.68	36.24	100	91	68	37	34	25	156	143	107
Diesel	1.50	0.21	12.50	3.70	12.40	7,096	10,143	13,884	6,985	9,983	13,695	978	1,398	1,917
Motor/Tricycles						6,198	10,166	15,822	5,544	9,093	14,161	1,719	2,819	4,390
Gas	2.00	0.62	0.20	18.60	26.00	6,198	10,166	15,822	5,544	9,093	14,161	1,719	2,819	4,390
Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total						24,906	39,462	55,854	23,346	37,113	52,654	5,647	8,653	12,105
Gas						8,214	12,906	19,219	6,915	10,974	16,514	3,350	4,993	7,055
Diesel						16,692	26,557	36,634	16,431	26,138	36,141	2,297	3,660	5,050
Cars						12,543	16,393	21,093	26,473	33,444	43,607	217,127	273,189	356,779
Gas	0.10	0.12	2.70	6.00	49.50	11,805	14,820	19,372	26,234	32,933	43,048	216,427	271,694	355,144
Diesel	0.60	0.12	2.00	0.65	1.90	737	1,574	1,721	240	511	559	701	1,495	1,635
Utility Vehicles						35,058	53,916	71,092	66,009	97,164	122,640	470,150	686,473	859,114
Gas	0.12	0.12	3.00	8.00	60.00	22,375	32,403	40,197	59,667	86,408	107,193	447,502	648,058	803,945
Diesel	0.90	0.12	1.40	0.70	2.50	12,683	21,513	30,895	6,342	10,756	15,447	22,649	38,416	55,170
Buses						9,085	15,664	17,355	2,710	4,665	5,153	10,301	17,343	18,216
Gas	0.05	0.21	3.93	1.68	36.24	157	219	121	67	94	52	1,444	2,022	1,120
Diesel	1.50	0.21	12.50	3.70	12.40	8,929	15,444	17,234	2,643	4,572	5,101	8,857	15,321	17,096
Trucks						61,133	85,861	116,129	18,480	25,766	34,638	84,736	107,137	131,675
Gas	0.05	0.21	3.93	1.68	36.24	2,928	2,669	2,002	1,252	1,141	856	26,997	24,611	18,461
Diesel	1.50	0.21	12.50	3.70	12.40	58,205	83,192	114,128	17,229	24,625	33,782	57,739	82,526	113,214
Motor/Tricycles						554	909	1,416	51,559	84,562	131,699	72,072	118,205	184,095
Gas	2.00	0.62	0.20	18.60	26.00	554	909	1,416	51,559	84,562	131,699	72,072	118,205	184,095
Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total						118,373	172,743	227,086	165,231	245,601	337,737	854,388	1,202,347	1,549,880
Gas						37,819	51,020	63,108	138,778	205,137	282,847	764,442	1,064,390	1,362,765
Diesel						80,554	121,723	163,977	26,453	40,464	54,890	89,946	137,758	187,115

Note: ^aFor tire wear, 40% of PM is less than 10 micrometer in size while for running exhaust gasoline and diesel, PM10 is 99.4% and 96% of the total PM

Source of emission factors: BMB 1993 1990 Air Pollution Emission Inventory for Metro Manila

Formula:

Emission = (NV x D) x EF, where
 NV = number of registered vehicles by type of vehicle and type of fuel used for the year covered,
 D = ave. distance travelled by type of vehicle and type of fuel used per year, and
 EF = emission factor by type of vehicle and fuel used

Appendix Table 23
COLD START EMISSION FACTORS AND EMISSIONS: PHILIPPINES, 1988, 1992 and 1995

Vehicle/ Fuel Type	Emission Factors			Emissions (metric tons)								
	(g/trip)			NO _x			VOC			CO		
	NO _x	VOC	CO	1988	1992	1995	1988	1992	1995	1988	1992	1995
Cars				753	946	1,236	2,769	3,478	4,545	22,954	28,827	37,675
Gas	4.3	15.82	131.18	752	944	1,234	2,767	3,473	4,540	22,942	28,801	37,647
Diesel	0.31	0.72	4.11	1	2	2	2	5	5	12	26	28
Utility Vehicles				328	490	628	1,028	1,500	1,875	7,929	11,537	14,385
Gas	4.5	16.47	129.23	269	389	482	983	1,423	1,765	7,711	11,166	13,853
Diesel	1.1	0.83	4.02	60	101	146	45	77	110	219	371	532
Buses												
Gas												
Diesel												
Trucks												
Gas												
Diesel												
Motor/Tricycles				58	95	148	830	1,362	2,121	4,656	7,637	11,894
Gas	0.87	12.48	69.99	58	95	148	830	1,362	2,121	4,656	7,637	11,894
Diesel												
Total				1,139	1,531	2,012	4,627	6,339	8,541	35,540	48,000	63,953
Gas				1,078	1,428	1,864	4,580	6,258	8,426	35,309	47,604	63,393
Diesel				61	103	148	47	81	115	231	397	561

Note: Blank cells indicate no pollution emission as per USEPA report.

Source of Emission Factors: EMB. 1993. 1990 Air Pollution Emission Inventory for Metro Manila.

Formula:

Emission = (NV x NT x NO) x EF; where

NT = number of trips per vehicle per day (by type of vehicle and fuel used)

NO = number of days of operation per vehicle per year; and

NV & EF as defined in the running exhaust emission table

Appendix Table 24
HOT START COMPUTATION AND EMISSIONS: PHILIPPINES, 1988, 1992 and 1995

Vehicle/ Fuel Type	Emission Factors (g/trip)			Emissions (metric tons)								
	NOx	VOC	CO	NOx			VOC			CO		
				1988	1992	1995	1988	1992	1995	1988	1992	1995
Cars				513	645	843	961	1,208	1,578	2,297	2,895	3,778
Gas	5.86	10.98	26.12	512	643	841	960	1,205	1,576	2,284	2,867	3,748
Diesel	0.15	0.18	2.19	1	2	2	1	2	2	13	28	30
Utility Vehicles				1,619	2,394	3,037	2,640	3,834	4,771	6,409	9,461	11,979
Gas	5.94	10.88	23.8	1,418	2,053	2,547	2,597	3,760	4,665	5,680	8,226	10,205
Diesel	0.74	0.16	2.68	201	341	490	43	74	106	728	1,235	1,774
Buses												
Gas												
Diesel												
Trucks												
Gas												
Diesel												
Motor/Tricycles				559	917	1,427	2,807	4,605	7,171	6,540	10,726	16,705
Gas	0.84	4.22	9.83	559	917	1,427	2,807	4,605	7,171	6,540	10,726	16,705
Diesel												
Total				2,691	3,956	5,307	6,409	9,646	13,520	15,245	23,082	32,462
Gas				2,489	3,613	4,815	6,364	9,570	13,412	14,504	21,819	30,657
Diesel				202	343	492	45	76	108	741	1,263	1,804

Note: Blank cells indicate no pollution emission as per USEPA report.

Source of Emission Factors: EMB, 1993, 1990 Air Pollution Emission Inventory for Metro Manila.

Formula:

Emission = (NV x NT x NO) x EF; where
 NT = number of trips (starts) per vehicle per day (by type of vehicle and fuel used)
 NO = number of days of operation per vehicle per year; and
 NV & EF as defined in the running exhaust emission table

Appendix Table 25
EVAPORATIVE COMPUTATION AND EMISSIONS: PHILIPPINES, 1988, 1992 and 1995

Vehicle/Fuel Type	VOC Emission Factors for Non-Catalyst Motor Vehicles			VOC Emissions (metric tons)									
	Hot soak (g/trip)	Diurnal (g/vehicle/day)	Evaporative running losses (g/km)	Hot soak			Diurnal			Evaporative Running			
				1988	1992	1995	1988	1992	1995	1988	1992	1995	
	For gasoline fueled vehicles only												
Cars													
Gas	10	17	0.38	891	1,119	1,462	1,460	1,833	2,396	1,661	2,086	2,726	
Diesel													
Utility Vehicles													
Gas	9	16	0.36	2,241	3,245	4,026	3,738	5,413	6,715	2,685	3,888	4,824	
Diesel													
Buses													
Gas													
Diesel													
Trucks													
Gas	4	13		27	25	19	92	84	63	0	0	0	
Diesel													
Motor/Tricycles													
Gas	4	8		2,608	4,277	6,661	5,123	8,402	13,085	0	0	0	
Diesel													
Total													
Gas				5,767	8,666	12,168	10,413	15,731	22,259	4,346	5,974	7,550	
Diesel													

Note: Blank cells indicate no pollution emission as per USEPA report.

Source of emission factors: EMB 1990 Air Pollution Emission Inventory.

1. Formula (as indicated in EMB 1990 Air Pollution Emission Inventory):

Evaporative Running Losses:

Emission estimate = [Emission factor] X [distance travelled] X [no. of registered motor vehicle]

2. Conversion from grams to metric tons: multiply by .000001

Appendix Table 26
SULPHUR OXIDE AND LEAD EMISSIONS: PHILIPPINES, 1988, 1992 and 1995

Vehicle/Fuel Type	Emissions (metric tons)					
	SO _x			Pb		
	1988	1992	1995	1988	1992	1995
Cars	1,762	2,275	2,509			
Gas	1,269	1,345	1,552	259	187	59
Diesel	494	931	957			
Utility Vehicles	17,140	22,540	34,769			
Gas	2,742	3,352	3,672	559	466	140
Diesel	14,399	19,188	31,097			
Buses	3,677	4,989	5,848			
Gas	44	52	25	9	7	1
Diesel	3,633	4,937	5,823			
Trucks	24,504	27,227	38,980			
Gas	821	632	418	168	88	16
Diesel	23,682	26,594	38,562			
Motor/Tricycles	331	449	594			
Gas	312	432	594	64	60	23
Diesel	19	18	0			
Total	47,414	57,480	82,701			238
Gas	5,188	5,812	6,262	1,059	807	238
Diesel	42,227	51,668	76,438			0

1. Formula for SO₂ (SO_x): (as indicated in 1990 Air Pollution Emission Inventory by EMB)
 $SO_2 = [\text{fuel consumption}] \times [\text{density for diesel/gas}] \times [\text{sulfur content gas/diesel}] \times [2]$

density for diesel = 7.05 lbs./gal. sulfur content of gas = .002
density for gas = 6.17 lbs./gal. sulfur content of diesel = .009 (1988)
 sulfur content of diesel = .008 (1992, 1995)

2. Formula for Lead: (as indicated 1990 Air Pollution Emission Inventory by EMB)
Lead content of premium gasoline = [Vol of premium gasoline consumed] X [lead content of premium gasoline]
Lead content of regular gasoline = [Vol of regular gasoline consumed] X [lead content of regular gasoline]
Total lead emissions = [(Lead content of premium gasoline + lead content of regular gasoline)] X [75%]

Lead content (g/g):

Year	Premium	Regular
1988	0.89	0.6
1992	0.6	0.4
1995	0.15	0.15

Appendix Table 27
 NUMBER AND PERCENT SHARE OF REGISTERED VEHICLES BY TYPE OF OWNER AND BY TYPE OF VEHICLE: PHILIPPINES, 1988, 1992 AND 1995

