6－6　要員計画案

本件調査の本格調査団の構成は概ね、以下に示すものとなる。

1)　総括／大気汚染防止戦略

大気汚染防止戦略は他の調査団員の検討結果を踏まえて策定することとなるため、大気汚染対策、行政など広範な知識が要求される。また、策定に当ってはインドネシア側の行政担当者のほかインドネシアで本調査に関連する調査を実施している援助機関とも議論を行う必要があるため、これらの関係者と十分に議論を行える能力が必要である。

2)　環境大気調査

今回の調査対象地域においては既に環境大気質の自動測定を行っているほか、ＥＭＣが所有する分析用機材を用いることとなるため、インドネシア側が所有する関連機器の使用、維持管理などに習熟していることが望ましい。

3)　気象観測

気象調査の設計及び実施並びに結果の解析を担当する。

4)　発生源調査

インドネシア側においては発生源の情報が整備されていないので、実測を含め発生源に関する情報の整備を行う。また、併せて、発生源調査に関する技術移転を行う。必要に応じて複数の調査団員を配する。

5)　発生源対策

既存の調査報告書、実測結果などに基づき、技術的な対策の検討（概算費用の見積り含む）を行う。

6)　交通計画／都市・地域計画

交通量調査の実施、将来フレームの予測並びに交通計画及び都市・地域計画の観点からの大気汚染対策の検討を行う。

7)　大気汚染機構解析／シミュレーションモデル

調査対象地域の汚染機構解析並びにシミュレーションモデルの開発及び技術移転を行う。

8)　実施計画／対策費用

対策、戦略など関連分野の検討に基づき、実施計画の策定及び対策費用の算定を行う。

9)　経済・財務分析

将来フレームの予測(6)交通計画／都市・地域計画と分担）及び関係行政機関の財務分析を行う。

10)　組織・制度

対策の実施に必要となる組織及び制度の検討を行う。

調査団編成に当っての留意事項としては、以下の点が挙げられる。

1)　組織・制度の検討などについては、インドネシア人も含めてインドネシアの事情に詳し

い外国人コンサルタントの起用も検討すべきものと考えられる。

2) インドネシア側はＢＡＰＥＤＡＬの機能強化に力点を置いた調査の実施を望んでいるため、組織・制度、技術移転などに十分に配慮した調査団編成及び人選を行うべきである。

６－７　調査用資機材

本格調査では、現行実施されているモニタリングのデータを最大限利用すると共に、実測調査を行うに当っても現行保有の機材を最大限利用することとし、不足する機材と必要な消耗品類を調査のために準備する。

ＥＭＣ保有の多数の資機材は、環境大気調査ならびに発生源立入り調査に利用できまた、採取試料、特にＴＳＰの成分分析に利用できる。

(1) 大気汚染自動測定機

環境大気の自動連続測定機としては以下の種類のものが調査に必要となろうが、現在ＤＰＰＬ所管のものが２局分、ＥＭＣよりＫＰＰＬに移管した２局を含めてのものが５局分ある。その内訳は表６－１のとおりである。

なお、バンドン用に用意された１局は、ジャカルタ市内のモナス付近に設置する計画がある。また、タムリン通りとＫＰＰＬの測定機は、設置・稼働中ではあるもののメンテナンスが不十分なため、停止状態あるいは信頼性に乏しいとの情報があり、事前にメーカーの技術者が入って修理、点検をする必要がある。

- 窒素酸化物計（吸光光度方式、または化学発光方式）
- 二酸化硫黄計（溶液導電率方式、または紫外線蛍光方式）
- 一酸化炭素計（非分散赤外線吸収方式）
- 浮遊粒子状物質計（β線吸収方式）
- オキシダント計（中性よう化カリウム－吸光光度方式）、またはオゾン計（紫外線吸収方式）
- 非メタン炭化水素計（ＦＩＤ方式）
- 風向風速計
- 温度計／湿度計
- データ収録装置（ロガー）
- データ処理システム

表６－１　自動測定機の配置及び必要状況

	ブルイット	ブロガドゥン	ＥＭＣ	タングラン	バンドン ※1	タムリン通り	KPPL	追　加
ＮＯx 乾式	○	○	－	－	－	○	－	－
湿式	－	－	○	○	○	－	◎	●
SO_2 乾式	○	○	－	－	－	○	－	－
湿式	－	－	○	○	○	－	◎	●
ＣＯ	○	○	○	○	○	○	◎	●
ＳＰＭ（β線）	○	○	○	●	●	－	●	●
Dust（光散乱）	－	－	－	○	－	○	－	－
O_3　乾式	○	○	－	○	－	－	－	－
Ox　湿式	－	－	○	－	●	－	●	●
ＨＣ	○	○	○	○	○	●	●	●
風向風速	○	○	○	○	－	－	○※2	●
温度/ 湿度	○	○	○	○	－	－	－	－
日射量	－	－	○	－	－	－	－	－
データロガー	○	○	○	●	●	◎	●	●

○既設の機器を利用．　●新規設置が必要．　◎既設だが更新が必要．
※1 市内に設置予定　　※2 設置計画あり．

(2)　環境大気調査用機材及び成分分析機器

ＥＭＣでは大気試料の採取用に、以下のような各種サンプラーを保有しており、これらを利用すれば大概の調査は可能となる。

- ハイボリュームエアサンプラー（柴田、及び紀本製）　：各５台
- ローボリュームエアサンプラー（新宅製）　：　５台
- アンダーセンサンプラー　（柴田製）　：　２台
- デポジットゲージ　（柴田製）　：　５台
- ダストジャー　（柴田製）　：　５台
- PbO_2法　シェルタ　：　多数
- NO_x簡易サンプラー　：　多数

(3)　発生源調査用機材

- ばいじん測定用具　（濁川製ＮＧシリーズ）　：　５式

  主要構成品：ピトー管、傾斜マノメータ、デジタル温度計、吸引ポンプ、湿式ガスメータ、吸引瓶、洗浄瓶、水槽、ダストチューブホルダ、フィルターホルダ、吸引ノズル
- SO_x採取セット　（濁川製）　：　５式

・ NO_x採取セット　（濁川製）　：　5式
・ 酸素計　（島津、POT－101）　：　1台
・ 燃焼排ガスアナライザ（堀場、COPA-2000）　：　2台
　測定項目：CO、CO_2、O_2
・ 自動車排ガス測定用機器（堀場、MEXA-574GE）　：　2台
　測定項目：CO、CO_2、HC、O_2

(4) ラボの分析装置

採取された試料は、EMCのラボに装備されている以下の機器類、あるいは各種実験設備を使用して、原理的にほとんどの物質が分析可能である。

・ 電子天秤（島津、AEL-40S及びAEG-200）　：各4台
・ 紫外／可視吸光光度計（ダブルビーム）（日立、U-2000）：　5台
・ 原子吸光光度計（Perkin Elmer、3100及び日立、Z-6100）：　3台、及び2台
・ フレームレス原子吸光光度計（日立、Z-8100）　：　2台
・ イオンクロマトグラフ（Dionex、QIC）　：　2台
・ 高速液体クロマトグラフ（Waters、M501及び日立、L6000及びL6200）
　：計4台
・ 蛍光X線分析装置（島津、VF-320A）　：　1台
・ 元素分析計（柳本、MT-5）　：　2台

