在外プロジェクト形成調査

都市環境・産業公害状況調査

（マニラ首都圏）

―概　　要―

平　成　8　年　1　月　(調査期間 1995.12月～1996.1月)

フィリピン事務所

１．はじめに

この「在外プロジェクト形成調査－都市環境・産業公害状況調査」は、フィリピン国マニラ首都圏における大気汚染、水汚染及び固形廃棄物（有害物質を含む）の現在の状況の理解を深めるために実施された。本調査では加えて、政府各機関による産業公害政策、法規制等の現状を明確にし、並びにマニラ首都圏にて実施されている或は実施される予定の各種プロジェクトについても調査を行った。

調査地域

調査対象地域であるマニラ首都圏は、ルソン島中央部マニラ湾東岸に位置する面積６３６平方ｋｍ、人口約８００万人、人口密度１２，４６５人／ｋｍ² の比国随一の大都市である。首都圏内を３つの主要河川（パッシグーマリキナ川、ナボタスーマラボン川及びバラニャケーザポテ川）が流れている。通常はマニラ南部にあるラグナ湖（面積アセアン１位）からこれらの内パッシグ川を通じマニラ湾に水は注ぐが、乾季になるとマニラ湾海水面の変移により、河川水は逆にラグナ湖に注ぐ。マニラ首都圏は１７の市町からなり、首都圏行政は" マニラ首都圏庁が担っている。マニラ首都圏は現在、世界の都市の中でも経済的に発展著しく、同時に急増するスラム、不法居住者問題をも抱えている。都市の発展に付随した人口の急激な増加（人口増加率２％）は、都市社会インフラの未整備に伴い、都市住民の間に肺炎、気管支炎、ガン等の疾病罹患率を押し上げている。

２．都市環境現況及び将来状況

大気

大気汚染の主要な原因は大気中に放出される「微粒子」、「炭酸化物（ＣＯ）」「硫黄酸化物（ＳＯｘ）」、「窒素酸化物（ＮＯｘ）」及び「有機ガス」である。これらは「自動車」、「工場」、「建設現場」及び「航空機」等を主な発生源とし

ている。

マニラ首都圏では特に自動車が大気中の全有機ガスの９４％、ＮＯｘの83%の発生源であり、残りは主に工場が発生源となっている。また、ＳＯｘの７６％が火力発電所、１６％をディーゼルエンジン車が発生源となっている。この様にマニラ首都圏では、自動車が大気汚染の最大の発生源となっている。

環境天然資源省による首都圏内での大気汚染状況調査では、大気中放出物の数値はその許容範囲値をしばしば超過する。

昨今の経済成長に伴い自動車及び工場は飛躍的に増加しているものの、それらに起因する環境汚染に対する国の対策は満足に行われていない。

首都圏における大気放出物による公害は、2,００５年までには現在の２倍の程度にまで達するであろう。

水

「下水」、「沈殿物」、「重金属」、「有害化学物質」及び「殺虫剤」等がマニラ首都圏における代表的な水質汚染の原因となるものである。

首都圏内主要河川の汚染は、その大多数が家庭からの排水によるものである。その他の原因は工場関連施設からの排水による。特に、食品加工工場、屠殺場、飲料品製造工場及び衣料品製造工場水が最も汚染に繋る排水を行なっている。

主要河川ＢＯＤレベルは最高４０－１２０mg/l、最低０ｍｇ／１であり、雨期になるとこの数値は更に悪化する。首都圏内の主要河川は既に「生物学的には死んでいる河川」と判断されている。

首都圏南部に位置するラグナ湖は、首都圏に水を供給する主要な湖であるが、湖周辺に建設された工業団地等により周辺に工場が多数建設され、湖水自体の汚染も進んでいる。

また、マニラ湾の水質は家庭排水、工場排水及び農業排水の流入によって、既に溶解酸素濃度は３mg/lから８mg/lであり魚介類の生存に問題を生じている。更に、海水中に溶けている重金属は貝類（むらさき貝及びカキ等）に蓄積し、許容規準値を越える状況となっている。

固形廃棄物

首都圏における固形廃棄物問題は他のアジア諸国と大差は無い。固形廃棄物の発生要因は、住居（５０％）、道路（２０％）、マーケット（１３％）、各種工場（１２％）及び公共機関（５％）となっている。

８００万人の人口を抱えるマニラ首都圏は一日に５，０００から５，４００トンのゴミが発生しており、これに付随し多くの問題を発生させている。首都圏内は狭い道路があちこちに存在し、これがためにゴミ収集車が侵入し回収作業が行なえず結果、道路や空き地、側溝等にゴミが放置されることになる。これら収集されないゴミの蓄積は害獣や疫病の温床となる。また、雨期に頻繁に起こる洪水の原因の一つはこういった放置ゴミが側溝の機能を停止することにより起こる。

現存のゴミ埋立て場は既に許容能力を超えており、新しい埋立場の設置が急がれている。

ゴミ埋立場の処理能力、ゴミ集積所、収集車及びマンパワー等に係る諸問題が改善されない限り、首都圏におけるゴミ（固形廃棄物）問題は現況より悪化しこそはすれ、決して良化しない。

２，０００年には６，０００トン／日のゴミ発生が予想されている現在、首都圏におけるゴミ処理問題に対する包括的解決策策定が早急に望まれる。

有害・危険物質

有害・危険物質は処理方法により次の様に分類される。

①酸性、アルカリ性物質－これらは中和することにより処理される。

②重金属－これらは化学及び物理学的に処理され、埋め立てられる。

③溶解、炭化水素水－これらは再利用或は焼却処理される。

④特定疾病の感染恐れのある物質－これらは焼却され埋め立て処理される。

⑤処理困難な物質（ダイオキシン、核物質等）－これらは高度特殊技術により処理されるか、或は現在のところ確立した処理方法は存在しない。

比国では、現在のところこれら有害・危険物質に対する厳格な取扱規制の適用及び効果的な処理方法が欠落しており、ゴミ回収業者及びスカベンジャー達は常に

危険に直面している。

これら有害・危険物質に対する化学的処理方法の早急な確立が望まれている。

3．政府機関の環境問題に対する取組み及び能力

比国政府並びに民間セクターは首都圏における環境問題に対する役割を演じている。しかし、環境問題解決を確実に図るためには、各政府機関がどれくらいキャパシティと能力を保持しているか明らかにする必要がある。

１９９１年に施行されたLocal Government Cord(LGC ：地方自治体法）により、環境問題に対する施策責任の大部分が地方自治体に移管された。それまでは、環境施策は中央政府各機関が担っていたが、現在は地方自治体の担う役割が大幅に拡大されている。しかしこれがかえって深刻な問題を引き起こしているとも言える。

〈中央レベル政府機関〉

1）Department od Environment and Natural Resources(DENR: 環境天然資源省）

環境天然資源省は環境保護と公害制御に関する政策、ガイドラインを策定、実施する官庁である。主要な開発プロジェクトが環境ガイドラインに準拠しているかを審査している。

同省には、Environmental Management Bureau(EMB:環境管理局）という部局があり、効果的な環境保護プログラムの開発実施を担っている。また、主要な開発プロジェクトが実施されるにあたっては事前に承認されねばならないEnvironmental Compliance Certificate(ECC) の審査を実質的に行なっている部局である。

2）Pollution Adjudication Board(PAB)

ＰＡＢは産業公害制御のための実施母体である。民間工場が環境基準を超えて操

業していることが発覚した場合、それらを取り締まり操業停止せしめる権限を持つ。

3）Department of the Interior and Local Government(DILG: 内務自治省)

内務自治省は、地方自治体の行政サービス（環境関連含む）の向上強化を図る役目を担っている。１９９１年の地方自治体法施行以来、地方自治体に対し中央政府から種々の権限が委譲されており、地方自治体にはそれに伴い各種事業実施の責任が生じており、内務自治省の役目も確実に拡大している。

しかし、性急な地方自治体への権限委譲を実施したため、能力不足（大多数の地方自治体）から各種行政サービスの混乱、不効率化を招いていることも事実である

4）Department od Trade and Industry(DTI: 貿易工業省)

貿易工業省は自国産業の育成・プロモートを担っており、その傘下にBoard of Investment(BOI: 投資委員会）を擁している。ＢＯＩは民間セクターに対するライセンス付与を行っており、環境配慮の事業計画を推進している。そのためＢＯＩのインセンティブを受け取るため民間セクターは以前に増して環境に配慮した事業計画を実施しなければならない。

5）Department of Public Works and Highways(DPWH: 公共事業道路省)

ＤＰＷＨは国家社会経済インフラ（道路、公共建物、下水設備等）の整備を担っている。特に環境においては、固形廃棄物処理問題に係り、首都圏のゴミ収集配送設備及び埋め立て地域の設計、建設を行う。

6）National Economic and Development autholity(NEDA: 国家経済開発庁)

ＮＥＤＡはフィリピンの国家経済開発計画を策定・調整する機関である。また、同時に先進国援助の窓口機関でもある。フィリピン国内の自然及び都市環境と調和した経済開発を実施することを念頭に置き、ＤＥＮＲの所管するＥＣＣに抵触しな

いようなプロジェクトを策定し実施している。

7) Department of Helth(DOH:保健省)

ＤＯＨは国家保健政策、保健行政を取りしきる機関である。特に環境面においては、水供給・衛生整備事業を都市部のみならず地方を含めた全国レベルで推進している。また、病院から排出される使用済み注射器といった伝染性危険物の処理に関しする事業を行っている。

8) Department of Transportation and Comunication(DOTC: 運輸通信省)

ＤＯＴＣ傘下のLand Transportation Office(LTO: 陸運局) では車検制度の実施推進を行い、排ガス規制による車両の取り締まり強化を行っている。

9) Department of Education,Culture and Sports(DECS:教育文化スポーツ省)

環境教育の実施推進を行っている。

<地方レベル機関>

1) Metro Manira Development Authority(MMDA:マニラ首都圏庁)

マニラ首都圏における行政主体。国と首都圏内の17の市町間の調整を行う。首都圏内の市街地整備、衛生整備、ゴミ処理等を実施している。

2) Laguna Lake Development Authority(LLDA: ラグナ湖開発庁)

ＬＬＤＡはラグナ湖の開発を調整する国家機関。同湖に係る環境規制について独自の裁量権を保持するが、ＭＭＤＡ及びＤＥＮＲが保持する権限とオーバーラップする部分がある。

3) Metropolitan Waterworks and Sewerage System(MWSS: 首都圏上下水道庁)

首都圏内の上水道供給及び下水処理を司る。また、民間上下水道の敷設許可、規制を行う。

4) DENR-National Capital Region

首都圏におけるＤＥＮＲの地方事務所。首都圏内における環境の規制強化、推進を行う。

〈先進国環境関連援助〉

下記の国、国際機関が環境関連プロジェクトを実施している。

①ＷＯＲＬＤ　ＢＡＮＫ

②ＡＳＩＡ　ＤＥＶＥＬＯＰＭＥＮＴ　ＢＡＮＫ

③DANISH INTERNATIONAL DEVELOPMENT AGENCY

④THE UNITED NATIONS DEVELOPMENT PROGRAMME

⑤THE UNITED STATES AGENCY FOR INTENATIONAL DEVELOPMENT

⑥THE EUROPEAN ECONOMIC COMMUNITY

４．首都圏における環境政策、法令及び管理行政

既に都市環境・産業公害に係る法令、規制は数々制定されている。しかし、十分な効果が発現されていないのが現状である。法令・規制の制定とそれを実施することのギャップが甚だしい。政府機関の人材不足、環境モニタリング機材及び公害抑制機材の不足、並びに環境保全の重要性についての国民意識の低さ等がその理由として上げられる。当然の結果、包括的長期的環境モニタリング政策の欠如により現存する都市環境法令（大気、水、廃棄物）の効果的施行は妨げられている。

現行の法令及び規制

大気及び水質に関する法令、規制はそれらを司る各機関（ＤＥＮＲ、ＭＷＳＳ、ＬＬＤＡ等）によって制定されている。

固形廃棄物に関しては、Sanitation Cord(PD 856) によって定められている。

また、有害危険物質に関しては、Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990(RA 6969) によって規制が定められている。

政策戦略

比国政府は、閣議決定第３７号（the Philippin Strategy for Sustainable Development)のなかで、経済開発と環境保全は両立するとのべており、これに従い首都圏の開発は環境に十分に配慮した形で進められることとなっている。

また、これに加え、the Environmental Management Strategy を策定し、首都圏における環境保全の推進に勤めることとなっている。この戦略に含まれるものは、水質管理、固形廃棄物処理、大気管理、土地利用、洪水制御、有害危険物質管理、スラム及び不法居住者対策、組織強化である。

マニラ首都圏環境保全・向上主要プロジェクト

以下が過去首都圏にて実施されてきた環境関連プロジェクトである。（※は実施中の）

1) Metropolitan Manila Region Environmental Improvement Study (MMREIS)
2) Metropolitan Environment Improvement Program
3) ASEAN Environmental Improvement Project (AEIP)
4) Industrial Efficiency and Pollution Control Study
5) Waste Minimization/Cleaner Technologies for Industries
6) Industrial Waste Exchange Project

7) Industrial Environmental Management Project
8) Industrial Restructuring Program - Environmental Management Program
9) Vehicle Emissions Control Planning in Metro Manila
10) Urban Air Quality Management Project
11) Energy Sector Loan: Environmental Component
12) Economic Incentives to Promote Water Pollution Prevention and Abatement
13) Common and Individual Wastewater Treatment Facilities Study
14) Pasig River Rehabilitation Program
15) Save Our Lake Program
16) Navotas-Malabon-Tullahan-Tenejeros (NMTT) River Revival Program
17) Metro Manila Solid Waste Management Study
18) Waste-To-Energy Project
19) Smokey Mountain Project
20) Toxic and Hazardous Waste Management Study
21) Metro Manila Hospital Waste Incinerator Project

5. 環境マネージメントにおける問題

首都圏における環境マネージメントに関する問題は①天然資源（大気、水、土地）の保全、効果的利用及び②制度強化、の２点において生じている。これらに対し①種々の天然資源の持続可能的管理及び②効果的環境モニタリングの実施及び環境関連法令、規制の強制執行が望まれる。

天然資源（大気、水、土地）の持続的確保

天然資源を持続可能的に利用できるように確保するためには、以下の方策が考えられる。

①エコロジー的に貴重な地域の保全

②効果的な水質保全への投資

③土地開発、運輸ネットワーク管理

④固形廃棄物処理管理方法の確立

⑤自然災害防止

効果的環境モニタリングの実施及び環境関連法令、規制の執行

大気、水質に関する定期的モニタリングを通じ、環境データベースの確保向上に努めるべきであろう。現行においては、必要とされる機材の不足から、政府は法令が順守されているかどうかさえ見極めることが困難な状況にある。

このような状況を打開するためには、政府は現在以上に環境問題に予算を計上し、環境に係る諸機関と調整を行い、法令、規制の執行を十分に図らねばならない。

環境に係る政府、地方自治体の取り組み

中央政府及び地方自治体は、今後環境問題に対し取り組むにあたり、これまで以上に特に下記の点につき真剣に配慮せねばならない。

①モニタリングシステム、データベースの向上。

②産業誘致を含めた環境保全を念頭に置いた土地計画策定。

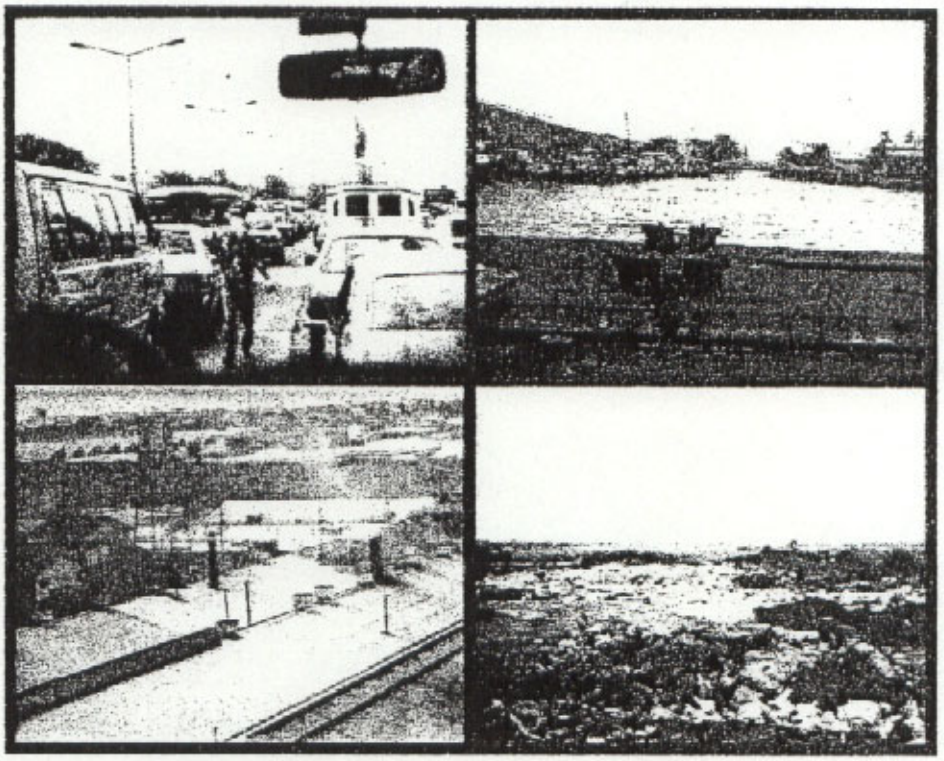
③現行の環境法令、規制の強制執行のための組織力強化。

④人材の育成。

⑤産業公害防止を促進するための、特に中小企業に対する技術支援。

JAPAN INTERNATIONAL COOPERATION AGENCY

URBAN ENVIRONMENTAL POLLUTION STUDY



FINAL REPORT

JANUARY 1996

CEST, INC.
Manila, Philippines

JAPAN INTERNATIONAL COOPERATION AGENCY

URBAN ENVIRONMENTAL POLLUTION STUDY

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URBAN ENVIRONMENTAL POLLUTION STUDY

FINAL REPORT

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EXECUTIVE SUMMARY

1. General

Most pollution is the result of wastes being introduced into environmental systems in greater concentrations than such systems can absorb. It is urbanization, produced by and combined with industrialization, that has created the excessive concentration of wastes. Among the cities in the Philippines, Metro Manila is the most affected by the problems of air and water pollution as well as solid and toxic/hazardous wastes disposal.

As such, Government concern has been expressed mainly through the regulation and control of various sources of pollution so as to attain an environmental quality that is conducive to a life of dignity and well-being of its population.

The Urban Environmental Pollution Study aims to provide a clear understanding of the situation of urban and industrial environmental pollution in Metro Manila, specifically, air pollution, water pollution, and solid waste (including hazardous waste). This study will cover the impact and/or effects or related policies, laws and regulations formulated by the national government as well as the administrative framework the government agencies/offices function. The study will also identify on-going and proposed programs/projects for urban and industrial environmental pollution in Metro Manila. It will provide specific information for JICA for the purpose of formulating future JICA assisted projects in the said sector.

The Study Area

Metro Manila Area (MMA) otherwise called the National Capital Region (NCR) is located along the east coast of Manila Bay. It has a total land area of 636sqkm. It is composed of 17 separate local government units (LGUs). These are the 7 cities of Manila, Caloocan, Pasay, Quezon, Mandaluyong, Makati and Pasig and the 10 municipalities of Las Piñas, Malabon, Marikina, Muntinlupa, Navotas, Paranaque,

Pateros, San Juan, Taguig and Valenzuela. With a total population of almost 8 million, it has a high density of 12,465 persons per sqkm compared to the country's density of only 202 persons/sqkm. The MMA is considered as the most highly urbanized area of the country.

Metro Manila is within the area classified as Type I of the Philippine climate with two pronounced seasons; dry from December to May and wet from June to November. It has 3 main geologic formations: the Coastal Margin, the Guadalupe Plateau and the Marikina Valley. There are 3 identified main river systems in MMA: 1) the Pasig-Marikina-San Juan River System; 2) the Navotas-Malabon-Tenejeros-Tullahan (NMTT) River System; and the 3) the Paranaque-Zapote River System. These river systems generally flow westward and finally drain into Manila Bay. However, during the dry season when the high tide in Manila Bay corresponds to a low water level in Laguna de Bay, the Pasig River reverses its flow and discharges via the Napindan River into the Laguna de Bay. Laguna de Bay is a freshwater lake located southeast of the MMA which serves as a natural detention reservoir for discharges from the nearby watercourses. The outlet of the lake is through the Napindan and Pasig Rivers to Manila Bay.

The pattern of land use development in MMA is characterized by older, higher density areas mostly located close to established commercial areas. Newer residential areas are located along commercial major transport routes, and in the vicinity of new commercial areas. Slums and squatter settlements proliferate in the more densely populated downtown areas and in larger lower density peripheral locations. Secondary concentrations are located to the north in Region III and south in Region IV, as well as along the main transport arteries.

The general land use trends have been and will continue along with rapid population growth and industrial development. These trends are: 1) rapid emergence and densification of a multi-nodal urban spine on the Plateau; 2) significant densification along a corridor north of Manila; 3) rapid land conversion and development activity

in the south; 4) incipient land conversion and development north of Quezon City; 5) densification and mixed land use development of old residential areas east of Manila; 6) conversion of land use and development activities in the Marikina Valley; 7) emergence of high rise buildings along Manila Bay; and 8) industrial expansion to the north, south and east.

A variable population growth rate had been experienced since the last 5 census years. From the 1990 Census of Population by NSO, MMA has a total population of 7.93 million. The NSO medium range projection indicates that the population will increase at a rate of 2% between 1990 and 2000. The estimated population for years 1995 is taken at 11.15 million and 12.96 million in 2000. The number one cause of morbidity was pneumonia, a respiratory disease followed by diarrhea, a water-borne/water-washed disease and bronchitis, another respiratory disease. For mortality, the number one cause was also pneumonia, followed by vascular diseases and cancer.

The MMA can be considered as the country's major center of economic, political and commercial activities. It accounts for about 3.5% of the total Gross Domestic Project (GDP) of the country and GDP per capita in NCR is double that of the GDP per capita for the total Philippines. As to economic activities, service and industry-related activities have the dominant share.

2. Current Environmental Quality and Future Condition

Air Quality

Primary sources of emissions in Metro Manila come from the large number of motorized vehicles serving the transport needs and the industrial installations. The level of emissions, principally particulate matters (PM), consistently exceed concentrations above which health effects were identified. Findings from recent studies on health effects related to emission exposure indicated that chronic

respiratory illnesses and symptoms were found to occur twice as frequently among jeepney drivers as among commuters.

Air pollutants consist of particulate matter (PM), carbon monoxides (CO), sulfur oxides (SOx), nitrogen oxides (Nox) and organic gases. Sources can either be mobile (motor vehicles), stationary (industrial plants), or area sources (dispersed sources like paved road travel, road and building construction, adhesives and sealants, commercial aircraft, etc.).

Motorized transport in Metro Manila accounts for the large fraction of total airborne pollutants consisting about 94% of total organic gas (TOG), 99% of CO, and 83% of NOx emissions, while the remaining comes from industrial installations, utilities and windblown/resuspended dust.

Air quality measurements undertaken by NCR-DENR in different monitoring stations showed levels occasionally exceeding acceptable standards for total suspended particle. Concentrations of sulfur dioxide had not exceeded the national ambient standards.

Mobile sources are found to be the leading source of pollutants. This is primarily due to the obsolete features of automotive engines running a large number of vehicles. Utility vehicles powered by gasoline are the leading source of total organic gas and carbon monoxide. Nitrous oxide emissions are highest on diesel-fed trucks while sulfur oxide is mostly emitted by diesel-fueled utility vehicles. Gas powered cars are chiefly responsible for lead emissions while diesel powered utility vehicles are leading contributors of particulate matter loadings.

Industries that require combustion in processing are common sources of fly ash, carbon monoxide and nitrogen oxides. It is estimated that out of 103,800 tons of SOx in 1990, 76% came from power plants, 8% from the industry and the remaining 16% from the transportation sector (mainly diesel powered). Of the

19,185 tons particulate emissions in 1990, 29% was attributed to power plants, 8% to industry and 63% to vehicles of all types. Power plants and overall industry have 11% and 2% share of NOx emissions respectively, with the rest of the loading coming from the transport sector. Generally, industries, services and power sectors are generating most of the total NOx, SOx, and PM.. Food and kindred manufacturing emit a large portion of total organic gas while paper and allied products are contributing most of CO pollutants.

"Smokestack industries" proliferate in the metropolis while pollution control actions have rarely been directed to curb their pollutive activities. Components for new factories that are brought into the country rarely, if ever pass through an emission test to establish its fitness to operate in an environmentally acceptable standards.

The total Metro Manila area projected emissions and trends show that pollution may increase twice as much as the current levels by year 2005. Also, particulate matters and lead emissions which are highly correlated to vehicular number are estimated to increase. Sulfur dioxide, nitrous oxide and carbon monoxide are still not considered critical but may double by the year 2010.

Water Quality

Sewage, sediments, pesticides, heavy metals and toxic chemicals are the major types of pollutants in the waterbodies of Metro Manila.

More than half of the organic pollution load in the main river systems of the metropolis is domestic in origin. These are discharges from households that find their way to the river systems draining the study area. The BOD levels in MMA's major river systems range from a high (40-120 mg/l) to a low 0 mg/l in Dario Creek, a tributary of San Juan and Pasig rivers during the dry season. During the wet season, BOD levels improve slightly (20 60 mg/l, highest and 0 mg/l, lowest).

During this season, only Montalban River exhibits levels below the standard set by the DENR for Class C waters.

It is estimated that about 38% of BOD loading in the entire Metro Manila is industry-related. This loading finds its way either towards Laguna Lake or Manila Bay areas. Food processing is found to be most pollutive followed by piggeries, beverage production and textile manufacturing.

Except for the headwaters of Marikina River, all the tributaries of these rivers do not support any form of aquatic life due to low levels of dissolved oxygen. The rivers are already considered as biologically dead. Considered worst of all systems is the NMTT since it now functions as a receiving basin to domestic and industrial wastes for residential settlements, and commercial and industrial establishments situated in the adjacent area of the river system.

Laguna de Bay is a major body of water in close proximity to Metropolitan Manila making it a major catchment area of both domestic and industrial wastewaters as well as to some extent solid waste.

The coastal waters of Manila Bay fail to meet the criteria for swimming and fishing because of the discharge of domestic, industrial and agricultural wastes. Dissolved oxygen concentration ranges from a low 3 mg/L at the bottom to a high 8.5 mg/L at the surface. Low concentrations can be attributed to high organic decomposition and decaying processes taking place. High ammonia levels are also present specifically adjoining the mouth of the Pasig River, which is an indication of eutrophication.

Heavy metal concentrations in shellfish gathered from the Bay were found to be of concern as concentration levels in mussels and oysters were reported to have exceeded acceptable standards. Also, oils and slicks coming from harbor and

shipping operations have contributed to the deterioration of the marine environment.

Solid Waste

Solid waste problem in Metropolitan Manila is no different from any metropolis in Asia. City/municipal administrators are now trying to reach for solutions to mounting refuse and its proper disposal given the meager financial and human resources allocated to address this concern. To complicate matters, the overall responsibility of solid waste management has been delegated to the local government units whose expertise and resources to handle such function is still insufficient.

The primary sources of solid waste in Metro Manila are residential areas (50%), roads (20%), wet markets (13%), commercial and industrial firms (12%) and institutions (5%).

Metro Manila, with an estimated population of about 8.8 million, generates garbage at the rate of 5,000 to 5,400 tons per day. There are a number of problems that beset this sector. Private contractors tasked to do the collection are usually ill-equipped and inefficient to handle the frequency and volume of collections. Due to narrow streets; garbage collection trucks cannot serve squatter settlements and residents therefore have to dump their refuse in either vacant lots, roadways, creeks or other waterways. Accumulation of uncollected garbage or indiscriminately dumped refuse causes vermins and other disease vectors to thrive well. Existing sanitary landfills do not have the flexibility to accommodate garbage beyond their capacity and therefore the metropolitan Government is now under pressure to locate and develop additional sites for disposal. Flooding of city streets is also related to improperly disposed garbage finding their way to the drainage system. Problems of this nature are more pronounced in areas not adequately served by collection trucks.

It is expected that the refuse situation may worsen if current resources (capacity of landfill, location and number of transfer stations, vehicles, equipment and manpower, etc.) allocated to solid waste management and institutional set-ups are maintained at the present levels. The estimated generation of solid waste for year 2000 is 6,000 tons per day.

Toxic and Hazardous Wastes

Toxic and hazardous substances can be classified by treatment type as follows: 1) acid and alkali wastes, which are treated by neutralization; 2) heavy metals which can be chemically treated and physically separated (e.g. as hydroxide precipitates) then placed in secured landfill; 3) solvents and hydrocarbon liquids, which can be recovered/reused or incinerated; 4) infectious waste which can be treated by disinfection, incineration and/or landfilling; and 5) intractable wastes which require highly specialized destruction techniques, or for which there is no method, e.g., dioxins, asbestos, and nuclear wastes.

There is still a dearth of information on the extent of toxic and hazardous substances being discharged from the different sources. At present, there is an on-going study on the inventory of these substances.

In the absence of any effective treatment process for toxic and hazardous wastes, recyclers or scavengers are faced with danger by coming in contact with these substances. When there are toxic wastes or dangerous substances present in the waste being disposed, a scientific and sophisticated treatment process prior to disposal is required.

3. Institutional Arrangements and Capacity For Environmental Management

Under the current institutional arrangement, both the government and the private sector play major roles in the environmental management of MMA. To ensure success in achieving the objectives and functions established for these institutions, their capacities and capabilities as well as their relationship and linkages with each other is discussed.

Meanwhile, this arrangement should take into account the Local Government Code (LGC) of 1991 which has essentially redefined the role of various central and local institutions in the delivery and implementation of some environmental areas of concern. The responsibility for environmental management functions were basically lodged with various national agencies. The new direction mandates the Local Government Units (LGUs) to play a larger role in the implementation of environmental programs/projects. This raises serious institutional capacity and resource reallocation issues.

Agencies at the National Level

The agencies involved at the national level are:

1) Department of Environment and Natural Resources

It formulates and enforces policies and guidelines for environmental protection and pollution control. It checks compliance of major projects with environmental guidelines. DENR has specialized agency and corporation attached as part of its function. The National Mapping and Resources Information Agency (NAMRIA) and National Resources Development Corporation (NRDC) are two main entities with functions relative to urban and environmental management.

2) Environmental Management Bureau

The Environmental Management Bureau (EMB), a staff bureau of DENR is responsible in developing strategies and programs for effective environmental protection and management. It is also tasked to formulate environmental policies/programs and actions utilizing tools like the Environmental Impact Assessment/Statement System (EIA/SS) and the Environmental Compliance Certificate (ECC).

3) Pollution Adjudication Board

The PAB is the primary enforcement body for industrial pollution control. It has the authority to issue cease and desist orders to industries found in violation of their discharge permits without the need for lengthy court procedures. This authority is only exercised in cases where major violations of environmental standards or permit conditions are found.

4) Department Of the Interior And Local Government

The Department of the Interior and Local Government (DILG) has the mandate of strengthening local capacity for delivery of basic services, including environmental management and protection. It is responsible for promoting legislation to assist Local Government Units (LGUs) and formulate plans, policies, programs, and projects that will develop the capabilities of the local government offices and personnel. The DILG also monitors, supervises and assists the LGUs in their operations. With the implementation of the Local Government Code, it has a critical role in monitoring the transfer of responsibilities (such as land use planning and pollution control) from the national government agencies to the LGUs.

5) Department of Trade and Industry

The Department of Trade and Industry (DTI) is charged with the promotion of local industrial development. Under this is the Board of Investment (BOI), the primary licensing agency for all private sector organization. The BOI has started integrating environmental concerns into its programming and planning. It now requires companies that will undertake an environmenatlly critical project or will locate in an environmentally critical areas to secure an ECC from EMB as one of the requirements for BOI registration which is necessary to avail of some incentives. It is also responsible for regulating the importation of second hand engines because of its impact on the air pollution problem in Metro Manila area.

6) Department Of Public Works And Highways

The Department of Public Works and Highways (DPWH) is responsible for the development of the country's infrastructure such as road and highway construction, drainage and flood control systems, public buildings construction (including markets and slaughterhouses), municipal fishing ports, sewerage and other public infrastructure. At the direction of the Presidential Task Force on Solid Waste Management, DPWH is also charged with the responsibility for the design and construction of solid waste transfer stations and sanitary landfills for Metropolitan Manila.

7) National Economic And Development Authority

The National Economic and Development Authority (NEDA) serves as the principal agency for economic planning in the Philippines. It serves as the lead agency with respect to acquisition and negotiation of foreign development assistance (both grants and loans) and has approval over all

such assistance extended to government agencies. Sustainable development concept is already integrated into NEDA's criteria in its review and evaluation of major capital projects prior to implementation. This is operationalized by requiring critical projects to obtain an ECC from EMB-DENR before it is cleared.

8) Department Of Health

The Department of Health (DOH) is the principal health policy-making and implementing agency. Among others, it is tasked with the improvement of the environmental sanitation conditions to make it more conducive to promotion and maintenance of the health of the populace. Some of its priority program components include water supply and sanitation (water treatment and disinfection, quality monitoring surveillance), excreta and sewage disposal, and wastewater collection and disposal. Also, DOH is charged with the responsibility of developing and implementing a plan for management of toxic and infectious wastes from hospitals.

Other agencies are: the Department of Transportation and Communications through the Land Transportation Office, an attached agency, is responsible for the registration and licensing of motor vehicles and their operators. The office requires that motor vehicles be inspected to determine their roadworthiness as a prerequisite to registration. It also operates a vehicle inspection station in Metro Manila for this purpose, including the enforcement of anti-smoke belching laws. The Department of Education, Culture and Sports is involved in the development of an environmental education curriculum and in the introduction of textbooks that strenghen the environmental values of students.

The Philippine Coast Guard is responsible for the enforcement of marine pollution regulations, including oil spill response and contingency planning (in conjunction

with EMB). The National Water Resources Board coordinates the overall policy framework for water resources development and management. It also deals with water rights issues. The Housing and Land Use Regulatory Board is the primary government agency responsible for physical planning, zoning and related regulatory matters, such as permitting industrial and housing estates.

Agencies at theLocal Level

The agencies involved at the local level are:

1) Metro Manila Development Authority/Local Governments Units

MMDA coordinates activities between the national government and the LGUs of the defined region. It also coordinates the delivery of basic urban services in Metro Manila including land use planning and zoning, public safety, sanitation and waste management.

2) Laguna Lake Development Authority

The Laguna Lake Development Authority (LLDA) is an organization of the national government but its jurisdiction is localized. It has the exclusive jurisdiction over the Laguna de Bay region and other bodies of water within the lake basin. There are however, considerable overlaps in jurisdiction from MMDA and DENR-NCR. LLDA is responsible for a wide range of activities: promotion of industrial development; regulation of land use and other activities; protection of water quality of Laguna de Bay; enforcement of environmental quality and regulations and standards; and coordination with other governmental agencies with regard to the needs of the area.

3) Metropolitan Waterworks and Sewerage System

The Metropolitan Waterworks and Sewerage System (MWSS) is responsible for providing potable water supply and sewerage needs of Metropolitan Manila and its contiguous area. It is also responsible for the approval and the regulation of the establishment of waterworks and sewerage systems in private subdivisions within its jurisdiction The MWSS is mandated to adopt measures that prevent environmental pollution and enhance the conservation, development and maximum utilization of natural resources but is only limited to the handling of sewerage system.

4) DENR-NCR

The DENR Regional Office of the National Capital Region (NCR) has jurisdiction over the Metro Manila area. The Regional Technical Director for Environment Management and Protected Areas Sector (EMPAS) and the CENRO are responsible for the enforcement of pollution control laws (except areas under the jurisdiction of the LLDA). The function of monitoring air and water quality is with EMPAS, while plant/firm-specific monitoring and inspections are handled by the CENRO.

Private Sector

Private sector involvement in urban and industrial environmental management includes: a) industrial firms; and b) private voluntary organizations (PVOs)/non-government organizations (NGOs). Each of these entities plays a vital role in improving the urban and industrial environmental.

External Support Agencies

Multilateral and bilateral agencies currently support programs and projects on environmental management in MMA. The World Bank (WB) provides support to 5 projects/studies. These are: 1) Economic Incentives to Promote Water Pollution: Prevention and Abatement; 2) Industrial Common Treatment Facilities and Waste Abatement for Individual Enterprises; 3) Industrial Waste Exchange Program; 4) Environmental Component of the Energy Sector Loan; and 5) Manila Second Sewerage Project. The first 3 projects/studies are funded by the Japan Grant Fund. This Fund is being administered by the WB. The Asian Development Bank (ABD) provides funds for the Metropolitan Manila Region Environmental Improvement Study (MMREIS). Other institutions include: the Danish International Development Agency, the United Nations Development Programme, the United States Agency for International Development and the European Economic Community.

4. Policies And Regulations And Current Environmental Management Programs For Metro Manila

There are various laws and regulations that address urban environment management in the country. Air quality, water quality, solid and toxic waste management and land use laws and regulations provide a mechanism to prevent and control the major sources of environmental pollution. However, the effects that are expected as a result of the enactment of these laws and regulations are insignificant. From the examination of environmental monitoring data collected, it showed that the existing environmental programs are not providing the anticipated levels of environmental control.

It has been observed that there is a wide disparity between the enactment of environmental laws and regulations and their implementation. Some of the reasons

include inadequate government resources, perceived cost of installing pollution control equipment, and inadequate public awareness on the importance of environmental protection. Corollary to this is the effectiveness of various components of the existing air quality and water quality regulations being hampered by the lack of comprehensive, long-term environmental quality monitoring programs. Laws and regulations have been enacted and were basically found to be adequate to control acceptable levels of emission from the sources.

Current Status of Laws and Regulations

Laws and regulations have been enacted dealing with air quality and were basically found to be adequate to control acceptable levels of emissions from the sources. The Revised Air Quality Standards of 1992 includes emission standards for smoke and particulate matter for stationary source, for source specific air pollutants and for sulfur compounds. The regulations also established the National Ambient Air Quality Guidelines and Standards.

As with air quality, a considerable number of laws and regulations has been enacted to address water quality, flooding and other aspects of urban environmental management. These laws deal on delegation of functions and responsibilities of the various agencies responsible for implementation and with defining national policy for protection of water quality. Major regulations passed were on standards that establish criteria for classifying water bodies and limitations for effluent discharges. There are also laws specifically directed to the problems in Metro Manila.

Solid waste management is principally governed by PD 856, commonly known as the Sanitation Code. Among others, the Code prescribes standards and procedures for refuse collection. It assigns to cities and municipalities the responsibility to provide for efficient disposal of waste.

RA 6969 known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 provides broad regulatory powers to DENR to regulate the entire life cycle of a chemical or chemical mixture, from its point of manufacture to final disposal. This act complements the existing environmental regulations of the country as well as the over-all pollution prevention strategy.

Program Strategies

The Government has adopted Cabinet Resolution No. 37, known as the Philippine Strategy for Sustainable Development (PSSD). For the first time, strategies tie development policies to the principle that economic growth and ecosystems protection are compatible. In line with the Strategy, and based on the framework for sustainable development, key issues and concerns with particular emphasis on the urban environment of MMA were identified. Existing and proposed interventions/strategies were drawn up to address these various issues/concerns.

Meanwhile, the Environmental Management Strategy, a study component of the Metropolitan Environment Improvement Program aims at providing specific pollution control strategy and framework for public and private sector actions that enhances the environmental quality of MMA. The recommendations include: 1) Water Quality Management Strategy; 2) Land Use Management Strategy; 3) Solid Waste Management; 4) Flood Control Strategy; 5) Toxic and Hazardous Waste Management; 6) Slum and Squatter Settlement; 7) Air Quality Management Strategy; and 8) Institutional Strengthening Strategy.

Major Initiatives/Programs On Metro Manila Environment Improvement

The following are recently completed/on-going programs/projects in MMA.

1) Metropolitan Manila Region Environmental Improvement Study (MMREIS)
2) Metropolitan Environment Improvement Program
3) ASEAN Environmental Improvement Project (AEIP)
4) Industrial Efficiency and Pollution Control Study
5) Waste Minimization/Cleaner Technologies for Industries
6) Industrial Waste Exchange Project
7) Industrial Environmental Management Project
8) Industrial Restructuring Program - Environmental Management Program
9) Vehicle Emissions Control Planning in Metro Manila
10) Urban Air Quality Management Project
11) Energy Sector Loan: Environmental Component
12) Economic Incentives to Promote Water Pollution Prevention and Abatement
13) Common and Individual Wastewater Treatment Facilities Study
14) Pasig River Rehabilitation Program
15) Save Our Lake Program
16) Navotas-Malabon-Tullahan-Tenejeros (NMTT) River Revival Program
17) Metro Manila Solid Waste Management Study
18) Waste-To-Energy Project
19) Smokey Mountain Project
20) Toxic and Hazardous Waste Management Study
21) Metro Manila Hospital Waste Incinerator Project

5. Identified Environmental Management Gaps And Recommendations

Following the same thrust and direction in which the Government is pursuing, supplementary gaps and countermeasures to further improve environmental management in MMA is presented. The major problems identified can be categorized into two (2) broad areas of concern: 1) conservation, improvement and effective use of natural resources (air, water, land); and 2) institutional strengthening. Countermeasures to these problems shall be addressed collectively, to wit: 1) management of various natural resources to ensure sustainability; 2) effective environmental monitoring and enforcement of environmental laws and regulations; and 3) promotion of environmental awareness especially at the local government units.

Management of Natural Resources to Ensure Sustainability

The following need to be vigorously pursued: 1) conservation/restoration of ecologically sensitive areas; 2) cost effective water pollution control; 3) management of land development and transportation network; and 4) appropriate levels and measures for solid waste management.

Effective Regular Environmental Monitoring and Enforcement of Environmental Laws and Regulations

Developing of database and presentation of environmental quality through regular monitoring of: air quality and water quality. At present, there is lack of modern and reliable equipment so that authorities can determine if environmental laws and regulations have been violated.

Air pollution control activities in Metro Manila need to be expanded to cover wider areas of concern. Particular attention must be given to the mobile sources. Current anti-smoke belching campaign should be continued and evaluated as to its

effectiveness. Stricter enforcement of laws and regulations need to be pursued through closer coordination among local governments and implementing agencies involved. This must be continously sustained.

It has been earlier estimated that large amounts of Biological Oxygen Demand (BOD) are domestic wastes. Majority of pollution load originates from septic facilities as well as uncollected solid wastes, while the remaining are sources from the industry. Solving the problem may therefore require huge government involvement not only in terms of financing but clearer delineation of responsibilities among government agencies in the sector as well. This clearly emphasizes the need to tackle the situation in a technically innovative (cost-effective) yet financially viable approach.

Promotion of Environmental Awareness

The identified needs for possible technical assistance and research are:

1) Monitoring, developing of database and presentation of environmental quality;
2) Land use planning, particularly for siting industrial zones and control environmental pollution;
3) EIA/EIS preparation, review and implementation for various projects at the local government units;
4) Disposal of domestic-industrial solid, sewerage and other non-toxic and hazardous wastes; and
5) Ecological study on the effect and utilization of marine outfalls for wastewater without toxic and hazardous waste. The procedure when properly controlled according to experts could improve the productivity of sea resources as a direct effect of nutrients added by the outfall.
6) Assessment of water resources availability now in critical condition and must be matched appropriately with present and projected demands. Long-

term plans must be firmed up for better coordination with landuse and other regulatory strategies.

Related to environmental administration, the following should be pursued at the level of local government units:

1) Clarification/establishment of functions of LGUs at different levels related to environmental management;
2) Development of human resources for LGUs;
3) Organized technical and functional support to small and medium enterprises in their efforts to control pollution; and
4) Improvement of communication between DENR and the industrial sector, and between DENR and local communities.

CHAPTER 1
INTRODUCTION

1. INTRODUCTION

1.1 General

Most pollution is the result of wastes being introduced into environmental systems in greater concentrations than such systems can absorb. It is urbanization, produced by and combined with industrialization, that has created the excessive concentration of wastes. Metro Manila, physically concentrated, core-oriented, and carrying with it a distinctive way of life not only brought economic growth and influence but also its concomitant environmental problems, among others, traffic congestion, poverty and pollution.

Among the cities in the Philippines, Metro Manila is the most affected by the problems of air and water pollution as well as solid and toxic/hazardous wastes disposal. On the physical side of the environmental spectrum, the principal categories of concern must therefore be: a) the climate (urban humidity patterns, atmospheric turbidity, wind speeds and directions, and precipitation); and its relationship to pollution via the locational pattern and area sources of pollutant; b) hydrologic effects of urban land use, involving changes in peak flow characteristics, sediment load and total run-off, changes in water quality and in groundwater recharge; and c) questions of wastes management and land pollution.

Through the above physical considerations differing urban forms and land use patterns have to be interfaced with air, water, solid wastes and noise pollution. In Metro Manila, Government concern has been expressed mainly through the regulation and control of various sources of pollution so as to attain an environmental quality that is conducive to a life of dignity and well-being of its population.

1.2 Objectives of the Study

The Urban Environmental Pollution Study aims to provide a clear understanding of the situation of urban and industrial environmental pollution in Metro Manila, specifically, air pollution, water pollution, and solid waste (including hazardous waste). This study will cover the impact and/or effects of related policies, laws and regulations formulated by the national government as well as the administrative framework the government agencies/offices function.

The study will also identify on-going and proposed programs/projects for urban and industrial environmental pollution in Metro Manila. It will provide specific information for JICA for the purpose of formulating future JICA assisted projects in the said sector.

1.3 Scope of the Study

The proposed study will include:

a) Urban and industrial environmental pollution covering air pollution, water pollution and solid waste including hazardous waste.

- Assessment of environmental pollution; e.g., sources, levels of pollution, projection, as per available information/studies
- Environmental pollution prevention measures/programs by private industries and other sources of urban and industrial environmental pollution
- Administrative set up relative to urban environmental pollution management, i.e., the delineation of responsibilities of various agencies/offices.
- Relevant policies, laws and regulations

b) On-going and proposed projects/programs for urban and industrial environmental pollution management especially under foreign donors such as USAID, CIDA, GTZ, etc.

1.4 The Study Area

1.4.1 General

Metro Manila Area (MMA) otherwise called the National Capital Region (NCR) is located along the east coast of Manila Bay. It is bounded on the north by Bulacan province in Region III, on the east by Rizal province in Region IV, and on the south/southeast by the provinces of Cavite and Laguna in Region IV. Figure 1.1 shows the location of Metro Manila.

The MMA has a total land area of 636sqkm that is about 0.2% of the Philippines total area of 300,000sqkm. It is composed of 17 separate local government units (LGUs). These are the 7 cities of Manila, Caloocan, Pasay, Quezon, Mandaluyong, Makati and Pasig and the 10 municipalities of Las Piñas, Malabon, Marikina, Muntinlupa, Navotas, Paranaque, Pateros, San Juan, Taguig and Valenzuela. With a total population of almost 8 million, it has a high density of 12,465 persons per sqkm compared to the country's density of only 202 persons/sqkm. The MMA is considered as the most highly urbanized area of the country. All its 1,689 barangays are classified as urban by the National Statistics Office (NSO). Table 1.1 presents the breakdown per city/municipality of the land area, population and density.

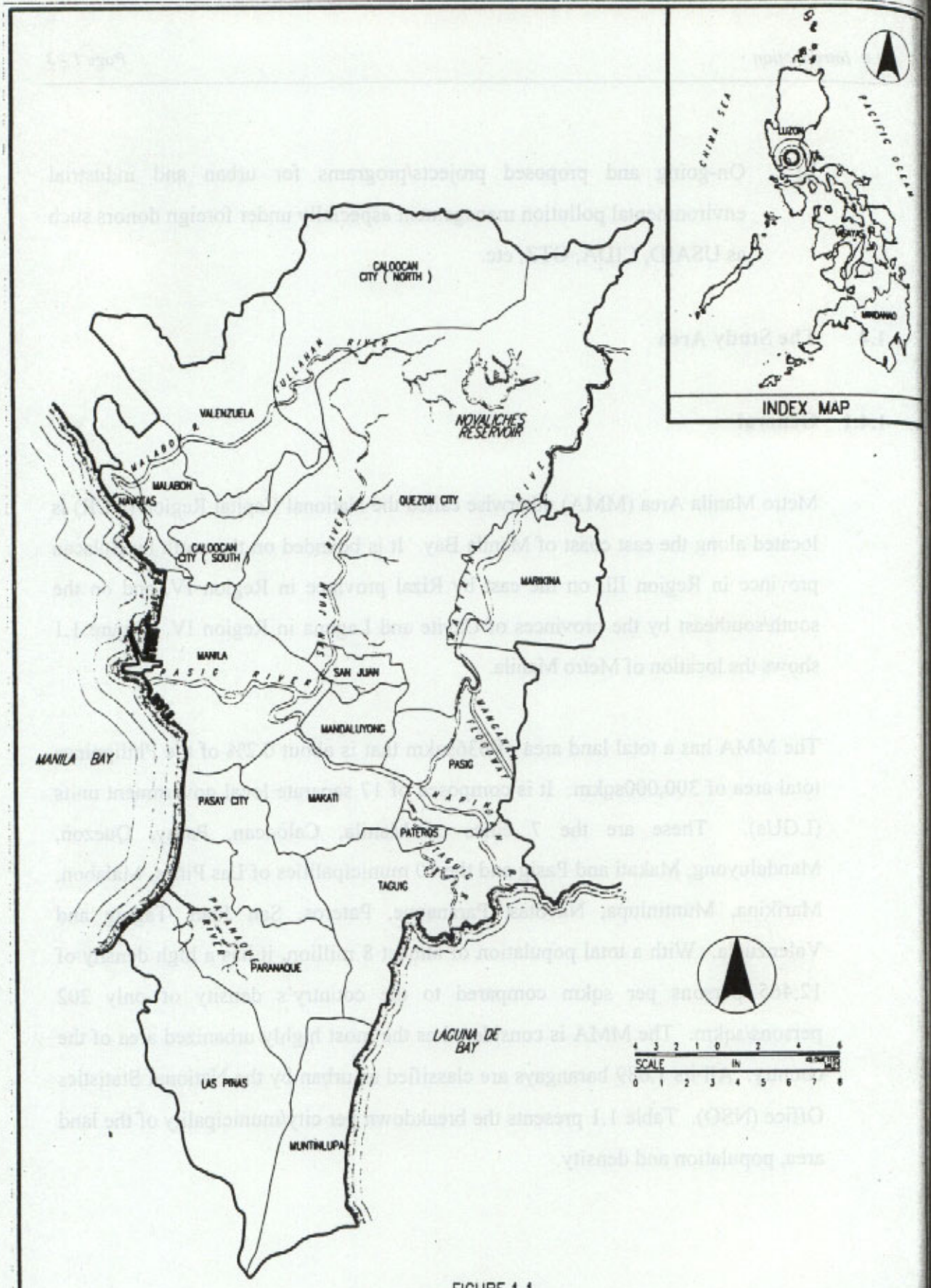


FIGURE 1.1

MAP OF THE METRO MANILA AREA

FILENAME : METRO-M3
DISKETTE NO. C:\

TABLE 1.1

OUTLINE OF CITIES AND MUNICIPALITIES, METRO MANILA AREA

CITY/MUNICIPALITY	LAND AREA (km^2)	1990 POPULATION (in thousands)	DENSITY (person/km^2)
Manila	38.3	1,599	41,749
Caloocan	55.8	761	13,638
Pasay	13.9	367	26,403
Quezon	166.2	1,667	10,030
Makati	29.9	453	15,151
Mandaluyong	26.0	245	9,423
Pasig	13.0	397	30,538
Las Pinas	41.5	297	7,157
Malabon	23.4	278	11,880
Marikina	38.9	310	7,962
Muntinlupa	46.7	277	5,932
Navotas	2.6	187	71,923
Paranaque	38.3	308	8,042
Pateros	10.4	51	4,904
San Juan	10.4	127	12,212
Taguig	33.7	266	7,893
Valenzuela	47.0	340	7,234
TOTAL	636	7,930	12,465

Source: 1995 Philippine Statistical Yearbook.