Type of Vehicle	Type of Owner															Total		
	Private (Ill)			Private (Iud.)			For Hire			Government			Diplomatic			1988	1992	1995
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
Cars	361,494	456,212	581,918	-	-	-	7,892	19,484	35,997	4,941	4,846	5,617	3,119	3,080	3,070	376,646	483,622	626,594
% Distribution	96%	94%	93%	0%	0%	0%	2%	4%	6%	1%	1%	1%	1%	1%	0%	30%	26%	25%
Utility Vehicles	-	-	-	400,166	625,655	837,271	55,895	96,471	135,219	19,038	22,064	25,831	-	-	-	475,099	744,190	998,331
% Distribution	0%	0%	0%	84%	84%	84%	12%	13%	14%	4%	3%	3%	0%	0%	0%	38%	40%	39%
Buses	-	-	-	3,273	4,816	3,735	11,420	20,493	23,983	390	518	474	-	-	-	15,083	25,827	28,192
% Distribution	0%	0%	0%	22%	19%	13%	76%	79%	85%	3%	2%	2%	0%	0%	0%	1%	1%	1%
Trucks	-	-	-	95,773	134,848	177,844	5,435	7,484	10,832	5,241	4,210	4,976	1,578	147	-	108,027	146,639	192,852
% Distribution	0%	0%	0%	89%	92%	92%	5%	5%	6%	5%	3%	3%	1%	0%	0%	9%	8%	8%
Motor/Tricycles	151,560	284,641	407,050	-	-	-	123,418	162,694	285,364	5,924	11,603	15,643	-	-	-	280,902	458,938	708,059
% Distribution	54%	62%	57%	0%	0%	0%	44%	35%	40%	2%	3%	2%	0%	0%	0%	22%	25%	28%
TOTAL	513,054	740,853	988,960	499,212	765,319	1,018,050	203,260	306,626	491,407	35,534	43,241	52,541	4,697	3,227	3,070	1,255,757	1,859,266	2,554,028
% Distribution	40.9%	39.8%	38.7%	39.8%	41.2%	39.9%	16.2%	16.5%	19.2%	2.8%	2.3%	2.1%	0.4%	0.2%	0.1%	100%	100%	100%

Source: NSCB 1991 Philippines Statistical Yearbook

Formula

Registered Vehicle by Type of Vehicle & by Type of Owner

 Total Registered by Type of Vehicle

= Registered vehicle share by type of owner

Appendix Table 28
 AIR POLLUTION EMISSION FROM FUEL COMBUSTION USING BUNKER OIL, PHILIPPINES, 1988, 1991 and 1995

PRIC	Sector	Fuel Consumption			Emissions (metric tons)																	
		(1000 Liters BOP)			PM			PM ₁₀			SO _x			NO _x			VOC			CO		
		1988	1991	1995	1988	1991	1995	1988	1991	1995	1988	1991	1995	1988	1991	1995	1988	1991	1995	1988	1991	1995
Emission Factor: BOP (kg/1000L) based																						
AGRICULTURE, FORESTRY AND FISHERY		15,740	5,582	8,217	68	25	37	57	24	35	81	358	525	88	57	54				8	3	5
11	Agricultural crops production				0	0	0	0	0	0	0	0	0	0	0	0						
111	Palay production																					
112	Corn production																					
113	Vegetable production																					
114	Hydro A nuts (peel, innerseed production)																					
115	Coconut production incl. copra making																					
116	Sugarcane production																					
117	Tobacco production																					
118	Fiber crops production																					
119	Agricultural crops production																					
12	Livestock, poultry and other animal prod'n																					
121	Livestock and livestock products																					
122	Poultry and poultry products																					
129	Raising other animals, incl. their products																					
13	Agricultural services																					
130	Agricultural services																					
14	Fishery	11,157	4,181	4,354	58	19	28	48	19	24	788	243	384	74	38	41				7	3	4
141	Ocean (all others) and coastal fishing	11,157	4,181	4,354	58	19	28	48	19	24	788	243	384	74	38	41				7	3	4
142	Inland fishing																					
143	Operation of fish farms																					
149	Other fishery activities																					
15	Forestry	2,183	1,482	2,843	9	6	9	9	6	9	132	88	129	14	9	14				1	1	1
151	Logging operations	2,183	1,482	2,843	9	6	9	9	6	9	132	88	129	14	9	14				1	1	1
159	Other forestry activities																					
16	Steeling, trapping and game operation																					
160	Steeling, trapping and game operation																					
MINING AND QUARRING		286,182	195,373	287,574	1,354	889	1,295	1,278	838	1,253	18,566	12,258	18,831	1,954	1,789	1,898	18	7	18	178	157	178
21	Metallic ore mining	288,928	197,931	285,457	1,328	874	1,284	1,241	852	1,225	18,439	12,168	17,899	1,948	1,788	1,884	18	7	18	176	156	176
211	Gold ore mining	191,920	191,931	285,437	1,324	874	1,284	1,241	832	1,223	18,429	12,168	17,894	1,948	1,788	1,884	18	7	18	176	156	176
212	Other precious metal ore mining																					
213	Copper ore mining																					
214	Nickel ore mining																					
215	Chromite ore mining																					
216	Iron ore mining																					
219	Other base metal ore mining																					
22	Non-metallic mining and quarrying	2,182	1,448	2,119	9	6	9	9	6	9	137	88	125	14	9	14				1	1	1
221	Coal mining																					
222	Quartz, pumice and, gas exploration & prod'n																					
223	Stone, quarrying, clay and sand pits	2,182	1,448	2,119	9	6	9	9	6	9	137	88	125	14	9	14				1	1	1
229	Other non-metallic mining and quarrying	77	51	75							5	3	5	1	0	0						

FISC	Sector	Emissions (metric tons)																				
		Fuel Consumption (000 L.H. or B.O.P.)			PM			PM ₁₀			SO ₂			NO _x			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
MANUFACTURING		1,949,782	1,414,374	2,491,869	5,692	5,957	6,739	5,426	5,654	6,326	75,112	82,987	129,827	12,069	9,335	15,748	155	69	88	4,512	1,516	1,957
31	Manufacture of food, beverages & tobacco	665,163	448,748	648,516	1,816	2,022	2,976	1,738	1,925	2,834	25,278	28,136	43,414	2,661	2,962	4,359	14	15	22	242	269	394
311-312	Food manufacturing	301,889	350,396	315,628	1,360	1,578	2,323	1,393	1,303	2,342	18,918	21,064	32,330	1,992	2,312	3,403	10	12	19	181	210	299
312	Beverage manufacturing	89,934	83,844	123,413	408	378	556	386	360	529	5,619	5,237	7,778	594	533	815	3	3	4	54	30	74
314	Tobacco manufacturing	11,341	14,590	21,475	51	66	97	49	63	92	711	915	1,347	75	96	142	0	0	1	7	9	15
32	Textile, wearing apparel and leather industries	163,894	152,755	224,828	726	688	1,013	691	655	944	18,181	9,576	14,894	1,063	1,008	1,484	5	5	7	96	91	135
321	Textile manufacturing	136,051	148,030	117,901	709	647	981	669	635	933	9,784	9,282	13,662	1,010	977	1,438	5	5	7	94	89	131
322	Wearing apparel	4,633	4,320	6,358	11	19	29	20	19	27	291	271	399	31	29	42				3	3	6
323-324	Manufacture of leather and leather products	410	383	363	2	2	3	2	2	2	16	14	33	3	3	4						
33	Manufacture of wood and wood products including furniture and fixtures	18,483	4,371	6,454	47	20	29	45	19	28	657	274	493	69	29	42				6	2	4
331	Manufacture of wood and wood products	10,033	4,083	6,012	43	18	27	49	18	26	610	256	377	66	27	40				6	2	4
332	Manufacture and repair of furniture	410	287	422	1	1	2	2	1	2	17	18	26	3	2	3						
34	Manufacture of paper and paper products; printing and publishing	154,274	175,914	258,935	695	792	1,166	662	754	1,111	9,873	11,838	16,235	1,018	1,161	1,789	5	6	9	93	186	155
341	Manufacture of paper and allied products	154,225	173,867	238,864	695	792	1,166	662	754	1,111	9,670	11,027	16,231	1,018	1,161	1,789	5	6	9	93	186	155
342	Printing, publishing and allied industries	51	48	70							3	3	4	0	0	0						
35	Manufacture of chemicals and chemical products	892,929	258,329	339,829	921	684	889	893	677	849	8,847	7,847	11,551	5,895	1,528	2,238	120	18	38	3,879	684	892
351,352 & 353	Manufacture of chemicals and plastic products	96,893	90,351	132,961	437	407	599	416	388	370	6,075	5,664	8,337	639	596	878	3	3	5	58	54	80
353	Petrochemicals	759,891	106,300	156,467	322	43	66	312	43	66	596	71	104	5,013	702	1,033	116	16	24	3,799	312	782
354	MR. of miscellaneous products of petroleum and MR. of miscellaneous products	633	590	868	5	3	4	3	3	4	40	37	54	4	4	6				1	1	1
355	Manufacture of rubber products	55,512	33,107	48,732	160	149	220	151	142	209	2,217	1,076	3,055	274	219	322	1	1	2	21	20	29
36	Manufacture of non-metallic mineral products	266,458	265,938	393,444	951	1,199	2,763	877	1,141	1,679	82,937	16,474	24,544	1,344	1,755	2,884	7	9	13	134	168	235
361	Manufacture of pottery, china and cements	20,797	16,342	24,349	94	75	110	89	71	104	1,394	1,037	1,527	137	109	161	3	2	4	37	43	43
362	Manufacture of glass and glass products	95,445	70,981	104,480	430	320	471	409	303	448	3,994	4,451	6,531	630	469	690	3	6	8	48	101	149
363	Manufacture of cement	80,284	168,978	248,723	362	761	1,121	344	723	1,067	3,034	10,593	15,593	520	1,113	1,642				6	6	8
369	Manufacture of other non-metallic mineral products	10,122	9,436	13,890	46	43	67	43	40	60	613	392	871	67	61	92						
37	Basic metal industries	114,398	129,834	191,243	515	585	862	498	557	828	7,166	8,746	11,992	754	858	1,263	4	4	7	69	78	138
371	Iron and steel industries	90,823	105,240	154,907	409	474	698	390	431	663	3,693	6,599	9,713	399	693	1,012	3	4	3	54	63	99
372	Non-ferrous metal basic industries	23,475	24,686	36,336	106	111	164	101	106	156	1,472	1,548	2,279	135	163	240	1	1	1	14	13	22
38	Manufacture of fabricated metal products, machine and equipment	6,899	6,424	9,455	31	29	42	29	27	48	432	465	593	45	42	62				4	4	6
381	Manufacture of fabricated metal products	2,941	2,742	4,016	13	12	18	13	12	17	184	172	233	19	18	27				2	2	2
382	Manufacture of machinery except electrical	68	64	54							4	4	6	0	0	1						
383	Manufacture of electrical machinery, etc.	2,787	2,598	3,824	13	12	17	12	11	14	175	163	240	18	17	23				2	2	2
384	Manufacture of transport equipment	1,094	1,020	1,502	5	5	7	5	4	6	69	64	94	7	7	10				1	1	1
385	MR. of prof., scientific and measuring eqpt.																					
386	MR. and repair of metal furniture & fixtures																					
39	Other manufacturing industries																					
390	Other manufacturing industries																					

