

に紹介している日本における「公害防止管理者制度」の導入を検討することが望ましい。

## 2.5 省エネ対策の実施

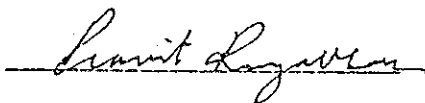
省エネ対策の実施はエネルギーの節約、有効利用だけでなく、環境面への効果（SO<sub>2</sub>、NO<sub>x</sub>排出量の削減）にもつながることから、長期的展望にたつてこれを実施する必要がある。具体的な省エネ対策は表2-1示すとおりである。

表 2-1 省エネ対策の方法

	① 燃料の燃焼の合理化	② 加熱及び冷却並びに伝熱の合理化	③ 放射・伝導等による熱の損失の防止	④ 廃熱の回収	⑤ 熱の動力等への変換の合理化	⑥ 低圧等による電気損失の防止	⑦ 電気的動力、熱等への変換の合理化
管理標準改善のための標準設定	空気比の管理標準	被加熱・冷却物の温度、熱媒体の温度、圧力・流量等の標準、空調の温度、湿度の標準	断熱工事の標準	廃熱の回収利用の標準	複数のボイラー・タービンの間の負荷調整の標準、排気、有圧タービンにおける最低許容圧力の標準	受変電・配電設備の電圧・電流・力率、負荷率、需要率の管理標準	電動力応用、電気加熱照明設備等に関する電圧、電流・力率、需要率の標準等
計測・記録等の実施	燃料の供給量、排山ガスの温度、排山ガス中の残存酸素量等の計測・記録等	温度、圧力、流量等熱の移動の状態を把握するための計測・記録、空調の温・湿度の計測・記録	熱安定分析の実施	廃熱の状況把握のための事項についての計測・記録、廃熱の有効利用方法の調査検討	主要なボイラー・タービンの熱効率の計測・記録、最低許容圧力下運転に関する計測・記録	同上値の計測・記録	同上値の計測記録（原則については照度の計測を含む）
保守・点検の実施	燃焼設備の保守及び点検	伝熱性能の低下の防止、ボイラー給水の水质管理、空調設備の保守及び点検	欠損による熱媒体の漏洩防止、断熱部分の維持、スチーム・トラップの保守及び点検	廃熱回収設備の伝熱面等の汚れ除去、設備からの熱媒体の漏洩防止等	ボイラー・タービンの保守・点検、最低許容圧力下運転におけるタービン封鎖等の保守及び点検	受変電、配電設備の保守及び点検	浮遊等機械損失の低減流体機械における流体の漏洩防止等、その他電熱、電解、照明設備の保守、点検
合理化のための改善措置及び設備の導入等	燃焼負荷の調整、適正なバーナーの選択、燃焼装置の改善等、燃焼制御装置の設置、蓄熱設備の設置	熱の使用条件、供給条件の見直し、ヒートパターンの改善、負荷の調整等、直接加熱への改善、熱の多段階利用等、熱効率の高い設備の導入、工場の連続・結合、短縮・省略	断熱の強化、開口部の縮小等、開放型設備へのおおい設備、配管経路の合理化等	廃熱の輸送過程での温度の低下防止、廃熱回収装置の伝熱面の改善、廃熱の用途に応じた回収利用設備の設置	最低許容圧力を低減するためのタービンの改造、利用価値のある余剰蒸気の発電・作業用動力等への利用	変圧器の適正負荷運転、変圧器の容量適正化、負荷の平準化受変電設備の配置の適正化等、力率の改善、三相不平衡の改善	電動機の変換防止、負荷の適正配分等、同様の見直し、速度制御の実施等適正容量の電動機の設計等その他の設備改善、設備導入

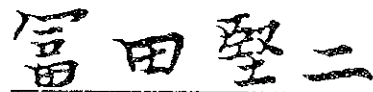
SCOPE OF WORK  
FOR  
THE STUDY ON THE AIR QUALITY MANAGEMENT PLANNING  
FOR  
SAMUT PRAKAN INDUSTRIAL DISTRICT  
IN THE KINGDOM OF THAILAND  
AGREED UPON BETWEEN  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD,  
MINISTRY OF SCIENCE, TECHNOLOGY AND ENERGY  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Bangkok, March 19, 1987



(Mr. Pravit Ruyabhorn)

Secretary - General  
Office of the National Environment Board  
Ministry of Science, Technology and Energy



(Dr. Kenji Tomita)

Leader of the Preliminary  
Study Team  
The Japan International  
Cooperation Agency

## I. INTRODUCTION

In response to the request of the Government of the Kingdom of Thailand, the Government of Japan decided to implement the study on the air quality management planning for Samut Prakan Industrial District in the Kingdom of Thailand (hereinafter referred to as "the Study"), within the general framework of technical cooperation between Japan and Thailand, which is set forth in the Agreement of Technical Cooperation between the Government of Japan and the Government of Thailand signed on 5 November, 1981.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "J I C A"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study, in accordance with the relevant laws and regulations in force in Japan and in close cooperation with the authorities concerned of the Kingdom of Thailand.

Office of the National Environment Board (hereinafter referred to as "O N E B"), Ministry of Science, Technology and Energy shall act as counterpart agency to the Japanese study team (hereinafter referred to as "the Team") and also as coordinating body in relation with other relevant organizations for the smooth implementation of the Study.

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

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## II. OBJECTIVES OF THE STUDY

The objectives of the Study are to provide the Government of the Kingdom of Thailand with the necessary data and recommendations to establish an air quality management plan on the emissions mainly from industrial sources in Samut Prakan Industrial District. (hereinafter referred to as "the District")

## III. SCOPE OF THE STUDY

In order to achieve the above objectives, the Study shall cover the following items :

1. To study the background and relevant conditions
  - (1) Present system of the air quality control.
  - (2) Governmental policy for industrialization.
  - (3) Relation with the national development plan.
  - (4) Available data and statistics.
  - (5) Relevant laws and regulations.
2. To survey for the present situation of air pollution in the District
  - (1) Monitoring survey for the District.
    - a. Monitoring of meteorological conditions.
    - b. Monitoring of ambient conditions on SO<sub>x</sub>, NO<sub>x</sub> and SPM.
  - (2) Survey for emission sources related to SO<sub>x</sub>, NO<sub>x</sub> and SPM in the District.