1.4.2 Physical Environment

1.4.2.1 Climatology

Metro Manila is within the area classified as Type I of the Philippine Climate as shown in Figure 1.2, with two pronounced seasons; dry from December to May and wet from June to November. The maximum rain period is from June to September. The areas characterized by this climate type are exposed to the southwest monsoon and get a fair share of the rainfall brought about by the tropical cyclones occurring especially during the maximum rain period. The controlling factor is topography. The localities of this type are shielded from the northers and even in good part from the trade by mountain ranges. However, they are still vulnerable to the southwest monsoon and tropical storms.

FIGURE 1.2

CLIMATE MAP OF THE PHILIPPINES BASED ON MODIFIED CORONAS

The weather and climate of MMA are represented by the climatological data for the period 1961-1993 from PAGASA (NAIA) Synoptic Station in Pasay City as shown in Table 1.2.

Wind Speed and Direction

The monthly normal wind speed ranges from 2 to 4 meters per second (mps) with an annual normal of 3mps. The wind speed equal to or greater than 3mps occurred during the months of February to May as reflected in Table 1.2. On the other hand, monthly climatological extreme showed wind speed equal to or more than 20mps in all months, with 56mps the highest ever recorded (November 1970) as indicated in Table 1.3.

The prevailing winds, represented by the characteristics of its speed and direction are generally influenced by bodies of waters on the western part (the Manila Bay and China Sea) and the southeastern part (the Laguna de Bay), as well as the north-south orientation of the Sierra Madre Mountain on the eastern part. The whole area of MMA is open to the southwest monsoon flow but shielded partly by the Sierra Madre Mountains during the northeast monsoon season.

The wind rose diagrams as shown in Annex 1.1 depict the influence of these barriers, show the airflow to be coming from the east to southeast during the northeast monsoon season. (October to February). It also shows that the barriers have the same effect on the Pacific Trade Winds (March to May). However, the wind flow is from west to southwest during the southwest monsoon season (June to September). The seasonal and annual percentages of wind vector at the Pasay City (NAIA) Synoptic Station are also presented in Table 1.4. The annual percentage of wind vector shows that easterly to southeasterly and westerly wind directions

TABLE 1.2 CLIMATOLOGICAL NORMALS AT PASAY CITY (NAIA) SYNOPTIC STATION (1961-1993)

MONTH	RAIN (mm)	RAIN (day)	TEMPERATURE (°C)							RH (%)	MSL PRESS (MBS)	WIND SPEED & DIRECTION	
			MAX.	MIN.	MEAN	DRY BULB	WET BULB	DEW. BULB	VB (MBS)			DIR	SPD/MPS
Jan	8.6	3	30.2	20.9	25.6	25.2	21.8	20.3	23.8	74	1013.5	E	2
Feb	3.1	2	31.2	21.1	26.2	25.9	21.9	20.2	23.7	71	1013.5	E	3
Mar	6.4	2	32.7	22.4	27.6	27.4	22.8	20.9	24.7	68	1012.7	E	4
Apr	11.6	2	34.2	24.0	29.1	29.0	23.9	22.0	26.3	66	1011.2	E	4
May	113.5	8	34.2	24.9	29.5	29.3	24.8	23.2	28.5	70	1009.4	SE	3
Jun	263.4	17	32.4	24.4	28.4	28.1	24.9	23.8	29.6	78	1008.8	W	2
Jul	362.0	19	31.3	24.1	27.7	27.4	24.7	23.8	29.5	81	1008.3	W	2
Aug	389.0	20	30.8	24.0	27.4	27.1	24.7	23.8	29.6	83	1008.0	W	2
Sep	310.2	18	31.1	24.0	27.5	27.2	24.7	23.9	29.7	83	1008.8	W	2
Oct	227.1	14	31.1	23.5	27.3	26.9	24.3	23.3	28.7	81	1009.8	E	2
Nov	119.5	11	31.0	22.8	26.9	26.6	23.6	22.5	27.4	79	1010.9	E	2
Dec	42.9	6	30.3	21.7	26.0	25.7	22.7	21.5	25.6	78	1012.5	E	2
Annual	1857.3	122	31.7	23.2	27.4	27.1	23.7	22.4	27.3	76	1010.6	E	3

TABLE 1.3 CLIMATOLOGICAL EXTREMES AT PASAY CITY (NAIA) SYNOPTIC STATION (AS OF 1993)

MONTH	TEMPERATURE °C				RAINFALL (mm)		HIGHEST WIND SPEED (mps)			SEA LEVEL PRESSURE (MBS)			
	HIGH	DATE	LOW	DATE	AMT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
Jan	35.8	07/89	14.8	10/12	55.3	03/73	20	ENE	12/86	1022.3	27/87	4.4	01/50
Feb	38.8	28/80	14.6	03/62	16.5	27/50	20	E	28/88	1021.4	01/62	5.5	15/52
Mar	36.5	30/78	16.0	16/12	35.5	12/71	20	E	08/88	1021.1	02/87	4.7	08/84
Apr	37.8	23/48	19.4	13/12	57.2	04/56	20	E	06/88	1019.9	23/87	3.8	25/71
May	38.1	18/69	19.1	01/14	229.1	27/60	31	SW	22/76	1015.9	09/57	992.2	17/89
Jun	38.0	02/91	20.0	10/61	316.8	27/85	36	S	29/64	1015.9	06/66	974.6	29/64
Jul	36.0	06/91	18.3	03/17	472.4	20/72	36	S	08/86	1014.9	07/53	994.2	15/83
Aug	35.2	29/89	17.4	07/18	401.8	10/47	30	WSW	16/84	1015.2	12/58	992.8	24/78
Sep	34.9	09/79	19.4	03/16	228.8	08/63	26	NW	27/78	1015.2	20/65	991.5	09/82
Oct	36.0	24/76	18.0	19/18	274.5	09/78	27	W	18/85	1017.0	25/86	977.9	14/70
Nov	35.8	17/72	17.2	14/11	121.7	14/77	56	W	19/70	1019.4	03/89	970.9	19/70
Dec	34.2	29/79	16.3	24/18	110.5	30/50	25	NW	30/50	1020.9	08/60	996.2	15/64
Annual	38.1	05/18	14.6	02/20	482.4	07/20	56	W	11/19	1022.3	01/27	970.7	11/19

are the most dominant with the east moving air having the highest frequency followed by southeasterly and westerly wind directions.

The wind speed is relatively higher (more than 3mps) from east to southeast quadrant and followed by south to west quadrant. Wind speed from zero to 1mps (calm) is 8.88% only of the total time.

TABLE 1.4
ANNUAL PERCENTAGE FREQUENCY OF WIND VECTOR AT PASAY CITY (NAIA) SYNOPTIC STATION, 1961-1993

DIRECTION OF 16-POINT OF THE COMPASS	ANNUAL PERCENTAGE FREQUENCY		SEASONAL PERCENTAGE FREQUENCY		
	PERCENTAGE	WIND SPEED	NORTHEAST MONSOON	SOUTHWEST MONSOON	TRANSITION PERIOD
N	2.16	2.89	4.26	1.07	1.19
NNE	0.57	2.80	1.17	0.30	0.14
NE	1.78	2.78	3.39	1.26	0.35
ENE	1.88	2.91	3.70	0.49	1.85
E	26.22	3.50	35.04	10.62	41.1
ESE	6.59	3.66	6.02	3.94	12.03
SE	19.99	3.62	17.09	13.14	35.65
SSE	0.32	2.91	0.22	0.34	0.19
S	2.39	2.84	1.84	3.22	0.98
SSW	1.36	3.32	0.36	2.88	0.11
SW	5.86	3.42	1.23	12.66	0.52
WSW	7.12	3.26	1.77	14.87	1.03
W	12.04	3.06	6.13	22.33	2.41
WNW	1.13	2.91	1.38	1.34	0.43
NW	0.95	3.03	1.11	1.16	0.39
NNW	0.75	3.03	1.08	0.56	0.27
ANNUAL	91.11	3.12	82.09	90.64	98.64
CALM	8.88		14.20	9.26	1.36

Source: PAGASA

Rainfall

The monthly climatological normal as referred to in Table 1.2 revealed 2 distinct dry (November to May) and wet (the rest of the year) seasons. The maximum monthly rainfall normal of 389mm occurred in August, while the

minimum value of 3.1mm occurred in February. The 33 year normal total annual rainfall amount was 1,857.4mm. The normal annual total number of rainy days was 122 with the month of August having the most number of rain occurrence with 20 out of 31 days, while February to April have the least with 2 day average rainy season. The highest amount of daily rainfall ever recorded (July 1970) in the area was 472.4mm as shown in Table 1.3. The computed extreme value and intensity of rainfall are presented in Tables 1.5 and 1.6.

Temperature

The daily normal temperature for the period 1961 to 1993 was 27.4°C as indicated in Table 1.2. The relatively coldest month was January with 25.6°C, while the warmest months were April and May with 29.5°C. The lowest temperature ever recorded in the area was 14.6°C (February 1962), while the highest was 38.1°C (May 1969).

1.4.2.2 Topography

The natural boundaries of MMA include the Central Luzon Plain on its north-east direction, the Sierra Madre mountain range on the east, the south-west Luzon Upland on the south and the Manila Bay on the west. It has 3 main geologic formations: the Coastal Margin, the Guadalupe Plateau and the Marikina Valley.

The Coastal Margin (including the Reclamation Area) consists of a relatively flat strip of land flanking Manila Bay with an elevation ranging from 1.8m to 10m. It is made up of fluvial deposits of loosely consolidated saturated sand, silt, gravel and clay. The Margin is about 30km long and has a maximum width of 6km along the Pasig River, and a minimum width of 1km at its southern end.

TABLE 1.5 COMPUTED EXTREME VALUES (IN MM) OF RAINFALL AT PASAY CITY (NAIA) SYNOPTIC STATION (BASED ON 24 YEARS OF RECORDS)

RETURN PERIOD (Years)	5 MINS.	10 MINS.	15 MINS.	20 MINS.	60 MINS.	2 HRS.	3 HRS.	6 HRS.	12 HRS.	24 HRS.
2	12.1	20.4	25.7	37.0	48.2	62.3	72.3	95.0	121.8	157
5	16.1	25.9	31.0	46.1	61.8	80.5	95.5	131.6	173.1	217
10	18.7	29.6	34.5	52.2	70.8	92.5	110.9	155.9	207.1	260
15	20.1	31.6	36.5	55.6	75.8	99.3	119.6	169.6	226.3	284
20	21.2	33.1	37.9	58.0	79.4	104.1	125.6	179.2	239.7	303
25	22.0	34.2	39.0	59.8	82.1	107.7	130.3	186.6	250.1	314
50	24.4	37.6	42.3	65.5	90.6	119.0	144.7	209.3	281.9	355
100	26.8	41.0	45.5	71.1	98.9	130.2	231.0	231.9	313.6	395

TABLE 1.6 INTENSITY (IN MM/HR) OF COMPUTED EXTREME VALUES AT PASAY CITY (NAIA) SYNOPTIC STATION (BASED ON 24 YEARS OF RECORDS)

RETURN PERIOD (Years)	5 MINS.	10 MINS.	15 MINS.	30 MINS.	60 MINS.	2 HRS.	3 HRS.	6 HRS.	12 HRS.	24 HRS.
2	145.2	122.4	102.8	74.0	48.2	31.2	24.1	15.8	10.1	6.3
5	193.2	155.4	124.0	92.2	61.8	40.3	31.8	21.9	14.4	9.0
10	224.4	177.6	138.0	104.4	70.8	46.3	37.0	26.0	17.3	10.8
15	241.2	189.6	146.0	111.2	75.8	49.6	39.9	28.3	18.9	11.9
20	254.4	198.6	151.6	116.0	79.4	52.0	41.9	29.9	20.0	12.6
25	264.0	205.2	156.0	119.6	82.1	53.9	43.4	31.1	20.8	13.1
50	292.8	225.6	169.2	131.0	90.6	59.5	48.2	34.9	23.5	14.8
100	321.6	246.0	182.0	142.2	98.6	65.1	53.0	38.6	26.1	16.5

Source: PAG-ASA

The Guadalupe Plateau forms a low ridge that extends the full length of the region. The volcanic tuff (adobe) which forms the plateau is considered a suitable bedrock foundation. The soil that overlies the adobe mostly comprises waterlaid sediments. The Plateau covers an area of approximately 395sqkm. Its elevation rises from 10m, where it meets the Coastal Margin, to 140m in the northeast.

East of the Guadalupe Plateau is the Marikina Valley, a broad alluvial plain form as a result of river deposition. The alluvium is made up of unconsolidated mixture of sand and gravel together with considerable amounts of silt and clay. The Valley has an area of about 118sqkm. The Laguna lowland is a marginal strip of flat land south of the Marikina Valley, along the western shore of the Laguna de Bay. Its physiographic character is similar to that of the Marikina Valley and the Coastal Margin and has an area of about 21sqkm.

1.4.2.3 Drainage

There are 3 identified main river systems in MMA: 1) the Pasig-Marikina-San Juan River System; 2) the Navotas-Malabon-Tenejeros-Tullahan (NMTT) River System; and 3) the Paranaque-Zapote River System. These river systems generally flow westward and finally drain into Manila Bay as reflected in Figure 1.3. However, during the dry season when the high tide in Manila Bay corresponds to a low water level in Laguna de Bay, the Pasig River reverses its flow and discharges via the Napindan River into the Laguna de Bay. Laguna de Bay is a freshwater lake located southeast of the MMA which serves as a natural detention reservoir for discharges from the nearby watercourses. The outlet of the lake is through the Napindan and Pasig Rivers to Manila Bay.

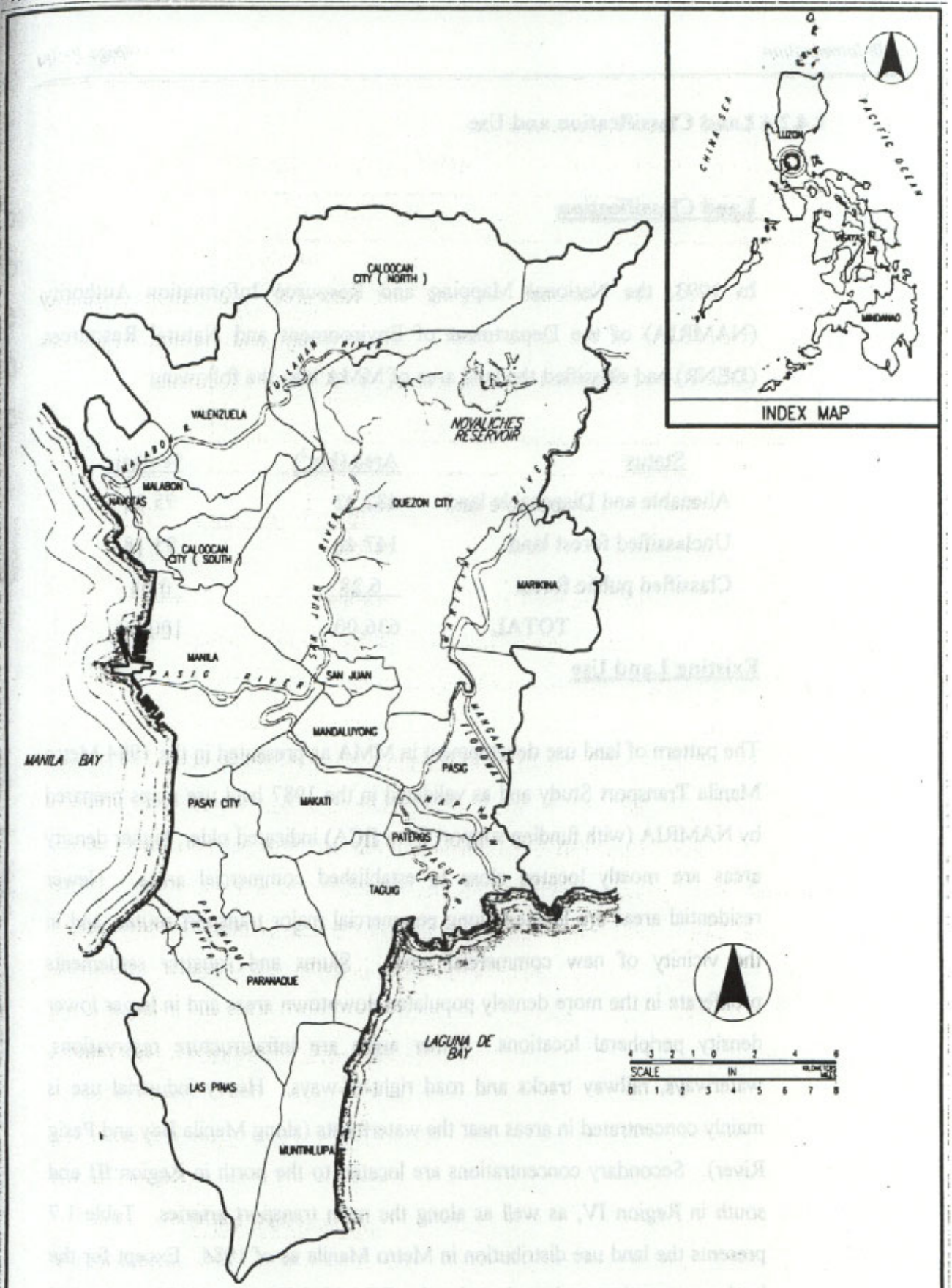


FIGURE 1.3

RIVER SYSTEMS OF THE METRO MANILA AREA

CEST, Inc.

1.4.2.4 Land Classification and Use

Land Classification

In 1993, the National Mapping and Resource Information Authority (NAMRIA) of the Department of Environment and Natural Resources (DENR) had classified the land area of MMA into the following:

Status	Area (km^2)	% Share
Alienable and Disposable land	482.32	75.84
Unclassified forest land	147.40	23.18
Classified public forest	6.28	0.98
TOTAL	636.00	100.00

Existing Land Use

The pattern of land use development in MMA as presented in the 1984 Metro Manila Transport Study and as validated in the 1987 land use maps prepared by NAMRIA (with funding support from JICA) indicated older, higher density areas are mostly located close to established commercial areas. Newer residential areas are located along commercial major transport routes, and in the vicinity of new commercial areas. Slums and squatter settlements proliferate in the more densely populated downtown areas and in larger lower density peripheral locations. Other areas are infrastructure reservations, waterways, railway tracks and road right-of-ways. Heavy industrial use is mainly concentrated in areas near the waterfronts (along Manila Bay and Pasig River). Secondary concentrations are located to the north in Region III and south in Region IV, as well as along the main transport arteries. Table 1.7 presents the land use distribution in Metro Manila as of 1984. Except for the land use mapping project done by the JICA-NAMRIA in 1987, no detailed study has yet been undertaken to update the land use distribution of MMA.

TABLE 1.7

LAND USE DISTRIBUTION IN METRO MANILA

LAND USE	PERCENTAGE (%)
Residential	39
Commercial	9
Industrial	2
Institutional	5
Public Utilities	1
Agricultural lands	11
Open space/vacant land	33
TOTAL	100

Land Use Trends

The general land use trends have been and will continue along with rapid population growth and industrial development. These trends are: 1) rapid emergence and densification of a multi-nodal urban spine on the Plateau; 2) significant densification along a corridor north of Manila; 3) rapid land conversion and development activity in the south; 4) incipient land conversion and development north of Quezon City; 5) densification and mixed land use development of old residential areas east of Manila; 6) conversion of land use and development activities in the Marikina Valley; 7) emergence of high rise buildings along Manila Bay; and 8) industrial expansion to the north, south and east.

1.4.3 Socio-Economic Environment

1.4.3.1 Population

Present Population

A variable population growth rate had been experienced since the last 5 census years as indicated in Figure 1.4 and Table 1.8. From an average

FIGURE 1.4
POPULATION DEVELOPMENT IN METRO MANILA
BY CITY/MUNICIPALITY

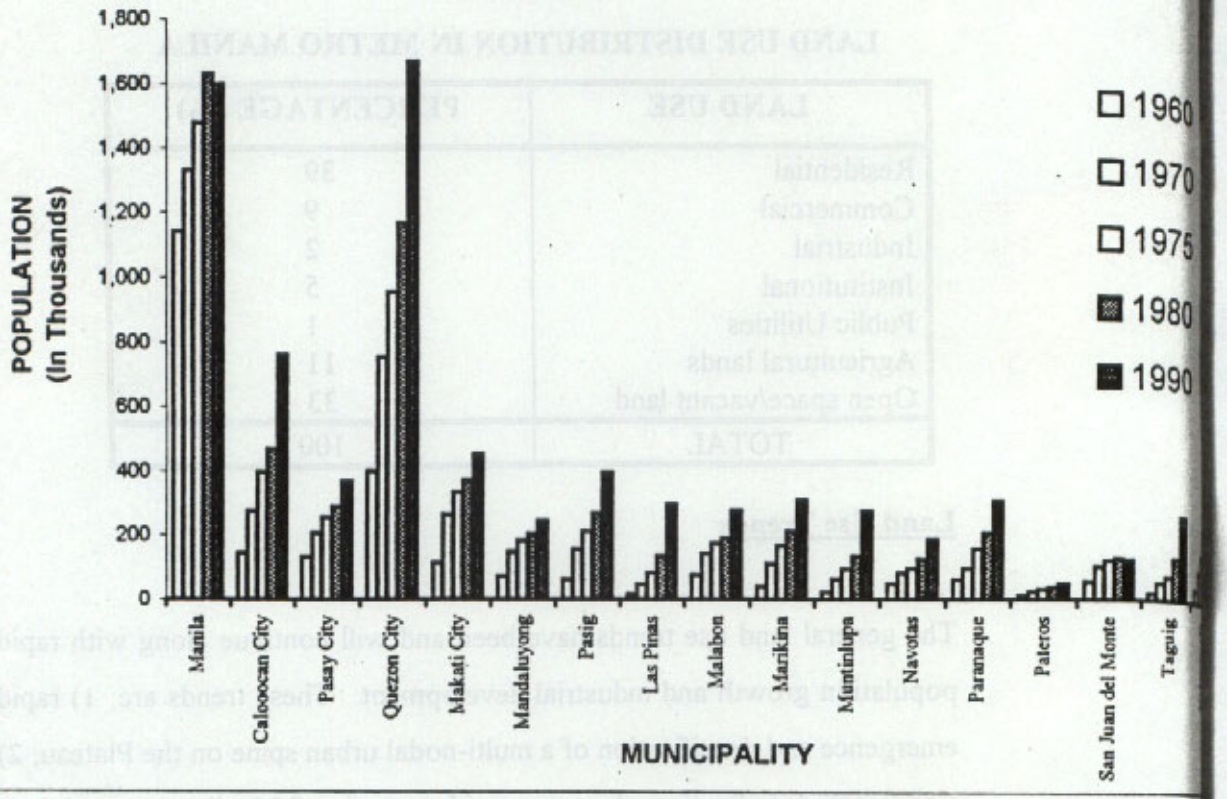


TABLE 1.8
POPULATION DEVELOPMENT IN METRO MANILA BY CITY/MUNICIPALI
(In Thousands)

CITY/ MUNICIPALITY	PREVIOUS POPULATION				
	1960	1970	1975	1980	1990
Manila	1,139	1,331	1,479	1,630	1,
Calooocan City	145	274	397	468	
Pasay City	133	206	255	288	
Quezon City	398	754	957	1,166	1,
Makati City	115	265	334	373	
Mandaluyong	72	149	182	205	
Pasig	62	156	210	269	
Las Pinas	16	46	82	136	
Malabon	76	142	175	191	
Marikina	40	113	168	212	
Muntinlupa	22	65	95	137	
Navotas	49	83	97	126	
Paranaque	62	97	159	209	
Pateros	13	25	33	40	
San Juan del Monte	57	105	122	130	
Taguig	22	55	74	134	
Valenzuela	41	98	151	212	
TOTAL	2,462	3,964	4,970	5,926	7

annual growth rate of 3.83% covering the period 1948 to 1960, it increased to 4.63% (1970-1975) and declined to 2.96% (1980-1990). A summary of the average annual growth rates is as follows:

Year	Population (in thousands)	Ave. Annual Growth Rate (%)	Period
1960	2,462	3.83	1948-1960
1970	3,964	4.88	1960-1970
1975	4,970	4.63	1970-1975
1980	5,926	3.58	1975 1980
1990	7,930	2.96	1980-1990

From the 1990 Census of Population by NSO, MMA has a total population of 7.93 million. Quezon City has the most number of people (1.67 M), followed by Manila (1.60 M) and Caloocan City (0.76 M). The least number of people is in the municipality of Pateros (0.051 M), followed by San Juan (0.13 M) and Navotas (0.19 M). However, in terms of population density (refer to Table 1.1), the most populous is Navotas (71,923 persons/sqkm), followed by Manila (41,749 persons/sqkm). Pateros has the lowest population density (4,904 persons/sqkm).

Projected Population

The NSO medium range projection indicates that the population will increase at a rate of 2% between 1990 and 2000. The estimated population for years 1995 and 2000 is indicated in Table 1.9.

TABLE 1.9

PROJECTED POPULATION - 1995 and 2000
(in thousands)

CITY/MUNICIPALITY	1995	2000
Manila	1,611	1,635
Caloocan	348	581
Pasay	393	436
Quezon	1,929	2,280
Makati	497	546
Mandaluyong	270	295
Pasig	478	579
Las Pinas	410	584
Malabon	895	1,073
Marikina	369	443
Muntinlupa	392	552
Navotas	225	273
Paranaque	358	427
Pateros	57	65
San Juan	128	131
Taguig	373	520
Valenzuela	428	538
TOTAL	11,156	12,958

1.4.3.2 Health Status

The number one cause of morbidity was pneumonia, a respiratory disease followed by diarrhea, a water-borne/water-washed disease and bronchitis, another respiratory disease. For mortality, the number one cause was also pneumonia, followed by vascular diseases and cancer. Table 1.10 presents the 10 leading causes of morbidity and mortality of MMA in 1994.

TABLE 1.10

TEN LEADING CAUSES OF MORBIDITY AND MORTALITY, METRO MANILA, 1994

	CAUSES OF MORBIDITY	NUMBER	RATE	CAUSES OF MORTALITY	NUMBER	RATE
1.	Pneumonia	94180	1063.6	Pneumonia	5228	59.0
2.	Diarrhea	89494	1010.7	Vascular Disease	3882	43.8
3.	Bronchitis	59137	667.8	Cancer	3248	36.7
4.	TB, All Forms	22396	256.3	TB, All forms	2870	32.4
5.	Influenza	16868	190.5	Hypertensive Disease	2603	29.4
6.	Disease of the Heart	5923	66.9	Accident	2145	24.2
7.	Chicken Pox	2769	31.3	Diabetes	986	11.1
8.	Measles	2767	31.2	Septicemia	812	9.2
9.	Cancer	2489	28.1	Kidney Disease	693	7.8
10.	Hepatitis	1233	13.9	Liver Dis. & Cirrhosis	513	5.8

1.4.3.3 Economic Activities

MMA can be considered as the country's major center of economic, political and commercial activities. It accounts for about 3.5% of the total Gross Domestic Product (GDP) of the country. GDP per capita in MMA is double that the GDP per capita for the total Philippines. As to economic activities, service and industry-related activities have the dominant share as presented in Figures 1.5 and 1.6. Tables 1.11 and 1.12 show a detailed distribution of employed persons by major industry and occupation groups, respectively.

1.5 Organization of the Report

This Report consists of the following:

Chapter 2	Current Environmental Quality and Future Condition
Chapter 3	Institutional Arrangements and Capacity for Environmental Management
Chapter 4	Policies and Regulations and Current Environmental Management Programs for Metro Manila
Chapter 5	Identified Environmental Management Gaps and Recommendation

FIGURE 1.5
EMPLOYED PERSONS BY INDUSTRY GROUP
METRO MANILA, 1994

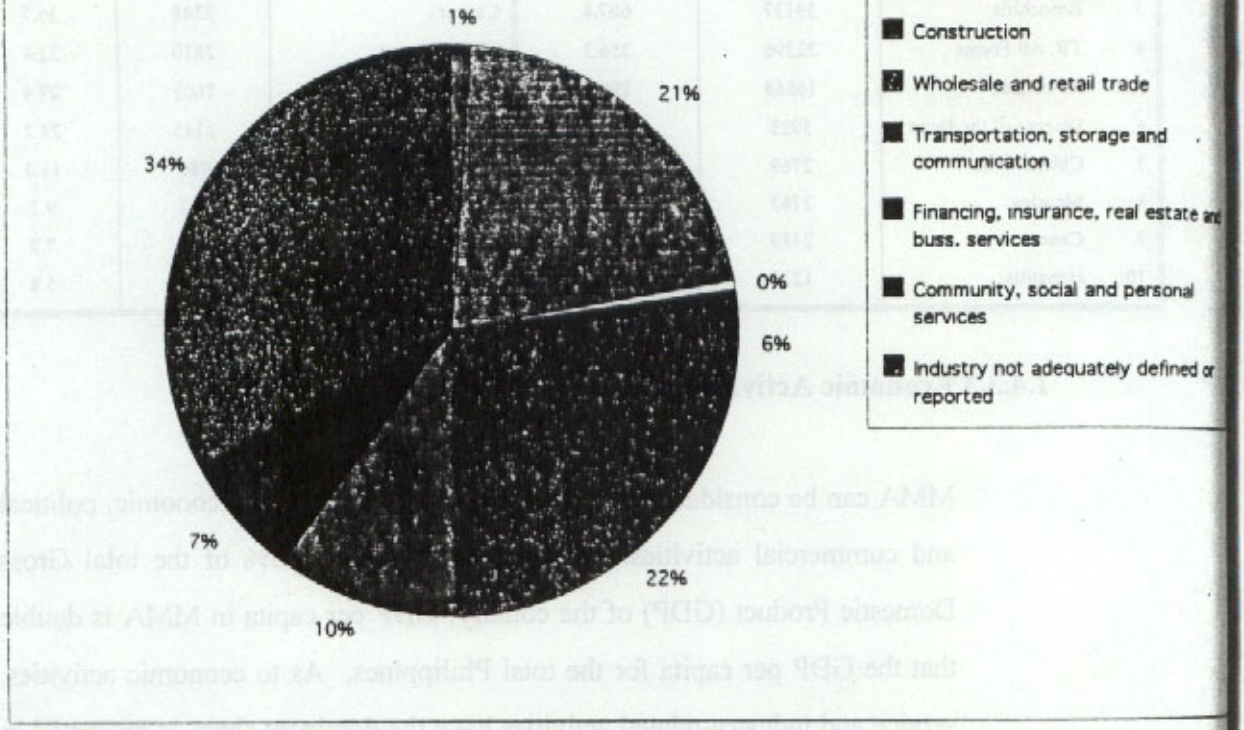


TABLE 1.11
EMPLOYED PERSONS BY MAJOR INDUSTRY GROUP
METRO MANILA, 1994
(In Thousands)

INDUSTRY	METRO MANILA	PHILIPPINES	% SHARE OF MMA
Agriculture, fishery and forestry	35	11249	0.31
Mining and quarrying	3	101	2.97
Manufacturing	633	2582	24.52
Electricity, gas and water	15	100	15.00
Construction	184	1187	15.50
Wholesale and retail trade	641	3563	17.99
Transportation, storage and communication	293	1402	20.90
Financing, insurance, real estate and buss. services	217	494	43.93
Community, social and personal services	985	4480	21.99
Industry not adequately defined or reported		8	0.00
TOTAL	3006		

Source: 1995 Philippine Statistical Yearbook

FIGURE 1.6
EMPLOYED PERSONS BY OCCUPATION GROUP
METRO MANILA, 1994
(In Thousands)

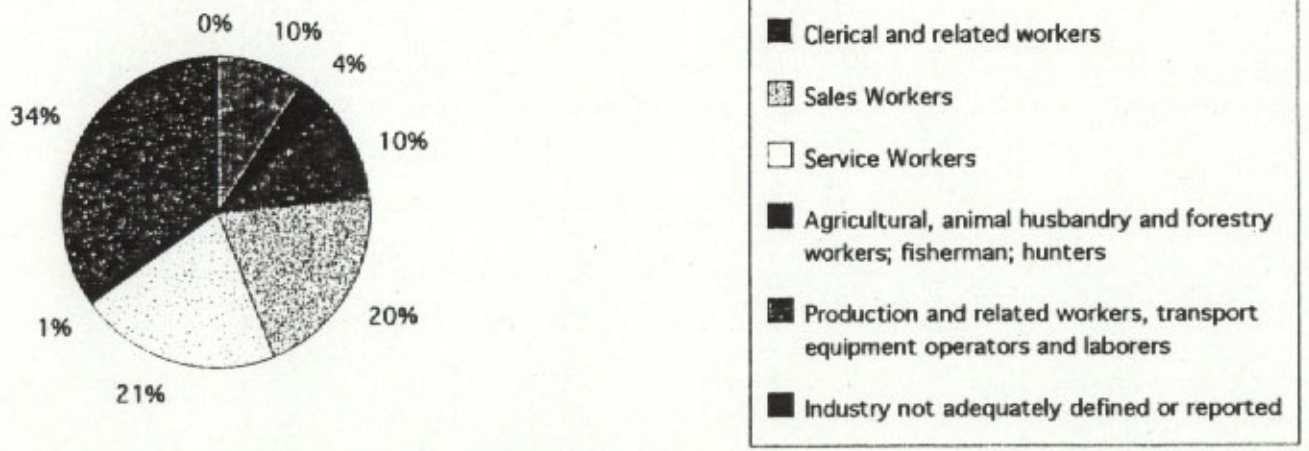


TABLE 1.12
EMPLOYED PERSONS BY OCCUPATION GROUP
METRO MANILA, 1994
(In Thousands)

OCCUPATION	METRO MANILA	PHILIPPINES	% SHARE OF MMA
Professional, technical and related workers	291	1366	21.30
Administrative, executive and managerial workers	108	358	30.17
Clerical and related workers	311	1033	30.11
Sales Workers	610	3446	17.70
Service Workers	637	2329	27.35
Agricultural, animal husbandry and forestry workers; fisherman; hunters	28	11112	0.25
Production and related workers, transport equipment operators and laborers	1020	5493	18.57
Industry not adequately defined or reported	1	29	3.45

Source: 1995 Philippine Statistical Yearbook

CHAPTER 2
CURRENT ENVIRONMENTAL QUALITY and FUTURE CONDITION

2. CURRENT ENVIRONMENTAL QUALITY AND FUTURE CONDITION

2.1 General

Urban ecology is generally sensitive that once abused, it is a matter of time before environmental distress begin to surface. Reasons for this are readily traceable to a multitude of interrelated problems. Policy papers of the Philippine Government (Philippines 2000 and Environment, 1992) relate these concerns to the direct effects of high density of human activities, high consumption of resources and generation of wastes, and lack of planned urban growth. These major factors contribute to the marginal environmental quality of Metro Manila area today.

2.2 Air Quality

Primary sources of emissions in Metro Manila come from the large number of motorized vehicles serving the transport needs and the industrial installations. The level of emissions, principally particulate matters (PM), consistently exceed concentrations above which health effects were identified. Findings from 2 recent studies on health effects related to emission exposure (National Occupational Health Survey Phase I [NCR] - 1991, and the Epidemiology of Chronic Respiratory Symptoms and Illnesses among Jeepney Drivers and Commuters Exposed to Vehicular Emissions in Metro Manila - 1991) indicated that chronic respiratory illnesses and symptoms were found to occur twice as frequently among jeepney drivers as among commuters.

2.2.1 Types of Pollutants

Pollutants consist of particulate matter (PM), carbon monoxides (CO), sulfur oxides (SOx), nitrogen oxides (Nox) and organic gases.

2.2.2 Emission Sources and Amounts

Air pollution sources can either be mobile (motor vehicles), stationary (industrial plants), or area sources (dispersed sources like paved road travel, road and building construction, adhesives and sealants, commercial aircraft, etc.). Figure 2.1 shows the types and percentage share of emissions from all sources in MMA. Mobile sources are clearly the dominant pollution source, followed by stationary sources.

As shown in the Figure, motorized transport in Metro Manila accounts for the large fraction of total airborne pollutants consisting about 94% of total organic gas (TOG), 99% of CO, and 83% of NOx emissions, while the remaining comes from industrial installations, utilities and windblown/resuspended dust.

Air quality measurements undertaken by NCR-DENR in different monitoring stations showed levels occasionally exceeding acceptable standards for total suspended particle as reflected in Figures 2.2 and 2.3. Table 2.1 shows the monthly minimum, maximum and average concentration of total suspended particle. Concentrations of SOx had not exceeded the national ambient standards as presented in Figure 2.4 and Table 2.2.

2.2.2.1 Mobile Emissions

As stated earlier, mobile sources are found to be the leading source of pollutants. This is primarily due to the obsolete features of automotive engines running a large number of vehicles.

A 1990 survey of motor vehicle fleet in Metro Manila revealed that there were 675,310 registered motor vehicles plying the streets of the metropolis as follows:

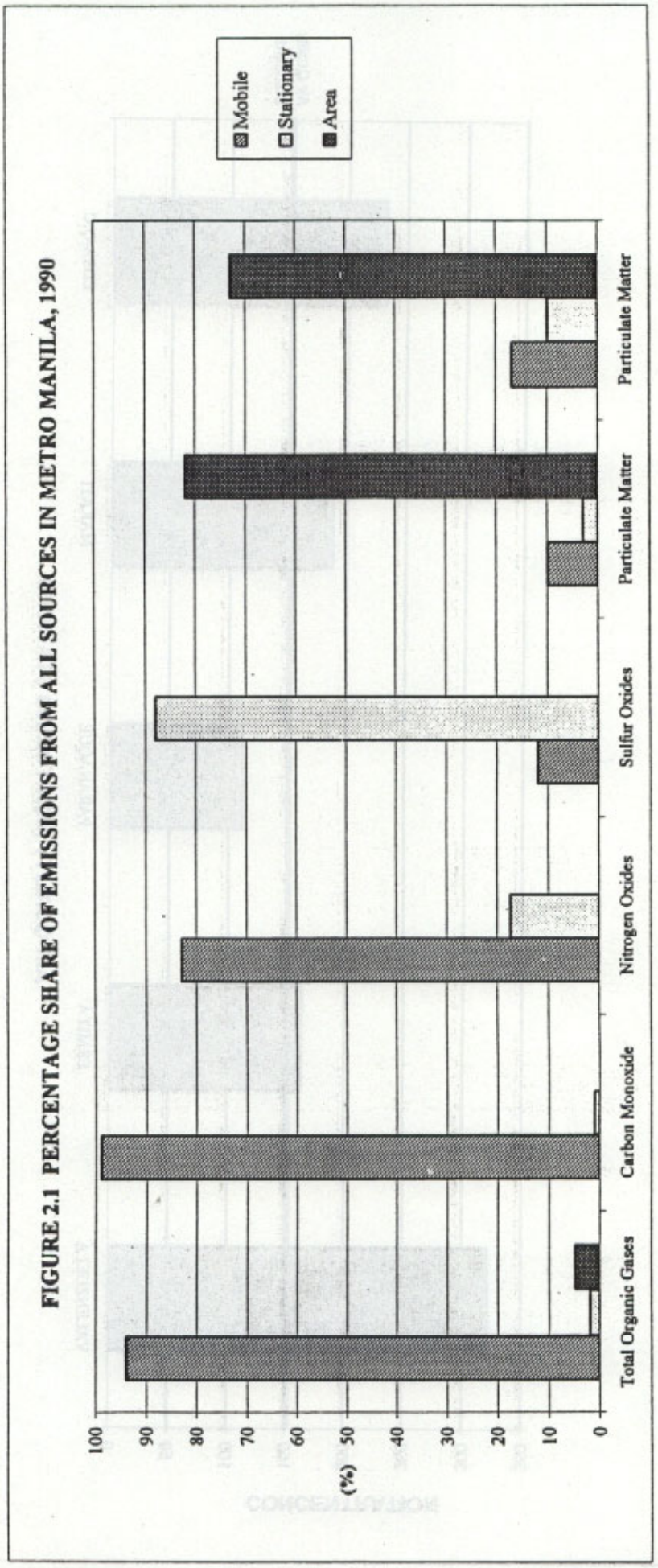


FIGURE 2.1 PERCENTAGE SHARE OF EMISSIONS FROM ALL SOURCES IN METRO MANILA, 1990

Source: A paper on the state of the Urban Environment in the Philippines, EMB

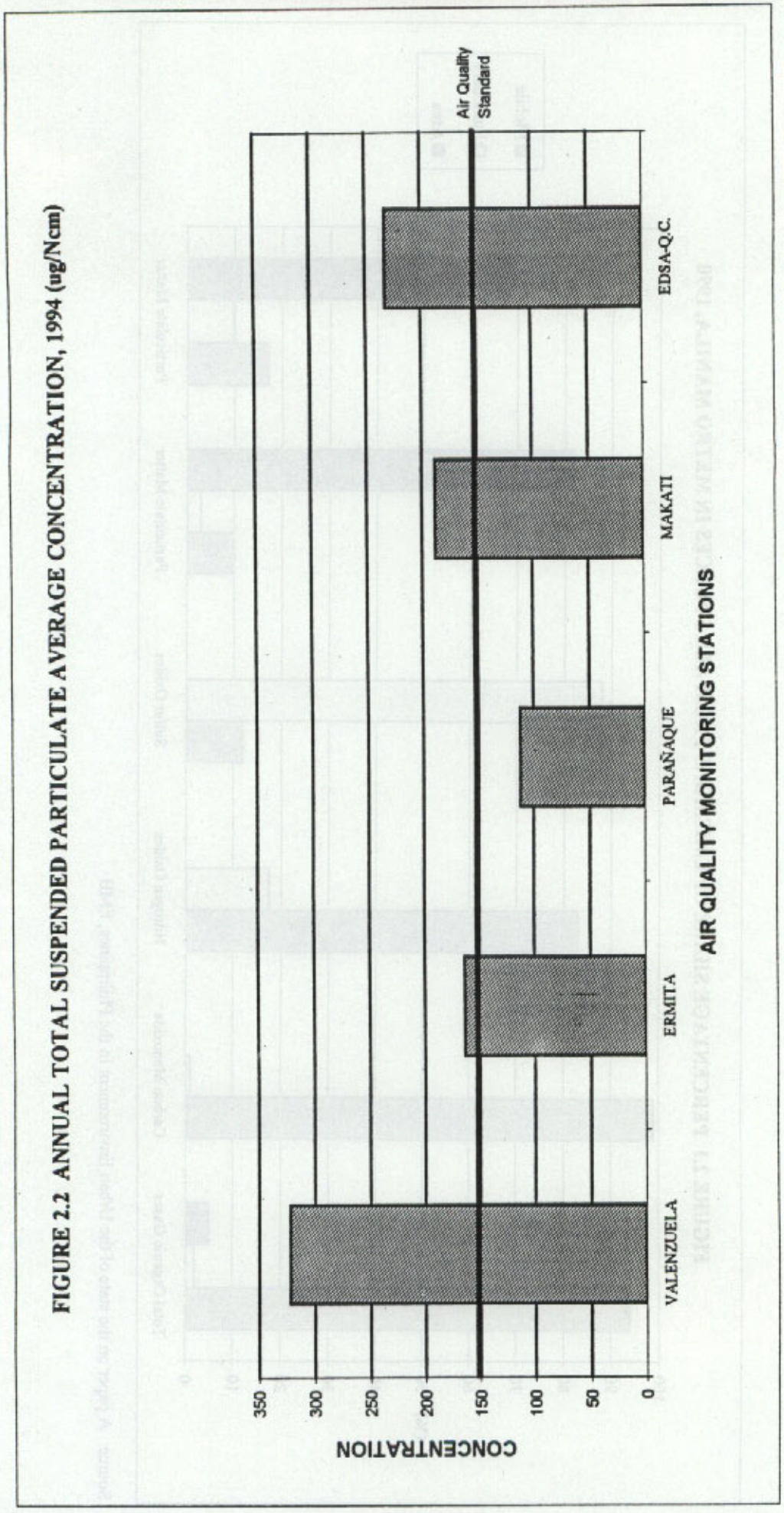


FIGURE 2.2 ANNUAL TOTAL SUSPENDED PARTICULATE AVERAGE CONCENTRATION, 1994 (ug/Ncm)

Source: DENR-NCR

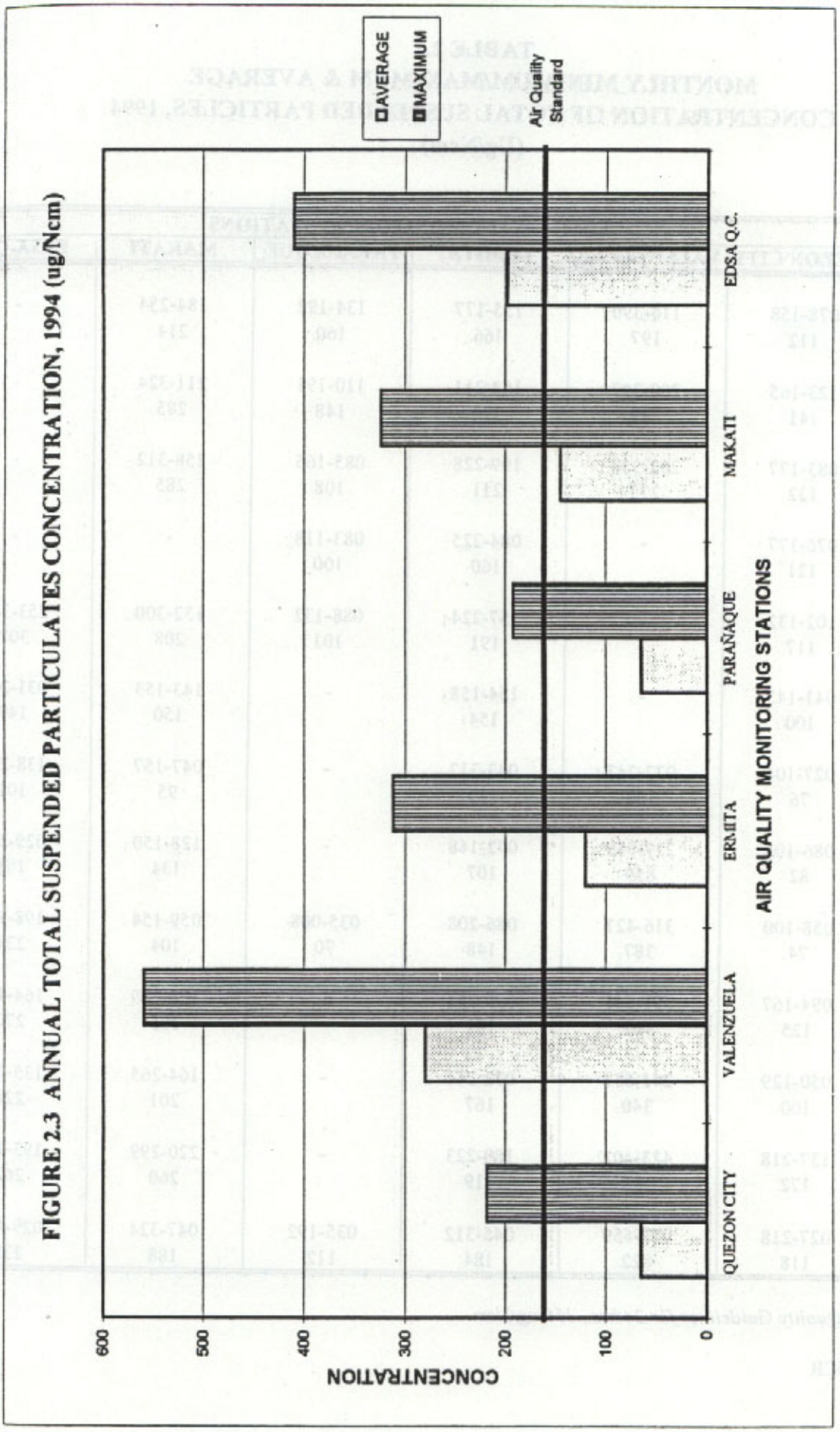


FIGURE 2.3 ANNUAL TOTAL SUSPENDED PARTICULATES CONCENTRATION, 1994 (ug/Ncm)

Source: DENR-NCR

TABLE 2.1
MONTHLY MINIMUM/MAXIMUM & AVERAGE CONCENTRATION OF TOTAL SUSPENDED PARTICLES, 1994
(Ug/Ncm)

MONTH	AIR QUALITY MONITORING STATIONS					
	QUEZON CITY	VALENZUELA	ERMITA	PARANAQUE	MAKATI	EDSA-Q.C.
January	078-158 112	116-390 197	155-177 166	134-192 160	184-254 214	-
Febuary	123-165 141	200-397 249	152-211 179	110-191 148	211-324 285	-
March	083-177 132	202-350 273	199-228 211	085-165 108	258-312 285	-
April	076-177 121	-	084-225 160	083-118 100	-	-
May	102-132 117	-	157-224 191	088-132 101	132-300 208	253-347 307
June	041-143 100	-	154-158 154	-	143-153 150	031-209 147
July	027-104 76	077-247 162	043-312 123	-	047-157 95	138-278 101
August	086-108 82	217-559 859	072-148 107	-	128-150 134	029-277 168
September	058-100 74	316-427 387	086-208 148	035-008 70	059-154 104	198-327 234
October	094-167 125	201-541 401	099-261 181	-	138-289 195	164-410 270
November	050-129 100	241-537 340	072-244 167	-	164-265 201	135-326 228
December	137-218 172	423-402 448	180-223 119	-	220-299 260	193-338 262
ANNUAL	027-218 118	077-559 822	045-312 184	035-192 112	047-324 188	029-410 232

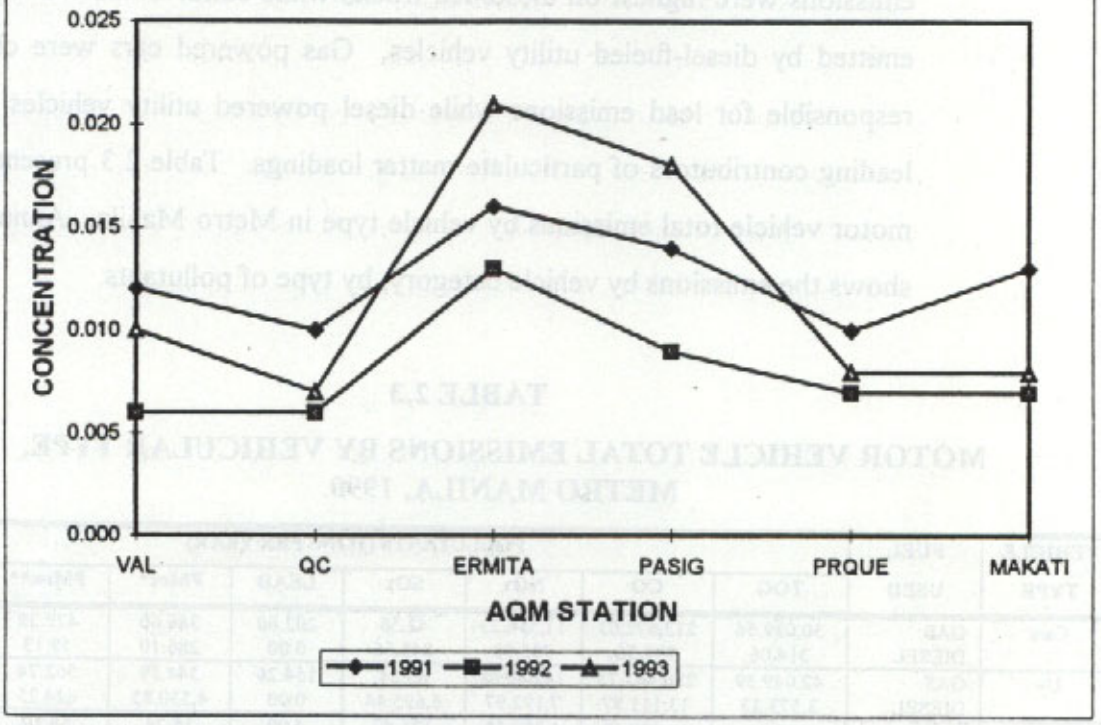
TSP Ambient Air Quality Guidelines for 24 hrs., 150 ug/Ncm

Source: DENR-NCR

TABLE 2.2
ANNUAL AVERAGES OF SULFUR DIOXIDE (SO2)
(24 Hour Sampling)

YEAR	AIR QUALITY MONITORING STATIONS						
	VAL	QC	ERMITA	PASIG	PRQUE	MAKATI	UNIT
1991	0.012	0.010	0.016	0.014	0.010	0.013	ppm
1992	0.006	0.006	0.013	0.009	0.007	0.007	ppm
1993	0.010	0.007	0.021	0.018	0.008	0.008	ppm

FIGURE 2.4
SULFUR DIOXIDE (SO2) ANNUAL AVERAGES
TREND (24 hour sampling)



Note: 0.07 ppm SO2 24-hour sampling - New standard
Source: DENR-NCR

Classification	Percentage to Total (%)
Car	45
Utility vehicles	37
Motorcycle/Tricycle	10
Trucks	7
Buses	1

The ADB Study on Vehicular Emission Control Planning in 1992 found out that about 74% of the accounted for vehicles was gasoline-fed and the remaining was diesel fueled. Utility vehicles powered by gasoline were the leading source of total organic gas and carbon monoxide. Nitrous oxide emissions were highest on diesel-fed trucks while sulfur oxide was mostly emitted by diesel-fueled utility vehicles. Gas powered cars were chiefly responsible for lead emissions while diesel powered utility vehicles were leading contributors of particulate matter loadings. Table 2.3 presents the motor vehicle total emissions by vehicle type in Metro Manila. Annex 2.1 shows the emissions by vehicle category, by type of pollutants.

