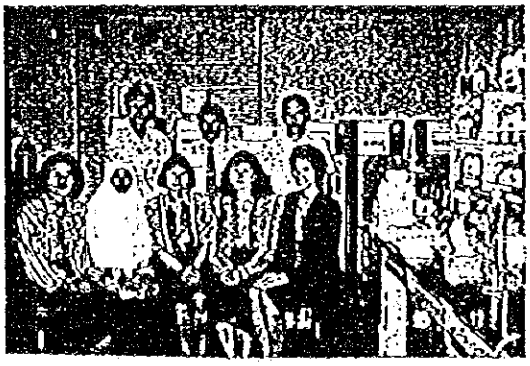
大気ラボ（振動を含む）

AIR AND NOISE LABORATORY ACTIVITIES

I. AIR AND NOISE LABORATORY MEMBERS
II. AIR & NOISE STAFF CAPABILITY
III. AMBIENT AIR QUALITY MONITORING
IV EMISSION MEASUREMENT
V. NOISE LEVEL MEASUREMENT
VI VISIT LOCAL LABORATORIES AND LOCAL GOVERNMENT
VII. COLLABORATION WITH BAPEDAL
VIII. FUTURE PLANS

AIR AND NOISE LABORATORY MEMBERS



AIR AND NOISE LABORATORY MEMBERS

1.	Ir. Hari Wahyudi	- Coordinator
2.	Drs. Agus Saefudin	- *Ambient Air Quality Monitoring Sup.*
3.	Esrom H. Ssi	- *Ambient Air Quality Monitoring Staff*
4.	Dra.Noor Rahmaniah	- *Ambient Air Quality Monitoring Staff*
5.	Ir. Rina Aprishanty	- *Ambient Air Quality Monitoring Staff*
6.	Emalya Rachmawati	- *Ambient Air Quality Monitoring Staff*
7.	Dewi Farida	- *Ambient Air Quality Monitoring Staff*
8.	Dra. Novy Farhani	- Emission Measurement Supervisor
9.	Djurit Teguh P. S.T.	- Emission Measurement Staff
10.	Nevy Rinda	- Emission Measurement Staff
11.	Supri Handari	- Emission Measurement Staff
12.	Ir. Wisnu Eka Y.	- *Noise and Vibration Supervisor*
13.	Ir. Sigit Reliantoro	- *Noise and Vibration Staff*

ANALYTICAL CAPABILITY OF AMBIENT PARAMETERS

	SO2	NO2	O3	TSP	CO	HC	DUST- FALL
1. Ir. Hari W.	O	O	O	O	O	O	O
2. Drs. Agus S.	O	O	O	O	O	O	X
3. Esrom H. Ssi	O	O	O	O	O	O	X
4. Dra.Noor R.	O	O	O	O	O	O	O
5. Ir. Rina A.	O	O	O	O	O	O	X
6. Emalya R.	O	O	O	O	O	O	O
7. Dra. Novy F.	O	O	O	O	O	O	X
8. Djurit T. P.	O	O	O	O	O	O	X
9. Nevy Rinda	O	O	O	O	O	O	X
10. Supri Handari	O	O	O	O	O	O	X

NOTE :
- O : CAPABLE - X : UNABLE

ANALYTICAL CAPABILITY OF EMISSION PARAMETERS

	DUST	NOX	O2	SOX	CO2
1. Ir. Hari W.	O	O	O	O	O
2. Drs. Agus S.	O	O	O	O	O
3. Esrom H. Ssi	O	O	O	O	O
4. Dra.Noor R.	O	O	O	O	O
5. Ir. Rina A.	O	O	O	O	O
6. Emalya R.	O	O	O	O	O
7. Dra. Novy F.	O	O	O	O	O
8. Djurit T. P.	O	O	O	O	O
9. Nevy Rinda	X	X	X	X	X
10. Supri Handari	X	X	X	X	X

NOTE :
- O : CAPABLE - X : UNABLE

ANALYTICAL CAPABILITY OF NOISE & VIBRATION

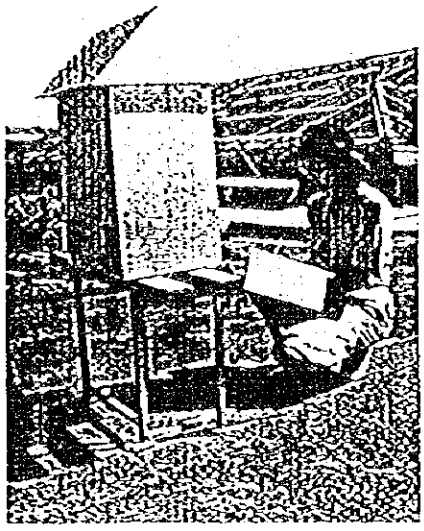
	Noise	*Vibration*
1. Wisnu Eka	O	O
2. Sigit Reliantoro	O	O