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3. To analyze the data and conditions

- (1) Evaluation of the present conditions of air pollution in the District.
- (2) Assessment of the future conditions of air pollution in the District.
- (3) To analyze the main sources and their contribution ratio.

4. To recommend the management plan for improvement of the air quality in the District

- (1) Method for reduction of the emissions from industrial sources.
- (2) Planning for the monitoring system.
- (3) Economical evaluation for the industrial activities caused by the reduction of the emissions.
- (4) Necessary data and information for the short term and long term air quality control and management strategies.

5. Conclusions and recommendations

IV. STEPS AND SCHEDULE OF THE STUDY

1. Steps

Step 1 : Preparatory office work in Japan

Step 2 : Field work in Thailand

Step 3 : Home-office work in Japan

Step 4 : Presentation of and discussion on the Draft Final Report

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2. Schedule

As shown in Annex.

V. REPORTS

JICA will prepare and submit the following reports to the Government of Thailand :

1. Progress Reports written in English at the each end of the Step 2 : 10 copies
2. Draft Final Report and its summary written in English within twelve (12) months after commencement of the Step 3 : 15 copies
3. Final Report and its summary written in English within two (2) months after the receipt of comments on the Draft Final Report by Thailand : 30 copies

VI. UNDERTAKING OF THE GOVERNMENT OF THE KINGDOM OF THAILAND

1. In accordance with the Agreement on Technical Cooperation between the Government of Japan and the Government of the Kingdom of Thailand dated November 5, 1981, the Government of the Kingdom of Thailand shall accord benefits to the Team as follows ;
  - (1) to permit the members of the Team to enter, leave and sojourn in Thailand for the duration of their assignment therein and exempt them from alien registration requirements and consular fees.
  - (2) to exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of Thailand for the conduct of the

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Study.

- (3) to exempt the members of the Team from income taxes and charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Team for their services in connection with the implementation of the Study.
  - (4) to bear claims, if any arises against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
2. To facilitate smooth conduct of the Study, ONEB shall take necessary measures in cooperation with other relevant organizations ;
- (1) to secure permission for entry into private properties or restricted areas for the conduct of the Study.
  - (2) to secure permission for the Team to take all data and documents (including photographs and maps) related to the Study out of Thailand to Japan.
  - (3) to provide the medical services as needed. (Its expenses will be chargeable on members of the Team.)
  - (4) to ensure the safety of the members of the Team when and as it is required in the course of the Study.

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(5) to make the best efforts to ensure the securities of machinery, equipment and materials brought into Thailand for the conduct of the Study.

3. ONEB shall, at its own expense, provide the Team with the following:

- (1) available data and information related to the Study.
- (2) counterpart personnel.
- (3) suitable office space with necessary equipment.
- (4) suitable sites and spaces for monitoring stations, laboratory facilities and storage.
- (5) local transportation facilities.
- (6) utilities such as electric power supply for the monitoring stations and points.
- (7) workers for setting up the monitoring stations and points.
- (8) daily operation of the monitoring stations and points.
- (9) credentials or identification cards.

#### VII. UNDERTAKING OF JICA

For the implementaion of the Study, JICA shall take following measures;

1. to dispatch, at its own expense, study teams to Thailand
2. to pursue technology transfer to the Thai counterpart personnel in the course of the Study

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VIII. OTHERS

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

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Annex

Tentative Schedule of the Study.

Monitoring Survey  Work in Japan  Work in Thailand

	1987				1988												1989												1990		
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	1	2	3				
Preparatory Office Work	_____																														
Field Works					_____																										
Data collection by the monitoring	_____																														
Progress Report					_____																										
Home office Work					_____																										
Submission of Draft Final Report					_____																										
Presentation of Draft Final Report					_____																										
Submission of Final Report					_____																										

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MINUTES OF MEETING  
FOR  
THE STUDY ON THE AIR QUALITY MANAGEMENT PLANNING  
FOR  
SAMUT PRAKAN INDUSTRIAL DISTRICT  
IN THE KINGDOM OF THAILAND

Bangkok, March 19, 1987

Pravit Ruyabhorn

(Mr. Pravit Ruyabhorn)

Secretary - General

Office of The National Environment Board

Ministry of Science, Technology and Energy

富田 堅二

(Dr. Kenji Tomita)

Leader of the Preliminary

Study Team

The Japan International

Cooperation Agency

The Japanese Preliminary Study Team on the Air Quality Management Planning for Samut Prakan Industrial District in the Kingdom of Thailand (hereinafter referred to as "the P/S Team") has visited Thailand from March 9 to 21, 1987 and exchanged views and discussions with the authorities concerned of the Government of the Kingdom of Thailand.

As the result of a series of discussions, the Leader of the P/S Team and the Secretary-General of Office of the National Environment Board (ONEB) both have agreed on the Scope of Work for the Study (hereinafter referred to as "the S/W") on March 19, 1987.

The followings are the matters posed in the course of the meeting with the P/S Team and ONEB regarding the S/W.

#### 1. Information on Emission Sources

1.1 The P/S Team requested for the preliminary information on the emission sources in the District.

ONEB agreed that the above information including Name of Factory, Type of Industry, Name of Owner/Manager, Location, Indication on the Map, Consumption of Raw Materials, Capacity of Production, Capital Investment, Number of Workers, etc., should be made available by the end of April 1987.

1.2 The P/S Team and ONEB agreed that in the course of the Study, survey to the emission sources will be implemented by ONEB under the guidance of the Team and the format of the questionnaire to the emission sources will be prepared by the Team.