TABLE 2.3

MOTOR VEHICLE TOTAL EMISSIONS BY VEHICULAR TYPE, METRO MANILA, 1990

VEHICLE TYPE	FUEL USED	POLLUTANTS (TONS PER YEAR)							
		TOG	CO	NOx	SOx	LEAD	PMex*	PMtw**	PMH
Cars	GAS	30,039.56	213,672.03	11,556.23	42.53	202.60	386.60	479.39	576.0
	DIESEL	314.06	938.36	955.98	845.56	0.00	286.10	59.13	298.3
Uv	GAS	42,049.39	280,441.73	14,640.68	65.54	154.26	544.59	562.74	766.4
	DIESEL	3,573.23	13,111.87	7,192.97	6,695.44	0.00	4,530.85	624.25	4,599.3
Trucks	GAS	577.49	11,770.02	1,276.38	121.47	4.09	16.24	68.20	43.4
	DIESEL	7,944.81	26,625.86	26,840.58	2,284.62	0.00	3,220.87	450.92	3,272.4
Buses	GAS	32.29	696.46	75.53	7.19	0.24	0.96	15.95	7.34
	DIESEL	997.94	3,344.45	3,371.42	286.97	0.00	404.57	56.64	411.04
MC/TC	GAS	15,425.57	22,025.37	306.25	2.93	46.11	1,466.45	45.46	1,475.3
TOTAL	GAS	88,124.30	528,605.61	27,855.08	237.65	407.30	2,414.84	1,171.74	2,869.0
	DIESEL	12,830.04	44,020.55	38,360.96	10,112.59	0.00	8,442.38	1,190.94	8,581.0
GRAND		100,954.34	572,626.15	66,216.02	10,350.25	407.30	10,857.23	2,362.67	11,450.

Source: EMB, 1990

* PM exhaust emission

** PM tire wear emission

2.2.2.2 Industrial and Area Source Emissions

Industries that require combustion in processing are common sources of fly ash, carbon monoxide and nitrogen oxides. A study by WBESS conducted in 1993 estimated that out of 103,800 tons of SOx in 1990, 76% came from power plants, 8% from the industry and the remaining 16% from the transportation sector (mainly diesel powered). Of the 19,185 tons particulate emissions in 1990, 29% was attributed to power plants, 8% to industry and 63% to vehicles of all types. Power plants and overall industry have 11% and 2% share of NOx emissions respectively, with the rest of the loading coming from the transport sector.

Generally, industries, services and power sectors are generating most of the total NOx, SOx, and PM. Food and kindred manufacturing emit a large portion of total organic gas while paper and allied products are contributing most of CO pollutants. As surveyed of the total 162 point sources in the Metro Manila area, the thermal power plants in Sucat, Manila and Rockwell accounted for 77% of the particulates and 29% of the total SOx emissions.

Table 2.4 indicates the types of pollutants by area of source emissions.

2.2.3 Air Quality Assessment

1) From the existing condition, traffic-related air pollution is relatively extensive compared with other sources of pollutants. Suspended particulate matter appears to be the most serious problem aside from lead that is found to be consistently beyond the allowable levels in certain areas of MMA (refer to Annexes 2.2 and 2.3 Revised Air Quality Standards of 1992 and Amendment to Administrative Order No. 14 series of 1993 and Clarifying its Coverage and

TABLE 2.4

TYPES OF POLLUTANTS BY AREA OF SOURCE EMISSIONS

METRO MANILA, 1990

TYPE OF SOURCE	POLLUTANTS, TONS/YEAR					
	TOG	CO	NOX	SOX	PM	PM10
Paved Road Travel	–	–	–	–	80,507.88	37,033.63
Structural Fires	9.25	113.08	2.57	–	7.20	7.06
Automobile Fires	0.09	2.87	0.09	–	2.30	1.61
Road Construction	–	–	–	–	8,478.89	5,426.49
Building Construction	–	–	–	–	13,380.19	8,563.32
Surface Coatings	381.8	–	–	–	–	–
Adhesive & Sealants	13,32.87	–	–	–	–	–
Dry Cleaning	80.75	–	–	–	–	–
Industrial Degreasing	773.30	–	–	–	–	–
Residential Fuel Combustion	11.61	29.71	145.98	0.18	5.17	5.17
Commercial Aircraft	161.54	378.93	127.17	12.09	4.49	4.38
Gasoline Dispensing Facilities	2,410.92	–	–	–	–	–
Total	5,162.13	524.59	275.81	12.27	102,386.12	51,041.66

Source: Vehicular Emission Control Planning in Metro Manila Report

Scope, respectively). Additional findings from the ADB Study accounted for a 3month average for lead concentration in the air at the ADB/EDSA station that exceeded the existing standard. Carbon monoxide and sulfur dioxide or other gaseous pollutants are not considered critical at their present concentrations although some points in the metropolis observed concentrations higher than the allowable limits at a given time.

2) "Smokestack industries" proliferate in the metropolis while pollution control actions have rarely been directed to curb their pollutive activities.

Components for new factories that are brought into the country rarely, if ever pass through an emission test to establish its fitness to operate in an environmentally acceptable standards. At present, the Pollution Adjudication Board has set a ruling that only the opinion of experts is acceptable so as to penalize an erring manufacturer. This makes the collection of hard data on pollution and making it more difficult to dispute in court. Factory owners have taken advantage of this weakness and openly break the law.

2.2.4 Pollution Load Projection

The Vehicular Emission Control Planning in Metro Manila Study conducted in 1992, made projections of the total Metro Manila area emissions and trends show that pollution may increase twice as much as the current levels by year 2005. Also, particulate matters and lead emissions which are highly correlated to vehicular number are estimated to increase by a factor of 2.19 and 2.32, respectively.

Sulfur dioxide, nitrous oxide and carbon monoxide are still not considered critical but may double by the year 2010. Consistent with these projections are the additional 2,000 units per month of new cars being fielded in Metro Manila at present. Figure 2.5 shows an indicative Emissions Trend up to the year 2005.

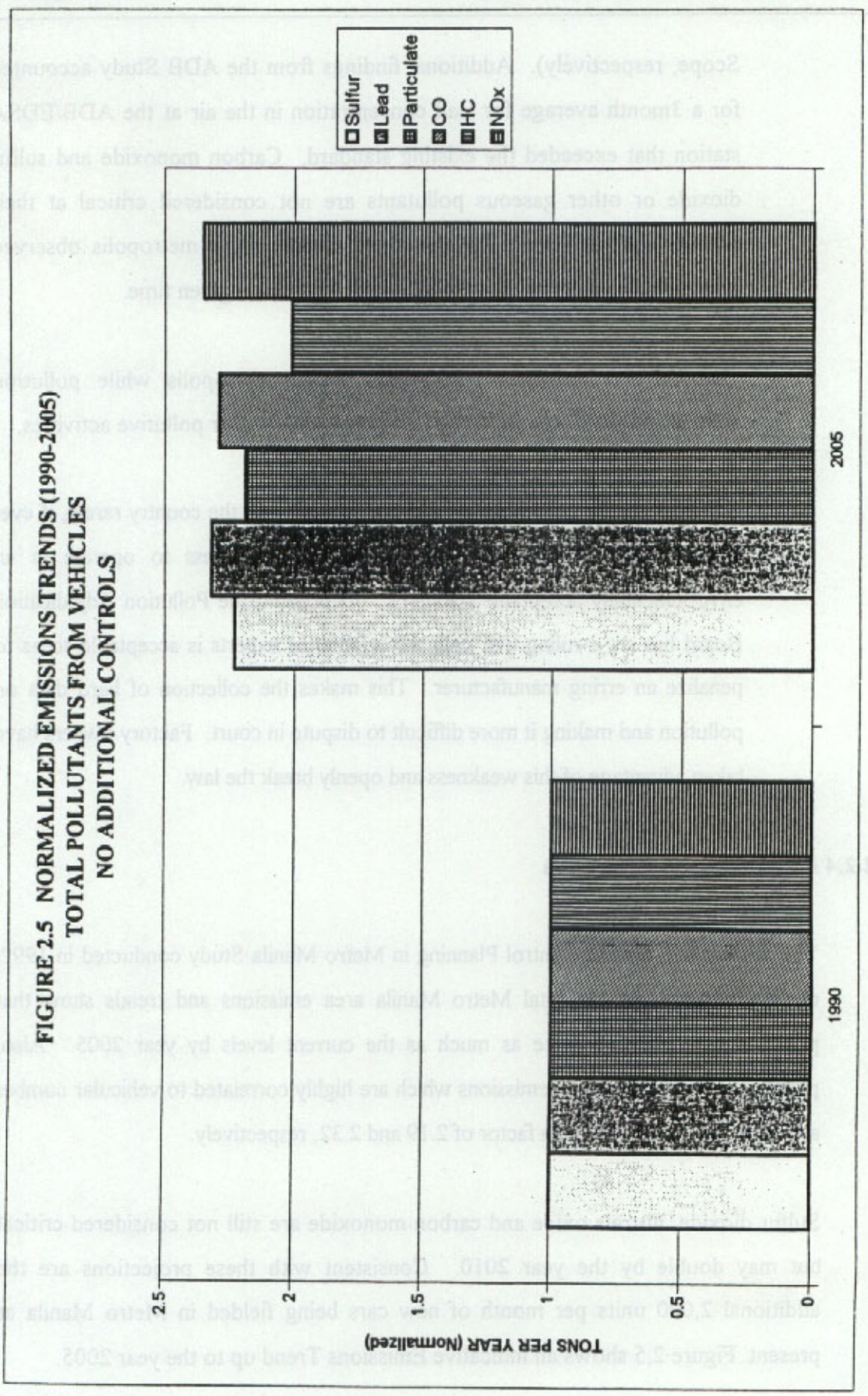


FIGURE 2.5 NORMALIZED EMISSIONS TRENDS (1990-2005)
TOTAL POLLUTANTS FROM VEHICLES
NO ADDITIONAL CONTROLS

Source: Final Report for Vehicular Emission Control Planning in Metro Manila

2.3 Water Quality

2.3.1 Types of Pollutants

Sewage, sediments, pesticides, heavy metals and toxic chemicals are the major types of pollutants in the waterbodies of Metro Manila.

2.3.2 Effluent Sources and Amounts

2.3.2.1 Domestic Wastewater

More than half of the organic pollution loads in the main river systems of the metropolis is domestic in origin. These are discharges from households that find their way to the river systems draining the study area.

Based on the Metropolitan Manila Management Study, the BOD levels in MMA's major river systems ranged from a high (40-120 mg/l) to a low 0 mg/l in Dario Creek, a tributary of San Juan and Pasig rivers during the dry season. During the wet season, BOD levels improved slightly (20 60 mg/l, highest and 0 mg/l, lowest). Figure 2.6 presents the mean BOD concentrations during the dry season in the major river systems of MMA. During this season, only Montalban River exhibited levels below the standard set by the DENR for Class C waters. Class C waters are waters intended for fisheries, recreation (boating) and industrial water supply (for manufacturing processes after treatment). Figure 2.7 shows the dissolved oxygen (DO) levels in MMA major rivers. Only the rivers of Paranaque and Marikina exhibited DO levels above the set standard for Class C waters.

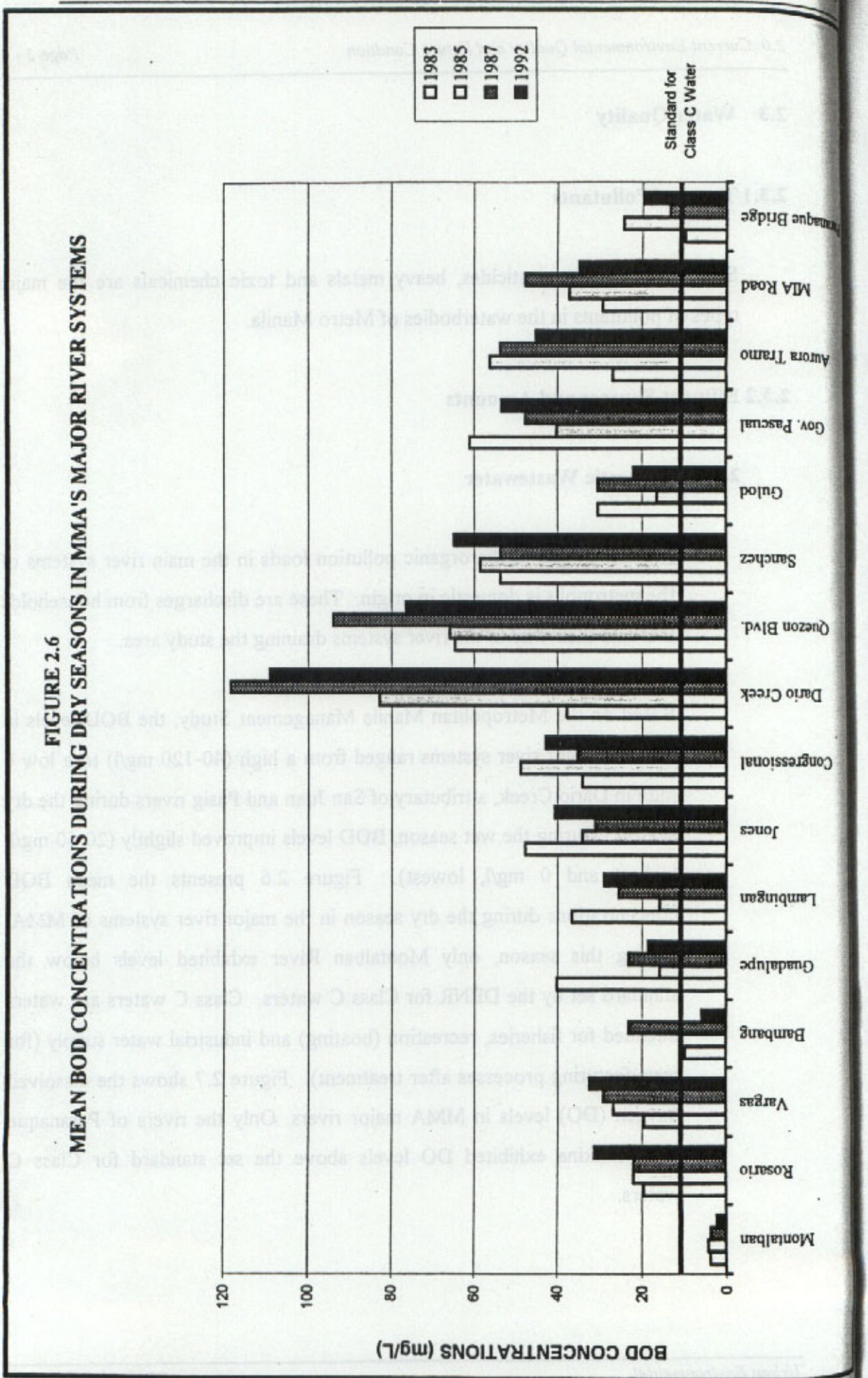


FIGURE 2.6
MEAN BOD CONCENTRATIONS DURING DRY SEASONS IN MMA'S MAJOR RIVER SYSTEMS

FIGURE 2.7 METRO MANILA RIVERS DISSOLVED OXYGEN CONCENTRATION

Source: Metropolitan Manila Management Study

2.3.2.2 Industrial Wastewater

Data from the 1992 Industrial Efficiency and Pollution Control Program (IEPCP) estimated that about 38% of BOD loading in the entire Metro Manila is industry-related. This loading finds its way either towards Laguna Lake or Manila Bay areas.

Food processing is found to be most the pollutive followed by piggeries, beverage production and textile manufacturing. Other sources include: petrochemical and chemical industry, pharmaceutical, metal finishing, commercial laundries, hospitals and clinics, electronic industries, leather tanning, automotive industry, pulp and paper, paints and solvents, battery manufacture and construction industry.

From the same data source, it was revealed that out of the 315 industries visited, 76 (24%) have installed water treatment facilities, 39 (12%) are operating without treatment, while the rest (64%) failed to make clear if they have treatment systems.

2.3.3 Water Quality Assessment

2.3.3.1 Inland Waters

River Systems

Except for the headwaters of Marikina River, all the tributaries of these rivers do not support any form of aquatic life due to low levels of dissolved oxygen. The rivers are already considered as biologically dead. Considered worst of all systems is the NMTT since it now functions as a receiving basin to domestic and industrial wastes for residential settlements, and commercial and industrial establishments situated in the

adjacent area of the river system. Pasig-Marikina system is second primarily due to inadequate treatment of septage disposed by residents in nearby areas. This problem is aggravated during rainy season when flooding occurs bringing in raw effluent and thereby increasing the risk of disease in the affected communities.

Laguna de Bay

Laguna de Bay is a major body of water in close proximity to Metropolitan Manila making it a major catchment area of both domestic and industrial wastewaters as well as to some extent solid waste. The remaining forest cover of its watershed area is only about 10%. Some problems associated with the current environmental degradation of the lake are:

1) high sedimentation rate resulting to increased turbidity, less light penetration and destruction of fish habitat;
2) influx of nutrients from agricultural lands using inorganic fertilizers causing eutrophication, alga bloom, and fishkills;
3) BOD loads coming from domestic and industrial wastes resulting to slow fish growth;
4) overfishing and bad fishing aquaculture practices;
5) toxic and hazardous wastes from industrial wastes;
6) decrease in the amount of saline water entering the lake from Manila Bay, and
7) use of lakewater for cooling purposes in industries and power plants causing localized rise in temperature resulting to decrease in dissolved oxygen.

Also, a study conducted by URSI in 1989 also revealed that the growth of diatom and green algae in the lake is estimated at 20,000 and 30,000 cells per millimeter respectively indicating a high level of pollution. It is

likewise a prolific host to water hyacinth plants which grow thick especially along the fishpens. During summers when these plants die off, organic concentration is very high.

Data on DO concentrations (1982-1990) as gathered from the different points of the Bay indicated that the DO levels were slightly decreasing. Likewise, BOD levels showed a decreasing trend.

The recreation potential of the lake is also on the decline being classified as Class C water quality with coliform counts exceeding the standards. The mean coliform count for the entire lake was taken at 12,580 MPN/100 ml in 1985. Relatedly, it has also a negative impact on the fisheries. Statistics showed a declining trend of fish hauls from a high of 80,000 tons per year down to 17,000 tons per year as recorded in 1987. Biodiversity is likewise affected as manifested by drastic reduction and disappearance of some fish species.

2.3.3.2 Coastal Waters

The coastal waters of Manila Bay fail to meet the criteria for swimming and fishing because of the discharge of domestic, industrial and agricultural wastes. Manila Bay has become shallow with an average depth of only 10m depth (up to 3km offshore), is poorly flushed, and has a high sedimentation rate.

Dissolved oxygen concentration ranges from a low 3 mg/L at the bottom to a high 8.5 mg/L at the surface. Low concentrations can be attributed to high organic decomposition and decaying processes taking place at the bottom. High ammonia levels are also present specifically adjoining the mouth of the Pasig River, which is an indication of eutrophication.

Furthermore, fecal coliform bacteria counts were excessive (3,332 to 512,000 MPN/100ml) that swimming at the beaches along the eastern part of the Bay has been prohibited.

Heavy metal concentrations in shellfish gathered from the Bay were found to be of concern as concentration levels in mussels and oysters were reported to have exceeded acceptable standards. Also, oils and slicks coming from harbor and shipping operations have contributed to the deterioration of the marine environment.

Figures 2.8 and 2.9 present the mean DO and BOD concentrations, respectively in Manila Bay, Laguna Lake and river systems in MMA. Annexes 2.4 and 2.5 present the Revised Water Usage and Classification-Water Quality Criteria Amending Section Nos: 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations (DENR Administrative Order No. 34) and Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982 (DENR Administrative Order No. 35), respectively.

2.3.4 Pollution Load Projection

The IEPC has established the following trends that are utilized for this projection:

1) A mild recession in 1990 and 1991 resulted in a 1.2% decrease in production capacity of industries but signs of recovery were noticed the last quarter of 1991.

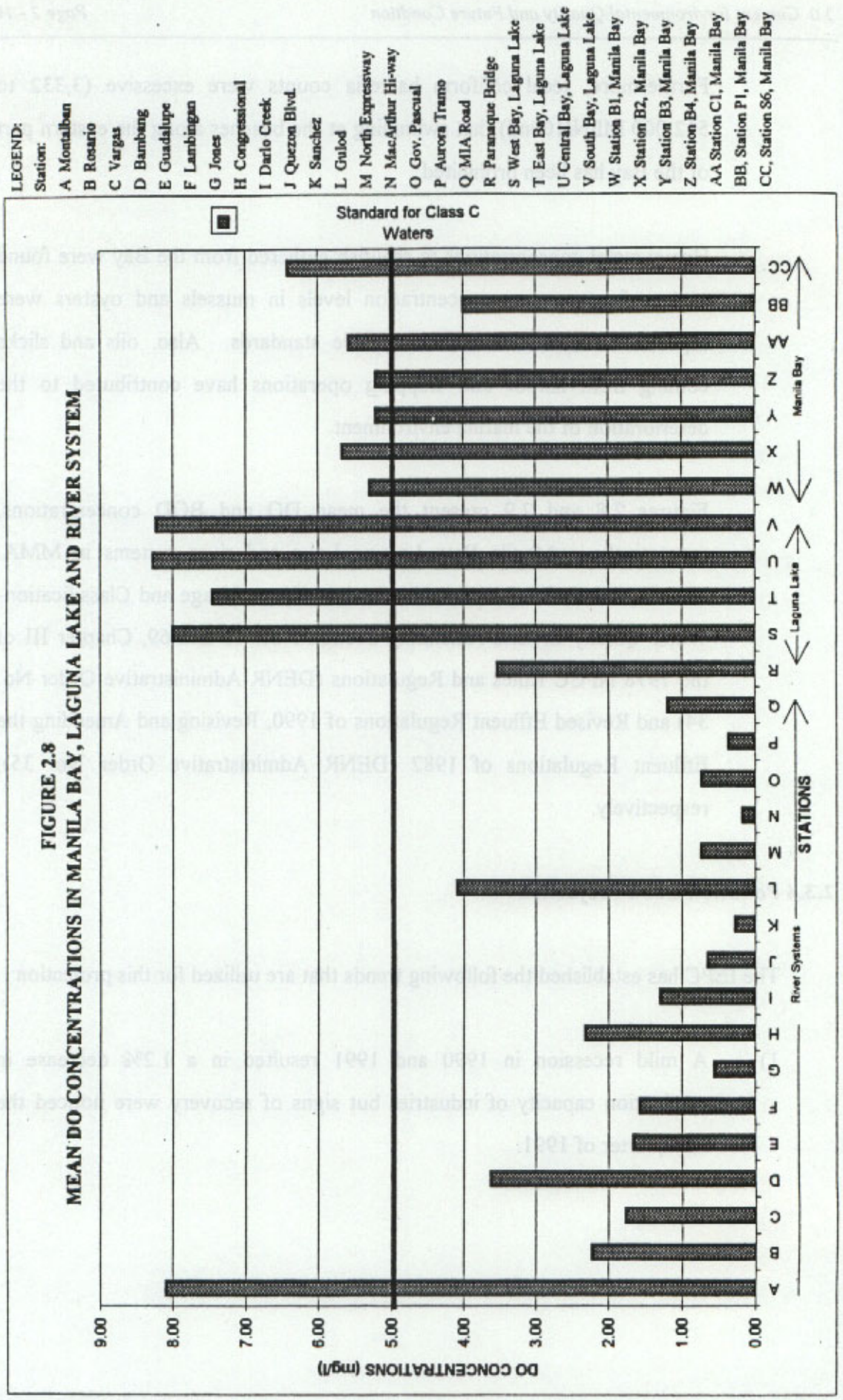


FIGURE 2.8
MEAN DO CONCENTRATIONS IN MANILA BAY, LAGUNA LAKE AND RIVER SYSTEM

Source: Metropolitan Manila Management Study

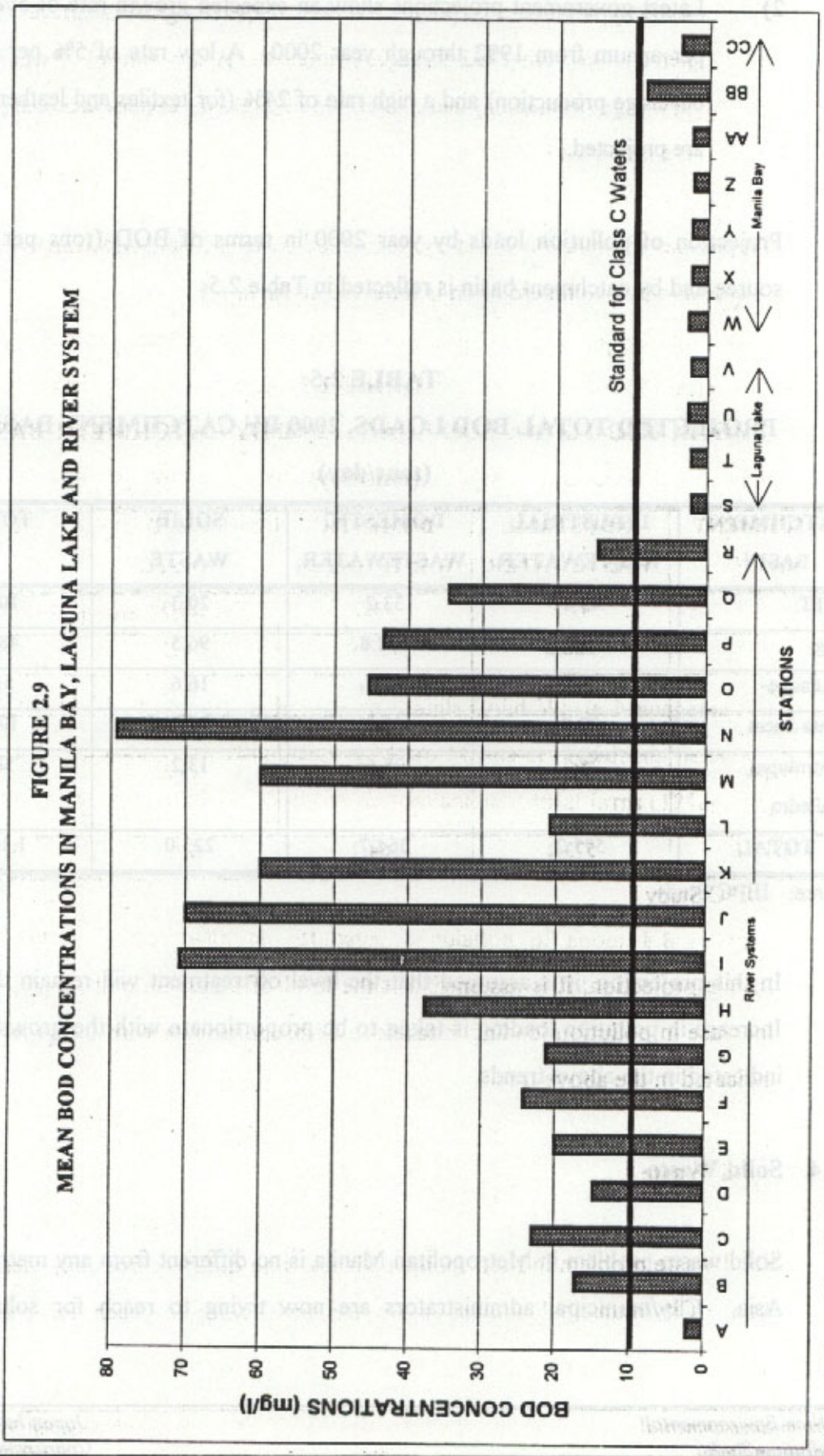


FIGURE 2.9
MEAN BOD CONCENTRATIONS IN MANILA BAY, LAGUNA LAKE AND RIVER SYSTEM

Source: Metropolitan Manila Management Study

2) Latest government projections show an expected growth rate of 5% to 24% per annum from 1992 through year 2000. A low rate of 5% per year (for beverage production) and a high rate of 24% (for textiles and leather tanning) are projected.

Projection of pollution loads by year 2000 in terms of BOD (tons per day) by source and by catchment basin is reflected in Table 2.5.

TABLE 2.5

PROJECTED TOTAL BOD LOADS, 2000 BY CATCHMENT BASIN

(tons/day)

CATCHMENT BASIN	INDUSTRIAL WASTEWATER	DOMESTIC WASTEWATER	SOLID WASTE	TOTAL
NMTT	47.1	33.2	20.3	100.6
Pasig	226.8	157.8	96.5	481.1
Parañaque	7.8	27.1	16.6	51.5
Cainta Sucat	77.8	60.9	37.2	175.9
Muntinlupa/ San Pedro	25.1	21.6	13.2	59.9
TOTAL	573.2	364.7	223.0	1,160.9

Source: IEPC Study

In this projection, it is assumed that the level of treatment will remain the same. Increase in pollution loading is taken to be proportionate with the growth rate as indicated in the above trends.

2.4 Solid Waste

Solid waste problem in Metropolitan Manila is no different from any metropolis in Asia. City/municipal administrators are now trying to reach for solutions to

mounting refuse and its proper disposal given the meager financial and human resources allocated to address this concern. To complicate matters, the overall responsibility of solid waste management has been delegated to the local government units whose expertise and resources to handle such function is still insufficient.

2.4.1 Types of Refuse

Waste characterization shows the following major composition: food and kitchen wastes (32%), screenings of less than 10 millimeters (17%) and paper (10%). Residential and market areas are the major sources of food and kitchen wastes and screenings, while paper wastes are largely produced by commercial and institutional establishments.

2.4.2 Generation Factors

Based on the report of the Metro Manila Solid Waste Management Project, the primary sources of solid waste in Metro Manila are residential areas (50%), roads (20%), wet markets (13%), commercial and industrial firms (12%) and institutions (5%).

Metro Manila, with an estimated population of about 8.8 million, generates garbage at the rate of 5,000 to 5,400 tons per day. Table 2.6 presents the status of solid waste management in Metro Manila.

TABLE 2.6
STATUS OF SOLID WASTE MANAGEMENT IN METRO MANILA
1991, 1994

	1991	1994
Population (Million)	8.5	8.8
Households (Million)	1.5	1.6
Waste Generation Rate (kg/capita/day)	.5-.6	.6
Volume of waste generated (tons per day)	4,500-5,000	5,000-5,400
Environmental Sanitation Center (ESC) Personnel	11,000	9,115
ESC Trucks (owned)	168 (55% available)	229 (203 compactors, 6 dumptrucks, 20 prime movers)
ESC Trucks (contracted)	438 (75% available)	
ESC open dumpsites	5	2 (Catmon, Malabon, and Payatas, Q.C.)
ESC Sanitary landfills	1	2
Volume of waste dumped by ESC: - San Mateo Landfill - Carmona Landfill	3,850 tons per day	 1,100,000 cu.m. 567,368 cu.m.
ESC Annual Expenditure	₱ 765 Million	₱ 441 Million
ESC Recurrent Expenditure (per ton w/o owning cost)	₱ 615/ton ₱ 113 capita/year	

Source: Environmental Sanitation Center, MMDA

2.4.3 Quality Assessment

1) Private contractors tasked to do the collection are usually ill-equipped and inefficient to handle the frequency and volume of collections.

2) Due to narrow streets, garbage collection trucks cannot serve squatter settlements and residents therefore have to dump their refuse in either vacant lots, roadways, creeks or other waterways.

3) Accumulation of uncollected garbage or indiscriminately dumped refuse causes vermins and other disease vectors to thrive well. This results to unsanitary/unhygienic environment.

4) Existing sanitary landfills do not have the flexibility to accommodate garbage beyond their capacity and therefore the metropolitan Government is now under pressure to locate and develop additional sites for disposal.

5) Flooding of city streets is also related to improperly disposed garbage finding their way to the drainage system. Problems of this nature are more pronounced in areas not adequately served by collection trucks.

2.4.4 Solid Waste Generation Projection

From the same report cited earlier, the amount of refuse that can be generated is directly correlated with the rate of population growth. The annual population growth rate for Metro Manila during the period was 2.9 percent per annum with an estimated rate of increase in refuse generation of 4.4% per annum.

With the projected growth rate of about 2 percent, it is expected that the refuse situation may worsen if current resources (capacity of landfill, location and number

of transfer stations, vehicles, equipment and manpower, etc.) allocated to solid waste management and institutional set-ups are maintained at the present levels.

Solid waste projection will be influenced by annual growth rates of population, consumption patterns, production levels, and resource recovery and recycling efforts. Table 2.7 shows the estimated generation of solid waste for year 2000.

2.5 Toxic and Hazardous Wastes

Substances that are harmful to humans or to the environment by virtue of their corrosivity, reactivity or ignitability are by definition considered as toxic and hazardous wastes. In most cases, these may be liquid or solid substances such as waste pesticides and asbestos, or it may also be gaseous materials. Special treatment techniques are required prior to disposal.

2.5.1 Types of Pollutants

Toxic and hazardous substances can be classified by treatment type as follows:

1) acid and alkali wastes, which are treated by neutralization;
2) heavy metals which can be chemically treated and physically separated (e.g. as hydroxide precipitates) then placed in secured landfill;
3) solvents and hydrocarbon liquids, which can be recovered/reused or incinerated;
4) infectious waste which can be treated by disinfection, incineration and/or landfilling; and
5) intractable wastes which require highly specialized destruction techniques, or for which there is no method, e.g., dioxins, asbestos, and nuclear wastes.

TABLE 2.7
ESTIMATED GENERATION OF SOLID WASTE
BASED ON PROJECTED POPULATION
Metro Manila, (per City and Municipality)
Years 1995, 2000

CITIES/ MUNICIPALITIES	1995		2000	
	POPULATION	ESTIMATED GENERATION	POPULATION	ESTIMATED GENERATION
Manila	1,610,948	2,685	1,635,258	2,725
Quezon City	1,928,958	3,215	2,279,951	3,800
Kalookan City	348,508	581	438,477	731
Malabon	894,608	1,491	1,072,819	1,788
Navotas	225,212	375	272,690	454
Valenzuela	427,772	713	538,203	897
Pasig	478,272	797	579,099	965
San Juan	128,916	215	130,862	218
Marikina	369,355	616	442,933	738
Taguig	372,735	621	520,341	867
Pateros	57,421	96	64,650	108
Makati	496,603	828	545,607	909
Mandaluyong	270,045	450	295,240	492
Parañaque	358,031	597	427,286	712
Las Piñas	408,684	381	583,995	973
Muntinlupa	391,735	653	552,001	920
Pasay City	392,764	655	435,773	726
TOTAL (cu. m. per day)	9,160,567	14,969	10,815,185	18,023
(tons per day)		5,038		5,948

Notes:
1. Population Projection base year is 1990 per National Statistics Office report.
2. Estimated Generation is computed by multiplying 0.5 kg. (per capita generation per day) with projocted population (with 10% mark up for transient/daytime population), then divided by 330 kgs. (waste density is 330 kgs. per cu. m.).

Source: Integrated National Solid Waste Management System Framework 1993-1998

2.5.2 Generation of Pollutants

There is still a dearth of information on the extent of toxic and hazardous substances being discharged from the different sources. At present, there is an on-going study on the inventory of these substances.

2.5.2.1 Industrial Waste

From the IEPC report, a rough estimate was derived based on a survey of a few industries as well as their inventories and presented in Table 2.8.

2.5.2.2 Hospitals

Another concern is the waste generated by the hospitals, clinics, and similar health care facilities. Disposal of waste from hospitals caught the attention of the public with the spread of AIDS and other diseases. By law, hospitals are required to maintain an incinerator to dispose contaminated materials and amputated human organs unless intended for research or upon orders of the courts.

2.5.2.3 Others

Households also contribute to this type of pollution. While individually, the toxic/hazardous wastes present in collected residential rubbish is low, the cumulative effect can be large that the combined volume may exceed the industrial share. A number of hazardous materials are used in the manufacture of household products such as fluorescent lamps which after use, these products are typically dumped with other solid wastes. Flashlight batteries, electronic appliances, paints medicines, and beauty

TABLE 2.8
TOXIC AND HAZARDOUS WASTE GENERATION (1992)

INDUSTRY SECTOR	ACID ALKALI (m^3/yr)	HEAVY METALS (T/yr)	SOLVENT WASTES (m^3/yr)	INFECTIOUS WASTES (T/yr)	OILS & GREASES (T/yr)	BIOLOGICAL SLUDGE (T/yr)	INTRACTABLE WASTES (T/yr)
Automatic:							
Assembly/Parts		950	950				100
Service		1					
Battery Manufacture	780	3			17,500		
Dyes & Textiles						700	10
Electronics	22×10^6	440	100				
Hospitals				100		40	
Leather Tanning		1			550	210	10
Metal Finishing	2.5×10^4	125	600				30
Paints and Solvents		20	160				100
Petrochemical & Chemicals	1.1×10^5	10			90	500	40
Pharmaceuticals						150	
Pulp and Paper						580	
TOTAL	**24.6 x 106**	**1,550**	**1,810**	**100**	**18,140**	**2,180**	**290**

Source: IEPC Program Report

aids are common waste materials from households that contain toxic and hazardous materials.

2.5.3 Quality Assessment

In the absence of any effective treatment process for toxic and hazardous wastes, recyclers or scavengers are faced with danger by coming in contact with these substances. When there are toxic wastes or dangerous substances present in the waste being disposed, a scientific and sophisticated treatment process prior to disposal is required.

Under the new law, the national government has the authority to regulate toxic and hazardous waste disposal. In addition, DENR has the authority to regulate the entire lifecycle of a chemical or mixture from the point of manufacture to its ultimate disposal. There are also guidelines for transport and storage of hazardous waste although there is still lack of recognition on the importance of said provisions.

With the implementation of the national government's policy to construct small hospitals for better access by the public to health services, concerns are raised on the capability of these hospitals to develop and maintain proper disposal of hospital wastes such as syringes, dressing materials and amputated organs. Also, attention must be given to the proper disposal of expired drugs, which are often disposed in hospitals' septic system.

CHAPTER 3
INSTITUTIONAL ARRANGEMENTS and CAPACITY FOR ENVIRONMENTAL MANAGEMENT

3. INSTITUTIONAL ARRANGEMENTS AND CAPACITY FOR ENVIRONMENTAL MANAGEMENT

3.1 General

Under the current institutional arrangement, both the government and the private sector play major roles in the environmental management of MMA. To ensure success in achieving the objectives and functions established for these institutions, their capacities and capabilities as well as their relationship and linkages with each other is discussed.

Meanwhile, this arrangement should take into account the Local Government Code (LGC) of 1991 which has essentially redefined the role of various central and local institutions in the delivery and implementation of some environmental areas of concern. The responsibility for environmental management functions was basically lodged with various national agencies. The new direction mandates the Local Government Units (LGUs) to play a larger role in the implementation of environmental programs/projects. This raises serious institutional capacity and resource reallocation issues.

3.2 Agencies at the National Level

Table 3.1 outlines the agencies that are involved in various urban environmental management functions in MMA.

TABLE 3.1

AGENCIES INVOLVED IN URBAN AND INDUSTRIAL ENVIRONMENTAL MANAGEMENT FUNCTIONS, METRO MANILA

ENVIRONMENTAL CONCERNS	INSTITUTIONAL FUNCTIONS				
	POLICY AND PLANNING	PERMITTING	ENFORCEMENT	MONITORING	SUPPORT
I. *Air Quality*					
a. Mobile Sources	Department of Environment and Natural Resources Environment - Environmental Management Bureau (EMB)	DENR Regional Offices Laguna Lake Development Authority (LLDA)	DENR Regional Offices Metro Manila Development Authority (MMDA)	EMB	Department of Transportation and Communications (DOTC)
					Department of Health (DOH) Department of Energy (DOE)
			Local Government Units (LGUs)		Department of Trade and Industry (DTI)
b. Stationary Sources	DENR (EMB)	DENR Regional Office LLDA	DENR Regional Office LLDA	DENR (EMB) LLDA	DOE DTI
II. *Water Quality*					
a. Domestic (Sewerage)	DENR (EMB)	Metropolitan Waterworks and Sewerage System (MWSS) LGUs	MWSS	MWSS DENR Regional Office	MWSS DOH
b. Industrial	DENR (EMB)	MWSS	MWSS	MWSS	DTI
III. *Solid Waste Managememt*					
a. Domestic	DENR	DENR MMA LGUs	LGUs MMA	LGUs MMA	Department of Public Works and Highways(DPWH) DOH DENR Non-Government Organizations (NGOs)
b. Industrial	DENR (EMB)	MMA	LGUs	MMA	DTI
c. Toxic and Hazardous Waste	DENR (EMB)	DENR (EMB)	DENR (EMB)	DENR (EMB)	DENR
IV. *Land Use*					
a. Residential	DENR (EMB) Housing and Land Use Regulatory Board (HLURB)	LGUs HLURB	LGUs HLURB	LGUs HLURB	National Economic and Development Authority (NEDA) Coordinating Office for Regional Development (CORD) DENR
b. DENR (EMB)	LGUs HLURB	LGUs HLURB MMA	LGUs HLURB MMA	LGUs	DTI

Source: Metropolitan Manila Management Study

3.2.1 Department of Environment and Natural Resources

The Department of Environment and Natural Resources (DENR) is the lead agency taking charge of the country's environment. It formulates and enforces policies and guidelines for environmental protection and pollution control. It checks compliance of major projects with environmental guidelines.

DENR works with all environmental management agencies and special regulatory bodies. Its coverage however, is less than what it would take to fully influence the quality of urban and industrial environment. There are many agencies that influence the number and location of industries, housing subdivisions, and the location of transportation and water resource development infrastructure.

Organizationally, DENR is a typical government agency as reflected in Figure 3.1. Line and staff organizations provide a command line that extends from a chief executive officer (Secretary) to the lowest operating level, the Community Environment and Natural Resources Officers (CENRO). Following the chain of command, the operations would flow through an Undersecretary to the Regional Executive Directors (REDs), the Provincial Environment and Natural Resources Officers (PENROs), and the CENROs.

The staff is usually organized along technical specialty lines. The specialties are presented by staff Bureaus: Forest Management, Environmental Management, Lands, and Mines and Geosciences, etc. The staff expertise is replicated at each of the line command levels to the degree that the work load warrants. The key units of the DENR tasked with urban and industrial environmental management are 1) the Office of the Undersecretary for Environment and Research, which provides staff support to the Secretary, including policy recommendations and program/project proposals in the area of environmental management, protection

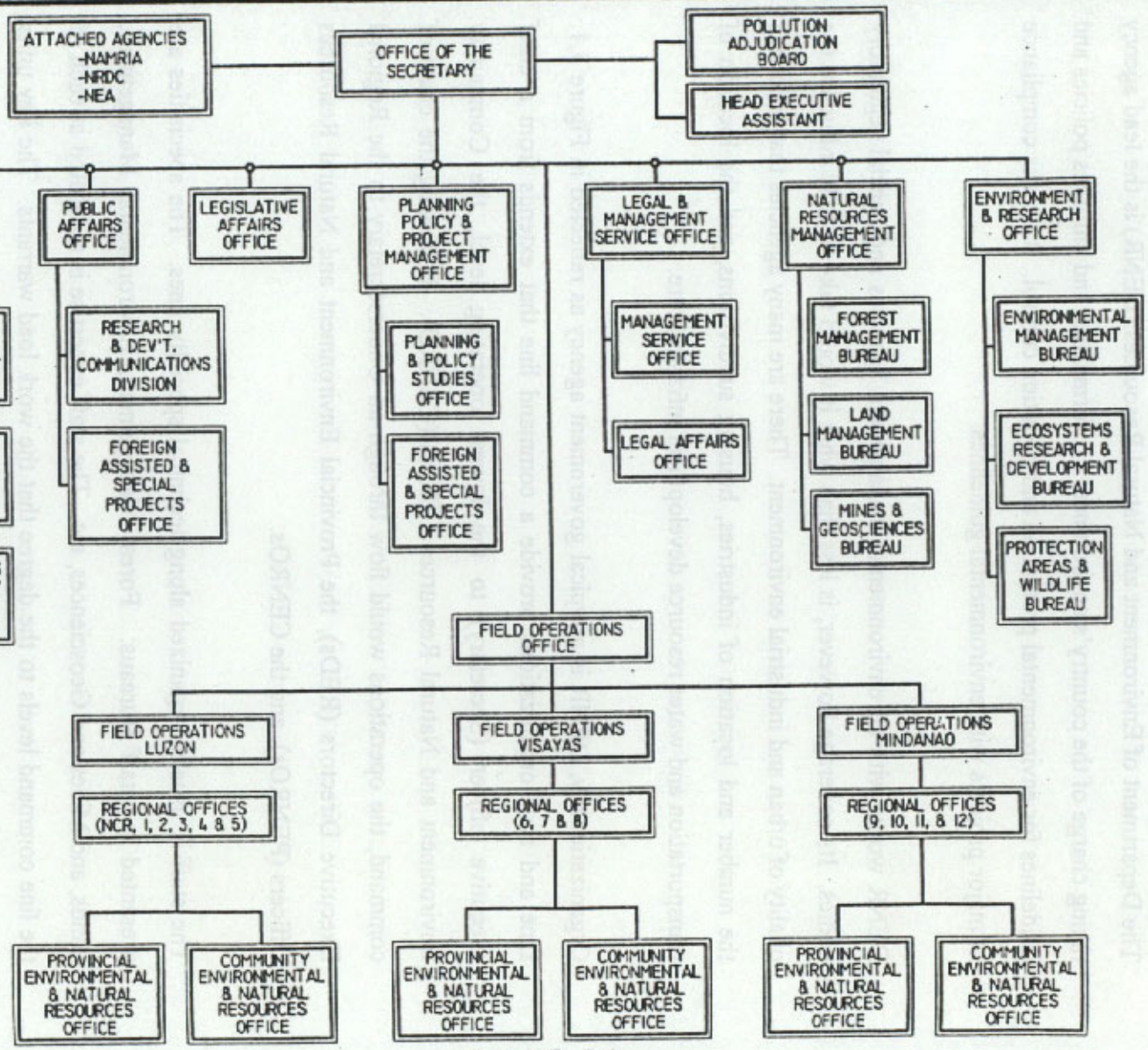


FIGURE 3.1
ORGANIZATIONAL STRUCTURE
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

and enhancement; and 2) the Office of the Undersecretary for Field Operations, which supervises the DENR Regional Offices, including implementation of the programs/projects, enforcement of environmental laws, rules and regulations, and compliance monitoring.

3.2.1.1 Specialized Agency/Corporation

DENR has specialized agency and corporation attached as part of its function. The National Mapping and Resources Information Agency (NAMRIA) and National Resources Development Corporation (NRDC) are two main entities with functions relative to urban and environmental management.

Comprehensive data acquisitions on resources and mapping program are the primary responsibilities of NAMRIA. As one of the recipients to Australian Government Assistance under its Natural Resources Management Project, NAMRIA is a depository of aerial photographs and maps particularly useful to land use planning, environmental impact assessments and other environmental planning activities. It is not however, capable of producing powerful planning aids like time series aerial photography which is extensively used nowadays for assessment of pollution problems due to limited technology and resources. At present, the agency's output is not maximized in application to urban and industrial management despite the presence of expertise within the organization.

NRDC is governed by a Board of Directors with the Secretary of DENR as the chairman. NRDC is acting as a facilitator for transaction between private and government entities. It has so far made arrangements for private-public sector ventures into mineral development.

FIGURE 3.1 ORGANIZATIONAL STRUCTURE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

3.2.1.2 Environmental Management Bureau

The Environmental Management Bureau (EMB), a staff bureau of DENR is responsible for developing strategies and programs for effective environmental protection and management. It is also tasked to formulate environmental policies/programs and actions utilizing tools like the Environmental Impact Assessment/Statement System (EIA/SS) and the Environmental Compliance Certificate (ECC). The processes flow for the granting of ECCs are shown in Figures 3.2 and 3.3.

Specifically, the functions of EMB are: 1) to recommend for legislation environmental management and pollution control concerns; 2) to establish air and water quality standards and regulations of toxic and hazardous waste materials; 3) to set conditions for, and to issue permits for air and water discharges; 4) to provide assistance to regional offices on a request basis and to maintain regulatory enforcement responsibility for the National Capital Region (NCR).

EMB is composed of the Office of the Director and four divisions: legal, environmental quality, research and development, and environmental education. Figure 3.4 presents the organizational structure of the EMB.

3.2.1.3 Pollution Adjudication Board

Under Executive Order 192 of 1987, the various duties and responsibilities of the NPCC were transferred to the Pollution Adjudication Board (PAB), the Environmental Management Sector of the DENR Regional Offices and the EMB.