PSIC	Sector	Fuel Consumption			Emissions (metric tons)																	
		('000 Short Tons)			PM ₁₀			PM _{2.5}			SO _x			NO _x			VOC			CO		
		1989	1992	1995	1989	1992	1995	1989	1992	1995	1989	1992	1995	1989	1992	1995	1989	1992	1995	1989	1992	1995
ELECTRICITY, GAS AND WATER																						
41	Electricity	2,517,112	5,034,161	4,466,092	10,439	13,669	20,120	9,940	13,017	19,140	145,283	198,242	209,024	15,293	20,025	29,474	79	103	152	1,370	1,020	2,400
411	Electricity generation and distribution	2,517,112	5,034,161	4,466,092	10,439	13,669	20,120	9,940	13,017	19,140	145,283	198,242	209,024	15,293	20,025	29,474	79	103	152	1,370	1,020	2,400
412	Electricity distribution to consumers																					
42	Gas and steam																					
421	Gas and steam distribution through systems																					
422	Boilers and power plants																					
43	Waterworks and supply																					
430	Waterworks and supply																					
CONSTRUCTION																						
50	Construction	5,272	10,715	15,000																		
501	General building construction	5,272	10,715	15,000	74	49	72	22	46	40	313	677	994	35	71	105				3	6	10
502	General engineering construction	856	1,333	2,701	4	8	11	4	8	12	34	115	169	6	12	18				1	1	2
503	Specialty construction	4,967	8,305	12,077	10	37	54	17	35	52	221	514	717	26	54	80				0	0	7
503	Specialty construction	369	756	1,312	2	3	5	2	3	5	13	47	70	2	5	7				0	0	1
WHOLESALE AND RETAIL TRADE																						
61	Wholesale trade																					
610	Petroleum & petroleum products, wholesaling																					
62	Retail trade																					
620	Petroleum and petroleum products, retailing																					
TRANSPORTATION, STORAGE AND COMMUNICATIONS																						
71	Transportation services	174,743	224,441	253,347	794	1,020	1,501	720	971	1,430	13,002	14,190	20,090	1,166	1,494	2,200	6	7	11	106	156	200
711	Railway transport	174,743	224,441	253,347	794	1,020	1,501	720	971	1,430	13,002	14,190	20,090	1,166	1,494	2,200	6	7	11	106	156	200
712	Road passenger transport	5,541	8,016	8,099	25	27	40	24	26	38	340	379	518	37	40	49				3	4	5
713	Water transport																					
714	Air transport																					
719	Services allied to transport	171,188	220,375	244,178	771	993	1,461	724	945	1,392	10,714	13,018	20,339	1,110	1,454	2,161	6	7	11	103	152	193
72	Storage and warehousing	11	20	10							1	1	2				0	0				
73	Communication																					
FINANCING, INSURANCE, REAL ESTATE AND BUS. SERVICES																						
81	Banking institutions																					
82	Financial intermediaries																					
83	Insurance																					
84	Real estate																					
85	Business services																					
85	Business services	4,133	1,431	2,106	19	6	9	18	6	9	250	90	132	27	9	14				2	1	1
COMMUNITY, SOCIAL, AND PERSONAL SERVICES																						
91	Public administration and defense	4,133	1,431	2,106	19	6	9	18	6	9	250	90	132	27	9	14				2	1	1
92	Library and similar services																					
93	Education services																					
94	Medical, dental, other health & soc. services																					
95	Other social and related community services																					
96	Recreational and cultural services																					
97	Personal and household services																					
98	Restaurants and hotels																					
99	Int. org. and other extrajurisdictional bodies																					
100	Household sector																					
NATURE, Nature sector																						
TOTAL		4,762,485	4,880,458	7,195,057	10,529	21,530	31,702	17,469	20,512	30,195	251,113	299,216	410,427	51,997	57,190	47,502	250	177	261	6,197	3,593	6,095

10-11a
 1 Emissions = (Fuel) x (Emission Factor), where gross rate = annual fuel consumption. Calculations used EPA/USEPA emission factors for industrial boilers using boiler oil fuel as well as for the 1990 Air Pollution Emission Inventory for State Markets (EPA, 1992), except the PM_{2.5} (Wholesale/Retail) which used the 1995 USEPA factor (234 - 1.15E+1 0.50 PM_{2.5} - 10E, 10%, 6.4, VOC - 0.1574 and CO - 1.64E+1 0.01E+01 PM_{2.5}

BOF Fuel (1995) (Metric Tons)	PM _{2.5}	Total 1995 Fuel Consumption
Petroleum Refining (BOF)	4.351E+01	0.0004
Petroleum Refining (TIC)	4.310E+01	0.0004
Refining (Total BOF)	41.709E+01	0.0007
Manufacturing (BOF)	6.879E+01	0.0006
Utility (Gas and Steam) (BOF)	0.014E+01	0.1574
Carbon Intensity (CO ₂)	0.490E+01	1.0000

- For PM_{2.5} 14, 141, 141, 149, 711, 713 & 714 BOF sources were already entered in the 1990 inventory.
- Fuel coming from the same district listed in the combined AIR and construction & VOC fuel sales data, unless otherwise indicated.
- Construction fuel used in 1995 is shown in the table.
- Block calls indicate sources of BOF by the respective sector.
- 10% of electricity generated in industrial processes is approximately 10% of 714.

Appendix Table 29
 AIR POLLUTION EMISSIONS FROM STATIONARY SOURCES RELATED TO FUEL COMBUSTION USING COAL: PHILIPPINES, 1988, 1992 and 1995

PSIC	Sector	Emissions (metric tons)																	
		Coal Consumption (tons)			PM			SOX			NOX			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
		Emission Factors (lb/ton burned)			10	10	10	39	39	39	21	21	21	0.07	0.07	0.07	0.6	0.6	0.6
AGRI, FORESTRY AND FISHERY																			
11	Agricultural crops production																		
111	Palmy production																		
112	Corn production																		
113	Vegetable production																		
114	Fruits and nuts (excluding coconut) production																		
115	Coconut production including copra-making																		
116	Sugarcane production																		
117	Tobacco production																		
118	Fiber crops production																		
119	Agricultural crops production																		
12	Livestock, poultry and other animals production																		
121	Livestock and livestock products																		
122	Poultry and poultry products																		
129	Raising of other animals, including their products																		
13	Agricultural Services																		
130	Agricultural services																		
14	Fishery																		
141	Ocean (off-shore) and coastal fishing																		
142	Inland fishing																		
143	Operation of fish farms																		
149	Other fishery activities																		
15	Forestry																		
151	Logging operations																		
159	Other forestry activities																		
16	Hunting, trapping and game operation																		
160	Hunting, trapping and game operation																		
MINING AND QUARRYING																			
21	Metallic ore mining																		
211	Gold ore mining																		
212	Other precious metal ore mining																		
213	Copper ore mining																		
214	Nickel ore mining																		
215	Chromite ore mining																		
216	Iron ore mining																		
219	Other base metal ore mining				4,519	0	0	17,623	0	0	9,489	0	0	32	0	0	271	0	0
22	Non-metallic mining and quarrying	996,200	0	0	4,519	0	0	17,623	0	0	9,489	0	0	32	0	0	271	0	0
221	Coal mining	996,200			4,519	0	0	17,623	0	0	9,489	0	0	32	0	0	271	0	0
222	Crude petroleum & natural gas exploration and prodn.																		
223	Stone, quarrying, clay and sand pits																		
229	Other non-metallic mining and quarrying																		
MANUFACTURING																			
31	Manufacture of food, beverages, and tobacco	158,731	272,748	18,497	720	1,237	84	2,808	4,825	327	1,512	2,598	176	5	9	1	43	74	5
311-312	Food manufacturing	99,207	170,468		450	773	0	1,755	3,016	0	945	1,624	0	3	5	0	27	46	0
313	Beverage manufacturing	59,524	102,281	18,497	270	464	84	1,053	1,809	327	567	974	176	2	3	1	16	28	5
314	Tobacco manufacturing																		
32	Textile, wearing apparel and leather industries	1,102	1,894		5	9	0	19	34	0	10	18	0	0	0	0	0	1	0
321	Textile manufacturing	1,102	1,894		5	9	0	19	34	0	10	18	0	0	0	0	0	1	0
322	Wearing apparel																		
323-324	Manufacture of leather and leather products																		

Appendix Table 22 (continued)

1987 SIC	Sector	Coal Consumption (tons)			Emissions (metric tons)											
					PM			SOX			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
33	Manufacture of wood and wood products including Furniture and fixtures				0	0	0	0	0	0	0	0	0	0	0	0
331	Manufacture of wood and wood products															
332	Manufacture of repair of furniture															
34	Manufacture of paper and paper products; printing and publishing	20,944	35,988		95	163	0	370	637	0	199	343	0	1	1	0
341	Manufacture of paper and allied products	20,944	35,988		95	163	0	370	637	0	199	343	0	1	1	0
342	Printing, publishing and allied industries															
35	Mfr. of chemicals & chemical products, petroleum, coal, rubber and plastic products	1,779	3,058	31,718	8	14	0	31	54	0	17	29	0	0	0	0
351,352 & 356	Manufacture of chemicals and plastic products	0	0	31,718												
353	Petroleum refineries				3	5	0	12	21	0	6	11	0	0	0	0
354	Mfr. of miscellaneous products of petroleum and coal	677	1,163		5	9	0	19	34	0	10	18	0	0	0	0
355	Manufacture of rubber products	1,102	1,891													
36	Mfr. of non-metallic mineral products	1,100,061	976,089	1,388,396	4,990	4,428	6,298	19,460	17,267	24,561	10,479	9,298	13,225	35	31	44
361	Manufacture of pottery, china and earthenware															
362	Manufacture of glass and glass products															
363	Manufacture of cement	1,100,061	976,089	1,388,396	4,990	4,428	6,298	19,460	17,267	24,561	10,479	9,298	13,225	35	31	44
369	Manufacture of other non-metallic mineral products															
37	Basic metal industries	19,841	34,094	302,177	90	155	1,371	351	603	5,346	189	325	2,878	1	1	10
371	Iron and steel basic industries	5,512	9,470	302,177	25	41	1,371	97	168	5,346	52	90	2,878	0	0	10
372	Non-ferrous metal basic industries	14,330	24,623	0	65	112	0	253	436	0	136	235	0	0	1	0
38	Mfr. of fabricated metal products, machinery and equipment	7,716	13,259	0	35	60	0	136	235	0	73	126	0	0	0	0
381	Manufacture of fabricated products	7,716	13,259	0	35	60	0	136	235	0	73	126	0	0	0	0
382	Manufacture of machinery except electrical															
383	Manufacture of electrical machinery, etc.															
384	Manufacture of transport equipment															
385	Mfr. of professional, scientific and measuring eqpt.															
386	Manufacture of equip. of metal furniture and fixtures															
39	Other manufacturing industries	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390	Other manufacturing industries															
49	ELECTRICITY, GAS AND WATER	0	1,489,978	1,420,972	0	355	220	0	8,014	7,672	0	1,378	1,314	0	0	0
41	Electricity	0	1,489,978	1,420,972	0	355	220	0	8,014	7,672	0	1,378	1,314	0	0	0
411	Electricity generation and distribution															
412	Electricity distribution to consumers															
42	Gas and steam															
421	Gas manufacture and distribution through systems															
422	Steam heat and power plants															
43	Waterworks and supply															
430	Waterworks and supply															
CONSTRUCTION																
50	Construction															
501	General building construction															
502	General engineering construction															
503	Special trade construction															
WHOLESALE AND RETAIL TRADE																
61	Wholesale trade															
619	Petroleum and petroleum products, wholesaling															
62	Retail trade															
628	Petroleum and petroleum products, retailing															

Appendix Table 29 (continued)

PSIC	Sector	Emissions (metric tons)																	
		Coal Consumption (tons)			PM			SOX			NOX			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
TRANSPORTATION, STORAGE AND COMMUNICATION																			
71	Transportation services																		
711	Railway transport																		
712	Road passenger transport																		
713	Water transport																		
714	Air transport																		
719	Services allied to transport																		
72	Storage and warehousing																		
720	Storage and warehousing																		
73	Communication																		
FINANCING, INS., R. ESTATE AND BUS. SERVICES																			
81	Banking institution																		
82	Financial intermediaries																		
83	Insurance																		
84	Real estate																		
85	Business services																		
COMMUNITY, SOCIAL AND PERSONAL SERVICES																			
91	Public administration and defense																		
93	Sanitary and similar services																		
93	Education services																		
94	Medical, dental, other health and veterinary services																		
95	Other social and related community services																		
96	Recreational and cultural services																		
97	Personal and household services																		
98	Restaurants and hotels																		
99	Int'l org. and other extra-territorial bodies																		
1111	Household sector																		
NATURE Nature sector																			
Total		2,306,375	2,827,107	3,161,760	10,462	6,820	8,472	40,800	31,698	37,905	21,969	14,115	17,594	73	42	54	628	364	465

Notes:

- Emission = (Process Rate) X (Emission Factor); where process rate = annual fuel consumption. Calculations used EPA/NEDB emission factors (Jan. 1998) for industrial boilers using Bituminous Coal (B-01-002-02; Pulp Coal Dry Bed), below:
 Particulate Matter (PM) 10 Btu/ton burned
 Sulfur Oxide (SO₂) 19 Btu/ton burned
 Nitrogen Oxide (NO_x) 21 Btu/ton burned
 Volatile Organic Compounds (VOC) 0.07 Btu/ton burned
 Carbon Monoxide (CO) 0.60 Btu/ton burned
- Emissions from electricity generation (PSIC 411) were computed using the actual electricity generated from coal as the process rate with a different set of emission factors generated from actual operation of Calaca plant.
- Fuel consumption data for 1988 were taken from the Annual Survey of Establishment output for the cement industry which was taken from the 1991 BIP Reinvesting Studies for Cement. While for 1992, data were provided by DOE for cement, power generation & industrial process. The industrial process coal consumption was then attributed to different sectors using the 1988 ratio as basis. The 1995 data was actual data taken from DOE records.
- Blank cells indicate non use of coal by the respective sectors.
- PM₁₀ discharges are not computed.