#### 2. Monitoring Stations and Points

Based on the joint field survey by the P/S Team and ONEB, the following monitoring stations and points were proposed. The P/S Team confirmed that the necessary measures for the preparation of these

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monitoring sites should be taken by ONEB as soon as possible.

1) Bang Na

The site at the Bang Na Meteorological Office, Department of Meteorology, Ministry of Communications.

2) Bang Plee District

The Site at the Bang Plee District Office.

3) Muang District

The site at the Samut Prakan Provincial Government Office.

4) Muang District

The site at the South Bangkok Power Station.

5) Phra Pradaeng District

The site at the police station of Phra Pradaeng District.

In the cases that one or more of these proposed sites are not available, ONEB will find alternative sites and inform JICA as soon as possible.

3. Instruments and Materials

The P/S Team and ONEB agreed that the following instruments and materials are necessary for the Study, and ONEB requested these instruments and materials to be donated to ONEB after the completion of the Study without the request by Form A-4.

- |   |           |
|---|-----------|
| 1) Continuous measurement instruments for SO <sub>x</sub> | : 5 sets  |
| 2) Continuous measurement instruments for NO <sub>x</sub> | : 5 sets  |
| 3) Continuous measurement instruments for SPM             | : 5 sets  |
| 4) Low-volume air samplers                                | : 10 sets |
| 5) Andersen air samplers                                  | : 5 sets  |
| 6) Pyranometer  | : 1 set   |
| 7) Net radiometer   | : 1 set   |

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- 8) Anemometers : 3 sets
- 9) Telemetric printer with five (5) dataloggers : 1 set
- 10) Others

#### 4. Schedule


4.1 ONEB requested that the schedule of the Study should be shortened.

4.2 Related to the above, the P/S Team explained the details of the schedule of the Study and ONEB is satisfied with the explanations.

#### 5. Technology Transfer

ONEB requested that two (2) ONEB officers to work with data analysis and modeling in Japan for the period of one month or more at the expense of the Government of Japan.

The attendance list is in Annex 1.

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Annex 1.

LIST OF ATTENDANCES

JAPANESE SIDE

1. DR. KENJI TOMITA  
LEADER, SPECIAL TECHNICAL ADVISOR  
JAPAN INTERNATIONAL COOPERATION AGENCY
2. MR. KYO SAISU  
ENVIRONMENTAL PROTECTION POLICY  
MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (M.I.T.I.)
3. DR. TAKEHIRO ISEI  
MEASUREMENT AND ANALYSIS TECHNIQUES  
NATIONAL RESEARCH INSTITUTE FOR POLLUTION AND RESOURCES (M.I.T.I.)
4. MR. HIROSHI YOSHIKADO  
ENVIRONMENTAL ASSESSMENT  
NATIONAL RESEARCH INSTITUTE FOR POLLUTION AND RESOURCES (M.I.T.I.)
5. MR. KIYOTO KUROKAWA  
COORDINATOR  
INDUSTRIAL SURVEY DIVISION, JAPAN INTERNATIONAL COOPERATION AGENCY

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LIST OF ATTENDANCES

THAI SIDE

1. MR. SIRITHAN PAIROJ-BORIBOON  
DIRECTOR OF ENVIRONMENTAL QUALITY STANDARD DIVISION  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
2. MR. PORNCIAI TARANATHAM  
CHIEF OF INDUSTRY, ENERGY AND MINERAL RESOURCES SECTION  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
3. DR. SANGSANT PANICH  
ACTING-CHIEF OF AIR AND NOISE SECTION  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
4. MRS. NOPPAPORN PANICH  
ENVIRONMENTAL OFFICER  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
5. MRS. JANTANEE WATTANAKOM  
ENVIRONMENTAL OFFICER  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
6. MR. KHUNCHAI KRIENGKRAI-UDOM  
ENVIRONMENTAL OFFICER  
OFFICE OF THE NATIONAL ENVIRONMENT BOARD
7. MR. PAILIN PAIROH  
PROGRAMME OFFICER  
DEPARTMENT OF TECHNICAL AND ECONOMIC COOPERATION


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Minutes of Meeting  
on  
Field Survey  
for  
The Study on the Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
in the Kingdom of Thailand

The Japanese Field Survey Team (hereinafter referred to as "survey team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from January 6th to February 2nd, 1988, for the first field work of the study on the Air Quality Management Planning for Samut Prakarn Industrial District. The field work has been carried out by the survey team in cooperation with Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of members attending the field work are shown in Appendix 1.

During the period of the field work, the survey team had series of discussion with ONEB on the implementation of the field work and the following points have been agreed and/or confirmed by the both sides:

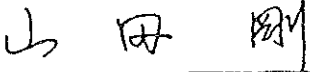
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1. Contents of the Progress Report, and ten copies of it should be submitted to ONEB by the survey team through JICA Bangkok on February 1, 1988.
2. ONEB shall maintain all of measuring instrument and equipment supplied by JICA in good condition, and also, except for Andersen Air Samplers, ONEB shall operate them for monitoring of air quality and meteorological condition in Samut Prakarn area during the period of vacancy of the survey team. As ONEB may not be able to solve and repair the measuring instruments and equipment in case of their failures during the period field survey, however, ONEB shall contact with JICA Bangkok office, in order to solve such problems. The measuring instruments, equipment and their spare parts supplied by JICA are listed in Appendix 2.
3. ONEB and the survey team confirmed that the second field work would be conducted by the survey team in March, 1988, and that the detailed schedule of the second field work would be informed to ONEB around mid-February, 1988, through JICA.