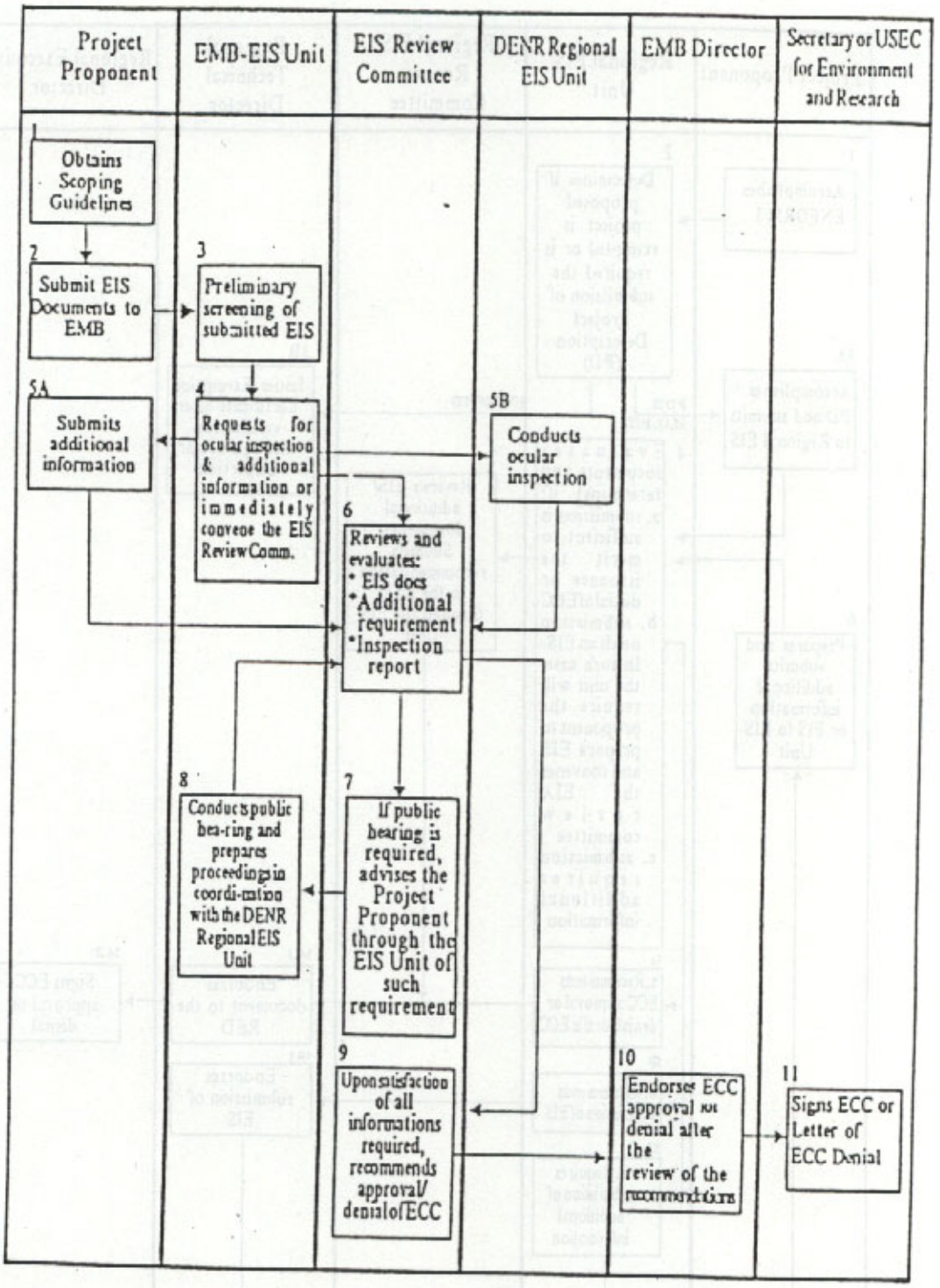


FIGURE 3.2

PROCESS FLOW FOR THE REVIEW OF ENVIRONMENTAL IMPACT STATEMENT (EIS) DOCUMENTS

SOURCE : EMB - DENR

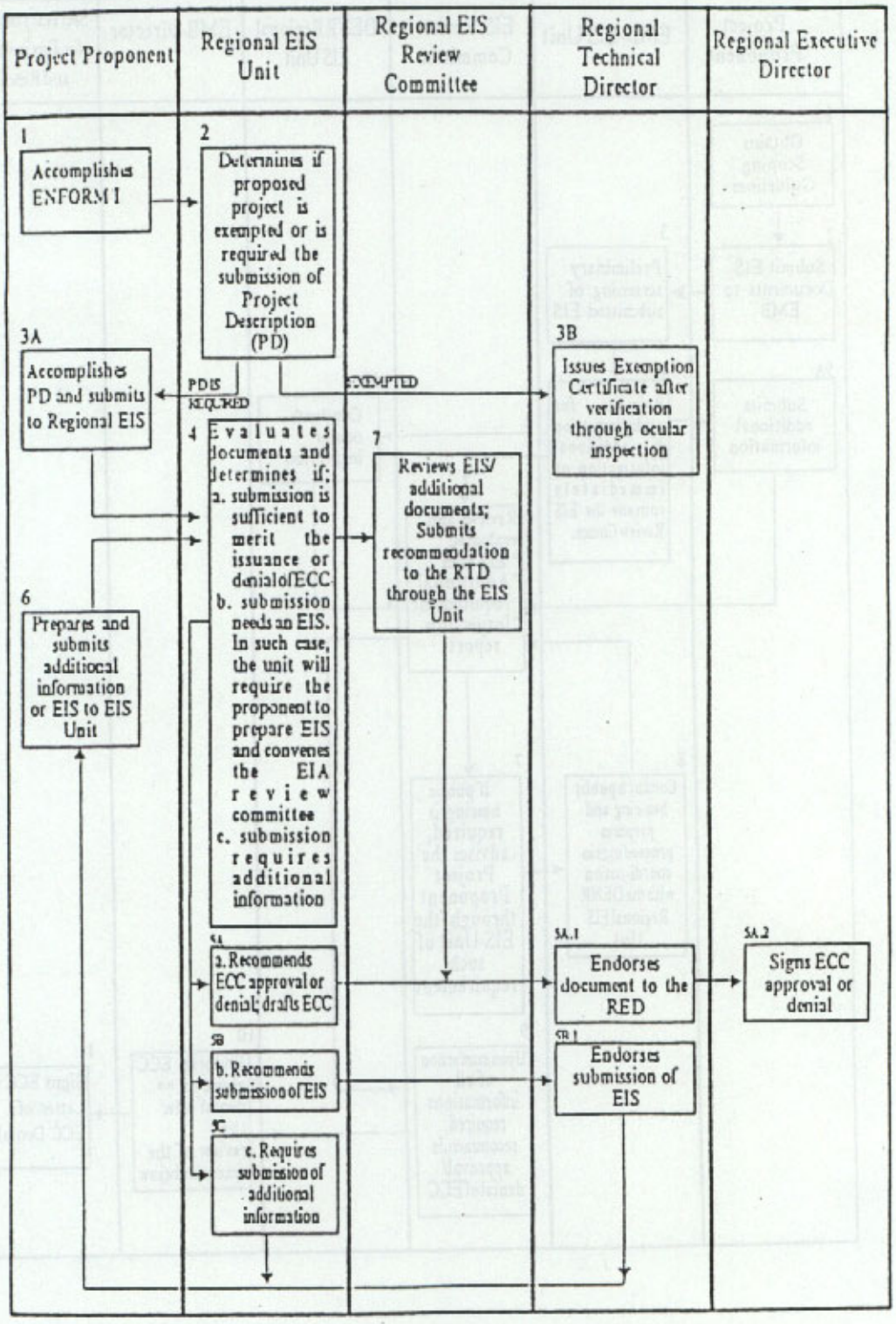


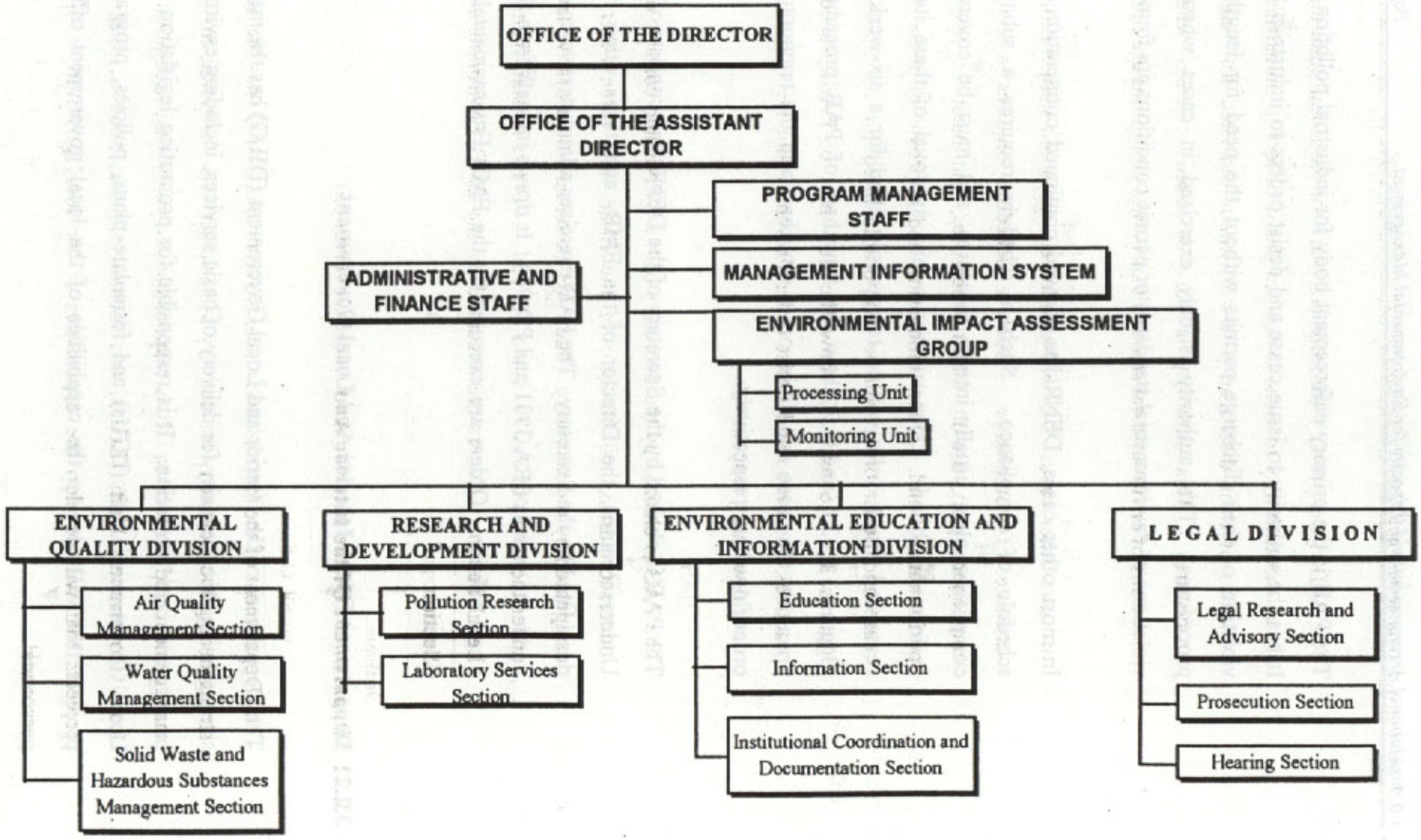
FIGURE 3.3

PROCESS FLOW FOR THE REVIEW OF PROJECT DESCRIPTION (PD) DOCUMENTS

SOURCE : EMB - DENR

FILENAME : ----- DISKETTE NO. -----

FIGURE 3.4
EMB ORGANIZATIONAL STRUCTURE



Source: EMB-DENR

The PAB is the primary enforcement body for industrial pollution control. It has the authority to issue cease and desist orders to industries found in violation of their discharge permits without the need for lengthy court procedures. This authority is only exercised in cases where major violations of environmental standards or permit conditions are found.

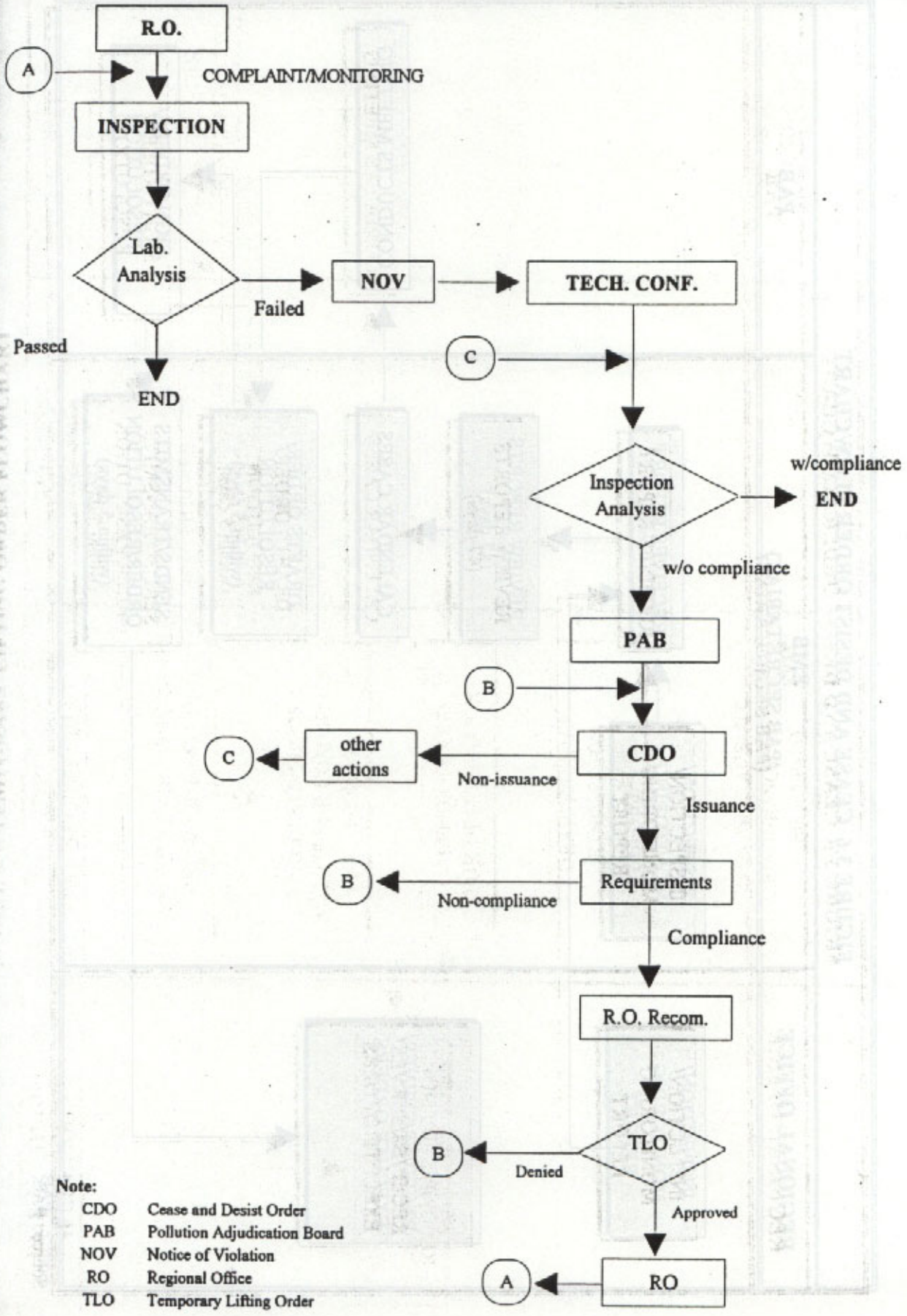
In most other cases, DENR has allowed continued cooperation under a schedule of compliance. Such a schedule requires a submittal of compliance plan, usually interim measures, and must be covered by a performance bond. Upon submission and approval of these items, the cease and desist order will be temporarily lifted for a six-week period. Figures 3.5, 3.6 and 3.7 show the flowchart of PAB procedures and practices, the cease and desist order flowchart and the temporary lifting order flowchart, respectively.

The PAB is chaired by the Secretary of the DENR and consists of the two Undersecretaries, the Director of the EMB, and three other members designated by the Secretary. The PAB exercises administrative law powers under the terms of RA 3931 and PD 984. It draws its staff from the EMB Legal Section. Orders are executed by the EMB Environmental Quality Section.

3.2.2 Department Of the Interior And Local Government

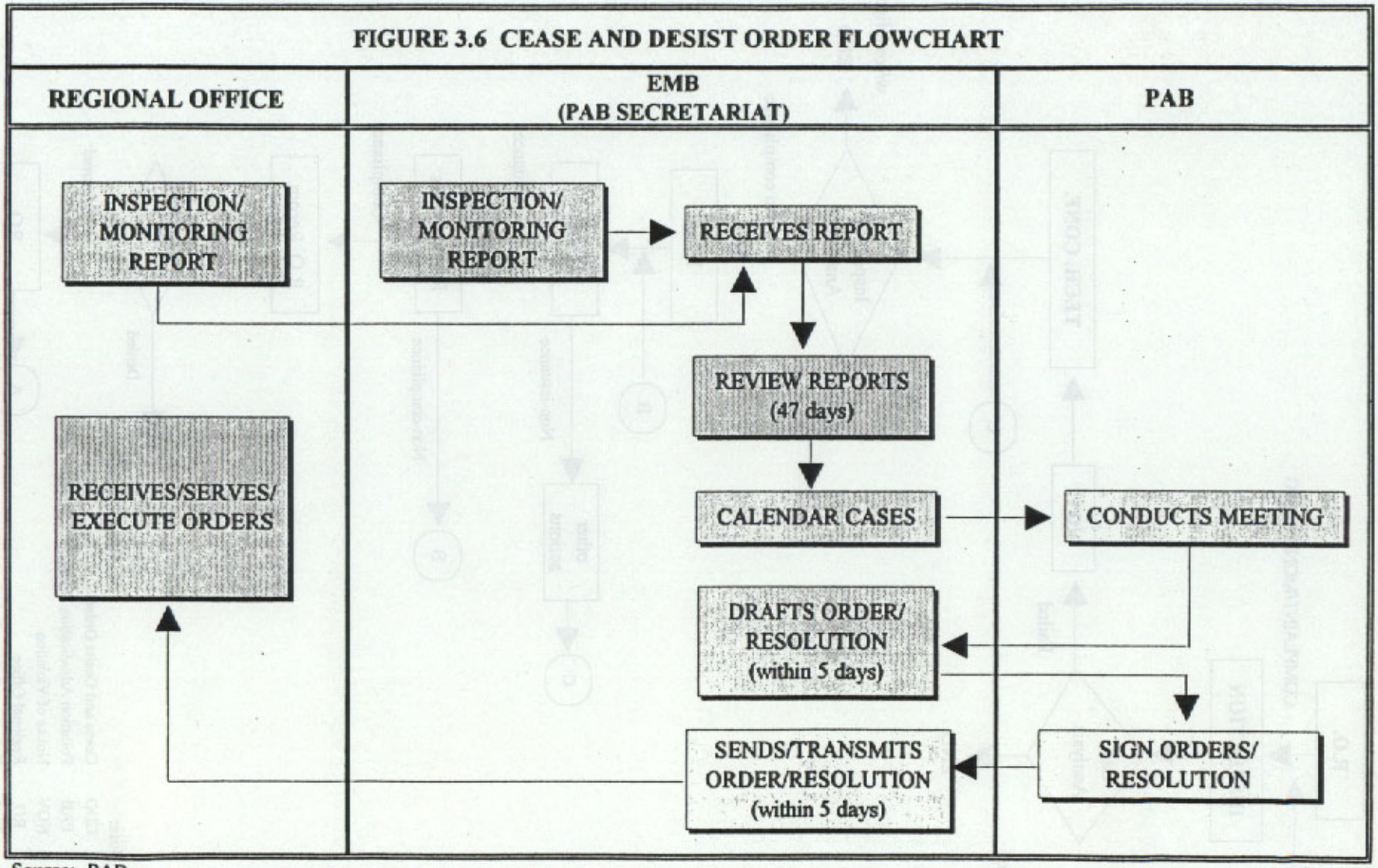
The Department of the Interior and Local Government (DILG) has the mandate of strengthening local capacity for delivery of basic services, including environmental management and protection. It is responsible for promoting legislation to assist Local Government Units (LGUs) and formulate plans, policies, programs, and projects that will develop the capabilities of the local government offices and personnel.

FIGURE 3.5
FLOWCHART OF POLLUTION ADJUDICATION BOARD PROCEDURES AND PRACTICES



Source: PAB

FIGURE 3.6 CEASE AND DESIST ORDER FLOWCHART



Source: PAB

FIGURE 3.7 TEMPORARY LIFTING ORDER FLOWCHART

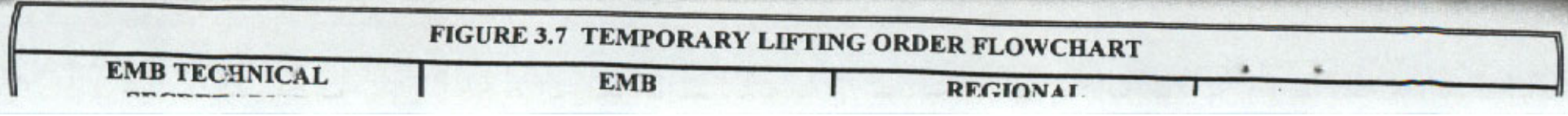
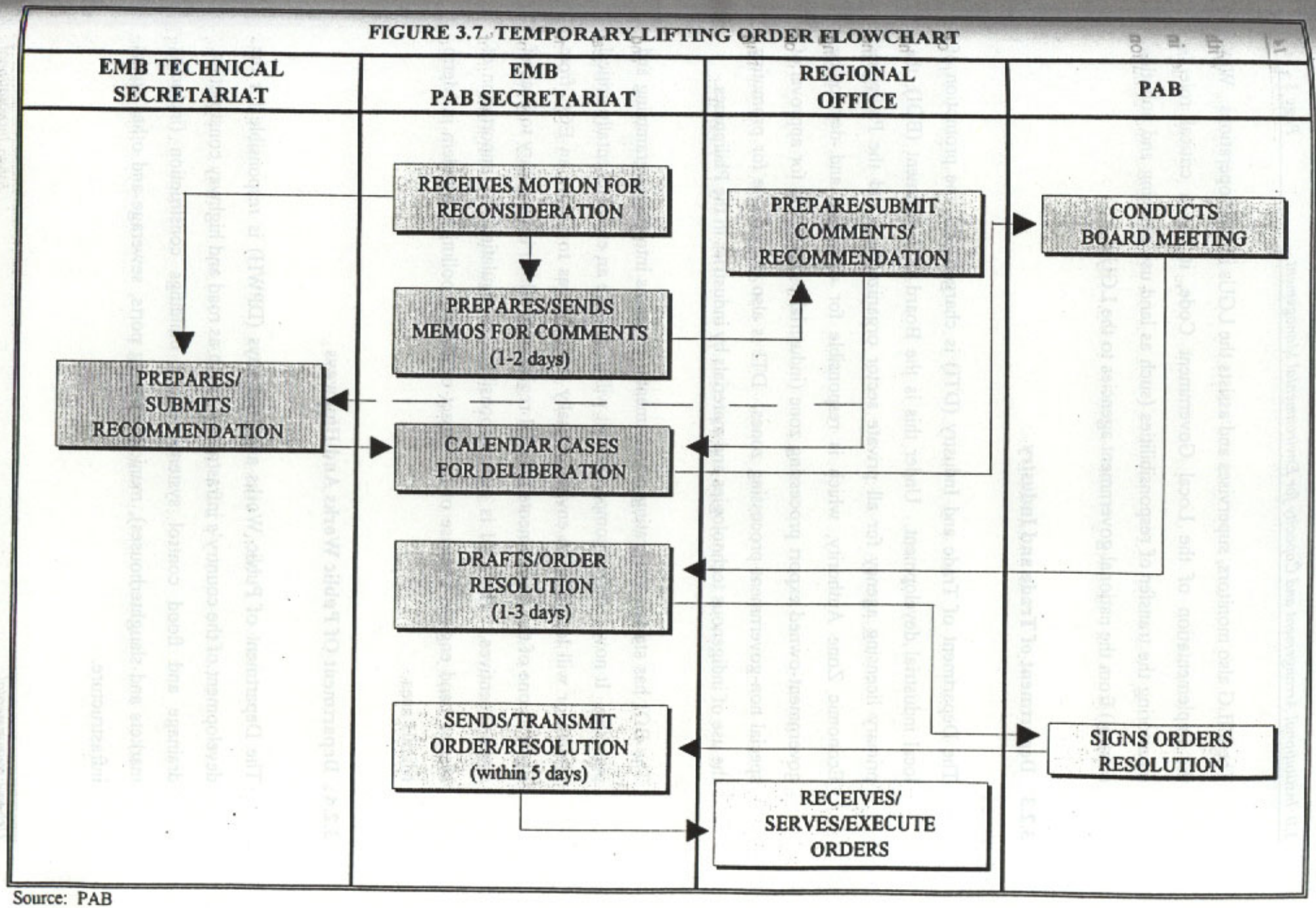


FIGURE 3.7 TEMPORARY LIFTING ORDER FLOWCHART



Source: PAB

The DILG also monitors, supervises and assists the LGUs in their operations. With the implementation of the Local Government Code, it has a critical role in monitoring the transfer of responsibilities (such as land use planning and pollution control) from the national government agencies to the LGUs.

3.2.3 Department of Trade and Industry

The Department of Trade and Industry (DTI) is charged with the promotion of local industrial development. Under this is the Board of Investment (BOI), the primary licensing agency for all private sector organizations, and the Philippine Economic Zone Authority, which is responsible for operating and developing government-owned export processing zone (industrial estates) and for approval of special non-government processing zones. DTI is also responsible for promoting the use of indigenous technologies and materials by industries in the Philippines.

The BOI has started integrating environmental concerns into its programming and planning. It now requires companies that will undertake an environmentally critical project or will locate in an environmentally critical areas to secure an ECC from EMB as one of the requirements for BOI registration which is necessary to avail of some incentives. The BOI is also responsible for regulating the importation of second hand engines because of its impact on the air pollution problem in Metro Manila area.

3.2.4 Department Of Public Works And Highways

The Department of Public Works and Highways (DPWH) is responsible for the development of the country's infrastructure such as road and highway construction, drainage and flood control systems, public buildings construction (including markets and slaughterhouses), municipal fishing ports, sewerage and other public infrastructure.

At the direction of the Presidential Task Force on Solid Waste Management, DPWH is also charged with the responsibility for the design and construction of solid waste transfer stations and sanitary landfills for Metropolitan Manila. It is likewise responsible for the maintenance or clean-up of major waterways and esteros. The DPWH is an important agency that can contribute to the significant enhancement of the Metro Manila environment.

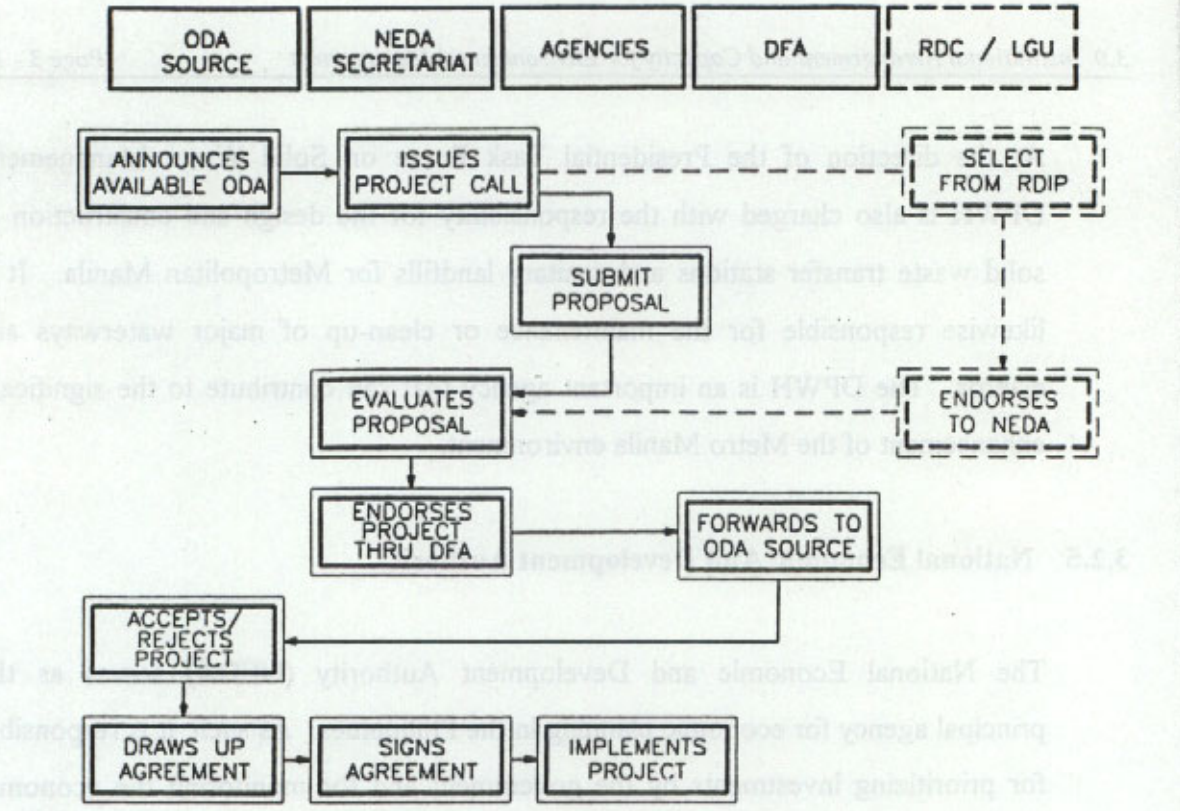
3.2.5 National Economic And Development Authority

The National Economic and Development Authority (NEDA) serves as the principal agency for economic planning in the Philippines. As such, it is responsible for prioritizing investments by the government and for monitoring the economic effects of those decisions. It serves as the lead agency with respect to acquisition and negotiation of foreign development assistance (both grants and loans) and has approval over all such assistance extended to government agencies. Figure 3.8 presents a flowchart for processing overseas development funds.

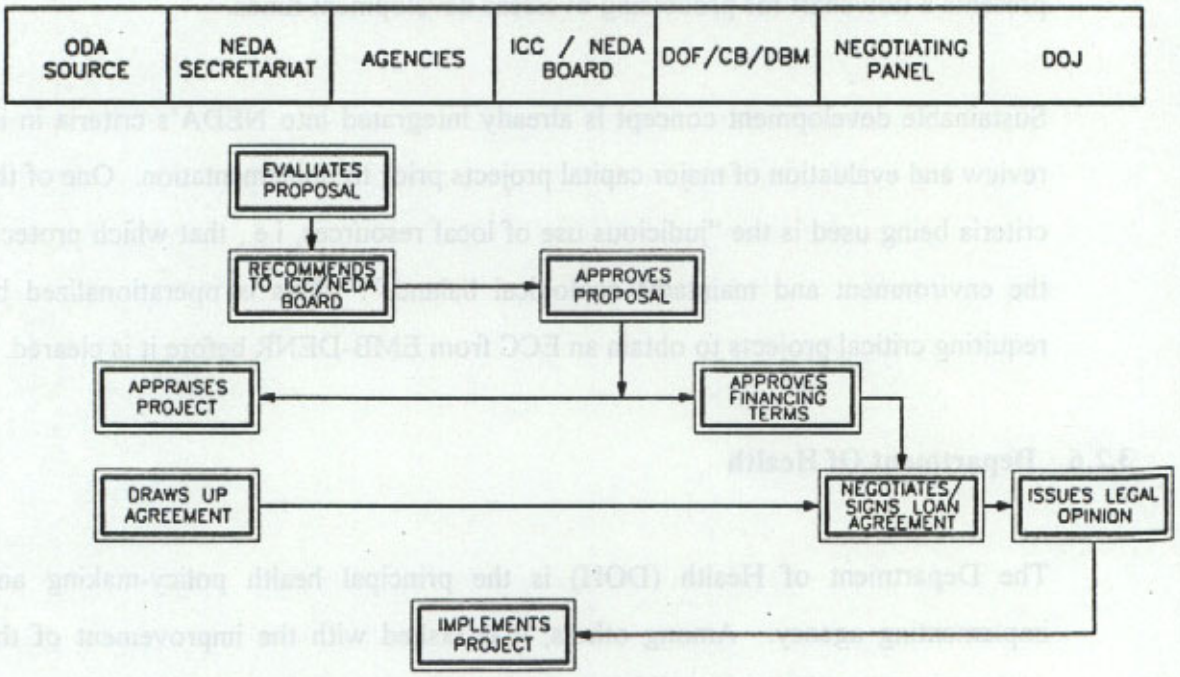
Sustainable development concept is already integrated into NEDA's criteria in its review and evaluation of major capital projects prior to implementation. One of the criteria being used is the "judicious use of local resources, i.e., that which protects the environment and maintains ecological balance". This is operationalized by requiring critical projects to obtain an ECC from EMB-DENR before it is cleared.

3.2.6 Department Of Health

The Department of Health (DOH) is the principal health policy-making and implementing agency. Among others, it is tasked with the improvement of the environmental sanitation conditions to make it more conducive to promotion and maintenance of the health of the populace. Some of its priority program



GRANTS



LOANS

FIGURE 3.8

FLOWCHART FOR PROCESSING ODA GRANTS AND LOANS

SOURCE : NEDA

FILENAME : ----
DISKETTE NO. ----

components include water supply and sanitation (water treatment and disinfection, quality monitoring surveillance), excreta and sewage disposal, and wastewater collection and disposal. Also, DOH is charged with the responsibility of developing and implementing a plan for management of toxic and infectious wastes from hospitals.

Table 3.2 presents the agencies and its area of responsibility directly involved in environmental mangement for the country.

3.2.7 Other National Agencies

The Department of Transportation and Communications through the Land Transportation Office, an attached agency, is responsible for the registration and licensing of motor vehicles and their operators. The office requires that motor vehicles be inspected to determine their roadworthiness as a prerequisite to registration. It also operates a vehicle inspection station in Metro Manila for this purpose, including the enforcement of anti-smoke belching laws. The Department of Education, Culture and Sports is responsible for setting educational policy and reviews the acceptability of the curricula for all levels of education. It is involved in the development of an environmental education curriculum and in the introduction of textbooks that strengthen the environmental values of students.

The Philippine Coast Guard is responsible for the enforcement of marine pollution regulations, including oil spill response and contingency planning (in conjunction with EMB). The National Water Resources Board coordinates the overall policy framework for water resources development and management. It also deals with water rights issues. The Housing and Land Use Regulatory Board is the primary government agency responsible for physical planning, zoning and related regulatory matters, such as permitting industrial and housing estates.

TABLE 3.2 AREAS OF RESPONSIBILITY - SELECTED AGENCIES

ORGANIZATION	AIR QUALITY	WATER QUALITY	WASTE MANAGEMENT	LAND USE
Dept. of Environment and Natural Resources				
• Environmental Management Bureau	• Promulgation of policies and standards • Enforcement policies • Ambient air quality monitoring	• Promulgation of policies and standards • Ambient water quality monitoring • effluent discharge monitoring • Staff support to PAB	• Promulgation of toxic and and hazardous waste management regulations (RA 6969) • Promulgation of solid waste management rules • Inter-agency coordination	• Issuance of ECC as precursor to HLURB approvals
• Pollution Adjudication Board (PAB)	• Enforcement decision • Schedule of fines for non-compliance • Compliance schedule • Closure notices	• Enforcement decisions • Schedule of fines for non-compliance • Compliance schedule • Closure notices	• Future enforcement actions RA 6969	
• Regional Offices	• Monitoring • Enforcement	• Monitoring • Enforcement	• Future monitoring and enforcement of RA 6969	• Input of ECC decision
Department of Health	• Protection of public health • Monitoring	• Protection of public health • Monitoring	• Management of hospital wastes	
Department of Public Works and Highways	• Traffic management responsibilities for emission control	• Maintenance of drainages	• Maintenance of drainages • Construction of sanitary landfills (in Metro Manila) • Coordination with Presidential Task Force on Solid Waste Management	
Metropolitan Waterworks and Sewerage System Local Water Utilities Administration	• None	• Construction and operation of municipal wastewater treatment systems • Provision of water supply	• Disposal of sludges from wastewater treatment facilities	• Land use patterns affected by availability of water supply and wastewater treatment capacity
Department of Trade and Industry	• Licensing (BOI) of firms that could emit air pollution • Promotion of adoption of indigenous technologies	• Licensing of firms (BOI) that could have waste-water discharges • Promotion of adoption of indigenous technologies	• Licensing of firms (BOI) that would generate solid waste • Promotion/development/ operation of industrial estates	• Promotion/development of industrial growth and industrial estates • Promotion and operation of export processing zone through EPZA

3.3 Agencies at the Local Level

3.3.1 Metro Manila Development Authority/Local Governments Units

Coordination of activities between the national government and the LGUs of the defined region is the task of the Metro Manila Development Authority (MMDA). The MMDA coordinates the delivery of basic urban services in Metro Manila including land use planning and zoning, public safety, sanitation and waste management.

While it performs the overall coordinator of urban development activities as well as having management functions in Metropolitan Manila, actual project operation and maintenance, including enforcement of development controls and anti-pollution measures are undertaken by national line agencies. There are two exceptions: solid waste management and land use planning and zoning which are delegated to the municipal government. Solid waste management is solely a responsibility of the municipal government as spelled in the LGC. There is no national line agency with which to share the task.

Annex 3.2 provides the guidelines for the transfer and implementation of DENR Functions Devolved to the LGUs.

The MMDA is governed by a council composed of the mayors of the 7 cities and 10 municipalities, for a total of 17 members. The chairmanship of the council is rotated among the members. Figure 3.9 presents the organizational structure of the MMDA. Funds for support of the MMDA staff and whatever operation are undertaken outside of the national budget releases come from the contributions made by the constituent cities and municipalities. Figure 3.9 shows the organizational structure of MMDA by major offices.

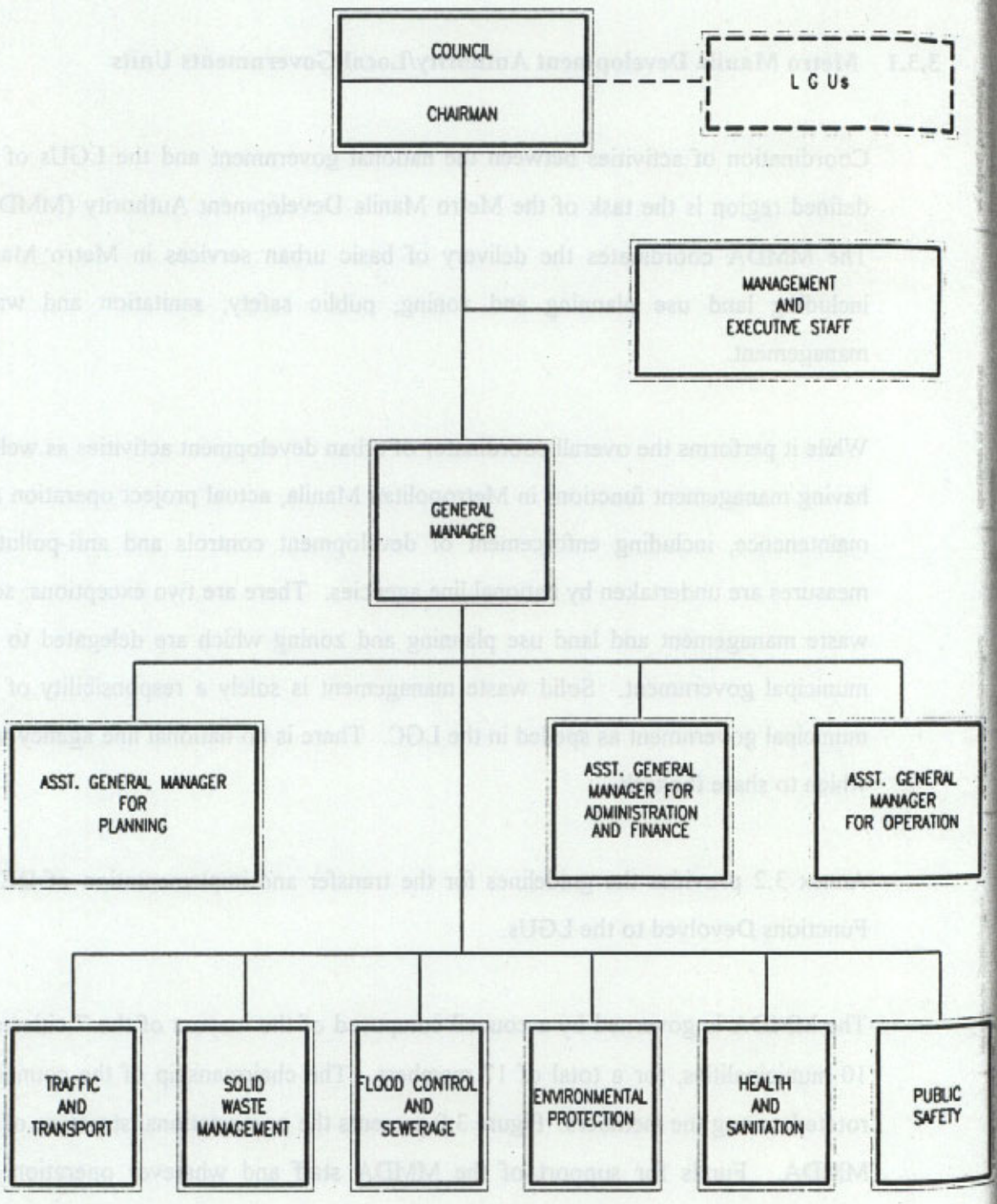


FIGURE 3.9

METROPOLITAN MANILA DEVELOPMENT AUTHORITY ORGANIZATIONAL STRUCTURE

SOURCE : M M D A

FILENAME : -----
DISKETTE NO. -----

3.3.2 Laguna Lake Development Authority

The Laguna Lake Development Authority (LLDA) is an organization of the national government but its jurisdiction is localized. It has the exclusive jurisdiction over the Laguna de Bay region and other bodies of water within the lake basin. There are however, considerable overlaps in jurisdiction from MMDA and DENR-NCR. LLDA is responsible for a wide range of activities: promotion of industrial development; regulation of land use and other activities; protection of water quality of Laguna de Bay; enforcement of environmental quality and regulations and standards; and coordination with other governmental agencies with regard to the needs of the area. Of these, it has been most effective in establishing land use controls (primarily concerning industrial estates) and environmental quality enforcement.

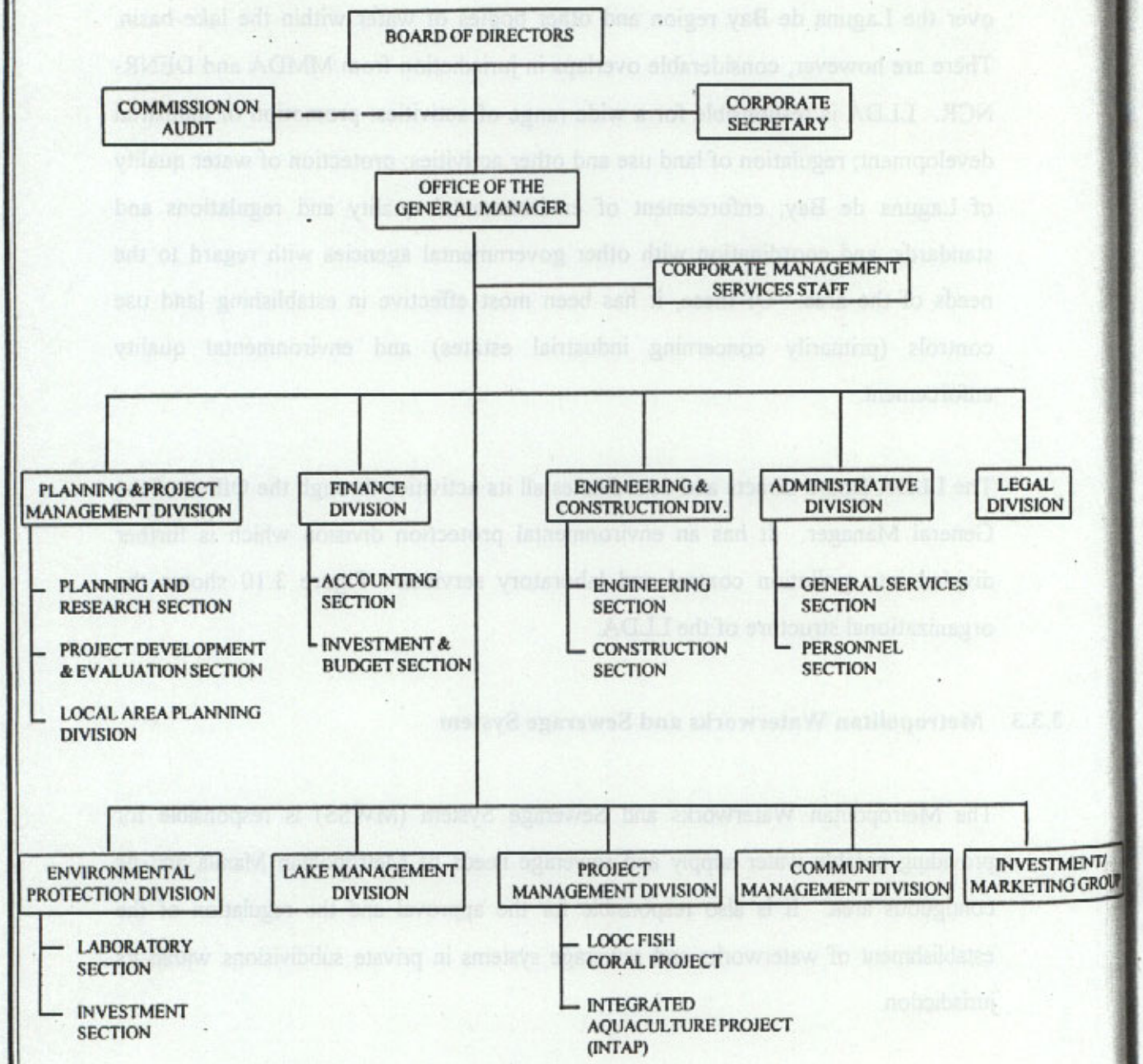
The LLDA Board directs and coordinates all its activities through the Office of the General Manager. It has an environmental protection division which is further divided into pollution control and laboratory services. Figure 3.10 shows the organizational structure of the LLDA.

3.3.3 Metropolitan Waterworks and Sewerage System

The Metropolitan Waterworks and Sewerage System (MWSS) is responsible for providing potable water supply and sewerage needs of Metropolitan Manila and its contiguous area. It is also responsible for the approval and the regulation of the establishment of waterworks and sewerage systems in private subdivisions within its jurisdiction.

The MWSS is mandated to adopt measures that prevent environmental pollution and enhance the conservation, development and maximum utilization of natural resources. This however, is limited to the handling of sewerage system of

FIGURE 3.10
ORGANIZATIONAL CHART
LAGUNA LAKE DEVELOPMENT AUTHORITY



Source: LLDA

household waste and industrial waste is not included. As with LLDA, it is an organization of the national government but with localized jurisdiction.

MWSS is governed by a Board of Trustees comprised of the Secretary of DPWH, the MWSS Administrator, and 6 members appointed by the GOP President and the Government Corporate Council.

3.3.4 DENR-NCR

The DENR Regional Office of the National Capital Region (NCR) has jurisdiction over the Metro Manila area. The Regional Technical Director for Environment Management and Protected Areas Sector (EMPAS) and the CENRO are responsible for the enforcement of pollution control laws (except areas under the jurisdiction of the LLDA).

The function of monitoring air and water quality is with EMPAS, while plant/firm-specific monitoring and inspections are handled by the CENRO.

DENR-NCR is headed by the Regional Executive Director who is assisted by 4 Regional Technical Directors for Environmental Management and Protected Areas, Land Management, Forestry and Ecosystem Research.

3.4 Private Sector

Private sector involvement in urban and industrial environmental management includes: a) industrial firms; and b) private voluntary organizations (PVOs)/non-government organizations (NGOs). Each of these entities plays a vital role in improving the urban and industrial environmental.

One of the industrial firms/businessmen that recognizes the need to address environmental issues and concerns is the Philippine Business for the Environment, Inc. (PBE), a group of businessmen/firms organized in 1992. The organization is involved in environmental enhancement projects, training, education and awareness, development of regulatory policy, and intermediation between communities, business and government in environmental issues as presented in Annex 3.3. The organization has 27 member firms.

Another organization is the Philippine Environmental Industry Association (PEIA) which was also formed to address environmental issues in the country and elsewhere. The association is composed of companies, other organizations and individual professionals. It provides services on systems technologies and training on environmental concerns. The association is linked to similar international environmental industry associations. Other industry-related organizations are: Voluntary Organization of Industries for a Cleaner Environment (VOICE), Tourist Belt Businessmen's Association (TBBA), etc.

The PVOs/NGOs are more actively involved in public awareness activities, such as air and water pollution education and citizen action programs. The Center for Clean Technology and Environmental Management (CTEM) is an NGO made possible by the ASEAN Environmental Improvement Program (AEIP), an element of US-ASIA Environment Partnership (USAEP) and the PBE. The purpose of the Center is to provide information and solutions for improving industrial problems to reduce pollution at the least costs and risks. Members or users are people from the industry, students, media, researchers or other sectors that may want to get information on industrial management and technology.

Other PVOs/NGOs that are active in the sector are: the Phillipne Ecological Networ (PEN), the Philippine Federation for Environmental Concerns (PFEC), the Green Forum, etc.

3.5 External Support Agencies

Multilateral and bilateral agencies currently support programs and projects on environmental management in MMA. The World Bank (WB) provides support to 5 projects/studies. These are: 1) Economic Incentives to Promote Water Pollution: Prevention and Abatement; 2) Industrial Common Treatment Facilities and Waste Abatement for Individual Enterprises; 3) Industrial Waste Exchange Program; 4) Environmental Component of the Energy Sector Loan; and 5) Manila Second Sewerage Project. The first 3 projects/studies are funded by the Japan Grant Fund. This Fund is being administered by the WB. Details of these projects/studies are presented in Chapter 4.

The Asian Development Bank (ABD) provides funds for the Metropolitan Manila Region Environmental Improvement Study (MMREIS). Other institutions include: the Danish International Development Agency, the United Nations Development Programme, the United States Agency for International Development and the European Economic Community and the Japan International Cooperation Agency.

CHAPTER 4
POLICIES and REGULATIONS and CURRENT ENVIRONMENTAL MANAGEMENT PROGRAMS for METRO MANILA

4. POLICIES AND REGULATIONS AND CURRENT ENVIRONMENTAL MANAGEMENT PROGRAMS FOR METRO MANILA

4.1 General

There are various laws and regulations that address urban environment management in the country. Air quality, water quality, solid and toxic waste management and land use laws and regulations provide a mechanism to prevent and control the major sources of environmental pollution. However, the effects that are expected as a result of the enactment of these laws and regulations are insignificant. From the examination of environmental monitoring data collected, it showed that the existing environmental programs are not providing the anticipated levels of environmental control. An example is the requirement of industrial firms to install pollution control devices and obtain permits. Very few firms comply with this requirement.

It has been observed that there is a wide disparity between the enactment of environmental laws and regulations and their implementation. Some of the reasons include inadequate government resources, perceived cost of installing pollution control equipment, and inadequate public awareness on the importance of environmental protection. Corollary to this is the effectiveness of various components of the existing air quality and water quality regulations being hampered by the lack of comprehensive, long-term environmental quality monitoring programs.

4.2 Current Status of Air Quality Laws and Regulations

Laws and regulations have been enacted and were basically found to be adequate to control acceptable levels of emission from the sources. The National Ambient Air Quality Standards (NAAQS) of 1978 includes particulates, sulfur dioxide,

photochemical oxidants, nitrogen dioxide and carbon monoxide. It also specify maximum permissible emission standards for specific pollutants from stationary sources and designate maximum permissible ambient concentrations for certain metals and other pollutants.

The Revised Air Quality Standards of 1992, Revising and Amending the NAAQS of 1978 (DENR-Administrative Order No.14) includes emission standards for smoke and particulate matter for stationary source, for source specific air pollutants and for sulfur compounds. The regulations also established the National Ambient Air Quality Guidelines and Standards. Administrative Order No. 14-a series of 1993 clarifies its coverage and scope.

Other major national laws on air quality are:

1) RA 3931 - An Act creating the National Water and Air Pollution Control Commission, defining pollution and providing penalties therefor.

2) LOI 247 - To enforce provisions of PD 552 prescribing sanitation requirements and facilities for the convenience of the traveling public.

3) LOI 551 - Requiring all public utilities to install anti-pollution devices, and requiring the listing of all factories discharging offensive effluents into the air or waters.

4) PD 1160 - Vesting authority in Barangay Captains to enforce pollution and environmental control laws.

5) PD 1181 - Providing for the prevention, control and abatement of air pollution from motor vehicles and providing for the penalties therefor.

Annex 4.1 presents brief descriptions of the above-mentioned laws including that of regulations on air quality. There are enough laws and regulations that deal on air quality. At this point, there is a need to vigorously pursue the implementation and enforcement of the standards.

