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REPORT OF THE
EXPERT GROUP MEETING ON

TYPE APPROVAL PROCEDURES FOR NEW VEHICLES IN THE ASIA - PACIFIC REGION

organized by UNDP, UNIDO and
Directorate General of Land Transportation,
Ministry of Communications,
Republic of Indonesia

Jakarta, 8 - 10 June 1993

This document has not been edited

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I. INTRODUCTION

In accordance with Project Document DP/RAS/89/057 "Regional Network on Control and Regulatory Measures Concerning Motor Vehicle Emissions" UNDP/UNIDO in cooperation with Directorate General of Land Transportation, Ministry of Communications, Republic of Indonesia organized an Expert Group Meeting on Type Approval Procedures for New Motor Vehicles in the Asia-Pacific Region. The Meeting was held on June 8 - 10, 1993 in Jakarta.

The Meeting was the second in the series of four meetings to be held under the project DP/RAS/89/057. This one was devoted to the subject of establishing standards and procedures related to the emission control of new motor vehicles.

The main objectives of the meeting were as follows:

1. Development objectives
   a) To initiate, develop and promote the cooperation among countries of the Asia-Pacific Region in the area of motor vehicle emission control and to set up the nucleus of the regional network for the development and promotion of recommendations concerning emission-related standards and policy measures,
   b) To lay down terms for the introduction of common standards and control procedures for motor vehicle emission control for the Region.

2. Immediate objectives
   a) To provide a forum for exchange of experience and information among countries of the Region in the area of new vehicle emission control,
   b) To identify common issues of new vehicle emission control to be dealt with on regional levels and specific issues to be dealt with on country levels,
   c) To assess options for common test procedures and common limit values for individual vehicle categories and to select those which are most appropriate for the Region,
   d) To review the draft "Guidelines for New Motor Vehicle Emission Control in the Asia-Pacific Region" and to adopt its terms.

II. AGENDA

The agenda of the meeting is enclosed in Annex 1.

III. PARTICIPANTS

Participants were:

- representatives of the following countries which have declared their participation or their interest in the project: China, Hongkong, India, Indonesia, Iran, Republic of Korea, Malaysia, Philippines, Singapore, Sri Lanka, and Thailand,
- UNDP/UNIDO staff,
- technical consultants.

The full list of participants is given in Annex 2. The updated list of the national focal points for the project is enclosed in Annex 3.

IV. OPENING ADDRESSES

The Meeting was inaugurated by the Secretary General of the Ministry for Communications, Republic of Indonesia. Introductory speeches were delivered by the Chairman of the Organizing committee, the UNDP Deputy Resident Representative and the UNIDO Country Director.

V. PRESENTATION OF THE CONSULTANT'S PAPER

The UNIDO consultant in Vehicle Exhaust Emission Control presented a paper based on his draft "Guidelines for New Motor Vehicle Emission Control in the Asia-Pacific Region". The presentation was composed of two parts.

The first part included:

- the status of new motor vehicle emission control around the world,
- the status of new motor vehicle emission control in countries of the Region participating in the project,
- detailed information about emission standards and control procedures used in countries leading in the area of motor vehicle emission control: ECE/EC, USA, Japan.

In the second part of his paper, the consultant presented:

- an outline of the motor vehicle emission control system recommended for countries participating in the project, comprising general description of the system and functions of its main components, in particular new motor vehicle control,
- terms for regional cooperation in the area of new motor vehicle emission control,
- actions to be taken on regional levels including common emission standards, common type-approval procedure and reciprocal recognition of type approval granted in

participating countries,
- actions to be taken on country levels,
- detailed proposals for common emission standards for cars and light-duty vehicles, for diesel medium/heavy-duty vehicles as well as for motorcycles,
- prerequisites for the implementation of new motor vehicle emission control in the Region based on the proposed terms, preconditions for the introduction of low-emission standards and impact of the control on the cost.

STATUS OF NEW MOTOR VEHICLE EMISSION CONTROL AROUND THE WORLD

Emission control systems for new motor vehicles currently used around the world are based on standards and procedures developed in the USA, Japan or Europe. These standards and procedures are continually modified and amended in order to adopt them to requirements of environment protection and development of emission reduction technologies.

The standards and procedures used around the world differ in many respects but at the same time have some common points. The main differences lie in applicability, control procedures, severity of emission standards and driving cycles. Common points are usually some elements of test procedures, except driving cycles, e.g. analytical methods and equipment, gas sampling systems.

The current standards lay down requirements with regard to emissions from all main vehicle sources, i.e:

a) exhaust systems (exhaust emissions), the following pollutants being controlled:
   - gaseous emissions (carbon monoxide (CO), total hydrocarbons (HC) and oxides of nitrogen (NO_x)),
   - particulate emissions (PM),
   - smoke (visible emissions),
b) crankcase (crankcase emissions),
c) fuel system (evaporative emissions or losses).

Exhaust emissions of lead and sulphur compounds are controlled by limiting lead and sulphur content in fuels.

The current emission standards fall into two broad categories. They are applicable:
- to new vehicles, or
- for vehicle useful life.

The severity of requirements laid down in individual countries varies very much. An exact comparison is difficult or even impossible because of differences in test procedures. It is to note that the severity of requirements does not depend only on standards. Other factors play also a very important role, e.g. the manner in

which the requirements are enforced (control procedure).

The existing control procedures are formed from the following main elements:

a) vehicle certification or type approval,
b) verification of conformity of production (COP),
c) recall programme.

For many years, emission reduction programmes in the leading countries concentrated on cars equipped with SI engines. They contributed to very fast advances in emission technologies, which, in turn, resulted in the considerable reduction of emissions. Since the end of the seventies the dominant technology for exhaust emissions has become that of three way catalyst combined with electronic engine management.

As a result of continual amendments of exhaust emission legislation in order to adopt it to the progress in technology and vice versa, a current new "high-tech" vehicle emits on the average under test conditions only 5-15% of CO, HC and NO_x amounts exhausted to the atmosphere by its uncontrolled predecessor from the sixties. The progress in terms of the exhaust emission reduction under real driving conditions is lower, but still spectacular.

While the considerable progress in the field of cars has been achieved, it has become more and more evident that the reduction from these vehicles alone is not sufficient to solve the air pollution problems in many areas. Therefore, another main category, medium/heavy-duty diesel vehicles, has been receiving increased attention as a significant source of NO_x and particulates. Up till now no dominant technology has emerged for this category.

TERMS FOR REGIONAL COOPERATION IN THE AREA OF NEW VEHICLE EMISSION CONTROL

Experiences of many countries have shown that the best efficiency of the emission reduction can be achieved if all measures taken up for this purpose are not conducted separately but form a comprehensive and uniform motor emission control system. In such a system the vehicle emission control consists in:

- new vehicle control,
- in-use vehicle inspection,
- fuel quality control.

The system is formed by the following elements:

- legislation empowering competent authorities to carry out control and to introduce emission standards,
- standards (regulations) for new-and in-use vehicles, and standards for fuel quality, specifying limits and test methods,

- control procedures for new-and in-use vehicles, as well as for fuel quality,
- network of test centres and inspection stations,
- supportive and enforcing elements.

In the majority of countries participating in the project, motor vehicle emission reduction programmes do not include all required elements. It applies in the first place to the new vehicle control which is effectively conducted only in a few countries. The most comprehensive and effective is the programme carried out in Korea. As a whole, the Korean programme can be held up as a reference for all countries participating in the project.

It is possible to considerably reduce the emissions by upgrading the current programmes. The control system to be aimed at should be implemented:

a) partly on regional levels in the framework of the cooperation among countries participating in the project,
b) partly on country levels.

The regional cooperation in the area of new motor vehicle emission control should be based on the following common elements of the control programmes:

- common, harmonized emission standards,
- uniform conditions of approval,
- reciprocal recognition of approval granted in other participating countries.

The cooperation among the participating countries based on the above terms will have many advantages for the Region as a whole and for individual countries. In this respect much can be learned from experiences of ECE. Countries applying ECE Regulations, like those of the Asia-Pacific Region, differ very much with regard to conditions affecting emissions. Despite these differences, it has been possible to set up a harmonized control system, including common limit values, test procedures and conditions of approval.

The actions on country levels include the following elements:

- conformity of production verification,
- control of vehicles which are not subject to type-approval,
- other elements if their application is deemed necessary for the reduction of emissions in individual countries.

Two kinds of common standards differing in terms of severity are recommended for the first phase of implementation of regional cooperation:

a) reduced-emission standards,
b) low-emission standards.

The ultimate goal is, however, to introduce low-emission standards for vehicle categories which account for the considerable share of emission in a given country at earliest convenience.

ACTIONS ON REGIONAL AND COUNTRY LEVELS

Irrespective of differences in vehicle population, scope of coverage of current standards etc. priority in all countries participating in the project should be given to the control with regard to emissions from the following categories:

a) vehicles equipped with SI engines:
   - cars,
   - light-duty,

b) diesel vehicles:
   - light-duty,
   - medium/heavy-duty.

Moreover, common standards for motorcycles are of interest for a small group of countries as well.

The Region should not develop its own standards, but use existing ones. It is recommended to adopt the following standards:

Reduced-emission level
- cars and light-duty vehicles: ECE Regulation 83/01 Approval A or US 1973 standards,
- diesel medium/heavy-duty vehicles: ECE Regulation 49/01,

Low-emission level
- cars and light-duty vehicles: ECE Regulation 83/01 Approval B and C or current US standards,
- diesel medium/heavy-duty vehicles: ECE Regulation 49/02,
- motorcycles: current Swiss standards (test method specified in ECE Regulation 40/01) or current US standards.

The following common conditions of type approval in the Region are recommended. The vehicle manufacturer or his representative apply to the competent authority (administrative department) for the approval of a vehicle type with regard to limitation of emissions. The technical service prepares a test report and, if all the requirements, both formal and technical, are met, the competent authority grants the type approval and issues an approval certificate. Every modification of the vehicle type should be notified by the holder of type approval to the authority which approved the type.

The cornerstone of the recommended new vehicle control is that the vehicle should be physically tested in accordance with the agreed procedure in one of the participating countries. The competent authority of such a country communicates the approval (or refusal of approval) to the concerned authorities in all other countries participating in the cooperation. The approval of modifications or the extension of approval should also be communicated in a similar way. Any country participating in the cooperation should not refuse the registration, permit for sale or entry into service of new vehicles on grounds relating to their

emission levels if they are covered by a valid certificate of approval issued in another participating country.

The type approval procedure alone is insufficient to ensure that vehicles entering into traffic comply with the construction requirements. Therefore, all countries are recommended to conduct the verification of conformity of vehicles with the approved type. The procedure specified in ECE Regulations is recommended for this purpose.

PREREQUISITES FOR THE IMPLEMENTATION OF NEW MOTOR VEHICLE EMISSION CONTROL

To implement the effective control of emissions from new motor vehicles, irrespective of whether they are reduced- or low-emission ones, it will be necessary for the majority of countries of the Region to develop:

- administrative services,
- technical services (test centres).

The number one precondition for the introduction of the state of the art emission technologies is the availability of suitable fuels, in particular, but not only, unleaded petrol. This problem will be presented in separate guidelines and reviewed at the next meeting.

Experience with low-emission vehicles collected up till now shows that the potential of the state of the art technology is taken full advantage of if the enhanced in-use inspection is introduced parallelly with the introduction of such vehicles into service. The enhanced inspection is particularly important in the transition period when two grades of petrol, leaded and unleaded, are parallelly available in the market.

The cost of implementation of the new vehicle emission control in line with the recommendations of the present "Guidelines" results from:

a) the setting up and operation of the control structure,
b) increase of fuel production cost,
c) increase of vehicle production cost.

In spite of low-emission technological advances, many countries in the world have only been able to make limited progress in reducing vehicle emission. The main reason for it is the high cost of such technologies. The cost increase is dependent on the initial technological state of a given vehicle. It is to note that in order to meet the current low-emission standards for petrol vehicles, not only the introduction of catalytic converter and λ-probe, but also modifications of the engine itself (e.g. the replacement of carburetors with electronic fuel injection, electronic engine

management) and sometimes even a modification to vehicle body are required. On the average, the introduction of the state of the art technology adds about 5 - 15% to the production cost of vehicles depending on their size. On the other hand, however, the above modifications not only reduce emissions, but give better overall vehicle performances, lower fuel consumption included, better reliability and higher durability of components and vehicle as a whole.

The consultant's paper is not enclosed to this report as it was distributed to the participating countries in April, 1993.

VI. PRESENTATION OF THE COUNTRY PAPERS

The country papers were presented by country representatives. They were concentrated on the following topics:

- current status of particular countries with regard to new vehicle emission control and future plans in this area,
- traffic conditions in their countries and representativeness of existing driving/operating cycles,
- views on regional cooperation in the area of new vehicle emission control, its advantages and precondition for implementation.

The country papers are listed below in the order in which they were presented, all papers being enclosed as Annexes.

1. China

   Title:
   The Vehicle Emission Control in China.

   Presented by:
   Mr. Song Nai Yang
   Beijing Automotive Research Institute.

   (Annex 4)

2. Hong Kong

   Title:
   Vehicle Emission Control in Hong Kong

   Presented by:
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   Vehicle Emission Control Section
   Hong Kong Environmental Protection Department.

   (Annex 5)

3. Malaysia

Presented by:
Radzuan Nong
Assistant Director
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(Annex 6)

4. Korea

Presented by:
Mr. Ju-Sop Cho
Deputy General Manager
Engineering Center
Ssangyong Motor Company

(Annex 7)

5. Philippines

Presented by:
Mr. Juan A. Magarro Jr.
Executive Director, LTO Region V

(Annex 8)

6. Singapore

Title:
Vehicular Exhaust Emission Standards
and Certification System in Singapore.

Presented by:
Mr. Ng Yook Koong
Head, Vehicle Engineering Division
Registry of Vehicles

(Annex 9)

7. Sri Lanka

Presented by:
T.L. Peiris
Assistant Commissioner
of Motor Traffic Sri Lanka

(Annex 10)

8. India

Presented by:
Mr. N. Bagchi
Director, Ministry of Environment Government of India
New Delhi

(Annex 11)

9. Iran

Title:
General View of Motor Vehicle Inspection for Emission Control in Teheran/Iran.

Presented by:
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Teheran Traffic Control Center

(Annex 12)

10. Thailand

Presented by:
Mr. Suvidh Voravisuthikul
Director, Transport Engineering Division
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(Annex 13)

11. Indonesia

Presented by:
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Head of Sub Directorate General of Land Transportation
Ministry of Communications

(Annex 14)

VII. DISCUSSIONS ON SELECTED TOPICS

The Meeting selected for discussion the following topics concerning the new motor vehicle emission control:

1. Operating cycles and test procedures for diesel medium/heavy-duty vehicles applied around the world and their suitability for the Asia-Pacific Region.
2. Driving cycles and test procedures for cars and light-duty vehicles applied around the world and their

suitability for the Asia-Pacific Region.

3. Conditions of motor vehicle type approval with regard to emissions and reciprocal recognition of type approval on the basis of bilateral and multilateral agreements.

It was generally agreed that countries of the Region should adopt one of the existing operating/driving cycles and test procedures and should not develop special ones as any cycle can not fully represent the real driving conditions. A view was shared that the harmonization of emission standards for new vehicles has many advantages for participating countries. The common standards for the above mentioned vehicle categories were identified as the cornerstone for regional cooperation in the area of motor vehicle emission control.

The outcome of the discussions was used for the review of the draft "Guidelines for New Motor Vehicles Emission Control in the Asia-Pacific Region".

VIII. REVIEW OF THE DRAFT "GUIDELINES" AND ADOPTION OF ITS TERMS

The Meeting reviewed in great detail the draft "Guidelines for New Motor Vehicle Emission Control in the Asia-Pacific Region" prepared under the project. The particular attention was paid to the following topics:

- terms for the regional cooperation in the area of new motor vehicle emission control,
- actions to be taken on regional and country levels,
- proposals for common emission standards for different vehicle categories,
- prerequisites for the implementation of comprehensive new motor vehicle emission control in the Region.

The Meeting recommended to introduce to the draft "Guidelines" several amendments of editorial character. Moreover, some countries (Korea, Thailand, Malaysia) updated information concerning their standards. The Meeting adopted the amended version of "Guidelines".

IX. VENUE OF THE NEXT MEETING

The next meeting to be held under the project will be devoted to motor fuel and lubricant specifications for low emissions. This Meeting was informed that the possibility of hosting the next meeting in Beijing in March 1994 is now under consideration at the national focal point for China. The venue of the next meeting will be confirmed at a later date.

The Meeting was informed that in order to strengthen the cooperation within the regional network on motor vehicle emission control set up in the framework of the project, the main focal

point, Korea Institute of Science and Technology (KIST), would issue a newsletter devoted to activities in the Region in the area covered by the project. In this connection, all national focal points are requested to inform KIST about activities in their respective countries with regard to motor vehicle emission control, e.g. changes in regulations, new standards for new- and in-use vehicles or for fuels, new test methods, works on alternative fuels, setting up of emission laboratories, new equipment for emission measurement, changes in vehicle taxation, incentives for the introduction of low-emission vehicles etc.

X. RECOMMENDATIONS

1. The "Guidelines for New Motor Vehicle Emission Control in the Asia-Pacific Region" prepared under the project should form a basis for the implementation of increasingly stringent new motor vehicle emission standards and comprehensive control procedures in the Asia-Pacific Region.

2. It is desirable to considerably reduce the emissions by upgrading new vehicle emission control. To this end, the regional cooperation in the area is required. The cornerstone of the cooperation should be common, harmonized emission standards.

3. A number of technical centers capable of full type approval testing should be upgraded to act as centers of excellence for the training and proliferation of expertise in the area of motor vehicle emission control.

4. Communication within the regional network between the main focal point and individual national focal points as well as between the national institutions dealing with motor vehicle emission control should be strengthened.

AGENDA OF EXPERT GROUP MEETING ON TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

Tuesday

June 8, 1993

1. Registration

2. Opening Session

   a. Introductory speech by National Organizer, Mr. M. Yusuf.

   b. Address of UNDP Deputy Resident Representative, Mr. Anders O. Frismark.

   c. Address of UNIDO Country Director, Mr. Fernando Z. Vicente.

   d. Inauguration of the Meeting by the Secretary General for the Ministry of Communication, Mr. Muchtarudin Siregar.

3. a. Election of Chairman and Raporteur

   b. Adoption of Agenda

4. Presentation of draft "Guidelines" by UNIDO Consultant

   Part I : Status of new motor vehicle emission control.

   Part II : New motor vehicle emission control system for the region.

5. Presentation of country papers by participants

Wednesday

June 9, 1993

1. Presentation of Country papers by participants (cont'd)

2. Discussion on selected topics.

3. Review of the draft guidelines and adoption of their terms.

4. Venue of the next expert group meeting and its agenda.

5. Review of recommendations and conclusions for the final report of the meeting.

Thursday

June 10, 1993

1. Technical visit

   Visit to motor vehicle inspection center, Bekasi - Indonesia

2. Closing session

   Closing Remarks by :

   - Chairman of the meeting.
     Mr. Hans Seidel
   - UNIDO Country Director,
     Mr. Fernando Vicente
   - Director General for Land Transport, represented by Director of Land Transport Safety and Means Engineering, Mr. Muhammad Yusuf

Annex 2

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Expert Group Meeting on Type Approval Procedures for New Vehicles

Country Paper
The Vehicle Emission Control in China

1. The review of the current status of China with regard to new vehicle emission control and future plans

The emission from motor vehicle had not been paid attention to until 1970s in China. The domestically manufactured automobiles in China was emission uncontrolled. Two important components, which significantly influence the emission level, carburetor and distributor are of bad quality. The air/fuel ratio and ignition timing are dispersed. So both the fuel consumption and idle exhaust concentration are very high.

In 1980s, China began to import several types of automobiles from developed countries, such as Santana, Cherokee, Daihatsu etc.. These types of automobiles, either emission uncontrolled or controlled one, are not installed emission control devices because there are no emission regulations in China. However since these imported models of automobiles have good production quality and good combustion efficiency, both the fuel consumption and emission concentration at idle speed of those vehicles are quite low.

Thus it can be seen that to control vehicle emissions in China those domestically manufactured automobiles should either improve the basic performance and production quality, or give up those old automobile models to meet the first step emission control requirement, i.e. Exhaust Emission Standard at Idle Speed.

The second step, both domestically made and imported models of vehicles must meet the Crankcase Emission Standard and the Evaporative Emission Standard.

The third step, light-duty vehicles must meet the limits from ECE 1503 Regulation by using the measurement method from ECE 1504 Regulation. Then we will basically put the vehicle under the emission regulation control.

After this, we will make the emission standard more stringent step by step, and import relevant mature control technology from developed countries, from simple to complecated according to the principle of being reasonable in both technology and economy.

For gasoline vehicle the control measures we will take are as follows:

(1) Improve the basic performance and quality of carburetor and distributor. If necessary we will import the carburetor from developed countries, and make the accuracy of air/fuel ratio within 8%. This measure will make the fuel consumption and emissions decrease 30 percent, so it is very important one.

(2) Remove the crankcase pollutants by PCV system.

(3) Reduce the evaporative pollutants from fuel supply system by evaporative emission control system.

(4) Install emission control devices or components on carburetor, such as automatic choke, fast idle mechanism, throtle positioner, etc..

(5) Develop ignition systems which are either contact-assisted with low amperage, or contact-less with high amperage, and a reasonable ignition timing.

(6) Introduce EGR for decreasing the NOx when the road condition improved and vehicle average speed increased.

(7) Introduce the fuel injection technology.

(8) Introduce three-way catalystic converter technology.

For automobiles with diesel engine the control measures we will take are as follows:

(1) Decrease the smoke measured by filter smoke-meter at free acceleration and full load.

(2) Decrease the smoke measured by opacity smoke-meter at free acceleration and full load.

(3) Decrease the NOx.

(4) Decrease the particulates.

Most of the above technology is very mature in developed countries. In fact what we should do is to choose them reasonably according to the environmental requirement and economy condition of China.

2. The brief introduction about National Emission Standards of motor vehicle in China

From the end of 1970s, we began to set emission standard for motor vehicle. According to China's condition, we put forward a plan as follows:

For vehicles with petrol engines, the first step is the emission standard for pollutants at idle speed. The second step is the emission standard for controlling crankcase pollutants and evaporative

emissions. The third step is the emission standard for exhaust pollutants from light-duty vehicle with mass measurement method. If the condition permits, we will set the emission standard for exhaust pollutants from heavy-duty vehicles. Finally, transforming the only concentration measurement method into both concentration & mass measurement method.

As for vehicles with diesel engines, in an apropriate period we mainly control the smoke at free acceleration for vehicles and the smoke at full load for diesel engines.

According to this emission control technical line, we issued a number of emission standards in 1988. They are:

(1) Emission standard for pollutants at idle speed from road vehicle with petrol engine.

(2) Measurement method for pollutants at idle speed from road vehicle with petrol engine.

(3) Emission standard for smoke at free acceleration from road vehicle with diesel engine.

(4) Measurement method for smoke at free acceleration from road vehicle with diesel engine.

(5) Emission standard for smoke at full load from diesel engine.

(6) Measurement method for smoke at full load from diesel engine.

At the same time, we developed the relevant instruments and equipments, i.e. NDIR portable analyzer and filter type smoke-meter. Since these two kinds of instruments are not very complicated, now they are mass-produced and very popular in China.

At present, there are idle speed emission inspections at the ends of assembly lines for every gasoline vehicle and free acceleration smoke inspections at the ends of assembly lines for some of diesel engine vehicles.

The EPA system places the auto factories under surveillance by using idle speed emission standard and free acceleration smoke standard. The Ministry of Public Security places the in-use vehicles under serveillance at year inspection, road side inspection and spot check by using these two standards also. In China the EPA directly manages the auto factories in vehicle emission control field.

The results of implementation of these emission standards are as follows:

(1) Force the auto factories to improve the basic quality of carburetors and distributors. Some factories even improved the backward combustion chamber.

(2) Promote the auto user to take good care of their cars and trucks. Some local governments established a network for I/M program and keep the automobile in good conditions.

The implementation of the smoke standard has got the similar results:

(1) Auto factories make great effort to improve the combustion chamber and fuel supply system.

(2) More attention were paid to the maintenance and repair of the in-use vehicles.

We have made great progress through implementation of the standards mentioned above. In 1993 we changed the limits of these standards and made them more stringent.

In the revision of"Measurement method of pollutants at idle speed from road vehicle with petrol engine", we entirely follow ISO 3929 adding a measuring point at raised idle speed. Our experiments have proved that inspecting the emission of this point is very useful not only for the vehicles with the catalystic converter but also for the vehicles without catalystic convertor. Specially for in-use vehicle the test at

raised idle speed point can show the reason of high emission at low and midle speed when the fuel orifice wired seriously. Through the measurement of the emission at the raised idle speed point (the position of throttle edge is just at the transfer port, and the air/ fuel ratio can not be adjusted at this point) we can judge if the fuel orifice wired seriously or not. This work is very useful for solving severe emission problem in the urban area, the significance of which is more than of the idle speed point.

As we analyzed above, we think that these two short tests are very important for the developing countries like China.

In 1989, we issued a mass emission standard for light-duty vehicle, i.e. "Emission standard and measuring method for exhaust pollution from light-duty vehicle". This standard adopts the measuring method of ECE 1504 Regulation and the limits of ECE 1503 Regulation(multiply the limits of HC by factor 1.83) . The instruments and equipments which this standard uses are too expensive and too complicated, therefore until now this standard have not been put into practice. In 1993 we are going to issue another emission standard, i. e. Evaporative emission standard from road vehicle with petrol engine and its measurement method by trap. The limit for LDV will be 2 g/test after July 1, 1995. The limit for HDV will be 4 g/test after July 1, 1996. A test includes 1 hour diurnal breathing losses plus 40 minutes running losses plus 1 hour hot soak losses.

Considering the chassis dynamometer is too expensive and not very popular in China (even a lot of auto factories haven't had it) , our standard stipulates that the test may be done on an engine bench instead of chassis dynamometer. In that case, it is necessary to connect the fuel supply system talling with actual vehicle situation. We can get the same effect on an engine bench as on a chassis dynamometer:

(1) The fuel tank must be sealed and be able to stand certain

pressure, so we will remove the evaporative losses from fuel tank.

(2) The carbureter must remove the hole on the float chamber, through which the vapor passes into the air. This is the best way to decline the evaporative emissions from float chamber. If we introduce the fuel injection system there will be no evaporative emissions from fuel supply system.

According to the Evaporative Emissions Standard, on July 1, 1996 the problem of evaporative emissions will be solved thoroughly, so the HC will be declined about 20 percent. We think that the SHED method is not suitable for developing countries since the equipments are too expensive and too complicated specially for heavy-duty vehicles.

In order to put the mass emission standard into practice, we have bought several measuring instruments & equipments recent years having spent plenty of foreign exchange. It is impossible for developing countries to buy a lot of so expensive meassuring equipments spending much foreigh exchange. So we imagine that on one hand, we make a management system which can only use a few measuring equipments to control all auto factories, on the other hand we develop a simpler measuring equipments conforming with the EPA or ECE Regulations. Then we will progressively make them more automatically and more scientifically. In this field we hope to have a coorperation with other developing countries.

Mass emission measuring method is the most difficult but the most important. Without it we can not know how the matter stands, and how the air pollution contributed from vehicle, therefore we can not set reasonable emission standards, and can not evalue the emission level of the vehicle either. In this respect we just start the work and have no mature experience so we hope to have a wide coorperation with other countries.

3. Communications in China and the driving cycles of the vehicle

The status of China's communications is that: the roads are not encugh, and all kinds of vehicles and people travel mixedly on the roads, so the average speed of the vehicle is very low. Along with the vehicle population increasing rapidly, the average speed of vehicle in the urban area is going to decrease day by day. So we should use a driving cycle with low average speed. We think ECE 1504 15 mode maybe is a suitable one (its average speed is about 19 km/h).

Based on the reason above, as first step, we decided to use ECE 1504 15-mode. In recent years, the road traffic construction is developing very fast along with the economy reform and the open door. It is the key point to develop separated super highway in the urban area, and express highway between cities. As a result, the average speed of vehicles will increase year by year. We plan to take EPA FTP75 as the driving cycle when the average speed reaches 35 km/h. The main reasons that we take the ECE or EPA driving cycles are:

(1) Any driving cycle can not represent the real driving conditions of any cities.

(2) It will be very convenient for international exchange, when most of the countries harmoniously take the same driving cycle.

(3) In fact most of the countries in the world have taken these two driving cycles.

4. The formulation and practice of national emission standards of motor vehicle

According to China's experience, we must pay great attention to several points as follow . when we work out the emission standards and make them into practice.

(1) The formulation of the emission standards must be done by the government department, which can represent the benefit of nation and environment. This work must not be done by a department or a group, which mainly stands for the economic benefit of auto factories.

In China, the amount of emission standards of motor vehicle are not complete and the limits of these standards are quite lenient, because the automotive manufacture system dislikes any emission standards and made influence on them. As a result, for many years, the emission condition of the vehicle produced in China are improved quite slowly. At present, this situation is being changed, through the effort of EPA of China.

(2) In China, The EPA is the authority of the emission control of motor vehicle. Without powerful EPA, the vehicle emission control in China is very difficult into a right way. So we hope there will be a lot of exchange among EPA of China and the goverment department (which manage the vehicle emission affairs) from other countries. Specially, we hope the United Nation support the EPA of China on this field.

(3) In China the local EPA are in charge of actual practice of the vehicle emission control. So we must strengthen the trainning to them that they could make the practice correctly. In the past we did a lot of the trainning work, but still we ought to do more.

(4) The environment is a global problem. The cooperation among countries is very important. We sincerly hope that there will be an

organization in Asia-pacific area, similar to ECE in Europe, which will be very convenient & beneficial for exchanging experiences, promoting vehicle emission control affairs each other, simplifying the procedure of trade.

5. Conclution

(1) For effectively controlling the emission from motor vehicle, it is necessary to set a complete emission standards by the EPA of China(noted: not by others).

(2) For making the standards reasonable, it is necessary to research on the contribution to the air pollution from motor vehicle.

(3) For making the emission control technology reasonable, it is necessary to work out a series scientific technical policy and line.

(4) For monitoring and evaluating the emission level from motor vehicle, it is necessary to establish emission laboratories.

(5) For incorporating other countries' experience in controlling vehicle emission, it is necessary to strengthen the exchange and cooperation among internations.

COUNTRY PAPER
VEHICLE EMISSION CONTROL IN HONG KONG

UNIDO
United Nations Development Programme

Presented to the Expert Meeting on
Type Approval Procedure for New Vehicles
8-10 June 1993, Jakarta, Indonesia

Presented by : Mr. Kong Ha
Vehicle Emission Control Section
Hong Kong Environmental Protection Department

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Attachments :

- Charts and tables

Country Paper. Hong Kong EPD

1. Summary

This country paper briefly describes the vehicle emission related air quality problems experienced in Hong Kong.

The current control status, both regulatory and enforcement issues, are also described. Special emphassis will be put on present and future new vehicle emission standard and type approval requirements.

The most pressing problems of particulate and NOx pollution are identified. Short, intermediate and long terms draft strategies are laid out in this paper. Draft 1995 and 1998 emission standards are proposed to tackle the problems.

2. National Focal Point

In relation to the matters of vehicle emissions with respect to legislations, policies and controls, the national focal point for Hong Kong is:

Mr. Kong HA
Senior Environmental Protection Officer
Environmental Protection Department
33/F, Revenue Tower,
5 Gloucester Road,
Wan Chai,
Hong Kong.

Country code: 852
Tel: 594 6414
Fax: 827 8040

3. Organisation Chart

The Vehicle Emission Control Section of the Hong Kong Environmental Protection Department is responsible for the matters of formation of policies, development and introduction of control technologies and implementation of emission control program. The section is headed by a Senior Environmental Protection Officer, and assisted by 3 Environmental Protection Officers and a team of 15 technical and clerical supporting staff.

The work of the section is divided into three major areas:

1) Policy and development of emission control strategies and legislation, including standards on fuel properties and vehicle emission;

2) Technical services and introduction of new technologies in vehicle emission control, including applications on new and in-use vehicles;

3) Enforcement of in-use diesel vehicle smoke regulation.

The senior officer reports to the Principal Environmental Protection Officer, head of the Air Services Group, who reports to the Assistant Director of the Air and Noise Division, AD(AN). AD(AN) is held responsible by the Director of Environmental Protection.

Draft policies will be put forward to the Policy Branch of Planning, Environment and Lands for decision making.

(See attachment chart 1)

4. Control of Air Borne Emission from Motor Vehicles - List of Related Ordinances and Regulations

Automotive Fuels

Fuel Type	Effective Date	Regulations/Ordinance	
Unleaded Petrol	Apr 1991	Air Pollution Control (Amendment) Ordinance 1991	*
Diesel	Proposed 1995 & 98	Draft proposed specifications	

Emission Standards (Newly Register Vehicles)

Present : Air Pollution Control (Vehicle Design Standards) (Emission) Regulations 1991 *

1995 : Draft Emission Standards for Heavy Duty Vehicles, 1st phase

1998 : Draft Emission Standards for Heavy Duty Vehicles, 2nd phase

Emission Standards (In-use Vehicles)

Present : Road Traffic (Construction and Maintenance of Vehicles) Regulations *

1995 : Draft In-use Emission Standards for ALL Vehicles

Inspection of In-use Vehicles

Present : Road Traffic (Amendment) Ordinance 1991 *

*(These documents in gazette form are available from the nation focal point)

Our regulations reflect that the approach we are taking is technology complying, not forcing. However in future EPD will not be too far behind from the most advance applicable technology.

5. Vehicle Classifications in Hong Kong

(Ref: Road Traffic (Construction & Maintenance of Vehicles) Regulations

Class	Maximum Passenger Seating Capacity	Maximum Gross Vehicle Weight (kg)
Passenger Carrying Vehicles :		
Private Car	7	3,000
Taxi	5	3,000
Public/Private Light Bus	16	4,000
Public/Private Bus	17+	24,000
Goods Carrying Vehicles :		
Light Goods Vehicle	5	5,500
Medium Goods Vehicle	5	24,000
Heavy Goods Vehicle	5	38,000

6. Status of Control of Vehicular Emissions in Hong Kong

1) Petrol engined vehicles (new)

Under the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations 1991, Cap. 311 of Law of Hong Kong, all petrol engined vehicles registered on or after 1.1.92 must use unleaded petrol.

The regulations also lay down the design standards of passenger cars and light duty vehicles below 2500kg GVW to conform to the US and/or Japanese emission standards.

2) Diesel engined vehicles (new)

Under the aforementioned regulation the design standards of passenger cars and light duty vehicles below 2500kg GVW are required to conform to the current US and/or Japanese emission standards.

The aforementioned regulations are being amended to incorporate the emission standards of the EEC directive 91/441/EEC.

3) Unleaded petrol specifications

Unleaded petrol of Hong Kong, as defined in the Air Pollution Control Amendment Ordinance, is of minimum RON and MON of 95 and 85 respectively. Lead content is limited to maximum of 0.013 g/L.

4) Diesel Fuel specifications

There is no specific regulation for automotive diesel but under the Air Pollution Control (Fuel Restriction) Regulation 1990, Sulphur is limited to 0.5% by weight for industrial diesel. Since only one grade of diesel fuel is available in Hong Kong, the automotive diesel in the market is similar to the industrial specification. In general the sulphur content is between 0.3% to 0.4%.

5) In-use vehicles

Under the Road Traffic (Construction and Maintenance of Vehicles) Regulations of Hong Kong, vehicle emitting excessive smoke is illegal. The regulation defined excessive smoke as 60 HSU as tested by Hartridge Mark 3 smoke meter.

Hong Kong Environmental Protection Department is running a spotter program where some 450 trained volunteers will report smoky vehicles spotted to the enforcement agency. In 1988 the program started to test smoky vehicles by one testing centre operated by Environmental Protection Department alone. The testing capacity was then expanded by adding designated private testing centers in 1991. Currently there are 20 such private centres.

Data of the reports received from spotters would be verified by comparing with the vehicle register via a computer link. Incorrect data or vehicles under action by the authority would be screened out. Typically the wastage rate is about 40%.

An emission testing notice would then be issued according to the actionable reports. The notices are sent to the registered owners of vehicles concerned by registered mail. At the same time a computer code will be added to the vehicle register to prevent vehicles under action from licence renewal or transfer. The notice will require the vehicle owner to correct any defect of the vehicle and have it presented to any one of the 20 designated centres for emission testing.

A limited time period (currently 18 days from the date of notice) would be given to the owners to obtain an emission certificate of compliance from the testing centres. Owners whose vehicle failed to comply to the HSU 60 standard or fail to present the vehicles for testing, would result in the vehicle licences being cancelled.

For 1992, 68,974 reports were processed, resulted in 46,132 Emission Testing Notice being issued and 45,926 vehicle tests.

7. Emission Limit and Test Procedure for Individual Vehicle Categories

Emission standards for motor vehicles registered in Hong Kong on or after 1 January 1992.

Vehicle Class	Emission limits [g/km]				Test Method
	CO	HC	NOx	PM	
Cars/Taxi (Petrol)	2.10 2.70	0.26 0.39	0.63 0.48		US FTP 75 Japanese 10-mode
Cars/Taxi (Diesel)	2.10 2.70 2.70	0.26 0.62 0.62	0.63 0.72(a) 1.26(b)	0.12	US FTP 75 Japanese 10-mode
Light bus or goods vehicle 1700kg or less (Petrol)	6.20 2.70	0.50 0.39	0.75 0.48		US FTP 75 Japanese 10-mode
Light bus or goods vehicle 1700kg or less (Diesel)	6.20 2.70	0.50 0.62	0.75 1.26	0.16	US FTP 75 Japanese 10-mode
Light bus or goods vehicle 1700-2500 kg (Petrol)	6.20 17.00	0.50 0.70	1.10 0.98		US FTP 75 Japanese 10-mode
Light bus or goods vehicle 1700-2500 kg (Diesel)	6.20 0.80	0.50 6.70	1.10 3.50(c) 5.00(d)	0.28	US FTP 75 Japanese 10-mode (e)

Notes for the table :

a) vehicle curb weight of not more than 1265 kg,
b) vehicle crub wight exceeding 1265 kg,
c) indirect injection engines,
d) direct injection engines,
e) limits expressed in ppm.

Motor vehicles above 2.5 tonnes are to conform to one of the following standards :-

- vehicles equipped with petrol engines: ECE regulation 15/00, EC Directive No. 70/220/EEC or 74/290/EEC, or Austrialian Design Rules No. 27 or 27A.

- diesel vehicles (smoke level): British Standard BS AU 141a, 1971, ECE Regulation 24/00, EC Directive No. 72/306/EEC or Australian Design Rule No. 30.

8. Enforcement Procedures for New Vehicle Categories

In Hong Kong, no vehicle is allowed to run on a road unless it is registered and licensed.

Registration, which is normally a once-only operation, means giving the vehicle a registration mark and assigning it into appropriate class, e.g. private car, light goods vehicle, etc. Licensing, which is annually or four-monthly, conveys the right for a vehicle to be driven on a road. A local motor vehicle agent usually applies for registration and licensing of a vehicle on behalf of its client. However, if a person imports a vehicle, he has to do the job himself.

If a person wishes to register a vehicle which he has imported into Hong Kong, he must apply to the Transport Department on the prescribed form together with relevant documents. With respect to emission aspects, Transport Department will check against the vehicle emission standards laid down in the Air Pollution Control (Vehicle Design Standards) Emission Regulations 1991.

The provisions apply to vehicles first registered in Hong Kong on or after 1 January 1992, whether new or used. These vehicles must be either type approved or individually certified by Transport Department.

An application for type approval should comprise, among others, emission documentation including:

- certificate of compliance of vehicle emission standards,
- description of vehicle and engine,
- emission test report,
- diagrams of emission control system, exhaust system and additional anti-pollution devices.