Bangkok, February 1, 1988

  
\_\_\_\_\_  
(Mr. Pravit Ruyabhorn)

Secretary - General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology and Energy

  
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(Dr. Takeshi Yamada)

Leader of the Japanese  
Field Survey Team  
  
The Japan International  
Cooperation Agency

Appendix 1 : Member List

1. ONEB

Mr. Pravit	Ruyabhorn	Secretary General
Mr. Arthorn	Suphapodok	Deputy Secretary General
Mr. Sirithan	Pairoj-boriboon	Director of Environmental Quality Standards Division
Dr. Sangsant	Panich	Acting Chief of Air and Noise Section
Mrs. Noppaporn	Panich	Environmental Officer
Miss. Khantong	Soontrapa	Environmental Officer
Mr. Warawut	Suadee	Environmental Officer
Mr. Kanok	Suksomsunk	Environmental Officer
Mr. Khunchai	Kriengkrai-udom	Environmental Officer
Mr. Santad	Koompalum	Environmental Officer


2. Survey Team

Dr. Takeshi	Yamada	Team Leader
Mr. Keizo	Kobayashi	
Mr. Shigeru	Suda	
Mr. Isao	Ono	
Mr. Yoshikazu	Ohta	
Mr. Tomoyuki	Inoue	
Mr. Eiichi	Ohkubo	
Mr. Mitsutaka	Nagasaka	
Mr. Jiro	Ohta	
Mr. Shuji	Kimura	

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Appendix 2 : List of Measuring instruments and equipment

1. Measuring station house      MSH-8      4 sets
2. YAMATO Working table FKM3-120G      4 pcs
3. Auto voltage regulator      5KVA      5 pcs
- "      1KVA      2 pcs
4. SO<sub>2</sub> Analyzer Model GFS-31      5 sets  
 Maintenance parts: GFS-545452-Z  
 Consumables: GFS4-544982-Z..  
                                  544983-Z
5. NOx Analyzer Model GLN-31      5 sets  
 Maintenance parts: GLN4-545451-Z  
 Consumables: GLN4-544984-Z
6. SPM Analyzer Model DUB-12      5 sets  
 Maintenance parts: DUB4-545453-1Z  
                                  545454-Z  
 Consumables:      DUB4-544985-Z
7. Wind vane and anemometer      KSS-550      2 sets  
 Maintenance parts:      TT4-545950-Z  
 Consumbles: TT4-545951-Z  
 Pole: 10m  
 Cable: 50m
8. Data Logger Model RDL-30      5 sets  
 Modem output      ST-1230B  
 RS-232C Cable
9. Automatic calibration unit      SGGU-501      5 sets


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|-----|--|---------------|---------|
| 10. | Recorder   | ER-186        | 10 sets |
|     | Maintenance parts:   | TT4-545949-Z  |         |
|     | Chart paper  |               |         |
| 11. | Sampling system  |               | 5 sets  |
| 12. | Telemetering system Model APC-III  |               | 1 set   |
|     | Consumables:   | RDL4-544986-Z |         |
| 13. | Spare parts for Telemetering system  |               | 1 set   |
| 14. | Telemetering system, Steel box   |               | 1 set   |
| 15. | ( 1 ) Parts for SO <sub>2</sub> Analyzer   |               | 1 set   |
|     | ( 2 ) Parts for NOx Analyzer   |               | 1 set   |
|     | ( 3 ) Parts for SPM Analyzer   |               | 1 set   |
|     | ( 4 ) Parts for data logger  |               | 1 set   |
|     | ( 5 ) Parts for automatic calibration unit   |               | 1 set   |
|     | ( 6 ) Parts for sampling system  |               | 1 set   |
| 16. | Standard Gas   |               | 10 pcs  |
|     | SO <sub>2</sub> Gas, 10 litter in Bombe  |               |         |
| 17. | Standard Gas   |               |         |
|     | NO Gas, 10 litter in Bombe   |               | 10 pcs  |
| 18. | UCHIDA Working Chair, round,<br>with Casters   |               | 4 pcs   |
| 19. | TONE Repairing Tool Set<br>for Measuring Apparatus.<br>Model 700s<br>consisting of : |               | 5 sets  |
|     | 1) Socket Wrench 10-32mm   | 15 sets       |         |
|     | Ratchet Handle   |               |         |
|     | Nut Spin Handle  |               |         |
|     | Extension Bar  |               |         |
|     | Cross Bar  |               |         |

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- |     |  |       |        |
|-----|--|-------|--------|
| 2)  | Spanner 6 pcs/set.<br>6x7, 3x10, 11x13,<br>12x14, 17x19 & 22x24                          | 1 set |        |
| 3)  | 45 Double Offset<br>Wrench Set 6 pcs/set<br>10x12, 11x13, 14x17,<br>10x21, 22x24 & 23x26 | 1 set |        |
| 4)  | Driver<br>(-) 75, 100 & 150.<br>(+) NO. 1, No.2 & No3                                    | 6 pcs |        |
| 5)  | Adjustable Angle Wrench<br>Model HW-300  |       | (1 pc) |
| 6)  | Plier CP-200   | 1 pc  |        |
| 7)  | Pliers CT-175  | 1 pc  |        |
| 8)  | Radio Plier 1 Lb   | 1 pc  |        |
| 9)  | Water Pump Plier KWB-250   |       | (1 pc) |
| 10) | Hexagon Bar Wrench<br>2, 2.5, 3, 4, 6<br>8 & 10mm  | 8 pcs |        |
| 11) | Plastic Hammer 1 Lb  | 1 pc  |        |
| 12) | Plain Chisel<br>19 x 165 mm  | 1 pc  |        |
| 13) | Center Punch 125   | 1 pc  |        |
| 14) | V Type Metal Case  | 1 pc  |        |

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|-----|---|---------|
| 20. | Actinograph Emission Income and Outcome Meter. complete set<br>Accessories :<br>- Common Recorder<br>- Common Fitting Base Pole,<br>- Cable 50 m<br>- Spare Parts 15 month<br>- Repairing Parts                   | 1 set   |
| 21. | Pressure Gauge, Stainless Steel   | 10 pcs  |
| 22. | Bombe Stand   | 5 pcs   |
| 23. | Wet Type Gas Meter<br>Model WONKO 10B Stainless Steel   | 1 pc    |
| 24. | Ultra Sonic Cleaner<br>Modle UTU-152  | 1 set   |
| 25. | Hand Tally, No, 30-929<br>4 Figure, 5 Gang  | 10 pcs  |
| 26. | SHIBATA Low Volume Sampler<br>Model LT-20, All Weather Type<br>with Transformer, Shelter and Flow Meter<br>Accessories :<br>- Quarts Filter without<br>Binder 100 pcs<br>- Fluorine Resin 100 pcs<br>Filter       | 10 sets |
| 27. | ANDERSEN Air Sampler All Weather<br>Model AN-200 wutg<br>Transformer, Shelter & Flow Meter<br>pressur Gauge & pump Accessories :<br>- Fluorine Resin<br>Filter 400 pcs<br>Quarts Folter without<br>Binder 100 pcs | 5 sets  |