4.3 Current Status of Water Quality Laws and Regulations

As with air quality, a considerable number of laws and regulations have been enacted to address water quality, flooding and other aspects of urban environmental management. These laws deal on delegation of functions and responsibilities of the various agencies responsible for implementation and with defining national policy for protection of water quality. Major regulations passed were on standards that establish criteria for classifying water bodies and limitations for effluent discharges. There are also laws specifically directed to the problems in Metro Manila, namely:

1) LOI 376 - Providing directions to recover creeks, rivers, esteros, drainage channels, and similar bodies of water in Greater Manila area which have been illegally filled-up.

2) RA 4850 - Creating Laguna Lake Development Authority. An amendment is PD 813, expanding the functions of the Authority to include a comprehensive water quality management program for the lake designed to preserve its ecological balance.

3) PD 274 and 381 - Creating the Pasig River Development Council to remedy the problems relating to the discharge harmful substances and the lack of control over the use of waterways.

4) LOI 712 - Includes provision banning the use of waters as a waste depository, specifically Manila Bay and Laguna de Bay, despite the general prohibition on such practice.

Annex 4.2 presents brief descriptions of the above-mentioned laws and other laws that are national in scope. Included also are the regulations concerning water pollution abatement. As with air quality, there are already enough laws and regulations that can address water quality concerns. The area for improvement is again on the enforcement of these laws and regulations. Emphasis should be placed on the issuance of permits to industrial pollutant sources and ensuring that they comply with applicable standards.

4.4 Current Status of Solid Waste Laws and Regulations

Solid waste management is principally governed by PD 856, commonly known as the Sanitation Code. Among others, the Code prescribes standards and procedures for refuse collection. It assigns to cities and municipalities the responsibility to provide for efficient disposal of waste.

Other national laws are:

1) PD 825 - Defining penalties for the improper waste disposal of garbage and assigning the supervision of proper disposal of garbage to the DPWH.

2) PD 984 - Defining industrial waste and other waste, and prohibits pollution of such wastes in water and land resources.

3) PD 1152 - Providing for a Waste Management Program under sections 42 and 45 for proper disposal of wastes.

Annex 4.3 presents brief description of the laws mentioned above. It also presents laws and regulations concerning land use. There are still some gaps in these laws that have been enacted for the proper management of solid waste. Additional studies and evaluation on the feasibility of different solid waste management options have to be undertaken. These actions may result in the re-development of guidelines and regulations for the proper siting, design and operation of sanitary landfills and other treatment or disposal facilities such as incinerators.

4.5 Current Status of Toxic/Hazardous Materials Laws and Regulations

RA 6969 known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 provides broad regulatory powers to DENR to regulate the entire life cycle of a chemical or chemical mixture, from its point of manufacture to final disposal. This act complements the existing environmental regulations of the country as well as the over-all pollution prevention strategy.

Annex 4.4 presents the details of RA 6969. At present, EMB is in the process of preparing a chemical inventory. This inventory will have considerable importance since new chemicals will be identified and necessary actions will be undertaken.

4.6 Program Strategies

The Government has adopted Cabinet Resolution No. 37, known as the Philippine Strategy for Sustainable Development (PSSD). For the first time, strategies tie development policies to the principle that economic growth and ecosystems protection are compatible. In line with the Strategy, and based on the framework for sustainable development as presented in Figure 4.1, key issues and concerns with particular emphasis on the urban environment of MMA were identified. Existing and proposed interventions/strategies were drawn up to address these various issues/concerns as summarized in Table 4.1. Target timetables and institutions involved/to be involved in the implementation or operationalization are likewise identified.figure 1.1.

FIGURE 4.1
FRAMEWORK FOR SUSTAINABLE DEVELOPMENT

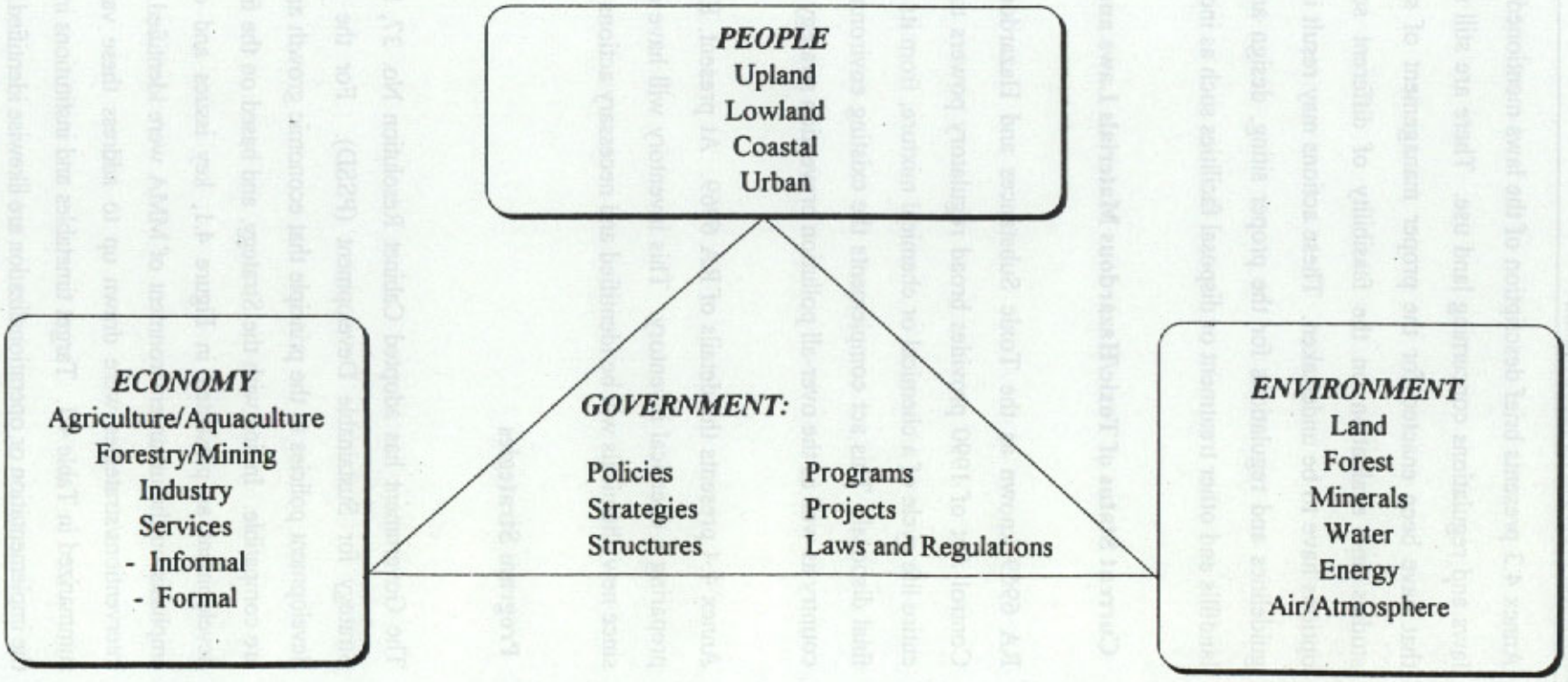


TABLE 4.1
SUMMARY OF THE PHILIPPINE STRATEGY FOR SUSTAINABLE DEVELOPMENT (PSSD)
ADDRESSING POLLUTION RELATED ISSUES

TABLE 4.1

SUMMARY OF THE PHILIPPINE STRATEGY FOR SUSTAINABLE DEVELOPMENT (PSSD) ADDRESSING POLLUTION-RELATED ISSUES

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
• Pollution from: - Industrial Effluents - Domestic Sewage - Agricultural Run-Off - Oil Slicks from Motor Boats	• Rivers Revival Program (P.D. 924 s. 1978)	• Increased budget for Rivers Rehabilitation	ST	DENR, Congress
	• Pollution Control Laws, Rules and Regulations	• Strengthening of the enforcement of the existing rules and regulations		
	• Encouragement of the use of Organic Fertilizers	• Regulations of the use of rivers for commercial navigation	LT	DENR, DA, NGOs, LGUs, PCG, BFAR, MWSS
	• Initial Study on River Classification	• Hastening and implementing Rivers Classification System		
		• Closer coordination with PCG and other institutions concerned		
		• Land Use Zoning		LLDA, LGUs
		• Regulation of Pesticide Use		
		• Institutionalization of incentive system and effluent charges for industries	MT	
		• Upgrading of monitoring and laboratory capabilities	LT	NGOs, LGUs, LLDA DENR
		• Infrastructure measures		DPWH
• Lack of urban infrastructures for basic services and pollution control (e.g. sewerage, drainage system, waste disposal sites, roads bridges, water and electrical supply, transpo. facilities)	Implementation of existing pollution control laws and municipal ordinances	• Strict implementation of plan, monitoring and better multi-agency/entity coordinative linkages for urban infrastructures for basic and pollution control facilities	MT	DPWH, MMDA, MWSS, NHA, DENR, NEDA, LGUs, NGOs

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
• Insufficiency or lack of sewerage system	• For Metro Manila, DENR A.O. 35	• Construction of sewerage system		MWSS, LGUs
• Inadequate land use planning and zoning	• Implementation of land use planning and zoning in some urban areas	• Updating of Metro Manila Zoning	MT	MMDA, HLURB, DENR
		• Ordinance		
		• Strict implementation monitoring, completion of urban planning and zoning for some sites; coordination between HLURB and DENR	ST	HLURB, DENR
	• Conduct carrrying capacity studies for some regions in the country	• Conduct of carrying capacity studies for urban areas	LT	MESS, LGUs, DENR
• Solid wastes pollution	• Garbage disposal	• Systematization of collection, handling, transfer and disposal of solid wastes complemented by a livelihood program for scavengers	LT	LGUs, MMDA, NGOs, POs, DENR, DPWH, DOST
		• Conduct of efficient garbage recycling (biogas) at the community level		
• Confilict between stringent air quality standards and the government policy of developing indigeneous energy sources		• Review as to environmental practicability of standards, and revisions as necessary		DENR
• Water pollution from domestic and industrial sources	• Implementation of existing Pollution Control Laws	• Strict implementation of Pollution Control Laws; devolution of some pollution-related functions to LGUs, upgrading of pollution-related equipment		DENR, LWUA, NGOs LGUs
		• Construction of collection system, pump station, treatment facilities and outfall;		MWSS

Urban Environmental Pollution Management Programs for Metro Manila

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
		and strengthened monitoring network for pollutive industries		

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
		• Construction of collection system, pump station, treatment facilities and outfall;		MWSS
		and strengthened monitoring network for pollutive industries		
		• Classificationof water bodies		
		• Closure of all dumps		DENR, MMDA
• Inadequate solid, toxic and hazardous waste management	• Open dumping and sanitary landfill	• Adoption of more environmentally-sound garbage disposal system including recycling, sanitary landfill, etc.	LT	MMDA, LGUs, DENR, NGOs
		• Integration of specifications for pollution control (i.e. industries, hospitals) and sanitary landfill structures in the National Building Code		DOH, DENR, DPWH
		• Installation of centralized collection/disposal system of hospital wastes, and wastes of similar industry types		DOH, DENR, DPWH
		• Improvement of MWSS services	LT	MWSS, NWRB
		• Regulation of groundwater extraction	LT	DENR, NIA, NPC, NEA, NGOs, POs, LGUs
• Air Pollution	• Anti-smoke belching campaign	• Policy reforms on importation and registration of vehicle engines	LT	DENR, DTI, NGOs, LGUs, POs, Tariff Commission
		• Gradual phase-out leaded gasoline		
		• Strengthening of monitoring capabilities	LT	
		• Establishment of urban tree parks and greenbelt areas		
		• Strict implementation of ordinances		DENR, POs, LGUs, NGOs

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
• Pollution and waste resulting from industry/development activities, e.g. smoke emission and coal dust from coal-fired thermal plants, effluent from alcohol plants, air pollution and other related problems associated with geothermal development	• Industrial Waste Exchange Program, Polluter's Pay Principle	• Support in terms of policy, research, economic instruments/market mechanism for: - Promotion of recycling or re-use of industrials residualss from raw materials and by-products - Waste minimization through modification of: manufacturing process, use of raw materials, equipment • Research work on carrying or assimilative capacity of the environment • Research work on cost-effective pollution control facilities • Research and implementaion of final disposal of wastes	LT	DOST, DENR, OEA, NPC, Private Companies • FDA, DENR, DTI, BOI, NEDA, NGOs
• Hazards of motor vehicle emissions, e.g. carbon monoxide content of exhaust gases, tetra-ethyl lead, oxides of nitrogen and sulfur, etc.		• Strengthening of the Environmental Impact Assessment (EIA) process to ensure identification of unknown pollutants, and transmission of useful information to environmental regulations • Investments on the research and/or the use of less pollutive technologies • Rationalization of the importation of surplus engines • Rationalization of franchising/registration of vehicles • Research on the improvement of fuel		DENR, DOST, DTI

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
		• Promotion of masss transit system		

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
		• Promotion of masss transit system		
• Relocation of highly pollutive industries from industrialized countries like the Philippines (e.g. transfer of AZARCO USA roasting process to Lepanto, LIDE, Phil.)		• Strengthening of EIA process particularly for foreign firms intending to set-up operations in the country • Adoption by legislation and implementation of industry-specific environmental standards		
• Environmental risks of new technologies and hazards from existing industrial technologies	• Awareness and Preparedness on Emergencies at the Local Level	• Imposition of payment of pollution fines high enough to make investment in pollution control devices more attractive than the payment of such fines, through the amendment of P.D. 984		FDA, DENR, DTI, BOI, NGOs, NEDA
• Concentration of industrial facilities in urban areas		• Encouragement of industry dispersal into the countryside through rural infrastructure development and provision of incentives • Updating of the Naitonal building Code to include specifications of pollution control structures		DPWH
• Proliferation of small-scale industries without adequate pollution control facilities		• Provision of technical assistance on pollution control to small and medium scale industries		DOST, DENR-EMB
• Pollution due to mining operations (land, air, water)	• Implementation of DAO 85 (Mine Tailings Fee), DAO 35 (Water Quality), installation of anti-pollution devices facilities	• Strict monitoring • Strict implementation of the EIA system • Rehabilitation of mined-out areas	LT	DENR, NGOs, LGUs, PDS, Industry
• Heavy metals pollution (mercury, lead, copper, etc)	• Implementation of effluent water quality standards (DAO 34/35 s. 1990) • Buying of small-scale mine-tailings by big companies	• Strict enforcement • Monitoring		

KEY ISSUES/CONCERNS	EXISTING INTERVENTIONS	PROPOSED INTERVENTIONS	TARGET* TIMETABLE	INSTITUTIONS INVOLVED
	• People's mining act	• Immediate implementation of the Act		
	• Promotion of the use of retort; adoption of cyanidation method; amalgamation method of gold recovery from ores	• Improvement of retort system		
	• Regulation of commercial handling and disposal of mercury and cyanide			

ST - Short Term
MT - Medium Term
LT - Long Term

Meanwhile, the Environmental Management Strategy, a study component of the Metropolitan Environment Improvement Program aims at providing specific pollution control strategy and framework for public and private sector actions that enhances the environmental quality of MMA. The recommendations include:

1) Water Quality Management Strategy

To include: a) reduction of domestic wastewater pollution; and b) industrial wastewater reduction.

2) Land Use Management Strategy

To strengthen capabilities of institutions mandated to regulate land use in dispensing their respective functions.

3) Solid waste Management

To establish a strong central waste management body that will be responsible for the entire phases of solid waste management stream flow and an intensive public education program that emphasizes or encourages the reduction of waste generated.

4) Flood Control Strategy

To implement the programmed Flood Control Programs, e.g., the Metro Manila Flood Control Project II and Retrieval of Flood Prone Areas supplemented by projects identified in the JICA 1990 Flood Control Master Plan.

5) Toxic and Hazardous Waste Management

As a first step, to develop an inventory system of monitoring the amounts and types of THS generated.

6) Slum and Squatter Settlements

- To enact/implement policies and projects designed to reduce the impact of these settlements to the environment.

7) Air Quality management strategy

To impose the controls by strictly enforcing the laws and regulations and to strengthen the monitoring program.

8) Institutional Strengthening Strategy

To promote the smooth implementation of the EMS and its identified components; increase environmental awareness of the populace; and re-align functions and responsibilities that enhances more coherent environmental institutions.

Some of these strategies have already been translated into programs/projects/studies as presented in the succeeding section.

4.7 Major Initiatives/Programs On Metro Manila Environment Improvement

4.7.1 General

Table 4.2 presents a summary of major initiatives/programs on Metro Manila Environment Improvement, by category, lead agency, status, funding assistance, implementation period, and project/study cost.

4.7.1.1 Metropolitan Manila Region Environmental Improvement Study (MMREIS)

The DENR completed the ADB-funded Metropolitan Manila Region Environmental Improvement Study in June 1990. The primary objective of the study is to come up with an environmental improvement plan for Metro

TABLE 4.2
MAJOR RECENT AND ON-GOING PROJECTS/STUDIES

SECTOR	LEAD	STATUS	FUNDING	IMPLEMENTATION	* PROJECT/STUDY COST	REMARKS

TABLE 4.2
MAJOR RECENT AND ON-GOING PROJECTS/STUDIES

MAJOR PROJECTS/STUDIES	SECTOR	LEAD AGENCY	STATUS	FUNDING ASSISTANCE	IMPLEMENTATION PERIOD	PROJECT/STUDY COST	REMARKS
1 Corporate Environmental Initiatives	General	DENR	finished	UNDP	Sept 93-July 94	P 125,000	MEIP-2
2 Environmental Management Strategy	General	DENR	finished	UNDP	1991-1993	$ 350,000	MEIP-1
3 Study on Environmental Management through Communities and NGOs	General	DENR	finished	UNDP	Feb-July 1992	$ 15,000	MEIP-1
4 Institutional Arrangements for Urban Environmental Management	General	DENR	finished	WB	1992-1993	$ 12,000	MEIP-1
5 Integrated Waste Resource Recovery and Reuse for San Juan and Mandaluyong	General	DENR	finished				MEIP-1
6 Training for PCOs of Industries and LGUs	General	DENR	finished		May 1993	$ 5,700	MEIP-2
7 Metropolitan Manila Region Environmental Improvement Study	General	DENR	finished				
8 Metropolitan Environment Improvement Project	General	DENR	on-going				
9 Waste Minimization/Cleaner Technologies for Industries	Industry	DENR	finished	USTDA	April 94-May 95	$ 586,000	MEIP-2
10 Industrial Efficiency and Pollution Control Study	Industry	DENR	finished	WB	1991-1993	$ 650,000	MEIP-1
11 Improvement of the Quality of Industrial Effluent Data in the Philippines	Industry	DENR	finished	CIDA	Mar - Sept 95	$ 54,000	MEIP-2
12 Industrial Waste Exchange Project (IWEP Phase I)	Industry	DENR	finished	IDRC	1987-1991		
13 The Economics of Pollution Control in the Cavite Industrial Area	Industry	DENR	on-going	CIDA	1995-1996	$ 90,000	MEIP-2
14 Industrial Waste Exchange Project (IWEP Phase II)	Industry	DENR/PBE	on-going	WB	1993-1994	P 420,000	MEIP-2
15 Study to Develop a Training and Information, Education and Communications Plan for IEPC	Industry	DENR	on-going				MEIP-2
16 Industrial Environmental Management Project	Industry	DENR	on-going	USAID			MEIP-2
17 Industrial Restructuring Program - Environmental Management Program (Phase II)	Industry	DENR	on-going	SAID			
18 Urbair Air Quality Management	Air	DENR	finished	WB/Norway	1993-1994	$ 80,000	MEIP-2
19 Clean Air 2000 Action Plan	Air	DENR	finished		Oct. 1995	$ 3,000	MEIP-2
20 Training of LGU PCOs on the Anti-Smoke Belching Program	Air	DENR	finished	UNDP			MEIP-2
21 Vehicle Emmisions Control Planning	Air	DENR	finished		1991-1992		
22 Energy Sector Loan: Environmental Component	Air	DENR	on-going				
23 Manila Bay Monitoring Program	Water	MWSS	on-going				
24 Economic Incentives to Promote Water Pollution Prevention and Abatement	Water	DENR	on-going	WB	1994-1996	$ 150,000	MEIP-2
25 Industrial Common Treatment Facilities and Waste Abatement for Individual Enterprises	Water	DENR	on-going	WB	1994-1996	$ 320,000	MEIP-2
26 Pasig River Rehabilitation Program	Water	DENR	on-going	DANIDA	1990-1991		
27 NMTT River Revival Program	Water	MULTI-AGEN	on-going		1998-		
28 Manila Second Sewerage Project	Water	MWSS	on-going		1996-1999	P 2,270,000,000	
29 Environmental Management Program for the Laguna de Bay Region	Water	LLDA	on-going				
30 Save Our Lake Program	Water	LLDA	on-going		1988-		
31 Community Participation and Advocacy for Ecological Waste Management in 3 Brgys. /Paco Mkt.	Solid Waste	DENR	finished	UNDP			MEIP-2
32 Metro Manila Solid Waste Management Study	Solid Waste	MMDA/DPWH	finished		1993-		
33 Urgent Garbage Proposal Improvement Project	Solid Waste	MULTI-AGEN	finished	JICA	1990-1993		
34 Smokey Mountain Development Project	Solid Waste	MULTI-AGEN	on-going		1993-		
35 Toxic and Hazardous Waste Management Study	Toxic Waste	DENR	on-going	EC	1995-1996	ECU 950,000	MEIP-2
36 Metro Manila Hospital Waste Incinerator Project	Toxic Waste	MMDA	on-going	French Protocol		P 274,947,782	
37 Environmental Quality Criteria - Toxicity Testing Project	Toxic Waste	DENR	on-going	UNDP/DANIDA			
38 Minimization of Medical and Hospital Waste	Toxic Waste	DENR	finished	UNDP	1992-1996		MEIP-2
39 Public Sanitation Evaluation Study	Sanitation	DPWH	finished	UNDP		$ 7,500	MEIP-1

Manila. The plan included an institutional framework plan defining delineation of responsibilities among different agencies with respect to the various projects/programs under the plan, and recommendations for institutional reforms. The plan also included a financial package which defined financial requirements for capital and operational expenditures.

4.7.1.2 Metropolitan Environment Improvement Program

The Metropolitan Environmental Environment Improvement Project (MEIP) is a UNDP-funded and WB-administered undertaking whose principal objective is to assist pilot urban centers in Asia to address and reverse the degradation of their environment.

The main activities under the program which started in 1992 can be classified as:

1) the development of a regional Environmental Management Strategy (EMS) to provide a framework to guide environmental institutions, private sector agencies, non-government organizations and communities in planning activities to address urban environmental problems;

2) the enhancement of coordination and collaboration between environmental protection institutions on one hand and economic policy planners and sectoral agencies on the other;

3) the identification and (feasibility study) preparation of high-priority investment projects for the improvement of urban environmental management;

4) the establishment and/or strengthening of metropolis-wide networks, linking government efforts in urban environmental management with the initiatives of the private sector, NGOs and low-income communities;

5) the provision of technical assistance to communities, as well as private enterprises, in the identification, planning and implementation of local projects to improve waste and resource management, and;

6) the facilitation of information exchange within and among the MEIP pilot cities.

MEIP-Manila covers the whole Metro Manila as well as portions of the provinces of Laguna, Cavite, and Bulacan.

The Steering Committee of MEIP-Manila is chaired by the DENR. The policy making body is composed of eight (8) government agencies, two (2) NGOs and two (2) private sector industry associations, as follows: National Economic and Development Authority (NEDA), Department of Health (DOH), Department of Interior and Local Government (DILG), Department of Budget and Management (DBM), Metro Manila Authority (MMA), Laguna Lake Development Authority (LLDA), Housing and Land Use Regulatory Board (HLURB), Lingkod Tao Kalikasan, Philippine Business for the Environment (PBE), Philippine Chamber of Commerce and Industry (PCCI), and Pollution Control Association of the Philippines, Inc. (PCAPI).

Under its present structure, a Technical Working Group provides technical guidance in the implementation of studies and projects which covers air pollution, water pollution, solid waste, toxic and hazardous wastes,

industrial pollution as well as constituency building for environmental protection and management. Secretariat works is provided by the Manila Project Office which also serves as liaison between the Bank and the technical working groups and various consultants working on specific projects and studies. Various project/programs are being implemented under the overall MEIP, e.g., studies such as Industrial Efficiency and Pollution Control, Environmental Management through Communities and NGOs, Institutional Arrangements for Urban Environmental Management. These are reflected in Table 4.2 and several are discussed in the succeeding sections.

The Environmental Management Strategy (EMS) was prepared from 1991 to 1993. Taking and improving MMREIS findings and recommendations, the EMS provides a pollution control strategy/framework for Metropolitan Manila.

4.7.1.3 ASEAN Environmental Improvement Project (AEIP)

The ASEAN Environmental Improvement Project (EIP) is a USAID/ASEAN program designed to facilitate environmental management projects, particularly for the private (industrial) sector. The AEIP which is being implemented from 1992 to 1997 has the following objectives:

1) To assist environmentally acceptable economic development in ASEAN countries;

2) To promote private sector initiatives and strengthen local, national and regional capabilities to address urban and industrial pollution.

The aforementioned project has the following components:

1) Policy and Institutional Development: involves assistance to ASEAN government agencies, private organizations and non-governmental organizations for the development and implementation of effective environmental policies and programs.

2) Technical Assistance and Training: involves sending of industrial environmental experts who will visit ASEAN industrial firms and make recommendations on appropriate waste management strategies.

3) Technology Commercialization and Investment Promotion: involves promotion of technology commercialization activities in environmental technology areas where US firms are deemed as market leaders, as well as assistance to ASEAN/US firms in accessing financing for environmental projects.

4.7.2 Industry (General)

4.7.2.1 Industrial Efficiency and Pollution Control Study

With funding from the WB, the Industrial Efficiency and Pollution Control Study was undertaken from 1991 to 1993. The study focused on the contribution of industry to urban environmental degradation, identification and analysis of policy, management, technical, and financial issues, and the development of an Action Plan. After having gathered from the study some aspects that were deemed in need of immediate follow-up action, WB (Japan Grant Fund) arranged funding for the conduct of three comprehensive studies: Economic Incentives to Promote Water Pollution Prevention and Abatement in the Philippines; Industrial Common

Treatment Facilities and Waste Abatement for Individual Enterprises, and; Development of a Training and Information, Education and Communications (IEC) Plan for Industrial Efficiency and Pollution Control. The two latter studies are discussed in succeeding sections.

4.7.2.2 Waste Minimization/Cleaner Technologies for Industries

Funded by the US Department of Trade and Development Agency, the project aims to introduce strategies that will minimize dependence on costly environmental protection systems, particularly end-of-pipe systems. The project specifically looks into ways of improving production processes resulting in the minimization of wastes particularly in the identified six most pollutive industrial sectors: food processing, slaughterhouses/piggeries, beverage production, chemicals, electroplating, and tanneries. The project which was undertaken from April 1994 to May 1995 involved the following:

1) Twenty-five actual plant assessments which carry out environmental audits of plant production processes;

2) Workshops on waste management/clean technologies among representatives from industry, government, and consultants;

3) Technology-matching that will facilitate assessment of the applicability and cost effectiveness of US technology in the Philippines.

Consultants conduct plant assessments in coordination with DENR, LLDA, and the technical staff of the firm. These are conducted with the assurance of confidentiality and that the findings will not be used for regulatory purposes.

4.7.2.3 Industrial Waste Exchange Project

The Industrial Waste Exchange Project (IWEP) uses the "combined concept of industrial waste exchange and utilization, whereby the wastes of one industry maybe utilized in-house or transferred to another industry and made useful rather than disposed." Funded by the International Development Research Center of Canada (IDRC), the first phase of the IWEP was started in 1987. The objectives of the first phase are as follows:

1) develop an acceptable system of waste exchange for the Philippines based on the assessment of various waste exchanges worldwide;

2) devise an administrative and technical framework for facilitating and encouraging contract between generators and potential users in the waste exchange program;

3) set up an information center which will serve as a clearing house to maintain and continually update an inventory of wastes available and materials wanted in the Philippines;

4) conduct detailed physical, chemical and biological characterization of waste samples where necessary in order to appropriately complete the inventory of waste available for listing in waste exchange bulletins; and,

5) determine the suitable resource recovery and utilization options for selected industries which will optimize waste exchange practices.

The first phase of the IWEP was completed in June 1991.

As a follow-up to the IWEP Phase I, IDRC funded the Waste Minimization and Pollution Control for Small and Medium Business Enterprises Project otherwise known as IWEP Phase II. However, waste exchange is only one of several waste management thrusts being taken under the project.

The four major components of IWEP Phase II are: policy initiatives for improved environmental protection; implementation of existing industrial waste exchange program; pollution prevention and appropriate waste management strategies for key industry sectors; and training and knowledge.

The Philippine Business for the Environment (PBE) now operates the waste exchange information center. EMB assists in providing technical assistance, operation support and conduct of surveys for updating the waste material database. Waste listings are published in the PBE magazine, "Business and the Environment" through the support of the USAID.

4.7.2.4 Industrial Environmental Management Project

The Industrial Environmental Management Project started in 1992 is funded by the USAID. The project's overall objective of industrial pollution management is implemented through a three-part strategy, namely: pollution prevention/reduction at source; reclamation of industrial wastes if technically and financially viable; and encouragement of cost-effective pollution abatement technologies.

Under the project, Pollution Management Appraisals (PMAs) are undertaken for cooperating industrial firms. IEMP specialists work hand in hand with the management and technical personnel of the firm in drawing up pollution management strategies. Environmental Risk Assessment

(ERAs) are also conducted and these help DENR identify priorities with respect to policy, regulation, monitoring and enforcement. Specifically, ERAs help identify high-risk industries.

Under the IEMP, policy studies are also conducted. In particular, market-based instruments for pollution control have been recommended for certain industry sectors.

4.7.2.5 Industrial Restructuring Program - Environmental Management Program

The Environmental Management Program under the Industrial Restructuring Program (IRP) is basically an institutional strengthening program for DENR-EMB and Development Bank of the Philippines (DBP) personnel. It aims to prepare the afore-mentioned staff for the development of environmentally-sound projects under the IRP. Specifically, the program will strengthen DENR/DBP personnel in the evaluation and approval of investments with respect to environmental compliance, the conduct of environmental audits, and in the development of environmentally sound projects. The project commenced in 1991 with funding support from the Swedish Agency for International Development.

4.7.3 Air

4.7.3.1 Vehicle Emissions Control Planning in Metro Manila

Funded by the Asian Development Bank, the overall objective of the study conducted in 1991-1992 was to assess the air pollution problem of Metro Manila with respect to vehicle emissions. The study involved the measurement of ambient air quality and vehicle emissions, estimates of current and projected total motor vehicle emissions, estimates of human

health effects of current air quality, assessment of enforcement and institutional structures, and drawing up of measures/recommendations for an effective vehicle emissions control program. The study recommends an "investment in vehicle inspection related measures, in conjunction with the application of appropriate policies relating to: (a) improved fuels, (b) vehicle emissions standards, (c) vehicle inspection and maintenance, and (d) vehicle conversion from diesel to gasoline fuel."

4.7.3.2 Urban Air Quality Management Project

To address the persisting problem of urban air pollution, a comprehensive air quality management strategy was drawn up through a study conducted from 1993 to 1994. Funded from the Consultants Trust Fund of Norway and Netherlands and the World Bank, the study focused on air quality assessment which included dispersion modeling, emission source inventory, health impact assessment, as well as the economic valuation of air pollution impact.

The air quality management strategy shall be operationalized through the Clean Air 2000 Action Plan which is a result of studies and workshops among participants from various government agencies, businesses, NGOs as well as foreign and local experts/consultants.

The Clean Air 2000 Action Plan focuses on the following aspects: improved air quality; fuel switch; air quality; traffic management; transport demand management; inventory/dispersion modeling; technology improvement; institutional and regulatory framework; land use planning; awareness raising/training. For each of these area of concern, activities were delineated among different agencies and organizations with defined implementation schedules.

4.7.3.3 Energy Sector Loan: Environmental Component

The main objective of the sub-project is to assist the EMB in assessing the needs for air and water quality sampling equipment, specifying and installing the equipment. Two air quality monitoring stations have been installed in Metro Manila: one at Severina Subdivision and one at the Manila Memorial Park, both in Paranaque.

4.7.4 Water

4.7.4.1 Economic Incentives to Promote Water Pollution Prevention and Abatement

The objectives of the program are to: review technical aspects of existing regulations; assess legal schemes for imposing pollution charges; and to draw up the pollution charges implementing strategy.

As of the present, pollution charge models have been defined. Institutional arrangements, as well as necessary administrative and/or legislative steps are being undertaken. The study funded by the WB (Japan Grant Fund) started in 1994 and will be finished in 1996.

4.7.4.2 Common and Individual Wastewater Treatment Facilities Study

The on-going study funded by WB (Japan Grant Fund) aims to: identify five to ten cost-effective Common Treatment Facility (CTF) schemes; prepare six preliminary engineering plans; and draw up pollution reduction plans for four individual enterprises. Identified CTFs include tanneries in Meycauayan, Bulacan, electroplaters in Metro Manila, textile

manufacturers in Valenzuela, the Food Terminal Inc., the industrial estate of the VFD Development and Management Corp. (PHIVIDEC) in Taguig and the First Cavite Industrial Estate. The ITFs, on the other hand, are for the San Juan General Textile in Quezon City, the Eduardo Alarilla Tannery in Hulo, Bulacan and Stork Products in Pasig. Detailed feasibility studies are now being undertaken.

4.7.4.3 Pasig River Rehabilitation Program

The program was started in 1989 when the DANIDA-funded feasibility study was conducted. In the study, major pollution sources were identified and a Plan of Operation was drawn up with the objective of improving water quality to DENR Class C standards (suitable for industrial use) by year 2005. For the medium-term, the program aims to reduce by 1998, BOD load from commercial and industrial sources by 50%. By that year also, it is expected that domestic wastewater BOD will be reduced by 28% through the implementation of MWSS projects.

With support coming from DANIDA, the River Rehabilitation Secretariat was created to oversee the program implementation. At present, the implementation of the rehabilitation program involves more than a hundred agencies, NGOs, and other groups. In 1993, the Presidential Task Force on Pasig River Rehabilitation (PTF-PRR) was created. The Task Force reports directly to the President and is chaired by the DENR Secretary.

4.7.4.4 "Save Our Lake" Program

The LLDA in 1988 launched the "Save Our Lake" Program which aims to encourage greater community participation in the enforcement of pollution control rules and regulations.

The program is implemented in selected lakeshore barangays through the participation of private companies and other government agencies.

4.7.4.5 Navotas-Malabon-Tullahan-Tenejeros (NMTT) River Revival Program

The project which started in 1988 is being implemented by the DENR, LLDA, DPWH, MWSS, and NHA. At the start of the project, the objective was to reduce pollution load by half by May 1992.

4.7.5 Solid Waste

4.7.5.1 Urgent Garbage Disposal Improvement Project

JICA has provided under three (3) phases garbage compactor trucks, dumptrucks and landfill equipment from 1990 to 1993. The more than five hundred equipment units were distributed to various cities and municipalities nationwide, including some in MMA. Fourty (40), seventy-one (71), and sixty-four (64) equipment units were distributed in Metro Manila.

4.7.5.2 Metro Manila Solid Waste Management System

Following the Metro Manila Solid Waste Management Study conducted in 1989, WB (Japan Grant Fund) funded the detailed design of two (2) landfills at Carmona, Cavite andSan Mateo, Rizal as well as the detailed engineering for a transfer station at Mangaha, Pasig.

The GOP implemented, on an interim basis, the sanitary landfill at Carmona and San Mateo. A transfer station was constructed in Las Piñas, Parañaque. DPWH was responsible for the construction and these facilities are now being operated by MMDA.

The San Mateo Sanitary Landfill has a total capacity of 2.1 million cum. It covers a land area of 8 hectares. The Carmona Landfill has a total capacity of 1.1 million cum. It has an area of around 5 hectares.

The transfer station in Las Piñas was put up to service the requirements of Manila and all towns and cities south of Pasig River. It began operations in 1994.

4.7.5.3 Smokey Mountain Development Project

The Smokey Mountain Development Project (SMDP) is being implemented through a multi-agency Executive Committee consisting of representatives from PEA, MMDA, Commission on Urban Poor, NEDA, DPWH and NHA. The SMDP consists of three (3) packages as follows:

a) Package I: construction of housing units;
b) Package II: construction and operation of an incinerator with power generation facilities;
c) Package III: development and operation of a river barge transport system.

The Project has been awarded to a private company an a BOT basis. Package I started in 1992 and is expected to be substantially completed by end 1996. Presently, proposals for Package II are now being solicited.

4.7.5.4 Waste-to-Energy Project

The MMDA has proposed, in light of numerous proposals for the installation of municipal waste incinerators, the solicitation of BOT offers for the construction and operation of waste-to-energy systems for Metro Manila. The proposed plants will be located in the San Mateo and Carmona landfills. A 3,000 tons per day incinerator capable of producing 30 MW of power is proposed to be installed in San Mateo. On the other hand, a 2,000 ton per day incinerator with a 20 MW power plant is proposed for the Carmona landfill.

4.7.6 Toxic and Hazardous Wastes

4.7.6.1 Toxic and Hazardous Waste Management Study

The European Commission has funded a Technical Assistance on Toxic and Hazardous Waste (THW) Management in the Metro Manila Area. The two-year study started in January 1995. The study's main objective is to develop clearly defined policies and a sustainable, comprehensive plan for toxic and hazardous management in the MMA.

The study consists of two phases. Phase I involves the following activities:

1) Development of an appropriate policy and institutional framework for the management of THW in Metro Manila;

2) Quantification and characterization of current and projected arisings of THW in MMA;

3) Identification and assessment of short-term and long-term options for managing THW in the MMA;

4) Design and development of an appropriate campaign to improve public awareness of the issues involved in THW management;

5) Management, liaison and reporting, including the preparation of a report to the programme sponsors (European Commission) on the conclusions from Phase I of the program.

Phase II of the program will involve the following:

1) Selection of an appropriate site for a comprehensive THW management facility;

2) Preparation of a technical specification and design for the facility covering landfill, thermal/chemical treatment and transport/support elements;

3) Financial and economic analysis of the proposed facility, including preparation of a comprehensive financial plan;

4) Development of site operating and management procedures, and carrying out of a comprehensive environmental impact assessment;

5) A review of ownership and operation options for the proposed facility, and assistance with the identification and procurement of an appropriate contractor;

6) Implementation of the public awareness campaign and preparation of the final report on the programmed.

4.7.6.2 Metro Manila Hospital Waste Incinerator Project

Under the 1994 French Protocol, a hospital waste incinerator will be set-up for the requirements of Metro Manila. The project shall be implemented by the MMDA. The proposed plant consists of two (2) incinerators, each with a capacity of 23 tons per day. The incinerator will have enough capacity to handle Metro Manila and neighboring regions' hospital wastes for sixteen years from start of operation. A third incinerator can be installed in the future if necessary.

The proposed plant shall be installed within the San Mateo sanitary landfill area. At present, the project design is being reviewed for purposes of government clearance and approval.

CHAPTER 5
IDENTIFIED ENVIRONMENTAL MANAGEMENT GAPS and RECOMMENDATIONS

5. IDENTIFIED ENVIRONMENTAL MANAGEMENT GAPS AND RECOMMENDATIONS

5.1 General

The preceding chapter provides the major initiatives and actions taken up by the Government as well as the private sector to address issues and concerns raised/identified by various programs and projects. Following the same thrust and direction in which the Government is pursuing, this chapter will discuss supplementary gaps and countermeasures to further improve environmental management in MMA.

The major problems identified can be categorized into two (2) broad areas of concern: 1) conservation, improvement and effective use of natural resources (air, water and land); and 2) institutional strengthening. Countermeasures to these problems shall be addressed collectively, to wit: 1) management of various natural resources to ensure sustainability; 2) effective environmental monitoring and enforcement of environmental laws and regulations; and 3) promotion of environmental awareness.

5.2 Management of Natural Resources to Ensure Sustainability

5.2.1 Conservation/Restoration of Ecologically Sensitive Areas

Laguna de Bay is a major body of water in a state of environmental distress as discussed in Chapter 2. Inspite of its present rating as Class C body of water, the World Health Organization, MWSS and LLDA still foresee the potential use of the lake waters as one of the main sources of water supply for Metro Manila. It is for this reason that the continuous deterioration of the lake must be checked. Clear-cut measures should be introduced to discourage polluters from further degradation of the lake.

Getting the industries to cooperate and the active participation of the LGUs (in the case of domestic wastewater) are needed where they may have the opportunity to develop and implement schemes that promote cleaner technology. On the other hand, the Government's enforcing agencies must be seriously tasked in ensuring that industries shall comply with effluent standards adjusted to match the absorptive capacity of the lake.

The primary rivers of Metro Manila must also be conserved for economic as well as for aesthetic values. At present, these river systems are heavily polluted by domestic sewage and solid waste. Organic materials undergoing anaerobic decomposition are the primary pollutants that generate malodorous hydrogen sulfide gases, floating scums, dissolved oxygen depletion and subsequent fish skills or other dislocation of aquatic ecology.

5.2.2 Cost Effective Air/Water Pollution Control

Apparently although domestic waste has been the main source of pollutants, industry sources would be easier to manage primarily because of their relatively ready access to pollution control resources. Secondly, domestic waste collection falls within the jurisdiction of LGUs which more often than not, are less capable of improving their sanitation facilities much less a sewerage system.

Sludge from septic tanks/vaults maybe handled using the same type of communal processing. Fees may be charged from communities availing of the disposal facilities to support the operational requirements of the plants possibly needing only minimum support from both local and national government.

Putting up a centralized sewerage system for the whole of MMA will require huge government involvement not only in terms of financing but clearer delineation of responsibilities among government agencies in the sector as well. This clearly

emphasizes the need to tackle the situation in a technically innovative (cost-effective) yet financially viable approach.

Septic tanks, a common treatment for human excreta have been found to have limited effectiveness in the proper treatment of sewage. This problem is aggravated by insufficient maintenance works. At present, there is no regular program to address this concern, such as the desludging of filled-up tanks and disposal of the collected materials. In MMA, there is no designated treatment/processing points or place for the collected sludge.

5.2.3 Management Of Land Development And Transportation Network

At present, there is uncontrolled development in MMA. To attain urban growth that is conducive the region's economic development, such growth should be actively supported and encouraged, basically by public sector investments. Government investments, through infrastructure shall either lead or influence development to the areas which are most suitable to development.

Development controls should be effectively implemented to help shape the urban form of MMA, and thereby help curb the traffic and pollution problems. An updated land use/zoning must be undertaken, especially for proper siting of new industries and not be in conflict with other land uses.

5.2.4 Appropriate Levels And Measures For Solid Waste Management

As mentioned earlier, substantial portion of solid waste generated ends up in rivers, vacant lots and floodways seriously degrading the aesthetic as well as biological environment of affected areas. Lack or total absence of reliable collection system results in indiscriminate disposal of solid waste into water bodies.

To prevent further deterioration of the quality of Metro Manila waterbodies, proper facilities for the disposal and processing of solid waste must be constructed and operated by the local government units.

Recycling of materials such as glass, papers and metals must be promoted. This will reduce the space required in sanitary landfills thus, increasing the service life of the dumpsite while, at the same time providing means of livelihood and conservation of resources. Scavenging however, should be properly managed to avoid exposing people engaged in this livelihood to various health risks.

Composting of solid waste should also drastically reduce garbage volume since solid waste in MMR is usually high in organic and moisture content. This by-product should be of great value to farmers in the country side as long as careful segregation of toxic materials and heavy metals is done prior to composting.

Identification and construction of landfills and other methods of disposal such as incinerator for future use should be intensified integrating in the design recycling and composting thus, optimizing the benefits that can possibly be derived from solid waste processing.

5.3 Effective Regular Environmental Monitoring and Enforcement of Environmental Laws and Regulations

5.3.1 Air Quality

Air pollution problem requires proper equipment to undertake some real-time measurement of pollution indicators. There is lack of modern and reliable equipment so that authorities can determine if environmental laws and regulations have been violated.

Undoubtedly air pollution control activities in Metro Manila need to be expanded to cover wider areas of concern. Particular attention must be given to the mobile

sources. Current anti-smoke belching campaign should be continued and evaluated as to its effectiveness. This should result into a greater number of dilapidated vehicles being taken off the streets and prevented from being registered.

Licensing and registration on an annual basis ensures that vehicles are complying to the emission standards prior to registration. While all these tests may indicate the immediate condition of engines prior to registration, maintaining them in this form the rest of the year is another.

Existing working arrangements between drivers and operators of any public conveyance system is also subject to greater scrutiny of past studies in urban air quality environment. In most cases, maintenance routines are given the least place in the order of priorities. Expectedly, engine parts are prematurely worn down affecting the normal working efficiency of vehicles which translates to higher emission levels and shorter economic life of the vehicles. Some working arrangements are also encouraging drivers to adopt poor driving habits such as racing down of engines sometimes beyond its normal ranges resulting to higher emission levels specially from diesel powered engines.

Industries are obliged to comply with the 1990 effluent standards and are confronted with problems on how to deal with the regulation. Often, these needed plants already long in existence to operate under an entirely new set of conditions and to few, squeeze in required treatment facilities in their cramped up spaces possibly resulting to less efficient operations.

A provision was effected imposing less stringent requirements for old facilities by providing them more leeway in terms of time prior to full compliance with new effluent regulations. Entities found to be giving off higher concentrations of loadings are allowed to operate under less regulative environment on condition

that studies are to be undertaken on how best to satisfy the regulation standards within a two-year period. Beyond this allotted term, industries not able to comply are required to apply for temporary permits and are subject to penalty fee. Within this context, stricter enforcement of its provision is needed through closer coordination among LGUs and implementing agencies involved. Such coordination must be continuously sustained.

5.3.2 Water Quality

Previously, the monitoring program involved the taking of annual or bi-annual samplings of main river basins around the country, and a monthly sampling around Metro Manila. Budgetary constraints however, forced the Government to limit the scope and frequency of this activity.

Studies should likewise cover monitoring levels of carbon monoxide, hydro-carbons and lead to determine the extent of health risks.

Not only in Manila that the coverage of pollution control and monitoring be extended. Other urban growth centers should be equally given emphasis at the same time by introducing incentive system and by encouraging public awareness for them to take action against vehicular emissions.

Experts are keen on having these incentives reinstituted and encouragement of local manufacturing to reduce costs, make parts more readily available, and aid employment.

Assessment regarding management needs points at the acute necessity to compile and assemble all water resources related data within a single and accessible agency that is equipped to update and synthesize the information into useful and effective planning aid. This would require NWRB being made an independent and

completely devolved organization with full authority to exercise measures that will ensure the preservation of groundwater and surface water resources of the country.

Permit issuance for extraction of groundwater/surface water should likewise be given as regular function of LGUs guided by the NWRBs full and complete information on the state of groundwater and surface water over the area in question. This would require monitoring equipment including a laboratory to monitor effluent quality discharged into any water bodies.

5.4 Promotion of Environmental Awareness

To understand and appreciate the complex nature of the environment and its role in economic development, as well as to develop values which will create the commitment and political will to deal with difficult environmental and social issues, environmental education/awareness must be promoted to the populace giving emphasis to the LGU's decision makers.

5.4.1 Possible Areas of Technical Assistance and Research

The identified needs for possible technical assistance and research are:

1) Monitoring, developing of database and presentation of environmental quality;
2) Land use planning, particularly for siting industrial zones and control environmental pollution;
3) EIA/EIS preparation, review and implementation for various projects;
4) Disposal of domestic-industrial, sewerage and other non-toxic and hazardous waste;
5) Ecological study on the effect and utilization of marine outfalls for wastewater without toxic and hazardous waste. The procedure when

properly controlled according to experts could improve the productivity of our sea resources as a direct effect of nutrients added by the outfall;

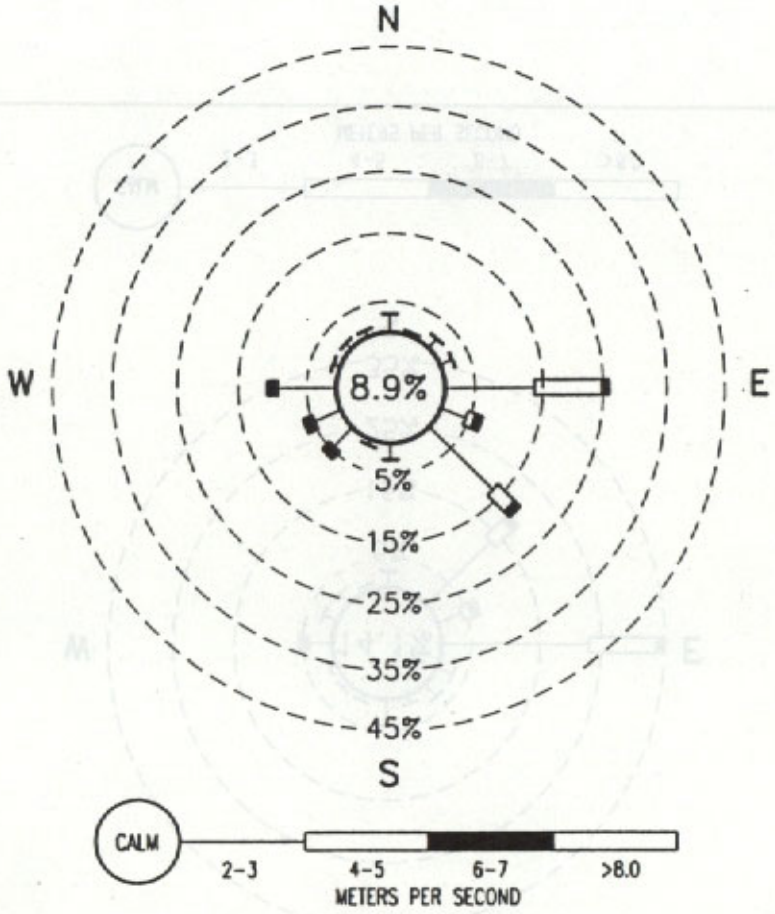
6) Assessment of water resources availability now in critical condition and must be matched appropriately with present and projected demands. Long-term plans must now be firmed up for better coordination with land use and other regulatory strategies.

5.4.2 Strengthening Environmental Administration at the Local Government Units

The following should be pursued related to environmental administration:

1) Clarification/establishment of functions of LGUs at different levels related to environmental management;
2) Development of human resources for LGUs;
3) Organized technical and functional supports to small and medium enterprises in their efforts to control pollution; and
4) Improvement of communication between DENR and the industrial sector, and between DENR and local communities.