Certificates of compliance issued either by an authorized motor vehicle emission testing laboratory or by an authority vested to grant the approval by a national or international body are accepted.

For vehicles, e.g. used imported ones, which have not been type-approved in Hong Kong, individual emission testing is required. A certificate of compliance issued by testing laboratory approved by Transport Department is accepted. This certificate should state the following :-

- make, model, vehicle identification number and engine number,
- method of testing (US FTP 75 or Japanese test),
- test resuslts.

There are no motor vehicle emission testing facilities in Hong Kong at present, therefore the documentary evidence issued by foreign laboratories or authorities must be produced.

On registration of a vehicle, the Transport Department will issue a registration mark and a registration document containing particulars of the vehicle to the registered owner.

9. Some Background of Air Quality in Hong Kong

Background of local air quality in relation to vehicular emissions

Ambient air quality objectives (AQOs) are being implemented in Hong Kong which are of similar stringency as in the US. (Table 2)

Among the pollutants being specified, the Total Suspended Particulates (TSP), Respirable Suspended Particulates (RSP) and Nitrogen Dioxide (NO2) are of concern. In urban areas, the TSP and RSP level are consistently exceeding their respective AQOs while the NO2 level is at the marginal level. It was estimated that vehicular emission contributed approximately 75% of both particulate and nitrogen oxides (NOx) emissions and, thus, are the major source of pollution.

Further information can be obtained from the Principal Environment Protection Officer of the Air Services Group of the Hong Kong Environmental Protection Department.

10. Fleet Population and Vehicle-kilometre Travel

(See attachment figures 3 & 4)

The city state of Hong Kong is a dense development comprising residential, commercial and industrial activities. In most places, situations of mixed goods and passenger transports can be found. The situation is even worse with the "old towns" where traffic flow volume, passenger and goods embarkment are difficult to manage in terms of minimizing emission from vehicles and its impact on people in the area.

The terrain of Hong Kong varies significantly, with high rise buildings along main roads, forming typical street canyons. Dispersion modeling on situations like this is difficult, and, although new town planning being exercised is improving the air pollution impacts on people, such benefit is not shared by the people living in the old towns.

11. Estimated Tonnage of Emission from Motor Vehicles

Trend of pollutant emission from motor vehicles

It is estimated that by 2010, there would be some 107% and 77% increase in particulate and NOx emission as compared with 1992 level due to the expected increase in traffic volume. (See figures 5 & 6)

Figures 7 & 8 shows the breakdown of the vehicular particulate and NOx pollutant contribution by class for 1992 and 2011. It can be observed that goods vehicles and buses are the major contributors and they are primarily Diesel engined vehicles.

With the expected growth in traffic volume, the situation will get worse and hence the "at source" control of vehicular emission is a must as a solution to improve air quality of Hong Kong. This requires stringent control on emissions from new and in-service vehicles.

Of course one should not ignore the important role of proper planning on transportation arrangements in the areas of demand, utilization, routing etc. not only to minimize the impact of emission on the environment, but also to emit as little pollutant as possible to assist the global environment.

12. Short, Intermediate and Long Term Solutions to Tackle Vehicle missions

Short, intermediate and long term control strategy proposals

See chart 9.

All the light duty petrol vehicles would be regulated using the most stringent standards feasible.

A program to upgrade the medium and heavy duty Diesel vehicle regulations is being formulated in the draft proposal aiming at US standards or equivalent of 0.6 g/bhp-hr particulate and 6 g/bhp-hr NOx standards by 1995 and 0.1 g/bhp-hr particulate and 5 g/bhp-hr NOx standards by 1998. The phase 1 and 2 of European

standard (91/542/EEC), commonly known as Euro 1 and 2, will also be adopted for 1995 and 1998. Feasibility of accelerated program for urban buses to advance the 98 standard to 96 is also being considered.

In parallel with the Diesel program, the required low sulphur Diesel fuel supply is under negotiation with the oil industry targeting at 0.2% by 1995 and 0.05% by 1998. The objective is to have low sulphur fuel standards set in parallel with the requirements of particulate emission standards.

The draft may also propose all new vehicles be required to carry emission warranty. The warranty may form the foundation of implementing in-use emission standards and inspection and maintenance programs.

13. The Way Forward

The discussion above had unfold the problems of smoke nuisance, particulate and NOx pollution in Hong Kong.

The analysis has en-visioned the primary objective of the Vehicle Emission Control Section to enact on the "at source" control of vehicular emissions.

Heavy duty vehicles, whom were identified to has contributed majority of urban air pollutions, must relay on the medium and long term strategies in introducing the world most stringent emission standards and best available control technology for Hong Kong.

Standards for light duty petrol vehicles will be kept upgrading as long as it is required. The development in transitional low emission vehicles (TLEVs), low emission vehicles (LEVs) and the zero emission vehicles (ZEVs) would then become the backbone of our control tools.

An emission warranty would be required for all new cars, which would define the responsible parties and liabilities, coupling with an I&M program would keep the deterioration of petrol vehicle to a minimum. Such approach would become the future shape of our in-use vehicle emission control.

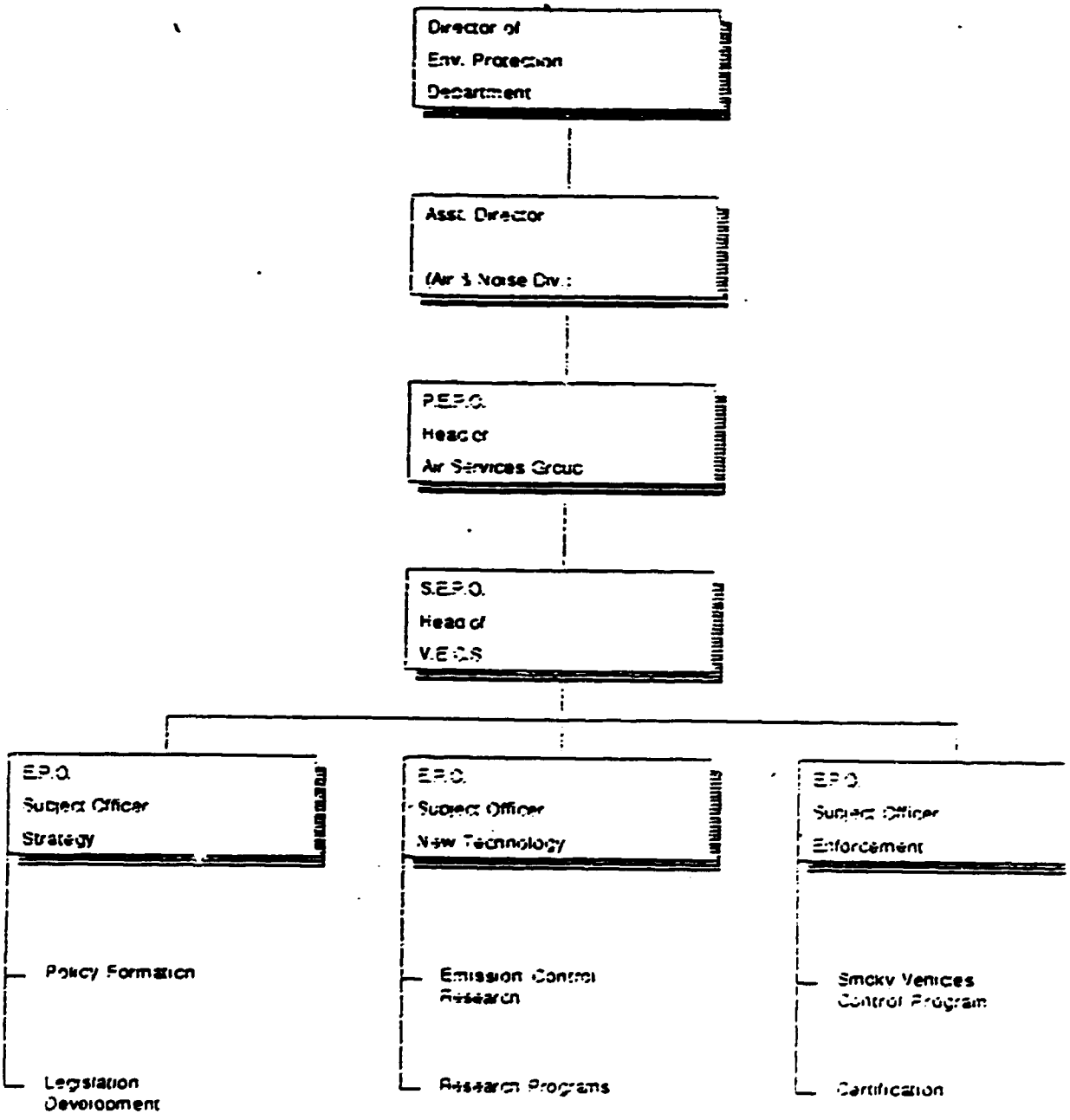
While there is little development in light duty Diesel emission control technology worldwide, our targeting classes of vehicles such as taxis and light buses may have an unknown future. Until there is a clear indication or break through of real possibility of smokeless as well as odorless light duty Diesel vehicles, we will keep working on the strategy of reduce reliance on light duty Diesel vehicles, which may include a forced shift to alternative fuels.

14. Comments on the Guildelines for New Motor Vehicle Emission Control in the Asia-Pacific Region

Hong Kong Environmental Portection Department is proposing adoption of Euro 1 standard (approximately equivalent to US90) starting 1995. From 1998, adopting of Euro 2 standard (approximately equivalent to US94) is being considered.

END

Organisation Structure of Hong Kon Environmental Protection Departmer on Vehicle Emission Control



V.E.C.S. - Vehicle Emission Control Section
PEPO/SEPO - Principal/Senior Environmental Protection Officer
EPO - Environmental Protection Officer

CHART

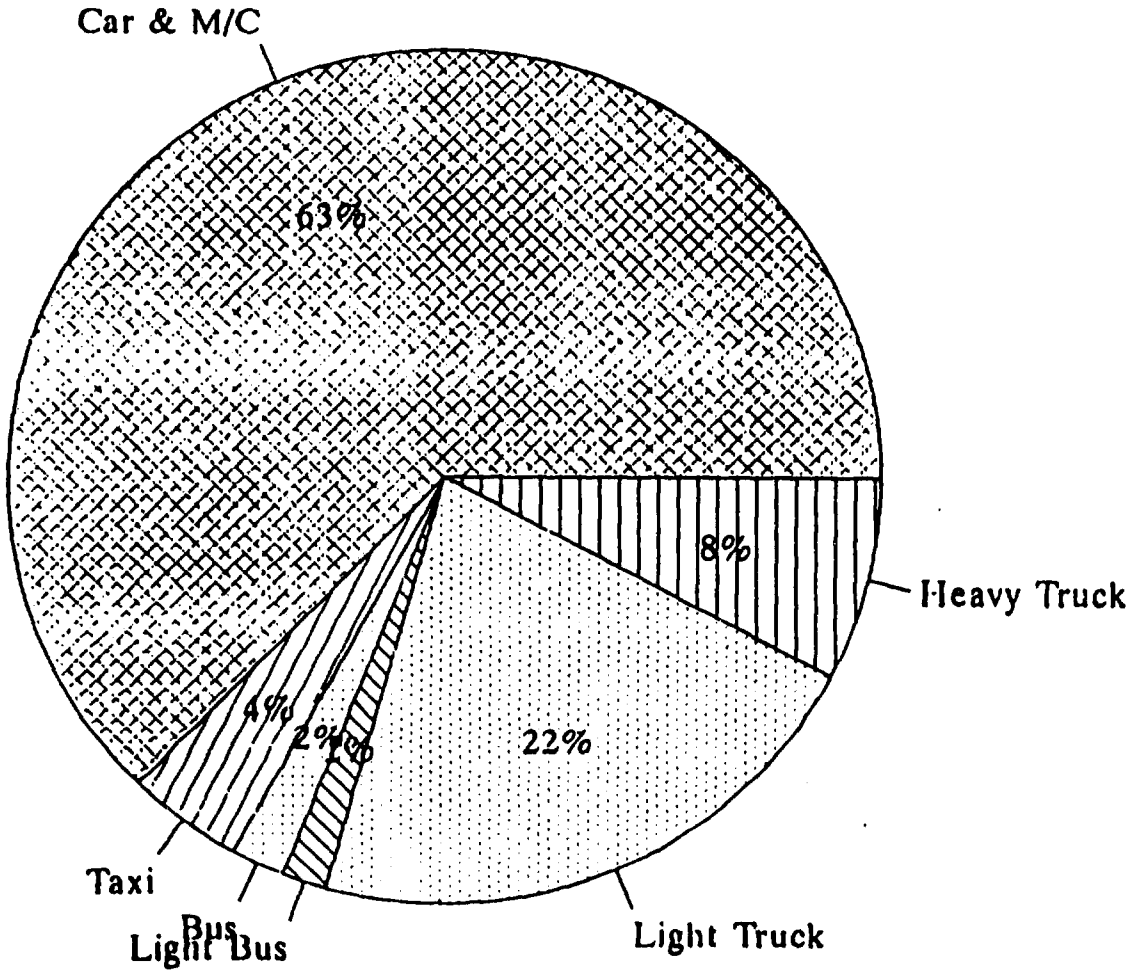
Air Quality Objectives of Hong Kong

Pollutant	1 hour	6 hours	24 hours	3 months	1 year
-Sulphur Dioxide (SO2)	800	-	350	-	80
-Total Suspended Particulates (TSP)	-	-	260	-	80
-Respirable Suspended Particulates (RSP)	-	-	180	-	55
-Nitrogen Dioxide (NO2)	300	-	150	-	80
-Carbon Monoxide (CO)	30000	10000	-	-	-
-Ozone	240	-	-	-	-
-Lead	-	-	-	1.5	-

Table 2

All Units in micro gram per cubic metre

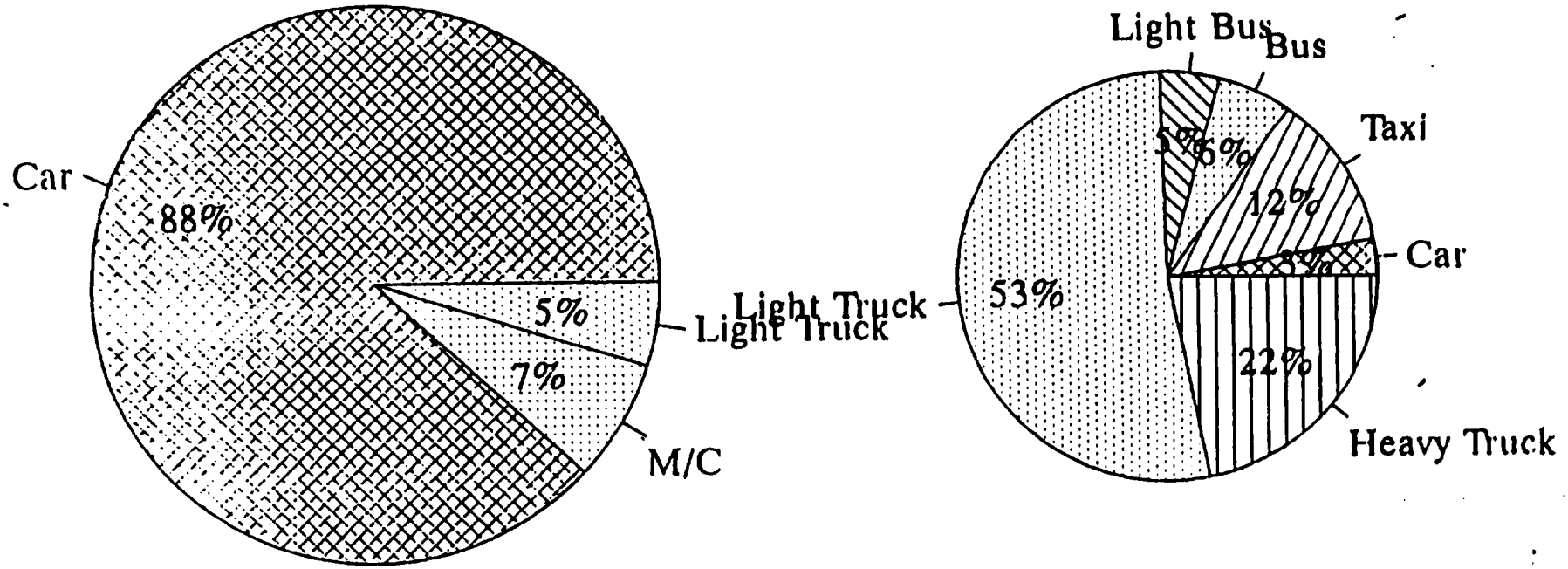
Number of Vehicle Licenced as of 1/1/93



Total: 424,526

Figure 3

Number of Vehicle Licenced as of 1/1/93



Petrol Total : 264,671
Fuel consumption : 35%

Diesel Total: 143,072
65%

Figure 4

VECS-ASD-HKEPD

Vehicle Emissions Growth
(Particulates and Nitrogen Oxides)

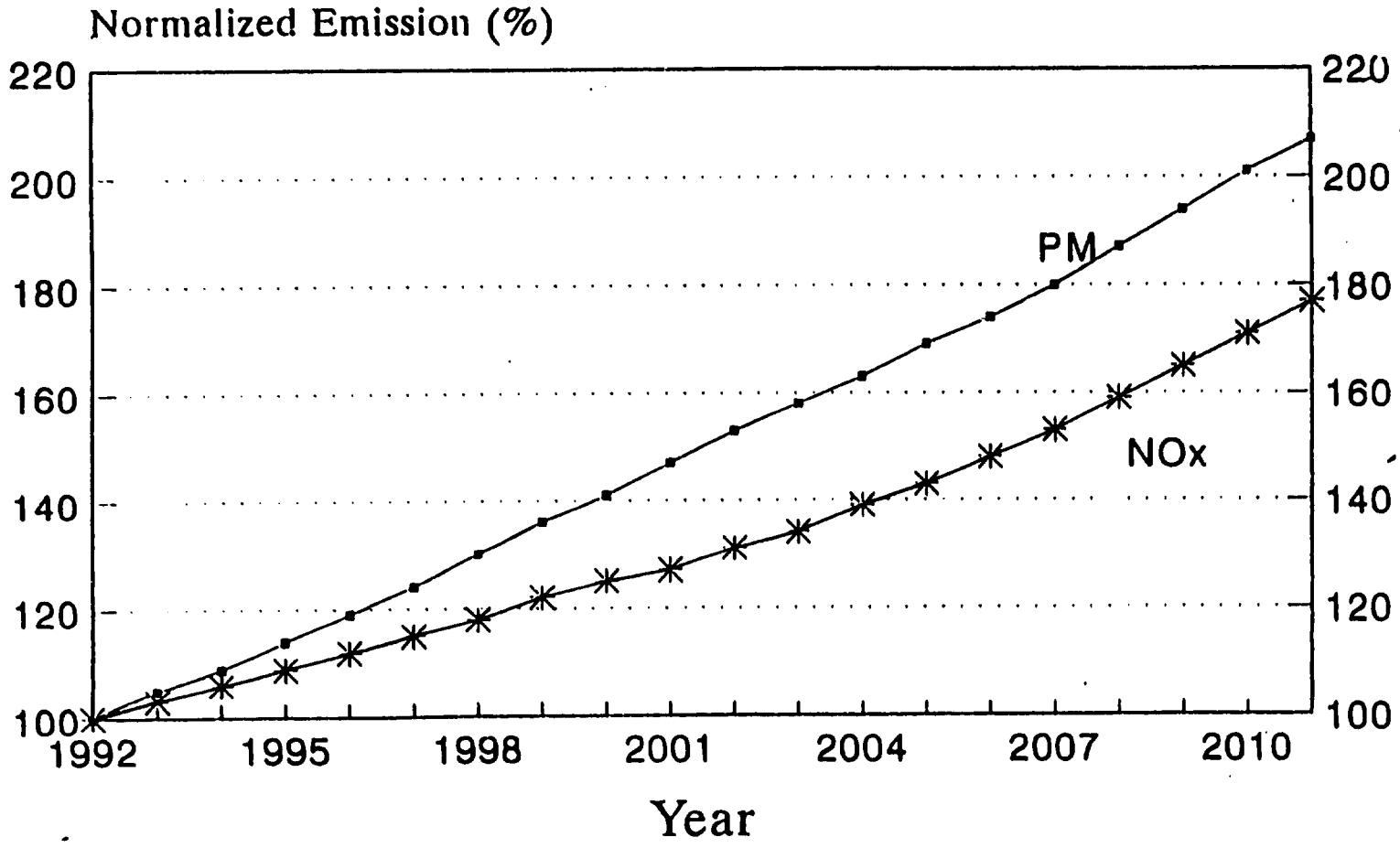
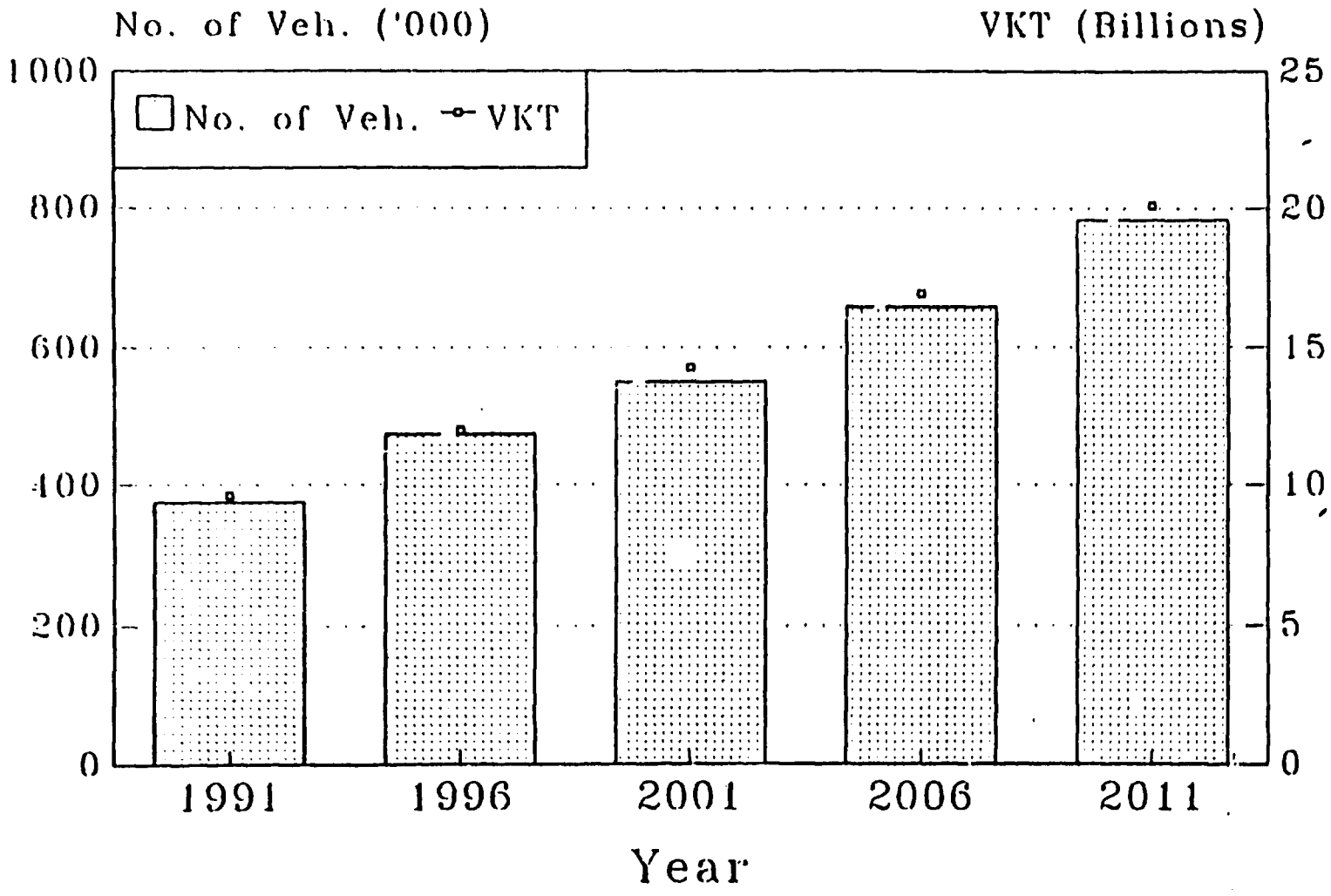


Figure 5

VECS-ASG-HKEPD

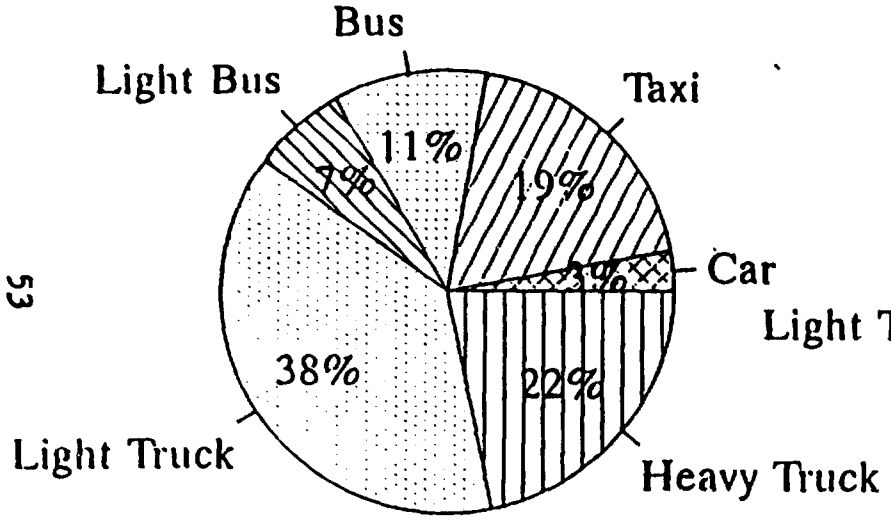
Vehicle and Kilometre Travelled Growth Projection



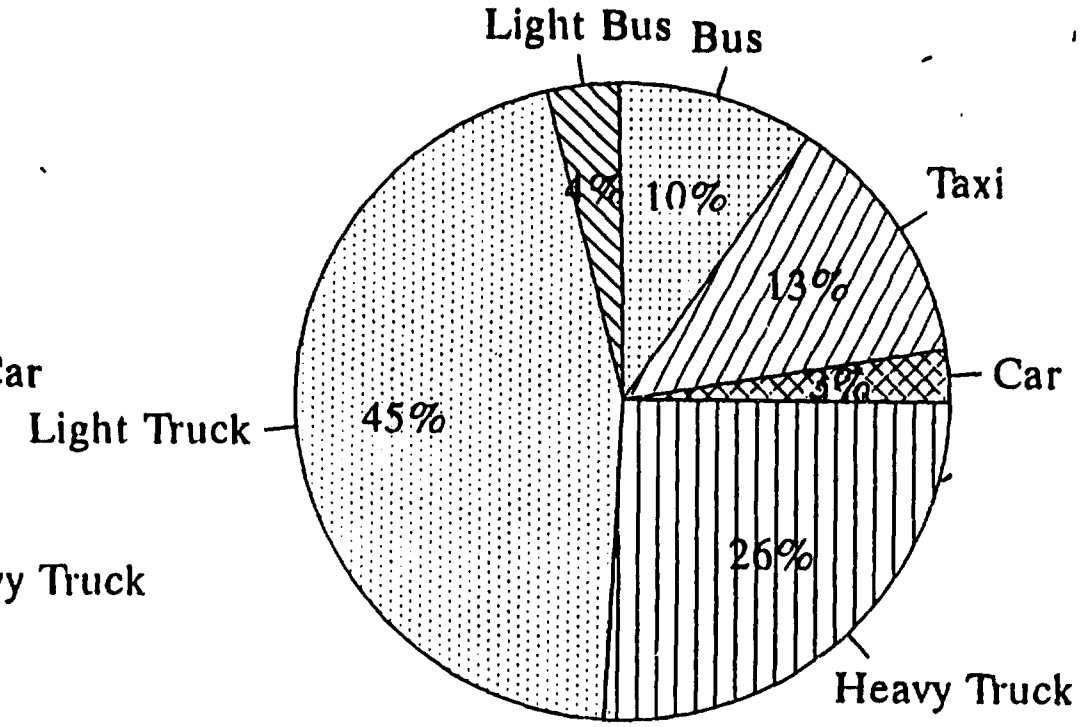
Firure 6

VECS-ASG-HKEPD

Particulate Contribution by Vehicle Class
1992 and 2011



1992 Total: 5723 Tons

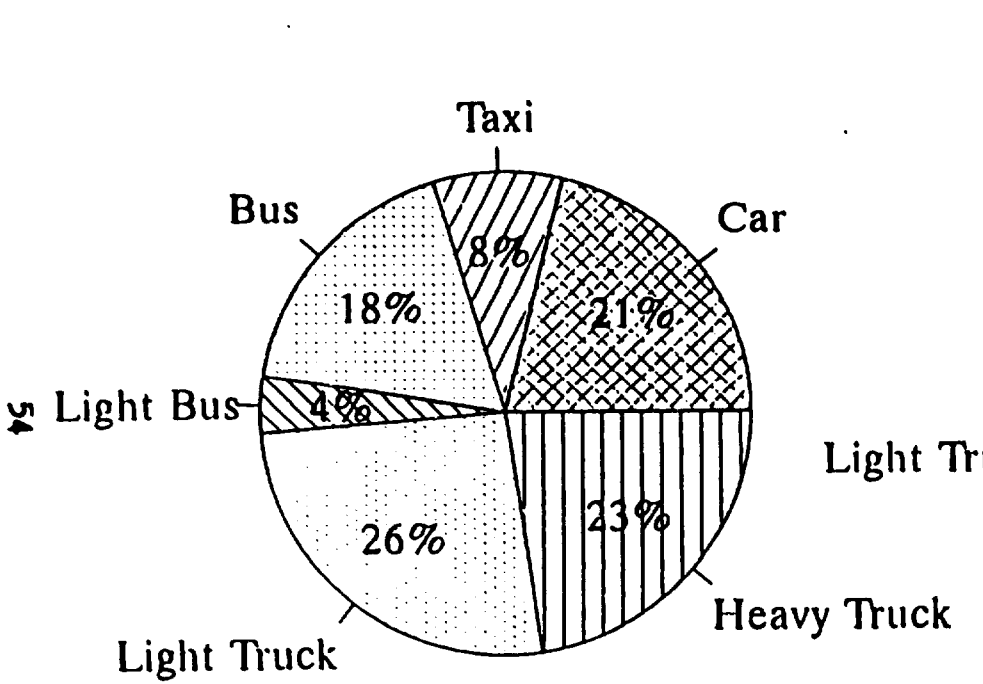


2011 Total: 11873 Tons

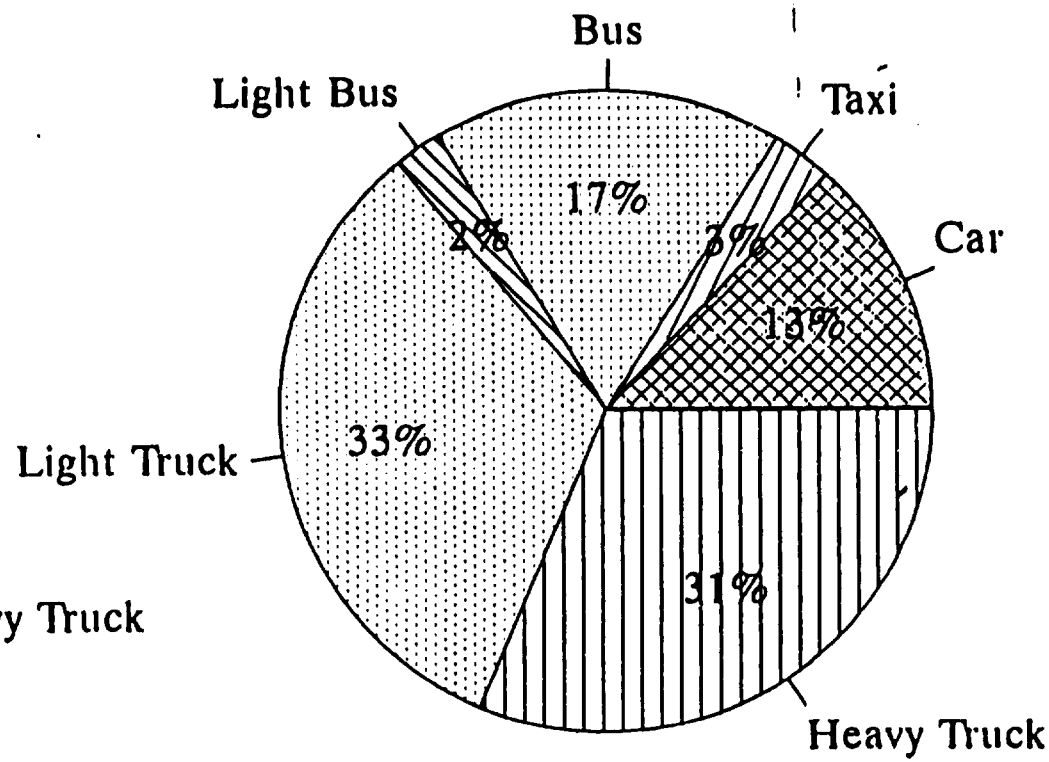
Figure 7

VECS-ASG-HKEPD

Nitrogen Oxides Contribution by Vehicle Class
1992 and 2011



1992 Total: 30995 Tons



2011 Total: 54747 Tons

Figure 8

VECS-ASG-HKBPD

Proposed Motor Vehicle Emission Control Strategy for New Vehicles

Vehicle Class	Approx. Popu. as of 1.1.93	Short 92-95	Intermediate 95-98	Long 98 and after
Petrol				
Car	230000	ULP & TWC	I&M	LEVs/ZEV
Light truck	13000	ULP & TWC	I&M	LEVs
Medium/heavy truck	minimal	-	-	-
Light bus	minimal	-	-	-
Bus	minimal	-	-	-
M/C	18000	-	-	-
Diesel				
Car	4300	ULP & TWC	I&M	LEVs
Taxi	17000	Smoke Ctrl. Prog.	91/441/EEC + stringent I&M	ULP & TWC ?
Light truck	76000	Smoke Ctrl.	US 90, 91/441/EEC	US 98, 91/441/EEC
Medium/heavy truck	31000	- ditto -	- ditto -	- ditto -
Light bus	7200	Smoke Ctrl.	91/542/EEC + stringent I&M	ULP & TWC ?
Bus	8600	Smoke Ctrl. + Retrofit	US94 or equv	US 98 or Equv.
Others	minimal	-	-	-

TWC - Three way catalyst
ZEV - Zero emission vehicle
LEV - Low emission vehicle

Chart 9

COUNTRY REPORT OF MALAYSIA

CONTROL AND REGULATORY MEASURES CONCERNING MOTOR VEHICLES EMISSION IN ASIA-PACIFIC REGION

TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

by

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TECHNICAL DIVISION
ROAD TRANSPORT DEPARTMENT, MALAYSIA

JAKARTA 8-10 JUNE 1993

CONTROL AND REGULATORY MEASURES CONCERNING MOTOR VEHICLE EMISSIONS IN THE ASIA - PACIFIC REGION

TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

Marzuki bin Mokhtar *

&

Radzuan bin Nong **

INTRODUCTION

1. Motor vehicle exhaust gas emission are the major contributor to air pollution problem in major town in Malaysia. Studies and prediction based on local conditions conducted by the Department of Environment (DOE) showed that pollution caused by mobile sources accounted for more than 70 % of the total pollution load emitted by fuel burning sources. The remaining air pollutants are emitted by industries and power generation.

2. A great number of vehicle travelling within the confines of a city and unefficient public transport system has caused air quality deterioration in city centres.

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Technical Division
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3. As at 31st December 1992 , there are about 5.6 millions registered vehicles in Malaysia, of which 5.2 millions are petrol driven vehicles while the remaining 0.4 millions are diesel powered vehicles.(Table 1)

CURRENT AND FUTURE PLANS

4. Presently, emission from motor vehicles were controlled by Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977 and Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations , 1985. Kerbside smoke test and random sampling of petrol are activities carried out by Department of Environment and Road Transport Department to ensure compliance to the above regulations.

5. In order to effectively control the emission from motor vehicles, preventive measure need to be taken at source. For this reason, two sets of regulations has been proposed which are based on United Nations Economic Commission for Europe (UN/ECE) Regulations. For petrol engine, the proposed regulations are based on UN/ECE R 15.04 while for diesel engine, the proposed regulations are based on UN/ECE R 24 and R 49.

6. The implementation of the above regulations will be carried out in two phases :

Phase I

Starting from 1st July 1992, all new petrol and diesel powered vehicles has to comply to UN/ECE R 15.04 and UN/ECE R 24 and R 49 respectively.

Phase II

Beginning 1st July 1994 (proposed date), all new model of petrol driven vehicles introduced into Malaysia market shall comply to EEC 91/441 where the use of catalytic converter will be made compulsory.

7. Compliance to the above-mentioned regulations is through type approval inspection. In the absence of suitable local type approval facilities, the compliance is checked through certification. Manufacturer or the franchise holder has to submit a certificate of compliance stating that the type approval test is conducted in accordance with the relevant test procedures and the result meets the respective emission standards. The certificate has to be endorsed by either the vehicle manufacturer or an authorised emission testing laboratories .

8. As and when type approval facilities are available locally, the Goverment will determine the relevant test procedures to be used, select and type test engine and vehicle in accordance with the procedures and the specifications prescribed in the UN/ECE regulations.

9. In order to verify the vehicles manufactured by the manufacturer conform to the emission standard , the Department of Environment will conduct sample test on vehicles randomly drawn from assembly line.

10. At present, the percentage of compliance to UN/ECE 15.04 for petrol driven vehicle is 92 percent while for diesel vehicle the compliance to UN/ECE R 24 and R 49 is 91 percent.

11. The entire administration of the road transport is under the responsibility of the Director General of Road Transport. Under the Road Transport Rules of Malaysia, Director General of Road Transport Department has the power to inspect all motor vehicle at any time before registration.

12. The purpose of carrying out vehicle inspection is to check the road safety and worthiness of the vehicle concerned and compliance to the Malaysian Road Transport Act and Regulations.

13. Motor vehicle is considered roadworthy if it complies with the technical requirement (where applicable) stipulated under :

i) Motor Vehicle (Construction and Use) Rules 1959 LN 170/59

ii) Motor Vehicle (Construction and Use)(Vehicles Carrying Petroleum Products) Rules 1965 LN 405/1965

iii) Motor Vehicle (Construction, Equipment and Use) (Prohibition of Certain Types of Glass) Rules 1978 P.U (A) 82/1978

iv) Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977 P.U (A) 414/1977

v) Motor Vehicles (Construction, Equipment and Use) (Use of Liquified Petroleum Gas Fuel System in Motor Vehicles) Rules 1982 P.U (A) 392/1982.

vi) Motor Vehicles (Safety Seat-Belts) Rules 1978.

vii) Motor Vehicles (Taximeter) Rules 1959.

viii) Road Traffic (Weight of Timber) Rules 1981 P.U (A) 263/1981

The vehicle will be allowed for registration after initial inspection under the above rules has been carried out.

TAXES

14. Among the taxes that the vehicles owner has to pay before registration are road tax, excise duty and sales tax.

i) Road tax

The amount required are based upon engine capacity, type of vehicles, usage and weight. (Annex 1)

ii) Excise duty

For locally manufactured and assembled vehicles the excise duty and sales tax are calculated based on open market value (OMV). [Table 2 (a)]

iii) Import duty

For imported vehicles the import duty and sale tax are based on the value declared by the vehicle owner. [Table 2 (b)]

CONCLUSION

15. Rapid development of manufacturing activities and urbanization are factors causing air pollution problem in Malaysia. Emission from motor vehicle is the major contributor of air quality deterioration especially in urban areas.