(5) 調査実施に当り用意すべき機材

インドネシア側が保有する調査用資機材のほか、主要なものとしておおむね以下のものを準備する必要がある。

1) 環境大気質調査用資機材

調査対象地域内の7ヶ所において既に自動測定が実施されているかまたは予定されているため、自動測定局の新設の必要性は低いものと考えられる。そのため、有効なデータを得るためには、新規の測定局の設置を検討するよりも、インドネシア側が保有している機材のうち耐用年数を過ぎているものの更新や、測定項目の欠けているものの補充を検討する方が効果的であると考えられる。測定用車輌を利用する場合には、維持管理、電源の利用可能性及び安定性、カウンターパート側の対応可能性などについて十分に検討しておく必要がある。

また、標準ガス、記録用紙などの消耗品についてはインドネシア側による対応が困難であるとの情報もあるため、消耗品については十分な量を日本側で準備することを検討する必要がある。

2) 上層気象観測用資機材

今回の事前調査ではインドネシア側の上層気象観測の実施状況を確認することはでき

なかったが、インドネシア側が本調査の解析に適した観測を実施していない可能性もあるため、最低１地点において上層気象観測を実施すべきものと考えられる。この場合、インドネシア側の実施状況を十分に考慮して調査地点などを決定する必要がある。この場合、バルーン、ヘリウムガスなどの消耗品は日本側が購入することとなるが、その他の機材についてはリースでも対応は可能であろう。

3) 固定発生源調査用機材

ＥＭＣには固定発生源調査用機材（サンプリング用）がかなりそろっているため、調査の実施内容に応じて補足すべき機材を特定し、それらの機材を日本側が準備する。なお、固定発生源調査用資機材に関しては、現地で作業を行った結果を踏まえて部品、消耗品などを追加できる体制が必要である。（排出ガスの性状によっては機器の劣化が予想以上に早いこともありうる）。また、固定発生源調査を効率的に実施するためには固定発生源調査用車輌を用意するのが望ましい。その場合、機器の維持管理を容易にするため、固定発生源調査用車輌には分析用機器は積み込まず、ラボで分析を行うこととし、サンプリング機材の運搬のみに用いるものとする。

4) 全体的留意事項

・ インドネシア側の保有資機材の状況を十分に把握し、かつ、それらを十分に利用することを検討する。この場合、分析などを行う機関が複数になるので、作業分担に配慮する必要がある。

・ 調査対象地域における電源事情、発生源などの状況を十分に踏まえて資機材の使用及び数量を決定する。

・ 技術移転も本調査の重要な目的であるため消耗品を通常よりも多めに準備しておく必要がある。

６－８ 便宜供与

インドネシア側の便宜供与の内容はＳ／ＷのVII. UNDERTAKINGS OF THE GOVERNMENT OF INDONESIA並びにＭ／Ｍの７．及び８．に示されたとおりであり、また、Ｓ／Ｗに示された内容は標準的なものであるため、ここでは、便宜供与の内容のうち留意すべき事項のみを以下に示す。

1) 調査団に対する招請状及び調査用資機材の通関

本格調査団がインドネシアに渡航する際には一般旅券を用いることとなるが、インドネシア入国に必要なビザを取得するためにインドネシア側の招請状が必要となる場合がある（詳細については確認が必要）。そのため、事前調査団がインドネシア側に対して招請状の発給及び調査用資機材の通関手続きの補助を事前調査団が求めた。

2) 医療サービスの提供

インドネシア側はS／Wの記述はインドネシア側に対して過大な負担を課する可能性があるとの懸念を示した。そのため、事前調査団は当該条項の意味を説明し、それをM／Mに示した。

3) 本格調査団用の事務室・調査用車輌の提供

ＢＡＰＥＤＡＬ側は事務室及び調査用車輌をＳ／Wに示されたとおりに提供できない可能性が高いとの懸念を示した。そのため、事前調査団はインドネシア側に対して、本格調査団員全員がＣＡＰＥＤＡＬ本庁に常駐するわけではなく、調査担当分野によっては、例えば、ＥＭＣで作業を行う団員もいることを説明した。

なお、上記の2)及び3)については、インドネシア側は十分には納得していないようであった。

６－９　調査実施上の留意点

調査の実施に当って留意すべき事項については、これまでにも本報告書の中で繰返し述べてきたところであるが、調査実施上の留意点のうち重要なもの及び全体的事項について再度とりまとめておく。

1) 本調査はインドネシア側の大気保全行政の能力の向上に力点を置く調査なので技術移転及び組織・制度の検討を十分に行うことが必要であり、この目的を達成できるような調査団編成（人選を含む）及び調査内容とする。

2) 他国の援助機関及び国際機関が本調査に関連する調査を数多く実施しているため、既に実施した或いは実施中の調査に関する情報を十分に把握し、それらの成果を踏まえたものとする必要がある。

3) 組織・制度の検討に際し、調査対象地域の実態を十分に踏まえたうえで関係機関と十分に議論をしておく必要がある。

4) シミュレーションモデルの開発に際し、データの入手可能性、モデルの使用目的、インドネシア側の対応可能性を考慮してモデルのレベルを決定する必要がある。

5) 環境大気質及び発生源に関する実測調査はジャカルタ特別市の区域についてはＫＰＰＬが、それ以外の地域についてはＥＭＣがそれぞれ実施するものと考えられるため、調査計画の立案及び技術移転の実施の際に配慮する必要がある。

付　属　資　料

TERMS OF REFERENCE

Development Survey
on Air Pollution Control Countermeasures

DECEMBER, 1991
ENVIRONMENTAL IMPACT MANAGEMENT AGENCY (BAPEDAL)

1. Introduction

The economic and social activities in the Republic of Indonesia have been developing conspicuously, and as well the population has been growing. As a result pressures on natural resources and environment have been becoming more and more serious in this country.

Jakarta, the biggest city in South East Asia, is the capital of Republic of Indonesia and the center of political, economical and cultural activities in Indonesia. The area of the capital city is 656 square kilometers and the population is said to be more than 8 million. The population is still growing as a result of the persistent tendency of migration to the urban areas and is estimated to become 10 million or more in near future. The growing population will, as a matter of course, be accompanied by further development of industrial activities and motorization.

On the other hand, it is reported that the desease most frequently found in Jakarta is that concerning respiratory system. It cannot be denied that air pollution in Jakarta city is somewhat responsible to this respiratory trouble.

As a result, the Government of Indonesia (GOI) is seriously worrying about the growing pressures by industrialization and motorization on environment, especially on air pollution. It is vitally important to take measures against air pollution problems in order to preserve the people and environment from adverse effects.