ANNEXES



WINDROSE DIAGRAM

STATION: PASAY CITY (NAIA)
PERIOD : 1961-1993

ANNUAL DATA

AVE. SPEED : 3.07

TOTAL OBSN. : 10728

>% OF SPEED LIMITS<

[2-3 mps]
= 57.43%

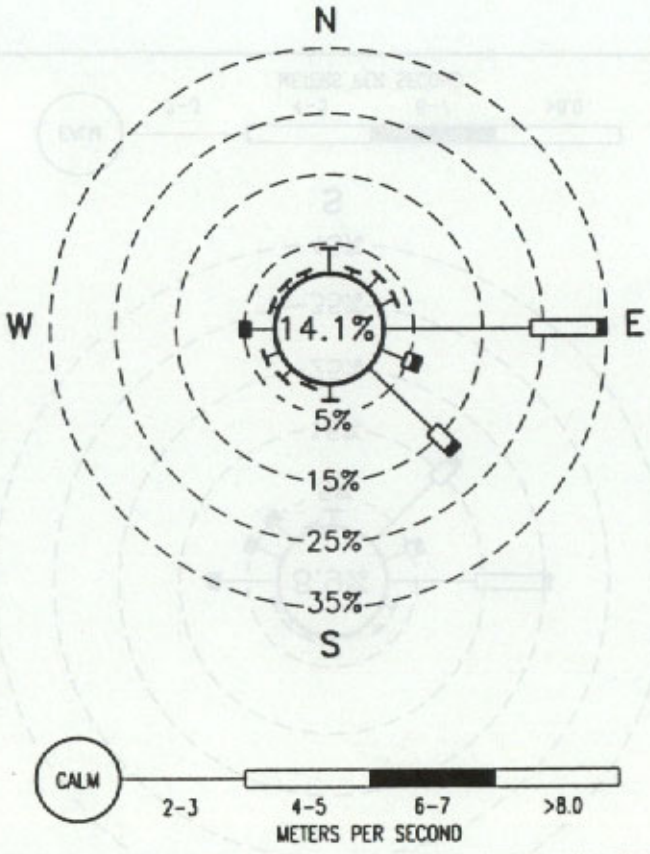
[4-5 mps]
= 28.24%

[6-7 MPS]
= 4.744%

[>8 mps]
= .6897%

SOURCE : PAGASA

ANNEX 1-1o
WINDROSE DIAGRAM



WINDROSE DIAGRAM

STATION: PASAY CITY (NAIA)
PERIOD : 1961-1993

NORTHEAST MONSOON

AVE. SPEED : 2.56

TOTAL OBSN. : 3599

>% OF SPEED LIMITS<

[2-3 mps]
= 68.26%

[4-5 mps]
= 15.33%

[6-7 MPS]
= 1.611%

[>8 mps]
= .7224%

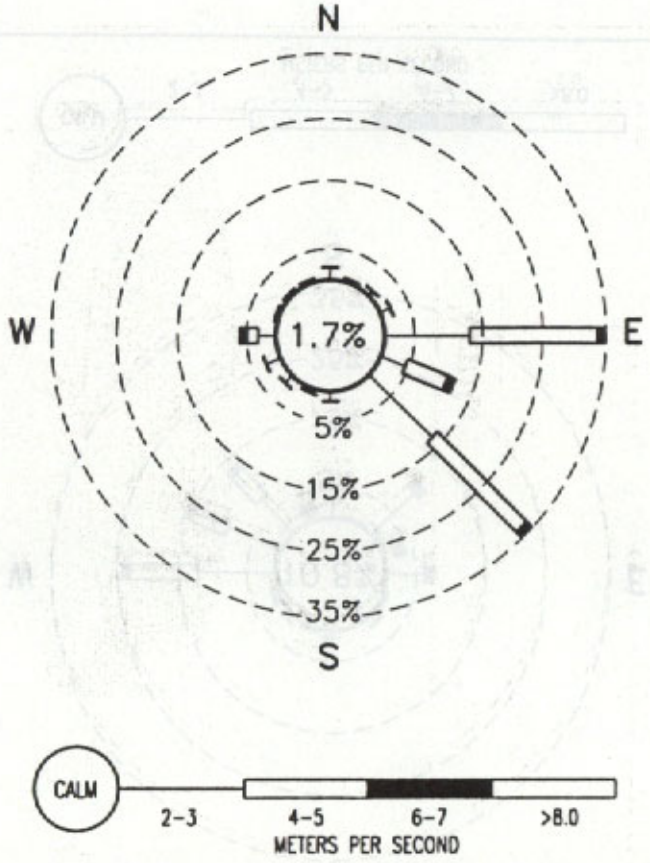
SOURCE : PAGASA

ANNEX 1-1b
WINDROSE DIAGRAM

DISKETTE NO. ------

Urban Pollut

Annexes



WINDROSE DIAGRAM

STATION: PASAY CITY (NAIA)
PERIOD : 1961-1993

TRANSITION PERIOD

AVE. SPEED : 3.88

TOTAL OBSN. : 3540

>% OF SPEED LIMITS<

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[4-5 mps]
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[6-7 MPS]
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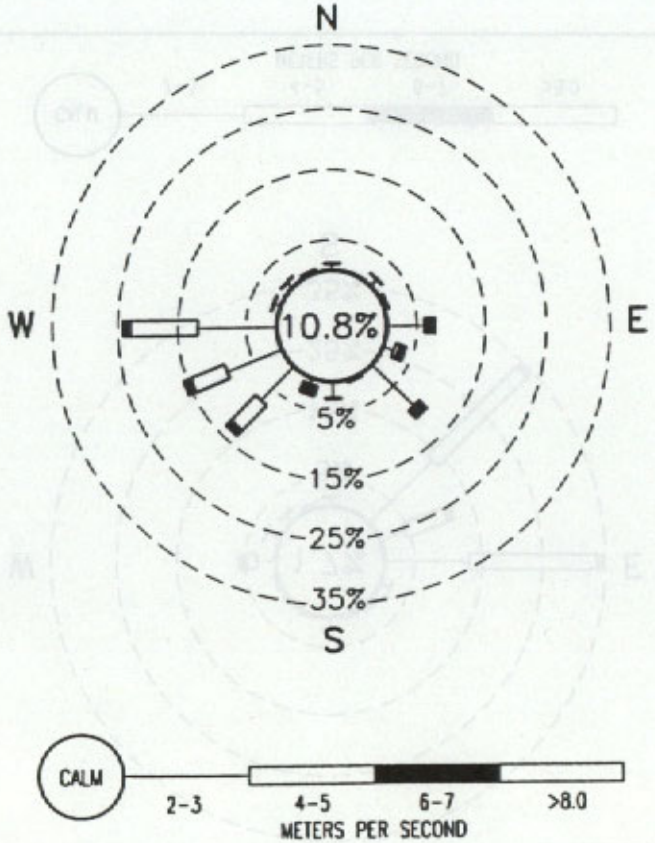
[>8 mps]
= .5649%

SOURCE : PAGASA

ANNEX 1-1c
WINDROSE DIAGRAM



WINDROSE DIAGRAM

STATION: PASAY CITY (NAIA)
PERIOD: 1961–1993

SOUTHWEST MONSOON

AVE. SPEED : 2.78

TOTAL OBSN. : 3589

>% OF SPEED LIMITS<

[2–3 mps]
= 66.70%

[4–5 mps]
= 18.22%

[6–7 MPS]
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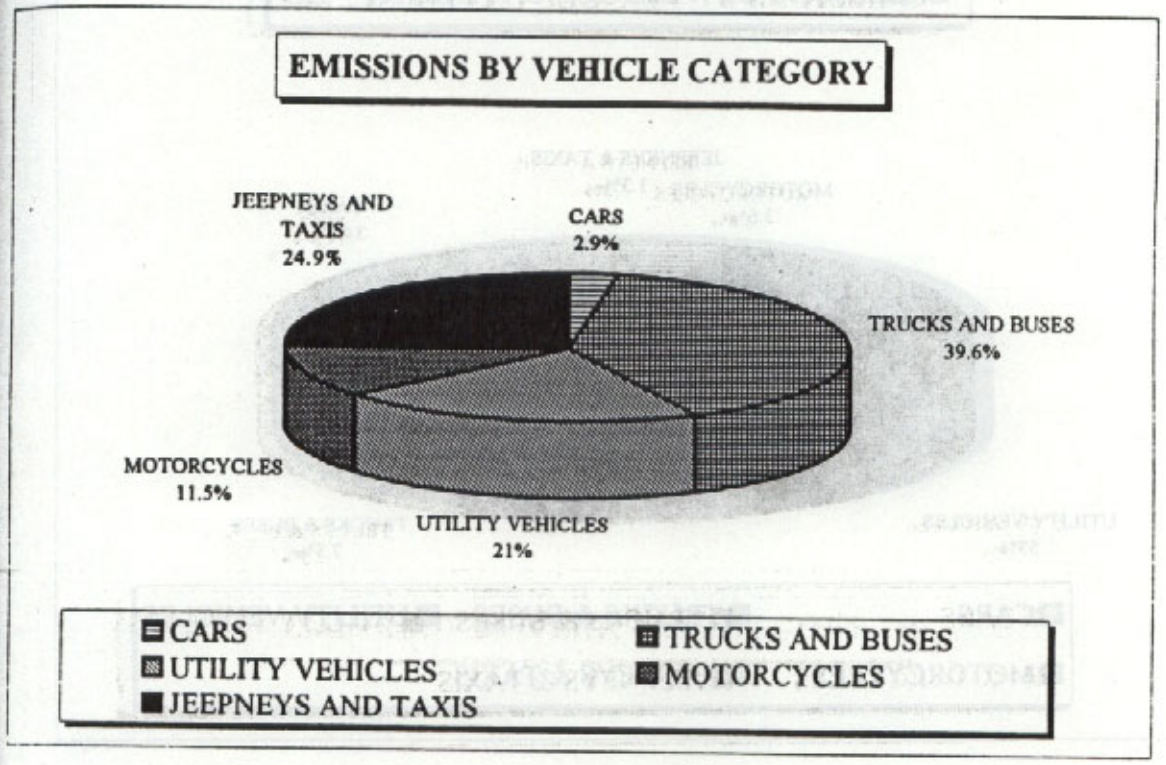
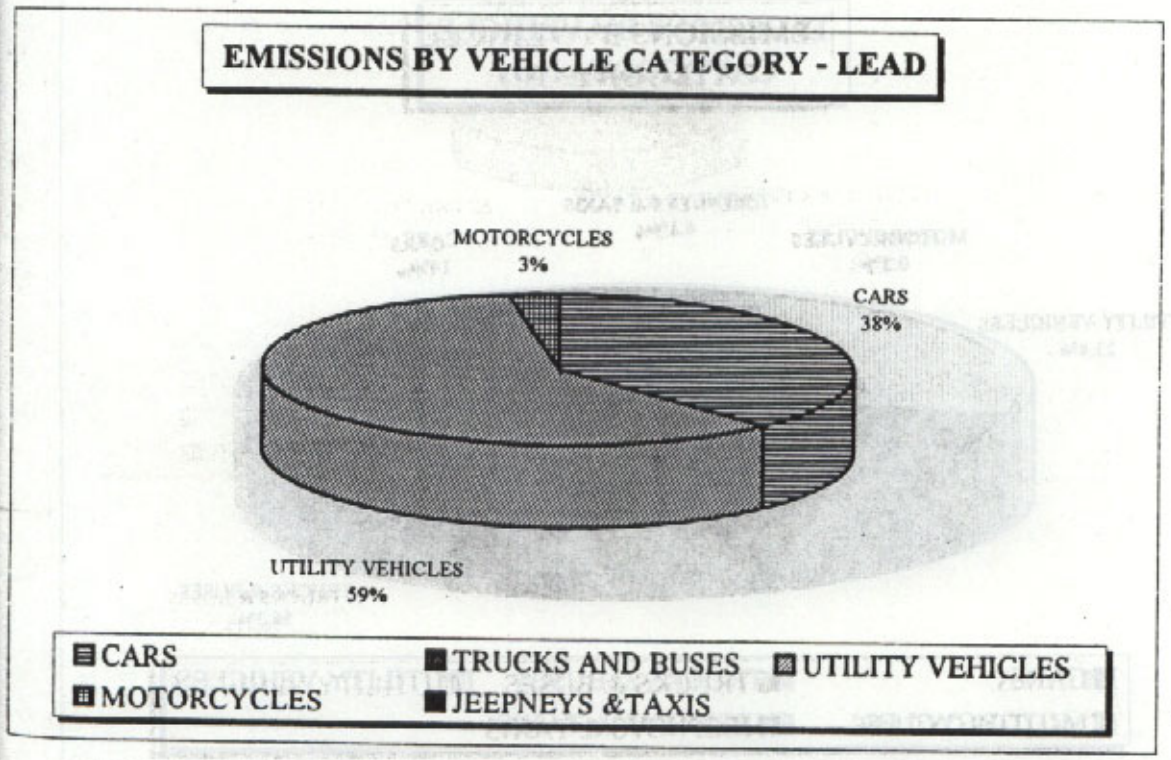
[>8 mps]
= .7801%

SOURCE : PAGASA

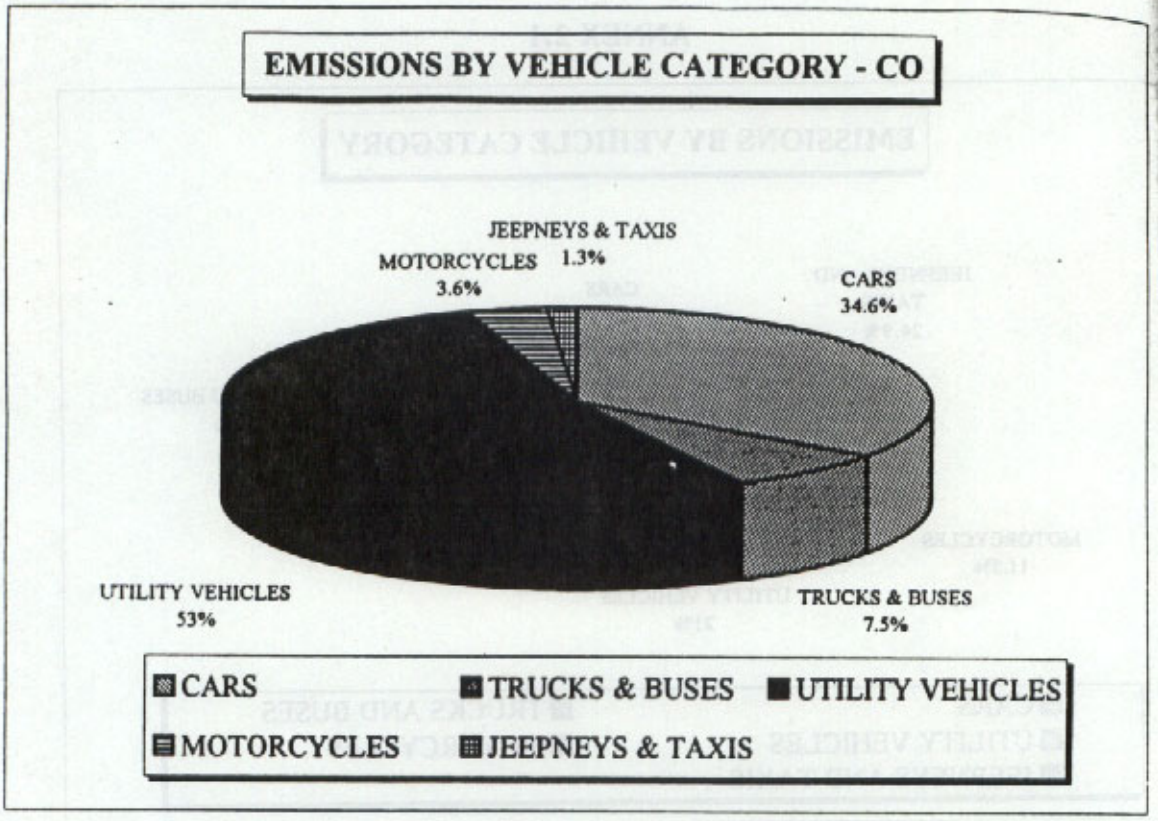
ANNEX 1–1d
WINDROSE DIAGRAM

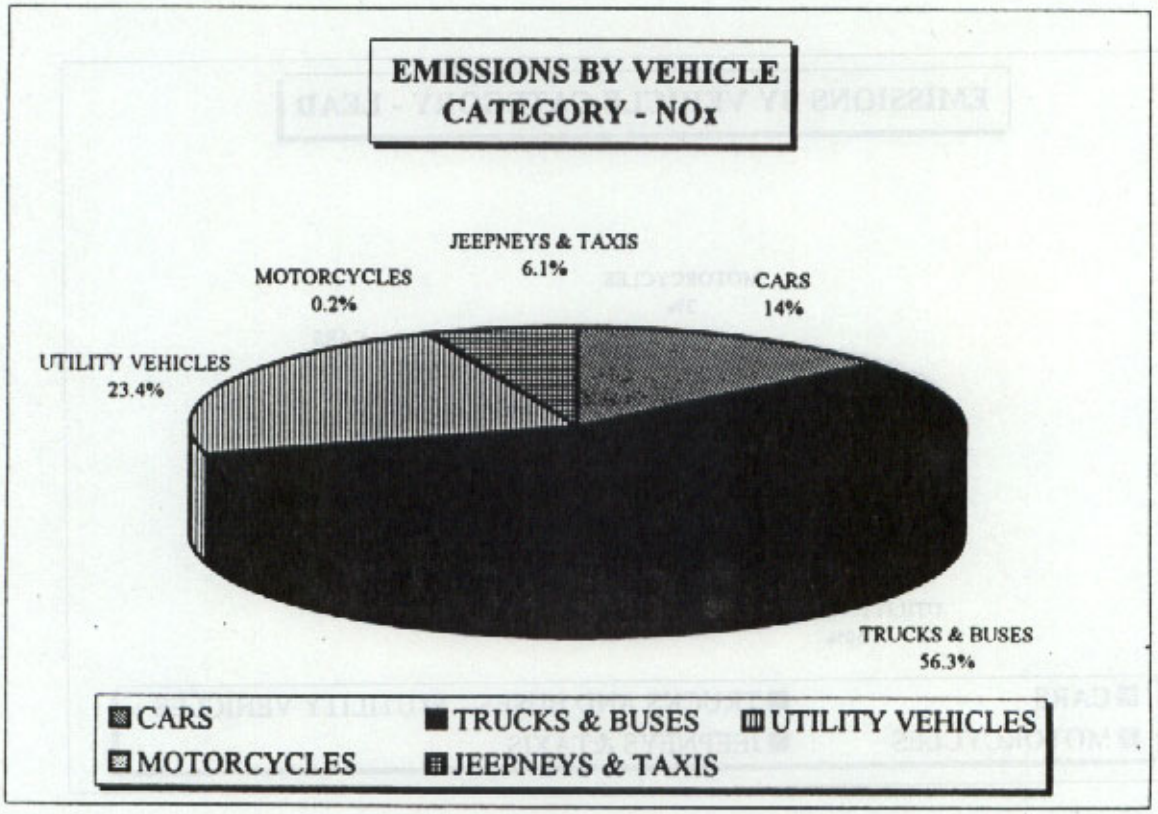
ANNEX 2.1





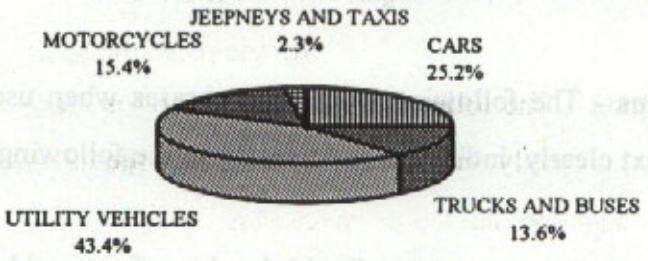
Source: Final Report for Vehicular Emission Control Planning in Metro Manila





Source: Final Report for Vehicular Emission Control Planning in Metro Manila

EMISSIONS BY VEHICLE CATEGORY - HC



ANNEX 2.2

REVISED AIR QUALITY STANDARDS OF 1992

REVISING AND AMENDING THE AIR QUALITY STANDARDS OF 1978

Pursuant to the provisions of Section 6 (1) of Presidential Decree No. 1984, otherwise known as the "Pollution Decree of 1976" and by virtue of Executive Order No. 192, series of 1987, the Department of Environment and Natural Resources hereby adopts and promulgates the following rules and regulations:

Section 1. Title - These rules and regulations shall be known as the "Air Pollution Control of 1993".

Section 2. Scope - These rules and regulations shall apply to all industrial emissions and other establishments which are potential sources of air pollution.

Section 3. Definitions - The following words and phrases when used in this Chapter shall, unless the context clearly, indicates otherwise, have the following meanings:

(a) "Acid Mist" means minute liquid droplets of any acid including, but not limited to, sulfuric acid, sulfur trioxide, hydrochloric acid and nitric acid.

(b) "Air Pollutant" or "Air Impunity" or "Air Contaminant", means any matter found in the atmosphere other than oxygen, nitrogen, water vapor, carbon dioxide and the inert gases in their natural or normal concentrations, and includes smoke dust, soot, cinders, fly ash, solid particles of any kind, gases, fumes, mists, odors and radio-active substances.

(c) "Air Pollutant Source" or "Source" means any identifiable piece of process equipment at, from, or by reasons of which there is emitted into the atmosphere any pollutant(s). A "facility" is composed of one or more air pollutant sources.

(d) "Airborne Dust" means minute solid particles released into or carried into the atmosphere by natural forces or by any fuel-burning, combustion or process equipment or device, or by construction works, or by mechanics, or industrial processes.

(e) "Control Equipment" means:

1. any apparatus for separating any air impurities from the gas medium in which they are carried.
2. any device used for securing at the more efficient operation of any fuel-burning equipment.
3. any other device used for the purpose of limiting or reducing air pollutants; and
4. any device to indicate or record air pollution to give warning of excessive pollution, provides that such device is used in conjunction with the equipment as defined in items (1) and (2) and (3) above.

(f) "Equivalent Method" means any method of sampling and analyzing for an air pollutant deemed by the Department to be equivalent in sensitivity, accuracy, reproducibility and internationally accepted methods.

(g) "Existing Source" means any source already erected, installed, and in operation: or any source for which constructions has been offered for bidding or actual construction has commenced prior to the effectivity date of these revised Rules and Regulations except that any existing source

which in the considered opinion of the Department has undergone a modification after the date of adoption of an applicable rule or regulation shall be reclassified and considered a new source.

(h) "Fly Ash" means any solid particulate matter capable of being gas-borne and consisting essentially of fused ash and/or partially burned materials like coal, wood, bagasse or other combustible matter.

(i) "Fuel-burning Equipment" means any equipment, device or contrivance and all appurtenances thereto including ducts, breeching, fuel-feeding equipment, ash removal equipment, controls, stacks and chimneys, used primarily, but not exclusively to burn any fuel for the purpose of direct proposes applications or indirect heating such as in the production of hot air or hot water.

(j) "Fuel-burning Steam Generators" means furnaces and boilers which produce steam by combustion of liquid, solid, or gaseous fuels.

(k) "Fugitive Particulate" means the particulate matter which escapes and becomes airborne from lunen closed industrial operation or that which escapes from incompletely or partially enclosed operation into the outside atmosphere without passing or being conducted through a fuel pipe stack or other structure.

(l) "Fumes" means an airborne colloidal system which is formed by chemical reactions or by processes such as combustion, distillation, sublimation, calcination or condensation, and containing particulate matter of a size generally less than 1.0 micron.

(m) "Guide" or "Guideline Value" means the concentration of air over specified periods classified as short-term and long-term periods which are intended to serve as objectives or goals for the protection of health and/or public welfare. These values are not necessarily intended for direct enforcement but only for an air quality management purposes such as determining time trends, evaluating stages of deterioration or enhancement of the air quality and in general use as basis for taking positive action in preventing, controlling and abating pollution.

(n) "Incinerator" means any equipment, device or contrivance and all appurtenance thereof used primarily for destruction by burning solid, semi-solid, liquid, gaseous combustible waste and/or other similar materials.

(o) "Major Source" or "Facility" means any source or sources for which the potential emission rate after air pollution control equipment has been installed in equal to or greater than 100 tones per year of any of the following pollutants-particulate matter, sulfur oxides, nitrogen oxides or volatile organic compounds. Best available control technology is used in major sources.

(p) "Modification" means any process change or any physical change in, or change in the method of operation of an existing equipment or source, which increases the potential emission rate of any air contaminant emitted by such source, or which results in the emission of any contaminant not previously emitted except that:

(1) routine maintenance, repair and replacement shall not be considered physical changes, and

(2) the following shall not be considered a change in the method of operation.

(i) an increase in the production rate, if such increase does not exceed the operating designed capacity of the existing source.

(ii) an increase in hours of operation.

(q) "New Source" means any plant, equipment, or installation in any trade, business, or establishment which generates, emits or disposes air impurities into the atmosphere and constructed after the effectivity date of these revised rules and regulations. This includes any existing stationary source transfered or moved to a different location or site for the purpose of installation, operation or use after such date.

(r) "Non-Attainment Area" means an airshed or a region that does not meet any of the ambient standards or guidelines set in the regulations.

(s) "Normal Cubic Meter" (Ncm) means the volume of dry gas which occupies a cubic meter measured at twenty five degrees celsius (25°C) and at an absolute pressure equivalent to seven hundred sixty (760) mm Hg.

(t) "Opacity" means a state which renders materials partially or wholly impervious to rays of light, causing obstruction of the observer's view.

(u) "Owner or "Operator" means any person who owns, leases, operates, controls or supervises any facility, article, machine, equipment, other contrivance or source.

(v) "Particulate Matter" or "Suspended Particulate" means any material, other than uncombined water, which exists in a finely divided form as a liquid or solid.

(w) "Point of Emission" means the point in the stack, chimney, fuel or duct which is selected by the Department or its authorized officers for the purpose of sampling and determining the concentration and rates of emission of air impurities in the residual gases after completion of the process and before admixture with atmospheric air.

(x) "Practicable" means having regard, among other things, to local conditions and circumstances and to the current state of technical knowledge. And the term, "best practicable means" as determined by the Department includes the provision for emission control and the efficient maintenance of a plant and the proper use thereof and the supervision by or in behalf of the owner or operator.

(y) "Refuse" means any waste or other discarded or abandoned matter consisting of garbage, rubbish, ashes, street debris, dead animals, abandoned vehicles, industrial wastes, demolition wastes, construction wastes, special wastes, or sewage treatment residues.

(z) "Ringelman Chart" means the chart described in the U.S. Bureau of Mines. Information Circular No. 8333 and No. 7718, used for measuring smoke density.

(aa) "Standard" or "Limit" means the concentration of any air contaminant which in order to protect public health and/or public welfare shall not be exceeded at a particular region or zone, and at a specified period of time. Standards are enforceable and must be complied with by the Owner and person in charge, of an industrial operation, process or trade.

(bb) "Smoke" means gas-borne particulates resulting from incomplete combustion, consisting predominantly but not exclusively of carbon, ashes, or other combustible material.

(cc) "Stack" or "Duct" means any flue, pipeline, chimney or other contrivance arranged to conduct emission into the open air.

(dd) "Tonne" means 1000 kilograms.

(ee) "Variance" means a temporary suspension in the compliance with an emission standard for specified period of time in order to allow time to study, institute and/or finance an appropriate and adequate control equipment or technology to most regulatory standards or requirements. Variance shall not be used as a ploy to avoid compliance with any standard. It shall be granted only under exceptional cases and for a reasonable period of time, usually less than once a year and variance. Submission of attainable plans and progress report towards this particular air pollution problem are the usual conditions.

(ff) "Visible Emission" means an emission greater than five percent capacity.

(gg) "Volatile Organic Compound" means any compound containing carbon and hydrogen, or carbon and hydrogen in combination with any other element which has an absolute vapor pressure of 0.10 kg//cm^2 equivalent to 77.6 mm Hg or greater under actual storage conditions. Organic solvents include diluents and thinners and are defined as chemical compounds of carbon which are liquids at standard condition and which are used as dissolvers, viscosity reducers, or cleaning agents.

Section 4. National Emission Standards for Smoke and Particulate Matter for Stationary Source

(a) Visible Opacity Standard of Smoke

(1) The opacity of smoke emitted from any point of emission in all stationary sources determined in accordance with the provisions of these Rules and Regulations shall be such that, when compared in the appropriate manner with the Ringerlmann Chart or an equivalent method approved by the Department. Visible emission shall not appear darker than Shade 1 on the chart.

(2) Exception to Regulation 58 (a) (i) may be allowed under the following circumstances:

2.1 The opacity limit herein before prescribed shall not apply to the emission of dark smoke for less than five (5) minutes of such emission shall not exceed an aggregate of 15 minutes in any 24 hours; provided further that no time should the capacity be darker than shade 3 of the chart; and provided finally that this provision shall not apply to cases of dark smoke emissions resulting from cold-start and up-set conditions. The latter of which is however further regulated under paragraph (6) of Section 63 (e) hereof.

2.2 Neither shall said opacity limit apply to existing sources when in the opinion of the Department. It is not reasonably practicable to achieve these standards and a permission has

been granted in writing for a conditional variation of these Rules and Regulations.

(b) Maximum Permissible Emission Limits for Particulate Matter

For any source, industry or process, the maximum permissible limits for particulate matter in the effluent gas measured at the point of emission or after completion of the process and before admixture with atmospheric air shall be in accordance with Table 1.

TABLE 1

MAXIMUM EMISSION LIMITS IN mg/Hcm FOR PARTICULATES IN STATIONARY SOURCES

	NEW SOURCE	EXISTING SOURCE	
	1993	Before 1978	After 1978
1. Fuel Burning Steam Generators	150	300	500
a) Urban or Industrial Areas			
b) Other Areas	200	300	500
2. Incinerators	200	300	--
3. Cement Plants (kilns, etc.)	150	300	500
4. Smelting Furnaces	160	300	500
5. Other Stationary Sources	200	300	500

Note for Table 1

(1) For existing sources the applicable date classification in columns (3) and (4) refers to the initial plant construction or modification whichever is appropriate.

(2) For fuel-burning steam generators or sources, the concentration of particulate matter at the point of emission shall be corrected on the basis of 12% CO_2 by volume

(3) For the purpose of this table, the following definitions apply.

(a) "Other Stationary Sources" means a trade, process, industrial plant, or fuel burning equipment other than thermal power plants, or fuel burning equipment

other than thermal power plant, industrial boilers, cement plants, incinerators and smelting furnaces.

(b) "Urban Area" means a poblacion or central district of cities or municipalities having at least 50,000 population, or twin political subdivisions with contiguous boundary with essentially form one community whose population is more than 50,000 inhabitants. Inside these centers of population are some scattered industrial establishments.

(c) "Industrial Area" means a well-defined exclusive land use area in various stages of development that are primarily established for industrial subdivisions manufacturing and other industry mixes with provisions for common support infrastructure, facilities and services such as roads, water supply, power supply, communication systems, housing, storm drainage, sanitary sewerage systems, industrial wastewater treatment facilities, etc. These areas are registered with the HLURB or any other duly authorized government entities as industrial estates, parks or areas. Export processing zones also fail under this category of land use.

(d) "Other Areas" means all areas other than urban or industrial area.

(4) Owners or operators of existing sources constructed before 1978 emission standards (column "3", Table 1) for particulates within five years after the effectivity of these revised rules and regulations.

Section 5. National Emission Standards for Source Specific Air Pollutants (NESSAP)

(a) For any trade, industry, process, fuel-burning equipment or industrial plant emitting air pollutants, the concentration at the point of emission shall not exceed the limits set in Table 2.

TABLE 2

NATIONAL EMISSION STANDARDS FOR SOURCE SPECIFIC AIR POLLUTANTS (NESSAP)

Pollutants	Standard Applicable	Maximum Permissible Limits (mg/Mcm)	Method of Analysis
1. Antimony and its compounds	any source	10 as Sb	AASb
2. Arsenic and its compounds	any source	10 as As	AASb
3. Cadmium and its compounds	any source	10 as Co	AASb
4. Carbon Monoxide	any industrial source	500 as CO analysis	Orsat
5. Copper and its compound	any industrial source	100 as Cu	AASb
6. Hydroflouric Acid and Fluorine compounds	any source other than the manufacture of Aluminum iron alumina	50 as HF	Titration with Ammonium Thiocyanate
7. Hydrogen Sulfide	i. Geothermal power plant ii. Geothermal exploration and well testing iii. any source other than (i) and (ii)	c, d, e	Ammonium thiocyanate
8. Lead	Any trade, industry of process	10 as Pb	AASb
9. Mercury	Any source	5 as elemental Hg	AASb/Cold-Vapor Technique or Hg analyzer
10. Nickel and its compounds except nickel carbony)	any source	20 as Ni	AASb
11. Hox	i. manufacture of nitric acid. ii. fuel burning steam generators Existing source New source coal-fired oil-fired iii. any source other than (i) and (ii)	2,000 as acid and Hox calculated NO_2 1,500 as NO_2 1,000 as NO_2 500 as NO_2	Phenol-disulfonic acid method --do-- --do--
12. Phosphorous pentoxide	any source	200 as P_2O_5	spectrophometry
13. Zinc and its compounds	any source	100 as Zn	AASb

NOTE:

a. Other equivalent methods approved by the Department may be used.

b. Atomic absorption spectrophotomentry

c. All geothermal power plants starting construction by 01 January 1994 shall control H_2S emissions to not more than 150 g/GHW-Hr

d. All existing geothermal power plants shall control H_2S emissions to not more than 200 g//GMW-Hr, within 5 years from the date of effectivity of these revised regulations.

e. Best practicable control technology for air emissions and liquid dischargers. Compliance with air and water quality standards is required.

f. Provisional guidelines

g. Emission limit of Nickle Carbonyl shall not exceed 0.5 mg/Ncm.

h. Limits of other air pollutants not included in this table but appearing in the 1978 regulations shall be maintained.

(b) Absence of Emission Standard for Other Air Pollutants

(1) Where no emission or ambient standard is prescribed hereof for a specific air pollutant that is potentially harmful to public health and/or public welfare, the owner or operator of an industrial plant, establishment or stationary source shall conduct the operation or process by the best practicable means as may be necessary to prevent or minimize air pollutant; provided that if any time any question air pollutant; provided that if any time any question arises as to what is the best practicable means available for the purpose of this paragraph, the same shall be determined by the Secretary or his duly authorized and representative.

(2) The absence of the ambient air or emission standard for a specific air pollutant shall not preclude the Department to take appropriate action to control such pollutants to assure the health, welfare and comfort of the general population.

(c) Emission Limits for Non-Attainment Areas

Subject to public hearing and approval of the Department, emission limits more stringent than those prescribed in Section 58, 59, and 60 hereof. Where no such limits are prescribed in non-attainment areas where no alleviation of the situation may prohibit the establishment or new stationary sources that contribute significant pollution and/or initiate such appropriate action for the replacement of old obsolete existing plants with new ones that are provided with adequate or effective control equipment.

Section 6. Control of Sulfur Compound Emissions

(1) Initial Specifications 1993 - 1996:

In order to prevent and/or control increasing emissions of SO_2 into the atmosphere and unless otherwise allowed or exempted in writing by the Department or existing stationary sources fuels burning equipment, only liquid or solid fuel containing sulfur not exceeding the percentages by weight in accordance with the following schedule:

(a) Liquid Fuel	Metro Manila	Outside Metro Manila
(i) Fuel Oil (All grades)		
July 1, 1993	-3.5%	3.8%
January 1, 1996	-3.0%	3.0%
ii) Industrial Diesel		
July 1, 1993	-0.7%	0.8%
January 1, 1996	0.5%	0.5%

(b)	Solid Fuel (Coal)		
	July 1, 1993	-2.5%	2.5%
	January 1, 1996	-/1.0%	1.0%

(2) Further Reduction of Sulfur Content of Fossil Fuels

Two years after the effectivity of these revised regulations the Secretary shall after consultation with the Department of Energy or its equivalent, the national oil companies and concerned government agencies and private entities, promulgate new and lower sulfur content specifications of fossil fuels as an alternative approach to control SO_2 emissions in existing stationary sources to install appropriate SO_2 control equipment to meet the emission standards in accordance with Section 60 (b) (1) within five years; and provided finally that existing smaller fuel burning equipment shall comply with these requirements under Section 60 (c) or Section 61 of these regulations.

(b) Maximum Permissible Emission Limits for Sulfur Oxides in Stationary Sources.

(1) Existing Sources

(i)	Manufacture of Sulfuric acid and Sulf(on)ation Process	- 2.0 gm/Ncm as SO_3
ii)	Fuel Burning Steam Generators	- 1.5 gm/Ncm as SO_2
iii)	Other Stationary Sources except (i) and (ii)	- 1.0 gm/Ncm as SO_3

(2) New Sources

(i)	Manufacture of Sulfuric Acid and Sulf(on)ation Process	- 1.5 gm/Ncm as SO_3
(ii)	Fuel burning steam generators	
	January 1, 1994	- 1.0 gm/Ncm as SO_2
	January 1, 1993	- 0.7 gm/Ncm as SO_2
(iii)	Other Stationary Sources except (i) and (ii)	- 0.2 gm/Ncm as SO_3

(3) The applicable method of measurement for SO_2 is the barium-thorin titration method.

(c) When an existing source of sulfur oxides emission is unable to comply with the emission limits under this Section. The Secretary shall require in writing the owner or operator of said source to institute any one or a combination of the following within a specific period of time to be agreed upon between the Department and the owner/operator of the source.

(i) use a specified sulfur content of fuel;

ii) Erect or alter the height or dimensions of the stack to reduce ground level concentrations of sulfur dioxide at a specified level which shall not exceed 80 ug/Ncm (24-hr sampling) above background level; or

iii) Alter the method of operation or industrial process to prevent or reduce pollution.

(d) Penalty for Non-Compliance

For a period to be determined by the Secretary and provided that the resulting effect of SO_2 on the atmosphere does not pose an immediate threat to life or property, any existing source that complies with the provision of sub-section (a) (1) but cannot comply with the SO_2 emission standard on sub-section sub-section (b) (1) of these regulations may be allowed to operate and be issued a temporary permit for one year on condition that it pays first a penalty of fine for polluting the air environment in the amount equivalent to P 20.00 per kilogram of SO_2 discharged per day in exceed of the allowable emission limit provided further the calculated amount of the fine does not exceed P 5,000.00 per day in accordance with Section 9 (e) of PD 984.

(e) Hydrogen Sulfide Emissions

Any exit gas stream containing hydrogen sulfide which is discharge into the atmosphere from any source shall be vented, incinerated, flared or otherwise disposed of in such a manner that hydrogen sulfide and sulfur dioxide ambient standards are not violated.

Section 7. Variance

(1) Upon application, the Secretary at the discretion may grant a variance from the pertinent emission limits and related requirements under Section 58, Section 59, and Section 60 of these regulations. Variances and renewals thereof may be granted under any of the following grounds:

(a) There is no practical means or technology available for meeting the emission standard or the adequate control of air pollutant involved;

(b) Compliance with the particular emission standard or related requirements will necessitate the taking of measures which because of their extent or cost, must spread over a considerable period of time. A variance granted under this instance shall prescribed a timetable for compliance or the implementation of measures required.

(2) The applicant for a variance shall support his application with such information as the complete details of the proposed abatement program time schedule, cost estimates, interim abatement measures, surety bond to be determined by the Department, and other relevant requirements.

(3) The Secretary or his duly designated hearing officer shall hold a hearing on each application for a variance. The hearing procedures under Article 3 of these regulations shall apply at such hearing. In the absence of oppositors or complainants, a technical conference at the DENR Regional level is sufficient.

(4) Any variance or renewal thereof granted this section shall in no case exceed a period of 24 months.

(5) The Department may prescribed such time limits and other conditions that is shall deem appropriate in the granting of a variance.

Section 8. National Ambient Air Quality Guidelines (NAAQG) and Standards

(a) Criteria Pollutants

(1) For the purpose of protecting the public health and welfare and reducing damage to property as well as providing an air quality management control strategy for emission limitation from mobile and stationary sources, locating of commercial, industrial and residential facilities and to assist in the promotion and use of an improved transportation system, the hereunder National Ambient Air Quality Guidelines in Table 3 are hereby established.

TABLE 3

NATIONAL AMBIENT AIR QUALITY GUIDELINE FOR CRITERIA POLLUTANTS

POLLUTANT	SHORT TERM (a)			LONG TERM (b)		
	ug/Ncm	ppm	Averaging Time	ug/Ncm	ppm	Averaging time
Suspended Particulate Matter (c) TSP	230 (f)		24 hours	90	-	1 yr. (c)
PM-10	150 (g)		24 hours	60	-	1 yr. (c)
Sulfur Dioxide (c)	150	0.07	24 hours	60	-	1 yr. (c)
Nitrogen Dioxide	150	0.08	24 hours	80	0.03	1 yr.
Photochemical Oxidant	140	0.07	1 hour	-	-	-
as Ozone	60	0.03	8 hours	-	-	-
Carbon Monoxide	35 mg/Ncm	30	1 hour	-	-	-
	10 mg/Ncm	9	8 hours	-	-	-
Lead (d)	1.5	-	3 mos. (d)	1.0	-	1 yr.

NOTE:

(a) Maximum limits represented by ninety eight percentile (98%) values not to be exceeded more than once a year.

(b) Arithmetic Mean

(c) Annual Geometric Mean

(d) Evaluation of this guideline is carried out for 24-hour averaging time and averaged over three moving calendar months. The monitored average value for any three months shall not exceed the guideline value.

(e) SO_2 and Suspended Particulates are sampled once every six days when using the manual methods. A minimum number of twelve sampling days per quarter or forty eight sampling days each year is rquired for the methods. Daily sampling may be done in the future once continous analyzers are procured and become available.

(f) Limits for Total Suspended Particulates with mass median diameter less than 25-50 u.

(g) Provisional limits for Suspended Particulates with mass median diameter less than 10 microns and below until sufficient monitoring data are gathered to base a proper guideline.

(2) The applicable method for sampling and measurement of the above pollutants are as follows:

Sulfur Dioxide - Gas Bubbler and Pararosaniline Method (West and Gaske Method), or Flame Photometric Detector

Nitrogen Dioxide - Gas Bubbler and Griess-Saltzman, Chemiluminescence method

Ozone - Neutral Buffer Potassium Iodine (NBKI), Chemiluminescence method

Total Suspended Particulates (PM-10) - High volume with 10 micron particle - size inlet; gravimetric.

Carbon Monoxide - Non-dispersive Infra-red spectrophotometry (NDIR).

Lead - High volume and atomic absorption spectrophotometry.

(3) Other equivalent methods approved by the Department may be adopted.

(b) Source Specific Pollutants - National Ambient Standards

(1) For any industrial establishment or operation. The discharge of air pollutants that result in airborne concentrations in excess of the National Ambient Air Quality Standards shown in Table 4 shall not be permitted. Sampling shall be done at an elevation of at least two (2) meters above the ground level and conducted either at the property line or at downwind distance of five to twenty times the stack height whichever is more stringent.

TABLE 4

NATIONAL AMBIENT AIR QUALITY STANDARDS FOR SOURCE SPECIFIC AIR POLLUTANTS FROM INDUSTRIAL SOURCES/OPERATIONS

POLLUTANTS	CONCENTRATION		Averaging	Method of Analysis
	ug/Ncm	ppm	time(min)	Measurement (b)
Ammonia	200	0.28	30	Nesselerization
Carbon Disulfide	30	0.01	30	Tischer Method
Chlorine & Chlorine compounds expressed as Cl_2	100	0.03	5	Methyl orange
Formaldehyde	50	0.04	30	Chromotropic acid method or MBTH-colorimetric method
Hydrogen Chloride	200	0.13	30	Volhard titration with Iodine solution
Hydrogen Sulfide	100	0.07	30	Methylene Blue
Lead	20		30	AAS[b]
Nitrogen Dioxide	375	0.20	30	Griess-Saltzman
	280	0.14	60	
Phenol	100	0.03	30	4-Aminoantipyrine
Sulfur Dioxide	470	0.18	30	Colorimetric-Pararosaline
Suspended Particulate matter-TSP	300		60	Grivametric
PM	200		60	- do-

NOTE:

(a) Pertinent ambient standards for Antimony, Arsenic, Cadmium, Asbestos, Nitric Acid and Sulfuric Acid in the 1978 NPCC Rules and Regulations may be considered as guides and determining compliance.

(b) Other equivalent methods approved by the department may be used.

(c) Ninety-eight percentile (98%) values of 30-min, sampling measured at 25 degree celsius and one atmospheric pressure.

Section 9. Prohibitive Acts

A. Fugitive Particulates

1. No person shall cause permit or allow the emissions of fugitive particulates from any source whatsoever, including but not limited vehicular movement, transportation of materials, construction demolition of wrecking materials, construction, alteration demolition or wrecking, or industry-related activities such as loading, storing or handling without taking reasonable precautions to prevent such-emission. Such reasonable precaution shall include but not be limited to the following:

   a. use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structure, construction operations, quarrying operations, grading of roads or the clearing of land;

   b. application of asphalt, water, or suitable chemicals on dirt and unpaved roads, materials stockpiles and other surfaces which can give rise to airborne dust problems.

   c. installation and use of hoods, fans and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations; and

   d. covering open loaded trucks transporting materials likely to give rise to airborne dust.

2. No reason shall cause or permit the discharge of visible fugitive dusts beyond the boundary line of the property from which the emissions originate.

3. When dusts, fumes gases, mists, odorous matters vapors or any combination thereof escape from a building or equipment in such manner and amount as to cause nuisance or to violate any regulations, the Department may order that the building or equipment in which processing, handling, and storage are done, be tightly enclosed and ventilated in such a way that all emissions or gasborne materials leaving the building or equipment are treated to remove or destroy such air pollutants before discharge into the open air.

B. Volative Organic Compounds Emissions or Organic Compound Emission

1. Storage and handling of volatile organic compound - No person shall place, store, or hold in any stationary tank, reservoir, or other container of more than 150,000 liters capacity any volatile organic compounds unless such tank, reservoir, or other container is a pressure sufficient under normal conditions to prevent vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor loss control devices.

1.1 A floating roof, consisting of a pontoon type double check type roof or internal floating cover which will with a closure seal or seals to close the space between he roof edge and tank wall in accordance with the American Petroleum Institute (API). The National Fire Protection Association (NFPS) and pertinent Philippine regulations and standards. All tanks gauging or sampling devices shall be gas-tight except when tank gauging or sampling is taking place.

1.2 A vapor recovery system consisting of a vapor gathering system capable of collecting the volatile organic compounds, vapors, and

gases discharged and a vapor disposal system capable of processing such volition organic vapors and gases so as to prevent their emission to the atmosphere and with all tank gauging and sampling devices gas-tight except when gauging or sampling is taking place.

1.3 Other equipment or means of equally acceptable efficiency for purposes of air pollution control as may be approved by the Department.

(2) Waste Gas Disposal

No person shall cause or permit the emission of more than 7.0 kg per day of waste gas from any ethylene emission source unless the waste gas stream is properly burned at 704 deg. celsius for 0.3 seconds or direct flame afterburner or burned in a smoke flare or an equally effective device as approved by the Department. This provisions shall not apply to emergency relief and vapor blowdown systems.

(3) Organic Solvents

No person shall cause or permit the emission of more than 1.5 kg of organic solvents in any one hour nor more than 7.0 kg. in any one day from any article, machine, equipment, or other contrivance is provided with an acceptable ventilation and control system approved by the Department.

Paragraph (3) hereof shall not apply to:

(a) The manufacture of organic solvents.

(b) The spraying or other employment of insecticides, pesticides, or herbecides,

(c) Industrial surface coating operations when the coating's solvent make-up is water based and does not exceed 20 percent of organic materials by volume.

C. Nuisance

No person shall discharge from any source whatsoever such quantities of air contaminants or other material which constitute nuisance as defined under Act No. 694 to 707 of R.A. 886, otherwise known as Civil code of the Philippines.

D. Open Burning

No person shall ignite, cause to be ignited or maintain any open fire except as follows:

(1) Open fires for the cooking of food for human consumptions.

(2) Fires for recreational or ceremonial purposes.

(3) Fires to abate a fire hazard, provided the hazard is so declared by the fire department.

(4) Fires for the prevention and control of disease or pests.

(5) Fires for the disposal of dangerous materials, when there is no practical alternative method of disposal and burning, is approved by the Department.

(6) Fires purposely set for recognized agricultural forest and wildlife management practices.

(7) Fires purposely set for recognized agricultural, forces and wildlife management practices.

(8) Open fire specifically or expressly approved by the Department.

E. General Restrictions:

(1) No plant or source shall operate at capacities which exceed the limits of operation or capability of a control devices to maintain the air emission within the standard limitations imposed by the Rules and Regulations of this chapter or by relevant permit conditions issued in writing by the Department.

(2) No person shall build, erect, construct, install, or implant any new source, or operate, modify, or rebuild an existing source or by any other means release or take action which would result in the release of air pollutants into the atmosphere and result in together with the concentrations of existing air pollutants, ambient air concentration greater than the ambient air quality standards specified in Table 4 of Section 62 of this chapter.

(3) No person shall build, erect, install or use any article, machine, equipment or other contrivance the use of which will conceal an emission which would otherwise constitute a violation of any of the provisions of this Chapter.

(4) No person shall cause or permit the installation or use of any devices or any means which without resulting in reduction in the total amount of air contaminant emitted. Conceals or dilutes any emission of air contaminant which would otherwise violate the provisions of this chapter.

(5) All pollution control devices and systems shall be properly and consistently maintained and correctly operated in order to maintain emissions in compliance with the provisions of this chapter. No facilitates shall be operated without the control equipment in proper equipment operation except with the permission of the Department when special circumstances arise.

(6) In the event that any emission source, air pollution control equipment or related facility fails or breaks down in such a manner as to cause the emission of air pollutants in violation of these Rules and Regulations, the person responsible for such source equipment or facility shall notify the Department within 24 hours of such failure or breakdown and provide a written statement giving all pertinent facts, including the estimated duration of breakdown. The Department shall be notified when the condition causing the failure or breakdown has been corrected and such source equipment or facility is again in operation.

(7) Any person intending to erect, install, resite or alter any chimney from or through which air impurities may be emitted shall obtain prior written approval from the Department.

Every application for the erection, installation, resisting or alteration of a chimney shall be accompanied by the following information:

(i) Site plan of a reasonable scale indicating clearly the location of the proposed chimney and buildings within 1000 meters of it and the height of the tallest building within a radius of 50 meters.

(ii) Details of air impurities to be discharged which shall include the rate of emission concentration and quantity.

(iii) Proposed construction drawings, design parameters and calculations.

Section 10. Source Monitoring Record Keeping and Testing

(a) The Department may require the owner or operator of any source to install, use, and maintain such monitoring equipment, example such emissions, and such ambient air pollutants that are significant for a particular industry, establish and maintain such records and make such periodic reports as the Department shall prescribed. For each major source, moreover, it shall be the responsibility of the owner or operator to install without waiting for any directive from the Department to (a) sample ambient air quality around the source and (b) either sample emissions from each stack or provide equivalent determination acceptable to the Department such as those provided for under Section 65 (a) (S).

(b) All analyses and tests shall be conducted in a manner specified by the Department. Results of the analyses and tests shall be calculated and reported in a manner specified by the Department.

(c) A person responsible for the emission of air pollutants from any source shall upon direction of the Department. Provide in connection with such sources and related source operations, such sampling and testing facilities exclusive of treatments and sensing devices as may be necessary for the proper determination of the nature and quantity of air pollutants which are or may be emitted as a result of such operation.

(d) Authorized representatives of the Secretary upon presentation of proper credentials may at reasonable time have access to and copy records, inspect any monitoring equipment or method to determine its accuracy and sample and emissions or ambient air quality which the owner or operator of such source is required under these regulations.

(e) When the Department upon investigation, has good reasons to believe that the provisions of this chapter concerning emission of pollutants are being violated, it may, by notice in writing require the person responsible for the source of pollutants to conduct test which will identify the nature and quantity of pollutant emission from the source and to provide the resulted of said tests to the Department. These tests shall be carried out under the supervision of the Department.

Section 11. Miscellaneous Provisions

(a) Stationary Fuel-Burning Equipment

(1) An owner or operator of stationary fuel-burning equipment shall, if so required by the Department, provides a mean to the satisfaction of the Secretary whereby a person in charge of such a plant or equipment may at all times ascertain without leaving the boiler room, furnace room, or control room, whether or not dark smoke is discharging from any stack or such installation. Such means may include one or more the following:

a) a window or opening through which an unobstructed view of the top of the stack may be obtained from the boiler room, furnace room, or control room.

b) a mirror so placed as to reflect the top of the stack, which reflection shall be visible from the boiler room, furnace room, or control room.

c) a smoke density indicator and alarm installed so as to indicate adequately in the boiler room, furnace room and control room the density of smoke being discharges;

d) a closed circuit television installation with the receiver located in the boiler room, furnace room, or control room.

e) any similar device which may be approved by the Secretary.

(2) All oil-burning equipment shall have heaters capable of heating oil to a temperature appropriate for the oil and burner.