16. To reduce vehicles emission, the Government has taken several steps such as introducing stringent standard to control emission from motor vehicles, control of lead concentration in gasoline, unleaded gasoline and upgrading transportation system. Lately, the use of natural gas for vehicles has been introduced as alternative fuel. The response has been very encouraging especially from fleet owners in particular taxis.

Table 1

Registered Vehicles In Peninsular Malaysia

As At 31 December, 1992

Type of Vehicles	No. of Vehicles		Total
	Gasoline	Diesel	
Motorcycles	3,255,927	-	3,255,927
Passenger cars	1,755,518	46,544	1,802,062
Buses	1,476	22,622	24,098
Taxis	15,113	19,123	34,236
Lorries/Truck	157,092	194,110	351,202
Other (Excluded Trailer)	12,737	145,079	157,816
Total	5,197,863	427,478	5,625,341

Table 2

a) EXCISE DUTY

For the first	RM 7,000	25 %
For the next	RM 3,000	30 %
For the next	RM 3,000	35 %
For the next	RM 7,000	50 %
For the next	RM 5,000	60 %
For the balance		65 %

Sale tax = (Excise duty + OMV) x 10 %

b) IMPORT DUTY

For the first	RM 20,000	140 %
For the next	RM 5,000	160 %
For the next	RM 5,000	185 %
For the next	RM 5,000	210 %
For the next	RM 5,000	250 %
For the balance		300 %

Sale tax = (import duty + declared value) x 10 %

Item No.	*Description of Fee*	*Amount of Fee*

11. For a MOTOR VEHICLE LICENCE as follows: *[Am. P.U.(A) 348/89]*

(1)(a) In respect of motor cycles with engine capacity—

	Per Annum
Not exceeding 75 cubic centimetres ...	$ 50.00
exceeding 75 cubic centimeters but not exceeding 100 cubic centimetres	$ 55.00
exceeding 100 cubic centimetres but not exceeding 150 cubic centimetres ...	$ 65.00
exceeding 150 cubic centimetres but not exceeding 500 cubic centimetres	$100.00
exceeding 500 cubic centimteres	$130.00

(b) (A) In respect of motorcar saloon owned by an individual—

(i) If fitted with engines designed solely to use a fuel which is subject to duty under heading No. 27.10.211 of the Customs Duties Order 1978 and using such fuel only.

		Per Annum
Not exceeding 7 seating capacity (including driver)	With cylinder capacity of 1,000 cubic centimetre or less	13 sen per cubic centimetre (subject to a minimum of $100)
	For the next 200 cubic centimetre	15 sen per cubic centimetre
	For the next 300 cubic centimetre	20 sen per cubic centimetre
	For the next 500 cubic centimetre	35 sen per cubic centimetre
	For the next 500 cubic centimetre	50 sen per cubic centimetre
	For the next 500 cubic centimetre	$2.00 per cubic centimetre
	For the balance	$3.60 sen per cubic centimetre
Exceeding 7 seating capacity (including driver)		Above rates plus twenty five percent of these rates

The fees for half a year are half of the rates stated above and the fees for a month or part thereof are one twelfth of the rates stated above to be calculated to the next 10 sen.

(ii) If not so fitted.

Four times the rates stated in sub-paragraph (A) (i) of this paragraph.

(B) In respect of motorcar saloon owned by a company–

(i) If fitted with engines designed solely to use a fuel which is subject to duty under heading No. 27.10.211 of the Customs Duties Order 1978 and using such fuel only:

Two times the rates stated in sub-paragraph (A) (i) of this paragraph.

(ii) If not so fitted:

Four times the rates stated in sub-paragraph (B) (i) of this paragraph.

(C) In respect of private passenger motor vehicles (other than motorcar saloon or motor cycle) owned by an individual or a company–

(i) If fitted with engines designed solely to use a fuel which is subject to duty under heading No. 27.10.211 of the Customs Duties Order 1978 and using such fuel only

		Per Annum
Not exceeding 7 seating capacity (including driver)	With cylinder capacity of 1,000 cubic centimetre or less	$200.00
	For the next 200 cubic centimetre	15 sen per cubic centimetre
	For the next 300 cubic centimetre	20 sen per cubic centimetre
	For the next 500 cubic centimetre	35 sen per cubic centimetre
	For the next 500 cubic centimetre	80 sen per cubic centimetre
	For the balance	$1.60 sen per cubic centimetre
Exceeding 7 seating capacity but not exceeding 15 seating capacity (including driver)		Above rates plus twenty-five percent of those rates
Exceeding 15 seating capacity but not exceeding 20 seating capacity (including driver)		Above rates plus forty per cent of those rates
Exceeding 20 seating capacity but not exceeding 30 seating capacity (including driver)		Above rates plus fifty per cent of those rates
Exceeding 30 seating capacity (including driver)		Above rates plus seventy percent of those rates

The fees for half a year are half of the rates stated above and the fees for a month or part thereof are one twelfth of the rates stated above to be calculated to the next 10 sen

(ii) If not so fitted:

Four times the rates stated in sub-paragraph (C) (i) of this paragraph.

Item No.	*Description of Fee*	*Amount of fee*
(c)	In respect of private trailers drawn by private passenger vehicles and not used in connection with trade	$10 per month
(d)	In respect of trailers rented for hire or reward for the carriage of passengers and personal and household effects and drawn by private passenger vehicles	$20 per month

(2) In respect of limousine taxi cabs–

(a) If fitted with engines designed solely to use a fuel which is subject to import duty under heading no. 27.10.211 or no. 27.10.219 of the Customs Duties Order 1978 or to excise duty under item 5.1 or 5.2 of the Excise Duties Order 1978 and using such a fuel only:

Per Annum	*Per ½ Year*	*Per Month or part thereof*
12 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $40)	6 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $22)	1 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $5)

(b) If not so fitted:

Per Annum	*Per ½ Year*	*Per Month or part thereof*
24 sen per cubic centimetre of the cylinder capacity	12 sen per cubic centimetre of the cylinder capacity	2 sen per cubic centimetre of the cylinder capacity

(Any fraction of a ringgit to be counted as one ringgit)

(2A) In respect of hire cars and taxi cabs–

(a) If fitted with engines designed solely to use a fuel which is subject to import duty under heading no. 27.10.211 or no. 27.10.219 of the Customs Duties Order 1978 or to excise duty under item 5.1 or 5.2 of the Excise Duties Order 1978 and using such a fuel only:

Per Annum	*Per ½ Year*	*Per Month or part thereof*
6 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $20)	3 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $11)	1 sen per cubic centimetre of the cylinder capacity (subject to a minimum of $2 50)

(b) If not so fitted:

Per Annum	*Per ½ Year*	*Per Month or part thereof*
22 sen per cubic centimetre of the cylinder capacity	11 sen per cubic centimetre of the cylinder capacity	2 sen per cubic centimetre of the cylinder capacity

(Any fraction of a ringgit to be counted as one ringgit)

(2B) In respect of hire-and-drive vehicles –

(a) If fitted with engines designed solely to use a fuel which is subject to duty under heading No. 20.10.211 or No. 27.10.219 of the Customs Duties Order 1978 or to excise duty under item 5.1 or 5.2 of the Excise Duties Order 1978 and using such fuel only:

	Per Annum
With cylinder capacity of:	
Not exceeding 1,600 cubic centimetre ...	12 sen per cubic centimetre
Exceeding 1,600 cubic centimetre but not exceeding 1,800 cubic centimetre	14 sen per cubic centimetre
Exceeding 1,800 cubic centimetre but not exceeding 2,200 cubic centimetre	18 sen per cubic centimetre
Exceeding 2,200 cubic centimetre but not exceeding 2,600 cubic centimetre	22 sen per cubic centimetre
Exceeding 2,600 cubic centimetre ...	30 sen per cubic centimetre

The fees for half a year are half of the rates stated above and the fees for a month or part thereof are one twelfth of the rates stated above to be calculated to the next one ringgit.

(b) If not so fitted:

Three times the rates stated in subparagraph (i) of this paragraph.

(3) In respect of charter buses, excursion buses, express buses, minibuses and stage buses, the following licence fee shall be charged per month or part thereof.

(i) If fitted with an engine designed solely to use a fuel which is subject to duty under Heading No. 27.10211 of the Customs Duties Order 1988 and using such a fuel only:

(a) not exceeding 2,000 c.c.	$ 5.60
(b) exceeding 2,000 c.c.	$ 8.40

(ii) If not so fitted:

(a) not exceeding 1,500 c.c.	$ 45.00
(b) exceeding 1,500 c.c. but not exceeding 2,500 c.c.	$ 56.00
(c) exceeding 2,500 c.c. but not exceeding 3,500 c.c.	$ 67.00
(d) exceeding 3,500 c.c.	$123.00

(4) In respect of goods vehicles –

(i) If fitted with engines designed solely to use fuel which is subject to import duty under heading no. 27.10.221 of the Customs Duties Order 1978 and using such fuel only, in the case of rigid motor vehicles (including rigid motor vehicles drawing pole type trailers) based on the maximum permissible laden weight in cwts and in the case of articulated vehicles, that is the drawing vehicles, based on the "kerb weight" in cwts as stated hereunder

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
1- 5	38	19	4	65	575	288	48
6-10	98	49	9	66	576	288	48
11	109	55	10	67	578	289	49
12	120	60	10	68	579	290	49
13	132	66	11	69	581	291	49
14	143	72	12	70	582	291	49
15	154	77	13	71	584	292	49
16	165	83	14	72	585	293	49
17	177	89	15	73	587	294	49
18	188	94	16	74	588	294	49
19	199	100	17	75	590	295	50
20	210	105	18	76	591	296	50
21	218	109	19	77	593	297	50
22	225	113	19	78	594	297	50
23	233	117	20	79	596	298	50
24	240	120	20	80	597	299	50
25	248	124	21	81	599	300	50
26	255	128	22	82	600	300	50
27	263	132	22	83	602	301	51
28	270	135	23	84	603	302	51
29	278	139	24	85	605	303	51
30	285	143	24	86	606	303	51
31	293	147	25	87	605	304	51
32	300	[illegible]	25	88	[illegible]	[illegible]	[illegible]
33	308	154	26	89	[illegible]	[illegible]	[illegible]
34	315	158	27	90	[illegible]	[illegible]	51
35	323	162	27	91	[illegible]	[illegible]	[illegible]
36	330	[illegible]	28	92	[illegible]	[illegible]	[illegible]
37	345	[illegible]	29	[illegible]	[illegible]	[illegible]	[illegible]
38	360	180	30	94	[illegible]	309	[illegible]
39	375	188	32	95	629	310	52
40	390	195	33	96	[illegible]	311	[illegible]
41	405	203	34	97	[illegible]	312	[illegible]
42	420	210	35	98	634	312	52
43	428	214	36	99	636	313	53
44	435	218	37	100	637	314	53
45	450	[illegible]	38	101	639	315	53
46	465	[illegible]	39	102	[illegible]	315	[illegible]
47	480	[illegible]	40	103	[illegible]	316	[illegible]
48	495	[illegible]	42	[illegible]	[illegible]	[illegible]	[illegible]
49	510	[illegible]	43	[illegible]	[illegible]	[illegible]	[illegible]
50	525	263	44	106	638	319	53
51	529	265	45	107	[illegible]	[illegible]	[illegible]
52	533	267	45	108	[illegible]	[illegible]	[illegible]
53	537	269	45	109	641	321	54
54	540	270	45	110	642	321	[illegible]
55	544	272	46	111	644	322	[illegible]
56	548	274	46	112	645	323	54
57	552	276	46	113	647	324	54
58	555	278	47	114	648	324	54
59	559	280	47	115	650	325	54
60	563	282	47	116	651	326	55
61	567	284	48	117	653	327	55
62	570	285	48	118	654	327	55
63	572	286	48	119	656	328	55
64	573	287	48	120	657	329	[illegible]

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $	Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
121	559	330	55	184	753	377	[illegible]
122	660	330	55	185	755	378	[illegible]
123	662	331	56	186	756	378	[illegible]
124	663	332	56	187	758	379	[illegible]
125	665	333	56	188	759	380	64
126	666	333	56	189	761	381	[illegible]
127	668	334	56	190	762	381	[illegible]
128	669	335	56	191	764	382	64
129	671	336	56	192	765	383	64
130	672	336	56	193	[illegible]	384	64
131	674	337	57	[illegible]	768	384	64
132	[illegible]	338	[illegible]	[illegible]	[illegible]	385	[illegible]
[illegible]	[illegible]	339	[illegible]	196	[illegible]	386	[illegible]
[illegible]	[illegible]	339	57	197	[illegible]	387	[illegible]
[illegible]	680	340	[illegible]	198	[illegible]	387	65
136	681	341	57	199	776	388	65
[illegible]	683	342	[illegible]	200	[illegible]	389	[illegible]
[illegible]	[illegible]	342	[illegible]	201	[illegible]	390	[illegible]
139	[illegible]	343	58	202	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	344	58	203	[illegible]	391	[illegible]
[illegible]	[illegible]	345	[illegible]	[illegible]	[illegible]	392	[illegible]
[illegible]	690	345	58	205	[illegible]	393	66
[illegible]	692	346	[illegible]	206	[illegible]	393	66
144	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	348	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	696	348	[illegible]	[illegible]	[illegible]	396	[illegible]
[illegible]	[illegible]	349	59	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	355	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	356	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	220	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	60	221	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	366	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	370	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	372	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	241	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	374	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	244	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
247	848	424	71	310	942	471	79
248	849	425	71	311	944	472	79
249	851	426	71	312	945	473	79
250	852	426	71	313	947	474	79
251	854	427	72	314	948	474	79
252	855	428	72	315	950	475	80
253	857	429	72	316	951	476	80
254	858	429	72	317	953	477	80
255	860	430	72	318	954	477	80
256	861	431	72	319	956	478	80
257	863	432	72	320	957	479	80
258	864	432	72	321	959	480	80
259	866	433	72	322	960	480	80
260	867	434	73	323	962	481	81
261	869	435	73	324	963	482	81
262	870	435	73	325	965	483	81
263	872	436	73	326	966	483	81
264	873	437	73	327	968	484	81
265	875	438	73	328	969	485	81
266	876	438	73	329	971	486	81
267	878	439	73	330	972	486	81
268	879	440	74	331	974	487	82
269	881	441	74	332	975	488	82
270	882	441	74	333	977	489	82
271	884	442	74	334	978	489	82
272	885	443	74	335	980	490	82
273	887	444	74	336	981	491	82
274	888	444	74	337	983	492	82
275	890	445	74	338	984	492	82
276	891	446	74	339	986	493	83
277	893	446	74	340	987	494	83
278	894	447	74	341	989	495	83
279	896	448	75	342	990	495	83
280	897	449	75	343	992	496	83
281	899	450	75	344	993	497	83
282	900	450	75	345	995	498	83
283	902	451	75	346	996	498	83
284	903	452	75	347	998	499	84
285	905	453	75	348	999	500	84
286	906	453	75	349	1 001	501	84
287	908	454	76	350	1 002	501	84
288	909	455	76	351	1 004	502	84
289	911	456	76	352	1 005	503	84
290	912	456	76	353	1 007	504	84
291	914	457	76	354	1 008	504	85
292	915	458	76	355	1 010	505	85
293	917	459	76	356	1 011	506	85
294	918	459	76	357	1 013	507	85
295	920	460	77	358	1 014	507	85
296	921	461	77	359	1 016	508	85
297	923	462	77	360	1 017	509	85
298	924	462	77	361	1 019	510	85
299	926	463	77	362	1 020	510	85
300	927	464	77	363	1 022	511	86
301	929	465	78	364	1 023	512	86
302	930	465	78	365	1 025	513	86
303	932	466	78	366	1 026	513	86
304	933	467	78	367	1 028	514	86
305	935	468	78	368	1 029	515	86
306	936	468	78	369	1 031	516	86
307	938	469	78	370	1 032	516	86
308	939	470	79	371	1 034	517	87
309	941	471	79	372	1 035	518	87

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
373	1,037	519	87	413	1,097	549	92
374	1,038	519	87	414	1,098	549	92
375	1,040	520	87	415	1,100	550	92
376	1,041	521	87	416	1,101	551	92
377	1,043	522	87	417	1,103	552	92
378	1,044	522	87	418	1,104	552	92
379	1,046	523	87	419	1,106	553	93
380	1,047	524	88	420	1,107	554	93
381	1,049	525	88	421	1,109	555	93
382	1,050	525	88	422	1,112	556	93
383	1,052	526	88	423	1,113	557	93
384	1,053	527	88	424	1,115	558	93
385	1,055	528	88	425	1,116	558	93
386	1,056	528	88	426	1,118	559	94
387	1,058	529	89	427	1,119	560	94
388	1,059	530	89	428	1,121	561	94
389	1,061	531	89	429	1,122	561	94
390	1,062	531	89	430	1,124	562	94
391	1,064	532	89	431	1,125	563	94
392	1,065	533	89	432	1,127	564	94
393	1,067	534	89	433	1,128	564	94
394	1,068	534	89	434	1,130	565	95
395	1,070	535	90	435	1,131	566	95
396	1,071	536	90	436	1,133	567	95
397	1,097	537	90	437	1,134	567	95
398	1,074	537	90	438	1,136	568	95
399	1,076	538	90	439	1,137	569	95
400	1,077	539	90				
401	1,097	549	90				
402	1,080	540	90				
403	1,082	541	91	cwt	1,50	0 75	
404	1,083	542	91	there			
405	1,085	543	91	after			
406	1,086	543	91				
407	1,088	544	91	For			
408	1,089	545	91	each			
409	1,091	546	91	6 cwts			0 75
410	1,092	546	91	ther			
411	1,094	547	92				
412	1,095	548	92				

(ii) (a) If not so fitted, in the case of rigid motor, motor vehicles (including rigid motor vehicles drawing pole-type trailers), based on the maximum permissible laden weight in cwts. as stated hereunder; or

(b) If not so fitted, in the case of articulated vehicles drawing semi-trailers other than those authorised and constructed for the carriage of containers, based on the kerb weight in cwts. of the drawing vehicles as stated hereunder; or

(c) If not so fitted, in the case of articulated vehicles drawing semi-trailers authorised and constructed for the carriage of containers, based on the maximum permissible laden weight in cwts. of the drawing vehicles as stated hereunder.

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
1-10	270	135	23	64	1,688	844	141
11	300	150	25	65	1,707	854	143
12	334	167	28	66	1,725	863	144
13	368	184	31	67	1,740	870	145
14	402	201	34	68	1,755	878	147
15	432	216	36	69	1,770	885	148
16	462	231	39	70	1,872	891	149
17	495	248	42	71	1,793	897	150
18	525	263	44	72	1,804	902	151
19	555	278	47	73	1,815	908	152
20	585	293	49	74	1,827	914	153
21	612	306	51	75	1,838	919	154
22	630	315	53	76	1,849	925	155
23	649	325	55	77	1,860	930	155
24	668	334	56	78	1,872	936	156
25	687	344	58	79	1,883	942	157
26	705	353	59	80	1,890	945	158
27	732	366	61	81	1,901	951	159
28	747	374	63	82	1,913	957	160
29	765	383	64	83	1,928	964	161
30	784	392	65	84	1,935	968	162
31	818	409	69	85	1,950	975	163
32	855	428	72	86	1,958	979	164
33	893	447	75	87	1,969	985	165
34	930	465	78	88	1,980	991	166
35	964	482	81	89	1,992	996	167
36	1,002	501	84	90	2,003	1,002	168
37	1,035	518	87	91	2,018	1,009	169
38	1,076	538	90	92	2,028	1,014	170
39	1,107	554	93	93	2,039	1,019	171
40	1,140	570	95	94	2,048	1,024	172
41	1,176	589	98	95	2,059	1,030	173
42	1,212	606	101	96	2,070	1,035	174
43	1,249	625	105	97	2,082	1,041	175
44	1,275	638	107	98	2,093	1,047	176
45	1,305	653	109	99	2,104	1,052	176
46	1,324	662	111	100	2,115	1,058	177
47	1,347	674	113	101	2,123	1,062	178
48	1,365	683	114	102	2,138	1,069	179
49	1,388	694	116	103	2,149	1,075	180
50	1,407	703	118	104	2,160	1,080	181
51	1,425	713	119	105	2,172	1,086	182
52	1,448	724	121	106	2,183	1,092	183
53	1,467	734	123	107	2,194	1,097	184
54	1,489	745	125	108	2,205	1,103	184
55	1,508	754	125	109	2,217	1,109	185
56	1,530	765	128	110	2,228	1,114	186
57	1,553	777	130	111	2,239	1,120	187
58	1,572	786	132	112	2,250	1,125	188
59	1,590	795	133	113	2,265	1,133	189
60	1,613	807	135	114	2,280	1,140	190
61	1,628	814	136	115	2,256	1,144	191
62	1,650	825	138	116	2,295	1,148	192
63	1,665	833	139	117	2,307	1,154	193

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
118	2.318	1.159	194	181	3.015	1.150	252
119	2.329	1.165	195	182	3.027	1.514	253
120	2.340	1.170	195	183	3.038	1.519	154
121	2.352	1.176	196	184	3.053	1.527	255
122	2.363	1.182	197	185	3.064	1.532	256
123	2.374	1.187	198	186	3.079	1.540	257
124	2.385	1.193	199	187	3.090	1.545	258
125	2.397	1.199	200	188	3.102	1.551	259
126	2.408	1.204	201	189	3.150	1.575	263
127	2.419	1.210	202	190	3.128	1.564	261
128	2.430	1.215	203	191	3.139	1.570	262
129	2.442	1.221	204	192	3.150	1.575	263
130	2.453	1.227	205	193	3.165	1.583	264
131	2.460	1.230	205	194	3.180	1.590	265
132	2.472	1.236	206	195	3.192	1.596	266
133	2.483	1.242	207	196	3.202	1.602	267
134	2.490	1.245	208	197	3.218	1.609	269
135	2.502	1.251	209	198	3.229	1.615	270
136	2.509	1.255	210	199	3.240	1.620	270
137	2.520	1.260	210	200	3.252	1.626	271
138	2.528	1.264	211	201	3.263	1.632	272
139	2.535	1.268	212	202	3.278	1.639	274
140	2.547	1.274	213	203	3.289	1.645	275
141	2.554	1.277	213	204	3.300	1.650	275
142	2.565	1.283	214	205	3.315	1.658	277
143	2.573	1.287	215	206	3.327	1.664	278
144	2.584	1.292	216	207	3.338	1.669	279
145	2.592	1.296	216	208	3.353	1.677	280
146	2.599	1.300	217	209	3.364	1.682	281
147	2.610	1.305	218	210	3.375	1.688	282
148	2.618	1.309	219	211	3.388	1.694	283
149	2.625	1.313	219	212	3.402	1.701	284
150	2.637	1.318	220	213	3.413	1.707	285
151	2.644	1.322	221	214	3.425	1.713	286
152	2.655	1.328	222	215	3.439	1.720	287
153	2.663	1.332	222	216	3.450	1.725	288
154	2.674	1.337	223	217	3.465	1.733	289
155	2.685	1.342	224	218	3.477	1.739	290
156	2.700	1.350	225	219	3.486	1.744	291
157	2.715	1.358	226	220	3.503	1.752	292
158	2.727	1.364	228	221	3.515	1.758	293
159	2.738	1.369	229	222	3.529	1.765	294
160	2.753	1.377	230	223	3.540	1.770	295
161	2.764	1.382	230	224	3.552	1.776	296
162	2.775	1.388	231	225	3.564	1.782	297
163	2.790	1.395	232	226	3.578	1.789	298
164	2.802	1.401	234	227	3.589	1.795	300
165	2.817	1.409	235	228	3.600	1.800	300
166	2.828	1.414	236	229	3.615	1.808	302
167	2.839	1.420	237	230	3.627	1.814	303
168	2.854	1.427	238	231	3.638	1.819	304
169	2.865	1.432	239	232	3.652	1.826	305
170	2.877	1.439	240	233	3.664	1.832	306
171	2.888	1.444	241	234	3.675	1.838	307
172	2.903	1.452	242	235	3.690	1.845	308
173	2.918	1.459	244	236	3.702	1.851	309
174	2.929	1.465	245	237	3.713	1.857	310
175	2.940	1.470	245	238	3.728	1.864	311
176	2.955	1.478	247	239	3.739	1.870	313
177	2.967	1.484	248	240	3.750	1.875	313
178	2.978	1.489	249	241	3.765	1.883	314
179	2.993	1.497	250	242	3.777	1.889	315
180	3.004	1.502	251	243	3.788	1.894	316

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
244	3,803	1,902	317	307	4,590	2,295	383
245	3,814	1,907	318	308	4,602	2,301	384
246	3,825	1,913	319	309	4,613	2,307	385
247	3,840	1,920	320	310	4,628	2,314	386
248	3,852	1,926	321	311	4,639	2,320	389
249	3,863	1,932	322	312	4,650	2,325	387
250	3,878	1,939	324	313	4,665	2,333	389
251	3,889	1,945	325	314	4,677	2,339	390
252	3,900	1,950	325	315	4,688	2,344	391
253	3,915	1,958	327	316	4,703	2,352	392
254	3,927	1,964	328	317	4,714	2,357	393
255	3,938	1,969	329	318	4,725	2,36[illegible]	394
256	3,953	1,977	330	319	4,740	2,370	395
257	3,964	1,982	331	320	4,752	2,376	396
258	3,975	1,988	332	321	4,763	2,382	397
259	3,990	1,995	333	322	4,778	2,389	399
260	4,002	2,001	334	323	4,789	2,395	400
261	4,013	2,007	335	32[illegible]	4,800	2,40[illegible]	4[illegible]
262	4,028	2,014	336	325	4,815	2,4[illegible]	402
263	4,039	2,020	337	326	4,827	2,414	403
264	4,050	2,025	338	327	4,838	2,419	[illegible]
265	4,065	2,033	339	328	4,853	2,42[illegible]	[illegible]
266	4,077	2,039	340	329	4,864	2,432	406
267	4,088	2,044	341	330	4,875	2,438	407
268	4,103	2,052	342	331	4,890	2,445	[illegible]
269	4,114	2,057	343	332	4,902	2,451	409
270	4,125	2,063	344	333	4,913	2,457	410
271	4,140	2,070	345	334	4,928	2,464	[illegible]
272	4,152	2,076	346	335	4,939	2,47[illegible]	[illegible]
273	4,163	2,082	347	336	4,950	2,47[illegible]	[illegible]
274	4,178	2,089	349	337	4,96[illegible]	2,48[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	350	338	4,977	2,48[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	350	339	4,988	[illegible]	[illegible]
[illegible]	[illegible]	2,108	352	[illegible]	5,003	[illegible]	[illegible]
278	[illegible]	2,114	353	341	5,014	[illegible]	[illegible]
279	4,238	2,119	354	342	5,025	[illegible]	[illegible]
280	4,253	2,127	355	343	5,040	2,520	420
281	4,264	2,132	356	344	5,052	2,526	421
282	4,275	2,138	357	345	5,063	2,532	422
283	4,290	2,145	358	346	5,078	2,539	423
284	4,302	2,151	359	347	5,089	2,544	424
285	4,313	2,157	360	348	5,100	2,550	425
286	4,328	2,164	361	349	5,115	2,558	426
287	4,339	2,170	362	350	5,127	2,564	427
288	4,350	2,175	363	351	5,138	2,569	428
289	4,365	2,183	364	352	5,153	2,577	429
290	4,377	2,189	365	353	5,164	2,582	431
291	4,388	2,194	366	354	5,175	2,588	432
292	4,403	2,202	367	355	5,190	2,595	433
293	4,414	2,207	368	356	5,202	2,601	434
294	4,425	2,213	369	357	5,213	2,607	435
295	4,440	2,220	370	358	5,228	2,614	436
296	4,452	2,226	371	359	5,239	2,619	437
297	4,463	2,232	371	360	5,250	2,625	438
298	4,478	2,239	374	361	5,265	2,632	439
299	4,489	2,245	375	362	5,277	2,639	440
300	4,500	2,250	375	363	5,288	2,644	441
301	4,515	2,258	377	364	5,303	2,652	442
302	4,527	2,264	378	365	5,314	2,657	443
303	4,538	2,269	379	366	5,325	2,663	444
304	4,553	2,277	380	367	5,340	2,670	445
305	4,564	2,282	381	368	5,352	2,676	446
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
370	5,3[illegible]	2,689	449	410	5,877	2,939	490
371	5,387	2,695	450	411	5,888	2,944	491
372	5,40[illegible]	2,700	450	412	5,903	2,952	492
373	5,415	2,708	452	413	5,914	2,957	493
374	5,427	2,714	453	414	5,925	2,963	494
375	5,438	2,719	454	415	5,940	2,970	495
376	5,453	2,727	455	416	5,952	2,976	496
377	5,464	2,732	456	417	5,963	2,982	497
378	5,475	2,738	457	418	5,978	2,989	499
379	5,490	2,745	458	419	5,989	2,995	500
380	5,502	2,751	459	420	6,000	3,000	500
381	5,513	2,757	460	421	6,015	3,008	502
382	5,528	2,764	461	422	6,027	3,014	503
383	5,539	2,770	462	423	6,038	3,019	504
384	5,550	2,775	463	424	6,053	3,027	505
385	5,565	2,783	464	425	6,064	3,032	506
386	5,577	2,789	465	426	6,075	3,038	507
387	5,588	2,794	466	427	6,090	3,045	508
388	5,603	2,802	467	428	6,102	3,051	509
389	5,614	2,807	468	429	6,113	3,057	510
390	5,625	2,813	469	430	6,128	3,064	511
391	5,640	2,820	470	431	6,139	3,070	512
392	5,652	2,826	471	432	6,150	3,075	513
393	5,663	2,832	472	433	6,165	3,083	514
394	5,678	2,839	473	434	6,177	3,089	515
395	5,689	2,845	474	435	6,188	3,094	516
396	5,700	2,850	475	436	6,203	3,102	517
397	5,715	2,858	476	437	6,214	3,107	518
398	5,727	2,864	477	438	6,225	3,113	519
399	5,738	2,869	478	439	6,240	3,120	520
400	5,753	2,877	479	440	6,252	3,126	521
401	5,764	2,882	481	---	---	---	---
402	5,775	2,888	482				
403	5,790	2,895	483	For each cwt MPLW thereafter	12.40	6.80	1.50
404	5,802	2,901	484				
405	5,813	2,907	485				
406	5,828	2,914	486				
407	5,839	2,920	487				
408	5,850	2,925	488				
409	5,865	2,933	489	---	---	---	---

(...) Semi-trailers and pole-type trailers which are to be drawn ONLY by a motor vehicle which pays fees under (4) (1), based on the combined maximum permissible laden weights of the articulated vehicle and the semi-trailer, or the combined maximum permissible laden weights of the drawing vehicle and the pole-type trailer, in cwts as stated hereunder

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
1-10	38	19	4	13	53	27	5
11	45	23	4	14	57	29	5
12	49	25	5	15	61	31	5

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $	Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
16	64	32	6	54	216	108	[illegible]
17	68	34	6	55	218	109	[illegible]
18	75	38	7	56	219	100	19
19	79	40	7	57	221	111	19
20	83	42	7	58	222	111	19
21	87	44	8	59	224	112	19
22	90	45	8	60	225	113	19
23	94	47	8	61	227	114	19
24	98	49	9	62	228	114	19
25	102	51	9	63	229	115	20
26	105	[illegible]	[illegible]	64	[illegible]	115	[illegible]
27	109	[illegible]	10	65	[illegible]	116	[illegible]
28	113	[illegible]	10	66	[illegible]	116	[illegible]
29	117	[illegible]	10	67	[illegible]	116	[illegible]
30	120	60	10	68	233	117	20
31	124	62	11	69	234	117	20
32	128	64	11	70	234	227	20
33	132	66	11	71	235	118	20
34	135	68	12	72	236	118	20
35	139	[illegible]	12	—		—	—
36	143	[illegible]	12	For			
37	147	74	13	each			
38	150	[illegible]	13	cwt	0.8?		
39	154	[illegible]	13	there-			
40	158	[illegible]	14	after			
41	162	81	14	—		—	—
42	165	83?	14	For			
43	169	85?	15	each			
44	173	[illegible]	[illegible]	2 cwts		0.80	
45	177	[illegible]	[illegible]	there-			
46	[illegible]	[illegible]	[illegible]	after			
47	[illegible]	[illegible]	[illegible]				
48	192	[illegible]	[illegible]	For			
49	[illegible]	[illegible]	[illegible]	each			
50	210	[illegible]	[illegible]	12 cwts			
51	212	106	18	there-			
52	213	107	18	after			
53	215	108	18	—		—	—

(iv) Semi-trailers and pole-type trailers which are AT ANY TIME to be drawn by a motor vehicle which pays fees under (4) (ii) based on the combined maximum permissible laden weights of the articulated vehicle and [illegible] trailer, or the combined maximum permissible laden weights of the drawing vehicle and the pole-type trailer, in cwts as stated hereunder

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $	Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
1-10	113	57	10	14	[illegible]	81	14
11	120	60	10	15	[illegible]	87	15
12	135	68	12	16	184	92	16
13	147	[illegible]	13	17	[illegible]	100	17

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
18	210	105	18	81	762	381	64
19	222	111	19	82	765	383	64
20	237	119	20	83	769	385	65
21	244	122	21	84	773	387	65
22	252	126	21	85	780	390	65
23	259	130	22	86	784	392	66
24	267	134	23	87	788	394	66
25	274	137	23	88	792	396	66
26	282	141	24	89	795	398	67
27	285	143	24	90	803	402	67
28	300	150	25	91	807	404	68
29	308	154	26	92	810	405	68
30	315	158	27	93	814	407	68
31	327	164	28	94	818	409	69
32	342	171	29	95	825	413	69
33	357	179	30	96	829	415	70
34	372	186	31	97	833	417	70
35	387	194	33	98	837	419	70
36	402	201	34	99	840	420	70
37	413	207	35	100	848	424	71
38	428	214	36	101	852	426	71
39	443	222	37	102	855	428	72
40	458	229	39	103	863	432	72
41	473	237	40	104	867	434	73
42	484	242	41	105	870	435	73
43	499	250	42	106	874	437	73
44	510	255	43	107	878	439	74
45	532	261	44	108	882	441	74
46	529	265	45	109	886	443	74
47	540	270	46	110	890	445	75
48	548	274	47	111	894	447	75
49	555	278	47	112	898	449	75
50	563	282	48	113	902	451	76
51	570	285	48	114	906	453	76
52	578	289	49	115	910	455	77
53	585	293	49	116	914	457	77
54	597	299	50	117	923	462	77
55	604	302	51	118	927	464	78
56	612	306	51	119	930	465	78
57	623	312	52	120	934	467	79
58	630	315	53	121	942	471	79
59	638	319	54	122	945	473	79
60	645	323	54	123	949	475	80
61	653	327	55	124	953	477	80
62	660	330	56	125	957	479	81
63	668	334	56	126	965	483	81
64	675	338	57	127	969	485	82
65	683	342	57	128	973	486	82
66	690	345	58	129	977	488	82
67	698	349	59	130	980	490	82
68	702	351	59	131	984	492	83
69	709	355	60	132	988	494	83
70	713	357	60	133	992	496	83
71	717	359	60	134	998	499	84
72	724	362	61	135	1.002	501	84
73	728	364	61	136	1.005	503	84
74	732	366	61	137	1.009	505	85
75	735	368	62	138	1.013	507	85
76	739	370	62	139	1.017	509	85
77	743	372	62	140	1.020	510	85
78	747	374	63	141	1.024	512	86
79	754	377	63	142	1.028	514	86
80	758	379	63	143	1.032	516	86

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $	Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
144	1,035	518	87	207	1,335	668	112
145	1,039	520	87	208	1,343	672	112
146	1,403	522	87	209	1,347	674	113
147	1,047	524	88	210	1,350	675	113
148	1,050	525	88	211	1,358	679	114
149	1,054	527	88	212	1,362	681	114
150	1,058	529	89	213	1,363	683	114
151	1,062	531	89	214	1,373	687	115
152	1,065	533	89	215	1,377	689	115
153	1,069	535	90	216	1,380	690	115
154	1,073	537	90	217	1,388	694	116
155	1,077	539	90	218	1,392	696	116
156	1,080	540	90	219	1,395	698	117
157	1,084	542	91	220	1,403	702	117
158	1,088	544	91	221	1,407	704	118
159	1,095	546	92	222	1,410	705	118
160	1,107	553	93	223	1,418	709	119
161	1,110	555	93	224	1,422	711	119
162	1,118	559	94	225	1,425	713	119
163	1,122	561	94	226	1,433	717	120
164	1,125	563	94	227	1,437	719	120
165	1,129	565	95	228	1,440	720	121
166	1,138	569	95	229	1,448	724	121
167	1,141	571	95	230	1,452	726	121
168	1,148	574	96	231	1,455	728	122
169	1,152	576	96	232	1,463	732	122
170	1,155	578	97	233	1,467	734	123
171	1,159	580	97	234	1,470	735	123
172	1,167	584	98	235	1,478	739	123
173	1,170	585	98	236	1,482	741	124
174	1,174	587	99	237	1,485	743	124
175	1,182	591	99	238	1,493	747	125
176	1,185	593	99	239	1,497	749	125
177	1,189	595	100	240	1,500	750	125
178	1,197	599	100	241	1,508	754	126
179	1,201	600	101	242	1,512	756	126
180	1,208	604	101	243	1,522	761	127
181	1,212	606	101	244	1,538	769	129
182	1,215	608	102	245	1,549	775	130
183	1,219	610	102	246	1,560	780	130
184	1,223	612	102	247	1,566	784	131
185	1,227	614	103	248	1,575	788	132
186	1,230	615	103	249	1,583	792	133
187	1,238	619	104	250	1,593	796	133
188	1,242	621	104	251	1,605	803	134
189	1,245	623	104	252	1,620	810	135
190	1,253	627	105	253	1,626	813	136
191	1,257	629	105	254	1,634	817	137
192	1,260	630	105	255	1,647	824	138
193	1,268	634	106	256	1,658	829	139
194	1,272	636	106	257	1,669	835	140
195	1,275	638	107	258	1,680	840	140
196	1,283	641	107	259	1,686	844	141
197	1,287	643	108	260	1,699	850	142
198	1,290	645	108	261	1,707	854	143
199	1,298	649	109	262	1,718	859	144
200	1,302	651	109	263	1,729	865	145
201	1,305	653	109	264	1,740	870	145
202	1,313	657	110	265	1,748	874	146
203	1,317	659	110	266	1,755	878	147
204	1,320	660	110	267	1,767	884	148
205	1,328	664	111	268	1,778	889	149
206	1,332	666	111	269	1,789	895	150