2. Background

The Ministry of State for Population and Environment, whose mandate is for national coordination of environmental isues, had been the only governmental agency to address environmental management issues in Indonesia, before BAPEDAL, Environmental Impact Management Agency, was established in 1990. BAPEDAL is the central regulatory agency and has the authority and responsibility for monitoring and controlling environmental problems. BAPEDAL has a strategy to ensure improved performance in the 8 priority areas, including air pollution especially caused by mobile sources.

Although air pollution monitoring data available are limited, the result of some activities carried out by the Department of Communication's Meteorological and Geophysical Agency (BMG) and DKI Jakarta showed that Total Suspended Particulates increased sharply in Jakarta area. The concentration of other parameters such as nitrogen oxides and sulfer oxides are also increasing in these years.

GOI as well as DKI Jakarta made much of the above circumstances and initiated to cope with the situation respectively. Lead contained in gasoline fuel shall be removed in near future and on the other hand DKI Jakarta put in force the nation's first regulation on exhaust gas concentration for on-road vehicles on Oct.1, 1991.

BAPEDAL, responsible authority for controling air pollution in GOI, wishes to make a comprehensive survey on air pollution problems in Jakarta and to make clear the necessary measures in future against them and their implementing schedule from the long-term point of view. BAPEDAL also wishes to acquire the Japan's experiance and know-how in the field of air pollution control through carrying out the collaborative work.

3. Objectives

The objectives of the survey are:

-to work out the necessary measures to cope with air pollution problems and their implementing schedule by estimating the significance of air pollution at present and in future and by making clear the possible countermeasures and their effects to improve the air pollution problems.

-to transfer the technique, knowhow or experience, particularly in the field of air quality monitoring, numerical simulation of air pollution and exhaust gas treatment technology from Japan to the staff in Indonesia through carrying out the collaborative work.

4. Study Area

Study area shall cover the central area of Jakarta DKI, Surabaya and Bandung at least., and shall duly be considered depending on the each activities respectively.

5. Scope of Activities

(1) Collection of existing data and information

Appropriate data and information shall be collected and analysed. These include the following :

① socio-economic information
② institutional information
③ meteorological data
④ ambient air quality data
⑤ information on mobile source
⑥ information on stationary source
⑦ structure of ownership of emission sources

(2) Air pollution monitoring

Air pollution monitoring at the central area of Study Area shall be carrid out focusing on heavily polluted areas which shall be suspected or identified by the existing social economical physical and environmental information.

① Continuous Monitoring at least for one year
② Items monitored by automatic continuous monitoring equipment shall include SPM, NOx, CO, HC, SOx, and Pb shall also be analysed periodically.
③ Survey on the elemental composition of suspended particles shall be carried out
④ Meteorological Survey shall also be carried out at the monitoring sites

(3) Building up an inventory of existing air pollution sources

Investigation of the project area shall be made to identify the existing pollution sources. It shall include the measurement of emissions from stationary sources and exhaust gas from auto mobiles. Inventory of the pollution sources shall be developed based on the investigation by the following categories :

① mobile sources

② major stationary sources

③ non-point sources

(4) Developing simplified numerical simulation model

An air pollution simulation model shall be developed :
-to analyse the mechanism of the existing air pollution problem, and
-to estimate the effects of each countermeasures upon future concentration.

The simulation model shall be developed focusing on the highly polluted area.

(5) Evaluation of possible countermeasures

Information on existing countermeasures and the technology shall be collected and and scrutinized to evaluate the possible countermeasures to be introduced.

(6) Master plan to implement the possible countermeasures

Master plan shall be prepared which includes recommendation on the possible countermeasures and their implementing schedule based on the technological, social as well as economical consideration or analysis. The effects of each countermeasures on future pollution shall be estimated by the developed simulation model.

6. Report and Documents

JICA shall prepare and submit the following reports in English to the Government of Indonesia.

(1) Inception Report
    30 copies at the beginning of the survey in Indonesia.
(2) Progress Report
    30 copies in due course.
(3) Interim Report
    30 copies in due course.
(4) Draft Final Report
    50 copies in due course.
    GOI will provide the study team with their comments within one month after receipt of the Draft Final Report.
(5) Final Report
    50 copies at the end of the study.

7. Survey Schedule

The whole survey shall be conducted in accordance with the attached tentative schedule.

8. Undertaking of GOI

(1) Access to Land

GOI warrants that the consultant shall have, free of charge, unimpeded access to all land in respect of which access is required for the performance of the consultant services.

(2) Taxation and Duties

GOI will exempt the consultant and the personel including dependents from (or GOI shall bear the cost of) any taxes, duties, fees, levies and others imposed under the laws and ordinances in effcts in Indonesia on the consultant and the personel in respect of project undertaking.

(3) Other Priviledges and Assistance

GOI warrants that it shall:

1) provide counterpart staff with their necessary facilities to cooperate and assist the consultant during the field work,
2) provide the consultant and each of the personel with work permits and such other documents as may be necessary to enable them to perform the services,
3) arrange for the personel to be provided promptly with all necessary entry and exit visas, residence permits, exchange permits and travel documents required for the stay in Indonesia.