(3) The following major industries are required to install continuos stack monitoring devices for smoke opacity and sulfur oxide emissions:

(a) Fossil-fuel fired power plant (including Nox)

(b) Petroleum Copper Smelter

(c) Primary Copper Smelter

(d) Steel plant including ferro-alloy production facility (for opacity only)

(4) Existing sources falling under paragraph (3) above shall comply with the requirements of installing continuos monitoring devices within 24 months after the effectivity of the rules and regulations.

(b) Miscellaneous Equipment

Reheating furnaces, smoke ovens, bake ovens, coffee heaters, varnish kettles, paint booths, and similar equipment shall be so designated that when operating there is no free flow of objectionable gases into atmosphere. To minimize the escape of smoke, odors, fly ash or fumes, mechanical, chemical or similar devices shall be used.

Section 12. Air Quality Indices

(a) The following shall described the six (6) levels of air quality for suspended particulates, sulfur dioxide, photochemical oxidants or ozone, odors, fly ash or fumes, mechanical chemical or similar devices shall be used.

Section 13. Air Quality Indices

(a) The following shall describe the six (6) levels of air quality for suspended particulates, sulfur dioxide, photo-chemical oxidants or ozone, and carbon monoxide anywhere in the Philippines.

(1) Total Suspended Particulates - (24 hour average)

Good - 0 to 80 ug/Ncm
Fair - 81 to 230 ug/Ncm
Poor - 231 to 350 ug/Ncm

Serious or Alert Conditions

Very Unhealthful (Alert Level)	- 0 350 ug/Ncm
Hazardous (Warning Level)	- 600 ug/Ncm
Extremely Hazardous (Emergency Level	- 900 ug/Ncm

(2) Sulfur Dioxide - (24-hour average)

Good - 0 to 80 ug/Ncm
Fair - 81 to 180 ug/Ncm

Poor - 181 to 650 ug/Ncm

Serious or Alert Conditions

Very unhealthful (alert level) - 650 ug/Ncm (0.25 ppm)

Hazardous (warning level) - 1,570 ug/Ncm (0.60 ppm)

Extremely hazardous (emergency level) - 2,360 ug/Ncm (0.90 ppm)

(3) Photochemical Oxidants or Ozone (1-hr)

Good - 0 to 80 ug/Ncm

Fair - 81 to 160 ug/Ncm

Poor - 161 to 350 ug/Ncm

Serious or Alert Conditions

Very unhealthful (alert level) - 350 ug/Ncm (0.13 ppm)

Hazardous (warning level) - 34 mg/Ncm (30 ppm)

Extremely Hazardous (Emergency level) - 46 mg/Ncm (40 ppm)

(b) Actions to be Taken During very Unhealthful to Extremely Hazardous Conditions:

(1) Very Unhealthful Air Quality (Alert Level) - at this air quality level, elderly persons and those with existing heart or lung disease should stay indoors and reduce physical activity. Other actions that must be taken are as follows:

(i) Pedestrians should avoid heavy traffic areas, particularly in areas where alert is raised. People, especially those with

heart or respiratory diseases should stay indoors and rest as much as possible. Unnecessary trips should be postponed. Persons should report to the nearest health center is they experience eye or throat irritation. Highly sensitive individuals especially those suffering from anemia or other diseases that decrease the oxygen carrying capacity of the blood or those with cardio-respiratory diseases, should consult their doctors.

(ii) There should be voluntary restriction on the use of vehicles. Persons operating motor vehicles should eliminate all necessary operations. They should refrain from driving a car for non-urgent business. Car pools or public transportation should be used whenever possible.

(iii) All forms of open burning should be prohibited.

(iv) Certain commercial and industrial establishments should make preparations to cut and be requested to cooperate in cutting down the emission of pollutants concerned which shall be put into action as required when alert no. 2 is raised.

(2) Hazardous Air Quality (Warning Level) - At this level, elderly persons and those with existing diseases should stay indoor and avoid outdoor activity. Other actions that must be taken are as follows:

(i) The public should be requested to comply with all previous restrictions.

(ii) Motor vehicles should avoid areas under alert.

(iii) Main arteries of thoroughfares should be closed to traffic. Traffic should be re-routed away from the affected areas. If possible, the operation of retail and non-essential

commercial and business operations such as restaurants and entertainment establishment in the affected area should be curtailed.

(iv) All forms of open burning and incinerator should be prohibited.

(v) There should be selective curtailment of industrial activities, especially those contributing to the emission of pollutants concerned. Whenever possible, a cleaner substitute fuel should used.

(3) Extremely Hazardous Air Quality (Emergency Level) - At this level, all persons should remain indoors keeping windows and doors closed and that all persons should minimize physical exertion and avoid traffic. Other actions that must be taken as follows:

(i) The public should be requested to comply with all previous restrictions.

(ii) The use of motor vehicles shall be prohibited except in emergencies with the approval of the government.

(iii) There shall be major curtailment of all activities in the affected area. All places of employment such as those for construction or manufacturing and public and private offices except those vital for public safety and the enforcement of the emergency plan; retail and wholesale trade business establishments except those in the distribution of drugs, surgical supplies and blood schools, libraries and establishments rendering amusement and recreation facilities, including motion pictures shall immediately cease operation.

(iv) All forms of open burning and incineration shall be prohibited.

(v) All non-essential pollution - producing operations shall be stopped. Essential pollution - producing operations shall be curtailed to a level to just prevent equipment damage.

(vi) Certain industrial pollution producing operations contributing to the emission of the pollutants concerned shall be curtailed as directed by the Department.

(c) Curtailment Action by Industrial Sector During Episodes

All concerned industries in consultation with DENR shall within two years upon effectivity of these regulations prepare and submit to DENR detailed curtailment action program for each alert level.

Section 14. Separability Clause

Any section or provision of these regulations declared to be unconstitutional or invalid by a competent court, the other sections or provisions hereof shall remain to be in force.

Section 15. Repealing Clause

Any provision of the 1978 Rules and Regulations as amended, the air quality standards of 1993 and other existing rules and regulations of the Department of which are inconsistent herewith are hereby repealed.

Section 16. Amendments

This regulations may be amended and or modified from time to time by the Department.

Section 17. Effectivity

This Regulations shall take effect thirty (30) days after publication in the official gazette or any newspaper of general circulation.

ANNEX 2.3

AMENDMENT TO ADMINISTRATIVE ORDER NO. 14 SERIES OF 1993 AND CLARIFYING ITS COVERAGE AND SCOPE

WHEREAS, Administrative Order No. 14, Series of 1993 (AO 14 s. 1993) was promulgated by the Department of Environment and Natural Resources to revise the Air Quality Standards of the Philippines;

WHEREAS, due to a number of pressing concerns related to compliance with AO 14 s. 1993, the Department sees the need to amend certain portions of the Order to allow for a more effective flow of implementation;

NOW THEREFORE, for and in consideration of the above premises and consistent with the provisions of PD 984, the Department hereby amends and clarifies certain provisions of DAO 14 s. 1993, as follows:

1) The term "Existing Source" defined in paragraph (g) Section 57 shall be redefined as follows:

"Any source already erected, installed, and in operation or for which construction has been offered for bidding or for which the final engineering design was completed and/or actual construction has commenced prior to April 24, 1993; provided, however, that any existing source which in the considered opinion of the Department has undergone a modification after the date of adoption of an "applicable rule or regulation, shall be classified and considered a new source except when the modification is related to attempts to improve the quality of the air emissions of the source".

2) A source not satisfying any of the conditions enumerated in the redefinition of the term "Existing Source" stated above shall be classified as "New Source" stated above shall be classified as "New Source" for purposes of paragraph (g) Section 57 AO 14 s. 1993.

3) Footnotes "c" and "d" of Table 2. Section 50 shall be amended such that the following phrase shall be added to both footnotes: "subject to the availability of appropriate technology".

4) The provisions of Section 60, paragraphs (a) and (b) concerning sulfur compound emissions are classified as follows:

(i) Existing stationary sources shall burn in any fuel burning equipment/steam generators only liquid and solid fuel containing sulfur not exceeding those indicated in paragraph (s) (1) and (a) (1) (b) starting April 24, 1993;

(ii) The Department Secretary shall promulgate new and lower sulfur content fossil requirements within the period from April 24, 1995 to January 1, 1996;

(iii) If, by January 1, 1996, no such fuel requirements are promulgated, the following measures shall be implemented;

a) In order to meet the emissions standards, existing major sources shall install SOx control facilities within five (5) years;

b) Existing major/smaller fuel burning equipment/steam generators shall comply with Section 60 (c) and 61 off DAO 14 s. 1993.

5. Section 60 paragraph (c) providing corrective measures "when an existing source is unable to comply with SOx emissions limits", covers existing minor (smaller) as well as major fuel burning equipment/steam generators.

6. In lieu of the provisions of Section 61 (variance), the Department shall instead require the submission of a Program of Compliance which shall approved by the Department Secretary prior to implementation. The Program of Compliance shall consist of the following:

   (i) Details of the proposed abatement program, time schedule and cost estimates;
   (ii) Interim abatement measures;
   (iii) Other relevant data as may be required by the Department.
   (iv) Other relevant data as may be required by the Department.

   This program of Compliance, therefore, supersedes the provisions of Section 61 (variance).

7) Section 60 paragraph (d), "Penalty for Non-Compliance" shall be deleted and instead Section 67, "Penalties" shall be implemented.

This Order takes effect thirty (30) calendar days after its publication in at least two (2) newspapers of national circulation in the Philippines.

ANNEX 2.4

REVISED WATER USAGE AND CLASSIFICATION/WATER QUALITY CRITERIA AMENDING SECTION NOS. 68 AND 69, CHAPTER III OF THE 1978 NPCC RULES AND REGULATIONS

Section 68. Water Usage and Classification - The quality of Philippine waters shall be maintained in a safe and satisfactory condition according to their best usages. For this purpose, all waters shall be classified according to the following beneficial usages:

(a) **Fresh Surface Waters (rivers, lakes, reservoirs, etc.)**

Classification	Beneficial Use[1]
Class AA	Public Water Supply Class I. The class is intended primarily for waters having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the National Standards for Drinking Water (NSDW) of the Philippines.
Class A	Public Water Supply Class II. For sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the NSDW.

[1] In general, this refers to current best beneficial use that is expected to last, at least, for the next 10 to 20 years. In special cases when dictated by political, economic, social, public health, environmental and other considerations, certain waters may be classified according to the intended or future beneficial use (e.g. Pasig River, Tullahan-Tenejeros, etc.)

Class B	Recreational Water Class I. For primary contact recreation such as bathing, swimming, skin diving, etc. (particularly those designated for tourism purposes).
Class C	1) Fishery Water for the propagation and growth fish and other aquatic resources; 2) Recreational Water Class II (Boating, etc.) 3) Industrial Water Supply Class I (For manufacturing processes after treatment).
Class D	1) For agriculture, irrigation, livestock, watering, etc. 2) Industrial Water Supply Class II (e.g., cooling, etc. 3) Other inland waters, by their quality, belong to this classification.

(b) **Coastal and Marine Waters**

Classification	Beneficial Use
Class SA	1) Waters suitable for the propagation, survival and harvesting of shellfish for commercial purposes.
	2) Tourist zones and national marine parks and reserves established under

		Presidential Proclamation No. 1801; existing laws and/or declared as such by appropriate government agency.
	3)	Coral reef parks and reserves designated by law and concerned authorities.
Class SB	1)	Recreational Water Class I (Areas regularly used by the public for bathing, swimming, skin diving, etc.)
	2)	Fishery Water Class I (Spawning areas for Chanos chanos or "Bangus and similar species.
Class SC	1)	Recreational Water Class II (e.g., boating, etc.)
	2)	Fishery Water Class II (Commercial and sustenance fishing);
	3)	Marshy and/or mangrove areas declared as fish and wildlife sanctuaries;
Class SD	1)	Industrial Water Supply Class II (e.g., cooling, etc.)
	2)	Other coastal and marine waters, by their quality, belong to this classification.

(c) **General Provisions on Water Classification**

1. Classification of a water body according to a particular designated use or uses does not preclude use of the water for other purposes that are lower in classification provided that such use does not prejudice the quality required for such waters.

2. Water classifications are arranged in the order of the degree of protection required, with Class AA and SA having generally the most stringent water quality, respectively, for fresh surface waters and marine/coastal waters; and Class D and SD waters have the least stringent water quality for fresh waters and marine waters, respectively.

3. The main objective of the water quality criteria is to maintain the minimum conditions necessary to assure the suitability of water of its designated use or classification.

4. Any person regulated under these rules or having a substantial interest in this chapter may seek reclassification of waters by filing a petition with the DENR giving all necessary information to support the petition.

5. All reclassifications of water shall be adopted, only after public notice and hearing and upon affirmative findings by DENR Regional Office concerned that;

   i) The proposed reclassification will establish the present and future most beneficial use of the waters;

   ii) Such a reclassification is clearly in the public interest, and,

iii) The proposed designated use is attainable, upon consideration of environmental, technological, social, economic and institutional factors.

6. For purposes of classification or reclassification the following minimum water quality parameters are to be considered:

(i) Dissolved Oxygen (DO)
(ii) pH
(iii) Biochemical Oxygen Demand (BOD)
(iv) Total Coliform Organism

Section 69. Water Quality Criteria

(a) **Minimum Criteria for Surface Waters**. All surface waters of the country shall be free from:

1. Domestic, industrial, agricultural, or other man-induced and non-thermal components of discharges which, alone or in combination with other substances or in combination with other components of discharges (whether thermal or non-thermal):

i) That settle to form putrescent deposits or otherwise create a nuisance, or
ii) That float as debris, scum, oil, or other matter in such amounts as to form nuisances; or
iii) That produce color, odor, taste, turbidity, or other conditions in such degree as to create a nuisance; or
iv) That are acutely toxic, or
v) That are present in concentrations which are carcinogenic, mutagenic, or teratogenic to human

beings or to significant, locally occurring, wildlife or aquatic species; or

vi) That pose a serious danger to the public health, safety, or welfare.

2. Thermal components of discharges which alone, or in combination with other discharges or components of discharges (whether thermal or non-thermal);

i) That produce conditions so as to create nuisance; or

ii) That increase the temperature of the receiving body of water (RBW) so as to cause substantial damage or harm to the aquatic life or vegetation therein or interfere with the beneficial uses assigned to the RBW.

(b) **Water Quality Criteria for Fresh Waters.**

1. Conventional and Other Pollutants Affecting Aesthetics and Oxygen Demand - Please refer to Table 1 for the parameters and limits or specifications according to classification and use of the receiving body of water (RBW).

2. Toxic and Other Deleterious Substances - The maximum limits for these types of pollutants according to classification or use of the receiving body of water are found in Table 2.

TABLE 1

WATER QUALITY CRITERIA FOR CONVENTIONAL AND OTHER POLLUTANTS CONTRIBUTING TO AESTHETICS AND OXYGEN DEMAND FOR FRESH WATERS[a]

Parameter	Unit	Class AA	Class A	Class B	Class C	Class D[b]
Color	PCU	15	50	(c)	(c)	(c)
Temperature[d] (max. rise in degree celsius)	°C rise	--	3	3	3	3
pH (range)		6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-9.0
Dissolved Oxygen[e] (Minimum)	% satn	70	70	70	60	40
	mg/L	5.0	5.0	5.0	5.0	3.0
5-Day 20°C BOD	mg/L	1	5	5	7(10)	10(15)
Total Suspended Solids	mg/L	25	50	(f)	(g)	(h)
Total Dissolved Solids	mg/L	500[i]	1,000[i]	--	--	1,000[i]
Surfactants (MBAS)	mg/L	nil	0.2(0.5)	0.3(0.5)	0.5	--
Oil/Grease (Petroleum Ether Extract)	mg/L	nil	1	1	2	5
Nitrate as Nitrogen	mg/L	1.0	10	nr	10[j]	--
Phosphate as Phosphorus	mg/L	nil	0.1[k]	0.02[k]	0.4[k]	--
Phenolic Substances as Phenols	mg/L	nil	0.002	0.005[l]	0.02[l]	--
Total Coliforms	MPN/ 100mL	50[m]	1,000[m]	1,000[m]	5,000[m]	--
or Fecal Coliforms	MPN/ 100mL	20[m]	100[m]	200[m]	--	--
Chloride as Cl	mg/L	250	250	--	350	--
Copper	mg/L	1.0	1.0	--	0.05[o]	--

Footnotes for Tables 1, 2, 3 and 4

(a) Except as otherwise indicated, the numerical limits in Tables 1 and 3 are yearly average values. Values enclosed in parentheses are maximum values.

(b) For irrigation purposes, SAR should have a minimum value of 8 and a maximum value not to exceed 18. Boron should not exceed 0.75 mg/L.

(c) No abnormal discoloration from unnatural causes

(d) The allowable temperature increase over the average ambient temperature for each month. This rise shall be based on the average of the maximum daily temperature readings recorded at the site but upstream of the mixing zone over a period of one (1) month.

(e) Sampling taken between 9:00 AM and 4:00 PM.

(f) Not more than 30% increase

(g) Not more than 30 mg/L increase

(h) Not more than 60 mg/L increase

(i) Do not apply if natural background is higher in concentration. The latter will prevail and will be used as baseline.

(j) Applicable only to lakes, reservoirs, and similarly impounded water.

(k) When applied to lakes or reservoirs, the **Phosphate as P** concentration should not exceed an average of 0.05 mg/L nor a maximum of 0.1 mg/L.

(l) Not present in concentrations to affect fish flavor/taste.

(m) These values refer to the geometric mean of the most probable number of coliform organism during a 3-month period and that the limit indicated shall not be exceeded in 20 percent of the samples taken during the same period.

(n) For spawning areas for Chanoschanos and other similar species

(o) Limit is in terms of **dissolved copper**

nil Extremely low concentration and not detectable by existing equipment

-- Means the standard of these substances are not considered necessary for the present time, considering the stage of the country's development and DENR capabilities, equipment and resources.

nr Means No Recommendation made

TABLE 2

WATER QUALITY CRITERIA FOR TOXIC AND OTHER DELETERIOUS SUBSTANCES FOR FRESH WATERS (FOR THE PROTECTION OF PUBLIC HEALTH)

PARAMETER	UNIT	CLASS AA	CLASS A	CLASS B	CLASS C	CLASS D
Arsenic[(i)]	mg/L	0.05	0.05	0.05	0.05	0.01
Cadmium[(i)]	mg/L	0.01	0.01	0.01	0.01	0.05
Chromium[(i)] (hexavalent)	mg/L	0.05	0.05	0.05	0.05	0.1
Cyanide	mg/L	0.05	0.05	0.05	0.05	--
Lead[(i)]	mg/L	0.05	0.05	0.05	0.05	0.5
Total Mercury[(i)]	mg/L	0.002	0.002	0.002	0.002	0.002
Organophosphate	mg/L	nil	nil	nil	nil	nil
Aldrin	mg/L	0.001	0.001	--	--	--
DDT	mg/L	0.05	0.05	--	--	--
Dieldrin	mg/L	0.001	0.001	--	--	--
Heptachlor	mg/L	nil	nil	--	--	--
Lindane	mg/L	0.004	0.004	--	--	--
Toxaphane	mg/L	0.005	0.005	--	--	--
Methoxychlor	mg/L	0.10	0.10	--	--	--
Chlordance	mg/L	0.003	0.003	--	--	--
Endrin	mg/L	nil	nil	--	--	--
PCB	mg/L	0.001	0.001	--	--	--

Note:

1. Limiting values of organophospates and organochlorines may in the meantime serve as guidelines in the interim period pending the procurement and availability of necessary laboratory equipment. For **Barium, Cobalt, Fluoride, Iron, Lithium, Manganese, Nickel, Selenium, Silver and Vanadium,** the **1978 NPCC Rules and Regulations, Section 69** may be considered.

2. For footnotes please refer to Table 1.

(c) **Coastal and Marine Waters Criteria**

1. Conventional and Other Pollutants Affecting Aesthetics and Oxygen Demand. The criteria for Class SA, SB, and SD are found in Table 3.

2. Toxic and Other Deleterious Substances. The maximum limits for toxic and deleterious substances for waters classified as Class SA, SB, SC, and SD waters are found in Table 4.

(d) **Methods of Analysis** - For purposes of these regulations, any water sample taken for the purpose of classification or for determining compliance with the water quality criteria shall be analyzed in accordance with the methods enumerated in Table 5. The table also applies to determine compliance to effluent regulations.

(e) **Significant Parameters** - As a guide to discharges and regulatory agencies the significant parameters to be considered for monitoring purposes are indicated in Table 6.

TABLE 3

WATER QUALITY CRITERIA FOR CONVENTIONAL AND OTHER POLLUTANTS AFFECTING AESTHETICS AND EXERTING OXYGEN DEMAND FOR COASTAL AND MARINE WATERS

PARAMETER	UNIT	CLASS SA	CLASS SB	CLASS SC	CLASS SD
Color	PCU	(c)	(c)	(c)	(c)
Temperature[d] (max. rise in degree celsius)	°C rise	3	3	3	3
pH (range)		6.5-8.5	6.0-8.5	6.0-8.5	6.0-90
Dissolved Oxygen [e] Minimum	% satn	70	70	70	50
	mg/L	5.0	5.0	5.0	2.0
5-Day 20°C BOD	mg/L	3	5	7(10)	--
Total Suspended Solids	mg/L	(f)	(g)	(g)	(h)
Surfactants(MBAS)	mg/L	0.2	0.3	0.5	--
Oil/Grease Petroleum Ether Extract)	mg/L	1	2	3	5
Phenolic Substances as Phenols	mg/L	nil	0.01	(l)	--
Total Coliforms	MPN/ 100mL	70[m]	1,000[m]	5,000[m]	--
Fecal Coliforms	MPN/ 100mL	nil	200[m]	--	--
Copper	mg/L	--	0.02[n][o]	0.05[o]	--

NOTE: for footnotes please refer to Table 1.

TABLE 4
WATER QUALITY CRITERIA FOR TOXIC AND OTHER DELETERIOUS SUBSTANCES FOR COASTAL AND MARINE WATERS
(For the Protection of Public Health)

PARAMETER	UNIT	CLASS SA	CLASS SB	CLASS SC	CLASS SD
Arsenic[(i)]	mg/L	0.05	0.05	0.05	--
Cadmium[(i)]	mg/L	0.01	0.01	0.01	--
Chromium[(i)] (hexavalent)	mg/L	0.05	0.1	0.1	--
Cyanide	mg/L	0.05	0.05	0.05	--
Lead[(i)]	mg/L	0.05	0.05	0.05	--
Total Mercury[(i)]	mg/L	0.002	0.002	0.002	--
Organophosphate	mg/L	nil	nil	nil	--
Aldrin	mg/L	0.001	--	--	--
DDT	mg/L	0.05	--	--	--
Dieldrin	mg/L	0.001	--	--	--
Heptachlor	mg/L	nil	--	--	--
Lindane	mg/L	0.004	--	--	--
Toxaphane	mg/L	0.005	--	--	--
Methoxychlor	mg/L	0.10	--	--	--
Chlordane	mg/L	0.003	--	--	--
Endrin	mg/L	nil	--	--	--
PCB	mg/L	0.001	--	--	--

Note:

1. Limiting values of organophosphates and organochlorines may in the meantime serve as guidelines in the interim period pending the procurement and availability of necessary laboratory equipment. For **Barium, Cobalt, Iron, Lithium, Manganese, Nickel, Selenium, Silver and Vanadium, the 1978 NPCC Rules and Regulations, Section 69** may be considered.

2. For footnotes please refer to Table 1.

TABLE 5

APPROVED METHODS OF ANALYSIS

PARAMETER	METHOD OF ANALYSIS
Arsenic	Silver Diethyldithiocarbamate Method (Colorimeteric)
BOD_5	Azide Modification (Dilution Technique)
Boron	Carmine Method (Colorimetric Method)
Cadmium	Atomic Absorption Spectronophotometry Wet washing with concentration HNO_3 + HCl)
Chlorinated Hydrocarbons	Gas Chromatography (ECD)
Chromium (Hexavalent)	Diphenyl Carbazide Colorimetric Method
Color	Visual Comparison Method (Platinum Cobalt Scale)
Cyanide	Specific Ion Electrode Method
Dissolved Oxygen	Azide Modification (Winkler Method), Membrane Electrode (DO meter)
Fecal Coliforms	Multiple-Tube Fermentation Technique or Membrance Filter
Lead	Atomic Absorption Spectrophotometry
Nitrate as Nitrogen	Bruccine Method for Saline Water, specific Ion Electrode Meter for Fresh Water
Oil and Grease	Gravimetric Method (Petroleum Ether Extraction)

Organo Phosporus Compounds	Gas Chromatography (FPD)
Polychlorinated Byphenyl (PCB)	Gas Chromatography (ECD)
pH	Glass Electrode Method
Phenolic Substances	Chloroform Extraction Method
Phosphate as Phosporus	Stannous Chloride Method
Settleable Solids	Imhoff Cone Method
Surfactants (MBAS)	Methylene Blue Method (Colorimetric)
Temperature	Use of Mercury-Filled Thermometer
Total Coliforms	Multiple-Tube Fermentation Technique or Membrane Filter
Total Mercury	Cold Vapor Technique, (Mercury Analyzer, AAS)
TOTAL SUSPENDED SOLIDS	Grivametric Method

Note: Other methods found in the Philippine Standard Methods for Air and Water Analysis, the "Standard Methods for the Examination of Water and Waste Waters", published jointly by American Public Health Association (APHA), the American Waterworks Association and the Water Pollution Control Federation of the U.S. or in accordance with such other method of analyses as the DENR may prescribe.

TABLE 6

SIGNIFICANT PARAMETERS FOR SELECTED TYPES OF INDUSTRIES

TYPE OF INDUSTRY	SIGNIFICANT WASTEWATER PARAMETERS
A. Beverage Industry	BOD_5, pH, Suspended Solids, Settleable Solids, Oil and Grease
B. Cement, Concrete, Lime & Gypsum	pH, Suspended Solids, Dissolved Solids, Temperature
C. Dairy Product Processing	BOD_5, COD, pH, Suspended Solids, Dissolved Solids, Settleable Solids
D. Ferroalloy Mfg. (electric furnace with wet air pollution control	Suspended Solids, Chromium (hexavalent), Oil and Grease, Phenols, Phosphates
E. Fertilizer Industry	
Nitrogen Fertilizer Industry	Chloride, Chromium, Dissolved Solids, Nitrate, Suspended Solids
Phosphate Fertilizer Industry	pH, Phosphorus, Suspended Solids, Temperature, Cadmium, Arsenic
F. Grain Milling Industry	BOD_5, Suspended Solids, Temperature
G. Inorganic Chemicals, Alkalies and Chlorine Industry	pH, Total Suspended Solids, Total Dissolved Solids, Chlorides, Sulfates, COD, Temperature
H. Leather Tanning and Finishing Industry	BOD_5, COD, Chromium, Oil and Grease, pH, Suspended Solids, Color, Dissolved Solids
I. Livestock Industry	BOD_5, COD, Total Suspended Solids, pH, Color, Total Coliforms

J. Meat, Fish and Fruit Canning	BOD_5, COD, Suspended Solids, pH, Oil and Grease, Dissolved Solids
K. Meat Products Industry	BOD_5, pH, Suspended Solids, Settleable Solids, Oil and Grease, Total Coliforms, Toxic Materials
L. Metal Finishing Industry	Oil and Grease, Heavy Metals (Cr., Cd., etc.) Suspended Solids, Cyanide
M. Mineral Ore Processing (Mining Industry)	Suspended Solids, Heavy Metals (hg, CN, Cd, etc.) Arsenic
N. Organic Chemical Industry	BOD_5, COD, pH, Total Suspended Solids Total Dissolved Solids, Oil (Free-Floating)
O. Petroleum Refining Industry	BOD, Heavy metals, COD, Oil (total), pH, Phenols, Suspended Solids, Temperature, Total Dissolved Solids
P. Plastic Materials and Synthetic Industry	BOD_5, COD, pH, Total Suspended Solids, Oil and Grease, Phenols
Q. Pulp and Paper Industry	BOD_5, COD, pH, Total Suspended Solids, E. Coli., Color, Heavy Metals, Dissolved Solids, Oil and Grease, Phenols
R. Steel Industry	Oil and Grease, pH, Cyanide, Phenol, Suspended Solids, Temperature, Chromium
S. Sugar Cane Processing Industry	BOD_5, pH, Suspended Solids, Oil and Grease
T. Textile Mill Industry	BOD_5, COD, pH, Suspended Solids, Chromium, Phenols, Color, Oil and Grease
U. Thermal Power Generation	BOD_5, Color, Chromium, Oil and Grease, pH, Phosphate, Suspended Solids, Temperature

ANNEX 2.5

REVISED EFFLUENT REGULATIONS OF 1990, REVISING AND AMENDING THE EFFLUENT REGULATIONS OF 1982

Pursuant to the provisions of Section 6(i) of Presidential Decree no. 984, otherwise known as the "Pollution Control Decree of 1976", and by virtue of Executive Order No. 192, Series of 1987, the Department of Environment and Natural Resources hereby adopts and promulgates the following rules and regulations:

Section 1. Title - These rules and regulations shall be known as the "Revised Effluent Regulations of 1990".

Section 2. Scope - These rules and regulations shall apply to all industrial and municipal wastewater effluents.

Section 3. Definitions - The following words and phrases, as used in these rules and regulations, shall have the following meanings unless the context clearly indicates otherwise:

a) "BOD" means a measure of the approximate quantity of dissolved oxygen that will be required by bacteria to stabilize organic matter in wastewater or surface water. It is a semi-quantitative measure of the wastewater organics that are oxidizable by bacteria. It is also a standard test in assessing wastewater strength.

b) "Coastal Water" means an open body of water along the country's coastline starting from the shoreline (MLLW) and extending outward up to the 200-meter isobath or three-kilometer distance, whichever is farther.

c) "Department" refers to the Department of Environment and Natural Resources.

d) "Effluent" is a general term denoting any wastewater, partially or completely treated, or in its natural state, flowing out of a manufacturing plant, industrial plant or treatment plant.

e) "Inland Water" means an interior body of water or watercourse such as lakes, reservoirs, rivers, streams, creeks, etc., that has beneficial usage other than public water supply or primary contact recreation. Tidal affected rivers or streams are considered inland waters for purpose of these regulations.

f) "Mixing Zone" is the place where the effluent discharge from a point source mixes with a receiving body of water. The area or extent of the zone shall be determined by the discharger and approved by the Department on a case-to-case basis.

g) 'NPI" means New/Proposed Industry or wastewater treatment plants to be constructed.

h) "OEI" means Old or Existing Industry.

i) "Primary Contact Recreation" means any form of recreation where there is intimate contact of the human body with the water, such as swimming, water skiing, or skin diving.

j) "Protected Water" means a watercourse or a body of water, or any segment thereof, that is classified as a source of public water supply, propagation and harvesting of shellfish for commercial purposes, or spawning areas for Chanos chanos and similar species, or primary contact

recreation, or that which, is designated by competent government authority or by legislation as tourist zone, national marine park and reserve, including coral reef park and reserve.

k) "Strong Waste" refers to wastewater whose initial BOD value before treatment is equal to or greater than 3,000 mg/L.

Section 4. Heavy Metals and Toxic Substances - Industrial and other effluents when discharged into bodies of water classified as Class A, B, C, D, SA, SB, SC, and SD in accordance with Section 68, as amended, of the 1978 NPCC Rules and Regulations shall not contain toxic substances in levels greater than those indicated in Table 1.

TABLE 1
EFFLUENT STANDARDS: TOXIC AND OTHER DELETERIOUS SUBSTANCE
(Maximum Limits for the Protection of Public)[a] Health

Parameter	Unit	Protected Waters Category I (Class AA & SA)		Protected Waters Category II Class A,B& SB		Inland Waters Class C		Marine Waters Class SC		Marine Waters Class SD	
		OEI	NPI	OEI	NPI	OEI	NPI	OEI	NPI	OEI	NPI
Arsenic	mg/L	(b)	(b)	0.2	0.1	0.5	0.2	1.0	0.5	1.0	0.5
Cadmium	mg/L	(b)	(b)	0.05	0.02	0.1	0.05	0.2	0.1	0.5	0.2
Chromium (hexavalent	mg/L	(b)	(b)	0.1	0.05	0.2	0.1	0.5	0.2	1.0	0.5
Cyanide	mg/L	(b)	(b)	0.2	0.1	0.3	0.2	0.5	0.2	–	–
Lead	Mg/L	(b)	(b)	0.2	0.1	0.5	0.3	1.0	0.5	–	–
Mercury (Tot.)	mg/L	(b)	(b)	0.005	0.005	0.005	0.005	0.005	0.005	0.05	0.01
PCB	mg/L	(b)	(b)	0.003	0.003	0.003	0.003	0.003	0.003	–	–
Formaldehyde	mg/L	(b)	(b)	2.0	1.0	2.0	1.0	2.0	1.0	–	–

Note:

(a) Except as otherwise indicated, all limiting values in Table 1 (Section 4) are maximum and therefor shall not be exceeded.

(b) Discharge of sewage and/or trade effluents are prohibited or not allowed.

Section 5. Conventional and Other Pollutants Affecting Aesthetics and Oxygen Demand - Effluents from domestic sewage and industrial wastewater treatment plants not covered under Section 6 of these Regulations, when discharged into receiving waters classified as Class A, B, C, D, SA, SB, SC, and SD in accordance with Section 68, as amended, of the 1978 NPCC Rules and Regulations shall not contain the following pollutants in concentrations greater than those indicated in Tables 2A and 2B.

Section 6. Effluent Standards for BOD for Strong Industrial Wastes.

a) Interim Requirements for Old and Existing Industries - For strong industrial wastewaters with high BOD and where the receiving body of water is Class C, D, SC, and SD in accordance with Section 68, as amended, of the 1978 NPCC Rules and Regulations, the interim effluent requirements for old industries which will be applicable within a period is indicated in Table 3A.

b) Requirements for New Industries - Upon the effectivity of these regulations, new/proposed industries, or those old/existing industries that are yet to construct their wastewater treatment facilities, which are producing or treating strong wastewaters shall comply with the requirements in Table 3B below. By January 1995, this Table shall be applicable to all industries producing strong wastes.

TABLE 2A

EFFLUENT STANDARDS: CONVENTIONAL AND OTHER POLLUTANTS IN PROTECTED WATERS CATEGORY I AND II AND IN INLAND WATERS CLASS A[A]

PARAMETER	UNIT	PROTECTED WATERS				INLAND WATERS	
		CATEGORY I (Class AA & SA		CATEGORY II (Class A,B&SB)		CLASS C	
		OEI	NPI	OEI	NPI	OEI	NPI
Color	PCU	(b)	(b)	150	100	200[c]	150[c]
Temperature °C rise (max. rise in degree celsius in RBW)		(b)	(b)	3	3	3	3
pH (range)		(b)	(b)	6.0-9.0	6.0-9.0	6.0-9.0	6.5-9.0
COD	mg/L	(b)	(b)	100	60	150	100
Settleable Solids (1-hour)	mg/L	(b)	(b)	0.3	0.3	0.5	0.5
5-Day 20°C BOD	mg/L	(b)	(b)	50	30	80	50
Total Suspended Solids	mg/L	(b)	(b)	70	50	90	70
Total Dissolved Solids	mg/L	(b)	(b)	1,200	1,000	--	--
Surfactants (MBAS)	mg/L	(b)	(b)	5.0	2.0	7.0	5.0
Oil/Grease (Petroleum Ether Extract)	mg/L	(b)	(b)	5.0	5.0	10.0	5.0
Phenolic Substances as Phenols	mg/L	(b)	(b)	0.1	0.05	0.5	0.1
Total Coliforms	MPN/ 100mL	(b)	(b)	5,000	3,000	15,000	10,000

TABLE 2B

EFFLUENT STANDARDS: CONVENTIONAL AND OTHER POLLUTANTS IN INLAND WATERS CLASS D, COASTAL WATERS CLASS SC AND SD AND OTHER COASTAL WATERS NOT YET CLASSIFIED

Parameter	Unit	Inland Waters (Class D)		Coastal Water (Class SC)		Coastal Waters Not Classified	
		OEI	NPI	OEI	NPI	OEI	NPI
Color	PCU	--	--	(c)	(c)	(c)	(c)
Temperature °C rise (max. rise in degree celsius in RBW)	°C rise	3	3	3	3	3	3
pH (range)		5.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0	5.0-9.0	5.0-9.0
COD	mg/L	250	200	250	200	300	200
5-Day 20°C BOD	mg/L	150[d]	120	120[d]	100	150[d]	120
Total Suspended Solids	mg/L	200	150	200	150	(g)	(f)
Total Dissolved Solids	mg/L	2,000[h]	1,500[h]	---	---	---	---
Surfactants (MBAS)	mg/L	---	---	15	10	---	---
Oil/Grease (Petroleum Ether Extract)	mg/L	---	---	15	10	15	15
Phenolic Substances as Phenols	mg/L	---	---	1.0[i]	0.5[i]	5.0	1.0
Total Coliforms	MPN/ 100mL	(j)	(j)	---	---	---	---

Notes for Table 2A and 2B:

1. In cases where the background level of Total Dissolved Solids (TDS) in freshwater rivers, lakes, reservoirs, and similar bodies of water is higher than the Water Quality Criteria, the discharge should not increase the level of TDS in the receiving body of water by more than ten percent of the background level.
2. The COD limits in Tables 2A and 2B generally apply to domestic wastewater treatment plant effluent. For industrial discharges, the effluent standards for COD should be on a case basis considering the COD - BOD ratio after treatment. In the interim period that is not yet established by each discharger, the BOD requirement shall be enforced.
3. There are no effluent standards for chloride except for industries using brine and discharging into land waters, in which case the chloride content should not exceed 500 mg/L.

4. The effluent standards apply to industrial manufacturing plants and municipal treatment plants discharging more than thirty (30) cubic meters per day.

LEGEND for Tables 2A and 2B:

(a) Except as otherwise indicated, all limiting values in Tables 2A and 2B are 90th percentile values. This is applicable only when the discharger undertakes daily monitoring of its effluent quality, otherwise, the numerical values in the tables represented maximum values not be exceeded once a year.

(b) Discharge of sewage and/or trade effluents is prohibited or not allowed.

(c) Discharge shall not cause abnormal discoloration in the receiving waters outside of the mixing zone.

(d) For wastewaters with initial BOD concentration over 1,000 mg/L but less than 3,000 mg/L, the limit may be exceeded up to a maximum of 200 mg/L, or a treatment reduction of ninety (90) percent, whichever is more strict. Applicable to both old and new industries.

(e) The parameters Total Suspended Solids (TSS) should not increase the TSS of the receiving water by more than thirty (30) percent during the dry season.

(f) Not more than 30 mg/L increase (dry season)

(g) Not more than 60 mg/L increase (dry season)

(h) If effluent is the sole source of supply of irrigation, the maximum limits are 1,500 mg/L and 1,000 mg/L, respectively, for old industries and new industries.

(i) Not present in concentration to affect fish flavor or taste or tainting

(j) If effluent is used to irrigate vegetable and fruit crops which may be eaten raw, Fecal Coliforms should be less than 500 MPN/100 mL.

TABLE 3A

INTERIM EFFLUENT STANDARDS FOR BOD APPLICABLE TO OLD OR EXISTING INDUSTRIES PRODUCING STRONG INDUSTRIAL WASTES, (1990-1994)

Industry Classifications Based on BOD of Raw Wastewaters Produced	Maximum Allowable Limits in mg/L*, according to Time Period and Receiving Body of Water			
	EFFECTIVITY DATE-DEC. 31, 1991		JAN. 1, 1992-DEC. 31, 1994	
	INLAND WATERS (Class C & D)	COASTAL WATERS Class SC & SD)	INLAND WATERS (Class C & D)	COASTAL WATER Class SC & SD)
1. Industries producing BOD within 3,000 to 10,000 mg/L	320 or 95 % removal	650 or 90 % removal	200 or 97 % removal	320 or 95 % removal
2. Industries producing BOD within 10,000 to 30,000 mg/L	1,000 or 95 % removal	2,000 or 90 % removal	600 or 97 % removal	1,000 or 95 % removal
3. Industries producing more than 3,000 mg/L	1,500 or 95 % removal	3,000 or 90 % removal	900 or 97 % removal	1,500 or 95 % removal

Note:

1. Use either the numerical limit or percentage removal whichever is lower (or whichever is more strict).
2. Starting January 1, 1995, the applicable effluent requirements for old or existing industries are indicated in Table 3B.
3. For parameters other than BOD, Table 2A and Table 2B both under Section 5 shall apply.

TABLE 3B
EFFLUENT STANDARDS FOR NEW* INDUSTRIES PRODUCING STRONG WASTES UPON EFFECTIVITY OF THESE REGULATIONS AND FOR ALL INDUSTRIES PRODUCING STRONG WASTES STARTING JANUARY 1, 1995

INDUSTRY CLASSIFICATION BASED ON BOD OF RAW WASTEWATER	MAXIMUM ALLOWABLE LIMITS IN MG/L BASED ON RECEIVING BODY OF WATER	
	Inland Waters (Class C and D)	Coastal Waters (Class SC and SD)
1. Industries producing within 3,000 to 10,000 mg BOD/L	130 or 98% removal	200 or 97% removal
2. Industries producing within 10,000 to 30,000 mg BOD/L	200 or 99% removal	600 or 97% removal
3. Industries producing more than 30,000 mg BOD/L	300 or 99% removal	900 or 97% removal

Note: Including old or existing industries producing strong waste whose wastewater treatment plants are still to be constructed.

1. Use either numerical limits or percentage removal whichever is lower (or whichever is more strict).
2. For parameters other than BOD, Tables 2A and 2B shall apply.

Section 7. Mixing Zone Requirements - The following general conditions shall govern the location and extent of the mixing zone:

a. No mixing zone shall not include an existing drinking water supply intake if such mixing zone would significantly impair the purposes for which the supply is utilized.

b. A mixing zone shall not include an existing drinking water supply intake if such mixing zone would significantly impair the purposes for which the supply is utilized.

c. A mixing zone for rivers, streams, etc. shall not create a barrier to the free migration of fish and aquatic life.

d. A mixing zone shall not include a nursery area of indigenous aquatic life nor include any area designated by the Department of Environment and Natural Resources for shellfish harvesting, tourist zones and national marine parks and reserves, coral reef parks and reserves and declared as such by the appropriate government agency.

e. In general, the length of the mixing zone or plume in rivers or similar waterways shall be as short as possible and its width shall be preferably not more than one-half of the width of the waterway.

f. In discharging hot effluent from power plants, mineral ore milling and similar generators of large volume of liquid wastes the permissible size of the mixing zone shall be determined through modeling taking into consideration the size, hydraulic and hydrological data of the receiving body of water and the design and sitting of the wastewater outfall.

g. For the protection of aquatic life resources, the mixing zone must not be used for, or be considered as, a substitute for wastewater treatment facility.

Section 8. Additional Requirements

a) In addition to fulfilling the above-stated requirements in Sections 4 to 6, no effluent shall cause the quality of the receiving body of water to fall below the prescribed quality in accordance with its classification or best usage.

b) Where the combined effect of a number of individual effluent discharges causes one or more water quality parameters to exceed the prescribed limits, the maximum permissible concentrations of such parameters shall be reduced proportionately so as to maintain the desired quality.

c) When discharging effluents into coastal waters, the location and design of the submarine outfall shall be based on prevailing oceanographic and wind conditions so that discharged materials shall not find their way back to the shore and that there shall be minimum deposition of sediments near and around the outfall.

d) Effluents discharged into protected inland and coastal waters Category II, such Class A, B, and SB, shall meet the requirements of Sections 4 and 5 above.

e) Starting January 1, 1995 old or existing industries shall comply with the standards set for new industries in these regulations.

f) For a period to be determined by the Department Secretary and provided that the resulting effect on receiving water does not pose an immediate threat to life, public health, safety or welfare or to animal which cannot meet the limits for BOD in Tables 3A and 3B, maybe allowed to operate and be issued a temporary permit to operate on condition that it pays first a penalty fee for polluting a receiving body of water in the amount equivalent to five pesos (P 5.00) per kilogram of BOD discharged per day in exceed of the allowable effluent limit provided further that the calculated fine shall not exceed P 5,000 per day in accordance with PD 984 and its implementing rules and regulations. (Conversion Factor: 1 mg/L = 1 g/cu.m.)

g) Each discharger covered under these regulations shall monitor its effluent and its effect on the receiving body of water regularly in order to ensure compliance with Sections 4, 5 and 6 hereof and Section 69, as amended, of the 1978 NPCC Rules and Regulations.

Section 9. **<u>Prohibitions.</u>**

a) No industrial or domestic sewage effluent shall be discharged into Class AA and SA waters.

b) In order to avoid deterioration of the quality of the receiving body of water, no new industrial plant with high waste load potential shall be discharge into the body of water where the dilution or assimilative capacity of said water body during dry weather condition is insufficient to maintain its prescribed water quality according to its usage or classification.

c) No person shall discharge, wholly or partially, untreated or inadequately treated industrial effluents directly into bodies of water or through the use of by-pass canals and/or pumps and other unauthorized means except upon prior approval of the Department Secretary.

d) Other Restrictions:

1. All water pollution control facilities/installations shall be properly and consistently maintained and correctly and continuously operated in order to maintain an effluent quality that complies with Sections 4 to 6 of these regulations.

2. No industrial or manufacturing plant shall be operated without the control facilities or wastewater treatment system in good order or in proper operation except with the permission of the Department Secretary when special circumstances arise.

3. No industrial or manufacturing plant or source of pollution shall be operated at capacities beyond the limits of operation or capability of the wastewater treatment facility in order to maintain the effluent quality within the standards or pertinent conditions required by law and/or stipulated in the permit to operate.

4. No person shall build, erect, install or use any equipment, contrivance or any means the use of which will conceal and/or dilute an effluent discharge and which otherwise constitute a violation of any provisions of these regulations or the 1978 NPCC Rules and Regulations, as amended.

Section 10. **Methods of Analysis for Effluents.** - For purposes of these Regulations, any domestic or industrial effluent discharged in any body of water or watercourse shall be analyzed in a accordance with the latest edition of the "Philippine Standard Methods for Air and Water Analyses", the "Standard Method for the Examination and Water and Wastewater" published jointly by American Public Health Association, the American Waterworks Association and the Water Pollution Control Federation of the United States, or in accordance with such other methods of analysis as the Department may prescribe. The approved methods of analysis are given in Table 4.

TABLE 4

APPROVED METHODS OF ANALYSIS

PARAMETER	METHOD OF ANALYSIS
ARSENIC	Silver Diethydithiocarbamate Method (Colorimetric)
BOD	Azide Modification (Dilution Technique)
BORON	Carmine Method (Colorimetric Method)
CADMIUM	Atomic Absorption Spectrophotometry (Wet washing with concentration HNO_3 + HCL)
CHLORINATED HYDROCARBONS	Gas Chromatography (ECD)
CHROMIUM (Hexavalent)	Diphenyl Carbazide Colorimetric Method

COLOR	Visual Comparison Method Platinum Cobalt Scale
CYANIDE	Specific Iron Electrode Method
DISSOLVED OXYGEN	Azide Modification (Winkler Method), membrane Electrode (DO meter)
FECAL COLIFORMS	Multiple-Tube Fermentation Technique or Membrane Filter
LEAD	Atomic Absorption Spectrophotometry
NITRATE AS NITROGEN	Bruccine Method for Saline Waters, specific Iron Electrode Meter for Fresh Water
OIL AND GREASE	Gravimetric Method (Petroleum Ether Extraction)
ORGANO PHOSPHOROUS COMPOUNDS	Gas Chromatography (FPD)
PCB	Gas Chromatography (ECD)
pH	Glass Electrode Method
PHENOLIC SUBSTANCES	Chloroform Extraction Method
PHOSPHATE AS PHOSPHOROUS	Stannous Chloride Method
SETTLEABLE SOLIDS	Imhoff Cone Method
SURFACTANT (MBAS)	Methylene Blue Method (Colorimetric)
TEMPERATURE	Use of Mercury-Filled Thermometer
TOTAL COLIFORMS	Multiple-Tube Fermentation Technique or Membrane Filter

TOTAL MERCURY	Cold Vapor Technique, (Mercury Analyzer, AAS)
TOTAL SUSPENDED SOLIDS	Gravimetric Method

Note: Other methods found in the Philippine Standard Methods for Air and Water Analysis, the "Standard Methods for the Examination of Water and Waste Wasters", published jointly by American Public Health Association, the American Waterworks Association and the Water Pollution Control Federation of the US or in accordance with such other method of analyses as the DENR may prescribe.

Section 11. Maximum Quantity to be Discharged - For the protection of public health and the aquatic resources of the country and in cases where the volume, strength and nature of one or more pollutants, enumerated in, or not otherwise covered in the preceding Sections, are expected to cause a serious deterioration of a receiving body of water or cause harm or injury to aquatic life and resources, the Department Secretary shall promulgate guidelines for the use of the concerned line agencies, providing for the maximum quantity of any pollutant or contaminant that maybe allowed to be discharged into the said body of water or watercourse, including the maximum rate at which the contaminate may be so discharged.

This Section particularly applies, but is not limited to industrial effluents covered under Section 6 of these regulations, specifying in kilograms per day the BOD that may be discharged considering the classification and dry weather flow of the receiving body of water.

Section 12. Penalties - Any person or group of persons found violating or failing to comply with any Order or Decision of the Department and/or the Pollution Adjudication Board or any provision of these Regulations, shall be liable under Section 9 of the Pollution Control Law (PD No. 984) and/or Section 106 of the 1978 NPCC Rules and Regulations, as amended.

Section 13. Separability Clause - Any section or provision of these regulations declared to be unconstitutional or invalid by a competent court, the other sections or provisions hereof shall remain to be in force.

Section 14. Repealing Clause - Any provision of the 1978 Rules and Regulations, as amended, the Effluent Regulations of 1982, and other existing rules and regulations of the Department which are inconsistent herewith are hereby repealed.

Section 15. Amendments - This Regulations may be amended and/or modified from time to time by the Department.

Section 16. Effectivity - This Regulations shall take effect thirty (30) days after publication in the official gazette or any newspaper of general circulation.

ANNEX 3.1

PRIMER ON THE PROCEDURE BEFORE THE POLLUTION ADJUDICATION BOARD

A. Filing Of Complaint

1) What is the form of complaint required?

In cases of complaint filed by a person/persons other than the Board, the complaint shall be in writing stating clearly the facts which gives rise to the enforcement of his right, the pollution caused, specific violation of law and the remedy sought.

Reports of Inspection, results of laboratory analyses and other pertinent data/information transmitted by the DENR Regional Offices disclosing clear violations committed by a person are likewise considered as complaints wherein the Board takes appropriate action.

2) Where are complaints filed?

The complaint may be filed before the Pollution Adjudication Board thru the PAB Secretariat or with the DENR-Regional Offices.

3) What is the effect of withdrawal of complaint?

The withdrawal of the complaint shall not result in the automatic dismissal of the case. The Board may on its own continue the proceedings if it deems necessary in the interest of public welfare and safety.

B. Actions Taken Or Orders And Decisions

1) What actions are taken by the Board?

Upon receipt of a complaint filed by any person, the Board may issue an Order directing the PAB Secretariat or the DENR-Regional Office concerned to conduct an investigation and/or sampling/emission tests and to immediately submit its report.

In case the Board finds that it has no authority to act on the complaint, the Board may direct the inspection of the subject matter of the complaint and then refers the findings to the proper government agency informing the complainant of the action taken.

2) If a report of inspection is transmitted by the Regional Office to the Board what are the possible actions the Board may take?

The Board may issue any of the following orders depending on the recommendations of the Regional based on results of inspection conducted, results of laboratory analyses and/or compliance or non compliance to the requirements:

a) Ex-Parte Cease and Desist Order; or Cease and Desist Order; or

b) Order reimposing the previous cease and desist order; or

c) Order directing the respondent through its President or General Manager to pay appropriate fines; or

d) Order the Regional Office to monitor the compliance of respondent to Philippines Environmental Laws and to submit its report to the PAB.