Appendix Table 30a
PROCESS RATE DATA AND EMISSION FACTORS USED IN COMPUTING EMISSIONS FROM STATIONARY
SOURCES RELATED TO PRODUCTION PROCESSES: PHILIPPINES, 1988, 1992 and 1995

PSIC	Industry & Process	Unit of measure	Production in 1000			Emission factors (kg/unit) ^{1/}				
			mt per year			PM	PM ₁₀	SO _x	NO _x	VOC
ELECTRICITY, GAS AND WATER										
411	Electricity Generation									
	Diesel generated	(M KWID)	1,642	1,973	2,287	0.44	96% PM	16.65	8.46	
COMMUNITY, SOCIAL AND PERSONAL SERVICES										
94	Medical, dental, other health and veterinary services									
	Ethylene Oxide	(t)	12	12	12	0		0	0	2000

Emission factor sources:

- 1 World Health Organization, 1982. Rapid Assessment of Sources of Air, Water, and Land Pollution except for the II.
- 2 PSIC 21 & 22 - Ralph Stone & Co., Inc. 1977. Industrial Pollution Control Strategies.
- 3 PSIC 331 (Mfr. of wood & wood prod.) - WHO. 1993. Assessment of Sources of Air, Water and Land Pollution (Part One).
- 4 PSIC 353 (Petroleum refineries) - Table 9.1-1 USEPA. 1990. Supplement C to Compilation of Air Pollutant Emission Factors.
- 5 PSIC 362 (Mfr. of glass & glass prod.) - USEPA. 1990. Supplement C to Compilation of Air Pollutant Emission Factors.
- 6 PSIC 363 (Cement mfg.) - Economopoulos. 1993. WHO Rapid Assessment of Sources of Air, Water and Land Pollution & USEPA 1990.
- 7 PSIC 371 (casting & rolling) - UNEP. 1990. Guidelines for Environmental Management of Iron and Steel Works.
- 8 PSIC 371 (casting & electric arc furnace) - USEPA. 1990. Supplement C to Compilation of Air Pollutant Emission Factors.
- 9 PSIC 372 (Non-ferrous metal basic industries) - Ralph Stone & Co., Inc. 1977. Industrial Pollution Control Strategies.
- 10 PSIC 94 (med. dental & other health & sanitary services) - State of California Air Resources Board. EPA-NRDS emission factor (Jan. 1988)

Notes:

- 1 Blank cells indicate no pollution emission as per WHO report
- 2 Sectors not computed due to absence of data on production volume:
 - a. a. PSIC 355
 - b. b. PSIC 361
3. Formula:
 Pollutant emission = Process rate (vol. of prodn) x emission rate
4. For PSIC 363 45% of production undergoes wet process and the rest is dry process.
5. Emissions are in metric tons for the years 1988 & 1992.
6. Sectors with similar production data for 1988 & 1992:
 - a.
 - i. PSIC 311 (canning of fish)
 - ii. PSIC 311 (starch mfg.)
 - iii. PSIC 313
 - iv. PSIC 351, 352 & 356 which includes sulfuric acid, phosphoric acid, detergents, paints and varnishes
 - v. PSIC 371 (sintering)
 - b. Assumed vol. for 1992 as the same with 1988:
 - i. PSIC 371 (electric arc furnace)
 - ii. PSIC 94

Abbreviations used:

- t = ton (short)
- mt = metric ton
- sq m = square meter
- kg = kilogram

Appendix Table 30a
**PROCESS RATE DATA AND EMISSION FACTORS USED IN COMPUTING EMISSIONS FROM STATIONARY
 SOURCES RELATED TO PRODUCTION PROCESSES: PHILIPPINES, 1988, 1992 and 1995**

PSIC	Industry & Process	Unit of measure	Production in 1000 mt per year			Emission factors (kg/unit) 1/					
			1988	1992	1995	PM	PM ₁₀	SO _x	NO _x	VOC	CO
MINING AND QUARRYING											
21	Metallc ore mining										
	Copper	(mt of ore)	225	492	1,071 #DIV/0! #DIV/0! #DIV/0!	120.7	35% PM				
22	Non-metallic ore mining										
	Coal mining		1,336	1,565	1,776 #DIV/0!	10	50% PM	0.22	0.07	0.05	
	Stone quarrying, clay and sand pits		19,741	17,320	15,776	0.05					
	Other non-metallic mining and quarrying	(mt of gypsum)	2	28	1,612	20.9					
MANUFACTURING											
31	Manufacture of food, beverages and tobacco										
311-312	Food manufacturing	(mt)	180	180	180	0.05	61% PM				
	Canning of fish	(mt)	5,831	5,934	6,012	8.8	61% PM				
	Rice milling	(mt)	3,011	3,100	3,169	8.8	61% PM				
	Corn milling	(mt)	1,472	1,472	1,472	4	61% PM				
	Starch factory	(mt)	1,369	2,011	2,804	20	87% PM				
	Sugar cane factories										
313	Beverage manufacturing	(cu m)	120	120	120	4					
	Total for beer production										
314	Tobacco Manufacturing										
32	Textile, wearing apparel and leather industries										
321	Textile manufacturing	(mt)	3	14	84	14	62% PM				
	Cotton ginning										
323-324	Manufacture of leather and leather products										
	Tanneries and leather finishing										
33	Mfr. of wood/wood products incl. Furniture and fixtures										
331	Manufacture of wood and wood products	(mt of logs)	2,760,287	1,042,201	627,458	0.187	40% PM				
	Log debarking and sawing	(m3 plywood)	415,253	330,580	282,558	5	92% PM				
	Plywood cutting and sanding	(m3 veneer)	85,194	79,787	76,049					1.2	
	Dryers										
34	Manufacture of paper and paper products; printing and publishing						100% PM				
341	Manufacture of paper and allied products	(mt)									
	Sulfate kraft pulp		223	232	239	123		2.5			35
	- w/ no air emission controls										
342	printing, publishing and allied industries										

Appendix Table 30a
 PROCESS RATE DATA AND EMISSION FACTORS USED IN COMPUTING EMISSIONS FROM STATIONARY
 SOURCES RELATED TO PRODUCTION PROCESSES: PHILIPPINES, 1988, 1992 and 1995

PSIC	Industry & Process	Unit of measure	Production in 1000			Emission factors (kg/unit) 1/					
			mt per year			PM	PM ₁₀	SO _x	NO _x	VOC	CO
			1988	1992	1995						
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products										
351, 352	Manufacture of chemicals and plastic products					90% PM					
& 356	Basic chemicals	(mt)	142	142	142			20			
	- Sulfuric acid	(mt)									
	Agricultural chemicals	(mt)	1,070	923	832	4.5					
	- NP/NPK fertilizer	(mt)	254	254	254						
	- Phosphoric acid	(mt)									
	Detergents and surfactants	(mt)	205	205	205	45					
	- w/ no air emissions control	(mt)									
	Surface coating chemicals (i.e., paints, varnishes, etc.)	(mt)	37	37	37	1				15	
	- Paint manufacturing	(mt)								560	
	- surface coating	(mt)	1	1	1					40	
	- Varnish manufacturing	(mt)								500	
	- surface coating	(mt)								770	
	- Lacquer surface coating	(mt)	41	48	55	17				3.5	
	Vinyl resins (PVC)	(liter of feedstock)	8,467,306	2,379,600	1,313,276		0.1% PM			0.052	
	retrograde resins	(liter of feedstock)	867,391	1,161,889	1,483,576	0.695		1.413	0.204	0.67	39.2
	Vacuum distillation	(liter of feedstock)									
	Fluidized bed catalytic cracking	(liter of feedstock)									
355	Manufacture of rubber products										
	Tire and tube manufacturing										
36	Manufacture of non-metallic mineral products					90.365		0.0861	0.668	0.021	0.078
361	Manufacture of pottery, china and earthenware						98% PM				
362	Manufacture of glass and glass products	(t)	301	384	468	0.7		1.7	3.1	0.1	0.1
	Glass containers	(t)	95	105	113	1		1.5	4	0.1	0.1
	Flat glass	(t)	30	33	35	8.7		2.8	4.3	0.2	0.1
	Processed and blown	(t)					92% PM				
363	Manufacture of cement	(mt clinker)	4,577	5,591	6,572	5.581					
	Coal Storage and preparation	(mt clinker)	5,085	6,212	7,302	5.4605					
	Crushing and conveying	(mt clinker)	5,085	6,212	7,302	14.725					
	Clinker processing	(mt clinker)	2,388	2,795	3,286	60.3		2.46	5.725		
	Grinding and enclosing (wet)	(mt clinker)	2,797	3,416	4,016	64.1		2.71	5.125		
	Grinding and enclosing (dry)	(mt clinker)									
369	Manufacture of other non-metallic mineral products		7	7	7	90.365	56% PM	0.0861	0.668	0.021	0.078
	Structural clay products										
37	Basic metal industries										
371	Iron and steel basic industries	(t sinter)	6,035	6,035	6,035	8.96	98% PM				
	Sintering	(mt)	1,272	1,379	1,468	0.6	95% PM	2	0.5	0.2	0.3
	Casting and rolling	(t)	331	331	331	25	83% PM				
	Electric arc furnace	(t)									
372	Non-ferrous metal basic industries	(mt of products)	225	312	413	62					
	Copper refining, li sulfide etc										

Appendix Table 30a
**PROCESS RATE DATA AND EMISSION FACTORS USED IN COMPUTING EMISSIONS FROM STATIONARY
 SOURCES RELATED TO PRODUCTION PROCESSES: PHILIPPINES, 1988, 1992 and 1995**

PSIC	Industry & Process	Unit of measure	Production in 1000			Emission factors (kg/unit) ^{1/}					
			mt per year			PM	PM ₁₀	SO _x	NO _x	VOC	CO
			1988	1992	1995						
38	Manufacture of fabricated metal products, machineries and equipment										
381	Manufacture of fabricated metal products	(mt of iron sheets)	184	202	218					16.2	
	Appliances	(mt of iron sheets)	114	167	232					16.2	
382	Manufacture of electrical machinery	(mt of iron sheets)									
384	Manufacture of transport equipment	(mt of iron sheets)	5	7	10					16.2	
	Motor vehicles manufacturing	(mt of iron sheets)									
ELECTRICITY, GAS AND WATER											
411	Electricity Generation										
	Diesel generated	(M KWID)	1,642	1,973	2,287	0.44	96% PM	16.65	8.46		
COMMUNITY, SOCIAL AND PERSONAL SERVICES											
94	Medical, dental, other health and veterinary services										
	Ethylene Oxide	(t)	12	12	12	0		0	0	2000	0