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $	Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
270	1,800	900	150	333	2,427	1,214	202
271	1,808	904	151	334	2,438	1,219	204
272	1,815	908	153	335	2,449	1,225	205
273	1,827	914	153	336	2,457	1,229	205
274	1,838	919	154	337	2,460	1,230	205
275	1,849	925	155	338	2,468	1,234	206
276	1,680	930	155	339	2,483	1,242	207
277	1,868	934	156	340	2,498	1,249	209
278	1,875	938	157	341	2,509	1,255	210
279	1,887	944	158	342	2,520	1,260	210
280	1,898	949	159	343	2,528	1,264	211
281	1,909	955	160	344	2,535	1,268	212
282	1,920	960	160	345	2,547	1,274	213
283	1,928	964	161	346	2,558	1,279	214
284	1,935	968	162	347	2,569	1,285	215
285	1,947	974	163	348	2,580	1,290	215
286	1,958	979	164	349	2,588	1,294	216
287	1,969	885	165	350	2,595	1,298	217
288	1,980	990	165	351	2,607	1,304	218
289	1,988	994	166	352	2,629	1,315	220
290	1,995	998	167	353	2,629	1,315	220
291	2,007	1,004	168	354	2,640	1,320	220
292	2,018	1,009	169	355	2,648	1,324	221
293	2,029	1,015	170	356	2,655	1,328	222
294	2,040	1,020	170	357	2,663	1,332	222
295	2,048	1,024	171	358	2,670	1,335	223
296	2,155	1,028	172	359	2,682	1,341	224
297	2,067	1,033	173	360	2,697	1,349	225
298	2,074	1,037	173	361	2,708	1,354	226
299	2,085	1,042	174	362	2,715	1,358	227
300	2,100	1,050	175	363	2,727	1,363	227
301	2,108	1,054	176	364	2,738	1,369	228
302	2,115	1,058	176	365	2,750	1,375	229
303	2,127	1,064	177	366	2,760	1,380	230
304	2,134	1,067	178	367	2,768	1,384	231
305	2,149	1,074	179	368	2,775	1,388	232
306	2,160	1,080	180	369	2,787	1,394	233
307	2,168	1,084	181	370	2,978	1,399	234
308	2,175	1,088	182	371	2,809	1,405	235
309	2,187	1,094	183	372	2,817	1,409	235
310	2,198	1,099	183	373	2,824	1,412	236
311	2,209	1,105	184	374	2,835	1,418	237
312	2,220	1,110	185	375	2,847	1,423	238
313	2,228	1,114	186	376	2,858	1,429	239
314	2,235	1,117	186	377	2,868	1,434	239
315	2,247	1,123	187	378	2,879	1,439	240
316	2,255	1,127	188	379	2,884	1,442	241
317	2,269	1,135	189	380	2,895	1,448	242
318	2,280	1,140	190	381	2,907	1,454	243
319	2,288	1,144	191	382	2,914	1,457	243
320	2,295	1,148	192	383	2,926	1,463	244
321	2,307	1,154	192	384	2,937	1,469	245
322	2,318	1,159	193	385	2,945	1,473	246
323	2,329	1,165	194	386	2,955	1,478	247
324	2,340	1,170	195	387	2,965	1,482	247
325	2,348	1,174	196	388	2,970	1,485	248
326	2,355	1,178	197	389	2,982	1,491	249
327	2,367	1,184	198	390	2,993	1,497	250
328	2,374	1,187	198	391	3,008	1,504	251
329	2,389	1,195	200	392	3,015	1,508	252
330	2,400	1,200	200	393	3,023	1,512	252
331	2,408	1,204	201	394	3,036	1,518	253
332	2,415	1,208	202	395	3,047	1,523	254

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
396	3,053	1,527	255	422	3,315	1,658	277
397	3,064	1,532	256	423	3,327	1,664	278
398	3,075	1,538	257	424	3,338	1,669	279
399	3,087	1,544	258	425	3,345	1,673	279
400	3,094	1,547	258	426	3,353	1,677	280
401	3,105	1,553	259	426	3,364	1,682	281
402	3,113	1,557	260	428	3,375	1,688	282
403	3,135	1,568	262	430	3,398	1,699	284
404	3,143	1,572	262	431	3,405	1,703	284
405	3,143	1,572	262	431	3,405	1,703	284
406	3,150	1,575	263	422	3,415	1,707	285
407	3,162	1,581	264	433	3,424	1,712	286
408	3,173	1,587	265	434	3,435	1,718	287
409	3,184	1,592	266	435	3,443	1,722	287
410	3,195	1,598	267	436	3,454	1,727	288
411	3,203	1,602	267	437	3,465	1,733	289
412	3,214	1,607	268	438	3,477	1,739	290
413	3,225	1,613	269	439	3,489	1,744	291
414	3,233	1,617	270	440	3,495	1,748	292
415	3,144	1,622	271	- - - -	- - - -	- - - -	- - - -
416	3,255	1,628	272	For			
417	3,267	1,634	273	each			
418	3,274	1,637	273	cwt	12 00	6 00	1 00
419	3,285	1,643	274	there-			
420	3,297	1,649	275	after			
421	3,308	1,654	276				

(iv) Trailer other than semi-trailers or pole trailers, maximum permissible laden weights [illegible]

Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE			Combined MPLW or Kerb Weight (cwts.)	AMOUNT OF FEE		
	Per Annum	Per ½ Year	Per Month or part thereof		Per Annum	Per ½ Year	Per Month or part thereof
	$	$	$		$	$	$
1-10	36	19	4	[illegible]	[illegible]	[illegible]	[illegible]
11	49	25	4	[illegible]	[illegible]	[illegible]	[illegible]
12	57	29	5	[illegible]	[illegible]	[illegible]	[illegible]
13	68	36	7	[illegible]	[illegible]	[illegible]	[illegible]
14	75	38	7	[illegible]	[illegible]	[illegible]	[illegible]
15	83	42	8	[illegible]	[illegible]	[illegible]	[illegible]
16	90	45	8	[illegible]	[illegible]	[illegible]	[illegible]
17	98	49	9	[illegible]	[illegible]	[illegible]	[illegible]
18	105	53	9	[illegible]	[illegible]	[illegible]	[illegible]
19	113	57	10	[illegible]	[illegible]	[illegible]	[illegible]
20	124	62	11	[illegible]	[illegible]	[illegible]	[illegible]
21	132	66	11	[illegible]	[illegible]	[illegible]	[illegible]
22	143	72	12	[illegible]	[illegible]	[illegible]	[illegible]
23	150	75	13	[illegible]	[illegible]	[illegible]	[illegible]
24	154	77	13	[illegible]	[illegible]	[illegible]	[illegible]
25	158	79	14	[illegible]	[illegible]	[illegible]	[illegible]
26	165	83	14	[illegible]	[illegible]	[illegible]	[illegible]
27	169	85	15	[illegible]	[illegible]	[illegible]	[illegible]
28	73	87	15	[illegible]	[illegible]	[illegible]	[illegible]
29	177	89	15	[illegible]	[illegible]	[illegible]	[illegible]
30	180	90	15	[illegible]	[illegible]	[illegible]	[illegible]
31	184	92	16	[illegible]	[illegible]	[illegible]	[illegible]

Combined MPLW or Kerb Weight (cwts)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
54	293	147	25
55	297	149	25
56	300	150	25
57	304	152	26
58	308	154	26
59	312	156	26
60	315	158	27
61	323	162	27
62	330	165	28
63	334	167	28
64	338	169	29
65	342	171	29
66	345	173	29
67	349	175	30
68	353	177	30
69	360	180	30
70	364	182	31
71	368	184	31
72	375	188	32
73	379	190	32
74	383	192	32
75	387	194	33
76	390	195	33
77	398	199	34
78	402	201	34
79	405	203	34
80	409	205	35
81	413	207	35
82	420	210	36
83	424	212	36
84	428	214	36
85	431	216	37
86	435	218	37
87	443	222	37
88	447	224	38
89	450	225	38
90	454	227	38
91	462	231	39
92	465	233	39
93	469	235	40
94	473	237	40
95	477	239	40
96	480	240	41
97	488	244	41
98	491	246	41
99	495	248	42
100	499	250	42
101	503	252	43
102	506	254	43
103	510	255	43
104	518	259	44
105	522	261	44
106	525	263	44
107	529	265	45
108	533	267	45
109	540	270	45
110	544	272	46

Combined MPLW or Kerb Weight (cwts)	AMOUNT OF FEE Per Annum $	Per ½ Year $	Per Month or part thereof $
110	548	274	46
111	552	276	46
112	555	278	47
113	563	282	47
114	567	284	48
115	570	285	48
116	574	287	48
117	582	291	49
118	585	293	49
119	589	295	50
120	593	297	50
121	597	299	50
122	600	300	50
123	608	304	51
124	612	306	51
125	615	308	52
126	623	312	52
127	630	315	53
128	630	325	53
129	634	317	53
131	642	321	54
132	645	323	54
133	649	325	55
134	657	329	55
135	660	330	55
136	668	334	56
137	672	336	56
138	675	338	57
139	679	340	57
140	687	344	57
141	689	345	58
142	690	345	58
143	692	346	58
144	693	347	58
145	695	348	58
146	696	348	58
147	698	349	59
148	699	350	59
149	701	351	59
150	702	351	59
151	704	352	59

(vi) Semi-trailers authorised and constructed for the carriage of containers as stated hereunder:

AMOUNT OF FEE		
Per Annum	Per ½ Year	Per Month or part thereof
$	$	$
90	45	7.50

For the purpose of this sub-item –

(a) a motor vehicle constructed or adapted for use and used for the conveyance and no other load except articles used in connection with the machine or contrivance shall, notwithstanding that the machine or contrivance is built in as part thereof, be chargeable with fees on the maximum permissible laden weight of the vehicle.

(b) where a goods vehicle is licensed but is not an authorised vehicle under Part V of the Ordinance of a vehicle to which the exemption under paragraph (g) of subsection (2) of section 98 of the Ordinance applies, the above fees shall be reduced in the case of a vehicle not exceeding 40 cwts. in maximum permissible laden weight by a sum of $5 per month and in the case of a vehicle exceeding 40 cwts in maximum permissible laden weigth by a sum of $10 per month

(c) for licences issued under items 11 (1) (b) (i) and 11 (1) (b) (ii) for periods of less than six months but more than one month, the fees shall be calculated as a multiple of the one month rate; and

(d) in the case of a goods vehicle to which the exemption under paragraph (g) of subsection (2) of section 98 of the Ordinance applies and the maximum permissible laden weight of which exceeds 18 cwts there shall be added to the above fees a sum of $10 per month or part thereof

		Per Annum		Per Month or Part thereof
		$		$
(5)	In respect of invalid carriages			
(6)	In respect of school buses –			
	(a) not exceeding 20 passengers authorised seating capacity ...	$2.50	2.25	3.50
	(b) exceeding 20 passengers but not exceeding 30 passengers authorised seating capacity	75	1.50	2.75

	Per Annum	Per ½ Year	Per Month or Part thereof
	$	$	$
(c) exceeding 30 passengers authorised seating capacity	105	52.50	9

(7) In respect of motor vehicles which are –

(a) Land tractors (whether or not authorised under Part V of the Ordinance),

(b) Mobile machinery, and

(c) Road-making machinery,

not exempted from licence fee under rule 28 and which in the case of vehicles falling within (a) or (b) are designed and used primarily for work on land and are used on a road only when proceeding to and from the site of such work and when so used haul nothing other than land implements and which in the case of vehicles falling within (c) are used solely for the construction or repair of roads

(8) In respect of goods vehicles registered in Singapore and authorised to operate in the States of Malaya under a licence issued under Part V of the Ordinance, or in respect of goods vehicles registered in Singapore and in relation to which a motor vehicle licence under Part II of the Ordinance is granted for purposes of operating in the States of Malaya

The rates specified under ... per mensem less the fees paid or liable to be paid to the Registrar of vehicles in Singapore in respect of the same vehicle for the period of the licence applied for

(9) In respect of public service vehicles licensed in Singapore and authorised to operate in the

			Per Annum	Per ½ Year	Per Month or Part thereof
		States of Malaya under a licence issued under Part V of the Ordinance –			
		Hire Cars, Self Drive Cars and Taxi Cabs	24	12	2
		Other public service vehicles	60	30	5
(A)	(9A)	In respect of excursion buses Licensed in Thailand and authorised to operate in West Malaysia under a licence issued under the Commercial Vehicles Licensing Board Act 1987	60	30	5
	(10)	Vehicles other than road rollers which are not fitted with pneumatic tyres.	Double the rates chargeable under the foregoing provisions of this item in respect of a vehicle which is so fitted		

(A) (11) In respect of a factory workers [illegible] the following licence fee shall be charged [illegible]

(i) If fitted with an engine [illegible] to duty under Heading No. [illegible] the Customs Duties Order 1978 and [illegible]

(a) not exceeding 2,000 c.c.	$ 1.50	Plus $2.00 in respect
(b) exceeding 2,000 c.c.	[illegible]	

(ii) If not so fitted

(a) not exceeding 1,500 c.c.	[illegible]	passenger authorised
(b) exceeding 1,500 c.c. but not exceeding 2,500 c.c.	[illegible]	on the vehicle by the licence issued under Part V of the Ordinance
(c) exceeding 2,500 c.c. but not exceeding 3,500 c.c.	[illegible]	
(d) exceeding 3,500 c.c.	[illegible]	

(A) (11A) In respect of a goods vehicle and a bus the unladen weight of which exceeds 2,000 kg owned by a driving school for purposes of giving driving instruction [illegible]

12. In respect of a MOTOR TRADE LICENCE:

	Per Annum	Per ½ Year	Per Month or part thereof
(a) For use or all vehicles ...	700.00	350.00	60.00
(b) For use only on invalid carriages, motor cycles and pedestrian controlled vehicles	240.00	125.00	22.00

Plus a non-refundable fee of $20 in respect of each pair of trade plates issued with the licence.

13. In respect of a VISITOR'S LICENCE - - 7.50

PART II – SABAH

PRESCRIBED FEES

Item No	*Description of Fee*	*Amount of Fee $ sen*
1.	(a) On the REGISTRATION of a motor vehicle other than an invalid carriage a motor bicycle, a motor tricycle or a trader	[illegible]
	(b) On the REGISTRATION of a trader	20.00
2.	On the REGISTRATION of a motor vehicle which is a motor bicycle or a motor tricycle	5.00
3.	On the REGISTRATION of an invalid carriage	Nil
4.	*(Omitted).*	
5.	*(Omitted)*	
6.	On the RE-REGISTRATION of a motor of which the registration has been cancelled	(illegible)
7.	On the TRANSFER of a motor vehicle	
	(a) other than an invalid carriage, a motor bicycle or a motor tricycle	40.00
	(b) a motor bicycle or a motor tricycle	40.00
	(c) an invalid carriage	Nil
	(d) a trader	20.00

COUNTRY REPORT OF KOREA

EXPERT GROUP MEETING ON TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

by
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Presented
at
Expert Group Meeting on Type Approval Procedures
for New Vehicles
Organized by
United Nations Industrial Development Organization (UNIDO)
in co-operation with
Directorate General of Land Transport
Jakarta, Indonesia
8-10 June 1993

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1. Introduction

The vehicle population in Korea has increased at a rapid rate since the beginning of the 1980's, reached to over 5 million in year 1992 from 0.5 million in 1980. In addition, most of them (about 80%) are passenger cars and are concentrated in such large cities as Seoul.

Motor vehicles are one of the major sources of air pollution in Korea. To solve these air pollution problems, the government strengthened vehicle emission standards in 1987. To meet these new emission standards, many new models of passenger cars using gasoline and LPG were required to install catalytic converters as an exhaust purification systems, and to use unleaded fuel starting July 1987. From January 1988, this new emission standard was applied to all new passenger cars. Korea, thus became the fourth country in the world to require the mandatory use of low emission vehicles and unleaded gasoline.

The Ministry of Environment established a five year master plan for environmental improvement (1992 - 1996) in 1991 and revised the motor vehicle emission standards in 1991 and in 1992 in accordance with this plan.

The following are the main contents of the revisions :

- increase of the number of low emission passenger cars and expansion of recall program,
- lower emission standards,
- measures for reducing diesel vehicle smoke,
- establishment of low pollution fuel,
- development of clean cars,
- study of a monetary penalty system

2. Analysis of traffic condition

2.1 Increasing number of vehicles

- Motor vehicle population

  The number of motor vehicles has increased sharply from the beginning of the 1980's (see Figure 1). Korea has a vehicle population of more than 5 million as of Dec. 1992; 64.0% are cars, 25.7% are trucks and 10.1% are buses.

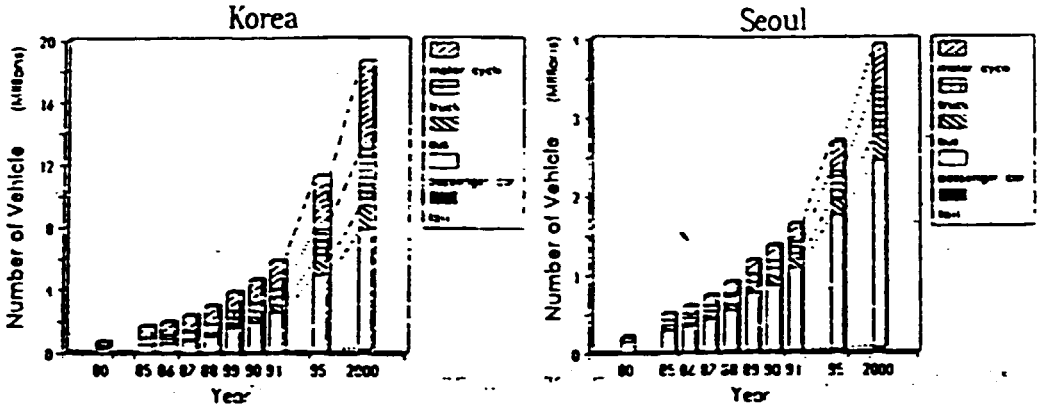


Figure 1. Increasing trend of number of vehicles

- Motor vehicle growth rate

  The number of the motor vehicle population in Korea increased continuously from 528,000 in 1980 to over 5 million in year 1992. The number of automobiles was increased more than 2700 vehicle per day (annual inc. rate 23.2%) in 1992. The motor vehicle growth rate for last decade was 30.4% (annual inc. rate) for PC (my car only) and 23.2% for total vehicles. If the current tendency is maintained, the projected motor vehicle number in 2000 is up to 13 million.

2.2 Status of roads

For last decade, the road construction was very insufficient compared with the sharp increasing number in vehicle population.

Sum of national expressway (1597km) and national highway (1212km) are only 23.6% out of total roads (58094km), and 90% of national highway are 2-lane roads. Accordingly, these roads are lack of a function as an arterial road.

National expressways newly cosntructed from 1981 to 1991 are only 352km and total length causing a bottleneck reach to 1320km. Especially, the traffic congestions of the Kyung-in Expressway (Seoul - Incheon) and the Kyung - Soo (Seoul - Soowon) are serious. If this trend of road traffic congestion is maintained, it is expected that total length causing a bottleneck reach to 4020km (natronal expressway : 1130km, national highway : 2890km) in 1996.

Campared the motorization and the road density with those of developed countries, we can see that m/vehicle and m/person are very low and serious.

To solve the traffic congestion owing to the lack of roads, especially in Seoul, expansion of the subway network is underway as shown in 2.3.2.

2.3 Traffic conditions of large cities in Korea

2.3.1 Status

The number of vehicles of large cities has increased rapidly compared with those of nation wide. In case of Seoul, the transportation share of city buses is 39%, which is higher than that of other foreign cities such as Tokyo (6%), New York (14%) and London (9%). On the other hand, the transportation share of subway is 25%, which is lower than that of other foreign cities such as Tokyo (76%), New York (72%) and London (74%) (see Table 1).

〈Table 1〉 Transportation share by mode in major cities

City / Transpotation	Seoul	Tokyo	New York	London
Bus	39%	6%	14%	9%
Subway	19%	76%	72%	74%

One of the main cause of traffic congestion in large cities is the high average daily driving distance. The average daily driving distance of a passenger car is 62.4 km which is higher than that of Japan (24.1 km) and that of U.S.A (45.2 km) (see Table 2 and Figure 2).

〈Table 2〉 Average daily driving distance

(Unit : km)

Countryy	Austria ('81)	Denmark ('81)	W.Germany ('81)	Japan ('85)	Holland ('82)
Average Daily Driving Distance	30.1	38.2	32.6	24.1	33.2
Norway ('81)	Spain ('81)	U.K ('81)	U.S.A ('87)	Sweden ('81)	Korea ('90)
31.5	18.6	41.4	45.2	32.9	62.4

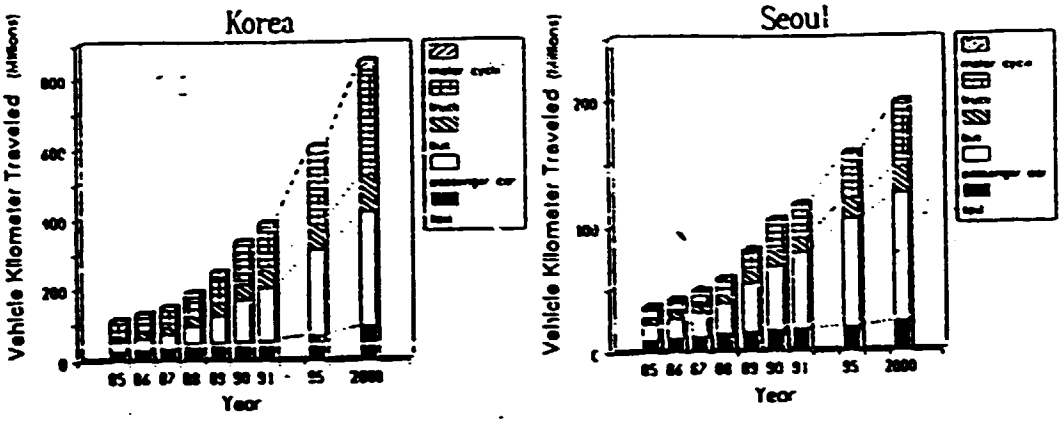


Figure 2. Increasing trend of vehicle kilometer traveled

Especially, the high concentration of vehicles in large cities causes the average vehicle speed drop (see Table 3), so does energy inefficiency and more exhaust emission.

<Table 3> Average vehicle speed in Seoul

Year	'83	'85	'89	'92
Average vehicle speed KPH	31	31.9	22.9	20

2.3.2 Expansion of the subway network

A distinguished feature of Korea's transportation system is its high dependence on buses. In Seoul, buses transport accounts for almost 39% of total passenger transportation, which cause tremendous congestion and air pollution.

The most effective way to tackle these problems would be the large scale expansion of the subway network. In order to alleviate the ever-worsening traffic and vehicle emission problem, the second phase of the subway construction project will be completed by 1996 and the third phase by 1999.

Upon completion of the third project, the Seoul subway system will be widely used by means of public transportation carrying 23 million passengers per day and handling 75% of the total traffic population. At present, the Seoul subway system handles 19% of the total transportation, carrying 4.63 million passengers a day (see Table 4).

<Table 4> Trends of the shares of transportation model split in Seoul

(%)

Mode of Transportation	1983	1990	1996	1999
Buses	64.3	43.3	26.2	10.0
Subways (Total length, km)	10.0 (7.8)	18.8 (118)	50.0 (278)	75.0 (400)
Taxies	17.0	12.8	5.0	4.0
Cars & others	8.7	25.1	18.8	11.0

3. Emission control of new vehicles

3.1 General

A comprehensive and effective control system has been set up in Korea in order to check that motor vehicles comply with roadworthiness standards being in force. The control procedure consists of two, separately conducted parts :

a) control with regard to safety and performance carried out by the Ministry of Transportation (MOT),

b) environment-related control carried out by the Ministry of Environment (MOE).

The environment-related control indudes the following items :

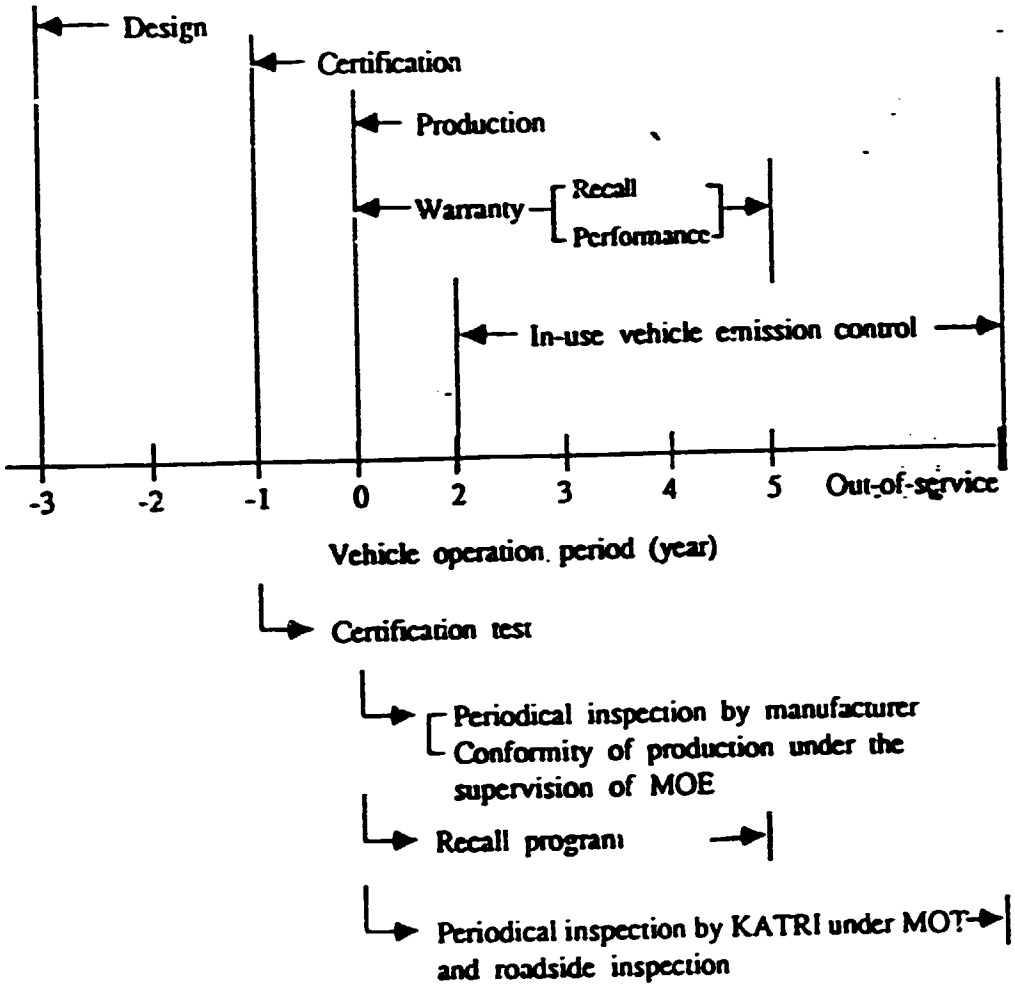
- poilutant emissions,
- noise.

New and in-use vehicle emission control system is shown in Figure 3.

3.2 Emission standards

Since the establishment of Environment Administration of Korea in 1980, emission standards for new vehicle were amended several times. Especially, the strict control over exhaust emission has been implemented to gasoline and LPG-powered vehicles (new model only) similarly to U.S.A and Japan from July 1, 1987, and extended to all gasoline and LPG-powered vehicles (new and existing model) since Jan. 1988.

Figure 3. New and in-use vehicle emission control system



* Test agencies

  - Certification test : NIER and/or car manufacturer under the supervision of NIER
  - Periodical inspection : Car manufacturer (E/M and noise only)
  - COP : Car manufacturer under the supervision of MOE
  - Recall program : NIER
  - Periodical inspection : KATRI
  - Roadside inspection : Regional environment offices, city and the provincial authorities

MOE : Ministry of Environment
NIER : National Institute of Environmental Research
MOT : Ministry of Transportation
KATRI : Korea Automobile Testing & Research Institute

As this strict standard, emission controllers, 3-way catalytic converter and EGR etc. are equipped to passenger car and 90% of emissions compared with conventional passenger car are reduced. Unleaded gasoline has been used in all new gasoline-powered vehicles.

As it is shown in Table 5, 10-mode test procedures were adopted for passenger cars and light-duty trucks from 1980 to June 1987, and CVS-75 test procedures from July 1987, which are similar to those of FTP-75 test proce-dures in US. With the adoption of CVS-75 test procedures, evaporative emi-ssion control was initiated.

Recent amendments (called the Air Quality Control Law) to the Environment Conservation Act call for gradually more stringent standards for diesel vehicles (see Table 6) according to which Korea will be able to meet U.S 1996 standards by the year 2000.

<Table 5> Emission standards for new gasoline and LPG vehicle

Type of Vehicle	Model Year	Test Procedure	CO	NOx	HC	
					Exhaust	Evaporative (g/test)
Small Size Car ①	1987.7.1	CVS-75 (g/km)	8.0	1.5	2.1	4.0
	2000.1.1	CVS-75 (g/km)	2.11	0.62	0.25	2.0
Passenger Car	1980.1.1	10-Mode (g/km)	26.0	3.0	3.8	-
	1984.7.1	10-Mode (g/km)	18.0	2.5	2.8	-
	1987.7.1	CVS-75(g/km)	2.11	0.62	0.25	2.0
	2000.1.1	CVS-75(g/km)	2.11	0.25	0.16	2.0
Light-Duty Truck (GVW≤3ton)	1987.7.1	CVS-75(g/km)	6.21	1.43	0.50	2.0
	2000.1.1	CVS-75(g/km) ②	2.11	0.62	0.25	2.0
		CVS-75(g/km) ③	6.21	1.43	0.5	2.0
Heavy-Duty Vehicle (GVW>3ton)	1980.1.1	6-Mode (ppm)	1.6%	2200	520	-
	1987.7.1	Transient (g/b.hp-hr)	15.5	10.7	1.3	4.0
	1994.2.1	G-13 Mode (g/KWH)	33.5	11.4	1.3	-
	2000.1.1	G-13 Mode (g/KWH)	33.5	5.5	1.3	-

① Less than 800cc of engine displacement

② LDTs which have gross vehicle weight of 2.0 ton or less and are constructed primarily for the carriage of persons

③ Light duty truck except ②

Diesel emission standards for new vehicle are different from those of the gasoline car. Especially the diesel emission standard is very important for air pollution prevention in Korea, because Korea has more diesel vehicles in percentage than any other developed countries. However, diesel passenger cars should meet the same standards as those of current gasoline passenger cars from 1993.

The contribution rate of air pollutants by the diesel vehicles is higher than that of other types of vehicles. Buses and trucks using diesel fuel are mainly responsible for NOx, SOx and particulate.

Upon this reason, the Ministry of Environment strengthened emission standards of diesel vehicles. Recent amendments, the Air Quality Control Law, established a new timetable which required, for example, the after-treatment devices for smoke to be equipped to the city bus by the year 2000.

The followings are the main contents of amendments in 1991.

a) Substantial reduction in NOx :
   (1) the reductionn of emission limits for NOx from diesel-powered vehicles by 61 to 65 percent from current levels by providing three-phase target values,
   (2) the unification of standards for both direct and indirect injection type diesel – powered motor vehicles,
   (3) the reduction of future diesel vehicles NOx emission targets to the same levels as for gasoline – fueled motor vehicles.

b) Introduction of particulate matter standards :
   (1) the introduction of particulate matter standards from diesel vehicles to reduce current levels by 50 to 89 percent by providing two – phase target values,
   (2) the reduction of diesel smoke emission levels by half from current levels by providing two – phase target values.

c) Revision of exhaust emission measurement methods :
   (1) 6 – Mode → CVS – 75 Mode (PC : from 1993, LDTs : from 1996)
   Emission standards for diesel passenger cars and light duty trucks are changed the current concentration standard to the weight standard (g/km) in accordance with the change in measurement method from the current Japanese Diesel 6 Mode to the CVS – 75 Mode.

(2) 6 – Mode → ECE – 13 Mode

The emission standards for heavy duty vehicles were revised to regulate emission weight (g/KWH) with ECE – 13 Mode test as opposed to the current standards which indicate levels of concentration for various emissions.

In the developing countries visible smoke is one of serious problems in general. Accordingly ECE – 13 Mode can be considered more efficient than Japan Diesel – 13 Mode in order to control visible smoke and particulate simutaneously.

<Table 6> Emission standards for new diesel vehicles

Type of Vehicle	Model Year	Test Procedure	CO	NOx	HC	Particulate	Smoke (%)⑤
Passenger Car	1980.1.1	Full Load	–	–	–	–	50%
	1984.7.1	6Mode (ppm)	980	1000/590 ①	670	–	50%
	1988.1.1	6Mode (ppm)	980	850/450 ①	670	–	50%
	1993.1.1	CVS – 75 (g/km)	2.11	0.62	0.25	0.12	–
	1996.1.1	CVS – 75 (g/km)	2.11	0.62	0.25	0.08	–
	2000.1.1	CVS – 75 (g/km)	2.11	0.62	0.25	0.05	–
Light duty Truck (GVW ≤ 3ton)	1980.1.1	Full Load	–	–	–	–	50%
	1984.7.1	6Mode (ppm)	980	1000/590	670	–	50%
	1988.1.1	6Mode (ppm)	980	850/450	670	–	50%
	1993.1.1	6Mode (ppm)	980	750/350	670	–	40%
	1996.1.1	CVS – 75 (g/km)	6.21	1.43	0.5	0.31 ② (0.16)	–
	2000.1.1	CVS – 75 (g/km)	2.11	0.75	0.25	0.12	–
		CVS – 75 (g/km) ③	6.21	1.06	0.5	0.16	–
Heavy Duty Vehicle (GVW > 3ton)	1980.1.1	Full Load	–	–	–	–	50%
	1984.7.1	6Mode (ppm)	980	1000/590	670	–	50%
	1988.1.1	6Mode (ppm)	980	850/450	670	–	50%
	1993.1.1	6Mode (ppm)	980	750/350	670	–	40%
	1996.1.1	D – 13Mode (g/KWH)	4.9	11.0	1.2	0.9	40%
	2000.1.1	D – 13Mode (g/KWH)	4.9	6.0	1.2	0.25 ④ (0.10)	25%

Note : ① Direct Injection/Indirect Injection

② LDTs which have gross vehicle weight of 2.0 ton or less and are constructed primarily for the carriage of persons

③ Light duty truck except ②

④ ( ) City Bus

⑤ Smoke is measured according to 3 – Mode

The emission standards for motor cycle are shown in Table 7. The standards which had been relieved of restraint except that relating to noise, were prepared for HC and CO begining Aug. 1991, and for strick requirements in 1993 and 1996.

<Table 7> Emission standards for motor cycle

Engine Displacement	Engine Type	Model Year	CO (%)	HC (%)	Test Procedure
displacement 125cc	2 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 4.5 4.0	1.10 1.10 0.70	Idling
	4 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 4.5 4.0	0.45 0.45 0.40	
125cc<displ-acement 500cc	2 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 4.5 3.6	1.10 0.78 0.45	
	4 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 4.5 3.6	0.45 0.45 0.25	
displacement> 500cc	2 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 4.5 3.0	1.10 0.45 0.30	
	4 stroke	1991.8.1 1993.1.1 1996.1.1	5.5 0.12 2.5	0.45 2.5 0.12	

3.3 Control measures

3.3.1 Certification

Every motor vehicle subject to certification should be covered by a certificate of conformity stating that emission requirements provided for in the standards are complied with. The certificate is issued by MOE for engine family – vehicle configuration combination. Actual emission tests are conducted by National Institute of Environmental Research (NIER). Certification system and certification flow chart are shown in Table 8 and 9 respetively.

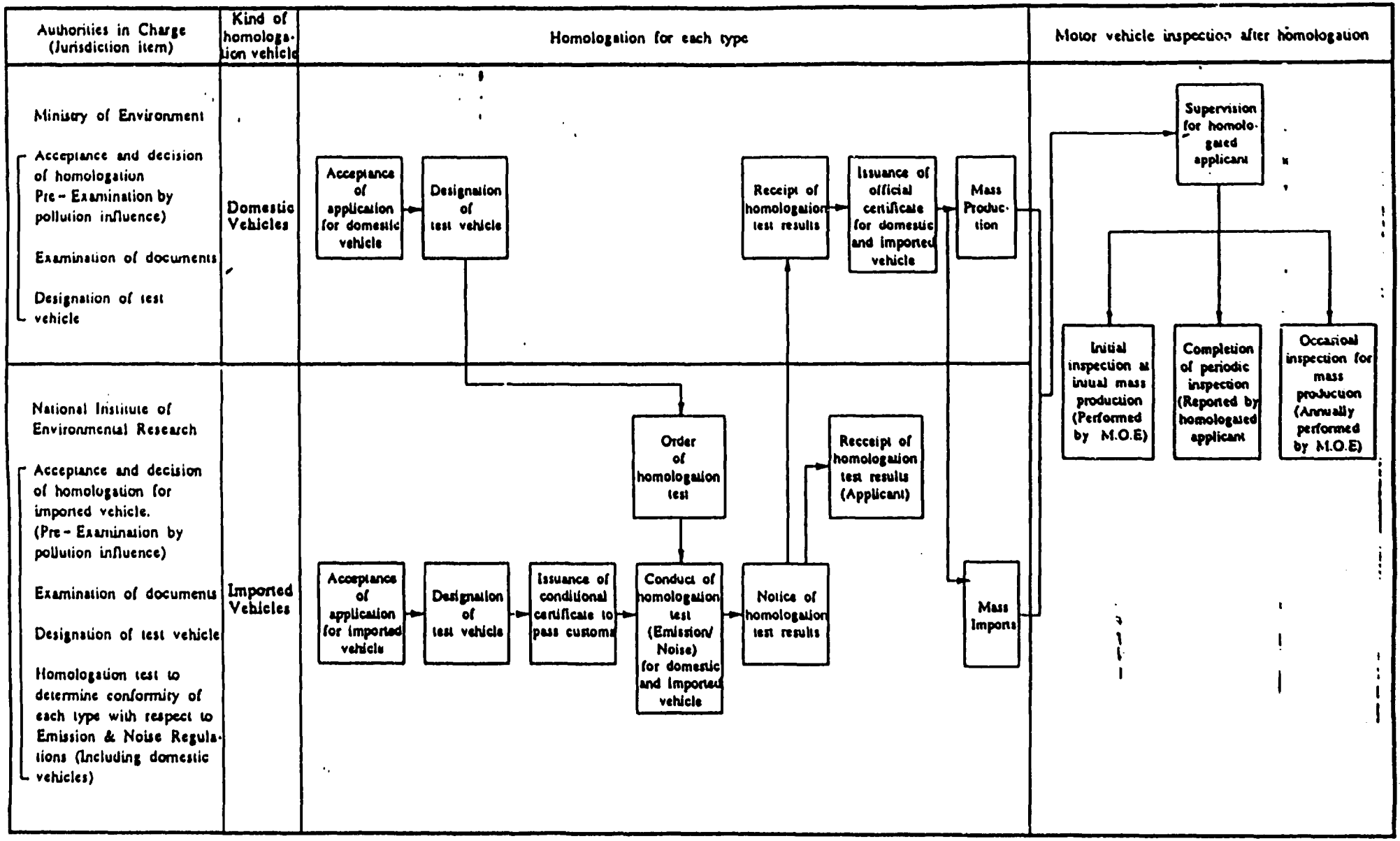
In order to determine whether vehicles manufactured by the manufacturer, who has obtained the certificate, conform to the emission standards in respect to which the certification was conducted, MOE is empowered to conduct surveillance tests on samples of vehicles randomly drawn from the

<Table 8> Certification Systems of Korea, Japan, U.S. and Europe

Comparison of Certification Systems

	PRE - PRODUCTION		ASSEMBLY - LINE	IN - USE
	TESTING	CERTIFICATEEE		
KOREA	Official Laboratory and/or Manufacturer	Issued by Government	• TPI • COP (at the start of production and on occasion) • Periodic inspection by manufacturer (monthly)	Periodic Inspection (MOT) and Maintenance (MOE) and Recall Program by Governement and Road - Size Inspection
JAPAN	Official Laboratory	Issued by Government	Sampling Emission Testing by Manufacturer	Periodic Inspection and Maintenance by Government or Authorized Service Shop
USA	Official Laboratory and/or Manufacturer	Issued by Government	Selective Audit Testing under the order of Government	Emission Testing of Privately Owned Vehicle by Government
EEC/ECE	Official Laboratory	Issued by Government		
AUSTRALIA	Manufacturer	Issued by Government	Test Facility Inspection (TFI) Conformity of Production (COP)	Emission Testing of New Vehicle by Some State Government
EFTA SWEDEN & SWITZERLAND)	Manufacturer and/or Official Laboratory	Issued by Government		Emission Testing of Stabilized Vehicle by Government
CANADA	Manufacturer	Self Certificate		Emission Testing of stabilized Vehicle by Government

<Table 9> Flow Chart of Homologation (Exhaust Emission & Noise) IN KOREA



manufacturer's line. 1–2 samples are usually drawn every year for each engine family. A sample is composed of 3–5 vehicles. If a sample fails the tests, the certificate of conformity may be suspended or revoked.