3) What is the nature of proceedings before the Board?

The proceedings are summary in nature. It does not follow the technical rules of procedure followed by the courts. Its decisions however are based on the Reports of Inspection, results of laboratory analyses, documents submitted by complainant and respondent, entire records of the case and other pertinent data or information.

C. Enforcement Or Execution Of Orders

1) Who executes the Order?

Orders are executed by the Regional Executive Director (RED) or his duly authorized representative or duly constituted authorities or the city or the provincial sheriff when directed by the Board or any agency of the government authorized by the Board to assist in the implementation/enforcement of the Order of the Board.

2) How are the orders executed?

Any order or decision of the Board or its duly authorized representative is executed in the same manner as decisions of the Regional Trial Courts. It has the power to issue to the City or Provincial Sheriff, Regional Executive Directors or his duly authorized representatives or duly constituted authorities, writs of execution or orders necessary for the enforcement of its decisions.

D. Violations

1) What are the usual violations committed and the corresponding penalties imposed?

USUAL VIOLATIONS COMMITTED	PENALTIES IMPOSSABLE
1) Discharging / emitting pollutants / odor / noise wastes that are of immediate threat to life, public health, safety or welfare, or animal or plant life or exceeds the DENR standards.	1) The Board may issue an ex-parte cease and desist order directing the discontinuance of the same or the temporary suspension or cessation of the operation of the establishment or person without the necessity of prior public hearing.
2) Failure or refusal to comply with any order or decision of the Board.	2) a. Fine of P5,000.00/day or for everyday that it continues to violate. Failure to pay the fine is sufficient ground for the Board to Order the closure of stoppage of operation of the establishment. b. May be punished by the proper courts for Indirect Contempt upon petition filed by the establishment. c. By imprisonment from two (2) to six (6) years; or d. Both fine and imprisonment; and e. Enjoined to discontinue such violation
3) Continues to discharge pollutant to the environment or performs any of the following without securing a permit from the Regional Office: a) constructs, installs, modifies or operates any sewage wastes or any extension or addition thereto; b) increase in volume or strength	3) a. Fine of P1,000.00/day of violation that it continues to violate; or b. by imprisonment from two (2) to six (6) years; or c. both fine and imprisonment; and d. enjoined to discontinue such violation

	of any wastes in excess of the permissive discharge specified under any existing permit;	
	c) construction, installation or operation of any industrial or commercial establishment or any extension or modification thereto, the operation of which would cause an increase in the discharge of wastes directly into the water, air and/or land resources of the Philippines or would otherwise alter their physical, chemical, or biological properties in any manner not already authorized.	
4)	Refusing the entry of the Board or its authorized representatives into any property of the public domain or private property devoted to industrial, manufacturing, processing or commercial use for the purpose of conducting investigation	4) a. Fine not exceeding P200 or b. Imprisonment of not exceeding one (1) month or c. both fine and imprisonment
5)	Direct contempt or	5) Fine not exceeding P200.00
	a. misconduct in the presence of the Board or duly designated hearing officers during inquiries, investigations or proceedings; or	
	b. willfully and unjustifiably refuses or fails to comply with summons, subpoena duces tecum issued by the Board or duly designated hearing officers; or	
	c. during hearings/investigations refuses to be sworn as a witness; or as a witness; or to answer questions when lawfully required.	

E. Motions For Reconsideration

1. Where shall the motion for Reconsideration be filed?

It shall be filed with the Board or with the Regional Office. Motions filed with the Regional Office shall be forwarded to the Board which alone has the power to adjudicate pollution cases.

2. When shall motions be filed?

Motions for Reconsideration's for Cease and Desist Orders shall be filed within fifteen (15) days from receipt of such order or decision. However, only motions received five (5) days prior to the scheduled Board meeting are included in the agenda of the Board for adjudication. Regular Board meetings are held every second and last Thursday of the month.

3. What are the requirements necessary for the temporary lifting of ex-parte Cease and Desist Order?

Within fifteen (15) days from receipt of the Order, respondent shall file the necessary motion for reconsideration and shall submit the following requirements to effect the lifting of the closure order:

a. plans and specifications of the proposed construction or rehabilitation or modification of its anti-pollution device;

b. performance bond equivalent to twenty-five percent (25%) of the construction cost to guarantee completion of the proposed

construction or rehabilitation or modification of its treatment facilities;

c. the plant shall undertake pollution management appraisal to identify measures to be instituted to mitigate pollution pending the completion of the construction or rehabilitation or modification of its anti-pollution device.

4. How many Motions for Reconsideration are allowed?

Only one (1) motion for reconsideration of the order or decision of the Board is allowed.

5 How many copies of Motion for Reconsideration are required?

At least thirteen (13) copies.

F. Appeals Or Review Of Decisions Of The Board

1. What are the procedures followed in appeals from decisions of the Board?

Review/Appeals from the decisions of the Board may be made in any of the following:

a. Within thirty (30) days from receipt of the Order, an appeal may be filled with the Office of the President in accordance with the provision of Administrative Order No. 18 of the Office of the President, series of 1987; or

b. Any decisions or order may also be reviewed by the Court of Appeals on both questions of fact and law. The procedure followed concerning appeals from Regional Trial Courts to the Court of Appeals shall be followed; or

c. It may also be reviewed by the Supreme Court on purely questions of law. The procedure concerning appeals from Regional Trial Courts to the Supreme Court shall be followed.

2. What is the effect of appeal?

All decisions or orders of the Board shall be immediately executory notwithstanding the appeal unless otherwise ordered by the Board itself, the Office of the President, or the Court of Appeals or the Supreme Court.

G. Explain Briefly The Policy Of The Board In "Closing Then Subsequently Opening" A Company

The PAB is not engaged in the habit of "close-open" in imposing sanctions on erring industries. Whenever a complaint/records of the case, or findings of inspections of DENR Regional Offices showed clear violations of anti-pollution laws and/or DENR standards, the Board after finding sufficient evidence to warrant issuance of cease and desist order, issues the same. Whenever a closed

firm files a "Motion for Reconsideration", it is required to submit the following requirements to effect the lifting of the CDO:

(1) submit plans and specifications for the construction/rehabilitation/modification of its anti-pollution facilities;

(2) the plant shall undertake pollution management appraisal to identify measures to be instituted by respondent to mitigate pollution pending construction/rehabilitation/modification of its anti-pollution facilities;

(3) Performance bind in the amount equivalent to twenty-five percent (25%) of the cost of construction/rehabilitation/modification.

The documents submitted are evaluated and reviewed by the PAB Secretariat which submits its findings to the Board. The Board after finding that there is merit to the motion, issues a temporary lifting order (TLO) subject to the condition that it must comply with its commitments, construct/rehabilitate/modify its anti-pollution facilities at a definite period of time, and upon its failure to comply with any of the conditions, the bond shall be forfeited in favor of the Government and the cease and desist order shall be reimposed.

The PAB cannot permanently close an establishment. The effect on the economy and the employees are likewise taken into consideration. It adopts the policy of sustainable development.

H. Definitions

1. "Board" - refers to the Pollution Adjudication Board

2. "Person/s" - includes any being, natural juridical, susceptible of rights and obligations or of being the subject of legal relations.

3. "Pollutants" - means any substance, whether solid, liquid or gaseous. which directly or indirectly:

(a) alters the quality of any segment of the receiving environment so as to affect or tend to affect adversely any beneficial use thereof;

(b) is a hazardous or potentially hazardous to health;

(c) imparts objectionable odor, noise, temperature, change, or physical, chemical or biological change to any segment of the environment; or

(d) is in excess of the allowable limits or concentrations or quality standards specified, or in contravention of the condition, limitation or restriction prescribed in the permit issued.

ANNEX 3.2

GUIDELINES FOR THE TRANSFER AND IMPLEMENTATION OF DENR FUNCTIONS DEVOLVED TO THE LOCAL GOVERNMENT UNITS

Pursuant to Republic Act No. 7160, otherwise known as the Local Government Code of 1991, and Executive Order Nos. 192 and 503, defining the mandates, organization and functions of the Department of Environment and Natural Resources (DENR) and the rules and regulations implementing the transfer to concerned Local Government Units (LGUs) of personnel assets and records pertaining to the devolved functions of national government agencies, respectively, the following guidelines governing the devolution of certain DENR functions, programs and projects to the LGUs are hereby promulgated.

Section 1. Policies Governing the Devolution of Functions - The transfer and implementation of certain DENR functions devolved to the LGUs, as enumerated under Section 17 of the Code, shall be governed by the following policies:

1.1 The DENR shall remain as the primary government agency responsible for the conservation, management, protection, development and proper use of the country's environment and natural resources and the promotion of sustainable development.

1.2 The LGUs shall share with the national government, particularly the DENR the responsibility in the sustainable management and development of the environment and natural resources within their territorial jurisdiction.

1.3 The implementation of the devolved functions by the municipalities and cities and the enforcement of laws rules and regulations pertaining to the devolved functions are provided for in the Code by the provinces and cities shall be pursuant to national policies and subject to supervision, control

and review of the DENR. Provided, that when necessary the concerned provinces, cities and municipalities shall enter into administrative arrangements to effectively and efficiently enforces the laws, rules and regulations pertaining to the developed functions.

1.4 Pursuant to the Code's mandate for National Government Agencies (NGAs) to deconcentrate its power and authority to appropriate field offices, the DENR shall retain and strengthen its region offices and provincial and community environment and natural resources offices (PENROs and CENROs).

1.5 Programs, projects or activities which are wholly or partially funded from foreign sources or those included as agency budgetary program, project or item under the Annual General Appropriations Act pertinent Executive Orders and other special laws, including the Comprehensive Agrarian Reform Program (CARP), shall be exempt from devolution thus retained by the DENR.

Section 2. Definition of Terms - As used in this Administrative Order (hereinafter referred to as Order) the terms enumerated below shall be defined as follows:

2.1 Cadastral Survey - Refers to all surveys made of extensive areas consisting of several lots for cadastral registration proceedings, agricultural development or for any purpose pursuant to the provision of pertinent land laws.

2.2 Cease and Desist Order - Refers to an Order issued by the Pollution Adjudication Board requiring respondents to refrain from further operating their establishment, machines, equipment or other facilities generating or causing pollution.

2.3 Communal Forest - Refers to a tract of forest land set aside by the Secretary of the DENR for the use of the residents of a municipality from which said residents may cut, collect and remove forest products for their personal use in accordance with existing laws and regulations.

2.4 Community Environment and Natural Resources Office (CENRO) - Refers to the DENR office headed by a Community Environment and Natural Resources Officer which is responsible for the implementation of DENR policies/regulations, programs, projects and activities in the community level.

2.5 Community-based Forestry Project - Refers to DENR developmental projects involving local communities which include the Integrated Social Forestry Project. Family and community contract reforestration, Forest Land Management Agreement (FLMA), Community Forestry Program and other similar projects.

2.6 Community Forestry Program (CFP) - Refers to the DENR projects lauched through DENR-Administrative Order No. 123, Series of 1989 towards the protection for sustainable management of forest lands predominantly consisting of residual forests by training and organizing upland communities for their participation in said activites for their benefits.

2.7 Contract Reforestation - The implementation of reforestation activities, including establishment, maintenance and protection of forest plantations and nursery preparations, through written agreements with the private sector such as families, communities and corporations and/or with the public sector like local government units (LGUs) and other government

agencies (OGAs). It shall also include contracts for surveying, mapping and planning, comprehensive site development, and monitoring and evaluation and other activities involved in or related to reforestation.

2.8 Deconcentration - Refers to increased and further delegation of functions, responsibilities and authority by the DENR central offices to its appropriate regional and field offices. This also involves the deployment of personnel from the Central Office and bureaus to the field offices in order to perform the increased functions and responsibilities.

2.9 Devolution - Refers to the act by which the national government confers and transfers power and authority heretofore performed by national agencies, together with the corresponding personnel, equipment, assets, liabilities, records and other appurtenances, to the various LGUs to perform specific functions and responsibilities.

2.10 Environment and Natural Resources Officer (ENRO) - Refers to the LGU official who may be appointed by the concerned Local Chief Executives and who shall be directly responsible for the planning and implementation of the devolved DENR functions to the LGUs, pursuant to Section 484 of the Code.

2.11 Environmental Compliance Certificate (ECC) - Refers to license/permit/authorization which DENR issues in favor of proponents, projects of which have been duly reviewed, evaluated and finally approved by DENR pursuant to PD 1586 as well as Proclamation 2146 otherwise known as Environmental Impact Assessment System.

2.12 Foreign-assisted Projects - Refer to DENR projects which are wholly or partially loaded from foreign sources.

2.13 Forest and Management Agreement (FMA) - A contract issued by the government to duly-organized bonafide residents of the community where the FMA area is located. Among others, granting the sole and exlusive privelege to develop said area, harvest and utilize its products for 25 years with the obligation to pay production share to the government equivalent to the cost invested in reforesting such area, pursuant to DENR Administrative Order No. 71, Series of 1990.

2.14 Integrated Social Forestry (ISF) - Refers to an inter-agency national program created by Letter of Instruction No. 1260, dated July 28, 1992, designed to promote the socio-economic conditions of forest occupants and communities dependent on forest land for their livelihood, provide land tenure and at the same time protect and improve the quality of the environment.

2.15 Isolated Survey - Refers to all classes of surveys of isolated parcel of land use for agricultural, residential, industrial, commercial, resettlement or for any other purposes.

2.16 Lot Survey - Refers to the survey of specific lots, particularly private lands.

2.17 Provincial Environment and Natural Resources Office (PENRO) - Refers to the DENR office, headed by a Provincial Environment and Natural Resources Officer appointed by the Secretary of the DENR, which is responsible for the implementation of the DENR policies, regulations, programs, projects and activities in the province.

2.18 Protected Areas - Refers to identified portions of land and water set aside by reason of their unique physical and biological significance, managed to enhance biological diversity and protected against destructive human exploitation, as provided for in RA 7586, the National Integrated Protected Areas System (NIPAS) Act of 1992.

2.19 Regional Environment and Natural Resources Office (RENRO) - Refers to the DENR office headed by a Regional Executive Director (RED) which is responsible for the coordination and implementation of all policies, regulations, programs and projects on environmental and natural resources development and conservation of the DENR in the region.

2.20 Regular Reforestration - Refers to reforestration activities funded through regular appropriations and implemented by DENR field offices by administration or by contracts or both, as distinguished from reforestration activities funded through foreign-soured funds.

2.21 Small-scale mining - Refers to small scale mining activities as defined by RA 7076 the People Small Scale Mining Act of 1994.

2.22 Small Watershed Areas - Refers to forest lands identified and delineated by the DENR as sources of water supply for specific local communities.

Section 3. Devolved Functions Programs and Projects - Pursuant to Section 17 of the Code and subject to the provisions herein particularly the policies enunciated in Sec. 1 above, the following functions, programs and projects of the DENR are hereby devolved to the concerned LGUs:

3.1 Implementation of the following community-based forestry projects:

(i) Integrated Social Forestry Projects currently funded out of regular appropriations except at least one project per province that shall serve as research and training laboratory, as identified by the DENR and those areas located in protected areas and critical watersheds;

(ii) Establishment of new regular reforestration projects, except those areas located in protected areas located in protected areas and critical watersheds;

(iii) Completed family and community-based contract reforestation projects. Subject to policies and procedures prescribed by the DENR;

(iv) Forest Land Management Agreements, in accordance with DENR Administrative Order No. 71, Series of 1990 and other guidelines that the DENR may adopt; and

(v) Community Forestry Projects, subject to concurrence of financing institution(s), if foreign assisted.

(b) Management and control of communal forests with an area not exceeding fifty (50) square kilometers or five thousand (5,000) hectares, as defined in Section 2, above. Provided that the concerned LGUs shall endeavor to convert said areas into community forestry projects:

(c) Management, protection, rehabilitation and maintenance of small watershed areas which are sources of local water supply as identified or to be identified by the DENR; and

(d) Enforcement of forest laws in community-based forestry project areas, small watershed areas and communal forests, as defined in Section 2 above such as but not limited to:

(i) Prevention of forest fire, illegal cutting and kaingin;

(ii) Apprehension of violators of forest laws, rules and regulations;

(iii) Confiscation of illegally extracted forest products on site;

(iv) Imposition of appropriate penalties for illegal logging, smuggling of natural resources products and of endangered species of flora and fauna, slash and burn, farming and other unlawful activities; and,

(v) Confiscation, forfeiture and disposition of conveyances, equipment and other implements used in the commission of offenses penalized under P.I. 705 as amended by E.O 277, series of 1987 and other forestry laws, rules and regulations.

Provided that the implementation of the foregoing activities outside the devolved areas abovementioned, shall remain with the DENR.

3.2 Protected Areas and Wildlife

a. Establishment, protection and maintenance of tree park, greenbelts, and other tourist attractions in areas identified and delineated by the DENR except those covered by the Integrated Protected Areas System, as defined by law, and the collection of fees for their services and the use of facilities established therein;

b. Except export and import, regulation of flora outside protected areas including industries and businesses engaged in their propagation and development, such as orchidaria and nurseries. Provided, that such businesses and industries are registered with the DENR for monitoring purposes.

(c) Implementation of the Rehabilitation in Conservation Hotspots (RICH) and the Conservation of Rare and Endangered Species (CARE) activities in areas identified and delineated by the DENR.

3.3 Environmental Management

a) Enforcement of the following pollution control and environment protection laws, rules and regulations:

(i) Issuance of Environmental Compliance Certificate (ECC) for projects and businesses, under the Kalakalan 20:

(ii) Adjudication of cases involving complaints against businesses under the Kalakalan 20; and

(iii) Apprehension and testing of smoke belching vehicles and collection of appropriate fees and charges.

b) Implementation of solid waste disposal and other environmental management systems and services related to general hygiene and sanitation, such as sewage and household wastes disposal:

c) Abatement of noise and other forms of nuisance as defined by law; and,

d) Implementation of Cease and Desist Orders issued by the Pollution and Adjudication Board.

3.4 Mines and Geo-Sciences Development

a) Enforcement of the small-scale mining law, subject to the policies, standards and guidelines of the DENR.

b) Issuance of permit for collection and to extract sand, gravel and other quarry resources; and

c) Verification and adjudication of conflicts on and collection of fees and charges for guano collection and the extraction of sand, gravel, and other quarry resources.

3.5 Land Management

a) Conduct of cadastral surveys;

b) Conduct of lot surveys; and

c) Conduct of isolated and special surveys.

Provided, that the issuance of survey authority and the verification of survey returns, records keeping issuance of patents and other post-survey activities shall be done by the DENR. Provided further, that the DENR shall extend the necessary administrative and technical assistance to the LGUs for the actual conduct of surveys, and the preliminary activities attendant to the surveys.

Section 4. Role of the LGUs - In coordination with the DENR and subject to the provisions of this Order, the LGUs shall adopt adequate measures to protect the environment and conserve land, mineral, marine, forest, and other resources within their territorial jurisdiction. Furthermore, the LGUs shall:

4.1 Provide the necessary financial, technical, manpower and other resources to ensure efficient and effective implementation of the devolved function as enumerated in Section 3 above;

4.2 In addition to the Internal Revenue Allotment, allot amounts from their share of forty percent (40%) of the gross collection derived by the national government from mining taxes, royalties, forestry charges and other taxes, fees, or charges enumerated in the Code to finance local development and livelihood projects, in accordance with Section 294 of the Code and for the protection and development of the environment and natural resources;

4.3 Whenever necessary, call any DENR official or employee assigned to them to make recommendations or advice on environment and natural resources-related matters affecting them. Provided, that said DENR official shall not leave his station without giving prior written notice to the local chief executive concerned.

Section 5. LGUs' ENROs - Notwithstanding the provision of Section 484 of the Code prescribing for the optional appointment of Environment and Natural Resources Officers (ENROs), LGUs with substantial natural resources or which identified by the DENR as environmentally critical areas shall endeavor to appoint an ENRO who shall take the responsbility for the planning and implementation of the devolved functions.

Section 6. Role of the DENR - The DENR subject to the provisions of Executive Order No. 503, shall transfer to the concerned LGUs the personnel and assets including pertinent records and equipment corresponding to the devolved functions. Provided, that those personnel performing inter-municipal functions like the Communit Development Officers/Assistants (CDO and CDAs) of the Integrated Social Forestry Projects, pursuant to Section 2 (b) of E.O. No. 503 shall be devolve to the provinces wherein the municipalities concerned are located. Provided further, that the Community Developer Officers/Assistants assigned to the ISF proper in the cities of Davao, Zamboanga and Puerto Princesa shall be transfer to those clients and that at least one Community Development Officer/Assistant shall be devolved to each of the other cities which have at least three (3) ISF projects in their geographic jurisdiction. Moreover, the DENR shall:

6.1 Strengthen its policy-making, planning, monitoring and evaluation capabilities at the central and regional levels and monitoring evaluation, investigation and prosecution capabilities at the regional, provincial and community environment and natural resources offices, to ensure efficient and effective enforcement of pertinent rules and regulations and delivery of services, including the implementation of the devolved functions, programs, and projects:

6.2 Pursuant to national policies and its supervision, control and review/functions over the devolved functions as provided for in the Code:

a) Conduct periodic monitoring and evaluation of the implementation of the devolved functions by the LGUs:

b) Alter or modify or nullify or set aside certain decisions or actions of the LGUs or their Chief Executives which, in the implementation of the devolved functions are inconsistent with national policies;

c) Conduct investigation, and when necessary, cause the prosecution of erring parties in the implementation/enforcement of the devolved functions.

6.3 Through its regional, provincial and community environment and natural resources offices, provide the LGUs technical assistance packages for the development of technical capabilities related but not limited to the following:

a) Enforcement of forest laws, small-scale mining law, pollution and other environmental laws, rules and regulations.

b) Implementation of reforestration, ISF and other community-based forestry projects and small-scale mining projects;

c) Protected areas and wildlife;

d) Ecosystems research and related activities and other researches;

e) Land surveys and delineation of boundaries;

f) Establishment of greenbelts, urban forests and forest-based recreation projects; and,

g) Other activities related to the devolved function;

6.4 Provide opportunities for scholarships/training to LGU personnel working on environment and natural resources-related programs and activities, whenever possible, subject to the recommendations and/or approval of the Chief Executives of the LGUs concerned.

6.5 Establish and maintain one research and training laboratory for upland/forest management per province to be identified from among the present ISF project sites;

6.6 Make available its upland/forest management laboratories for training of farmers and upland/forestry workers of concerned LGUs; and,

6.7 In coordination with the LGUs and concerned non-governmental organization (NGOs) formulate effective consultation mechanisms to facilitate project planning and implementation.

Section 7. Manual of Operations - Within six (6) months from the approval of this Order, the DENR shall develop a manual of operations which shall guide the LGUs in the implementation of the devolved functions, and the monitoring and evaluation of projects by the DENR.

Section 8. Environment and Natural Resources Council (ENRC) - The DENR and the concerned LGUs, shall organize within six months from the approval of this Order, an Environment and Natural Resources Council (ENRC) consisting of appropriate LGU and DENR officials and representatives from concerned agencies, professional and civic groups and other NGOs as may be determined by the DENR and the concerned LGU. The ENRC shall review and recommend the implementation of programs and projects and

perform oversight functions on matters pertaining to environment and natural resources. Provided, that for municipalities and cities the Vice-Mayor shall act as chairman of said council.

Section 9. Linkage/Support to NGOs - The DENR and concerned LGUs shall extend assistance to and enhance the participation of NGOs in the environment and natural resources-related activities such as but not limited to contract reforestration and the ISF projects. Provided, that said NGOs are accredited with both the DENR and the concerned LGUs.

Section 10. Deconcentration of Authority and Responsibility - The DENR shall six (6) months after the effectivity of RA 7160, effect the deconcentration of authorities and responsibilities not devolved to LGUs, to its appropriate regional, provincial and community environment and natural resources offices.

Section 11. Reorganization - The DENR may, on a case to case basis, reorganize its regional and field offices, and/or create new community offices, depending on the available natural resources and retained functions in their respective jurisdictions, and other criteria that may be set by the DENR. Provided, that in cases where new provinces are created, the DENR shall establish its necessary provincial offices in said provinces subject to the rules and regulations of the Department of Budget and Management (DBM) on the provision of the necessary staffing and funds for said purpose.

Section 12. Functions Retained by DENR - All functions, programs, projects and activities presently performed by the DENR which are not expressly devolved to LGUs in this Order, shall be retained by the DENR.

Section 13. Continuing Devolution - In support of local autonomy, the DENR, subject to the attainment of certain requisites and standards such as technical capability, implementation plans and other requirements as may be provided for in the national

policies shall further devolve other functions and responsibilities to the LGUs, not only through legislative enabling acts but also by administrative and organizational reforms, such as memorandum of agreements and deputation of local officials.

Section 14. Repealing Clause - Any provision of DENR Administrative Orders, Memorandum Circulars or other officials issuance not consistent herewith are hereby repealed.

Section 15. Effectivity - This Order shall take effect 30 June 1992 and remain in force and effect unless otherwise revoked or amended in writing by the Oversight Committee created by the RA 7160 or by any other higher competent authority.

ANNEX 3.3

PHILIPPINE BUSINESS CHARTER FOR SUSTAINABLE DEVELOPMENT

1. Corporate Priority

   To recognize environmental responsibility and management as a corporate priority and as an essential part of a corporation's commitment to sustainable development.

2. Environmental Policy and Management Practice

   To establish policies, programs and practices for conducting operations in an environmentally sound manner, to apply them consistently in all business operations, and to continually improve them taking into account laws and regulations, scientific and technical developments, consumer needs, and community expectations.

3. Environmental Assessment and Monitoring

   To assess environmental impact before starting a new project or activity and before decommissioning a facility or leaving a site; to conduct periodic monitoring of any project that is environmentally critical or is located in an environmentally critical area.

4. Clean and Safe Protection

   To apply products or services or conduct activities based on the precautionary principle, a principle that prevents environmental degration and invests in pollution prevention rather than cleaning-up.

5. Precautionary Approach

To provide products or services or conduct activities based on the precautionary principle, a principle that prevents environmental degradation and invests in pollution prevention rather than cleaning-up.

6. Sustainable Use of Natural Resources

To develop and operate facilities and conduct activities with sustainable use of natural resources such as water, soil and trees; to conserve non-renewable natural resources through efficient use and careful planning to invest in energy efficiency and conservation measures; to help protect wildlife habitat; open spaces and wilderness and preserve biodiversity.

7. Environmentally Sound Products and Services

To develop and provide products or services that have no undue environmental impact and are safe in their intended use that are efficient in their consumption of energy and natural resources, and that can be recycled, reused or disposed or safely.

8. Employee Education

To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.

9. Customer Advice

To advice and, where relevant, educate customers, distributors and the public in the safe use, transportation, storage and disposal of products provided, and to apply similar considerations to the provisions of services.

10. Contractors and Suppliers

To promote the adoption of these principles by contractors and suppliers and to encourage them to adopt environmentally sound practices which are consistent with those of the enterprise.

11. Emergency Preparedness

To develop and maintain emergency preparedness plans in cooperation with relevant authorities and the local community.

12. Transfer of Technology

To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.

13. Research

To conduct or support research on the environmental impacts or raw materials, process, products, emissions, and wastes associated with the enterprise and on the means of minimizing adverse impacts.

14. Public Communication and Cooperation

To foster openness and dialogue with employees, non-governmental organizations, and the public and to promote mutual understanding in addressing environmental issues.

15. Compliance And Reporting

To measure environmental performance; to conduct regular environmental audits and assessments of compliance with corporate and government requirements and

these principles; and to provide appropriate information to share-holders, employees, the authorities and the public.

16. Proactive Role

To contribute to the development of public policy and the conduct of educational and other initiatives that will enhance environmental awareness and protection.

ANNEX 4.1

REGULATORY FRAMEWORK - AIR QUALITY

A variety of laws and regulations have been issued for controlling air quality from mobile and stationary sources. The more pertinent laws are summarized briefly below:

Statutes

Republic Act 3931

This Act created the National Water and Air Pollution Control Commission; defining pollution and providing penalties therefor.

Letter of Instruction 247

Deputizing the Constabulary Highway Patrol Group (CHP) to enforce provisions of PD 552 prescribing sanitation requirements and facilities for the convenience of the traveling public.

Letter of Instruction 551

Requiring all public utility, government and private vehicles to install anti-pollution devices, with authority to immediately ground apprehended vehicles. Such vehicles are to remain grounded until the deficiency has been corrected.

Requiring the listing of all factories discharging offensive effluents into the air or waters to be submitted to the President; encouraging citizens to report to the National Pollution Control Commission (NPCC) the nuisances created by factories and vehicles.

Presidential Decree 1160

Vesting authority in Barangay Captains to enforce pollution and environmental control laws.

Presidential Decree 1181

Providing for the prevention, control and abatement of air pollution from motor vehicles and providing the penalties therefor.

Regulations

Regulations intended to control air pollution from mobile sources are spelled out in National Ambient Air Quality Standard of 1978. Section 61 of these standards provide the maximum permissible emission standards for mobile sources for both gasoline-powered and diesel-powered vehicles.

Emission standards for mobile sources limit particulates or visible emission only. For gasoline-powered vehicles, air emissions at the point of discharge into the atmosphere must not be visible for a continuos period of more than 10 seconds. For diesel-powered vehicles, air emissions at the point of discharge to the atmosphere must not be a shade (or density) greater than 20 percent capacity for a continuos period of more than 10 seconds.

The standards for mobile sources do not limit emissions for CO, hydrocarbons, lead, or other typical pollutants from mobile sources.

The 1978 standards also establish emission standards applicable to stationary sources. Limitation on visible emissions and particulates are provided for both new and existing fuel burning equipment, boilers, and incinerators. In addition, emission limitations for certain metals, acids, ammonia, and other pollutants are provided. While these limitations

are generally applicable to any emitting source, in some cases, different limitations are applied to different industrial operations.

The regulations also provide certain general restrictions on fugitive emissions, volatile organic compound (VOC) emissions from VOC storage/handling, and open burning.

The air pollution standards also established National Ambient Air Quality Standards (NAAQS) for particulates, SO_2 photochemical oxidants, NO_2 and CO. NAAQS is designed to protect human health and welfare from pollutants emitted by both mobile and stationary sources.

DENR - Administrative Order No. 14, known as the Revised Air Quality Standards of 1992 (Revising and Amending the Air Quality Standards of 1978) provides emission standards for smoke and particulate matter for stationary source, for source specific air pollutants and for control of sulfur compound emissions. The regulations also established the National Ambient Air Quality Guidelines and Standards. Some sections were later amended by Administrative Order No. 14-a series of 1993 clarifying its coverage and scope.

ANNEX 4.2

REGULATORY FRAMEWORK - WATER QUALITY

Some of the more important laws related to water quality are summarized briefly below:

Statutory Provisions

Act No. 2152, as Amended

Otherwise known as the "Irrigational Act", this law has undergone at the very least four express amendments under Act Nos. 2652, 3208, 3523, and 4157. Passed on June 6, 1912, it is totally repealed by Presidential Decree (PD) no. 1067. The objective of the law, however, remains similar, such is the authority to order the removal or alteration of dams, by filling in or opening canals or ditches and to order the construction of gates, and installation of gauges among others. Examination of streams and works diverting therefrom and to measure the discharge of streams, carrying capacity of canals and ditches and approximately measure lands irrigated as well as apportion waters to appropriators were included among the powers provided. Implementation is carried out by the National Irrigation Authority.

The order of preference for the use of waters was given as follows: domestic use first, then agricultural use, industrial use, ponds for fisheries and mining or milling in mines.

Act No. 4062

The State made development of hydraulic power a national policy. Through Act No. 4062, the Philippine legislature put into law the policy for hydraulic power to be developed for private or domestic use and not for sale to the public. As to franchises existing, or rights acquired prior to the passage of the Act, nothing contained therein prohibited or restricted the use of hydraulic power for irrigation purposes. At the same

time, it preserved to the Philippine Legislature the disposition of waters of the public domain for the utilization and development of hydraulic power.

Commonwealth Act No. 383

Recognizing that any action on the waters of rivers and streams may cause harmful effects to water quality, the legislature prohibited dumping which cause an elevation in the level of river beds or block in the course of streams. Known as the "Anti-Dumping Act", the prohibited act therein is one which is to cause alluvial formations of whatever means or device that may give rise for river banks to expand, or by similar process, reclaim a strip of land through accession, except only with the authority of the Secretary of Public Works now Secretary of Public Works and Highways) when such action is necessary for the protection of private property against the destructive action of the waters.

Letter of Instruction No. 376

Though issued much later than Commonwealth Act (CA) No. 383, this Letter of Instructions (LOI) created a committee to "recover" creeks, rivers, asteros, drainage channels, and similar bodies of water in the Greater Manila area which have been illegally filled up.

Republic Act No. 1899

Though prohibited under CA No. 383, reclamation as a practice was recognized to maximize and utilize, as well as extend, State policy on land-use. Reclamation of foreshore lands has been reserved to charter cities and municipalities. To them is granted the power to undertake, at their own expense, reclamation by dredging, or filling of any foreshore lands while reserving these areas as government property. The law does not provide for any qualification as to the applicability of the law in case the action of reclamation creates harmful effects to bodies of water in the area. Hence, unless such is

provided in subsequent laws, reclamation will remain an exception to the rule pronounced in CA No. 383.

Republic Act No. 128

This Act requires district health officers or their authorized representatives to inspect the sanitary condition of marine passenger vessels calling at ports in their district. These officers are also required to make a report of their findings to the Bureau of Health and provide a copy to the Bureau of Customs.

Republic Act 428

The First Act which prohibited the use of dynamite and other explosive or toxic substances in fishing grounds and waters. The intent of the Act was to protect water resource in the Philippines. This law has been repeated by PD No. 704 or the Fisheries Code.

Republic Act No. 1378

Otherwise known as the "Plumbing Law", RA No. 1378 provides that sewage and other waste from plumbing systems which may not be deleterious to surface or sub-surface water shall be discharged into the ground or into the waterway unless it has first been rendered innocuous through some acceptable form of treatment. It also provides that all premises intended for human habitation, occupancy, or use shall provide with a supply of pure and wholesome water.

Republic Act No. 1383

For more efficient utilization and appreciation of water resources, the Metropolitan Waterworks and Sewerage Systems was created under RA No. 6234, dissolving the National Waterworks and Sewerage Authority under RA No. 1383. Amendments were provided by PD No. 425. The MWSS under its Charter (RA No. 1383) is empowered to issue such regulations as may be necessary for the sanitary sewers and for the protection of water and sewer service.

Republic Act No. 2056

In line with the objectives of Act No. 2152 or the Irrigation Law, RA No. 2056 prohibits construction of dams, dikes or any other works in public navigable water or waterways and in communal fishing grounds which restrict the efficient utilization of water resources. The authority to remove and or demolish all obstructions has been granted to the Secretary of Public Works and Communications (now Secretary of the Department of Public Works and Highways).

Republic Act No. 4850

In 1966, Congress created the Laguna Lake Development Authority under RA No. 4850 with the objective of harnessing the potential of Laguna de Bay. An amendment to said law is PD No. 813, expanding the functions of the Authority to include a comprehensive water quality management program for the lake designed to preserve its ecological balance.

Republic Act No. 2370 and Republic Act No. 409

Unless these Acts, the Barrio Council has been given the power, duty and responsibility for constructing and maintaining, within its boundaries, water supply systems, drainage,

irrigation, public toilet facilities, and sewerage facilities. In the same light, RA No. 409, the revised Charter of the City of Manila, gives to the Municipal board the power to legislate and provide for the maintenance of waterworks for the purpose of supplying water to the inhabitants of the City and the purification of the source of water supply in the places through which the same passes, to regulate the construction, repair and use of hydrants, pumps, cisterns and reservoirs, and to provide for the establishment, maintenance and regulation of the use of public drains, sewers, latrines and cesspools.

Presidential Decree No. 198

In promulgating this decree, the President recognized that one of the prerequisites to an orderly and well-balanced growth of urban areas is an effective system of local utilities, the absence of which is realized to be a deterrent to economic growth, and a hazard to public health. At that time, when the decree was made, domestic water systems and sanitary sewers did not exist in many communities. In those areas where system existed, they failed to meet the needs of community. Hence, the need to create, operate, and maintain a reliable and economically viable and sound water supply and disposal system was imperative.

Presidential Decree No. 296

In line with the program adopted in RA No. 2056, PD No. 296 directs all persons, natural and jurisdictional, to renounce possession and move out of portions of rivers, creeks, esteros, and all drainage channels and other similar waterways encroached upon them.

Presidential Decree No. 424

The government foreseeing the conflict of interest among water users, created the National Water Resources council to coordinate, integrate and develop water resources.

Presidential Decree No. 856

The health of the people being paramount importance, the Code of Sanitation prescribes the standards for drinking water and bacteriological and chemical examination with evaluation to conform to the National Development Water Standards Criteria.

Presidential Decree No. 1160

Under this Decree, laws which have for their purpose environment pollution control are to be enforced by Barangay Captain.

Executive Order Nos. 30 (1954) and 24 (1966)

Both of these EO's created the Interim Water Resources Development Authority. At that time no government agency was tasked to regulate water and sewerage systems (prior to establishing the MWSS and the LWUA).

Republic Act No. 3931

The creation of the National Water and Air Pollution Control Commission (NWAPCC), later renamed the National Pollution Control Commission (NPCC) under terms of PD No. 979, was meant to effectively determine whether pollution exists in any of the waters, among other forms of natural resources. The Commission is tasked to adopt and prescribed rules and make orders for discontinuance of pollution due to discharge of sewage, industrial and other wastes. (Now the Pollution Adjucatory Board).

Presidential Decree No. 600, as amended by Presidential Decree No. 979

The Marine Pollution Decree of 1974 was promulgated to give the Philippine Coast Guard the responsibility of preventing, containing, and controlling pollution of the seas and other bodies of water within the territorial jurisdiction of the Philippines, including industrial pollution.

Philippine Coastguard Memorandum Circular No. 022-77 (May 20, 1977)

The Circular defines violations that describes the administrative penalties therefore and exacting, among others, compliance with preventive requirements for the shipping and maritime sectors and the oil industries, consistent with the policy set up against marine pollution.

Presidential Decree No. 1252

The PD was promulgated in recognition of the damage caused by pollution in waters due to the operation of mining industries. A Mine Wastes Tailing fund was established for the purpose of extracting fees from the mine operators and such would accrue to the 'reserve' fund to be used exclusively for payment of damages caused by the operation of mining companies.

Presidential Decree No. 602

In 1974, the National Operation Center for Oil Pollution (NOCOP) was created under the Philippine Coast Guard for the special purpose of enforcing the provisions of PD No. 600 and further designated the NOCOP as the contact agency for similar agencies of the Association of South East Asian Nation (ASEAN) to promote mutual assistance in cases of major oil spills in any member country.

Presidential Decree No. 1067

More commonly known as the "Water Code". The law generally provides for the "use" of waters and easements to waters, with the basic consideration of public health and welfare.

Presidential Decree No. 1152

Under Secs. 14, 15, 17, and 18 of the Philippine Environment Code (PD No. 1152), the water of the Republic have been classified according to their beneficial use with the goal of upgrading water quality.

Republic Act No. 4850

RA 3850 recognizes that the pollution and indiscriminate use of Laguna de Bay, one of the major inland waters of the country, has caused great extensive damage to the Bay, the Laguna Lake Development Authority was created for the special task to harness the potentials of the waters therein and to secure it fit for beneficial purposes.

Presidential Decree Nos. 274 and 381

One of the more beautiful rivers during the olden days, the Pasig River has been degraded faster than any other body of water in Greater Manila. To prevent more deterioration, PD No. 274 was promulgated in response to the apparent necessity to clean the waters of clutter wastes, and debris and likewise rid it of pollutants surrounding it.

The Pasig River Development Council was created to remedy the problems relating to the discharge of harmful substances, the lack of control over the use of waterways, and continued presence of constructions even when illegal. The Council is charged with the duty to implement the Pasig River development program and administer its trust account.

Letter of Instruction No. 712 (1978)

Having in mind the need for an express provision banning the use of waters as a waste depository, a more specific LOI was deemed necessary to ban the use of Manila Bay and Laguna de Bay as a waste depository, despite the existence of a general prohibition on such practice. Under the same LOI, a hydraulic survey of Metropolitan Manila was ordered.

Republic Act No. 6978

Passed on December of 1990 and approved by the President on January 24, 1991, this law provides that the National Irrigation Authority shall undertake a 10-year program for the construction of irrigation projects in the remaining 1,500,000 ha. of unirrigated but irrigable lands priority is to be given to communal irrigation projects and beneficiaries of the CARP and indigenous cultural communities.

Water Quality Standards

Surface Water

In 1978, standards were published for water quality classification and effluent limitations. While implementation of these standards was never particularly effective (1), the rules were re-evaluated and revised in 1990.

The revised water usage and classification standards (1990) require that all Philippine waters be maintained for their best usage. Classifications are provided for both fresh (surface) waters and coastal and marine water. Surface waters are classified for use as public water supply (Classes AA and A), recreation (Class B), fishery/recreation/industrial supply (Class C) or agriculture/irrigation/industrial supply/and other (Class D). Coastal and marine waters are classified for use as shellfish propagation, recreation, fishery and industrial water supply.

The objective of the water quality criteria established for different classes is to maintain minimum conditions needed to ensure water is suitable for its designated use. Reclassification of water is allowed in limited circumstances and must be approved by DENR.

Numerical criteria for different classes of fresh and marine waters have been established for a variety of conventional, indicator, and toxic parameters. The water usage and classification standards also specify approved methods of analysis for the pollutant parameters covered by the rules.

Effluent Regulations

The revised effluent regulations (1990) apply to all industrial and municipal wastewater effluents. These regulations are more flexible than the 1978 effluent standards in that separate limits were set for different classes of fresh or marine waters (see above). In addition, existing dischargers were provided a grace period to come into compliance with the more stringent limitations for new dischargers. Less stringent requirements apply to industries with "strong waste" (defined as those wastewaters whose initial BOD value before treatment is equal to or greater than 3,000 mg/L).

A zero discharge standard has been set for certain toxic pollutants (including cadmium, chromium, lead, mercury, and PCB's) for those waters classified as Class AA or Class SA (the highest classification for fresh waters and marine waters, respectively). Existing industrial discharge of strong wastewater that cannot meet the interim standards for BOD may be allowed to continue operation under a "temporary permit" for an indefinite period of time. A penalty fee must be paid, and the effluent must not pose a threat health or environment.

Groundwater

With regard to protection of groundwater supplies, the existing legal/regulatory framework appears to be limited, even with regard to groundwater currently used (or potentially used) as public water supply. As noted above, the 1978 water quality criteria and classification rules established two classes of ground water quality. Class GA was reserved for sources of domestic water supply, while Class GB was intended for groundwater used for irrigation or industrial water supply. The revisions to the water usage and classification regulations issued in 1990 dropped these groundwater classifications.

Toxic, Hazardous and Nuclear Substances

It should be noted that regulations developed pursuant to the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (3) will likely have a beneficial impact on both surface water and groundwater quality. This Act is discussed in Chapter B.3

ANNEX 4.3

REGULATORY FRAMEWORK - SOLID/HAZARDOUS WASTE MANAGEMENT AND LAND USE

National laws regarding solid waste management and land use are briefly summarized below:

Presidential Decree No. 856

Perhaps the most important contribution to waste disposal legislation is the Sanitation Code. Covering both solid and liquid waste disposal, the Code prescribes standards and procedures for drinking water, sewage collection, refuse and excreta disposal. It assigns to cities and municipalities the responsibility to provide for efficient disposal of proper waste (solid and liquid) disposal; nuisances and offensive trades and occupations; disposal of dead persons; and pollution by pesticides, chemicals, etc. The law empowers the Secretary of the Department of Health to prescribe rules and regulations therefor.

The important aspects of waste management embodied in the law can be summarized as follows:

- Waste Management

  - Waste management programs are required for all provinces, cities and municipalities.

  - The now Department of Interior and Local Government (DILG) is authorized to promulgate guidelines for the formulation and establishment of the program.

- Measures to facilitate the collection, transportation, processing and disposal of waste are the responsibility of local governments.
- The national government shall provide necessary subsidy to local governments.
- Methods of solid waste disposal.
- Prohibits dumping.
  - Dumping into the sea and other navigable waters is prohibited. Under CA No. 384, dumping into the river of refuse, waste matter or substance of any kind is prohibited; penalty of six months imprisonment or a fine of ₱ 200 or both is imposed (law repealed by PD No. 1067 but prohibition still provided thereunder).

Presidential Decree No. 825

Under this decree, penalties for the improper waste disposal of garbage requiring that all garbage, filth and waste be placed in proper receptacles. Supervision over proper disposal of garbage is lodged with the Department of Public Works and Highways. The penalty imposed is imprisonment of five days to one year or a fine of ₱ 100 - ₱ 200 or both.

Presidential Decree No. 1152

This decree provides for a Waste Management Program under sections 42 and 42 for proper disposal of wastes.

Presidential Decree No. 6969

This Act mandates the policy of control of toxic substances and hazardous and nuclear wastes.

Presidential Decree No. 1251, as amended by Presidential Decree No. 1720

The decree imposes a fee on operating mining companies, the fee called a "Mine Wastes and Tailing Fee" to compensate for damages due to mining operations. A committee to evaluate charges and fees was established composed of the Commissioner of the National Pollution Control Commission (NPCC), the Directors of the Bureau of Lands, the Bureau of Plant Industry, the Bureau of Fisheries and Aquatic Resources, the National Environment Protection Council, the Bureau of Soils, and the Executive Director of the Bureau of Food and Drug.

Presidential Decree No. 1152

Under Sections 22 and 23 of the Philippine Environment Code, the policy on land-use is provided.

Presidential Decree No. 399

Providing a restriction to the exercise of the attribute of just utendi of the right of ownership, the decree limits the use of a strip of 1,000 meters of land along any existing, proposed or ongoing public highway or road, until the government shall have a competent study and have formulated a comprehensive and integrated land use and development plan.

Presidential Decree No. 757

The enabling law of the National Housing Authority, the law dissolves all existing agencies exercising functions pertaining to housing settlements and defines the powers and functions of the NHA and providing funds therefore.

Presidential Decree No. 933

The law creates the Human Settlements Commission.

Presidential Decree No. 957

Under this legislation, the sale of subdivision lots and condominium is regulated.

Presidential Decree No. 1084 and 1396 and Executive Order No. 98

Another agency created for the purpose of land use management is the Public Estate Authority under Pres. Decree No. 1084. Under Pres. Decree No. 1396, the Department of Human Settlements Development Corporation was established. In 1946, the National Urban Planning Commission was created.

Executive Order no. 215

In 1968, a Presidential Committee on Housing and Urban Development was created under EO No. 135. In 1970, the same committee was reorganized under Exec. Order No. 215, as well as its powers defined under EO 208, "strengthening the Cabinet to make it more effective vehicle for the attainment of development goals."

Executive Orders Nos. 383 and 419

In 1972, under EO No. 383, the Caliraya Development Commission was created and in 1973, under EO No. 419, a Task Force on Human Settlements was organized.

Letter of Instruction Nos. 401 and 511

This LOI mandates the implementation of the Manila Urban Development Project which prescribed an order for systematic classification and survey of all lands within Manila. By virtue of LOI, No. 511, an ad-hoc National Coordinating Council was created which was to oversee and assure the preparation and development of town plans, housing and zoning measures.

Republic Act No. 2264

Under the "Local Autonomy Act", municipal and city governments are empowered to enact zoning regulations so that desirable patterns of land use can be attained. Interestingly enough, however, the national government also exercises general powers in providing for zoning measures such as, that through the National Building Code (PD no. 1096) prescribes zoning regulations and requirements in general, and the uniform application of measures prescribed by the Housing and Land Use Regulatory Board (HLURB).

Land Office Circular No. 29

Following the regalian doctrine in disposition of lands of the public domain, thereby recognizing acquisition of lands thru accretion, precaution as to disposition of riparian lands abutting rives, streams, lakes, etc. is to be observed, though. This policy is laid down in the circular.

Republic Act No. 5752

Land use is restricted by this Act by its mandate for the establishments and maintenance of a permanent forest and watershed by and within every city or municipality with a size equivalent to at least 2 percent of its entire area.

Presidential Decree No. 953

Even in use of privately-owned land, a restriction is provided by this decree in providing for the allocation of at least 20 percent of the entire area of a subdivision or industrial estate for and as an open space.

Letter of Instruction No. 511

This LOI creates an ad-hoc National Coordinating Council to oversee and assure preparation and developing town plans, housing and zoning measures.

Presidential Decree No. 2

This decree proclaims the entire country as a "land reform area" thereby reserving the use of lands for agricultural purposes. The decree was intended to accelerate the land reform program which to date, is still subject to much controversy. Implementation has still to move on a faster scale.

Republic Act No. 6969

One additional law that deserves special attention is RA 6969 empowers DENR, in consultation with an Inter-Agency Technical Advisory Council, to prepare regulations implementing the provisions of the Act. It is our understanding that a task force is currently drafting such regulations.

While the requirements for a chemical inventory, testing, and regulations are fairly explicit in the Act, the provisions regarding waste management are relatively limited. The exception to this is the ban on importation of hazardous and nuclear wastes in the Philippines. Such wastes are not to be permitted in the country, even for purpose of trans-shipment.

The definition of hazardous wastes included in the Act refers to "by-products, side-products, process residues, spent reaction media, contaminated plant or equipment or other substances from manufacturing operations", and as "consumer discards of manufactured products".

Nuclear waste is a subset of hazardous wastes derived from the production or utilization of nuclear fuels. It is unclear whether low-level radioactive wastes from medical diagnostic equipment or similar sources is intended to be covered by this statutory definition.

The Act authorizes DENR to publish regulations covering the importation, manufacture, processing, handling, storage, transportation, sale distribution, use and disposal of chemical substances and mixtures that present unreasonable risk of injury to health or the environment. (For purposes of this analysis, it is assumed that "hazardous waste" would satisfy the definition of either "chemical substance" or "mixture" and that this defines DENR's authority to regulate hazardous wastes). As mentioned earlier, the Act is not specific as to the regulatory framework for hazardous waste management. As a result, our proposed management system is based on experience in analyzing and developing hazardous waste regulatory programs in other countries.

ANNEX 4.4

REGULATORY FRAMEWORK - TOXIC/HAZARDOUS MATERIALS MANAGEMENT

The Toxic Substances and Hazardous Nuclear Wastes Control Act of 1990 addresses the importation, manufacture, processing, handling, storage, transportation, sale, distribution, use and disposal of chemical substances and mixtures in the Philippines. (It should be noted that the provisions of these statute related primarily to hazardous/nuclear waste management and transportation are covered elsewhere in this report). The objectives of the RA 6969 are to:

- Develop and maintain an inventory of chemicals imported or manufactured in the Philippines
- Monitor and regulate these chemicals where they pose unreasonable risks to human health or the environment, and;
- inform and educate the public regarding risks associated with toxic chemicals.

The Act requires DENR to publish implementing regulations in coordination with other national agencies. It is our understanding that a task force is currently drafting such rules.

Under RA 6969, DENR is empowered to maintain an inventory of chemicals manufactured or used in the Philippines. The inventory is to be updated through the submittal or pre-manufacture and pre-importation notifications for any "new" chemicals (e.g. chemicals not included in the inventory).

RA 6969 also authorizes DENR to require testing of new chemical substances and mixtures that present unreasonable risks to human health or the environment before they

are introduced into commerce. DENR can also require testing of existing chemicals based on the same criterion. The cost of such testing is to be borne by the manufacturer or importer of the chemical to be tested. DENR is also granted the authority to inspect establishments, confiscate or impound chemicals, conduct research, and educate the public, as well as to exercise other such powers as required to carry out its duties under the Act.

RA 6969 empowers DENR to control risks associated with chemicals or mixtures. Following submittal of pre-manufacture or pre-importation notification, DENR may prohibit or regulate the import, manufacture processing, sale, distribution, use or disposal of a chemical.