Emission factor sources:

- World Health Organization, 1982. *Rapid Assessment of Sources of Air, Water, and Land Pollution except for the ff.*
- PSIC 21 & 22 - Ralph Stone & Co., Inc. 1977. *Industrial Pollution Control Strategies.*
- PSIC 331 (Mfr. of wood & wood prod.) - WHO. 1993. *Assessment of Sources of Air, Water and Land Pollution (Part One).*
- PSIC 333 (Petroleum refineries) - Table 9.1-1 USEPA. 1990. *Supplement C to Compilation of Air Pollutant Emission Factors.*
- PSIC 362 (Mfr. of glass & glass prod.) - USEPA. 1990. *Supplement C to Compilation of Air Pollutant Emission Factors.*
- PSIC 363 (Cement mfg.) - Economopoulos. 1993. *WHO Rapid Assessment of Sources of Air, Water and Land Pollution & USEPA 1990.*
- PSIC 371 (casting & rolling) - UNEP. 1990. *Guidelines for Environmental Management of Iron and Steel Works.*
- PSIC 371 (smelting & electric arc furnace) - USEPA. 1990. *Supplement C to Compilation of Air Pollutant Emission Factors.*
- PSIC 372 (Non-ferrous metal basic industries) - Ralph Stone & Co., Inc. 1977. *Industrial Pollution Control Strategies.*
- PSIC 94 (md. dental & other health & sanitary services) - State of California Air Resources Board, EPA/NEDS emission factor (Jan. 1988)

Notes:

- Blank cells indicate no pollution emission as per WHO report.
- Sectors not computed due to absence of data on production volume:
 - PSIC 335
 - PSIC 361
- Formula:

$$\text{Pollutant emission} = \text{Process rate (vol. of prod'n.)} \times \text{emission rate}$$
- For PSIC 363: 45% of production undergoes wet process and the rest is dry process.
- Distinctions are in metric tons for the years 1988 & 1992.
- Sectors with similar production data for 1988 & 1992:
 - PSIC 311 (canning of fish)
 - PSIC 311 (starch mfg.)
 - PSIC 313
 - PSIC 351, 352 & 356 which includes sulfuric acid, phosphoric acid, detergent, paints and varnishes
 - PSIC 371 (wintering)
- Assumed vol. for 1992 as the same with 1988:
 - PSIC 371 (electric arc furnace)
 - PSIC 94

Abbreviations used:

- t = ton (short)
- mt = metric ton
- sq m = square meter
- kg = kilogram

Appendix Table 30b
 AIR POLLUTION EMISSIONS FROM STATIONARY SOURCES RELATED TO PRODUCTION PROCESSES: PHILIPPINES, 1988, 1992 and 1995

Appendix Table 30b (continued)

FAC	Industry & Process	PM			PM ₁₀			Emissions (mt)			NO _x			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
MINING AND QUARRYING																			
21	Metalliferous mining	27,158	59,354	129,270	9,505	20,774	45,244	0	0	0	0	0	0	0	0	0	0	0	0
	Copper	27,158	59,354	129,270	9,505	20,774	45,244												
22	Non-metalliferous mining	14,391	17,103	52,231	5,037	5,986	18,283	294	344	391	93	110	124	67	78	89	0	0	0
	Coal mining	13,337	15,652	47,757	4,675	5,478	16,215	294	344	391	93	110	124	67	78	89			
	Stone quarrying, clay and sand pits	987	866	789	315	303	276												
	Other non-metalliferous mining and quarrying	47	585	33,685	16	205	11,790												
MANUFACTURING																			
31	Manufacture of food, beverages and tobacco	111,567	HHHHHH	143,259	75,174	87,372	101,970	0	0	0	0	0	0	0	0	0	0	0	0
311-312	Food manufacturing	111,087	HHHHHH	142,779	74,881	87,079	101,677	0	0	0	0	0	0	0	0	0	0	0	0
	Canning of fish	9	9	9	5	5	5												
	Rice milling	51,314	52,217	52,910	31,302	31,853	32,275												
	Corn milling	26,497	27,279	27,888	16,163	16,640	17,011												
	Starch factory	5,888	5,888	5,888	3,592	3,592	3,592												
313	Sugar cane factories	27,378	40,217	36,081	23,819	34,989	48,793	0	0	0	0	0	0	0	0	0	0	0	0
	Beverage manufacturing	480	480	480	293	293	293												
	Total for beer production	480	480	480	293	293	293												
314	Tobacco manufacturing																		
32	Textile, wearing apparel and leather industries	48	202	1,177	30	125	730	0	0	0	0	0	0	0	0	0	0	0	0
321	Textile manufacturing	48	202	1,177	30	125	730	0	0	0	0	0	0	0	0	0	0	0	0
	Cotton spinning																		
322-324	Manufacture of leather and leather products																		
	Tanneries and leather finishing												102	96	91	0	0	0	0
33	Manufacture of wood and wood products (excluding furniture)	2,592	1,848	1,530	2,117	1,599	1,347	0	0	0	0	0	0	102	96	91	0	0	0
331	Manufacture of wood and wood products	2,592	1,848	1,530	2,117	1,599	1,347	0	0	0	0	0	0	102	96	91	0	0	0
	Log debarking and sawing	516	195	117	206	78	47												
	Plywood cutting and sanding	2,076	1,653	1,413	1,910	1,521	1,300							102	96	91			
	Dryers																		
34	Manufacture of paper and paper products; printing and publishing	27,429	28,536	29,409	27,429	28,536	29,409	558	580	598	0	0	0	0	0	0	7,805	8,120	8,368
341	Manufacture of paper and allied products	27,429	28,536	29,409	27,429	28,536	29,409	558	580	598	0	0	0	0	0	0	7,805	8,120	8,368
	Sulfite kraft pulp																		
	- w/ no air emission controls	27,429	28,536	29,409	27,429	28,536	29,409	558	580	598									
342	Printing, publishing and allied industries																		
35	Manufacture of chemicals and chemical products, petroleum, rubber and plastic products	18,368	15,040	14,970	13,837	12,568	13,174	4,056	4,472	4,926	177	237	303	1,727	1,622	1,794	34,002	45,846	58,156
351, 352 & 356	Manufacture of chemicals and plastic products	14,766	14,233	13,939	12,669	12,075	12,545	2,830	2,830	2,830	0	0	0	740	766	791	0	0	0
	Basic chemicals							2,830	2,830	2,830									
	- Sulfuric acid																		
	Agri. chemicals																		
	- Nitrogen fertilizer	4,815	4,155	3,742															
	- Phosphoric acid																		
	Detergents and surfactants																		
	- w/ no air emissions control	9,225	9,225	9,225															
	Surface coating chemicals (i.e., paints, varnishes, etc)													554	555	555			
	- Paint manufacturing	37	37	37															
	- surface coating													43	43	43			
	- Varnish manufacturing																		
	- surface coating																		
	- Lacquer surface coating																		
	Vinyl resins (PVC)	489	816	935										142	168	192			

Appendix Table 30b (continued)

PSIC	Industry & Process	Emissions (mt)																	
		PM			PM ₁₀			NOx			NO _x			VOC			CO		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
353	Petroleum refineries	603	808	1,031	368	493	629	1,226	1,642	2,096	177	237	303	987	856	1,003	34,002	45,546	58,156
	Vacuum distillation							1,226	1,642	2,096	177	237	303	440	124	68			
	Fluidized bed catalytic cracking	603	808	1,031				0	0	0	0	0	0	0	0	0	0	0	0
355	Rubber products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tire and tube manufacturing																		
36	Manufacture of non-metallic mineral products	1,672	1,860	2,041	1,334	1,515	1,688	752	919	1,085	1,474	1,789	2,101	46	55	65	43	53	62
	Manufacture of pottery, china and earthenware																		
362	Manufacture of glass and glass products	565	640	750	554	646	755	738	902	1,065	1,442	1,751	2,057	46	55	65	43	52	62
	Glass containers	211	269	328	207	263	321	512	653	796	933	1,190	1,452	30	38	47	30	38	47
	Flat glass	95	105	113	93	103	111	143	157	170	380	419	452	10	10	11	10	10	11
	Processed and blown	260	286	309	254	280	303	84	92	99	128	141	153	6	7	7	3	3	4
363	Manufacture of cement	445	544	639	410	501	588	13	16	19	27	34	39	0	0	0	0	0	0
	Coal Storage and preparation	26	31	37															
	Crushing and conveying	28	34	40															
	Clinker processing	75	91	108															
	Grinding and calcining (wet)	138	169	198				6	7	8	13	16	19						
	Grinding and calcining (dry)	179	219	257				8	9	11	14	18	21						
369	Manufacture of other non-metallic mineral products	661	656	652	370	367	365	1	1	1	5	5	5	0	0	0	1	1	1
	Structural clay products	661	656	652	370	367	365	1	1	1	5	5	5				1	1	1
37	Basic metal industries	77,055	82,542	88,811	60,580	60,641	60,692	2,543	2,758	2,936	636	690	734	254	276	294	382	414	440
371	Iron and steel basic industries	63,105	63,169	63,223	60,580	60,641	60,692	2,543	2,758	2,936	636	690	734	254	276	294	382	414	440
	Sintering	54,074	54,074	54,074	52,993	52,993	52,993	2,543	2,758	2,936	636	690	734	254	276	294	382	414	440
	Casting and rolling	763	827	881	725	786	837												
	Electric arc furnace	8,267	8,267	8,267	6,862	6,862	6,862												
372	Non-ferrous metal basic industries	13,950	19,373	25,588	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Copper refining fit sulfide ore	13,950	19,373	25,588	0	0	0	0	0	0	0	0	0	4,913	6,102	7,450	0	0	0
38	Manufacture of fabricated metal products, machineries and equipment	0	0	0	0	0	0	0	0	0	0	0	0	2,979	3,275	3,526	0	0	0
	Manufacture of fabricated metal products													2,979	3,275	3,526			
	Appliances													1,853	2,709	3,759			
382	Manufacture of electrical machinery													81	119	165			
384	Manufacture of transport equipment													81	119	165			
	Motor vehicle manufacturing																		
ELECTRICITY, GAS AND WATER																			
411	Electricity Generation	722	868	1,006	694	834	966	27,339	32,857	30,085	13,891	16,695	19,351	0	0	0	0	0	0
	Diesel generated	722	868	1,006															
COMMUNITY, SOCIAL AND PERSONAL SERVICES																			
94	Medical, dental, other health and sanitary services	0	0	0	0	0	0	0	0	0	0	0	0	10,887	10,887	11,976	0	0	0
	Beryllium Oxide																		
TOTAL		278,001	344,888	463,704	194,935	219,948	273,500	35,541	41,930	48,021	16,372	19,520	22,614	17,996	19,117	21,758	42,331	54,132	67,027

Appendix Table 31
TOP TEN WATER POLLUTIVE SECTORS: PHILIPPINES, 1988, 1992 and 1995

Appendix Table 31 (continued)