9. Undertaking of JICA

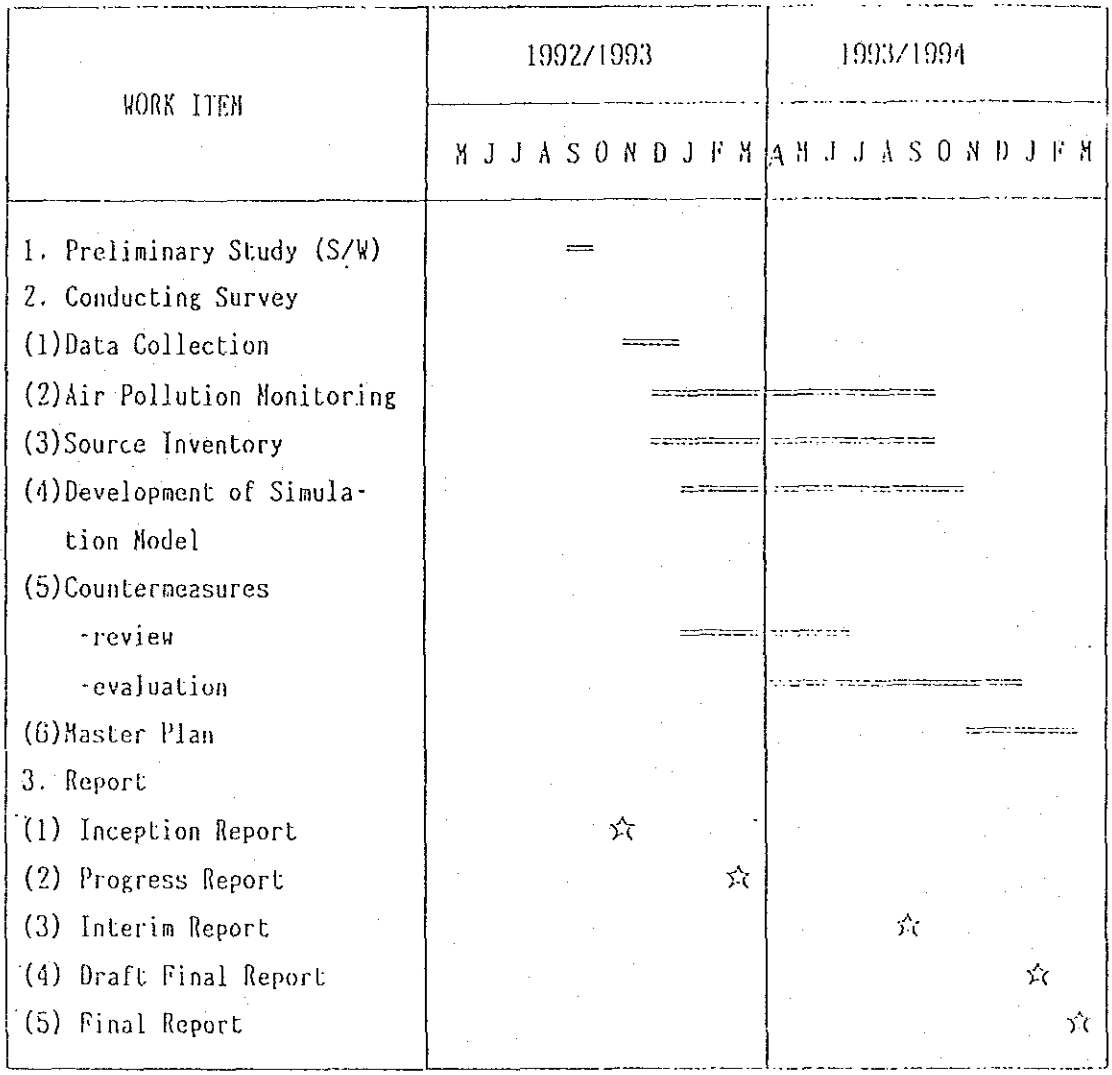
For the implementation of the survey, JICA shall take the following measures:

-to select a consultant, who shall review necessary previous report and preliminary studies, to carry out field investigation as well as desk study comprising with the preparation of necessary reports, etc.,

-to dispatch the Study team to the GOI,

-to pursue technology trnsfer to the Indonesian counterpart staff in the course of the study.

Fig.1 Time Schedule



SCOPE OF WORK

FOR

THE STUDY

ON

THE INTEGRATED AIR QUALITY MANAGEMENT
FOR JAKARTA METROPOLITAN AREA

IN

THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN

ENVIRONMENTAL IMPACT MANAGEMENT AGENCY (BAPEDAL)

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Jakarta, April 19, 1994

Nabiel Makarim
Deputy for Pollution Control
Environmental Impact
Management Agency

Hidetsuru Matsushita
Leader, Preparatory Study Team
Japan International Cooperation
Agency

I. INTRODUCTION

In response to the request of the Government of the Republic of Indonesia (hereinafter referred to as "the Government of Indonesia"), the Government of Japan has decided to conduct a Study on the Integrated Air Quality Management for Jakarta Metropolitan Area in the Republic of Indonesia (hereinafter referred to as "the Study") in accordance with the laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with authorities concerned of the Government of Indonesia.

The present document sets forth the Scope of Work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are the followings:

1. to develop strategies for air quality management and implementation plan, including improvement of institutional capacity to manage air quality; and
2. to transfer technologies for air quality management to counterpart personnel in the course of the Study.

III. STUDY AREA

The study area will cover Jakarta Metropolitan area (JABOTABEK).

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study will cover the followings:

1. Phase I : Basic Study

   1) Collection and review of existing data and information, and relevant studies
   2) Survey for collecting additional data including those on meteorological conditions, ambient air quality and emission sources

2. Phase Ⅱ: Analysis and Assessment

1) Assessment of present air quality
2) Development of appropriate simulation model
3) Estimation of future air quality
4) Review of organizations, laws and regulations

3. Phase III: Development of Strategies for Air Quality Management and Implementation Plan

1) Development of air quality management strategies
2) Development of implementation plan

4. Technology transfer

Technology Transfer will be undertaken during the Study including air monitoring (Phase I), modelling (Phase II), guidelines and regulations (Phase III) .

V. STUDY SCHEDULE

The Study will be carried out in accordance with the tentative schedule attached in Appendix.

VI. REPORTS

JICA will prepare and submit the following reports in English to the Government of Indonesia.

1. Inception Report:

Thirty (30) copies about one (1) month after the commencement of the Study

2. Progress Report(1):

Thirty (30) copies about fourteen (14) months after the commencement of the Study.

3. Interim Report:

Thirty (30) copies about eighteen (18) months after the commencement of the Study.

4. Progress Report(2):

Thirty (30) copies about twenty-two (22) months after the commencement of the Study.

5. Draft Final Report:

Fifty (50) copies about twenty-four (24) months after the commencement of the Study. The Government of Indonesia will submit its comments to JICA within thirty (30) days after the receipt of the Draft Final Report.

6. Final Report:

Fifty (50) copies within thirty (30) days after JICA's receipt of comments on the Draft Final Report from the Government of Indonesia

VII. UNDERTAKINGS OF THE GOVERNMENT OF INDONESIA

1. To facilitate smooth conduct of the Study, the Government of Indonesia shall take the following necessary measures:

(1) to secure the safety of the Japanese Study Team, (hereinafter
referred to as "the Team")

(2) to permit the members of the Team to enter, leave and sojourn in Indonesia for the duration of their assignment there in, and exempt them from foreign registration requirements and consular fees,

(3) to exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other materials brought into Indonesia for the conduct of the Study,

(4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with the conduct of the Study

(5) to provide necessary facilities to the Team for remittances as well as utilization of the funds introduced into Indonesia from Japan in connection with the implementation of the Study,

(6) to secure permission for entry into private properties or restricted areas for the implementation of the Study,

(7) to secure permission for the Team to take all data and documents (including photographs and maps) related to the Study out of Indonesia to Japan, and

(8) to provide medical services as needed. Its expenses will be

chargeable on members of the Team.

2. The Government of Indonesia shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, discharge of their duties in the implementation of the Study, except when such claims a rise from gross negligence or willful misconduct on the part of the members of the Team.

3. Environmental Impact Management Agency(hereinafter referred to as "BAPEDAL") shall act as the counterpart agency to the Team and also as a coordinating body in relation with other relevant organizations for the smooth implementation of the Study.

4. BAPEDAL shall, at its own expense, provide the Team with the followings, in cooperation with other organizations concerned:

(1) available data and information related to the Study,

(2) counterpart personnel,

(3) suitable office space with necessary equipment in the Study Area

(4) credentials or identification cards, and

(5) appropriate number of vehicles with drivers.