*Erant*

*EB*

28. 3-D ULtra Sonic Anemometer 1 set  
with Data Apparatus etc,  
complete Set

Accessories :

- Cable 70 m
- Recording Paper 15 month
- Repairing Parts
- Mast 2m x 15 pcs conected

29. Accessories : 1 set

- Mast 20 m
- Standard Anchor 2. 5m
- Thundre Protection Apparatus

*Leavit* 




Minutes of Meeting  
on  
The Second Field Survey  
for  
The Study on the Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
in the Kingdom of Thailand

The Japanese Second Field Survey Team (hereinafter referred to as "survey team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from March 3rd to 27th, 1988, for the second field work of the study on the Air Quality Management Planning for Samut Prakarn Industrial District. The second field work has been carried out by the survey team in cooperation with Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of members attending the second field work are shown in Appendix 1.

During the period of the second field work, the survey team had discussions with ONEB on the implementation of the second field work and the following points have been agreed and or confirmed by both sides.

1. Contents of the Progress Report which will be made out at the second field work, ten copies of it should be submitted to ONEB by the survey team through JICA Bangkok on March 25th, 1988.
2. ONEB shall maintain all of measuring instruments and equipment supplied by JICA in good condition, and also, except for Andersen Air Samplers, ONEB shall continue to operate them for monitoring of air quality and meteorological condition in Samut Prakarn area during period of vacancy of the survey team, April to June, 1988.

*Amchat* 

3. In order to get the detailed data on stationary emission sources, ONEB agreed to take the following means:
- a. ONEB will select 100-150 of considerably large scale factories from the factories whom ONEB mailed questionnaires to in middle of February, 1988, and will send ONEB's officials to investigate their emission facilities. This work will be done by April, 1988.
  - b. To get additional data on the factories entering into Samut Prakarn Industrial District in near future, ONEB will try to obtain co-operation from Samut Prakarn Provincial Industrial Office and Department of Industrial Works, Ministry of Industry. This work also will be completed by April, 1988.
  - c. Throughout the period of the work mentioned above, ONEB will try to plot locations of stacks and factories in one-to-twenty-thousand maps of Samut Prakarn Province.
- To conduct the above items, the survey team agreed that ONEB might employ some part-timers and such expenses would be paid by the survey team.
4. ONEB and the survey team confirmed that the third field work would be conducted by the survey team in July, 1988, and the detailed schedule of the third field work would be informed to ONEB around middle of June, 1988, through JICA.
  5. ONEB requested to give technical training to two ONEB's officials in Japan at appropriate period in 1988. The subject of technical training has been given to the survey team. The survey team confirmed to take back the request to JICA Head Office and will show the program to be extended to ONEB's officials at the time when the survey team come back to Bangkok for the third field survey.

*Sudarat*



6. ONEB also expressed the necessity of installation of extra data logger system to pick up meteorological data at the monitoring station 1. The survey team confirmed to convey it to JICA Head Office.

March 24, 1988, Bangkok

Suchat Mongkolphantha

(Mr. Suchat Mongkolphantha)  
Deputy Secretary - General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology and Energy

山田 隆夫

(Dr. Takesi Yamada)  
Leader of the Japanese  
Field Survey Team  
  
The Japan International  
Cooperation Agency

Minutes of Meeting  
on  
The Third Field Survey  
for  
The Study on the Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
in the Kingdom of Thailand

The Japanese Third Field Survey Team (hereinafter referred to as "survey team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from July 4th to 28th, 1988, for the third field work of the study on the Air Quality Management Planning for Samut Prakarn Industrial District. The third field work has been carried out by the survey team in cooperation with Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of members attending the third field work are shown in Appendix 1.

During the period of the third field work, the survey team had discussions with ONEB on the implementation of the third field work and the following points have been agreed and or confirmed by the both sides.

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Yamada

1. Contents of the Progress Report which will be made out at the third field work, ten copies of it should be submitted to ONEB by the survey team through JICA Bangkok on July 28th, 1988.
2. ONEB shall maintain all of measuring instruments and equipment supplied by JICA in good condition, and also, except for Andersen Air Samplers, ONEB shall continue to operate them for monitoring of air quality and meteorological condition in Samut Prakarn area during period of vacancy of the survey team, August, 1988, to January, 1989.
3. ONEB and the survey team confirmed that the survey team would visit here again in January, 1989, for the purpose of inspection and maintenance of all measuring instruments and equipment so that JICA could donate them to ONEB in the best condition.
4. ONEB stressed the necessity of visit of the survey team to here in middle of 1989 to have discussions on outcome of the final report. ONEB, however, agreed that this issue would be further discussed with the survey team in January, 1989.
5. The proposal of technical training program to be extended to two ONEB's officials in Japan was presented to ONEB by the survey team, and ONEB has basically agreed with the proposal. ONEB, however, requested that the following items be included in the program:

*RLB*

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- \* Field-site study of chassis-dynamo meter
- \* Observation trip to a maker of environmental measuring instruments
- \* Lecture on "Environmental Risk"
- \* Field-site study of "wind tunnel test"

The survey team confirmed to provide the program including ONEB's request to JICA Head Office and to send the final program to ONEB by end August, 1988.

6. ONEB requested that additional technical training(s) for ONEB officials was needed for industrial emission and automobile exhaust control, if these items would form part of the recommendation to be presented in the final report. ONEB, however, agreed that this matter would be further discussed with the survey team in January, 1989.