PSIC	Industry & Process	1988		1992		1995			
		BOD5		PSIC		Industry & Process			
		MT	% Share	MT	% Share	MT	% Share		
1111	Household	3,358,167	43.34%	3,809,520	44.26%	1111	Household	5,641,116	53.95%
15	Forestry (runoff)	1,563,840	20.18%	1,563,840	18.17%	15	Forestry (runoff)	1,496,681	14.31%
92	Sanitary & similar services	992,875	12.81%	1,421,571	16.51%	92	Sanitary & similar services	1,489,443	14.25%
11	Agri. crops production (runoff)	770,249	9.94%	770,249	8.95%	11	Agri. crops production (runoff)	736,237	7.04%
12	Livestock production	735,509	9.49%	738,118	8.57%	12	Livestock production	742,887	7.11%
98	Restaurants & hotels	145,438	1.88%	126,711	1.47%	31	Mfg. of food, beverage & tobacco	146,363	1.40%
31	Mfg. of food, beverage & tobacco	116,884	1.51%	110,306	1.28%	98	Restaurants & hotels	121,337	1.16%
32	Textile, wearing apparel and leather industries	25,692	0.33%	21,092	0.25%	628	Retail trade	22,749	0.22%
34	Mfg. of paper & paper prod.	11,201	0.14%	11,707	0.14%	32	Textile, wearing apparel and leather industries	18,925	0.18%
94	Med., dental, other health & veterinary serv.	9,118	0.12%	9,566	0.11%	34	Mfg. of paper & paper prod.	12,108	0.12%
	TOTAL.	7,728,993	99.75%	8,582,678	99.71%			10,427,846	99.74%

PSIC	Industry & Process	1988		1992		1995			
		SS		PSIC		Industry & Process			
		MT	% Share	MT	% Share	MT	% Share		
15	Forestry (runoff)	310,350,015	59.61%	310,350,015	60.88%	15	Forestry (runoff)	297,022,047	61.29%
11	Agri. crops production (runoff)	152,858,963	29.36%	152,858,963	29.99%	11	Agri. crops production (runoff)	146,108,968	30.15%
21	Metallic ore mining	48,836,305	9.38%	38,123,377	7.48%	21	Metallic ore mining	32,188,889	6.64%
12	Livestock production	5,297,465	1.02%	5,312,138	1.04%	12	Livestock production	5,348,846	1.10%
1111	Household	1,536,759	0.30%	198,014	0.04%	22	Non-metallic ore mining	214,761	0.04%
91	Public admin. & defense	1,124,337	0.22%	134,297	0.03%	31	Mfg. of food, beverage & tobacco	159,327	0.03%
22	Non-metallic ore mining	181,296	0.03%	12,507	0.00%	32	Textile, wearing apparel and leather industries	11,875	0.00%
41	Electricity	159,052	0.03%	57	0.00%	33	Mfg. of wood & wood prod.	49	0.00%
31	Mfg. of food, beverage & tobacco	120,433	0.02%	17,155	0.00%	34	Mfg. of paper & paper prod.	17,804	0.00%
98	Restaurants & hotels	66,564	0.01%	2,967	0.00%	35	Mfg. of chem. & chem. prod., petroleum	2,971	0.00%
	TOTAL.	520,531,189	99.99%	507,809,492	99.46%			481,075,537	99.27%

Appendix Table 31 (continued)

		BOD5				1995					
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
		TDS									
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
31	Mfr. of food, beverage & tobacco	1,022,883	89.35%	31	Mfr. of food, beverage & tobacco	1,732,403	93.26%	31	Mfr. of food, beverage & tobacco	1,022,883	89.35%
34	Mfr. of paper & paper prod.	36,850	4.97%	34	Mfr. of paper & paper prod.	59,392	3.20%	34	Mfr. of paper & paper prod.	36,850	4.97%
32	Textile, wearing apparel and leather industries	36,166	3.16%	32	Textile, wearing apparel and leather industries	30,983	1.67%	32	Textile, wearing apparel and leather industries	36,166	3.16%
36	Mfr. of non-metallic mineral prod.	19,191	1.68%	36	Mfr. of non-metallic mineral prod.	23,284	1.25%	36	Mfr. of non-metallic mineral prod.	19,191	1.68%
38	Mfr. of fabricated metal prod., mach. & eqpt.	8,969	0.78%	38	Mfr. of fabricated metal prod., mach. & eqpt.	10,376	0.57%	38	Mfr. of fabricated metal prod., mach. & eqpt.	8,969	0.78%
41	Electricity	533	0.05%	41	Electricity	866	0.05%	41	Electricity	533	0.05%
33	Mfr. of wood & wood prod.	203	0.02%	33	Mfr. of wood & wood prod.	161	0.01%	33	Mfr. of wood & wood prod.	203	0.02%
TOTAL		1,144,793	100.00%			1,857,666	100.00%			1,146,788	100.00%

		O & G				1995					
PSIC	Industry & Process	1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
91	Public admin. & defense	55,712	79.95%	91	Public admin. & defense	38,754	67.62%	91	Public admin. & defense	0	#DIV/0!
31	Mfr. of food, beverage & tobacco	11,247	16.14%	31	Mfr. of food, beverage & tobacco	15,508	27.06%	31	Mfr. of food, beverage & tobacco	0	#DIV/0!
35	Mfr. of chem. & chem. prod., petroleum	1,257	1.80%	35	Mfr. of chem. & chem. prod., petroleum	1,262	2.20%	35	Mfr. of chem. & chem. prod., petroleum	0	#DIV/0!
38	Mfr. of fabricated metal prod., mach. & eqpt.	1,014	1.46%	38	Mfr. of fabricated metal prod., mach. & eqpt.	1,256	2.19%	38	Mfr. of fabricated metal prod., mach. & eqpt.	0	#DIV/0!
32	Textile, wearing apparel and leather industries	455	0.65%	32	Textile, wearing apparel and leather industries	533	0.93%	32	Textile, wearing apparel and leather industries	0	#DIV/0!
41	Electricity	1	0.00%	41	Electricity	1	0.00%	41	Electricity	0	#DIV/0!
TOTAL		69,685	100.00%			57,314	100.00%			1,995	#DIV/0!

Appendix Table 31 (continued)

PSIC	Industry & Process	HDS									
		1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
		1,202,954	51.31%	15	Forestry (runoff)	1,202,954	50.76%	15	Forestry (runoff)	0	0.00%
11	Agri. crops production (runoff)	592,500	25.27%	11	Agri. crops production (runoff)	592,500	25.00%	11	Agri. crops production (runoff)	0	0.00%
HHH	Household	270,750	11.55%	HHH	Household	302,179	12.75%	HHH	Household	0	0.00%
12	Livestock production	234,874	10.02%	12	Livestock production	235,418	9.93%	12	Livestock production	0	0.00%
92	Sanitary & similar services	15,886	0.68%	92	Sanitary & similar services	22,709	0.96%	92	Sanitary & similar services	0	0.00%
91	Public admin. & defense	12,091	0.51%	98	Restaurants & hotels	8,750	0.37%	91	Public admin. & defense	62,575	69.57%
98	Restaurants & hotels	11,727	0.50%	91	Public admin. & defense	2,636	0.11%	98	Restaurants & hotels	0	0.00%
31	Mfg. of food, beverage & tobacco	2,057	0.09%	31	Mfg. of food, beverage & tobacco	1,138	0.05%	31	Mfg. of food, beverage & tobacco	23,972	26.65%
94	Med., dental, other health & veterinary serv.	715	0.03%	94	Med., dental, other health & veterinary serv.	715	0.03%	94	Med., dental, other health & veterinary serv.	0	0.00%
35	Mfg. of chem. & chem. prod., petroleum,	442	0.02%	35	Mfg. of chem. & chem. prod., petroleum,	422	0.02%	35	Mfg. of chem. & chem. prod., petroleum,	1,266	1.41%
	TOTAL	2,343,928	99.98%			2,169,421	99.98%			62,575	69.57%

Appendix Table 31. (continued)+A32

PSIC	Industry & Process	N									
		1988		PSIC	Industry & Process	1992		PSIC	Industry & Process	1995	
		MT	% Share			MT	% Share			MT	% Share
HHH	Household	108,279	73.49%	HHH	Household	120,432	75.81%	HHH	Household	302,179	13.18%
15	Forestry (runoff)	10,005	12.90%	15	Forestry (runoff)	19,005	11.96%	15	Forestry (runoff)	1,151,293	50.23%
11	Agri. crops production (runoff)	9,361	6.35%	11	Agri. crops production (runoff)	9,361	5.89%	11	Agri. crops production (runoff)	566,336	24.71%
98	Restaurants & hotels	4,690	3.18%	92	Sanitary & similar services	4,542	2.86%	92	Sanitary & similar services	22,709	0.99%
92	Sanitary & similar services	3,177	2.16%	98	Restaurants & hotels	3,487	2.19%	98	Restaurants & hotels	8,750	0.38%
91	Public admin. & defense	2,527	1.71%	91	Public admin. & defense	1,758	1.11%	91	Public admin. & defense	2,636	0.12%
94	Med., dental, other health & veterinary serv.	204	0.20%	94	Med., dental, other health & veterinary serv.	285	0.18%	94	Med., dental, other health & veterinary serv.	715	0.03%
	TOTAL	147,313	100.00%			158,870	100.00%			2,054,618	89.63%

APPENDIX TABLE 32
 VALUE OF WASTE DISPOSAL SERVICES TO AIR: PHILIPPINES, 1988, 1992 and 1995

Appendix Table 32 (continued)		Total Value (000 P)					Mobile (000 P)					Stationary (000 P)							
		1988		1992		1995		1988		1992		1995		1988		1992		1995	
		current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices	current	'88 prices
PSIC	Industry & Process																		
AGRICULTURE, FORESTRY AND FISHERY																			
11	Agricultural crops production	19,194	24,953	15,926	25,678	12,228	19,194	24,953	15,926	25,678	12,228	0	0	0	0	0	0	0	0
111	Palay production	165	220	140	230	110	165	220	140	230	110	0	0	0	0	0	0	0	0
112	Corn production	462	601	384	618	294	462	601	384	618	294	0	0	0	0	0	0	0	0
113	Vegetable production	2	3	2	3	1	2	3	2	3	1	0	0	0	0	0	0	0	0
114	Fruits and nuts (excluding coconut) production	5,734	7,454	4,757	7,669	3,652	5,734	7,454	4,757	7,669	3,652	0	0	0	0	0	0	0	0
115	Coconut production including copra-making	2,146	2,789	1,780	2,870	1,367	2,146	2,789	1,780	2,870	1,367	0	0	0	0	0	0	0	0
116	Sugarcane production	6,956	9,042	5,771	9,303	4,430	6,956	9,042	5,771	9,303	4,430	0	0	0	0	0	0	0	0
117	Tobacco production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118	Fiber crops production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
119	Agriculture crops production	3,727	4,845	3,092	4,985	2,374	3,727	4,845	3,092	4,985	2,374	0	0	0	0	0	0	0	0
12	Livestock, poultry and other animal products	8,850	11,504	7,342	11,836	5,636	8,850	11,504	7,342	11,836	5,636	0	0	0	0	0	0	0	0
121	Livestock and livestock products	2,283	2,967	1,894	3,053	1,454	2,283	2,967	1,894	3,053	1,454	0	0	0	0	0	0	0	0
122	Poultry and poultry products	6,568	8,536	5,448	8,783	4,183	6,568	8,536	5,448	8,783	4,183	0	0	0	0	0	0	0	0
123	Raising of other animals, including their products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Agricultural services	2,642	3,435	2,192	3,534	1,683	2,642	3,435	2,192	3,534	1,683	0	0	0	0	0	0	0	0
13	Agricultural services	2,642	3,435	2,192	3,534	1,683	2,642	3,435	2,192	3,534	1,683	0	0	0	0	0	0	0	0
130	Agricultural services	40,715	95,826	52,336	52,336	24,922	40,715	95,826	52,336	52,336	24,922	0	0	0	0	0	0	0	0
14	Fishery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141	Ocean (off-shore) and coastal fishing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142	Inland fishing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	Operation of fish farms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149	Other fishery activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Forestry	42,094	79,183	50,840	72,677	34,608	42,094	79,183	50,840	72,677	34,608	0	0	0	0	0	0	0	0
151	Logging operations	42,094	79,183	50,840	72,677	34,608	42,094	79,183	50,840	72,677	34,608	0	0	0	0	0	0	0	0
159	Other forestry activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Hunting, trapping and game operation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	Hunting, trapping and game operation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINING AND QUARRYING																			
21	Metallic ore mining	56,349	110,250	70,865	105,737	50,351	55,964	109,200	70,852	102,906	49,003	385	1,030	813	2,831	1,348			
211	Gold ore mining	39,738	77,220	49,547	72,459	34,504	39,720	77,205	49,535	72,431	34,491	18	15	12	28	13			
212	Other precious metal ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
213	Copper ore mining	367	1,015	801	2,803	1,335	9,249	17,870	11,462	16,881	8,038	367	1,015	801	2,803	1,335			
214	Nickel ore mining	9,249	17,870	11,462	16,881	8,038	9,249	17,870	11,462	16,881	8,038	0	0	0	0	0			
215	Chromite ore mining	6,957	14,049	9,007	13,496	6,427	6,957	14,049	9,007	13,496	6,427	0	0	0	0	0			
216	Iron ore mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
219	Other base metal ore mining	38	76	48	98	47	38	76	48	98	47	0	0	0	0	0			
22	Non-metallic mining and quarrying	180,273	363,919	233,352	350,435	166,969	180,041	363,624	233,121	349,502	166,430	211	293	231	1,133	539			
221	Coal mining	29,588	59,622	38,264	57,402	27,334	29,390	59,354	38,053	57,017	27,151	197	268	211	385	183			
222	Crude petroleum and natural gas exploration and production	131,196	264,950	169,862	254,571	121,224	131,196	264,950	169,862	254,571	121,224	0	0	0	0	0			
223	Stone, quarrying, clay and sand pits	17,623	35,571	22,804	34,294	16,331	17,609	35,556	22,792	34,277	16,322	13	15	12	17	8			
229	Other non-metallic mining and quarrying	1,866	3,776	2,422	4,368	2,080	1,865	3,766	2,414	3,637	1,732	1	10	8	730	348			
MANUFACTURING																			
31	Manufacture of food, beverage and tobacco	895,189	1,158,398	741,922	1,628,494	775,526	530,892	1,056,639	669,833	1,348,885	638,517	64,297	101,744	72,880	287,719	137,009			
311-312	Food manufacturing	525,096	1,014,174	649,978	1,465,833	498,016	459,479	913,519	577,872	1,180,299	562,047	63,617	100,655	72,107	285,533	135,968			
313	Beverage manufacturing	56,161	112,739	72,139	115,754	55,121	55,510	111,700	71,394	115,754	55,121	651	1,040	745	0	0			
314	Tobacco manufacturing	15,932	31,472	19,804	47,017	22,389	15,903	31,421	19,767	44,832	21,349	29	52	37	2,185	1,041			