VIII. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures:

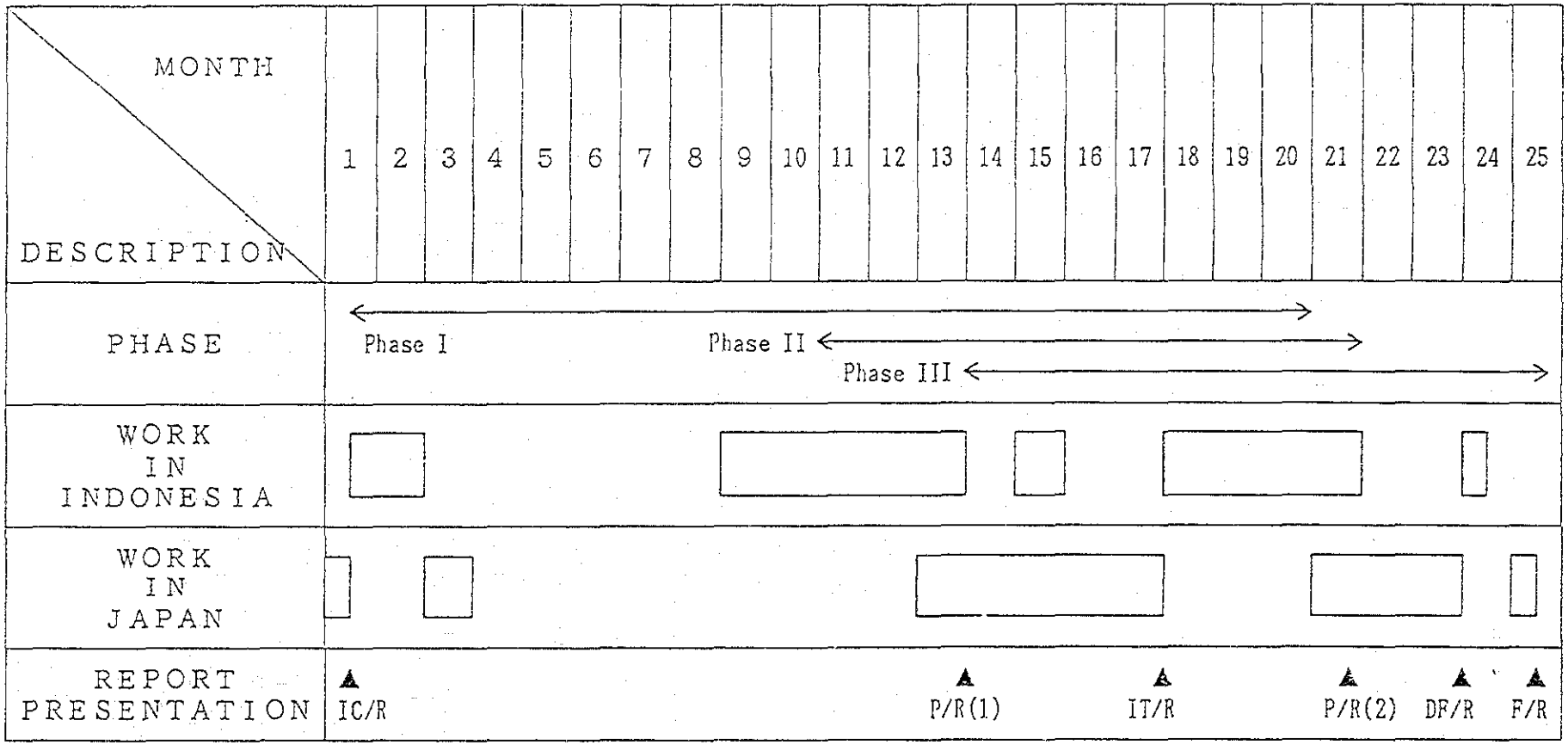
1. to dispatch, at its own expense, the Team to Indonesia; and

2. to pursue technology transfer to the Indonesian counterpart personnel in the course of the Study.

IX. CONSULTATION

JICA and BAPEDAL shall consult with each other in respect of any matter that may arise from or in connection with the Study.

APPENDIX TENTATIVE STUDY SCHEDULE



IC/R: Inception Report
IT/R: Interim Report
F/R: Final Report

P/R: Progress Report
DF/R: Draft Final Report

MINUTES OF MEETING

ON

SCOPE OF WORK

FOR

THE STUDY ON THE INTEGRATED AIR QUALITY MANAGEMENT FOR JAKARTA METROPOLITAN AREA IN THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN

ENVIRONMENTAL IMPACT MANAGEMENT AGENCY (BAPEDAL)

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Jakarta, April 19, 1994

Nabiel Makarim
Deputy for Pollution Control
Environmental Impact
Management Agency

Hidetsuru Matsushita
Leader, Preparatory Study Team
Japan International Cooperation
Agency

In response to the request of the Government of the Republic of Indonesia, the Preparatory Study Team (the Team) of the Japan International Cooperation Agency (JICA) visited Indonesia from April 7 to April 19, 1994 to discuss the Scope of Work for the study on Integrated Air Quality Management for Jakarta Metropolitan Area (the Study).

The Team carried out preliminary field surveys of the concerned area and held a series of discussion with the officials of the Environmental Impact Management Agency (BAPEDAL). The list of attendants is shown in Appendix.

The Scope of Work (S/W) signed on April 19, 1994, was discussed in detail between BAPEDAL and the Team. Main points of the discussion are summarized as follows:

1. (1) Regarding the section II of S/W (Objectives of the Study), both sides agreed that Implementation Plan and Technology Transfer will be the prime focus of this study.

   (2) Implementation Plan will identify specific action items, schedules and resources required for air quality management in the study area. The details of the contents of the Implementation Plan will be discussed in the Inception Report.

   (3) Technology Transfer will include the following, but not limited to:
   - On the job training for monitoring and modelling;
   - Regulations and guidelines including SOP, field inspection guidelines, etc.; and
   - Development of Implementation Plan.

2. Regarding the section II, 1 of S/W (Objectives of the Study, item one), both sides agreed that institutional building will be targeted mainly to BAPEDAL, but, if it is necessary, other agencies involved in the Study will also be included.

3. In reference to the section III of S/W (Study Area), both sides agreed that the Study covers Jakarta Metropolitan Area (JABOTABEK - DKI Jakarta, Bogor, Tangerang and Bekasi). Within the study area, however, the Study will focus on the area(s)

where air quality management is essential and/or significant emission sources are (or planned to be) located.

4. (1) In reference to the section IV, 1 of S/W (Scope of the Study, Phase I: Basic Study), both sides acknowledged that this phase of the Study will include the following items:

- natural conditions such as climate and topography;
- social and economic conditions;
- trend of urban development and land use (including future plans);
- transport and traffic conditions (including future plans);
- existing studies and projects relating to air quality management;
- meteorological data;
- ambient air quality (SO_2, NO_2, HC, CO, O_3, TSP and/or SPM (PM_{10}), and Pb and other major elements);
- adverse effects caused by air pollution;
- identify mobile emission sources including inventories, location and characteristics (traffic composition, distribution of traffic volume, fuel consumption and chemical composition of fuels used, emission factors, etc.);
- identify stationary emission sources including inventories, location and characteristics (type/location of factories, combustion facilities, fuel types and consumption rates, emission factors by combustion facilities, height of chimneys, etc.);
- identify non-point emission sources including inventories, location and characteristics (open burning, domestic coal burning, etc.);
- organizations, functional responsibility of the relevant agencies; and
- laws and regulations relating to air quality management.