7. ONEB and the survey team agreed that the following means must be taken to get the detailed data on stationary emission sources:

- a) To complete 137 questionnaires plus the additional questionnaires which had been collected before July 22, 1988, ONEB will provide further accurate information by end of August, 1988.

*PLB*

*Present*

b) ONEB will send the following items to Japan:

- \* A master list of factories located in Samut Prakarn Industrial District with business category, registration number, raw material used, products and employment, which is the translation of Department of Industrial Work's material.
- \* Listing of the factories which the questionnaires were sent and the factories which returned the questionnaires.
- \* A land-use map of Bangkok and vicinity

These items will be carried out by middle of September, 1988.

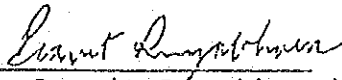
c) ONEB will plot the emission facilities in maps according to the survey team's request, which includes the number of stacks, height and diameter of stacks, locations of facilities and business code which can be referred to the corresponding tables.

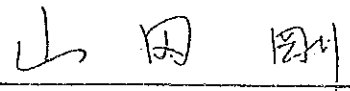
d) In order to help ONEB carry on the task mentioned in a) and c), the survey team will arrange a certain engineering consultant for surveying and obtaining accurate information.

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8. As to the ONEB's request on an extra data logger system at monitoring station 1, which was mentioned in the item No. 6 of "Minutes of Meeting of March 24, 1988", the survey team conveyed JICA Head Office's reply to ONEB that the equipment could not be granted, and ONEB understood it.

Bangkok, July 27, 1988

  
(Mr. Pravit Ruyabhorn)  
Secretary - General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology and Energy

  
(Dr. Takeshi Yamada)  
Leader of the Japanese  
Field Survey Team  
The Japan International  
Cooperation Agency



Minutes of Meeting  
on  
The Fourth Field Survey  
for  
The study on The Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
in The Kingdom of Thailand

The Japanese Fourth Field Survey Team (hereinafter referred to as "Survey Team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from January 17th to 26th, 1989, for presentation of the Interim Report and maintenance of the monitoring equipment to be donated to Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of members attending the work this time are shown in Appendix 1.

During the period of the work, the Survey Team had discussions with ONEB on the Interim Report and the study schedule in the Japanese term of a next year (April, 1989 to March 1990), and the following items have been confirmed by both sides :

1. Ten(10) copies of the Progress Report showing activities of the Survey Team during the period from January 17th to 25th, 1989, should be submitted to ONEB by the Survey Team through JICA Bangkok on January 25th, 1989.

2. As to the monitoring equipment used during the field survey from January 17th, 1988, to January 17th, 1989, and the spare parts concerned which were donated to ONEB from JICA on January 25th, 1989, ONEB confirmed that all of them be used for measurement of air quality in Thailand under the supervision of ONEB. ONEB also confirmed that any charge incurred in maintenance or repairs of the monitoring equipment after the donation would be managed on ONEB's own account.

3. ONEB and the Survey Team had common recognition of which the questionnaire research of stationary emission sources have been still incomplete, ONEB confirmed that the questionnaire research would be worked out by middle of March, 1989.

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4. In accordance with the item 4 of the Minutes of Meeting dated July 27th, 1988, ONEB and the Survey Team had discussion on the matter of the study schedule in the next year as shown in Appendix 2. ONEB and the Survey Team agreed with the following items :


- a) A preliminary discussion on the "Countermeasures for improvement of emission sources" will be held in July, 1989 when the Survey Team visits in here.
- b) On the basis of the above discussion, the Survey Team will present manu of the concrete countermeasures to discuss with ONEB again around late October, 1989.

5. As to the additional technical training(s) for ONEB officials mentioned in the item 6 of the Minutes of Meeting dated July 27th, 1988, the Survey Team conveyed JICA Head Office's reply to ONEB that JICA would accept two(2) trainees from ONEB in 1989. ONEB stressed their appreciation to JICA, and the following items has been requested to be included in the training program :

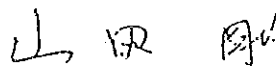
- a) On-the-job-training of industrial emission control
- b) Training of automobile exhaust gas control

The Survey Team confirmed to convey the above requests to JICA Head Office and to prepare a proposal of the training program under the consultation by JICA .

Bangkok, January 25, 1989



(Mr. Pravit Ruyabhorn)  
Secretary - General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology and Energy



(Dr. Takeshi Yamada )  
Leader of the Japanese  
Field Survey Team  
The Japan International  
Cooperation Agency

## Appendix 1 : Member List

### 1. ONEB

Mr. Pravit	Ruyabhorn	Secretary General
Mr. Arthon	Suphapodek	Deputy Secretary General
Mr. Sirithan	Pairoj-boriboon	Director of Environmental Quality Standards Division
Mr. Sangsant	Panich	Acting Chief of Air and Noise Section
Mrs. Hoppaporn	Panich	Environmental Officer
Miss. Khantong	Sootrapa	Environmental Officer
Mr. Warawut	Suadee	Environmental Officer
Mr. Kanok	Suksomsunk	Environmental Officer
Mr. Khunchai	Kriengkrai-udom	Environmental Officer
Mr. Santad	Koompalum	Environmental Officer
Mr. Phunsak	Tiramongkol	Environmental Officer