Appendix Table 32 (continued)

PSIC	Industry & Process	Total Value ('000 P)					Mobile ('000 P)					Stationary ('000 P)				
		1988	1992		1995		1988	1992		1995		1988	1992		1995	
			current	'88 prices	current	'88 prices		current	'88 prices	current	'88 prices		current	'88 prices	current	'88 prices
32	Textile, wearing apparel and leather industries	77,794	154,621	97,934	204,866	97,555	77,356	153,914	97,428	196,324	93,488	439	707	506	8,542	4,968
321	Textile manufacturing	50,231	99,960	65,428	127,175	60,559	49,805	99,270	62,934	122,901	59,425	426	690	491	4,273	2,835
322	Wearing apparel	23,178	45,990	29,048	65,189	31,138	21,166	45,975	29,037	61,177	29,132	12	15	11	4,213	2,006
123-324	Manufacture of leather and leather products	4,385	8,671	5,458	12,102	5,858	4,385	8,669	5,457	11,246	5,834	1	1	1	56	27
33	Manufacture of wood and wood products including furniture and fixtures	249,717	495,444	313,777	634,649	302,214	248,331	492,975	312,726	621,568	299,318	1,484	1,469	1,052	6,081	2,896
331	Manufacture of wood and wood products	211,759	419,785	291,247	581,532	278,349	210,272	418,317	290,193	581,489	274,900	1,486	1,468	1,052	3,043	1,449
332	Manufacture and repair of furniture	17,959	35,659	22,530	50,117	23,865	17,959	35,658	22,530	47,078	22,418	0	1	0	3,039	1,447
34	Manufacture of paper and paper products; printing and publishing	58,104	114,311	73,967	183,980	73,324	54,664	109,292	69,472	128,160	61,928	3,440	3,019	3,995	25,820	12,295
341	Manufacture of paper and allied products	37,325	73,058	47,003	86,500	41,191	33,885	68,038	43,408	73,590	35,042	3,440	3,019	3,995	12,910	6,148
342	Printing, publishing and allied industries	20,779	41,254	26,964	67,479	32,133	20,779	41,254	26,064	54,569	25,985	0	0	0	12,910	6,148
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products	111,403	228,240	139,564	287,451	136,882	109,416	217,575	137,655	289,290	133,471	1,987	2,665	1,909	7,161	3,410
351,352 & 356	Manufacture of chemicals and plastic products	84,316	166,551	105,603	216,690	103,186	82,462	164,040	103,818	209,994	99,997	1,853	2,492	1,783	6,696	3,189
353	Petroleum refineries	13,075	25,717	16,170	37,322	17,773	12,062	25,572	16,066	37,322	17,773	111	145	104	0	0
354	Manufacture of miscellaneous products of petroleum and coal	1	1	1	463	221	0	0	0	0	0	1	1	1	463	221
355	Manufacture of rubber products	14,011	27,991	17,790	32,976	15,703	13,991	27,964	17,771	32,074	15,702	20	27	19	2	1
36	Manufacture of non-metallic mineral products	86,887	173,366	111,919	182,057	86,694	83,230	171,473	109,664	175,197	83,427	1,457	1,892	1,355	6,859	3,266
361	Manufacture of pottery, china and earthenware	6,790	13,573	8,714	16,147	7,489	6,778	13,560	8,705	12,579	5,990	11	13	9	3,567	1,699
362	Manufacture of glass and glass products	15,338	30,979	19,886	29,040	13,829	15,269	30,867	19,806	28,994	13,807	69	112	80	46	23
363	Manufacture of cement	29,471	58,666	37,796	52,749	25,119	28,175	57,011	36,611	52,432	24,968	1,296	1,655	1,186	317	151
369	Manufacture of other non-metallic mineral products	35,088	70,148	44,622	84,121	40,058	35,008	70,056	44,542	81,192	38,663	81	112	80	2,929	1,395
37	Basic metal industries	69,130	126,566	82,196	174,424	83,060	55,464	112,392	72,844	104,415	51,626	9,467	14,175	10,152	66,011	31,434
371	Iron and steel basic industries	51,970	100,127	64,993	124,746	59,403	44,225	89,288	57,210	86,703	41,897	7,745	10,839	7,763	38,412	18,306
372	Non-ferrous metal basic industries	13,160	26,439	17,203	49,680	23,657	11,439	23,104	14,815	22,111	10,429	1,721	3,335	2,389	27,599	13,128
38	Manufacture of fabricated metal products, machines and equipment	75,488	149,939	94,836	185,615	93,150	75,476	149,975	94,825	195,583	93,135	8	15	11	33	16
381	Manufacture of fabricated metal products	20,129	39,827	25,089	55,594	26,473	20,123	39,815	25,080	55,576	26,465	6	12	9	18	8
382	Manufacture of machinery except electrical	13,869	27,537	17,400	36,366	17,317	13,849	27,537	17,400	36,358	17,310	0	0	0	8	4
383	Manufacture of electrical machinery, etc.	25,510	50,717	32,074	65,860	31,362	25,516	50,715	32,072	65,860	31,362	2	2	1	0	0
384	Manufacture of transport equipment	14,762	29,496	18,739	34,980	16,657	14,762	29,496	18,739	34,972	16,653	1	1	1	7	3
385	Manufacture of professional and scientific and measuring and controlling equipment	711	1,428	912	1,517	722	711	1,428	912	1,517	722	0	0	0	0	0
386	Manufacture and repair of metal furniture and fixtures	496	984	622	1,100	619	496	984	622	1,100	619	0	0	0	0	0
39	Other manufacturing industries	8,470	16,737	10,531	21,817	11,342	8,470	16,737	10,531	21,817	11,342	0	0	0	0	0
390	Other manufacturing industries	8,470	16,737	10,531	21,817	11,342	8,470	16,737	10,531	21,817	11,342	0	0	0	0	0
ELECTRICITY, GAS AND WATER																
41	Electricity	16,170	25,360	15,809	59,447	28,403	16,170	25,360	15,809	41,198	19,618	0	0	0	18,449	9,785
411	Electricity generation and distribution	16,170	25,360	15,809	59,423	24,011	16,170	25,360	15,809	41,198	19,618	0	0	0	9,224	4,393
412	Electricity distribution to consumers	0	0	0	9,224	4,393	0	0	0	0	0	0	0	0	9,224	4,393
42	Gas and steam	56	72	46	74	35	56	72	46	74	35	0	0	0	0	0
421	Gas manufacture and distribution through systems	29	0	0	0	0	29	0	0	0	0	0	0	0	0	0
422	Steam heat and power plants	26	72	46	74	35	26	72	46	74	35	0	0	0	0	0
43	Waterworks and supply	64	84	53	86	41	64	84	53	86	41	0	0	0	0	0
430	Waterworks and supply	64	84	53	86	41	64	84	53	86	41	0	0	0	0	0
CONSTRUCTION																
50	Construction	371,468	341,992	216,934	418,453	199,359	371,468	341,992	216,934	418,450	199,348	0	0	0	23	11
501	General building construction	32,382	64,501	40,868	80,748	38,452	32,382	64,501	40,868	80,738	38,452	0	0	0	0	0
502	General engineering construction	127,142	253,673	160,960	308,621	146,943	127,142	253,673	160,960	308,611	146,943	0	0	0	0	0
503	Special trade construction	11,945	23,818	15,106	29,283	13,944	11,945	23,818	15,106	29,260	13,934	0	0	0	23	11

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Appendix Table 32 (continued)