(2) Both sides also recognized that additional field surveys and measurements should be conducted in order to supplement the existing data, and the inventory of stationary sources will include factories and commercial buildings.

5. (1) Regarding the section IV, 3 of S/W (Phase III: Development of Strategies for Air

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Quality Management and Implementation Plan), both sides agreed that one of the major items of strategies and the implementation plan should include measures to improve institutional capacity of the relevant agency(ies) in reference to organizational structure, functional responsibilities, and laws and regulations, etc.

(2) Both sides recognized the importance of economic development and other external factors in devising the strategies and the implementation plans.

(3) The target year for the strategies should be the year 2010, and the implementation plan should cover a minimum period of four years after the completion of the study.

6. Regarding the section IV, 4 of S/W (Technology Transfer for the Three Different Phases...), BAPEDAL strongly requested that JICA will provide the necessary equipment for the study and the technology transfer.

7. (1) In reference to the section VII, 1 of S/W (Undertakings of the Government of Indonesia), the Team requested BAPEDAL to issue letters of invitation to the members of the full-scale study team (the JICA Study Team) to facilitate their obtainment of entry visas to Indonesia; and to provide assistance in their customs clearance of the study equipment.

(2) BAPEDAL requested the Team to clarify the meaning of the section VII, 1, (8) "to provide medical services as needed", and the Team pointed out that it was possible to read this phrase as "to provide assistance, other than financial, to the JICA Study Team in receiving appropriate medical services in Indonesia".

8. (1) In reference to VII, 4 of S/W (Undertakings of the Government of the Republic of Indonesia), BAPEDAL expressed a concern over the difficulty of securing office space within the office of BAPEDAL headquarters, and of providing vehicles for the JICA Study Team.

(2) The Team commented that some members of the JICA Study Team can be

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stationed at offices of the relevant agencies other than BAPEDAL headquarters, by considering the expertise of each study member.

9. Both sides agreed to form a steering committee which will have the mandate to provide direction for the study.

10. The outstanding issues would require further follow up prior to initiating the study.

APPENDIX: List of Attendants

Environmental Impact Management Agency (BAPEDAL)

Nabiel Makarim	Deputy for Pollution Control
Saut M. Lubis	Director, Directorate for Marine and Air Pollution Control
Ridwan D. Tamin	Air Pollution Control Sub-directorate
Abd. Manaf Sulton	Air Pollution Control Sub-directorate
Edy Purwanto Moh. Bakri	Air Pollution Control Sub-directorate
Umar Suyudi	Air Pollution Control Sub-directorate
Achmad Gunawan	Air Pollution Control Sub-directorate
M. Ilham Malik	Air Pollution Control Sub-directorate

JICA Preparatory Study Team

Hidetsuru Matsushita	Team Leader, JICA Preparatory Study Team
Yoshiharu Yamada	Study Planner, JICA Preparatory Study Team
Masaharu Yagshita	Air Quality Administration Expert, JICA Preparatory Study Team
Yoshikazu Suzuki	Pollution Sources Control Expert, JICA Preparatory Study Team

Chiaki Kuranami	Traffic Planning Expert, JICA Preparatory Study Team
Mitsuru Fujimura	Air Quality Monitoring and Equipment Expert, JICA Preparatory Study Team

Observer

Barid Manna	Advisor Air Pollution, Environmental Management Development in Indonesia
Mike Mowle	Air Pollution Advisor, Pollution Control Implementation
Liliansari, H.	KPPL, DKI Jakarta
Hiroshi Kurakata	Assistant Resident Representative, JICA Indonesia Office
Shanti Dewi	JICA Indonesia Office
Masahirò Ohta	JICA Chief Adviser, Environmental Management Center (EMC)
Motokazu Iwata	JICA Expert, Environmental Impact Management Agency (BAPEDAL)

Questionnaire to BAPEDAL and The Related Agencies

Prepared by The JICA S/W Mission on
The Integrated Air Quality Management for the City of Jakarta

1. What should be the major output of the proposed JICA study? What would be the course of actions which BAPEDAL intended to take based on the recommendations to be made in this study?

2. Where should be the study area? Why do BAPEDAL choose this area for the study?

3. Please describe the current issues regarding air pollution in Jakarta. Do different agencies hold different views on air pollution issues?

4. What are the air pollution control measures planned by BAPEDAL and other agencies?

5. Scope and progress of the relevant studies and projects

   a. Blue Sky program
   b. URBAIR project (World Bank)
   c. "Eco-transport Study" (Ministry of Transport, Japanese Government)
   d. Other relevant projects if any

6. Study organization

   a. Prospect of counterparts to be provided during the JICA study by BAPEDAL or other relevant agencies
   b. Necessity for establishing a steering committee for this study

7. List of local consultants in the field of air pollution and transport planning.

   a. Company qualifications, number of staff and the air pollution measuring equipments owned by them
   b. Average billing rates of consultant
   c. Cost of hiring supporting staff (English speaking secretary, typist, draftsman and office boy)

8. List of reports, documents, books and other information that BAPEDAL and the relevant government agencies can provide the Study Team with

9. Please provide the inventory(ies) of pollution sources in Jakarta, and the responsible organizations for this(these) inventry(ies).

10. Please provide other relevant information listed in Attachment 1 and 2.

Attachment 1

Existing Situation of Air Pollution and Control Measures

1. Location and types of air pollution monitoring stations

   a. Number of existing monitoring points and their sites (locations to be marked on a map, surrounding environment and height above ground)
   b. Agencies responsible for maintaining these monitoring stations
   c. Types of pollutant measured (monitored), and their measurement methods (types of equipment)
   d. Measurement frequencies and duration
   e. Data obtained from the monitoring
   f. Proposed sites for automatic and continuous monitoring, if any, and the reasons why these sites were selected

2. Existing emission sources and their location

   a. Location of industrial sites and large factories (to be shown on a map)
   b. Number of smoke and soot emitting installations
   c. Motor vehicle types operating in the street of Jakarta and the corresponding fuel types (gasoline, diesel, etc.), composition and emission factors (CO, HC, NOx, SO2, TSP, Pb) by year of first registration.
   d. Trends in consumption of leaded gasoline for the last 10 years.
   e. Areas with high levels of air pollution concentration (to be shown on a map), and the reasons for the concentration

3. Air pollution control measures for factories and enterprises

   a. Current situation and future plans concerning installation of equipment for smoke and soot treatment
   b. Plans for shifting to better quality fuels
   c. Plans for relocating factories

4. Air pollution control measures for mobile sources

a. Exhaust gas reduction measures (removal of lead in gasoline, regulation on exhaust gas concentration)
b. Details of vehicle inspection system and responsible agencies in relation to emission control