### 2. The Survey Team

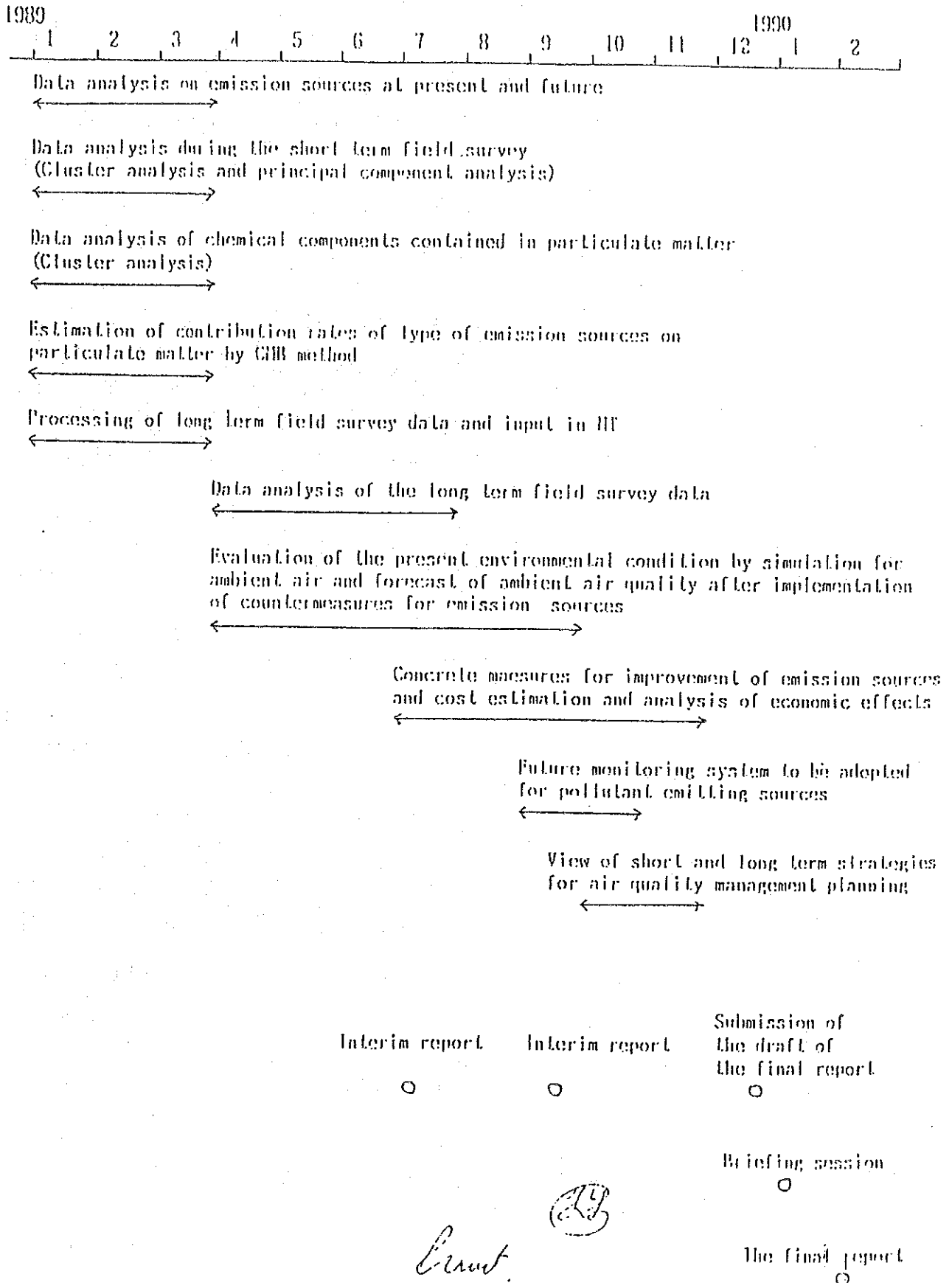
Dr. Takeshi	Yanada	Team Leader
Mr. Keizo	Kobayashi	Member
Mr. Shingeru	Suda	Member
Mr. Eiichi	Ohkubo	Member
Mr. Hisutaka	Wagasaka	Member
Mr. Shuji	Kimura	Member

*Pravit*

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Appendix 2

Schedule of the study : January/1989 March/1990



Minutes of Meeting  
for  
The Fifth Field Survey  
The Study on The Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
In The Kingdom of Thailand

The Japanese Fifth Field survey team (hereinafter referred to as "the Survey Team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from July 16th to 22nd, 1989, for presentation of the Interim Report to Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of the members attending the work this time are shown in Appendix 1.

During the period, the Survey Team had discussions with ONEB on the Interim Report and the study schedule in the Japanese term of this year (April, 1989 to March, 1990), and the following items have been confirmed by both parties:


1. Ten(10) copies of the Progress Report showing activities of the Survey Team during the period from July 16th to 22nd, 1989, should be submitted to ONEB by the Survey Team ~~through~~ JICA Bangkok on July, 21th, 1989.

2. The Working Plan of the study from April, 1989 - March, 1990 was agreed by both parties.

3. ONEB and the Survey Team reconfirmed that the Survey Team would visit here in October, 1989, for the purpose of presentation of the Second Interim Report and the further discussion on the countermeasures for improvement of emission sources in accordance with the item 4-b) of the Minutes of Meeting dated January 25<sup>th</sup> 1989, and to come to present the Draft Final Report around May or June, 1990. The Draft Final Report will be sent for ONEB's examination by the middle of April, 1990.

4. The proposal of the Second Technical Training Program to be extended to two ONEB's officials in Japan was presented to ONEB by the Survey Team, and ONEB has basically agreed with the proposal. ONEB, however, requested that the following items be considered in the program:

a) The lecture part should be shortened and be in more advanced level considering air pollution control technology.

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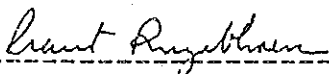
b) On training, emphasis should be made on making ONEB officials to understand thoroughly the concept, engineering design, operation, and maintenance.

The Survey Team confirmed to provide the program including ONEB's request to JICA Head Office and to send the Final Program to ONEB by the middle of August.

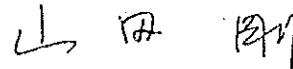
4. ONEB requested that softwares used for diffusion modeling in this study to be transferred to ONEB for future use such as updating of the study's result.

The Survey Team agreed to convey the request to JICA for further consideration.