PSIC	Industry & Process	Total Value ('000 P)					Mobile ('000 P)					Stationary ('000 P)				
		1988	1992		1995		1988	1992		1995		1988	1992		1995	
			current	'88 prices	current	'88 prices		current	'88 prices	current	'88 prices		current	'88 prices	current	'88 prices
WHOLESALE AND RETAIL TRADE																
61	Wholesale trade	30,734	39,948	25,496	41,103	19,573	30,734	39,948	25,496	41,103	19,573	0	0	0	0	
618	Petroleum and petroleum products, wholesaling											0	0	0	0	
62	Retail trade	16,324	21,217	13,542	21,831	10,396	16,324	21,217	13,542	21,831	10,396	0	0	0	0	
628	Petroleum and petroleum products, retailing											0	0	0	0	
TRANSPORTATION, STORAGE AND COMMUNICATIONS																
71	Transportation services	340,775	703,590	435,192	859,477	409,275	340,775	703,590	435,192	859,477	409,275	0	0	0	0	
711	Railway transport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
712	Road passenger transport	314,790	654,332	407,232	821,187	391,137	314,790	654,332	407,232	821,187	391,137	0	0	0	0	
713	Water transport	13,860	36,369	19,863	25,487	12,137	13,860	36,369	19,863	25,487	12,137	0	0	0	0	
714	Air transport	6,484	5,357	3,418	3,059	2,409	6,484	5,357	3,418	3,059	2,409	0	0	0	0	
719	Services allied to transport	5,641	7,332	4,680	7,544	3,593	5,641	7,332	4,680	7,544	3,593	0	0	0	0	
72	Storage and warehousing	205	266	170	274	131	205	266	170	274	131	0	0	0	0	
720	Storage and warehousing	205	266	170	274	131	205	266	170	274	131	0	0	0	0	
73	Communication	4,633	5,241	3,345	5,393	2,568	4,633	5,241	3,345	5,393	2,568	0	0	0	0	
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES																
81	Banking institution	10,257	13,332	8,509	12,717	6,532	10,257	13,332	8,509	12,717	6,532	0	0	0	0	
82	Financial intermediaries	2,459	3,196	2,940	3,288	1,566	2,459	3,196	2,940	3,288	1,566	0	0	0	0	
83	Insurance	1,735	2,255	1,439	2,320	1,105	1,735	2,255	1,439	2,320	1,105	0	0	0	0	
84	Real estate	3,110	4,043	2,580	4,160	1,981	3,110	4,043	2,580	4,160	1,981	0	0	0	0	
85	Business services	8,437	10,967	6,999	11,284	5,373	8,437	10,967	6,999	11,284	5,373	0	0	0	0	
COMMUNITY, SOCIAL AND PERSONAL SERVICES																
91	Public administration and defense	133,493	170,765	110,974	205,397	97,808	133,493	170,765	110,974	205,397	97,808	0	0	0	0	
92	Sanitary and similar services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
93	Education services	2,286	2,972	1,897	3,058	1,456	2,286	2,972	1,897	3,058	1,456	0	0	0	0	
94	Medical, dental, other health and veterinary services	3,733	4,852	3,096	4,992	2,377	3,733	4,852	3,096	4,992	2,377	0	0	0	0	
95	Other social and related community services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
96	Recreational and cultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
97	Personal and household services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
98	Restaurants and hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
99	International organizations and other extra-territorial bodies	23,290	34,437	22,393	37,099	17,666	23,290	34,437	22,393	37,099	17,666	0	0	0	0	
III	Household sector	1,864,896	2,938,128	2,134,397	3,621,515	1,724,531	1,864,896	2,938,128	2,134,397	3,621,515	1,724,531	0	0	0	0	
NATURE	Nature sector											83,176	129,011	92,512	430,662	
TOTAL		4,310,820	7,621,427	5,101,709	9,421,267	4,486,318	4,227,644	7,492,416	5,002,197	8,994,605	4,281,241	83,176	129,011	92,512	430,662	

Notes:

1. Adjusted cost for new vehicles from Filing books (PSIC 14) & domestic marine (PSIC 713) was based on the cost of fuel reformulation.
2. Mobile Cycles: The cost of catalytic converter, fuel reformulation and inspection & maintenance were added and correspondingly applied to all entries.

	1991		1995		Factors	Technology	Cycles		
	1991	1995	1991	1995			1991	1992	1995
Technology	3,361	3,500	PSIC 71-21			Dual Carburetor	1,215	1,710	2,168
Catalytic converter (per vehicle)	3,098	3,928	PSIC 31-32, 33			Mechanical carburetor			469
Fuel reformulation (per vehicle)	1,562	1,727	PSIC 341, 351, 353 & 336, 339, 334, 355, 36		except 361, 37 & 38	Engine	265	370	469
Prandium Carburetor	508	1,151				ESP	265	370	469
Regular Carburetor	2,451	3,381	PSIC 363			High eff. ESP	150	490	621
Diesel			PSIC 411						
Inspection & maintenance (per inspection)	208.55	264							
Light vehicles	312.85	397							
Heavy vehicles									

4. The Auxiliary engines from PSIC 15 & 50 were not valued since there is no appropriate technology for such engines. While for PSIC 41, it is assumed that all power plants comply to the standards, hence, the value is equal to zero.

Appendix Table 33
 VALUE OF WASTE DISPOSAL SERVICES TO WATER: PHILIPPINES, 1988, 1992 and 1995

PSIC	Industry & Process	Pollution Control Tech. 1/	Total Abatement Cost (P '000)				
			1988	1992		1995	
			current	1988 prices	current	1988 prices	
AGRICULTURE, FORESTRY AND FISHERY			8,062,382	13,264,751	8,071,368	16,823,223	8,011,059
11	Agricultural crops production	1	2,567,893	4,252,430	2,567,893	5,392,081	2,567,658
111	Palay production						
112	Corn production						
113	Vegetable production						
114	Fruits and nuts (excluding coconut) production						
115	Coconut production including copra-making						
116	Sugarcane production						
117	Tobacco production						
118	Fiber crops production						
119	Agricultural crops production						
12	Livestock, poultry and other animal products		274,271	367,639	283,257	469,685	223,660
121	Livestock and livestock products	2	81,818	109,860	84,644	145,476	69,274
122	Poultry and poultry products	2	39,683	62,454	48,119	81,097	38,618
129	Raising of other animals, including feral products	2	152,770	195,326	150,494	243,112	115,768
13	Agricultural services						
130	Agricultural services						
14	Fishery		0	0	0	0	0
141	Ocean (off-shore) and coastal fishing						
142	Inland fishing						
143	Operation of fish farms						
149	Other fishery activities						
15	Forestry	1	5,220,218	8,644,682	5,220,218	10,961,457	5,219,741
151	Logging operations						
159	Other forestry activities						
16	Hunting, trapping and game operation						
160	Hunting, trapping and game operation						
MINING AND QUARRYING			3,664,066	4,743,652	2,864,524	6,015,443	2,864,497
21	Metallic ore mining	3	3,650,514	4,719,140	2,849,722	5,983,870	2,849,462
211	Gold ore mining		1,594,621	2,320,098	1,401,025	2,941,884	1,400,897
212	Other precious metal ore mining						
213	Copper ore mining		1,772,006	1,918,099	1,158,272	2,432,149	1,158,166
214	Nickel ore mining						
215	Chromite ore mining		21,608	46,610	22,146	59,102	28,144
216	Iron ore mining						
219	Other base metal ore mining		262,279	434,334	262,279	550,735	262,255
22	Non-metallic mining and quarrying	3	13,552	24,511	14,802	31,573	15,035
221	Coal mining		998	1,698	1,026	3,022	1,439
222	Crude petroleum and natural gas exploration and production						
223	Stone, quarrying, clay and sand pits		12,554	22,813	13,776	28,551	13,596
229	Other non-metallic mining and quarrying						
MANUFACTURING			252,728	294,957	256,490	407,837	194,208
31	Manufacture of food, beverage and tobacco		137,913	164,604	145,185	241,091	114,805
311-312	Food manufacturing	4	78,420	97,156	85,695	142,962	68,077
313	Beverage manufacturing	4	59,492	67,449	59,492	98,129	46,728
314	Tobacco manufacturing						
32	Textile, wearing apparel and leather industries		40,036	41,836	36,901	47,600	23,667
321	Textile manufacturing	4	33,678	33,957	29,952	40,848	19,451
322	Wearing apparel						
323-324	Manufacture of leather and leather products	4	6,358	7,879	6,949	6,752	3,215

PSIC	Industry & Process	Pollution Control Tech. 1/	Total Abatement Cost (P '000)				
			1988	1992		1995	
			current	1988 prices	current	1988 prices	
33	Manufacture of wood and wood products including furnitures and fixtures		4,727	1,992	1,757	2,159	1,028
331	Manufacture of wood and wood products	4	4,727	1,992	1,757	2,159	1,028
332	Manufacture and repair of furniture						
34	Manufacture of paper and paper products; printing and publishing		22,728	26,430	23,312	34,661	16,505
341	Manufacture of paper and allied products	4	22,728	26,430	23,312	34,661	16,505
342	Printing, publishing and allied industries						
35	Manufacture of chemicals and chemical products, petroleum, coal, rubber and plastic products		23,141	25,720	23,336	32,660	15,552
351,352 & 356	Manufacture of chemicals and plastic products	4	16,207	17,830	16,377	5,311	2,529
353)	Petroleum refineries	4	6,934	7,890	6,959	10,052	4,787
354)	Manufacture of miscellaneous products of petroleum and coal	4					
355	Manufacture of rubber products	4					
36	Manufacture of non-metallic mineral products		9,068	13,265	10,037	20,185	9,612
361	Manufacture of pottery, china and earthenware	5					
362	Manufacture of glass and glass products	5	3,039	4,356	3,295	6,388	3,042
363	Manufacture of cement	5	6,029	8,908	6,741	13,798	6,570
369	Manufacture of other non-metallic mineral products	5					
37	Basic metal industries		10,295	13,855	10,552	17,939	8,542
371)	Iron and steel basic industries	5	10,295	13,855	10,552	17,939	8,542
372)	Non-ferrous metal basic industries	5					
38	Manufacture of fabricated metal products, machineries and equipment		4,821	7,256	5,407	11,542	5,496
381	Manufacture of fabricated metal products	5	2,557	3,576	2,694	4,986	2,374
382	Manufacture of machinery except electrical	5	1,979	3,230	2,428	5,987	2,851
383	Manufacture of electrical machinery, etc.	5	285	449	285	570	271
384	Manufacture of transport eqpt.						
385	Manufacture of professional and scientific and measuring and controlling equipment						
386	Manufacture and repair of metal furnitures and fixtures						
39	Other manufacturing industries		0	0	0	0	0
390	Other manufacturing industries						
ELECTRICITY, GAS AND WATER			0	0	0	0	0
41	Electricity		0	0	0	0	0
411	Electricity generation and distribution	5	0	0	0	0	0
412	Electricity distribution to consumers						
42	Gas and steam		0	0	0	0	0
421	Gas manufacturing and distribution through systems						
422	Steam heat and power plants	5	0	0	0	0	0
43	Waterworks and supply		0	0	0	0	0
430	Waterworks and supply						
CONSTRUCTION			0	0	0	0	0
50	Construction		0	0	0	0	0
501	General building construction						
502	gen. engineering construction						
503	Special trade construction						
WHOLESALE AND RETAIL TRADE			0	0	0	0	0
61	Wholesale trade		0	0	0	0	0
618	Petroleum and petroleum products, wholesaling	6					
62	Retail trade		0	0	0	0	0
628	Petroleum and petroleum products, retailing	6					

PSIC	Industry & Process	Pollution Control Tech. 1/	Total Abatement Cost (P '000)					
			1988		1992		1995	
			current	1988 prices	current	1988 prices	current	1988 prices
TRANSPORTATION, STORAGE AND COMMUNICATIONS			0	0	0	0	0	
71	Transportation services		0	0	0	0	0	
711	Railway transport							
712	Road passenger transport							
713	Water transport							
714	Air transport							
719	Services allied to transport							
72	Storage and warehousing		0	0	0	0	0	
720	Storage and warehousing							
73	Communication							
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES			0	0	0	0	0	
81	Banking institution							
82	Financial intermediaries							
83	Insurance							
84	Real estate							
85	Business services							
COMMUNITY, SOCIAL AND PERSONAL SERVICES			2,866,373	2,843,742	2,190,972	2,507,784	1,194,183	
91	Public administration and defense	7	2,865,954	2,843,119	2,190,553	2,507,784	1,194,183	
92	Sanitary and similar services							
93	Education services							
94	Medical, dental, other health and veterinary services	8						
95	Other social and related community services							
96	Recreational and cultural services							
97	Personal and household services	5	419	623	419	0	0	
98	Restaurants and hotels	8						
99	International organizations and other extra-territorial bodies							
HH	HOUSEHOLD SECTOR	8	7,427,504	12,644,709	6,895,798	23,742,308	11,305,861	
NATURE NATURE SECTOR								
TOTAL			22,273,053	33,791,812	20,179,153	49,496,596	23,569,807	

Legend for pollution control technology:

- 1 - erosion control measures
- 2 - anaerobic facultative pond
- 3 - tailings pond
- 4 - activated sludge
- 5 - chemical treatment
- 6 - oil/water separator
- 7 - primary treatment
- 8 - septic tank