Methods to determine the same "engine family", to clarify emission control system, and to classify the same "evaporative emission family" are similar to those of U.S.A which are described well in Annex 3 of "Guidelines for New Motor Vehicle Emission Control in the Asia – Pacific Region."

The aforementioned exhaust and evaporative emission standards apply to the emissions of vehicles for their useful life. The term "useful life" means one of the following values shown in Table 10 whichever first occurs :

< Table 10 > Warranty period of automotive emission control system (Useful Life)

Fuel \ Model Year / Type of Vehicle		Feb. 2, '91 – Dec. 31, '92	Jan. 1, '93 – Dec. 31, '95	After Jan. 1, '96
Gasoline	Passenger Car	5 years or 80,000km	5 years or 80,000km	5 years or 80,000km
	Light – Duty Truck	10,000km	20,000km	20,000km
Gas	Passenger Car	80,000km	100,000km	120,000km
	Light – Duty Truck	10,000km	20,000km	40,000km
Diesel	Passenger Car	–	5 years or 80,000km	5 years or 80,000km
	Light – Duty Truck	–		40,000km

The emission values to be compared with the standards are the official emission results for each emission – data vehicle adjusted by applying the appropriate deterioration factors. For light duty vehicles the deterioration factors are determined on the basis of durability – data vehicle tests :

a) for exhaust emissions – deterioration factors are equal to emissions interpolated to 50000 miles divided by emissions interpolated to 4000 miles; the emission – data vehicle results are multiplied by the respective facotrs.

b) for evaporative emissions – deterioration factor is equal to emission level at 50,000 miles minus emission level at 4000 miles ; the factor is added to the emission – data vehicle results.

According to the Circular Notice No. 92-28 (revision 5/13/92) of the Korean Ministry of Environment, the durability run could be exempted for the vehicles that the projected sales are less than 10,000 yearly, then the assigned deterioration factors have to apply to those vehicles tested acc. to the FTP – 75 test procedure.

The assigned deterioration factors (DFs) valid in such countries of which certificates are accepted by the Korean MOE (i.e. Austria, Germany, Sweden, Switzerland) are as shown in the Table 11 below.

<Table 11> Assigned DFs for Diesel powered vehicles

Country	DFs			
	HC	CO	NOx	PM
Austria	1.0	1.1	1.0	1.2
Finland	1.0	1.1	1.0	1.2
Germany	1.0	1.1	1.0	1.2
Norway	1.0	1.1	1.0	1.2
Sweden	1.0	1.1	1.0	1.2
Switzerland	1.0	1.1	1.0	1.2
Korea ①	1.2	1.2	1.2	1.2

① Valid for sales volume less than 10,000 units per veil model and per year.

The DFs for Diesel powered vehicles in the Korean exhaust emission regulation as revised with Circular Notice No. 92 – 28 are unrealistically high for the emission control system of Diesel vehicles and are therefore disadvantageous to accept as an option to the manufacturer.

Also for Gasoline powered vehicles the option to use assigned DFs instead of performing a 80,000 km durability run exists in the Korean exhaust emission regulation. Since this regulation accepts the use of foreign certificates, the assigned DFs valid in those countries (i.e. Austria, Germany, Sweden, Switzerland) as shown in Table 12, should also be accepted and implemented into the Korean exhaust emission regulation.

<Table 12> Assigned DFs for gasoline powered vehicles

Country	DFs		
	HC	CO	NOx
Austria	1.3	1.2	1.1
Finland	1.3	1.2	1.1
Germany	1.3	1.2	1.1
Norway	1.3	1.2	1.1
Sweden	1.3	1.2	1.1
Switzeriand	1.3	1.2	1.1
Korea ①	1.3	1.3	1.2

① Valid for sales volume less than 10,000 units per vehicle model and per year

Taking for above mentioned into consideration and with regard to the international harmonization, it is requested :

a) to accept for diesel powered vehicles as well as for gasoline powered vehicles the same assigned deterioration factors for gaseous emissions (HC, CO, NOx) like applicable in Austria, Germany, Finland, Norway, Sweden and Switzerland and to implement these deterioration factors also into the Korean exhaust emission regulation,

b) to implement for particulate emissions an assigned deterioration factor of 1.0, that the deterioration factor of the particulate matters is below 1.0.

Any motor vehicle/engine covered by a certificate of conformity should be marked with a legible label containing, among others, the following information :

- name or trade mark of manufacturer,
- certificate No.
- engine family identification,
- engine tune-up specifications,
- engine specifications
- fuel economy (km/ *l*)
- statement "This vehicle (engine) conforms to ROK MOE regulation applicable to 19.., Model Year ·····".

Most of the actual conduct of the certification process is usually done by the manufacturer. The approval authority monitors the process and tries to maximize the confidence level in the data and information which are the basis for issuance of a certificate of conformity. MOE may require that test vehicles be submitted to MOE, without charge, for purposes of conducting emission tests. Such tests may be conducted at the manufacturer's facility.

3.3.2 Selective enforcement audits (SEA or COP)

The conformity of production of vehicles covered by a certificate of conformity may be checked by MOE in the begining of production and on ocasion. The verification process is called Selective Enforcement Auditing (SEA). The testing is required by means of SEA test order addressed to the manufacturer in which, among others, the vehicle/engine configuration to be selected for SEA is specified. In principle, tests are conducted by the manufacturer under MOE supervision. However, MOE is empowered to conduct tests on its own.

SEA tests are carried out in accordance with the procedure used in the process of certification for emission – data vehicles i.e. no durability tests are conducted. The final SEA test results are determined by multiplying the values obtained on test vehicles by the appropriate deterioration factors derived from the certification process.

The vehicles comprising the test sample are tested until a pass decision or a fail decision is reached. The pass or fail decisions are taken on the basis of the cumulative number of failed vehicles. The criteria depends on the annual sales. An example of sampling plan is given in Table 13.

A failed vehicle is defined as one whose final test results exceed the emission standard for at least one pollutant. A pass decision is reached when the cumulative number of failed vehicles for each pollutant is less or equal to "pass number" (see Table 13). A fail decision is reached when the cumulative number of failed vehicles for one pollutant is greater than or equal to "fail number".

<Table 13> Sampling plan for SEA of light duty vehicles
(EX. : annual sales of 50 ~ 99)

Stage	Pass No.	Fail No.	Stage	Pass No.	Fail No.
1	(1)	(2)	16	6	11
2	(1)	(2)	17	7	12
3	(1)	(2)	18	7	12
4	0	(2)	19	8	13
5	0	(2)	20	8	13
6	1	6	21	9	14
7	1	7	22	10	14
8	2	7	23	10	15
9	2	8	24	11	15
10	3	8	25	11	16
11	3	9	26	12	16
12	4	9	27	12	17
13	5	10	28	13	17
14	5	10	29	14	17
15	6	11	30	16	17

(1) Test sample passing not permitted at this stage
(2) Test sample failure not permitted at this stage

The certificate of conformity may be suspended for a vehicle/engine configuration which does not pass SEA. Once it has been suspended, the manufacturer must take, among others, the following steps for the failed configuration :

- to remedy the non – conformity,
- to demonstrate that the configuration conforms to the standard by retesting vehicles.

3.3.3 Recall program

The aforementioned emission standards for cars and light duty vehicles apply to the emissions of vehicles for their useful life which is set to 80,000 km or 5 years. In order to guarantee required performance for the useful life the recall programmes were introduced in 1990. The following procedure is used for this purpose :

- a sample for the recall tests consists of 5 vehicles of the same engine family,

- vehicles are randomly selected from the register file,
- vehicle owners are requested by mail to submit their vehicles for testing,
- technical condition of selected and submitted vehicles is checked,
- emission tests are usually conducted at NIER facilities and arithmetical average is taken as the test results,
- if the sample fails the tests, the vehicle manufacturer may request a repetition of recall tests,
- if the sample fails the tests, components affecting emissions to be replaced/repaired are listed in the test report,
- MOE decides whether and which components should be replaced in the in-use vehicles.

3.3.4 Inspection and maintenance program for in-use vehicles

To control exhaust emissions for in-use vehicles, permissible emission standards, set as they are shown in Table 14, are applied through periodic and roadside inspections.

As they are shown in Table 15, safety performance and exhaust emission for in-use motor vehicle are tested once in every 6 month to 2 years depending on the types and ages of motor vehicles in periodic inspection.

In addition to periodic inspection, to make sure of the post inspection and maintenances, random roadside inspection are carried out by inspection teams organized between city or provincial administrative and prosecuting authorities. In inspection, vehicles that exceed the standards are subject to maintenance order with accusation. The driver of the accused vehicle is fined to the maximum of ₩500,000 for it. In case of a company owned vehicle, the owner of the vehicle are fined to the maxi-mum of ₩500,000 for it. Penalty provision of roadside inspection pro-gram is shown in Table 16.

In addition to these inspections, drivers and mechanics are fully informed of the effects of exhaust emissions to air pollution and adverse effects of air pollution to human health and they are advised to make through jobs of the inspection and maintenance of vehicles.

<Table 14> Emission standards for in-use vehicles

Type of Vehicle \ Pollutants		CO	HC	Smoke	Remark
Gasoline and LPG Cars	1979 - 1984.6	4.5%	-	-	
	1984.7 - 1987.7	4.5%	1200 ppm	-	
	As of July 1987.	4.5%	1200 ppm	-	Old model car (Small size car, LDTs and HDVs)
		1.2%	220 ppm	-	New model gasoline car
		1.2%	400 ppm	-	New model LPG car
Diesel Cars	1979 - 1990	-	-	50%	
	AS of Jan. 1991	-	-	40%	

* Test Method : CO/HC : Idling (NDIR)
Smoke : Free Acceleration (opacity)

<Table 15> Types of motor vehicle subjected to inspection and the interval of inspection

Classification		Inspection Intervals
Private Passenger Cars and Trailers	Aged less than 10 years Aged more than 10 Years	2 years 1 Year
Passenger Cars for Business Use		1 Year
Light Duty Trucks	Aged less than 10 years Aged more than 10 Years	1 year 6 months
Other Motor Vehicles	Aged less than 10 years Aged more than 10 Years	1 year 6 months

<Table 16> Penalty provision of roadside inspection program

Pollutant	Model Year	Kind of Fuel	Model Year	Standards	Penalty Provision		
					Maintenance Order	Suspension of Operation	Fine
Smoke	All Model	Diesel Fuel	All Vehicles	40%	41%	60–70% : 1day 70–80% : 2days Min. 80% : 5days	41%
CO	87 Model year or Old	Gasoline and LPG	All Vehicles	4.5%	4.6%	Excess % of standards - 400–500% : 2days - min. 500% : 3days	9.1%
	88 Model year or New	Gasoline and LPG	Passenger Cars	1.2%	1.3%		4.5%
			Others	4.5%	4.6%		9.1%
HC	87 Model year or Old	Gasoline and LPG	All Vehicles	1200ppm	1201ppm		4800ppm
	88 Model year or New	Gasoline	Passenger Cars	220ppm	221ppm		881ppm
		LPG	Passenger Cars	400ppm	401ppm		1601ppm
		Gasoline and LPG	Others	1200ppm	1201ppm		4801ppm

3.3.5 Fuel quality control

The normal performance of automobiles relies heavily on the quality of fuel, and so does the exhaust of automotive emission. New standards for aromatic compounds, benzene and oxygen in gasoline have been established (see Table 17). Those for lead will not be contained in gasoline from 1993 ; and those for phoshphorous that the catalytic function of catalytic converter equiped passenger cars are affected have also been introduced.

For diesel fuel, 10% of residual carbon and sulphur are regulated. The sulphur content, which directly relates to the emissions of particulate and sulphur oxide, will be reduced to the present level of 0.4% to 0.2% in 1993, and to maximum 0.1% in 1996.

<Table 17> Standards for automotive fuel and additives

Fuel \ Model Year / Item		Feb. 2, '91 Dec. 31, '92	Jan. 1, '93 Dec. 31, '95	Jan. 1, '96
Gasoline	Aromatic Compound (Vol. %)	-	Max. 55	Max. 50
	Benzene (Vol. %)	-	Max. 6	Max. 5
	Lead (g/liter)	Max. 0.013	Max. 0.013	Max. 0.013
	Phosphorous (g/liter)	Max. 0.0013	Max. 0.0013	Max. 0.0013
	Oxygen (Weight %)	-	Min. 0.5	Min. 1.0
Diesel	10% Residual Carbon (%)	Max. 0.20	Max. 0.15	Max. 0.15
	Sulphur (Weight %)	Max. 0.4	Max. 0.2	Max. 0.1

3.3.6 Other control measures

a) Increase of the number of low emission passenger cars, expansion of recall program and lower emission standards are already explained in 3.2 and 3.3.3.

b) Measures for reducing diesel smoke

(1) Fuel switch - over for light duty diesel vehicles

The big difference of oil price between gasoline and diesel makes consumers prefer the diesel vehicles to the gasoline ones, and the small buses and trucks are mostly designed to use diesel fuel. To overcome this, the Ministry of Environment is trying to switch over diesel to gasoline or LPG.

(2) Increasing horsepower of city bus

The excessive smoke from the diesel buses are partly caused by the overloading for the underpowered engines.

The city buses are mostly equipped with engines of about 180 to 185 horse power, and carry about 150 to 200 passengers (nominal capacity

: 80 to 85 passengers) during rush-hours. Accordingly, the buses usually run seriously short of the required power, generating smoke and becoming worn-out earlier than they are designed for, which lead to the some vecious cycle.

Therefore, the engine of city buses and seating-only buses increased their power from 185 HP to 230 HP to solve the problem encountered with the under powered engines.

(3) Research works for diesel particulate control

The uncontroled diesel engines emit approximately 30 to 70 times more particulate than the current gasoline-powered engines equipped with the catalytic converters.

In addition, 34% of total vehicles are diesel vehicle and the smoke emission rate caused by diesel vehicle is very high in Korea. So we are gathering the knowledge reducting the smoke from diesel vehicle.

Emission control technology of diesel vehicles has not been fully developed even in develped countries unlike that of gasoline vehicle. This technology is still in a rudimentary stage in Korea.

Since gasoline vehicles equipped with the three-way catalytic converter have been produced in Korea, gaseous pollutant emission from gasoline vehicles such as carbon monoxide, hydrocarbon, and nitrous oxides have been greatly decreased. Whereas particulate and nitrous oxides, however, have been increasing every year probably due to emission from the diesel vehicles.

Engine makers have much efforts to modify an engine to reduce the emission of diesel particulate. The use of alternative fuel such as methanol, LPG, CNG etc. as well as the various kind of post-treatment system was widely studied by many investigators. Treatment system is a very effective measures and large scale fleet tests using this system have been conducted in U.S and Europe. Ceramic monolith filter of the wall flow-type have been widely used in the aftertreatment system beacuse of its low flow resistance and high trapping efficiency.

The already known regeneration techniques can be divided into two major categories : techniques aiming at raising exhaust temperature by means of burner, electric heater etc. and techniques aiming at reducing the activation energy of the in-trap oxidation process by means of catalyst impregnation of the trap or fuel additives etc. The trap system of a new regeneration technique, was used with diesel exhaust gas throttling to increase exhaust temperature. Organometallic compound of cerium was also used as a fuel additive in order to maintain safe and reliable regeneration at relatively low temperature.

Motor Vehicle Emission Research Lab. is conducting a trap retrofit demonstration project with the Ministry of Science and Technology. The trap system consists of a ceramic wall flow filter with regeneration by means of exhaust throttling and fuel additive. The system was successfully tested on an engine dynamometer and installed on a City Bus.

c) Development of clean cars

Clean cars are now under intensive study worldwide and these include electric car, hydrogen car, solar car, etc. It is hard to classify the alcohol car in the same category, although it is probably a lower emission car than petroleum-used cars.

Research on electric car in Korea has been started CNG and alcohol engines are under development and lean-burn engine is also under deve-lopment.

3.4 Test procedures

Test methods for each of the vehicle categories are shown in Table 5 and 6. The test procedure currently used for cars and LDV emission testing is similar to US FTP-75 (CVS-75). As regards heavy-duty vehicles, the test procedure is similar to that specified in ECE 13-mode test for HDDE. These are explained in Annex 2 and 3 of the guidelines well, so I would like to omit a explanation on the test procedures.

3.5 Test equipments

<Table 18> Test equipments classified by the region and regulation

	FACILITIES		EQUIPMENTS	REGION				REMARKS
				NAS (KOREA)		EUROPE		
				REG.	VEH. CAT.	REG.	VEH. CAT.	
Em. & FE	EXHAUST Em. TEST (HC, CO, NOx, CH4, Particulate)	COM.	ENG. DYNAMO. (HDE)	COM.	COM.	COM.	COM.	
			CHASSIS DYNAMO.					
			DRIVER'S AID					
		GSL.	CVS (GSL)	40 CFR (REG. OF CAA)	ALL	91/441 R83	M1, N1	
			GAS A/Z (GSL)					
			METHANE A/Z					
			FUEL CONDITION CART (G)					
		DSL.	CVS (DSL)	40 CFR (REG. OF CAA)	ALL	91/441 R83	M1, N1	PC : 1993 LDT : 1996 HDDE : 1996
			GAS A/Z (DSL)					
			FUEL CONDITION CART (D)					
			DILUTION TUNNEL			R49	M2, M3, N1, N2	
			SMOKE METER			72/306	ALL	
			OPACIMETER			R24		
	Evapo. TEST	GSL.	SHED	40 CFR (REG. OF CAA)	ALL	91/441	M1	
			GAS A/Z (HC)					
	DURA. TEST	COM.	MACD	40 CFR (REG. OF CAA)	ALL	91/441	M1	COMPLETE VEHICLE TEST
			AUTO PILOT					
	ENV. TEST	COM.	HIGH ALTITUDE TEST ROOM	40 CFR	LDV, LDT	NA	NA	

Em : EMISSION
FE : FUEL ECONOMY
Evapo. TEST : EVAPORATIVE EMISSION TEST
DURA. TEST : DURABILITY TEST
ENV. TEST : ENVIRONMENT TEST
ENG. DYNAMO : ENGINE DYNAMOMETER
COM. : COMMON
NAS : NORTH AMERICAS
REG. OF CAA : REGULATION OF CLEAN AIR ACT IN KOREA
GSL : GASOLINE
DSL : DIESEL
CHASSIS DYNAMO. : CHASSIS DYNAMOMETER
CVS : CONSTANT VOLUME SAMPLER
GAS A/Z : GAS ANALYZER
MACD : MILAGE ACCUMULATION DYNAMOMETER
REG. : REGULATION
VEH. CAT. : VEHICLE CATEGORY
LDV (T) : LIGHT DUTY VEHICLE (TRUCK)
NA : NOT APPLICABLE

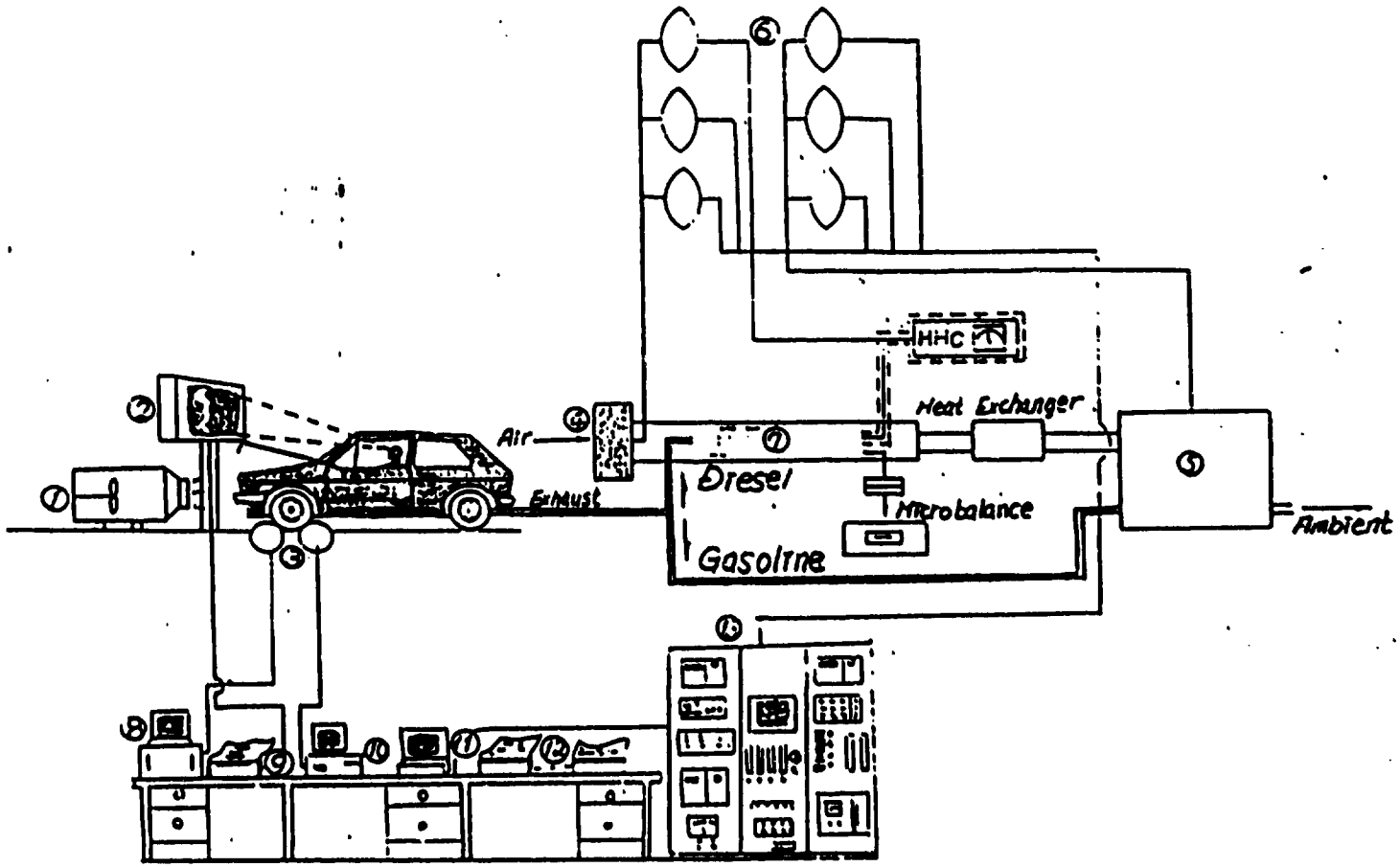


Figure 4 Schematic diagram for exhaust emission test system

1. Cooling fan
2. Driver's aid
3. Chassis dynamometer
4. Air filter trap
5. Constant volume sampler
6. Sample bag
7. Dilution tunnel
8. System computer
9. Printer
10. Driver's aid control system
11. Exhaust emission analyzing system control computer
12. Printer and plotter
13. Exhaust emission analyzer

4. Look through on the draft guidelines

4.1 General

The standards and procedures used in the Asia – Pacific Region differ in many respects, it in applicability, control procedures, severity of emission standards and driving cycles. At the same time common points lie in some elements of test procedures, except driving cycles, e.g. analytical methods, test equipments and gas sampling systems.
A part of these countries participating in the project has already started some sort of effective control developed in EC, US and Japan.
Pursuant to the purpose of the project, it is necessary to scrutinize the status of new motor vehicle emission control in the countries particiting in the project and to analyze the procedures and standards developed in the USA, Europe or Japan.
Fortunately, the "Draft Guidelines" analyzed aforementioned respects very well. However, we must be very careful in the choice of procedures and standards in order to solve the air pollution problems more wisely in this region.
Experiences of many countries have shown that the best eficiiency of the emission reduction can be achived if a comprhensive and uniform motor vehicle emission control system taken up for this pupose are conducted.

As mentioned in the introduction and chapt 3, a comprehensive and effective program is carried out in Korea.

4.2 Discussion

There is a room and need for genuine regional cooperation in the area of new motor vehicle emission control.
The recommended cooperation and harmonization of the emission control is conducted on a purely voluntary basis. The cooperation among the participating countries based on the

- common, harmonized emission standards,
- uniform conditions of approval,
- reciprocal recognition of approval granted in other participating countries,

will have many advantages for the region as a whole. In this respect much can be learned from experiences of ECE.
Like can tries applying ECE Regulations, those of the Asia – Pacific region can set up a harmonized control system, including common limit values, test procedures and conditions of approval.

Despite much differences with regard to conditions affecting emissions, we agree with the "Guideline" basically and we would like to propose an idea aiming at smooth implementation. It is shown in Figure 5.

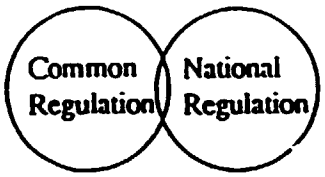


Figure 5. Relation between common or harmonized regulation and national regulation

For reciprocal recognition of approval granted in other participating countries, it will be necessary to set up administration services and technical services (test centers) empowering competent authorities to handle the task.

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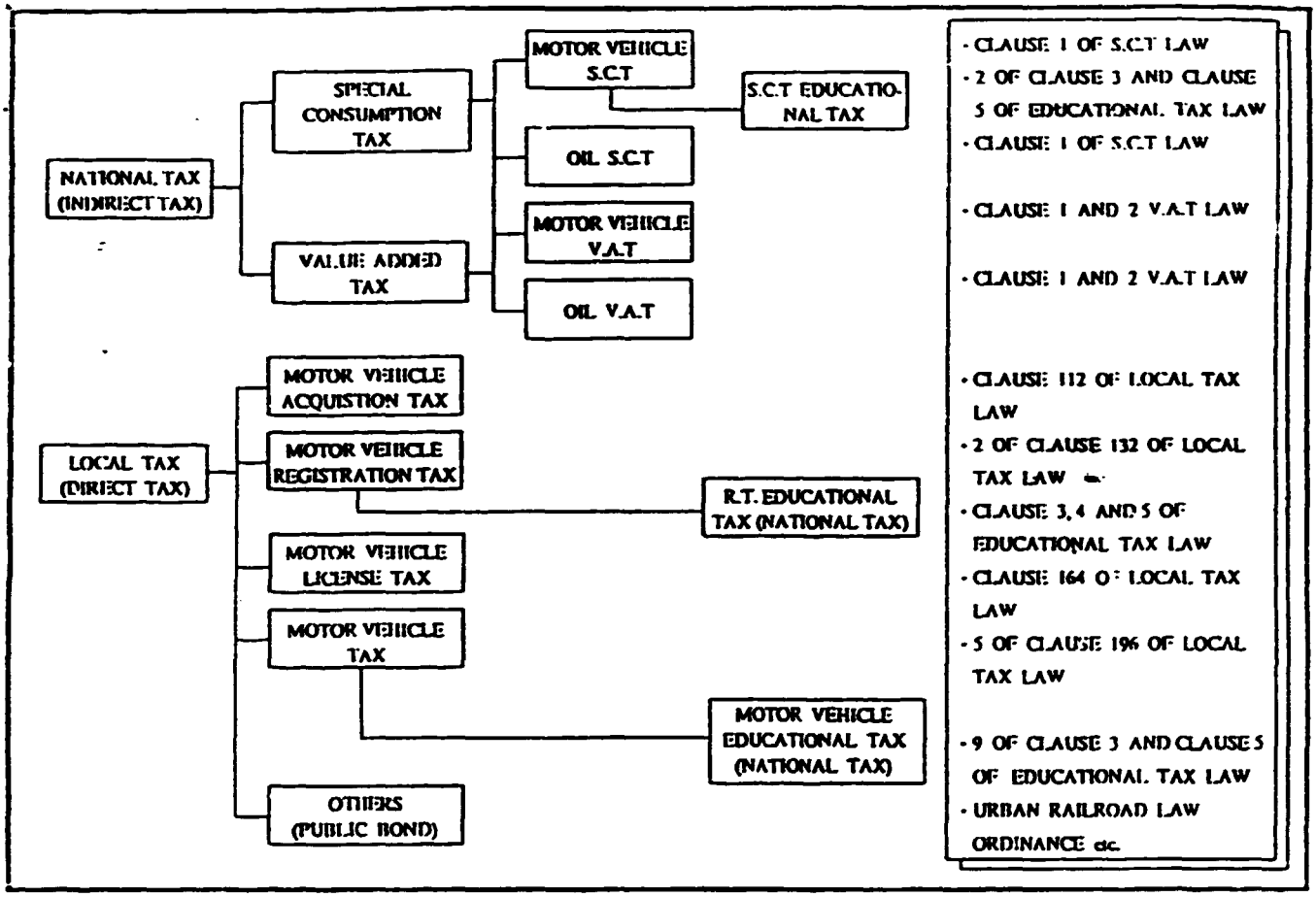
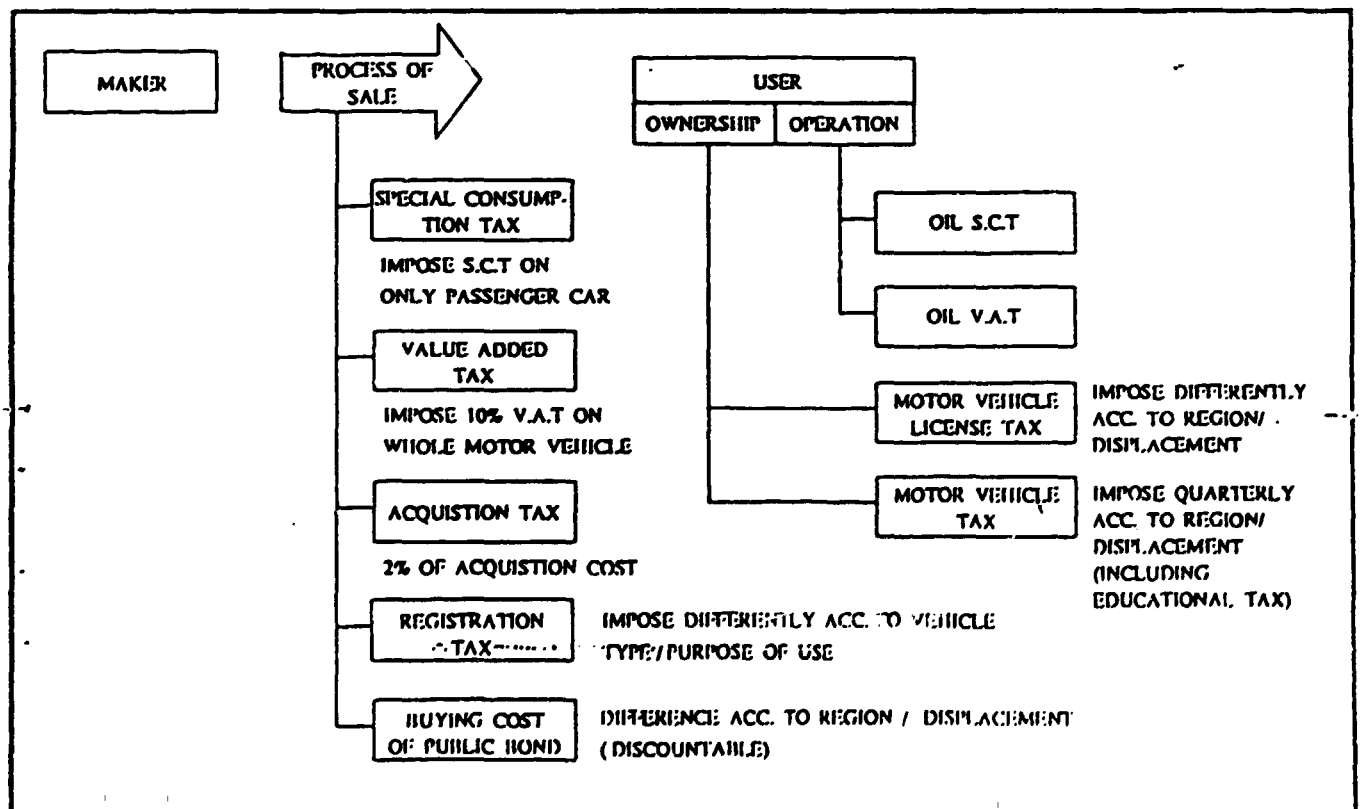
ANNEX 1

MOTOR VEHICLE RELATED TAX SYSTEM

■ MOTOR VEHICLE RELATED CURRENT TAX SYSTEM



■ MOTOR VEHICLE RELATED TAXES CLASSIFIED BY DISTRIBUTION STEP



■ MOTOR VEHICLE RELATED TAXES

TAX ITEMS		CLASSIFICATION	TAX RATES (TAX AMOUNT)	REMARKS
Included in Sales Price	S.C.T	• Displacement≤1500cc/Jeep (4WD) • Two-Wheeled Motor Vehicle	10% of Manufacturing Cost	▶ [Special Consumption Tax Law] ▶ Educational Tax → 30% of S.C.T Amount ※ Tax-Free for Private Passenger Car not less than 800 cc
		• 1500cc<D≤2000cc	15% of Manufacturing Cost	
		• D<2000cc / Camping Motor Vehicle	25% of Manufacturing Cost	
	V.A.T	• All Motor Vehicle	10% of (M.C + S.C.T + E.T)	
Registration Process	A.T	• General Motor Vehicle	2% of Vehicle Price	▶ [Clause 112 of Local Tax Law] : '90. 12
		• Deluxe Passenge Car	15% of Vehicle Price	
	R.T	USE / CLASSIFICATION	NEW / TRANSFER / CREATION / • OTHER	▶ [Clause 132 of Local Tax Law] : '90. 12 ▶ Educational Tax → 20% of R.T. Amount • Remark : Transfer / Structure Change
		• Passenger Car (For Private)	5% / 3% / ₩7,500 ('91. 12) / matter	
		• Commercial Vehicle (For Private)	3% / 2%	
		• Vehicle for Business	2% / 1%	
Ownership Process	L.T	GRADE / REGION	ⓐ / ⓑ / ⓒ	▶ [Clause 164 of Local Tax Law]
		• I Group : Passenger Car over sales price 70 million won	₩45,000 / ₩30,000 / ₩18,000	▶ Tax Amount for 1 Year : '90. 12 ▶ ⓐ Region with population over 500,000 ⓑ Others city ⓒ County
		• II Group : Private-Passenger Car not less than 1600cc	₩36,000 / ₩22,500 / ₩12,000	
		• III Group : Private-Passenger Car not less than 1400cc	₩27,000 / ₩15,000 / ₩8,000	
		• IV Group : Private-Passenger Car less than 1400cc Private-Commercial Veh. / Bus	₩18,000 / ₩10,000 / ₩6,000	
		• V Group : Owner-Driver Taxi / Owner-Driver Delivery Truck	₩12,000 / ₩5,000 / ₩3,000	
	M.V.T	MOTOR VEHICLE TYPE	PRIVATE / BUSINESS	▶ [5 of clause 196 of Local Tax Law] : '90. 12
		Passenger	• Displacement<3000cc	₩630 (819) / cc / ₩24 / cc	▶ Tax Amount For 1 Year → Divided Payment ▶ Educational Tax (For Private) → 30 % Of Tax Amount → ( ) : Tax Amount Included Educational Tax ▶ Tax Amount Limit : ₩3,000,000/Year
			• 2500cc<D≤3000cc	₩410 (533) / cc / ₩24 / cc	
			• 2000cc<D≤2500cc	₩250 (325) / cc / ₩19 / cc	
			• 1500cc<D≤2000cc	₩220 (286) / cc / ₩19 / cc	
			• 1000cc<D≤1500cc	₩160 (208) / cc / ₩18 / cc	
			• 800 cc<D≤1000cc	₩120 (156) / cc / ₩18 / cc	
			• 800 cc<D	₩100 (130) / cc / ₩18 / cc	
			• Others (Jeep)	₩100,000(130,000) /year / ₩20,000 / year	
		Commercial Veh.	• Pay-load≤10	₩157,500 / Year / ₩45,000 / Year	▶ For Pay load over 10 ton ① Private → Tax For Pay load below 10 ton + ₩ 30,000 / ton ② Business → Tax For Pay load below 10 ton + ₩ 10,000 / ton
			• P≤8	₩130,500 / Year / ₩36,000 / Year	
			• P≤5	₩79,500 / Year / ₩22,500 / Year	
			• P≤4	₩63,000 / Year / ₩18,000 / Year	
			• P≤3	₩48,000 / Year / ₩13,500 / Year	
			• P≤2	₩34,500 / Year / ₩9,600 / Year	
			• P≤1	₩28,500 / Year / ₩6,600 / Year	
		Bus	• Express Bus	– / ₩100,000 / Year	▶ Large-Sized Bus : not less than 40 Seating Capacity ▶ General Bus : Local Bus, Cross-Country Bus, Private Bus
			• Large-Sized Chartered Bus	– / ₩70,000 / Year	
			• Small-Sized Chartered Bus	– / ₩50,000 / Year	
			• Large-Sized General Bus	₩115,000 / Year / ₩42,000 / Year	
			• Small-Sized General Bus	₩65,000 / Year / ₩25,000 / Year	
		Others	• Large-Sized Special Motor Vehicle	₩157,500 / Year / ₩45,000 / Year	▶ Large-Sized Special : more than Payload 4 ton or corresponding Displacement ▶ Small-Sized Special : not more than Payload 4 ton
			• Small-Sized Special Motor Vehicle	₩58,500 / Year / ₩13,500 / Year	
			• Small Motor Vehicle of Less Than 4-Wheel	₩18,000 / Year / ₩3,300 / Year	

cf : 1 $ = 800 ₩

■ MOTOR VEHICLE RELATED TAXES

TAX ITEMS		CLASSIFICATION		TAX RATES (TAX AMOUNT)	REMARKS
OPERATION PROCESS	OIL S.C.T	· GASOLINE	LEAD	130%	▶ [SPECIAL CONSUMPTION TAX LAW]
			UNLEAD	109%	
		· DIESEL		9%	
		· LPG		8%	
	V.A.T	(M.C + S.C.T) . 10% OF DISTRIBUTOR MARGIN . 10% OF STATION MARGIN			
OTHERS		COST OF SAFETY ASSOCIATION / COST OF STAMP / COST OF CERTIFICATION / COST OF LICENSE NUMBER PLATE / COST OF VARIOUS TEST			

■ MOTOR VEHICLE RELATED TAXES

MOTOR VEHICLE TYPE CLASSIFICATION			REGION	NEW REGISTRATION		TRANSFER REGISTRATION	
				PRIVATE	BUSINESS	PRIVATE	BUSINESS
PASSENGER CAR	FOREIGN-MADE VEHICLE	IMPORTED VEHICLE	NATION WIDE	ⓐ	995,000	ⓐ	330,000
	DELUXE VEHICLE	2000cc≤ DISPLACEMENT	SEOUL, BUSAN (OF ⓑ)	20%	3%	6%	3%
			OTHERS	1,300,000	435,000	←	145,000
	GENERAL VEHICLE (A GRADE)	1500cc<D<2000cc	SEOUL, BUSAN (OF ⓑ)	12%	3%	6%	3%
			OTHERS	910,000	305,000	←	100,000
	GENERAL VEHICLE (B GRADE)	1000cc<D≤1500cc	SEOUL, BUSAN (OF ⓑ)	9%	3%	6%	3%
			OTHERS	325,000	110,000	←	30,000
	GENERAL VEHICLE (C GRADE)	1000cc≤D	SEOUL, BUSAN (OF ⓑ)	4%	3%	6%	3%
			OTHERS	260,000	85,000	←	30,000
	JEEP TYPE	4WD	SEOUL, BUSAN (OF ⓑ)	2%	←	←	←
			OTHERS	155,000	50,000	155,000	50,000
BUS	LARGE-SIZED	SEATING CAPACITY≤26	NATION WIDE	1,300,000	435,000	←	145,000
	MEDIUM-SIZED	16≤S.C≤25	-	650,000	215,000	←	70,000
	SMALL-SIZED	7≤S.C≤15	-	390,000	130,000	←	45,000
COMMERCIAL VEHICLE	LARGE-SIZED COMMERCIAL	PAY LOAD≤4.6 ton	-	650,000	215,000	←	70,000
		2.5≤P.L<4.5 ton	-	390,000	130,000	←	45,000
	SMALL-SIZED COMMERCIAL	2.5 ton<P.L	-	195,000	65,000	←	20,000

ⓐ FOREIGN-MADE VEHICLE SEEMS TO SAME AS DOMESTIC-MANUFACTURED VEHICLE (ON BASIS OF DISPLACEMENT)
ⓑ STANDARD OF ASSESMENT

■ OTHERS

TAX ITEMS	CONTENTS					REMARKS
TRAFFIC INDUCTION ALLOTMENT	o PROPERTY LIABLE FOR TAXATION : BUILDING WHICH INDUCING TRAFFIC COMPLEX AND MORE THAN TOTAL AREA 1000㎡ o CALCULATED AMOUNT OF ALLOTMENT SUM OF EACH FLOOR AREA × BASIC ALLOTMENT (3.3㎡) × TRAFFIC INDUCTION COEFFICIENT					▶ 「URBAN TRAFFIC MAINTENANCE PROMOTION ORDINANCE」 → ISSUED ON 26. SEP. '90 → TAX AMOUNT FOR 1 YEAR
TARIFF	CLASSIFICATION	'90	'91	'92	'93	▶ Unit (%) ▶ STANDARD : C.I.F * OTHERS : STATION WAGON / RACING CAR
	MASS TRANSPOTATION VEH.	20	←	17	15	
	PASSENGER CAR / *OTHERS	20	←	17	15	
	COMMERCIAL VEHICLE	20	←	17	15	
	SPECIAL-PURPOSE VEHICLE	13	←	11	9	
	TWO-WHEELED VEHICLE	16	←	13	10	

Annex 8

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
LAND TRANSPORTATION OFFICE
East Avenue, Quezon City

COUNTRY REPORT

Presented to the

Expert Group Meeting on Type Approval Procedures
for New Vehicles in the Asia-Pacific Region

08-10 June 1993
Jakarta, Indonesia

I.1.0 CURRENT STATUS OF THE PHILIPPINES WITH REGARD TO THE NEW VEHICLE EMISSION CONTROL AND FUTURE PLANS IN THIS AREA:

1.0.1 To this date, the control system for emissions from new motor vehicles is specified in "Rules and Regulations for the Prevention, Control, and Abatement of Air Pollution from Motor Vehicles (1979)" issued by the National Pollution Control Commission, pursuant to the provisions of Presidential Decree No. 1181. (National Pollution Control Commisssion was renamed as Environmental Management Bureau). As such, the Philippine smoke emission level for gasoline and diesel powered vehicles, as discussed and presented in the "GUIDELINES" distributed for each participant, is still in place.