July 21st, 1989



(Mr. Pravit Ruyabhorn)  
Secretary General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology and Energy



(Dr. Takeshi Yamada)  
Leader of the Japanese  
Field Survey Team  
The Japan International  
Cooperation Agency

Appendix 1 : Member List

1. ONEB

Mr. Pravit	Ruyabhorn	Secretary General
Mr. Arthorn	Suphapodok	Deputy Secretary General
Dr. Sangsant	Panich	Acting Chief of Air and Noise Section
Mr. Santad	Koompalum	Environmental Officer
Dr. Supat	Wangwongwatana	Environmental Officer
Mr. Warawut	Suadee	Environmental Officer
Miss. Khuntong	Soontrapa	Environmental officer

2. The Survey Team

Dr. Takeshi	Yamada	Team Leader
Mr. Isao	Ono	Member
Mr. Keizo	Kobayashi	Member
Mr. Shingeru	Suda	Member

3. JICA Headquater

Mr. Norifumi	Nagaoka	Industry Division
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Minutes of Meeting  
FOR  
The Sixth Field Survey  
The Study on the Air Quality Management Planning  
for  
Samut Prakarn Industrial District  
In the Kingdom of Thailand

The Japanese Sixth Field Survey Team (hereinafter referred to as "the Survey Team"), led by Dr. Takeshi Yamada and sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), has stayed in Bangkok, Kingdom of Thailand from October 22nd to 31st, 1989, for presentation of the Interim Report to Office of the National Environment Board (hereinafter referred to as "ONEB"). The names of the members attending the work this time are shown in Appendix 1.

During the period, the survey team had discussions with ONEB on the study schedule, particularly presentation of the draft final report, and the following items were confirmed by both parties:

1. Both parties agreed that the draft final report will be divided into two (2) volumes, executive summary and main section.
2. Both parties agreed with the following time schedule for preparation and presentation of the draft final report and the final report:

March, 1990	:	Submission of the draft final report to JICA from the survey team
April, 1990	:	Submission of the draft final report to ONEB from JICA
July, 1990	:	Presentation of the draft final report to ONEB from JICA
August, 1990	:	Submission of the final report to ONEB from JICA

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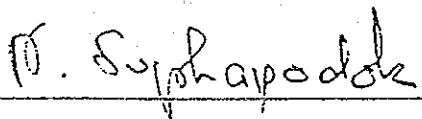
ONEB confirmed that it will finish the examination on the draft final report within two (2) weeks after receiving the draft final report from JICA and inform its comments to the survey team as soon as the examination is completed.

3. ONEB introduced to the survey team the plan of seminar to be conducted by ONEB for making publicity on this study to the people and institutions concerned which will be held at the time of presentation of the draft final report in July, 1990. In this connection, ONEB asked the survey team to extend cooperation and assistance to proceed with the seminar. The survey team expressed approval and confirmed to extend such assistance to ONEB.

The seminar will be organized into two (2) parts. First part (one day) will be on the scientific and technical aspects of this study. The second part (one day) will be on the management planning aspects. The Survey Team expressed the possibility of JICA co-sponsoring the first part of the seminar.

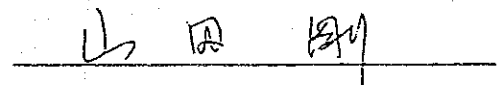
4. As to the ONEB's request on the software used for diffusion modeling in this study, which was mentioned in the item No. 4 of the "Minutes of Meeting dated July 21st, 1989", the Survey Team conveyed the message from JICA to ONEB that the software could not be granted.

Bangkok October 30th, 1989



(Mr. Arthorn Suphapodok)

Secretary - General  
Office of the National  
Environment Board,  
Ministry of Science  
Technology and Energy



(Dr. Tokeshi Yamada)

Leader of the Japanese  
Field Survey Team  
The Japan International  
Cooperation Agency

Appendix 1 : Member List

1. ONEB

Mr.	Arthorn	Suphapodok	Secretary General
Dr.	Sangsant	Panich	Acting Chief of Air and Noise Section
Dr.	Supat	Wangwongwatana	Environmental Officer
Mr.	Warawut	Suadee	Environmental Officer
Miss	Khantong	Soontrapa	Environmental Officer

2. The Survey Team

Dr.	Takeshi	Yamada	Team Leader
Mr.	Norifumi	Nagaoka	Industrial Division, JICA
Mr.	Makoto	Takagi	Member
Mr.	Keizo	Kobayashi	Member
Mr.	Shingeru	Suda	Member

6.

(MB)



Minutes of Meeting

of

The Presentation of the Draft Final Report

of

The Study on the Air Quality Management Planning

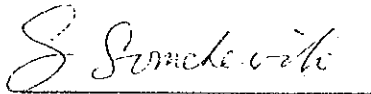
for

the Samut Prakarn Industrial District

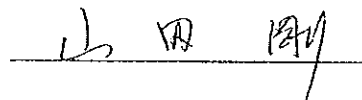
In the Kingdom of Thailand

Bangkok

November 19, 1990



(Mr. Sunthad Somchevita)  
Deputy Secretary-General  
Office of the National  
Environment Board  
Ministry of Science,  
Technology, and Energy



(Dr. Takeshi Yamada)  
Leader of the Japanese  
Field Survey Team  
The Japan International  
Cooperation Agency

The Japan International Cooperation Agency (hereinafter referred to "JICA") dispatched the Japanese Study Team (hereinafter referred to "the Study Team"), led by Dr. Takeshi Yamada, for the presentation of the Draft Final Report (hereinafter referred to "the presentation") of "The Study on the Air Quality Management Planning for the Samut Prakan Industrial District in the Kingdom of Thailand" during the period of November 11 to 20, 1990.

The Study Team made the presentation to the Office of the National Environment Board (hereinafter referred to "ONEB") on November 12 and 13, 1990. ONEB understood its contents and accepted the original Draft Final Report as submitted by the Study Team.

ONEB and the Study Team confirmed that 30 (thirty) copies of the Final Report of "The Study on the Air Quality Management Planning for the Samut Prakan Industrial District in the Kingdom of Thailand" will be sent to ONEB by the end of January 1991 through JICA.

*T.Y.*



JICA