5. Administrative and research organization concerning air pollution control

a. Laws and regulations concerning air pollution control (existing and planned)
b. Organizational structure, number of personnel and budget of the relevant administrative and research organizations
c. Number and types of the measuring equipment owned by these organizations
d. Air-pollution simulation models developed by these organizations, and types of computer systems to run those models

Attachment 2

List of Information Concerning DKI Jakarta, Transport and Traffic

1. General information

   a. Population growth and urbanization trend in the city and in the metropolitan area.
   b. Physical area of the city and metropolitan region.
   c. Climate and topography of the city and metropolitan area.
   d. Existing land use map indicating commercial, industrial, residential, and other types of land use
   e. Economic indicators (e.g. GDP, income levels and distribution in the city, average income, consumer spending)
   f. Types of industries and their respective compositions (in terms of workforce, output).
   g. Number of factories and enterprises (type and size)
   h. Brief account of transportation, traffic, and land development histories
   i. Existing economic, land use, and transport plans (national economic plans, dki jakarta master plan, comprehensive transport plans)

2. Natural condition

   a. Physical condition (geographic map, geological map, etc.)
   b. Meteorological data (direction of wind, precipitation, temperature, humidity, sunshine hours)

3. Vehicle ownership, use and production

   a. Registered numbers of motor vehicles by type (automobiles, motorcycles, trucks, and buses.) for at least the past 10 years.
   b. Manufacturing and assembly industry of motor vehicles
   c. Current prices (local currency) and their affordability relative to average income level.
   d. Current financing methods available to raise money to purchase motor vehicles by type including repayment period (e.g. regular bank loans, special loans, government assistance); existence of employer credit systems to motor vehicle users (e.g. commuter subsidies).
   e. Types and volume of motor vehicles used for public transport

4. Traffic and transport systems

a. Location and length of high-speed roads (e.g. km of freeways, expressways) and all other roads (e.g. arterials, collectors) in the central city and metropolitan area.
b. Peak hour traffic volume (and annual average daily traffic volumes) for all modes on city streets. Also include persons/veh. if available. The survey locations are to be shown on a map.
c. Average travel speed of all modes
d. Variations in motor vehicle use by months of the year compared to motorized transport
e. Modal split among person trips for all modes (car, buses, train, motorcycle, bicycle, other vehicle, walking) by trip purpose, if available
f. Annual vehicle kilometers by all types of motor vehicles
g. Existing and planned traffic management measures (such as bus lanes, area licensing)
h. Responsible government agencies and other organizations involved in planning, construction, and maintenance of each type of facility in comparison to other transport modes.

PROCEDURE OF MOTOR VEHICLE EMISSION INSPECTION[1]
（車検・型式認可における自動車の排気ガス検査手順）

1. The Director General of Land Transport Decree

The Director General of Land Transport issued the Decree Number AJ.402/8/5 of September 11, 1990 to provide guidelines on the procedure of roadworthiness inspection for motor vehicles, especially concerning exhaust gas emission and smoke. This procedure is used for type approval inspection and periodical inspection, covering inspection procedure of Carbon Monoxide (CO), Hydrocarbon (HC) and thickness of smoke.

2. Procedure of Measuring CO and HC

(1) Scope:

This procedure covers the method to determine the carbon monoxide (CO) and hydrocarbon (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 contained in the exhaust gas and expressed in percents (%).

b. The concentration of HC is the ratio of the volume of hydrocarbon (HC) equalized with normal hexane (C6H14) 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° C +/– 5° C. The testing equipment should not be exposed to direct heat of the sun, rain or wind.

b. Condition of motor vehicle:

(i) The tested vehicle should be on a flat place.
(ii) All additional equipment except the standard operational accessories of the engine must be removed and be in a position without load.
(iii) For vehicle with normal transmission, the position of the gears must be in neutral and the clutch must be at free position. For vehicle with automatic transmission, the transfer lever must be at neutral (N) or at position of parking (P).
(iv) The engine hood must be in proper close condition and an additional cooling fan

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[1] Adopted from Yusuf, M (1992), *Policies Concerning Performance, and Equipment, Related Requirement in exhaust gas regulations*, Directorate General of Land Transportation, Ministry of communications, The Republic of Indonesia, pp. 10–16.

should not be used.

c. Preparing the tested vehicle:

(i) 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 instructions from the manufacturing plant if such instruction 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.

(ii) 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 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 approximately 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 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 the 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.

3. 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 test vehicle.

(i) The seal on the engine must be in accordance with the factory specifications.
(ii) The exhaust gas system must not be leaking.
(iii) 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 the 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
(i) The equipments is constructed in such a way that it is capable of sucking exhaust gas as much as (330=15) ml within 1.4 = 0.2 seconds through a filter paper.
(ii) the installation of the probe in the exhaust gas pipe must be parallel to the axis of the pipe. if it is impossible for the probe to be parallel, an addition must be used.
(iii) The quality of the filter paper used must be in line with the class 5A filter paper shown at JIS P3801 or the equivalent.
(iv) 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 in point 2 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 the governor will be working. After 4 seconds release the accelerator pedal and the engine will return to idle rotation and leave it until the subsequent measurement. The pride of each measurement must be 15 second. The working of the gas collection of 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 sequence of the exhaust gas measuring shall be conducted.

(4) Test results

The opacity of the 3 pieces filter paper during the testing, the average, the average value is taken and final result obtained by comparing it with the value limit.

List of Contacts （面会者リスト）

Environmental Impact Management Agency (BAPEDAL)

Nabiel Makarim	Deputy for Pollution Control
Saut M. Lubis	Director, Directorate for Marine and Air Pollution Control
Ridwan D. Tamin	Air Pollution Control Sub-directorate
Abd. Manaf Sulton	Air Pollution Control Sub-directorate
Edy Purwanto Moh. Bakri	Air Pollution Control Sub-directorate
Umar Suyudi	Air Pollution Control Sub-directorate
Achmad Gunawan	Air Pollution Control Sub-directorate
M. Ilham Malik	Air Pollution Control Sub-directorate
Motokazu Iwata	JICA Expert
Harro Salim	Head, Sub-directorate of Coastal Pollution Control
Barid Manna	Advisor Air Pollution, Environmental Management Development in Indonesia (EMDI)
Mike Mowle	Air Pollution Advisor, Pollution Control Implementation (PCI)

Environmental Management Center

Masahiro Ohta	JICA Chief Adviser
Sobary	EMC/BAPEDAL

Hajime Shirayama	JICA Expert on Water Pollution
Morihiko Hayakawa	JICA Expert on Air Pollution
Mamoru Sakata	JICA Expert on Toxic Substances
Ryuji Hayase	JICA Expert on Air Pollution

DKI Jakarta (Government of Jakarta Capital City)

Aboejoewono A.	BBLH (Bureau of Environment)
Hotman Silaen	BBLH (Bureau of Environment)
Liliansari, H.	KP2L (Urban and Environmental Study Office)
Rafdjon Rax	KP2L
Aukusbsam, S.	KP2L
Touchid	DLLAJR
Adlin U. Adel	DLLAJR
Rusdy Juslf	BAPEDA
Aubarlk	BAPEDA
Vera R. Sari	BAPEDA
Hardywnoto	Head of Health Service