On the other hand, the Department of Transportation and Communications, in collaboration with the Japan International Cooperation Agency (JICA) has introduced the mechanized motor vehicle inspection system, wherein the Land Transportation Office is the implementing government agency. At present, there are four (4) Motor Vehicles Inspection Stations (MVIS) operational in the country. Two (2)of these MVIS's are stationed in Metro Manila, one (1) in Region III (San Fernando, Pampanga), and one (1) in Region IV (Lipa City). The inspection line consists of a fully computerized and automatic inspection equipment such as wheel alignment, brake, headlight, speedometer, HC/CO diesel smoke testers. It is envisioned that with this system, traffic accidents caused by motor vehicle mechanical failure, pollution contributed by mobile sources and even carnapping would be reduced.

As regards to the exhaust emission test of the mechanized inspection system, Nondispersive infrared analyzer (NDIR) type tester is employed to measure the volumentric concentrations of CO

and HC emissions at idling condition. The standards are as follows:

CO: up to 6%
HC: up to 1200 ppm for vehicles with a 4-stroke engine; 7800 ppm for vehicles with a 2-stroke engine; and 3300 ppm for vehicles with a rotary and specialized engine.

With respect to the exhaust emission from the exhaust pipes of diesel-fueled motor vehicles, the black soothe content shall not exceed 2.5 m-1 light absorption coefficient or 66% hartridge smoke limit or 48% in the Bosch type smoke meter. The diesel smoke is sampled while the accelerator is pressed and tested with diesel smoke tester.

The standard for diesel-fed vehicles under no load and fully accelerated conditions should not be more than 48%.

Under the present scenario, the mechanized system of inspection covers only in-use for-hire motor vehicles such as jeepneys, buses, and taxis due to the limited number of Motor Vehicle Inspection Stations in the country.

1.0.2 Future Plans:

1.0.2a Expansion of mechanized inspection stations at the regional level and the planned accreditation of 3, 4, and 5 star car repair shops and gasoline stations to serve as an alternate motor vehicle inspection stations, ultimately to cover all types and classes of motor vehicles.

1.0.2b Revision of P.D. 1181 by the Environmental Management Bureau is under process, in cooperation with the Department of Energy,

Department of Trade and Industry, National Science and Development Board, and Land Transportation Office, amending/modifying certain rules and regulations of the P.D., particularly on the allowable emissions of specific air pollutants from new and in-use motor vehicles.

1.0.2c Formulation of motor vehicles parts' standards by the Bureau of Products Standards under the Department of Trade and Industry is underway, in coordination with the Land Transportation Office, car manufacturers/assemblers, and National Steel Corporation.

1.0.2d Adoption of Asian Development Bank's comprehensive package geared towards pollution control:

-a mandatory inspection/maintenance program, requiring each vehicle to pass an emission test annually as a condition for licensing. High mileage vehicles will require testing at least twice per year;

-tighter motorcycle standards to either phase out 2-cycle motorcycles or require them to achieve the same level as less polluting 4-cycle motorcycles;

-a program to reduce lead and sulfur content in fuels by 1995 at the latest;

-encouragement of owners of small diesel vehicles such as jeepneys and taxis to gradually convert to

gasoline engines through a package of measures including gradually tightened smoke standards, imposition of measures to equalize the prices of the two fuels, and economic incentives to purchase gasoline rather than the diesel engines; and

-application of modern emission controls to new gasoline and diesel vehicles.

I.2.0 ANALYSIS OF TRAFFIC CONDITIONS:

As a backgrounder, the Department of Transportation and Communications through the Planning Service is incharged of the Nationwide Traffic Counting Program (NTCP) in 15 regions covering 59 seasonal stations, 115 control stations, and 1,222 coverage stations and 174 automatic traffic recorders (traffic recorders are located at seasonal and control stations) for a total of 1,396 counting stations.

All stations are located on national roads in such a way to allow observations, analysis and evaluation of traffic demand between regional and provincial capitals, highly populated cities/municipalities, important transport terminals and important political, social, economic, cultural, and administrative centers, or any combination of the centers.

As regards to Philippine traffic conditions, for purposes of reporting, it shall be limited only to Metro Manila's major thoroughfares. As per latest survey in 1991 (conducted by the Traffic Engineering Center), the average annual daily traffic (AADT) in all circumferential and radial roads of Metro Manila

is presented in Table 1 below. For specific name of street, please refer to "Annex 1", page 9.

TABLE 1. AVERAGE ANNUAL DAILY TRAFFIC (AADT)
METRO MANILA, 1991

	VEHICLE COMPOSITION				
	CAR	PUJ	BUS	TRUCK	TOTAL
C-1	31130	31203	343	431	63107
C-2	26772	4426	406	1586	33190
C-3	67289	18769	285	3397	89740
C-4	358263	3450	51532	12419	425670
R-1	144581	9179	7869	1761	163390
R-2	34716	33862	5738	414	74730
R-3	259309	22630	17823	10208	299762
R-4	54986	2828	626	898	59340
R-5	46482	22133	744	13806	83165
R-6	73389	34153	1267	791	109600
R-7	97881	56867	759	1593	157100
R-8	30569	17567	2180	2364	52600
R-9	41613	20390	1034	1273	64310

Source: Traffic Engineering Center

It could be gleaned from the given table that among the vehicle compositions, the most number of traffic counts is accounted for cars (private and for-hire), followed by public utility jeepneys (PUJ) and buses. The density of traffic occurs during peak hours in the morning, 6:00 to 10:00, and in the afternoon is from 4:00 to 9:00; hence, trucks are banned during this period.

I.3.0 POSSIBILITY OF, PRECONDITIONS FOR, AND MECHANICS OF IMPLEMENTATION OF THE RECOMMENDED NEW MOTOR VEHICLE EMISSION CONTROL PROCEDURES AND STANDARDS

An in-depth study and consideration on the recommended new new motor vehicle emission control and procedures shall be taken, since the Philippine government at present, is formulating standards for

motor vehicle parts, and revising P.D. 1181, providing for the prevention, control, and abatement of pollution from motor vehicles.

The "GUIDELINES" shall be distributed to the concerned authorities, the Environmental Management Bureau and the Bureau of Products in particular to serve as a substantial input in their current undertakings. It is hoped that the formulated control procedures and standards shall be implemented by the Department of Transportation and Communications, Land Transportation Office, if provided with the state of the art equipment and skilled manpower.

II.1.0 LIST OF RULES/REGULATIONS, ETC. WHICH ARE ENFORED IN THE PILIPPINES WITH REGARD TO VEHICLE TAXATION (KINDS OF TAXES, AMOUNTS, ETC.)

1.0.1 Section 6 of Administrative Order No. 3 dated 24 September 1990, re: Rules and Regulations on New System of Registration Pursuant to Batas Pambansa Bilang 43 and 74 Amending Related Provision of Republic Act 1130, otherwise known as the Land Transportation and Traffic Code; and pursuant to the provisions of Sec. 2 of Executive Order No. 43 dated 22 August 1986, re: Restructuring the Motor Vehicle Tax, the owners of motor vehicles upon every annual registration pay a motor vehicle tax in accordance with the attached schedule marked as "Annex 2", page 10.

In cases of new or initial registration, the collectible registration fee shall be in proportion to the quarterly portion of the year when the application for registration is made.

1.0.2 Motor vehicles which are exclusively used and operated on private roads regardless of type and/or denomination, shall be subject to an annual recording fee of ONE HUNDRED PESOS (P100.00) only, for which stickers in lieu of regular plates shall be issued corresponding to the year of recording. Such motor vehicle

shall not be required to be brought to the Land Tansportation Office (LTO), and neither shall the same be covered by compulsory vehicle insurance as ordinarily required for registration purposes.

1.0.3 Delivery of motor vehicles from the assembly line to the dealers thereof, or to the Constabulary Highway Patrol Group for clearance, or those from one place to another place for one (1) day, two (2) or three (3) days, but not to exceed seven (7) days, shall be done through a conduction permits for which feen of TEN PESOS (P10.00) per day shall be collected by LTO.

1.0.4 A fee of FIFTY PESOS (P50.00) shall be collected for every anotation of mortgage, attachment and other encumbrances or cancellation thereof.

1.0.5 Motor vehicle sought to be placed under storage to LTO shall pay a fee of FIFTEEN PESOS (P15.00) provided all the previous and outstanding collectible fees have been paid.

1.0.6 Science Tax contemplated under Republic Act No. 5448 shall be collected on MOPEDS and Motorcycles, provided that they shall not be imposed on "for hire" vehicles. Amount to be collected is as follows:

New	- P15.00
1 yr. old	- 13.50
2	- 12.00
3	- 10.50
4	- 9.00
5	- 7.50
6 and below	- 4.00

1.0.7 Sec. 149. of the National Internal Revenue Code of the Philippines. There shall be levied, assessed and collected an ad valorem tax on automobiles based on the manufacturer's or importer's selling price net of excise and valued added tax, in accordance with the following schedule:

Engine Displacement (in cc):

Gasoline	Diesel	Tax Rate
1600 & below	1800 & below	15%
1601 - 2000	1801 - 2300	35%
2001 - 2700	2301 - 3000	50%
2701 - above	3001 - above	100%

Provided, that in the case of imported automobiles not for sale, the tax imposed herein shall be based on the total value used by the Bureau of Customs in determining tariff and customs duties, including customs duty and all other charges, plus 10% of the total thereof. (As amended by Executive Order NO. 273).

Annotations

Automobiles are now subject to excise taxes; formerly, they were subject to sales taxes, advance sales tax or compensating tax. Now they are subject to ad valorem tax above based on manufacturer's or importer's selling price net of excise and value-added tax. the last part, below the rates, applies if automobiles are imported for one's own use (the counterpart of the compensating tax).

1.0.8 Value Added Tax - collected from manufacturers of trucks, light, medium and heavy commercial vehicles. (10% of the selling price).

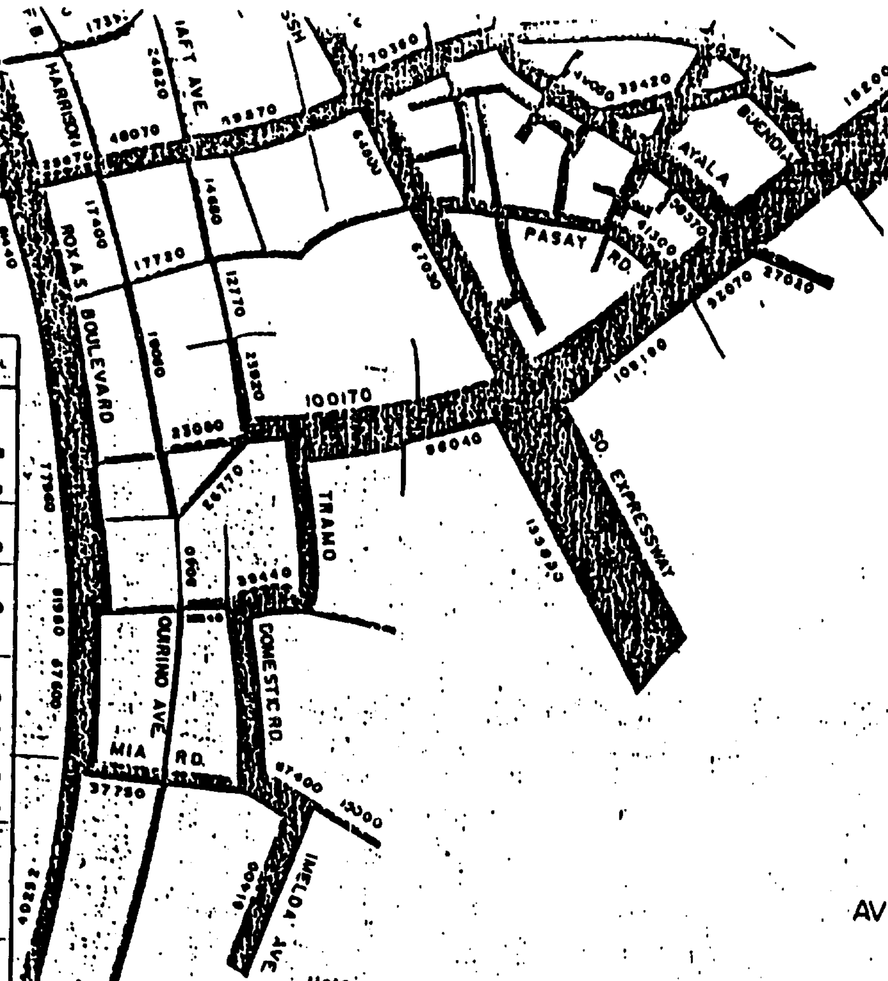
1.0.9 Withholding Tax (2% of acquisition cost)- collected on transfer of motor vehicles.

ANNEXES:

Annex 1 - Average Annual Daily Traffic
Annex 2 - Schedule of Motor Vehicle Registration Fee
Annex 3 - Philippine Vehicle Population, 1992

VEHICLE COMPOSITION

NAME OF STREET	CAR	PUJ	BUS	TRUCK	TOTAL
C-1: C.M. RECTO					
1 BET. RIZAL AVE AND T. ALONZO	13368	13400	8	114	28073
2 BET. LEGARDA & RIZAL AVENUE	17364	15709	335	317	34010
C-2. A. MENDOZA					
1 BET. ESPANA & UMASALANG	26773	4428	476	1306	33190
C-3: G. ARANETA AVE					
1 BET. E. RODRIGUEZ & QUEZON AVE.	34312	5327	85	2481	40820
2 BET. E. RODRIGUEZ & AURORA BLVD	32772	13442	200	306	43210
C-4: E.D.S.A.					
1 BET. ROOSEVELT & WEST AVE.	83963	907	11137	3770	79800
2 BET. SANTOLAN & ORTIGAS AVE	68760		13733	2218	82720
3 BET. GUADALUPE BRIDGE AND AYALA AVE	130549	2543	15166	3722	152000
4 BET. PASAY RD & E.S.H.	84300		11496	2706	109150
R-1 ROXAS BLVD.					
1 BET. MIA ROAD & EDSA	66660	6673	3284	931	81930
2 BET. PASAY RD & PRESIDENT QUIRINO AVE	73721	2304	2583	830	81440
R-2 TAFT AVENUE					
1 BET. PRESIDENT QUIRINO AVE./AIL	22421	22797	4443	249	49910



VEHICLE COMPOSITION

NAME OF STREET	CAR	PUJ	BUS	TRUCK	TOTAL
R-2: TAFT AVENUE BET. GIL PUYAT & SAN ANDRES	12295	11065	1293	165	24820
R-3 S.S.H.					
1 BET. VITO CRUZ & EDSA	50177	7295	4326	962	63640
2 BET. VITO CRUZ & PRES. QUIRINO	72432	8	3163	3060	78660
3 BET. MAGALLANES & NICHOLS INTERCHANGE	122700	13220	10124	3286	152210
R-4: ORTIGAS AVE. 1 BET. EDSA & SANTOLAN	24288	2919	936	098	29140
R-5: SHAW BLVD					
1 BET. EDSA & ACACIA LANE	26030	9643	342	12461	39290
2 BET. E. RODRIGUEZ & AURORA BLVD.	18422	12120	492	1242	32660
R-6: AURORA BLVD.					
1 BET. EDSA & DNA. RODRIGUEZ	18181	12116	808	374	30100
2 BET. ARANETA AVE & NAGTAHAN INTERCHANGE	22122	12012	722	417	61310
R-7: QUEZON BLVD					
1 BET. WEST AVE. & ARANETA AVE	87304	22476	480	839	101610
2 ESPANA: BET. E. RODRIGUEZ & A. MENDOZA	40677	34391	276	734	76100
R-8: A. BONIFACIO AVE					
1 BET. EDSA & DEL MONTE	30369	17867	2100	2364	52640
R-9: RIZAL AVENUE (10th AVENUE & AURORA AVENUE EXTENSION)	41613	20390	1034	1273	64310

METRO MANILA AREA
TRAFFIC FLOW MAP
AVERAGE ANNUAL DAILY TRAFFIC
1991

Note:

EDSA FROM WHITE PLAINS TO SANTOLAN ONLY TRUCKS & BUSES ARE ALLOWED PASS.

NAGTAHAN/ A. MENDOZA. BETWEEN G. TUAZON & NAGTAHAN BR. CLOSED DUE TO CONSTRUCTION OF FLYOVER.

LEGEND

====== DATA NOT AVAILABLE

"ANNEX 2"

REGISTRATION FEES

	BASIC REGISTRATION FEE						MV PLATES	STICKER	LRF
CARS-PRIVATE (LIGHT) 0-1600 cc	CURR. YR. to 3YRS. ₱1,000.00		4 to 5 YRS. ₱1,900.00		OVER 5 YRS. ₱700.00		₱43.00	₱3.00	₱10.00
(MEDIUM) 1601-2800 cc	₱3,000.00		₱2,400.00		₱1,200.00		₱43.00	₱3.00	₱10.00
(HEAVY) 2801-Above	₱6,000.00		₱6,000.00		₱2,800.00		₱43.00	₱3.00	₱10.00
CARS-FOR HIRE (LIGHT) 0-1600 cc	GAS ₱450.00		DIESEL ₱400.00				₱43.00	₱3.00	₱10.00
(MEDIUM) 1601-2800 cc	₱900.00		₱800.00				₱43.00	₱3.00	₱10.00
MOTORCYCLES 50 cc-Above	PRIVATE WITH SIDE CAR ₱150.00	PRIVATE W/O SIDE CAR ₱120.00	FOR HIRE ₱240.00				₱8.00	₱.50	₱10.00
49 cc-Below	₱60.00						₱8.00	₱.50	₱10.00
UTILITY VEHICLES (UV-PRIVATE) 2700 GW-Below	CURRENT YR. to 5 YRS. ₱1,000.00		OVER 6 YRS. ₱900.00				₱43.00	₱3.00	₱10.00
2701-4500 GW	GAS ₱1,000.00 + (EXCESS GWx.20)	DIESEL ₱1,000.00 + (EXCESS GWx.12)	GAS ₱900.00 + (EXCESS GWx.20)	DIESEL ₱900.00 + (EXCESS GWx.12)			₱43.00	₱3.00	₱10.00
(UV-FOR HIRE) 2100-Above	GAS ₱30.00 (PER 100 Kgs. GW)		DIESEL ₱15.00 (PER 100 Kgs. GW)				₱43.00	₱3.00	₱10.00
TRUCK (PRIVATE) 4501-Above	GAS GVW x .20		DIESEL GVW x .12				₱43.00	₱3.00	₱10.00
TRUCK (FOR-HIRE) 4501 Above	GAS GVW x .30		DIESEL GVW x .15				₱43.00	₱3.00	₱10.00
TRAILER	PRIVATE ₱10.00 (PER 100 Kgs. GW)		FOR HIRE ₱12.00 (PER 100 Kgs. GW)				₱21.50	₱.50	₱10.00
GOVERNMENT/ GOVT. CORPORATION	₱300.00 (REGARDLESS OF GROSS WT.)				MOTORCYCLES		₱8.00	₱.50	₱10.00
					OTHER MV		₱43.00	₱3.00	₱10.00

NOTE: COLLECT OTHER MISCELLANEOUS (TRANSFER OF OWNERSHIP, CHANGE OF ENGINE, etc.) FINES AND PENALTIES IF THESE TRANSACTIONS ARE EFFECTED SIMULTANEOUSLY WITH THE RENEWAL.

LRF -Legal Research Fund

ANNEX 3

Number of Motor Vehicles in 1992

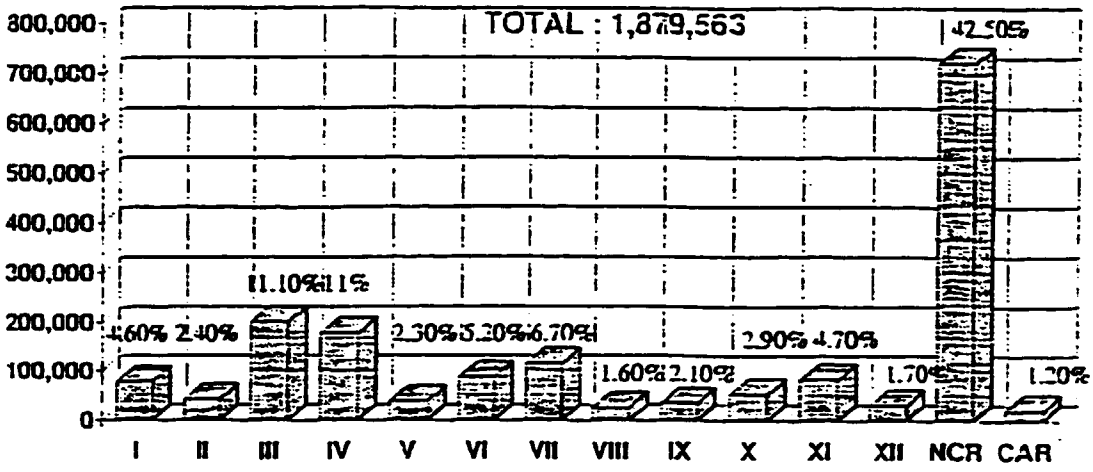


Chart I : Number of Motor Vehicles Registered by Region

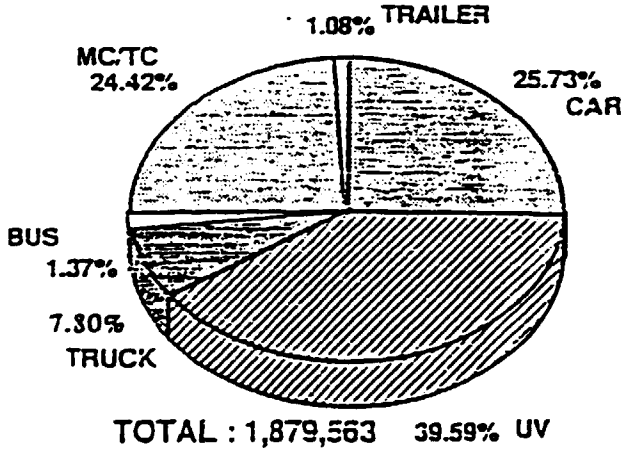


Chart II : Share of Motor Vehicles Registered by Type

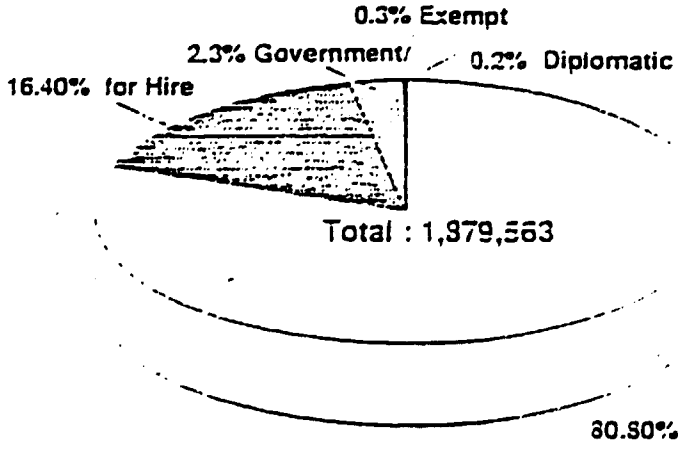


Chart III : Share of Motor Vehicles Registered by Denomination

Number of Motor Vehicles Registered, by Region, by Type of MV and Type of Fuel Used 1992

Region	CAR			UV			TRUCKS			BUSES			MC/TC			TRAIL-ERS	GRAND TOTAL	Share
	Gas.	Die.	S.Total	Gas.	Die.	S.Total	Gas.	Die.	S.Total	Gas.	Die.	S.Total	Gas.	Die.	S.Total			
I	8,733	80	8,813	12,530	16,761	29,291	81	5,679	5,760	296	2,068	2,364	39,440	372	39,812	604	86,644	4.6%
II	3,248	76	3,324	5,236	9,119	14,355	105	6,470	6,575	26	984	1,010	18,458	0	18,458	771	44,493	2.4%
III	35,444	685	36,129	49,047	49,509	98,556	951	14,959	15,910	64	2,931	2,995	52,101	13	52,114	3,201	208,985	11.1%
IV	27,581	655	28,236	43,604	67,458	111,062	545	11,747	12,292	24	2,900	2,924	50,530	396	50,926	1,179	206,619	11.0%
V	3,857	104	3,961	5,511	8,247	13,758	135	2,996	3,131	4	1,048	1,052	20,891	254	21,145	100	43,147	2.3%
VI	14,730	1,342	16,072	17,663	17,779	35,442	3,160	11,076	14,236	25	870	895	29,776	23	29,799	732	97,176	5.2%
VII	22,830	783	23,613	25,109	12,296	37,405	1,189	10,094	11,283	81	915	996	51,901	266	52,167	1,329	126,793	6.7%
VIII	1,626	36	1,662	5,072	4,323	9,395	281	2,577	2,858	7	573	580	14,536	90	14,626	192	29,313	1.6%
IX	2,155	8	2,163	7,620	4,216	11,036	234	2,650	2,884	14	567	581	22,305	0	22,305	122	39,891	2.1%
X	6,174	94	6,268	8,763	9,821	18,584	344	5,976	6,320	8	673	681	21,687	175	21,862	347	54,062	2.9%
XI	11,118	467	11,585	12,704	15,762	28,466	1,083	7,776	8,859	37	855	892	37,006	663	38,549	894	89,245	4.7%
XII	3,216	42	3,258	5,458	5,407	10,865	270	2,402	2,672	8	254	262	12,927	1,378	14,305	108	31,470	1.7%
NCR	311,674	21,539	333,213	157,240	155,948	313,188	5,132	47,030	52,162	513	9,693	10,206	79,050	529	80,307	10,590	799,754	42.5%
CAR	5,011	314	5,325	4,475	7,512	11,987	72	1,675	1,747	9	380	389	2,340	143	2,483	40	21,971	1.2%
TOTAL	457,397	26,225	483,622	360,032	384,150	744,190	13,582	133,107	146,689	1,116	24,711	25,827	454,636	4,302	458,938	20,297	1,879,563	100%
Share	---	---	25.73%	---	---	39.59%	---	---	7.80%	---	---	1.37%	---	---	24.42%	1.08%	100%	
G : D	94.6%	5.4%	100%	48.4%	51.6%	100%	9.3%	90.7%	100%	4.3%	95.7%	100%	99.1%	0.9%	100%	---	---	

'91 Total	436,775	19,831	456,606	338,177	332,671	670,848	15,682	122,448	138,130	885	19,805	20,690	405,753	4,374	410,127	18,957	1,715,366	
'91/92	104.7%	132.2%	105.9%	106.5%	115.5%	110.9%	86.6%	108.7%	106.2%	126.1%	124.8%	124.8%	112.0%	98.4%	111.9%	107.1%	109.57%	

CAR : Cordillera Autonomous Region S.Total : Sub Total

NCR : National Capital Region Gas. : Gasoline Die. : Diesele

VEHICULAR EXHAUST EMISSION STANDARDS AND CERTIFICATION SYSTEMS IN SINGAPORE

PRESENTATION AT EXPERT GROUP MEETING

ON TYPE APPROVAL PROCEDURES

FOR NEW VEHICLES

JAKARTA, INDONESIA

8 - 10 JUNE 1993

VEHICULAR EXHAUST EMISSION STANDARDS AND CERTIFICATION SYSTEM IN SINGAPORE

INTRODUCTION

1.1 Singapore consists of the main island of Singapore and some 58 islets within its territorial waters. It is approximately 140 kilometres north of the equator. The total land area is 639 square kilometres.

1.2 It has a uniformly high daily average temperature and relative humidity, but moderated by the influence of the sea. The average daily temperature ranges from 23°C to 31°C. The average daily relative humidity is 84.5%. Rain falls throughout the year, but tends to be heaviest in November, December and January.

1.3 It became independent on 9 August 1965 and has a population of about 2.8 million, who are largely descendants of immigrants from the Malay Peninsula, China, the Indian sub-continent and Sri Lanka. About 78% of the population are Chinese, 14% are Malays and 7% are Indians. The different ethnic groups have gradually acquired a distinct identity as Singaporeans while retaining their traditional cultures, customs and festivals.

1.4 The standard of living in Singapore is high. Its per capita Gross National Product had grown rapidly from S$8,343 in 1980 to S$20,031 in 1991.

VEHICULAR EXHAUST EMISSION STANDARDS

2. Singaporeans have a relatively wide range of choice of makes and models of vehicles for their transport needs. There are no import restriction and the vehicles in Singapore are mainly imported from Europe and Japan. However, all vehicles must be registered with the Registry of Vehicles (ROV) before they can be used on the roads. For this purpose, they must comply with certain rules and regulations and meet technical requirements which are set out and administered by the ROV.

3. The main purpose of these rules and regulations is to ensure that all vehicles are built to acceptable international standards and are safe for use on the roads. This will indirectly assist our efforts to keep our roads as free flowing as possible (as roadworthy vehicles are less likely to breakdown) and will ensure that the vehicles will not damage the roads or overstress the bridges. Our focus is on public safety and well being and we are also particularly interested in the need for more stringent noise and exhaust emission standards to better protect public health and the environment.

4. Environmental issues relating to vehicular emissions are important as they affect our health. In Singapore, efforts have been made to maintain the good air quality. The Ministry of the Environment (ENV) sets vehicle emission standards for all vehicles, including diesel and petrol driven

vehicles while ROV assists ENV in implementing them. These standards are incorporated into the Road Traffic (Motor Vehicles, Construction and Use) Rules.

Petrol-driven vehicles

5. Singapore's first legislation on emission limit was introduced on 1 Oct 84. From that date, all petrol-driven vehicles except motorcycles and scooters are required to comply with the UN/ECE R15.03. This legislation ensured that the emissions from petrol-driven vehicles on the road are within acceptable standards. The UN/ECE R15.03 was replaced by the more stringent emission standard, UN/ECE Regulation 15.04, on 1 Oct 86 in Singapore.

6. With the introduction of unleaded petrol in Singapore since early 1991, we have, with effect from 1 Jul 1991, required all petrol-driven vehicles, including motorcycles and scooters, to be able to use unleaded petrol before they can be registered for use in Singapore. The present maximum allowable level of lead content in petrol available in Singapore are as follows:

Type of petrol	Max. lead content
Leaded petrol	0.15 g/l.
Unleaded petrol	0.013 g/l.

7. With effect from 1 Jul 1992, all petrol-driven vehicles (excluding motorcycles and scooters) must comply with the exhaust emission standards in accordance with the UN/ECE Regulation 83 or the Japan Safety Regulations for Road Vehicles, Article 31 before they can be registered for use in Singapore. Smaller fuel tank opening of not more than 21.3mm in diameter is also required for vehicles registered on or after this date. This is to ensure that only unleaded fuel is used.

8. A more stringent revised version of the ECE 83 standard known as the Consolidated Emissions Directive (CED) or EC Directive 91/441/EEC is currently being adopted in the European Community (EC) countries. We have also announced plans to replace the ECE 83 standard with the Directive 91/441/EEC with effect from 1 Jul 94.

9. The following table summarises the exhaust emission requirements and test methods used for petrol-driven vehicles in Singapore, excluding motorcycles and scooters.

Effective date	Test method
1.10.1984	ECE 15.03
1.10.1986	ECE 15.04
1.7.1992	ECE 83 or Japan 78

The emission limits of the current emission standards for petrol driven vehicles are detailed in the Appendix.

Motorcycles and scooters

10. With effect from 1 Oct 1991, all motorcycles and scooters to be registered in Singapore must comply with the USEPA 40 CFR Section 86.410-80 emission standard.

Diesel-driven vehicles

11. With effect from 1 Jan 1991, all diesel-driven vehicles to be registered in Singapore must comply with the UN/ECE Regulation 24.03. In addition, the vehicles must also pass the smoke density of 50 Hartridge Smoke Units (HSU) tested at free acceleration.

CERTIFICATION SYSTEM

12. Every vehicle to be registered in Singapore must meet the technical and registration requirements set by the Registry of Vehicles (ROV). In the case of exhaust emission, the ROV in consultation with the Ministry of the Environment, requires every unit of used vehicles imported by a self-importer to be tested by an approved test laboratory or the appropriate vehicle manufacturer, which must certify that the exhaust emission requirements are complied with. In the case of a new vehicle, one unit of the production batch must be tested to comply with the requirement. This is embodied in the type approval procedure which is an international practice.

For local agents

13. It is an international practice that the vehicle certification authority of a country demands type approval of a vehicle model before a vehicle can be offered for sale. There are a whole lot of safety and environmental standards to comply with, for example, braking systems, exhaust emissions, noise levels, impact protection and so on. Type approval inspection is only available for local vehicle manufacturers or exclusive agents in the country for the vehicle manufacturers abroad. Type approval is a way of making sure that vehicles are safe for use on the road and do not pollute the environment, without having to inspect and test every single one. Under the type approval system, a prototype vehicle is tested. If it passes the tests and the production arrangements also pass inspection, then vehicles of the same type are approved for production and sale, without further testing.

14. Although Singapore is not a vehicle manufacturing country, it has been our practice that for vehicles imported by local agents, we would accept certificate of compliance with the emission standard issued by the manufacturer or reputable test laboratories. The ROV does not conduct mechanical inspection of the prototype vehicles. For new vehicles, the first unit of a vehicle model imported into Singapore must be physically tested to comply with the exhaust emission standard. The local agent must submit the necessary document and produce the test vehicle for a mechanical

inspection at the ROV. If the documents are in order and the test vehicle passes the inspection, the ROV issues a letter of approval to the agent. The vehicle can then be offered for sale and be registered for use on the roads. Subsequent units of the similar model are allowed to be registered without emission tests and mechanical inspection on each unit.

For self-importer

15. The ROV requires every second-hand or used vehicle for registration in Singapore to be tested individually. We do not accept certification for prototype.

16. The reason why we do not accept the manufacturer's certificate for a used vehicle is that it merely certifies that the vehicle meets the emission standards at the time of production. The conditions of the vehicle would deteriorate over time and, due to wear and tear, may not meet the standards any more at the time of importation into Singapore. Hence, we have to require that a vehicle to be tested by an approved emission laboratory before it can be allowed for registration.

17. For new vehicles, we require that every vehicle ~~imported~~ by any self-importer be tested individually for compliance with the exhaust emission standard unless the importer can produce documentary proof from the manufacturer that all the vehicles imported come from the same production batch. If there is documentary proof from the manufacturer,

the importer would only be required to send one unit from the batch of the vehicles for the exhaust emission test.

CONCLUSION

18. The automobile industry has an increasing responsibility to the community and the environment. It faces the challenges to adapt and co-exist with the environment. Much of what control does is to direct industry to meet acceptable standards.

19. Pollution prevention is better than pollution control. In trying to find a possible panacea to environmental problems, we need to recognise that industry, consumers and government must all cooperate in a united effort to find a fundamental solution. We should never stop and wait.

20. Vehicular standards must be constantly reviewed and upgraded to meet changing circumstances and to keep abreast with advances in vehicle manufacturing technologies. We will continue our search for better vehicle standards for Singapore.

dks/ws93/nykindo

EMISSION LIMITS FOR PETROL DRIVEN VEHICLES

(1) ECE 15.04 emission limit

In the ECE 15.04, the specified maximum emission rates for carbon monoxide and hydrocarbons depend on the weight of the vehicle.

Type of vehicles	CO (g/test)	HC+NOx (g/test)
RW <= 1020 kg	58	19.0
1020<RW<=1250 kg	67	20.5
1250<RW<=1470 kg	76	22.0
1470<RW<=1700 kg	84	23.5
1700<RW<=1930 kg	93	25.0
1930<RW<=2150 kg	101	26.5
RW>2150 kg	110	28.0

* RW = Reference weight

(2) ECE 83 emission limit for unleaded petrol

In the ECE 83, lower limits were set, related to the engine capacity rather than the weight of the vehicle.

Type of vehicles	CO (g/test)	HC+NOx (g/test)	NOx (g/test)
C>2000	25	6.5	3.5
1400<=C<=2000	30	8.0	-
C<1400	45	15.0	6.0

* C = Engine capacity (cc)

(3) US "EPA cycle" emission limit

The ECE 83 allowed manufacturers the alternative of certification according to the US "EPA" cycles for engine capacity =>1400 cc and fuelled with unleaded petrol.

Type of vehicles	CO (g/km)	HC (g/km)	NOx (g/km)
Passenger cars	2.11	0.25	0.62

The limit values are deemed to be met if they are not exceeded by the results of tests when masses of each pollutant are multiplied by the appropriate deterioration factor.

Emission Control System	Deterioration factor		
	CO	HC	NOx
Oxidizing Catalytic Converter	1.2	1.3	1.0
Without Catalytic Converter	1.2	1.3	1.0
Three-way Catalytic Converter	1.2	1.3	1.1

(4) Japan Safety Regulations for Road Vehicles

The Japanese Safety Regulations for Road Vehicles (Article 31) employs three different mode of operation.

The drive cycles require the vehicles to perform relatively simple acceleration and deceleration patterns which are repeated. The pollutant limits are as follows:-

(a) 10-mode six cycles for hot start test;

Type of vehicles	CO (g/km)	HC (g/km)	NOx (g/km)
GVW<=1.7t or pax<=10	2.7	0.39	0.48
1.7t<GVW<2.5t	17.0	2.70	0.98

(b) 11-mode four cycles for cold start test

Type of vehicles	CO (g/test)	HC (g/test)	NOx (g/test)
GVW<=1.7t or pax<=10	85.0	9.5	6.0
1.7t<GVW<2.5t	130.0	17.0	8.5

(c) 6-mode operation

Type of vehicles	CO (ppm)	HC (ppm)	NOx (ppm)
GVW>=2.5t or pax>10	1.6	520	850

(5) US EPA 40CFR Section 86.410-80 emission limit (For Motorcycles and Scooters only)

The emission limit shall not exceed:

(a) Hydrocarbons: 5.0 grams per vehicle kilometre;

(b) Carbon monoxide: 12 grams per vehicle kilometre.

dsk/ws93/nykindo

TABLE 1 MOTOR VEHICLE POPULATION 1983 – 1992

ITEM	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1 CARS										
I) Private cars & station wagons	182,120	195,873	200,032	200,163	201,651	215,928	234,438	247,606	261,050	268,435
II) Company cars & station wagons	16,992	18,248	18,105	17,556	17,868	18,959	20,010	20,361	19,679	14,451
III) Tuition cars & station wagons	1,090	1,085	1,104	910	856	957	954	963	904	847
IV) Private hire cars & station wagons	4,168	4,159	4,030	3,314	3,081	3,140	3,135	3,343	3,665	3,879
Sub-Total	204,370	219,365	223,271	221,943	223,456	238,984	258,537	272,475	285,298	287,612
2 MOTORCYCLES										
I) Motorcycles and scooters	140,267	133,492	126,337	119,241	115,476	116,476	119,897	121,338	121,164	115,339
Sub-Total	140,267	133,492	126,337	119,241	116,476	116,476	119,897	121,338	121,164	115,339
3 BUSES										
I) Omnibuses	3,287	3,354	3,597	3,530	3,482	3,410	3,304	3,220	3,145	3,211
II) School buses	2,733	2,645	2,575	2,427	2,345	2,207	2,047	2,011	1,959	1,922
III) Private buses	866	1,062	1,232	1,271	1,354	1,475	1,615	1,796	1,916	1,985
IV) Private hire buses	616	687	779	862	944	1,039	1,174	1,208	1,234	1,259
V) Excursion buses	338	356	356	383	458	657	855	1,063	1,086	1,127
Sub-Total	7,840	8,104	8,537	8,473	8,683	8,788	8,995	9,298	9,342	9,504
4 TAXIS										
I) Public taxis	10,668	11,058	10,938	10,677	10,552	10,473	10,652	12,239	12,705	13,445
II) School taxis	5	4	3	0	0	0	0	0	0	0
Sub-Total	10,673	11,062	10,941	10,677	10,552	10,473	10,652	12,239	12,705	13,445
5 GOODS AND OTHER VEHICLES										
I) Goods-cum-passenger vehicles	8,757	8,959	8,781	8,634	8,562	8,525	8,436	8,344	8,202	7,780
II) Light Goods Vehicles	59,208	59,940	57,915	55,442	54,211	53,933	53,825	53,065	52,272	50,959
III) Heavy Goods Vehicles	33,198	38,436	39,298	38,241	38,756	43,183	48,491	52,941	56,573	59,410
IV) Others	4,061	4,042	3,711	3,445	3,519	2,940	2,969	3,294	3,755	3,860
Sub-Total	105,224	111,377	109,705	105,762	105,048	108,581	113,773	117,644	120,802	122,009
6 TAX EXEMPTED VEHICLES										
I) Cars and station wagons	1,890	1,913	2,038	1,935	2,112	1,957	1,969	2,042	2,113	1,767
II) Motorcycles and scooters	1,302	1,201	1,227	1,146	1,068	1,094	1,099	1,187	1,246	1,193
III) Buses	164	178	180	165	150	136	131	150	136	154
IV) Goods Vehicles	1,370	1,296	1,152	1,112	1,114	1,202	1,156	1,185	1,162	1,186
VII) Others	3,188	3,333	3,372	3,203	3,565	4,117	4,328	4,793	5,336	5,375
Sub-Total	7,914	7,922	7,969	7,561	8,009	8,506	8,683	9,358	9,993	9,675
ALL MOTOR VEHICLES (TOTAL)	476,288	491,322	486,760	473,659	471,124	491,808	520,537	542,352	559,304	557,584

TABLE 2 MOTOR VEHICLE ANNUAL GROWTH RATE 1983 – 1992

Type of Vehicles	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Cars	12.1%	7.3%	1.8%	-0.6%	0.7%	6.9%	8.2%	5.4%	4.7%	0.8%
Motorcycles	3.6%	-4.8%	-5.4%	-5.6%	-3.2%	0.9%	2.9%	1.2%	-0.1%	-4.8%
Buses	5.4%	3.4%	5.3%	-0.7%	1.3%	2.4%	2.4%	3.4%	0.5%	1.7%
Taxis	3.8%	3.6%	-1.1%	-2.4%	-1.2%	-0.7%	1.7%	14.9%	3.8%	5.8%
Goods & Other Vehicles	8.5%	5.8%	-1.5%	-3.6%	-0.7%	3.4%	4.8%	3.4%	2.7%	1.0%
Tax Exempted Vehicles	-0.6%	0.1%	0.6%	-5.1%	5.9%	6.2%	2.1%	7.8%	6.8%	-3.2%
All Motor Vehicles (Total)	8.2%	3.2%	-0.9%	-2.7%	0.5%	4.4%	5.8%	4.2%	3.1%	-0.3%

TABLE 3 MOTOR VEHICLES BY TYPE OF FUEL USED 1983 – 1992

Year	Cars		Buses		Goods & Other Vehicles	
	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
1983	204,365	5	671	7,169	67,260	37,964
1984	219,362	3	819	7,285	70,117	41,260
1985	223,269	2	948	7,589	68,552	41,153
1986	221,943	2	996	7,477	66,222	39,540
1987	223,454	2	1,060	7,523	65,447	39,601
1988	238,980	4	1,159	7,629	66,346	42,235
1989	258,535	2	1,252	7,743	67,549	46,224
1990	272,474	1	1,350	7,948	67,872	49,772
1991	285,294	4	1,398	7,944	67,952	52,850
1992	287,608	4	1,419	8,085	66,440	55,569

Note : Exclude motorcycles, taxis and tax exempted vehicles.

TABLE 8 REGISTRATION OF NEW AND USED MOTOR VEHICLES 1983 – 1992

Types of Vehicles		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Normal Cars	New	30,211	22,245	14,021	8,142	12,676	26,445	35,402	31,872	26,823	26,581
	Used	931	169	47	63	55	38	214	241	591	902
	Total	31,142	22,414	14,068	8,205	12,731	26,483	35,616	32,113	27,414	27,483
Weekend Cars	New									1,869	2,956
	Used									20	27
	Total									1,889	2,983
Motorcycles & Scooters	New	17,198	13,352	8,392	4,842	5,834	6,352	5,965	4,111	4,312	6,420
	Used	234	192	74	78	357	1,623	4,079	3,960	3,847	93
	Total	17,432	13,544	8,466	4,920	6,191	7,975	10,044	8,071	8,159	6,513
Buses	New	701	391	767	336	473	625	755	904	854	887
	Used	351	221	177	155	114	147	155	101	97	34
	Total	1,052	612	944	491	587	772	910	1,005	951	921
Goods & Other Vehicles	New	10,606	10,102	6,117	3,252	3,730	6,889	8,046	7,081	6,666	7,462
	Used	1,315	1,394	257	78	206	344	575	574	802	18
	Total	11,921	11,496	6,374	3,330	3,936	7,233	8,621	7,655	7,468	7,480

Note : Exclude taxis and exempted vehicles

TCT/AR92/AR0892 – 21–Jan–93

EXPERT GROUP MEETING
ON
TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

8th to 10th June 1993

COUNTRY PAPER

PREPARED BY

D. D. J. WIJESUNDARA
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Emission Standards for new Vehicles

Presently Sri Lanka does not have any vehicle emission standards or eminent air quality standards. Air pollution in Sri Lanka is much lower than that of the other countries of the region. In fact it is in the urban areas of Sri Lanka like the city of Colombo that the air pollution is greater than in the suburbs. Hence city dwellers in the urban areas of the country would be exposed to unhealtny and dangerous levels of automotive air pollution from petrol and diesel vehicles before the end of the century at the present rate of vehicle imports unless preventive measures are taken to curb air pollution.

After the import liberalization policy the vehicle population in the country has increased three-fold during the past decade from 300,000 to 1 million. Of these nearly 50 per cent comprise motor cycles, 20 per cent motor cars, 5 per cent buses. 10 per cent agricultural land vehicles and the rest cover motor lorries and dual purpose vehicles. Accordingly, there has been a rapid growth in the import of motor cycles the most popular of which are those having an engine capacity between 50 and 100 CC, the two-stroke and four-stroke types.

All vehicle registrations are done in the Department of Motor Traffic, Colombo. Most of the vehicles running on the highways are re-conditioned ones. Nearly 30 per cent are brand new vehicles and operated at maximum efficiently. Ordinarily the re-conditioned motor cars imported into the country are less than 3 years old. In 1990 the number of vehicles using gasoline and diesel was as much as 88 per cent and 12 per cent respectively.

Super, regular petrol and auto-diesel are the types of fuel available in Sri Lanka. Crude Oil is imported from the Middle East and refined locally at the Sapugaskanda Refinery. The Sulphur content in refined petrol and diesel is maintained at below 0.1 per cent. Tetraetnyl lead is added on to petrol to increase the octane value of fuel. Super and regular petrol have an octane count of 93 and 90 respectively. As Sri Lanka does not manufacture any type of motor vehicles, all vehicles are imported into the country. 90 per cent of which come from Japan.

There has been a growing awareness among the people of Sri Lanka with regard to air-pollution. The vehicular emission control campaign is promoted by the Metropolitan environmental Improvement Programme in collaboration with -

Ministry of Transport and Highways
Police Department
Department of Motor Traffic
Ministry of Environmental and Parliamentary Affairs
Central Environmental Authority and
Ceylon Petroleum Corporation

With regard to the motor vehicle emission control, the situation varies from country to country. Where air pollution is concerned up-grading of new vehicles for emission control is considered necessary in the region as a whole. Our country is presently going ahead with a programme to introduce new regulations and emission standards for all motor vehicles both gasoline and diesel operated and motor cycles as well. Discussions are already being conducted to determine ways and means of introducing standards for emission control. It has been accepted that pollutants like carbon monoxide (C.O), hydro-carbon (H.C.) Oxide of Nitrogen (N.O.) particulate emission (P.M.), smoke (visible emissions), crankcase emissions and fuel system (evaporative emissions) should be controlled. In the case of diesel vehicles, the particulate and smoke have to be controlled. For this purpose the Government of Sri Lanka is going ahead with a programme of introducing smoke meters. This control procedure will have to be implemented in all new vehicles that will be manufactured. As Sri Lanka does not manufacture motor vehicles the countries which manufacture vehicles in the region should lay down common rules to a group of countries with regard to vehicle certificatation or type approvals. Vehicles manufactured by all such countries should have similar emission characteristics. It may also be necessary to have a certificate of conformity on type approvals for new vehicles, before putting up for sale. It may be mentioned that there are differences between the European, Japanese and American type approvals. These type approvals should comprise emission documentation including certificate of compliance of vehicle type, description of vehicle and engine, emission test report, diagrams of emission control system, exhaust system, and additional anti-pollution devices. There are different standards in India, Philippines and certain other countries.

Sri Lankan roads, such as those in the city of Colombo and major cities like Kandy, Galle are always congested with traffic. The fuel used in gasoline vehicles is leaded petrol. Vehicles imported to Sri Lanka (new or used) are not equipped with catalytic converters. Air pollution has a significant impact on health causing respiratory diseases. In order to control this state of emission from gasoline vehicles, catalytic converters could be ordered when new or used vehicles are imported. For this purpose it is necessary that the fuel supplied should also be non-leaded.

Discussions have been conducted regarding a programme of Clean Air 2000 - Action Plan. It may be mentioned that the Sri Lanka refineries would be in a position to supply non-leaded petrol by 1995 if the necessary funds are made available to do so. Similarly the Garages which are authorized to inspect vehicles for the issue of annual Fitness Certificates should have appropriate equipment to check engines for emission level.

Availability of smokemeters in these garages should be a requirement to test emission level both in petrol and diesel vehicles.

In the city of Colombo traffic planning is controlled by the Ministry of Transport & Highways, Urban Development Authority and the Colombo Municipal Council. Road transport in Sri Lanka is estimated to be nearly 8 - percent of the mode of transportation. Presently the network of the roads in most of the major cities is old and therefore unable to accommodate the traffic volume or the weight of vehicles. The roads are also not maintained regularly and properly due to various reasons. This is a main cause of road accidents, and air pollution. Fortunately some of the trunk roads have been re-constructed, widened and reinforced for heavy traffic and smooth flow. Because of the present road congestion and too many vehicles running on the same roads, vehicles have to be stopped many times on the journey thereby causing air pollution by vehicle emission.

The Department of Motor Traffic in collaboration with the Police Department has initiated a programme of road checks at random to prohibit the use of unroadworthy vehicles and to cancel their registrations. The Department is also taking stricter measures by these means to curb the use of unroadworthy belching vehicles on roads as the vehicle population is expected to double itself within the next 10 to 15 years.

It is considered necessary to eliminate the use of two-stroke motor cycles from highways and permit four-stroke ones whose air pollution is said to be less. In the present circumstances it is considered essential to stop the import of vehicles used for more than 3 years as an action plan to maintain clean air by the year 2000. At present this limitation is effective only for motor cars. The Department of Motor Traffic has already taken action to discourage the increasing conversions from petrol to diesel engines by way of increasing the conversion fee from Rs.50/ to Rs.35,000/.

The Police Department on the other hand imposes heavy penalties on unauthorised conversions of motor vehicles from petrol to diesel, and on owners of excessive belching vehicles.

Action is being taken by the Department of Motor Traffic to establish a fully automatic Vehicle testing Centre in the vicinity of Colombo initially and to have such Centres in all major cities subsequently for the purpose of inspecting vehicles properly for the issue of annual Fitness Certificates, which is presently done by authorized Garages, once this Testing Centre is established there is a possibility of testing all vehicles for fuel emission. According to present regulations a vehicle should be free of grit and smoke. Stricter regulations should be laid down after the installation of the Testing Centre.

SUGGESTED AMENDMENTS TO THE MOTOR TRAFFIC ACT.

It is suggested that the amendments to the Motor Traffic Act should include the following in order to mitigate the pollution caused by vehicle exhaust fumes.

1. STANDARDS FOR EXHAUST EMISSIONS FOR EXISTING DIESEL DRIVEN VEHICLES.

   Exhaust emissions from all diesel driven motor vehicles should conform to specified standards.
   These standards could be made by regulation/by order, etc. under the Motor Traffic Act.
   The standards may be made effective from a specified date or upon publication.

2. STANDARDS FOR EXHAUST EMISSIONS FOR EXISTING PETROL DRIVEN VEHICLES.

   Exhaust emissions from all petrol driven motor vehicles should conform to specific standards.
   These standards could be made by regulation/by order, etc. under the Motor Traffic Act.
   The standards may be made effective from a specified date or upon publication.

3. STANDARDS FOR EXHAUST EMISSIONS FOR EXISTING MOTOR CYCLES SCOOTERS AND THREE-WHEELERS.

   Exhaust emissions from every motor cycle, scooter or three-wheeler should conform to specific standards.
   These standards could be made by regulation/by order, etc. under the Motor Traffic Act.
   The standards may be made effective from a specified date or upon publication.

4. FINES FOR NON-COMPLIANCE WITH EXHAUST EMISSION STANDARDS.

   The appropriate authority/Department of Motor Traffic, Traffic Police/Central Environmental Authority should be empowered to specify and impose fines for non-compliance with the standards for exhaust emissions by motor vehicles as indicated under 1, 2, and 3 above.

5. STANDARDS FOR EXHAUST EMISSION FOR PETROL DRIVEN VEHICLES TO BE REGISTERED FOR THE FIRST TIME IN SRI LANKA.

   a) All petrol driven motor vehicles to be registered for the first time in Sri Lanka should be made to comply with relevant standards for exhaust emissions specified under the Motor Traffic Act.
      The standards could be made by regulation/by order, etc. and may be made effective from a specified date or upon publication.

5. b) Applications for registration of petrol driven vehicles should be approved only after the Department of Motor Traffic has been satisfied that the petrol driven motor vehicle has been tested for compliance with the specified standards.
A certificate issued by the Manufacturer of the vehicle or by a registered Garage in Sri Lanka should be made acceptable for this purpose.

6. STANDARDS FOR EXHAUST EMISSION FOR DIESEL DRIVEN MOTOR VEHICLES TO BE REGISTERED FOR THE FIRST IN SRI LANKA.

a) All diesel driven motor vehicles to be registered for the first time in Sri Lanka should be made to comply with relevant standards for exhaust emissions specified under the Motor Traffic Act.
The standards could be made by regulation/by order, etc. and may be made effective from a specified date or upon publication.

b) Applications for registration of diesel driven vehicles should be approved only after the Department of Motor Traffic has been satisfied that the diesel driven motor vehicle has been tested for compliance with the specified standards.
A certificate issued by the Manufacturer of the vehicle or by a registered Garage in Sri Lanka should be made acceptable for this purpose.

7. STANDARDS FOR EXHAUST EMISSION FOR MOTOR CYCLES AND SCOOTERS TO BE REGISTERED FOR THE FIRST TIME IN SRI LANKA.

a) All motor cycles, scooters and three-wheelers to be registered for the first time in Sri Lanka should be made to comply with relevant standards for exhaust emissions specified under the Motor Traffic Act.
The standards could be made by regulation/by order, etc. and may be made effective from a specified date or upon publication.

b) Applications for registration of all motor cycles, scooters and three-wheelers should be approved only after the Department of Motor Traffic has been satisfied that the petrol driven motor vehicle has tested for compliance with the specified standards.
A certificate issued by the Manufacturer of the vehicle or by a registered Garage in Sri Lanka should be made acceptable for this purpose.

8. UNLEADED PETROL.

a) All petrol driven motor vehicles to be registered for the first time in Sri Lanka should be capable of running on unleaded petrol with effect from a specified date.

REGULATIONS

Since smoke-meters for the measurement of smoke emissions from diesel vehicles are already in the process of being purchased we may also Gazette the Regulations under the Motor Traffic Act for this purpose. A draft is given below :

REGULATIONS UNDER THE MOTOR TRAFFIC ACT FOR SMOKE EMISSIONS FROM DIESEL VEHICLES.

1. Any officer not below the rank of Sub-Inspector of Police, who has reason to believe that a vehicle is emitting excessive or other pollutants which are likely to cause environmental pollution, endangering the health or safety of any other user of the road or the public, may direct the driver of any other person in charge of the vehicle, to submit the vehicle for undergoing a test - to measure the standard of black smoke or the standard of any of the other pollutants specified by these regulations.

2. The smoke level measurements from diesel vehicles shall be carried out by a .... * by means of a smoke meter approved for that purpose by the Department of Motor Traffic and the Central Environmental Authority.

3. The driver or any person in charge of the vehicle shall upon demand by any officer referred to in (1) above, submit the vehicle for testing for the purpose of measuring the standard of smoke or the levels of other pollutants or both.

4. Smoke density for all diesel driven vehicles shall be as follows :

Method of Test	Maximum Smoke Density Hardridge Unit
Running with free acceleration method from idle speed to 60 per cent of the maximum rotating speed.	60

* To be specified in consultation with the Commissioner of Motor Traffic and Director/Traffic, Police Headquarters.

CONTROL OF EMISSION FROM NEW VEHICLES

JAKARTA, JUNE 8 – 10, 1993

COUNTRY PAPER

I N D I A

CONTROL OF EMISSION FROM NEW VEHICLES

JAKARTA, JUNE 8 - 10, 1993

COUNTRY PAPER

I N D I A

N. Bagchi
Director, Ministry of Environment
Government of India
New Delhi

The growth of vehicles in the metropolitan cities in India is at 13 percent. The rate of growth is at about 3 percent.

This has caused an increase in the problem of air pollution.

While emissions from industries areis being effectively controlled through compliance of the prescribed standards and permit for location of new industries, the large number of vehicles being registered each day is causing a deterioration of air quality. Vehicles contributed 100 tons per day in 1973 in the city of New Delhi, this has gone up to 500 Tons per day of pullutionts in 1993 and is about 70 per cent of the total emissions. The situation is similar in other cities.

There is a network in the country of nearly 350 ambient air quality station which monitor suspended particulate matter, oxides of nitrogen and sulphur dioxide. The data shows that air quality is mostly within the prescribed standards. There are excursions in particulate levels from natural dust and adrese metecrological conditions.

The standards for new vehicle at present are as per ECE : 15-04. The standards notified for 1995 and indicative standard for 2000 are given in the Annexure. The driving cycle is based on actual data collected in 1987. This cycle is more demanding than the ECE cycle and is based on Indian cities, owning to their peculier mix.

The Government has initiated epidemeological studies in 18 critically polluted areas. This would show the effect of air pollution on the health of the people. The data would be used in setting standards for the future.

The pattern of fuel consumption shows that diesel is three times that of petrol. Within the SI engines, the two and three wheelers use 65 percent of the petrol. The price of petrol is more than twice that of diesel.

The analysis of the air quality data indicates that hydrocarbons and particulates are the major problem. The technical pathway for the future, demands strict control for two and three wheelers and public transport.

Compressed Natural Gas for public vehicles is proposed for the future.

Trials for substitution with CNG have already been taken up.

The standards notified on the basis of the technical pathway that has been adopted is awaiting public comments.

The use of CNG and lean - burn technology are the options that are being seriously considered.

Government has approved four laboratories to test vehicles for type approval and conformily of production.

New vehicles, at present, are being certified by these four laboratories which are equipped with chassis dinamometer required for such tests. One of these is being upgraded through UNDP support. Two other laboratories also have the basic facilities for such tests. These can be upgraded when required.

A) MASS EMISSION STANDARD FOR PETROL DRIVEN VEHICLES EFFECTIVE FROM 1.4.1995.

I TYPE APPROVAL TESTS

i) Passenger cars

Reference mass R(Kg)	CO g/km	HC + NO_x g/km
R < 1020	5.0	2.0
1020 < R < 1250	5.7	2.2
1250 < R < 1470	6.4	2.5
1470 < R < 1700	7.0	2.7
1700 < R < 1930	7.7	2.9
1930 < R < 2150	8.2	3.5
R > 2150	9.0	4.0

Note

1. The test will be as per Indian driving cycle with cold start.
2. There should be no cranckcase emission.(To be implemented from 1.1.1994)
3. Evaporative emission should not be more than 2.0 g/test. (To be implemented from 1.1.1994)

ii) Two wheelers (For all categories)

CO - 3.75 g/km
HC - 2.40 g/km

Note
The test will be as per Indian driving cycle with cold start.

iii) Three wheelers(For all categories)

CO - 5.6 g/km
HC - 3.6 g/km
Note
The test will be as per Indian driving cycle with cold start.

II CONFORMITY OF PRODUCTION TESTS

i) Passenger Cars (For all categories)
A relaxation of 20% for CO & 25% for combined HC+NO_x for the corresponding values of Type Approval Test given above would be permitted.

ii) Two & Three Wheelers (For all categories)
A relaxation of 20% for CO and 25% for HC for the values of Type Approval Test given above would be permitted.

MASS EMISSION STANDARD FOR DIESEL VEHICLES EFFECTIVE FROM 1.4.1995.

I TYPE APPROVAL TESTS

Vehicle category	HC* (g/KWH)	CO* (g/KWH)	NO_x (g/KWH)	Smoke
Medium & Heavy over 3.5 Ton/GVW	2.4	11.2	14.4	***
Light diesel upto 3.5 Ton GVW	2.4	11.2	14.4	***
		OR		
Reference mass R(Kg)		CO** g/km	HC + NO_x** g/km	
R < 1020		5.0	2.0	
1020 < R < 1250		5.7	2.2	
1250 < R < 1470		6.4	2.5	
1470 < R < 1700		7.0	2.7	
1700 < R < 1930		7.7	2.9	
1930 < R < 2150		8.2	3.5	
R > 2150		9.0	4.0	

Note

* The test cycle is as per 13 mode cycle on dynamometer.

**1) The test should be as per Indian driving cycle with cold start.

*** The emissions of visible pollutants(smoke) shall not exceed the limit values to smoke density, when expressed as light absorption coefficient given at page 2 of Annexure II for various nominal flows when tested at constant speeds over full load.

I CONFORMITY OF PRODUCTION TESTS

A relaxation of 10% for the values of Type Approval Test given above would be permitted .

Nominal Flow G(l/s)	Light Absorption Coefficient (K(m^{-1})
42	2.00
45	1.91
50	1.82
55	1.75
60	1.68
65	1.61
70	1.56
75	1.50
80	1.46
85	1.41
90	1.38
95	1.34
100	1.31
105	1.27
110	1.25
115	1.22
120	1.20
125	1.17
130	1.15
135	1.13
140	1.11
145	1.09
150	1.07
155	1.05
160	1.04
165	1.02
170	1.01
175	1.00
180	0.99
185	0.97
190	0.96
195	0.95
200	0.93

Annexure III

MASS EMISSION STANDARD FOR PETROL DRIVEN VEHICLES EFFECTIVE FROM 1.4.2000

I TYPE APPROVAL TEST

i) Passenger cars(for all categories)

CO - 2.72 g/km
HC + NO_x - 0.97 g/km

Note

1. The test should be as per Indian driving cycle with cold start.

ii) Two wheelers(for all categories)

CO - 2.0 g/km

HC - 1.5 g/km

Note

1. The test should be as per Indian driving cycle with cold start.

iii) Three wheelers(for all categories)

CO - 4.0 g/km

HC - 1.5 g/km.

Note

1. The test should be as per Indian driving cycle with cold start.

II CONFORMITY OF PRODUCTION TESTS

i) Passenger Cars (For all categories)
A relaxation of 16% for CO & combined HC + NO for corresponding values of Type Approval Test given above would be permitted.

ii) Two & Three Wheelers (For all categories)
A relaxation of 20% for CO as well as HC for the values of Type Approval Test given above would be permitted.

MASS EMISSION STANDARD FOR DIESEL VEHICLE EFFECTIVE FROM 1.4.2000

I TYPE APPROVAL TESTS

Vehicle category	HC*	CO* (g/KWH)	NO_x*	PM*	Smoke
Medium & Heavy over 3.5 ton GVW	1.1	4.5	8.0	0.36	***
Light diesel upto 3.5 ton GVW	1.1	4.5	8.0	0.61	***

OR

CO ** g/km	HC + NO_x** g/km	PM**
2.72	0.97	0.14

Note

* The test should be as per 13 mode cycle.

**1) The test should be as per Indian driving cycle with cold start.

*** The emission of visible pollutants (smoke) shall not exceed the limit values of smoke density , when expressed and light absorption coefficient given at Page 2 of Annexure IV for various nominal flows when listed at constant speed, over full load.

I CONFORMITY OF PRODUCTION TESTS

A relaxation of 10% for the values of Type Approval Test given above would be permitted for Conformity Of Production Test for all vehicles.

تاریخ _____

شماره _____

پیوست _____

ستاد مرکزی معاینه فنی
خودروهای تهران

GENERAL VIEW OF MOTOR VEHICLE INSPECTION FOR EMISSION CONTROL IN TEHRAN / IRAN

THE MUNICIPALITY OF TEHRAN

TEHRAN MOTOR VEHICLE TECHNICAL INSPECTION BUREAU

INTRODUCTION

The city of Tehran with an area of eight hundred square meter is one of the most polluted cities of the world. With the start of new management of the municipality of Tehran towards the end of 1989, the major problems which were not given enough attention to in the previous years because of the crisis caused due to the imposed war,they were once again seriously evaluated.

One of the main reasons for Tehran's pollution is due to the traffic of more than one million motor vehicles which contribute to 60-70 % of the over all pollution.

THE HISTORY OF THE FOUNDATION OF TEHRAN'S VEHICLES TECHNICAL INSPECTION BUREAU

The municipality of Tehran started to establish the bureau of Tehran's vehicles technical inspection in 1990 so that to make sure that the private and public transportation vehicles get inspected twice and four times a year respectively.

This bureau through proper selection and implementation of one hundred and fifty equipped stations throughout the city of Tehran started the inspection of vehicles and by the end of the first year, 350000 vehicles were throughly inspected. The points looking for during inspection are listed in attached appendix 1. Some of the projects carried out or in the process of being carried out by this bureau are as following.

CARRIED OUT PROJECTS :

1- THE PROJECT OF SUPPORTING THE INSPECTION LOCATION WITH ADVANCED FACILITIIES SUCH AS ADVANCED ENGINE ADJUSTMENT EQUIPMENT AND EMISSION ANALYSERS FOR THE ANALYSIS OF THE EXAUST EMISSIONS OF VEHICLES.

At the begining of technical inspection of vehicles for monitoring the emission of gases, it was sufficient enough to just look for vehicles which did not give out any soot, thus the non oil burning vehicles were certified and issued an inspection sticker. However with the improvement of technical inspection and the necessity to reduce air pollution, the need for modern facilities and advanced gas emission monitors were strongly felt.

Because of this need the municipality of tehran processed purchasing one hundred and fifty engine adjustment equipment and gas emission analysers from sun electric corporation. These equipment in addition to detecting faults within the electrical system of the vehicle, they can also search for and measure four different types of emission (co, co2, Hc, o2) and provide complete data before and after adjustment with the help of a printer. these results together with an inventory list from each vehicle will be sent to the data processing department of the bureau in order to gather and provide complete statistics and data of the vehicle fleet.

2- MAKING DATA BANK AND STATISTICS FOR TEHRAN'S VEHICLE FLEET.

Due to not having access to accurate statistic of current status of tehran's vehicles, the need to make an informative data bank was felt, and thus this bureau by the end of 1992 started making this bank and therefore it is hoped that a good statistic and data of all current existing vehicles to be gathered by the end of 1993 .

3- GIVING THE NECESSARY AWARENESS TO CITIZENS AND GIVING SUFFICIENT TRAINING TO PEOPLE IN CHARGE OF THE INSPECTION LOCATIONS.

Since air poilution reduction is not possible but with the cooperation of all the citizens, therefore this inspection bureau through runing great advertising project throughout the city provided the citizens with the necessary awareness of the need to act.

FUTURE PROJECTS

1) USING ADDITIVES IN DIESEL FUELS.

With consideration to traffic of approximately 3000 buses in the city and the pollution caused due to the traffic of these sort of vehicles, N I O C (National Iranian oil company) agreed to provide these vehicles with new types of fuels with added additives.

THE PRELIMINARY RESULTS OF THE TRIAL TEST OF USING FUELS WITH ADDED ADDITIIVES.

a) Reduction of fuel density and consequently reduction of soot to at least 50% .

b) Reduction of fuel consumption 15 to 18% .

c) Reduction of CO to approximately 15%

d) Other results: reduction of pollutants and hydrocarbons and as a result reduction of repairs and maintenance of diesel engines.

2) CONVERSION OF PUBLIC VEHICLES TO GASEOUS FUEL SYSTEMS.

Due to less pollution caused through consuming gaseous fuels than gasoline, conversion of public vehicles from gasoline system to gaseous system was looked over, and it is predicted that by the begining of 1994 , 2000 more taxi with gaseous fuel system to be added to the current existing 4000 taxi already converted to gaseous systems and approximately 125^ garbage pick up vans to be converted to gaseous fuel systems.

3) GASEOUS FUEL CONVERSION OF URBAN PUBLIC TRANSPORTATION.

The urban public transportation company, at present has purchased ten new benz model 302 buses with OM 360 engines which have been converted to three gaseous fuel systems (LPG , CNG , DAVAL FUEL). It is forseen that this number to be increased to one hundred at the present year and finally one thousand of them to be converted to gaseous fuel systems.

Parallel to other actions, NIOC has suggested the followings for better improvement of fuel.

A) To decrease the lead content of leaded gasoline to less than ./2 of gram in every liter.

B) To decrease the benzer. content of leaded gasoline to less than 5% of its volume.

C) The sulphur content in diesel fuel must not exceed over ./7 of the weight of fuel.

TEHRAN Technical Inspection of vehicles

Official copy

Date of Issue | Center code | No

Vehicle: Private ☐ Public ☐ Heavy ☐ Motor cycle ☐

Kind of vehicle | Licence plate | Serial No

System | Engine Number | Chassi No

Model | Speed Omitter Digit

General characteristics

Fail

1_ Number plate ☐ 2_ Chassi no ☐
3_ Engin no ☐ 4_ Color ☐
5_ Correctness of Documentation ☐

Pass

General Items

6_ Body ☐ 7_ Paint work ☐ 8_ Engine ☐ 9_Glass ☐
10_Mirrors ☐ 11_ Lights ☐ 12_ Horn ☐ 13_ Tires ☐
14_ Wippers ☐ 15_ Sits ☐ 16_ Breaks ☐ 17_ Exhaust ☐
18_ Steering wheel ☐ 19_ Front end Suspension ☐ 20_ Shock obserbers ☐
21_ Clutch ☐ 22_ Gear ☐ 23_ Gages ☐ 24_ emision gas ☐

CO2 ☐ % CO ☐ % O2 ☐ % HC ☐ PPM

Public service Vehicels

25_ Badges ☐ 29_Bumpers ☐
26_ Luggage Compartment ☐
27_ Meter
28_ Taxi sign

Customer copy

Date of Issue | Center code | No

Vehicle: Private ☐ Public ☐ Heavy ☐ Motor cycle ☐

Kind of vehicle | Licence plate | Serial No

System | Engine Number | Chassi No

Model | Speed Omitter Digit

General characteristics

Fail

1_ Number plate ☐ 2_ Chassi no ☐
3_ Engine no ☐ 4_ Color ☐
5_ Correctness of Documentation ☐

Pass

General Items

6_ Body ☐ 7_ Paint work ☐ 8_ Engine ☐ 9_Glass ☐
10_Mirrors ☐ 11_ Lights ☐ 12_ Horn ☐ 13_ Tiers ☐
14_ wippers ☐ 15_ Sits ☐ 16_ Breaks ☐ 17_ Exhaust ☐
18_ Steering wheel ☐ 19_ Front end Suspension ☐ 20_ Shock obserbers ☐
21_ Clutch ☐ 22_ Gear ☐ 23_ Gages ☐ 24_ emision gas ☐

CO2 ☐ % CO ☐ % O2 ☐ % HC ☐ PPM

Public service Vehicels

25_ Badges ☐ 29_Bumpers ☐
26_ Luggage Compartment ☐
27_ Meter ☐
28_ Taxi sign ☐

- *The number of this certificate must match your sticker number
- *Use the above form only when the vehicles pass, otherwise use this form.
- *In case of failure you are repair the fault immediatly and return to the save test station and obtain your certificate.
- *This certificate is valid for 3 months for H.G.V.S and P.S.V.S and 6 months for private case.

"The effect of service and tune-up on emission reduction in used and new vehicles"

Report from: Tehran Municipality

Project Done by: Air Pollution Control Co.

(P.Hasteh)

"In the name of God"

Introduction :

At the present the extremely polluted air of Tehran environment is its most intricated problem.According to the officials of World Health Organization (WHo). from the smoke concentration point of view , Tehran is the first polluted city and from SO2 - concentration view point it is the second polluted city of the world. The emissions of outomobiles. including those of the gasoline engines. gasoil engines.and motorcycles. are one of the most important source of air pollution in Tehran which make 60-70% of total air pollution in Tehran. According to the latest statistics. existing in the report of world Bank mission the amount of daily emission of major air pollutants of Tehran is as follows:

- HC. uncombusted Hydrocarbons (causing respiratory tract cancer). 610 tones.

- CO. carbon monoxide (causing reduction in O2-absorbtion by bo dy tissues). 4700 T.

-NOX. the family of nitrogen oxides (causing respiratory diseases). 500T.

- SO2, sulphur dioxide (its breathing in high amounts. causes repiratory diseases). 103 T.

- Pb. lead (causing hepatic . renal. digestive failures , and psychological effects in children). 5T.

Now there are many various and effective methods which are used in the field of reduction of pollution caused by cars. in the world . specially in industerial countries. Because of the limitations of the fuel kind and its cost. Applying these methods in our country at least in future years is impossible for example an equipment called "catalytic convertor" installed in the way of the exhaust of cars. reduces more than 90% of the poilution of emissions. bur since this equipment needs free lead gasoline. There is no possibility for using it in the country at the present time . So. considering the acute present situation of the air in Tehran it seems that using of an effective and economical approach for reducing air pollutions is necessary. The following report is the result of a research done recently in the field of studying the amount of the reduction of the pollution caused by the exhaust emmisions through regulating engine and doing periodic sarvices. by

the "unit of evaluation and control of air pollution", affiliated to "Tehran Traffic Control Company". The outcoming results are extremly considerable and can be used in the process of encountering with the pollution of cars.

Scope of the project :

The project has two parts. The fist part will assess the Technical safety of the gasoline cars of Tehran through sampling. The second part will test the 49 cars selected by statistical analysis for two times one before tune-up and required service (including changing spark plugs. points and air filter) and one , after the mentioned operation by analyzing oquipments existing in the combustion loboratory of oil research center. (The scope of the project and its caissification are enclosed.)

Results:

In the first part of this project the following results were obtained by assessment of the Technical saftety situation of the existing cars in Tehran.

A- 17% of the cars have oil burning , and 83% of them don't have this defect.

B- 12% of the cars have spark plugs with very good condtion (the spark plug is new.)

40% of the cars have spark plugs with good condition.(It is used for a short time.)

40% of the cars have spark plugs with bad condition.(It is out of

standard.)

C- 77% of the cars have regulated points.

23% of the cars have unregulated points.

D- The engine of 44% of the cars are repaired to tally the engine of 12% of the cars are repaired partially.

The engine of 44% of the cars arenot repaired.

E- 57% of the drivers pay little attention to engine regulation and service of their cars.

43% of the divers pay much attention to marintenance and service of their cars.

The best result that we can get from the first part of this project is : that a low percentage of the cars in Tehran which has a very bad technical situation makes the emajor part of the pollution caused by cars .

In the second part of the project with evaluation of the amount of reduction of air pollutant gases (Co.Hc) under the eeffect of engine regulation and periodric services.(including changing of spark plug, points and air filter) some interesting results are obtained. Figures 1 to 7 which are enclosed indicate cinsiderable reduction of pollution for some certain samples of cars. The characteristics of each car and the amount of pollution reuction are identified under each figure. The imposed driving cycle on car is the European cycle (04-15 ECE) . and

all of the obtained amounts of test have been compared with the current European standard in figure 8, the amount of fuel consumption reduction in manufactured cars in the decades of 60, 70, 80 and the years of 1990–1992 is identified, and if showes that the amount of fuel consumption reduction in old car, which inciude a higher percentage of existing cars , is at a high level.

The tested cars are selected through statistical onalysis and their characteristics are as follow:

1- They are selected from different decades, various types and models.

2- The above cars were the most numerous between their coevals.

The obtained results of tests are as follow:

1- Service and engine regulation in different age classes have reducted carbon monoxide about 20–58 percent and Hydrocarbones about 15–43 percent.

2- The overal statistics of cars from the view point of age class, show the following reductions :

- 45% of reduction in Co: and

- 40% of reduction in uncombusted HC

Using the obtained results of tests on cars befor regulating the engine, on the average the weight of the air pollutions or gasoline engines are as follow:

- Before regulating the engine and service , CO 57 g/Km and HC 4.6

g/Km.

- After regulating the engine and service , CO 2.8/gKm and HC 2.3 g/Km.

Now, supposing that each car annualy covers a distance of 15,000 Km on the average, and considering the number of 1,000,000 cars and gasoline vans the amount of annual reduction of the pollutant gases of Carbon monoxide and uncombusted Hydrocarbones in Tehran will be as follow:

- Carbon monoxide reduction : 435.000 tones per year .
- Uncombusted hydrocarbones reduction : 34.500 Tones per year.