The Office of the State Minister for Environment (LH)

RTM. Sutamihardja	Deputy Assistant Minister

Ministry of Communications

H. Abdul Razak Manan	Head, Land Communications Reseqarch and Development Center
Tjuk Sukardiman	Secretaris Badan, Department of Communication
Tjokorde Gde Agung S.P.	Subdit Keselamatan Angkutan Darat, PHBD
MHD. Hendrawan	Automobile Testing Center, PHBD

Ministry of Public Works

Bernaldy	BINKOT
Jany Agustin	BINKOT
A. Razak	BINKOT
Eddy Juni	BINKOT

Ministry of Industry

Krisyanto	Directorate General of Basic Metal, Machinery and Electronics Industry
Ubaldus Upa	Directorate of Land Air Transportation Equipment Industry
Mitsuhiro Hayashi	JICA Expert (Advisor on Industrial Development)

The World Bank, Indonesia Field Office

Thamrin Nurdin	Environmental and Social Institutions Specialist

Suhadi Hadiwinoto	MEIP – National Programme Coordinator
Sean Foley	Environmental Specialist

Embassy of Japan

Hiroshi Moriguchi	First Secretary

JICA Indonesia Office

Koichiro Okazaki	Resident Representative
Hiroshi Kurakata	Assistant Resident Representative
Shanti Dewi	JICA Indonesia Office

収集資料リスト

報告書類・論文集

1. 環境保全技術移転促進調査報告書－インドネシア共和国－（中間報告）、平成５年、社団法人海外環境協力センター
2. Third JABOTABEK Urban Development Project (JUDP Ⅲ), Environmental Component 2, Part B - Environmental Protection and Pollution Control Strategy and Action Plan, Phase Ⅰ Report, October 1993, BAPEDAL.
3. Third JABOTABEK Urban Development Project (JUDP Ⅲ), Environmental Component 2, Part B - Environmental Protection and Pollution Control Strategy and Action Plan, Phase Ⅱ Report, February 1994, BAPEDAL.
4. LLAJR Air Pollution Monitoring and Control (First JABOTABEK Urban Development Project), Executive Summary, PHBD, Ministry of Communications.
5. LLAJR Air Pollution Monitoring and Control (First JABOTABEK Urban Development Project), Final Report, PHBD, Ministry of Communications.
6. LLAJR Air Pollution Monitoring and Control (First JABOTABEK Urban Development Project), Final Report-Appendix, PHBD, Ministry of Communications.
7. Urban Air Quality Management in Jakarta : Draft of AQM Guidelines (Part A), First Workshop, Jakarta 6-7 April 1993, Prepared by Norsk Institute for Luftforksning Norwy and Institute for Environmental Studies, Netherlands.
8. Urban Air Quality Management in Jakarta : Draft of AQM Guidelines (Part B), First Workshop, Jakarta 6-7 April 1993, Prepared by Norsk Institute for Luftforksning Norwy and Institute for Environmental Studies, Netherlands.
9. An Overview of Air Pollution in Indonesia. by J. H. Kozak and Drs. R. P. Sudarmo, Environmental Management Development in Indonesia, July 1992.
10. Environmental Management Development in Indonesia, Air Quality Monitoring Networks in Indonesia, 1991, Project of the Ministry of State for Population and Environmental Republic of Indonesia and Dalhousie University, Canada.
11. Environmental Linkages, Proceedings of the Indonesia - Canada Conference, Mont Sainte-Marie, Canada, 9-11 October 1984, Sponsored by Environmental Manpower Development in Indonesia (EMDI).
12. Energy and the Environment : Marking Polluters Pay and Other Remedies, (Draft/Confidential Report No. 11874-IND), Country Department Ⅲ East Asia and Pacific Region of World Bank, May 13, 1993.
13. Energy and the Environment : A Plan of Action for Pollution Control, (Confidential Report No. 11871-IND), Country Department Ⅲ East Asia and

Pacific Region of World Bank, June 30, 1993.
14. Megacity Strategies to Reduce Emissions from Vehicles Vol. II, Report of the Mobile Sources Workshop Los Angeles, USA, August 9-21, 1992. (Sponsored by the World Environment Center).
15. Studi Evaluasi Lingkungan (Sel) Proyek Pembangunan Jalan Kranji Fly Over. (in Bahasa Indonesia)

発表・論文

16. Air Pollution Control Strategy in Indonesia, by Ridwan D. Tamin and Barid Manna, The Environmental Impact Management Agency (BAPEDAL), Presented at the Second International Conference on Computerized Air Quality Management: Control Strategies, November 30 - December 2, 1993, Bangkok, Thailand.
17. Policy and Strategy on Air Quality Management in Indonesia, by RTM Sutamihardja, The Expert Meeting on Acid Precipitation Monitoring Network in East Asia, October 26-28, Toyama, Japan.
18. Acid Precipitation in Indonesia, by Saut M. Lubis, Environmental Impact Management Agency, The Expert Meeting on Acid Precipitation Monitoring Network in East Asia, October 26-28, Toyama, Japan.
19. Implementation of the Environmental Impact Assessment Process in the Ministry of Public Works, by Suryatin Sastromijoyo, Prepared for the Workshop on Environmental Impact Assessment in Indonesia, Generic and Agricultural Sector Issues, Jakarta, Indonesia, April 10-11, 1990.
20. Plicies Concerning Performance, and Equipment, Related Requirement in Exhaust Gas Regulations, by Muhammad Yusuf, Directorate General of Land Transportation Ministry of Communications.

書籍・統計書類

21. Indonesia 1994 An Official Handbook, Department of Information Republic of Indonesia.
22. Jakarta in Figures, Jakarta Statistica Office, 1992.
23. Vehicles and Length of Road Statistics, 1989.

パンフレット類

24. Environmental Management Center (booklet).
25. インドネシア環境管理センター概要、ＪＩＣＡプロジェクトタイプ技術協力チーム、平成４年４月４日

26. Facilities of Environmental Management Center (EMC), by JICA Team for Project Type Technical Cooperation on EMC.
27. Urban and Environmental Aspect in DKI Jakarta (booklet), KPPL DKI Jakarta.
28. Department of Communication, Directorate General on Land Transportation, Board of Motor Vehicle Testing for Road Worthiness and Certification (Pamphlet)

その他

29. Environmental Guidelines for D. G. BINA MARGA Road Projects, Ministry of Public Works.
30. Terms of Reference for the Staff Acquisition and Human Resources Development and Management, BAPEDAL Development Technical Assistance Projects (BDTAP)
31. Terms of Reference for the BAPEDAL Training Program, BAPEDAL Development Technical Assistance Projects (BDTAP).
32. Clean Air Program : Action Plan for Air Quality Management in Jakarta, BBLH, DKI Jakarta, 1993, (in Bahasa Indonesia).