The results have also indicated that with regulating the engine the fuel use will be reduced about 13%.

According to the statistics. announced by the National oil company of Iran in 1991. 6 million liters of gasoline is daily consumed by cars in Tehran . So considering the average reduction of 13% in fuel consumption through regulating the engine and car service . we will save about 780.000 liters of gasoline each day.

Conclusion:

According to the estimations done in the project of studying the effects of engine regulation and periodic services of cars . the following results are obtained:

If we can provide the engine regulating facilities for the drivers of gasoline cars in economical way , a great number of cars will be regulated and serviced in a limited interval with a low cost.

Also , the studies indicate that the drivers training in different ways such as mass media can promote their knowledge about the effects of engine regulation on cars. Adopting the policy of regular service and regulation of car the following results are obtained.

1- The co production , which is one of the detrimental gases for human health and causes the reduction of O2 of absorbtion by body tissues. will be reduced by 435,000 Tones annualy.

2- The uncombusted HC production , which causes respiratory tract cancer in human. will be reduced by 34.500 tones annualy .

3- The daily gasoline consumption in Tehran will be reduced by 13 percent : taking into consideration the amaunt of daily consumption of 6 million liters (The statistics of the national oil company oil Iran in 1370). we will save 780.000 liters of gasoline.

4- Considering the amount of daily gasoline consevation in Tehran we can estimate that the annally production of lead in Tehran air will be reduced by 160 Tones.

Some various hygenic and cultural results have also been obtained by adopting this policy.

COUNTRY PAPER

FOR

EXPERT GROUP MEETING

ON

TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

(DP/RAS/89/057)

JAKARTA INDONESIA
8-10 JUNE 1993

Prepared by :
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THAILAND

COUNTRY PAPER OF THAILAND

Introduction

Thailand is naturally an agricultural country which is progressing rapidly in science and technology sectors. In the past decades, the rapid economic growth has increased air pollution gradually from industry, communication, transport, and other activities.

The major sources of air pollution in Thailand are motor vehicles and the industries. There are more than 3 million motor vehicles and more than 6 million motorcycles in 1992. The pollutants from motor vehicles include carbon monoxide, hydrocarbons, and suspended particulate matters (SPM). Lead from gasoline is also dangerous to public health.

The lead content in gasoline was reduced in 1984 from 0.84 g/litre to 0.45 g/litre and to 0.15 g/litre on September 1,1992.Unleaded gasoline was introduced to Thailand on May 1, 1991 in an effort to reduce the risk of people from lead toxicity. Even though air quality in Thailand is considered to be acceptable in general, there are still some problems in the congested streets and industrial plants. The problems can only be solved with strong coordination and implementation of various agencies concerned, especially the enforcement and control of standards. Public awareness can be a very important tool to help solving the problem. With mutual understanding between public and private sectors, the air and noise pollution problems may certainly be leading in a brighter direction.

Existing Vehicles Emission Control

Government has adopted many plans to address the air pollution problems caused by motor vehicles. Several measures which have been already taken under these action plans are the introduction of unleaded gasoline and reduced sulphur content in diesel fuel, and also the establishment of catalytic converter in new motor vehicles, beginning in 1993. Other planned measures include strengthening and reinforcing the existing annual safety and emission inspection programme for commercial vehicles, and the establishment of a similar annual inspection for motorcycles and private cars.

Land Transport Department had proposed a project, which had already approved by the Ministry of Transport and Communications to allow private sector in setting up the inspection stations (franchise stations) both in the Bangkok Metropolitan Area and provincial areas.

In the beginning of 1994, the inspection on private cars and motorcycles will begin within Bangkok and the vicinity which consist of 5 provinces in addition to Bangkok. This project will be expanded to other provincial areas and expected to cover every province by 1998. (17 provinces in 1995, 16 provinces in 1996, 21 provinces in 1997 and 13 provinces in 1998).

In 1994, which is in initial phase of this project, the inspection will be done on the private cars that has been registered for 10 years or more, 7 years or more for motorcycles.

In 1998, every private cars and motorcycle that has registered for 3 years or more must be inspected by the governmental authorized inspection centers. The effective terms of inspection are given in Annex I.

For more effective way to solve the pollution, the Sub-committee of Air and Noise Pollution, which is appointed by Pollution Control Committee, under the Environmental Promotion and Prevention Act. B.E. 2535 (1992) considered to reduce CO emitted from gasoline engine 6% by vol. at idle speed as follows:

- Any vehicle registered before January 1, 1983 must have CO not exceeding 6% by vol. at idle speed.
- Any vehicle registered from January 1, 1983 to October 31, 1993 must have CO not exceeding 4% by vol. at idle speed and must have HC not exceeding 600 ppm.
- Any vehicle registered from November 1, 1993 must have CO not exceeding 1% by vol. at idle speed and must have HC not exceeding 100 ppm.

However, the above standards are still under consideration and may change when ever the more information is available.

New Vehicle Emission Control

The new emission standards for motor vehicle and motorcycles that will go into effect in 1993 are based on ECE Regulations. These emission standards are established by the Technical Committee on Vehicle Emissions Standards of the Industrial Products Standard Act. B.E. 2511 (1968), which includes representatives of Land Transport Department, Pollution Control Department and other agencies concerned, and will be enforced by the Ministry of Industry. The Technical Committee has been set up 6 emission standards, of which 4 emission standards have already been published in the Royal Gazzette, the other 2 emission standards still are circulated for public comments before

submit to the Industrial Product Standards Council for approval. The Technical Committee has further prepared another 4 draft standards and will cary out in 1993. (Annex II)

On March 10, 1992 the Cabinet resolved that the following passenger cars (gasoline engine) have to be equipped with catalytic converter;-

Engine displacement of 1,600 cc. or more

- 1 January 1993 - for imported vehicles
- 1 March 1993 - for local assembly

Engine displacement less than 1,600 cc.

- 1 September 1993 - for imported vehicles
- 1 November 1993 - for local assembly

Traffic Conditions in Bangkok

Bangkok's traffic conditions are among the worst is Asia, and have been steadily deteriorating in recent years. Severe congestion is the principal symptom, with long journey times, high fuel consumption, and high level of pollution. Rapid growth of the human and vehicle populations, divided responsibility among separate agencies with no coordinating authority, and inadequate investments have contributed to the growing seriousness of the situation over the past 10-15 years. The problem is compounded as the city grows outward, and private land developers provides subdivision roads without relationship to an overall arterial road network. The result is a configuration of road space unable to cope with the existing traffic demands. As the vehicle fleet is expanding at about 10% annually (Annex III). The comparatively modest road building and traffic management measures that have been introduced have not been able to keep pace with the needs. Traffic congestion has reached the high levels that no "peak hours" are discernible as heavy traffic spread throughout most of the working day. Therefore the Government has to estabilsh the Office of the Commission for the Management of Road Traffic, under the Office of the Prime Minister, in order to solve such traffic problems.

Conclusion

Government and various agencies have implemented many measures including amended a rew pollution law in 1992. Such law has an effect on in-use vehicles and new vehicles to be more stringent. Therefore, it is expected that the ambient air in Thailand will be better in the

next coming years.

The government has also implemented the additional measures to release traffic congestion by investing in many projects such as :

1. The elevated highway from Bangkok to Bangkok International Airport which will opened to traffic in 1994.

2. The establishment of Metropolitan Rapid Transit Authority to be responsible for electric cars project.

3. The construction of the dual-track railway parallely to an existing track all over the country (1993-1998). In the first phase, four routes of which the distance between 40-100 kms. from Bangkok are expected to be in service in 1996.

4. The construction of 1,891 kms. national highway to be four-lane divided highway will be constructed (1993-1999).

5. The project of Intercity Motorway from Bangkok to Chonburi.

These projects will not only helps the transportation in Thailand to be more convenient, more safe but also will also be more benefit to the quality of ambient air.

However, if the government is able to implement the vehicle periodical maintenance system by authorized the approved service shops to meet certain requirements, it will help the exhaust emission control devices to work more effectively and will be very fruitful for road worthiness of the vehicle as well.

Effective Term of Motor Vehicle Inspection

Effective Term	Category of Motor Vehicles	Effective Date
1 year	1. Commercial motor vehicles (Except some motor vehicles prescribed by Ministerial Regulation)	Since 1963
	2. Passenger cars for private use which have been used for more than 10 years	Coming years
	3. Motorcycles which have been used for 3 years	Coming years
2 years	1. Passenger cars for private use, except new cars, which have been used for less than 10 years.	Coming years
3 years	1. New passenger cars for private use	Coming years
	2. Commercial motor vehicles prescribed by Ministrial Regulation.	Since 1979
	2.1 Trucks, for private use, having the maximum mass not exceeding 3,500 kg.	
	2.2 Bus, for private use, comprising not more than twenty seats in addition to the driver's seat	
	3. New motorcycle	Coming years

1. TIS 1085-2535 (Royal Gazzette : Dated 19 Mar. 1992)
   Standard for Gasoline Engine Vehicles:
   Safety Requirements; Emission From Engine.
   N.B. Equivalent to ECE R 15.04

2. TIS 1105-2535 (Royal Gazzette : Dated 25 Aug. 1992)
   Standard for Motorcycles :
   Safety Requirements; Emission From Engine, Level 1.
   N.B. Equivalent to ECE R 40.00

3. TIS 1120-2535 (Royal Gazzette : Dated 15 Oct. 1992)
   Standard for Gasoline Engine Vehicles:
   Safety Requirements; Emission From Engine, Level 2.
   N.B. Equivalent to ECE R 83 Approval B

4. TIS 1140-2535 (Royal Gazzette : Dated 25 Mar. 1993)
   Light Duty Diesel Engined Vehicles:
   Safety Requirements; Emission From Engine, Level 1.
   N.B. Equivalent to ECE R 83 Approval C

5. TC 697 No.5 (Circulated for Public Comments, Dated 12 Oct. 1992)
   Heavy Duty Diesel Engined Vehicles:
   Safety Requirements; Emission From Engine, Level 1.
   N.B. Equivalent to ECE R 49.01

6. TC 697 No.6 (Circulated for Public Comments, Dated 16 Oct. 1992)
   Standard for Motorcycles :
   Safety Requirements; Emission From Engine, Level 2.
   N.B. Equivalent to ECE R 40.01

Emission Standards Drafted by TC.697

1. TC 697 No.7

   Standard for Gasoline Engine Vehicles:

   Safety Requirements; Emission From Engine, Level 3.

   N.B. Equivalent to EC Directive /91/441/EEC

2. TC 697 No.8

   Light Duty Diesel Engined Vehicles:

   Safety Requirements; Emission From Engine, Level 2.

   N.B. Equivalent tc EC Directive /91/441/EEC

3. TC 697 No.9

   Heavy Duty Diesel Engined Vehicles:

   Safety Requirements; Emission From Engine, Level 2.

   N.B. Equivalent to EC Directive /91/542(A)/EEC

4. TC 697 No.10

   Heavy Duty Diesel Engined Vehicles:

   Safety Requirements; Emission From Engine, Level 3.

   N.B. Equivalent to EC Directive /91/542(B)/EEC

INDUSTRIAL PRODUCT STANDARDS ACT. B.E.2511 (1968)

Section 1 - 12 - omittted -

Section 13. The Minister has the power to appoint qualified persons whom the Council submits under section 8(5) members of one or several Technical Committees.

The Technical Committee has the duty to prepare a draft standard and carry out other technical matters concerning the standard and submit to the Council.

The Provisions of section 11 shall apply to the meeting of the Technical Committees mutatis mutandis.

Section 14. A member of the Technical Committee vacates office upon:

(1) death;

(2) resignation;

(3) being bankrupt;

(4) being an incompetent or quasi-incompetent person;

(5) being imprisoned by a final judgment except for a petty offence or offence committed through negligence;

(6) being advised in writing by the Minister.

Section 15. For the benefit of industrial promotion, the Minister may determine, amend and revoke standards for industrial products according to the recommendation of the Council.

The determination, amendment and revocation of standards under paragraph one shall be published in the Government Gazette.

Section 16. - omitted -

Section 17. For the purpose of ensuring safety or preventing harmful effect which may befall the public, the industry or economy of the country, any particular kind of industrial products which shall conform with a standard may be determined.

The determination under paragraph one shall be made by a Royal Decree and the date of its coming into force shall not be less than sixty days from the date of its publication in the Government Gazette.

Section 18. Before the issuance of a Royal Decree under section 17, the following steps shall be taken:

(1) the Institute shall publish, in the Government Gazette and at least in one Thai daily newspaper for a period of not less than seven days, an announcement stating the intention requiring any particular kind of industrial products to be manufactured in conformity with a standard, the place where the particulars are available and the period for a person wishing to protest to submit his protest to the Institute, which is not less tham thirty days from the date of the publication;

(2) if no protest is received, the Institute shall report to the Council, and in such case, the Council shall proceed further;

(3) in the case where a protest is received, the Institute shall refer the protest to the Council;

(4) the Institute shall post a notice Institute specifying the date, time and place where a hearing of the protest will be held and inform the protestant of it in writing;

(5) the council shall avail itself of the opportunity for all persons interested to attend and give their opinion in the hearing;

(6) if the protestant does not show up within the specified time, the Council shall have the power to proceed as it thinks fit;

(7) When a decision has been made by the Council, the Institute shall post a copy of the decision at the Institute and send one copy thereof to the protestant.

Section 19. A person having interest in the decision of the Council under section 18 has the right to appeal against such decision to the Minister within thirty days from the date of posting the copy of the decision at the Institute.

The decision of the Minister shall be final.

Section 20.- 58 - omitted -

Number of Vehicles Registered in Thailand (31 December 1989)

Type of Vehicle	Total	Bangkok	Provincials
Grand Total	6,505,020	1,721,586	4,783,434
A. Total Vehicles under Motor Vehicles Act	6,116,891	1,629,919	4,486,972
1. Sedan (Not more than 7 pass.)	637,243	470,927	166,316
2. Microbus & Passenger Pick up	363,177	232,689	130,488
3. Van & Pack up	787,028	236,082	550,946
4. Motortricycle	1,701	73	1,628
5. Interprovincial Taxi	444	370	74
6. Urban Taxi	16,424	13,493	2,931
7. Fixed Route Taxi	8,956	8,150	806
8. Motortricycle Taxi (Tuk Tuk)	18,204	7,406	10,798
9. Hotel Taxi	761	574	187
10. Tour Taxi	774	774	0
11. Car For hire	522	522	0
12. Motorcycle	4,153,000	644,597	3,508,403
13. Tractor	53,779	9,669	44,110
14. Road Roller	2,193	1,508	685
15. Farm's vehicle	66,801	0	66,801
16. Automobile's Trailer	5,884	3,085	2,799
B Total Vehicles under Land Transport Act	366,906	77,568	289,338
Bus : Total	67,627	19,528	48,099
- Fixed Route Bus	54,577	13,134	41,443
- Non Fixed Route Bus	8,081	3,190	4,891
- Private Bus	4,969	3,204	1,765
Truck : Total	277,153	58,040	219,113
- Non Fixed Route Truck	29,250	12,857	16,393
- Private Truck	247,903	45,183	202,720
Small Rural Bus	22,126	0	22,126
C Total Vehicles under Motorized Vehicle Act	21,223	14,099	7,124

Number of Vehicles Registered in Thailand (31 December 1990)

Type of Vehicle	Total	Bangkok	Provincials
Grand Total	7,592,085	2,245,814	5,546,271
A. Total Vehicles under Motor Vehicles Act	7,117,298	1,942,712	5,174,586
1. Sedan (Not more than 7 pass.)	777,345	598,223	179,122
2. Microbus & Passenger Pick up	445,093	300,938	144,155
3. Van & Pack up	925,936	268,598	657,338
4. Motortricycle	2,222	300	1,922
5. Interprovincial Taxi	449	370	79
6. Urban Taxi	16,827	13,493	3,334
7. Fixed Route Taxi	8,823	8,150	673
8. Motortricycle Taxi (Tuk Tuk)	19,614	7,406	12,208
9. Hotel Taxi	787	598	189
10. Tour Taxi	788	788	0
11. Car For hire	539	538	1
12. Motorcycle	4,778,220	728,679	4,049,541
13. Tractor	59,091	9,955	49,136
14. Road Roller	2,217	1,570	647
15. Farm's vehicle	73,733	0	73,733
16. Automobile's Trailer	5,614	3,106	2,508
B Total Vehicles under Land Transport Act	424,512	88,910	335,602
Bus : Total	71,680	20,923	50,757
- Fixed Route Bus	56,417	13,291	43,126
- Non Fixed Route Bus	9,896	4,153	5,743
- Private Bus	5,367	3,479	1,888
Truck : Total	330,541	67,987	262,554
- Non Fixed Route Truck	37,072	16,635	20,437
- Private Truck	293,469	51,352	242,117
- Small Rural Bus	22,291	.. 0	22,291
C Total Vehicles under Motorized Vehicle Act	50,275	14,192	36,083

Number of Vehicles Registered in Thailand (31 December 1991)

Type of Vehicle	Total	Bangkok	Provincials
Grand Total	8,481,025	2,112,518	6,368,507
A. Total Vehicles under Motor Vehicles Act	7,964,969	2,008,918	5,956,051
1. Sedan (Not more than 7 pass.)	796,807	594,078	202,729
2. Microbus & Passenger Pick up	482,455	324,517	157,938
3. Van & Pack up	957,365	156,136	801,729
4. Motortricycle	2,253	637	1,616
5. Interprovincial Taxi	527	370	157
6. Urban Taxi	16,351	13,493	2,858
7. Fixed Route Taxi	9,256	8,416	840
8. Motortricycle Taxi (Tuk Tuk)	20,492	7,406	13,086
9. Hotel Taxi	890	696	194
10. Tour Taxi	745	735	10
11. Car For hire	495	494	1
12. Motorcycle	5,521,391	887,289	4,634,102
13. Tractor	72,998	11,993	61,005
14. Road Roller	2,674	1,926	748
15. Farm's vehicle	76,312	-	76,312
16. Automobile's Trailer	3,458	732	2,726
B Total Vehicles under Land Transport Act	462,117	102,366	359,751
Bus : Total	76,359	23,199	53,160
- Fixed Route Bus	58,852	14,448	44,404
- Non Fixed Route Bus	11,552	4,779	6,773
- Private Bus	5,955	3,972	1,983
Truck : Total	363,089	76,167	283,922
- Non Fixed Route Truck	42,047	21,544	20,503
- Private Truck	321,042	57,623	263,419
Small Rural Bus	22,669	-	22,669
C Total Vehicles under Motorized Vehicle Act	53,939	1,234	52,705

COUNTRY PAPER OF INDONESIA

EXPERT GROUP MEETING ON TYPE APPROVAL PROCEDURES FOR NEW VEHICLES

JAKARTA, REPUBLIC OF INDONESIA
8 - 10 JUNE 1993

BY :

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MINISTRY OF COMMUNICATONS
THE REPUBLIC OF INDONESIA

COUNTRY PAPER OF INDONESIA

1. INTRODUCTION

From the beginning of Five Year Development Plan, Indonesian Government has already considered that highways as an important element of its economic development effort since road is a dominant transport mode within the transportation system in the country. It is estimated that more than 50% of freight and more than 85% of passenger traffic are carried out by roads, and the rest is accomodated by sea and air transport.

In the early 1990's, there were more than 200,000 kilometers of road scatarred throughout the country which comprise:

- 12,000 kilometers of national network;
- 40,000 kilometers of provincial netrwork;
- 120,000 kilometers of local network.

In addition, there is a small but growing number of toll finance, limited expressways built and operated by state owned company of toll roads. Such expressways connect several parts of the major cities in Java and Sumatra islands, where there are enough traffic to support a toll finance expressway.

These all road networks carry a varied mix of vehicles, from domestically produced and imported passenger cars, buses, trucks to small motorized public transport vehicles. Although in the last few years many road networks have been built, it seems that such development is not yet enough to accomodate road traffic, particularly in big cities.

In Indonesia, there were approximately 10 million motor vehicles as of the early of 1992, and these transport mode are now indispensable for economic activities and improving the people's living standards. These number of motor vehicle ownership is estimated would be increased about 10%-15% per annum. On the other hand, such condition cause some serious social problems as traffic accidents and adverse effect on the environment such as atmospheric pollution, noise, etc. Therefore, there is now a strong need to ensure safety and prevent environmental pollution by applying some various countermeasures.

2. CURRENT CONDITION

Most of motor vehicle in Indonesia use gasoline with octane number varies from 85 to 95. The special gasoline --so called premium has octane number more than 100, contends lighter hydro carbon (HC) or some kind of additive substances, such as tetraetil lead (TEL). The second largest fuel used in Indonesia is diesel fuel with cetane number between 30 and 60. Standard fuel for diesel vehicle / motor is classified into octane number. Its cetane 100 standard is n-heksaoctana ($C_{16}H_{34}$), sometimes called n-cetane and standard cetane 0 is alfa-metilnaf-talena ($C_{11}H_{10}$). Quality of the burning of diesel fuel can be determined by adding few certain chemical substance like organic nitrates and peroxide. Addition of 0.5% - 4% amylnitrate will rise cetane number 7 to 30 and addition of 0.5% - 4% acetoperoxide will rise cetane number 10 - 35.

Besides gasoline and diesel fuel, Compressed Natural Gas (CNG) has been introduced in Indonesia as automotive fuel in line with the government policy on conservation and diversification of energy as well as on air pollution. Although the current use of CNG as automotive fuel is still in a little amount, there is evidence that the government certainly intends to encourage the use of CNG in the near future. Since many government institutions are involved in this policy implementation, the governement through the Ministry of Mines and Energy has established a Coordination Team for The Improvement of CNG Use. The institutions or agencies involved in this Team are Ministry of Mines and Energy, the Ministry of Communications, the Ministry of Finance, the state owned oil and gas company (PERTAMINA), and the Association of Automobile Manufacturer (GAIKINDO).

Although some efforts have been taken to cope with air pollution problems due to the operation of transport sector, there is still strong evidence that transportation sector contributes the highest percentage on air pollution. It might be illustrated by the result of a survey conducted in big cities of Jakarta, Bandung, Surabaya, and Semarang during the period of 1986-1990, as follows:

Pollutant	Transportation	Dwellings	Garbage	Industry
Jakarta				
CO	98.8%	0.1%	1.0%	0.1%
NOx	73.4%	9.6%	1.1%	15.9%
HC	88.9%	2.2%	7.7%	1.2%
Bandung				
CO	97.4%	0.1%	2.4%	0.1%
NOx	56.8%	11.2%	3.0%	29.0%
HC	78.5%	2.2%	17.5%	1.8%
Surabaya				
CO	96.8%	0.3%	2.6%	0.3%
NOx	33.6%	21.5%	1.7%	43.3%
HC	71.0%	7.4%	17.2%	4.4%
Semarang				
CO	98.8%	0.1%	1.1%	Not
NOx	82.5%	16.3%	1.2%	available
HC	87.6%	4.0%	8.4%	data

3. AIR QUALITY STANDARD

In 1988, the State Minister for Population and Environment has issued the Decree concerning with the national ambient air quality standards for Indonesia, as follows:

- Sulfur Dioxide (SO_2)	260 mg/m^3	(0.10 ppm)
- Carbon Monoxide (CO)	22,600 mg/m^3	(20 ppm)
- Nitrogen Dioxide (NO_2)	92.5 mg/m^3	(0.05 ppm)
- Oxidant as Ozone (O_3)	200 mg/m^3	(0.10 ppm)
- Suspended Particles (TSP)	260 mg/m^3	
- Lead (Pb)	6 mg/m^3	
- Hydro Carbon (HC)	160 mg/m^3	(30.24 ppm)
- Hydrogen Sulphide (H_2S)	42 mg/m^3	(0.003 ppm)
- Ammonia (NH_3)	1,360 mg/m^3	(2 ppm)

In any places in the country are supposed to be below of the national ambient air quality standards. However, in some areas, especially in big cities, the parameters of air pollution were found as above of such air quality standards. For instance, the result of field measurement conducted in Jakarta during the period of December 1991 - February 1992 were indicated as follows:

Pollutant	Concentration (mg/m^3)	Standard ambient (mg/m^3)
CO	28,000	22,600
HC	350	160
NOx	145	92.5
TSP	250	260
Pb	2	0.06

4. THE POLICY OBJECTIVE

By taking into account the whole previous descriptions, and in order to improve the air quality, especially in the big cities such as Jakarta, Bandung, Surabaya, and Semarang, the Government of Indonesia imposes an environmental policy for reducing exhaust gas emission from motor vehicles by 50% during the period of 1993-1995. To implement this policy, the Government takes the following actions programs:

a. Coordination among the related agencies (e.g., State Ministry of Population and Environment, Ministry of Communications, Ministry of Industry, Ministry of Home Affairs, Traffic Police, and Local Government);

b. Preparation on publicity, administration work, personnel, and air quality monitoring;

c. Finalization and implementation of the Government Regualtion on Air, and other related Ministrial Decrees;

d. Trial Test;

e. Field implementation affecting private motor vehicles and commercial motor vehicles through strengthening law enforcement and improving motor vehicle inspection.

To support the policy objective, in the long terms, the Government arranges the following tentative action programs, such as:

a. Controlling the design of new model of automobiles;

b. Controlling the exhaust gas emission of motor vehicle during manufacturing;

c. Controlling and monitoring the exhaust gas emission of motor vehicle on the road;

d. Introducing Unleaded Petrol;

e. Introducing Catalytic Converter;

f. Disclosure Requirement;

g. Emission Taxation.

5. MOTOR VEHICLE INSPECTION

The Government realizes that the inspection of motor vehicles certainly plays an important role as one of measures to cope with the problems related to air pollution due to motor vehicles operated on the roads.

It is therefore, the new Traffic and Road Transport law No.14 of 1992 states that every motor vehicles operated on the road should be type approved. It means that before issuance of the type approval certificate, all motor vehicle should be tested through Motor Vehicle Test Centre for Roadworthiness and Certification which includes emission related checks such as:

- CO and HC concentrations for motor vehicles equipped with SI engines;
- Smoke for diesel motor vehicles.

In this respect, the Government imposes two kinds of motor vehicle inspections, i.e.:

a. Type approval inspection; and
b. Periodical inspection.

Type approval inspection is handled by the Directorate General of Land Transportation, Ministry of Communications and conducted in the motor vehicle inspection centre in Bekasi, about 30 kilometers from Jakarta. Such an inspection is intended to test the new type of all motor vehicles concerning with safety and exhaust gas emission. Any new type of motor vehicle does not pass the test is not allowed to be manufactured or assembled in mass production. For any new type of motor vehicle does pass the test, Director General of Land Transportation will grant a type approval certificate.

At a moment, all motor vehicles registered in Indonesia except private passenger cars must be inspected periodically twice per year. Similar to the type approval inspection, such a periodical inspection is intended not only for safety consideration, but also to control the smoke and exhaust gas emission. The periodical inspection is handled by Road Traffic and Transportation Office of the local government in every big city as well as in small city throughout the country.

Although the Government of Indonesia has enough regulation on motor vehicle periodical inspection, the objective in reducing air pollution due to motor vehicle

in use on the road is still far ahead since there is a fact that the local government are lack of motor vehicle inspection equipment. From the total number of motor vehicle inspection stations scattered throughout the country, only about 25% are equiped with a proper mechanical equipment. This condition suggests that the most of motor vehicles do not undergo the exhaust gas emission inspection.

In order to control a new motor vehicle with regard to emission, the Minister for Communications has already issued Decree Number KM.8 of 1989 which stipulates the exhaust gas emission standard, which states that:

a. CO and HC contents of the motor vehicle exhaust gas emission using premium (>= 87 RON) have been determined as follows: maximum 4.5% for CO and 1,200 ppm for HC;

b. Contents as stated above are measured at idling condition whilst gas condition is at unhampered position;

c. Thickness of the diesel fueled (>= 45 cetane number) motor vehicle exhaust gas smoke is determined at 50% maximum ;

d. Similar to point (b) above the measurement of smoke thickness must be conducted in idling condition.

6. PROCEDURE OF MOTOR VEHICLE EMISSION INSPECTION

Director General of Land Transportation issued the Decree Number AJ.402/8/5 of September 1990, to provide guidelines on the procedure of roadworthiness inspection for motor vehicles, specially concerning with exhaust gas emission and smoke. This procedure is used for type approval inspection and periodical inspection, covering inspection procedure of Carbon Monoxide (CO), Hydro Carbon (HC), and thickness of smoke.

a. Procedure of Measuring CO and HC

(1) Scope
This procedure covers the method to determine the carbon monoxide (CO) and hydro carbon (HC) content which are contained in exhaust gas of fire ignited internal combustion engines of motor vehicle in the position of idling rotation.

(2) Definition
(a) The concentration of CO is the ratio of the volume of carbon monoxide (CO) which is cantained in the exhaust gas and expressed in percents (%).

(b) The concentration of HC is the ratio of the volume of hydro carbon (HC) equalized with normal hexane (C_6H_{14}) in the exhaust gas and expressed in ppm.

(3) Test Condition

(a) Surrounding condition (outside).
The outside temperature for the testing vehicles and the measuring (testing) equipment should be around 25 +/- 5 ^{0}C. The testing equipment should not be exposed to direct heat of the sun, rain or wind.

(b) Condition of motor vehicle.

- The tested motor vehicle should be on a flat place.

- All additional equipment exept the standard operational accesories of the engine must be removed and be in aposition without load.

- For motor vehicle with normal transmission, the position of the gears must be in neutral and the clutch must be at free position. For motor vehicle with automatic transmission, the transfer lever must be at neutral (N) or at position of parking (P).

- The engine hood must be in proper close condition and an additional cooling fan should not be used.

(c) Preparing the tested motor vehicle.

- First, the propelling engine must be warmed up to the working temperature. The choke should not be in operation. The warming up of propelling engine should be conducted in line with the instruction from the manufacturing plant if such is available in the operating manual or other manuals. A thermometer or other measuring device should be used to measure whether the working temperature of the engine has been reached, which mean that the warming up is sufficient.

- The idling rotation of the propelling engine must be stable and the ignition period must be in line with the specification from the manufacture.

(d) Fuel oil.
The fuel oil must fulfill the government requirements.

(4) Testing Equipment

(a) The testing equipment must be capable of measuring the CO and HC content continuously at the tested motor vehicle in idling rotation.

(b) The operation of the testing equipment must adhere to the procedure for operating the testing equipment.

(5) Testing procedure

(a) Investigate whether there is a leakage at the propelling engine exhaust gas system and the testing equipment.

(b) After the warming up has been completed, the rotation of the engine should be increased to the medium rotation during 15 minutes without load and then back to the idling rotation.

(c) Immediately after the rotation of the engine has returned to the idling, attach the equipment (probe) into the exhaust gas disposal pipe as deep as 30 cm. After approxi ately 20 seconds, the measurement of the CO and HC content can be carried out in line with the SOP of the testing equipment.
If the motor vehicle has 2 or 3 exhaust gas disposal pipes, it should be arranged that the exhaust gas is discharged through 1 pipe. If the disposal cannot be made through 1 pipe, the measurement must be conducted at each disposal pipe, in this way, the connection must be calculated by way of finding the average value.

Notes:

(a) In 4 stroke engine, the probe must be placed minimum 30 cm inside the exhaust gas pipe, in so far as the testing is not influenced by surrounding air.

(b) If the probe can not be placed inside the exhaust gas pipe as required, then we must extend the exhaust gas pipe.

b. Procedure of Measuring Smoke Thickness

(1) Scope
This procedure explains the steps of testing the thickness of smoke content of diesel motor vehicle at a stationary rotation.

(2) Testing condition

(a) Condition of the propelling engine and tested motor vehicle.

- The seal on the engine must be in accordance with the factory specifications.
- The exhaust gas system must not be leaking.
- Before being warmed up until the working temperature in line with the specifications of the manufacturing factory, in particular, the cooling water and oil must reach the working temperature determined by the manufacturing factory requirements. The warming up of the propelling engine should be carried out in line with the instructions of the manufacturing manual or in another manual for propelling engine. The thermometer or other measuring equipment use for measuring whether the working temperature of the propelling engine has been reached, in the meaning of the warming up is sufficient.

(b) Fuel oil.

The fuel oil used must fulfill the requirements set by the Government.

(c) Testing equipment.

- The equipment is constructed in such away that it is capable of sucking exhaust gas as much as (330 ± 15) ml within 1.4 ± 0.2 seconds through a filter paper.
- The installation of the probe in the exhaust gas pipe must be paralel to the axis of the pipe. If it is impossible for the probe to be paralel, an addition must be used.
- The quality of the filter paper used must be in line with the class 5A filter paper shown at JIS P3801 or the equivalent.
- To know the opacity of the filter paper and to ensure the reflection of the smoke tester in line with the type Bosch (JIS D8004). The calibration of the smoke meter is carried out in line with the requirements issued by the manufacturing factory of the equipment as an example of the deflection type.

(d) Condition of the testing place

The absolute temperature of the testing place (T) expressed in degrees/kelvin and the atmospheric pressure H expressed in mm Hg must be measured and

the factor F can be calculated with the formula:

$$F = (750/H)^{0.65} \times (T/298)^{0.5}$$

To measure the value of F as correcting factor of the testing place can be taken : $0.98 < F < 1.02$.

(3) Testing procedure

(a) The transmission transfer lever must be place at the neutral position, and the position of the clutch must be free.

(b) Before starting the measurements, clean the disposal system by pressing the accelerator 2 or 3 times without load.

(c) After the cleaning as mentioned above, leave the propelling engine at an idle rotation during 5 to 6 seconds, and then press the accelerator pedal slowly so that there will be maximum injection from the injection pump.
This condition is maintained 4 seconds so that a maximum rotation will be reached and governor will be working. After 4 seconds release the accelerator pedal and the engine will return to idle rotation and leave it untill the subsequent measurement.
The period of each measurement must be 15 second.
The working of the gas collection by the equipment started simultaneously with start of the working of the accelerator pedal so that the equipment will collect the exhaust gas when the accelerator pedal is pressed down.

(d) The measurement is repeated 3 times and for each measurement must be used a new filter paper.

(e) The squence of the exhaust gas measuring should be conducted.

(4) Test results
The opacity of the 3 pieces filter paper during the testing, the average value is taken and final result obatained by comparing it with the value limit.

7. COMMENT ON GUIDELINES

a. Regional Cooperation

Guidelines for New Motor Vehicle Emission Control In the Asia - Pasific Region is certainly necessary to be decided by Expert Group Meeting of participating countries in order to cope with the problems related to motor vehicle emission.

Moreover, it is hoped to give some ideas in harmonizing of control system, actions to be taken on both regional and country level, as well as the adoption of any standards which have already been acceptable in many parts of the world.

From the experiences of many countries have advised us, that the best efficiency of the emission reduction can be achieved if all measures taken up for this purpose are not conducted separately, but form a comprehensive and uniform motor emission control system. It is, therefore, the system of vehicle emission control should not cover only in new vehicle control, in-use vehicle inspection, and fuel quality control, but also the use of advantageous emission technology.

Motor vehicle emission control system which is described in figure 3 seems to be very desirable for all participating countries. However, in particular occasions, the system might not be very easy to implement in certain country in Asia - Pasific region.

For instance, in the recent time, in Indonesia the registration of motor vehicle is separate activity in the whole motor vehicle emission control system. At the same time, the verification of production conformity activity might not be yet implemented in some participating countries. Somehow, in the near future the system might be applicable since the government regulation draft concerning with motor vehicle emission control system is legalized.

Based on the Traffic and Road Transport Law Number 14 of 1992, every new motor vehicles being operated on the roads are subjected to type approval. It is important to note that such new motor vehicles are usually produced/assembled by local manufactures, because Indonesia generally does not import ~~built-up~~ motor vehicle from any countries. However, due to particular reasons the government might import such motor vehicle if really needed.

b. Actions on Regional Levels

The guidelines states that irrespective of differences in vehicle population, scope of coverage of current standards, etc. priority in all countries participating in the project should be given to the control with regard to emission from the following categories:

(a) vehicles equipped with SI engines:
- cars,
- light duty,

(b) diesel vehicles:
- light-duty,
- medium/heavy duty.

For the above categories, two level (i.e. reduced - and low emission standars) harmonization including the majority of countries participating in the project is possible in the first place. Moreover, common standards for motorcycles seem to be interest for small group of countries as well.

In the respect of the description mentioned above, the control with regard to emission in Indonesia should cover both motor vehicles equipped with SI engine and diesel motor vehicles in the following categories:

(a) Bus,
(b) Goods vehicles,
(c) Passenger vehicles,
(d) Motorcycles,
(e) Special purpose vehicles.

As described in the guidelines draft, related to motorcycles, Indonesia has only specified requirements with regard to CO and HC concentrations at idle (different with regard to limits). For additional information, at the time being, the concentration of motorcycle emission is not yet inspected. However, in the near future, motorcycles might be a subject for such inspection.

To these all differences, it is necessary to discuss them among the Expert Group Meeting to point out the best way to find out the solutions in order to harmonize them.

c. Actions on Country Levels

Based on the experiences of many countries, it is easy to understand that the type approval procedure alone is insufficient to ensure that vehicles entering into traffic

comply with the construction requirements. It is therefore recommended to conduct the verification of conformity of vehicles with the approval type. In consequent of such recommendation, the manufacturer of the approved vehicle type should, among others:

- conduct functional tests with regard to emission affecting components and system,
- perform quality audit tests on a limited number of production vehicles,
- take all necessary steps to reestablish the conformity of production if vehicles have failed tests.

As mentioned previously, in the recent time in some countries, the activity of the conformity of production verification might not be implemented yet due to local condition and legislation. So that, these matters should be discussed more deeply among the Expert Group Meeting. After finding out a desirable solution of it, the competent authority which has granted the type approval is empowered to verify the conformity of production.

d. Prerequisites for The Implementation of New Motor Vehicle Emission Control

In order to implement the motor vehicle emission control effectively, it is necessary for majority of countries of the region to develop both administrative services and technical services (test centres). By setting up both the administrative services and technical services, in one side not only would be capable to handle effectively the control procedure, but also capable to handle some important task of technical matters.

It is to note, however, that the development of both administrative - and technical services may needs to fulfil some requirements, such as introducing changes to organizational structure of the authority in charge of vehicle emission programmes, redefining its function, etc. (for administrative service development), sophisticated equipment, skillful and competent personnel to conduct emission tests and operate the sophisticated equipment, etc. (for technical service development).

Based on the above description, it is important to note that the development of such both administrative - and technical services should also consider the specific local condition and legislation in each countries in the region.

8. CONCLUSION

a. There is still strong evidence that transportation sector contributes the highest percentage on air pollution, particularly in some big cities.

b. To minimize air pollution due to motor vehicles operated on the roads, there are many actions might be done, which need participation from all related persons.

c. It is realized that the inspection of motor vehicles certainly plays an important role as one of measures to cope with the problems related to air pollution due to motor vehicles operated on the roads. It is therefore, every motor vehicles should be tested through Motor Vehicle Test Centre for Roadworthiness and Certification which includes emission related checks such as; Co and HC concentration for motor vehicles equipped with SI engines, and smoke for diesel motor vehicles.

d. Minister for Communications has already issued Decree Number KM.8 of 1989 which stipulates the exhaust gas emission standard, therefore all motor vehicles operated on the roads must fulfil such limits.

e. Guidelines for New Motor Vehicle Emission Control In the Asia-Pacific Region is certainly necessary to be decided by Expert Group Meeting of all participating countries. Generally, The guidelines draft seems to be very desirable for all participating countries. However, in particular reasons, the proposal of the guidelines might be not be very easy to implement in certain country in the Asia-Pacific Region. It is therefore, in order to harmonize the control system of New Motor Vehicle with Regard to Emissions in The Asia-Pacific Region should consider every local condition and legislation of each countries in the Region.