NOTE :
- O : CAPABLE - X : UNABLE

AMBIENT AIR QUALITY MONITORING

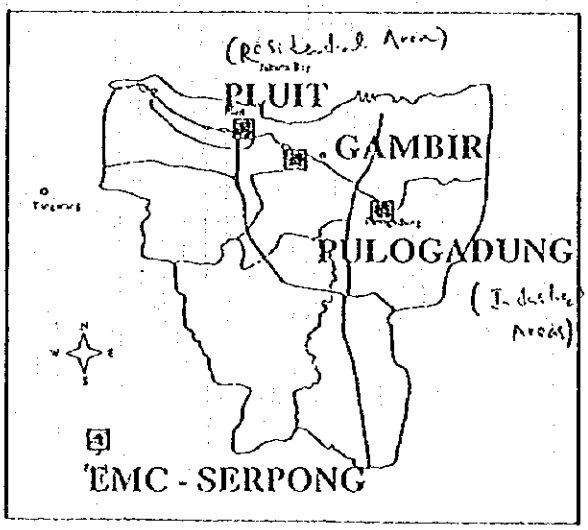
1. Automatic Continuous Air Quality Monitoring

2. Manual Method



AMBIENT AIR QUALITY MONITORING

Automatic Continuous Air Quality Monitoring



4 Stations Monitoring :

- Pulogadung*
- Pluit*
- Gambir*
- EMC Serpong**

* operated by DKI Jakarta Government

** operated by EMC

The parameters monitored :

Air quality :

* SO_2 *NOx *OX (O3)
* HC *SPM

Meteorology :

* wind speed * wind direction
* temperature * humidity

MANUAL METHOD

1. Ambient air quality monitoring at several big cities :

- 1994 - 1995 : Jakarta, Bandung, Semarang, Yogyakarta, Surabaya, Medan, Ujungpandang
- 1995 - 1996 : Bandung, Semarang, Balikpapan, Denpasar, Palembang, Medan, Ujungpandang
- 1996 - 1997 : Ujungpandang, Pekanbaru, Medan, Denpasar, Balikpapan
- 1997 - 1998 : Surabaya, Semarang, Bandung, Medan

Parameter : SO2 , NO2 and TSP

2. DUST FALL

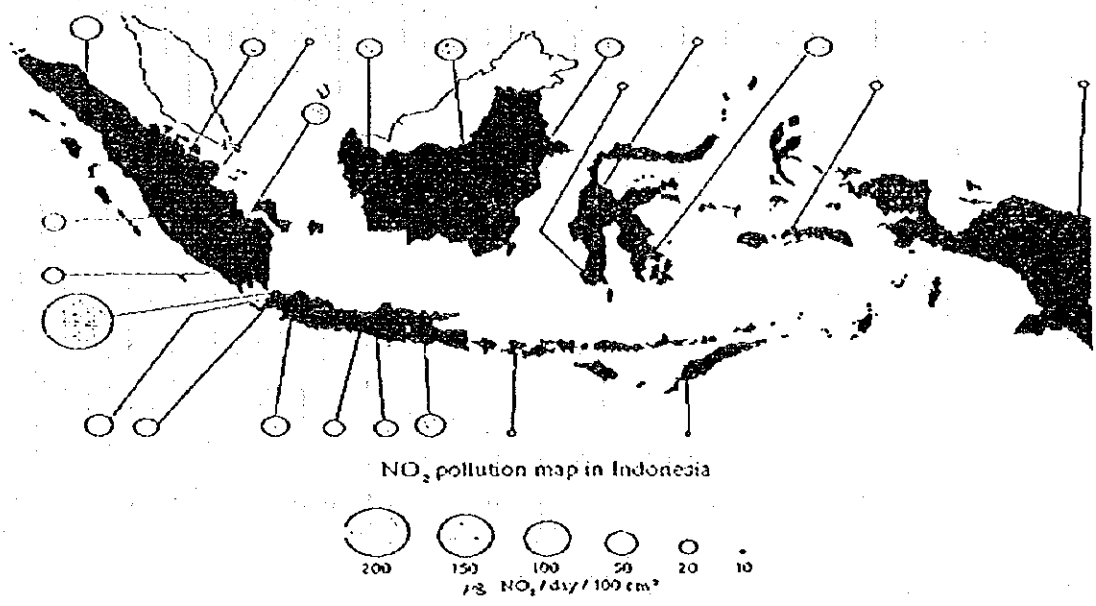
Operating 2 dust fall monitoring stations, compliance to British Standard Deposit Gauge and US Standard Dust Jar

Stations : - EMC Serpong
- JICA Office Thamrin St. Jakarta

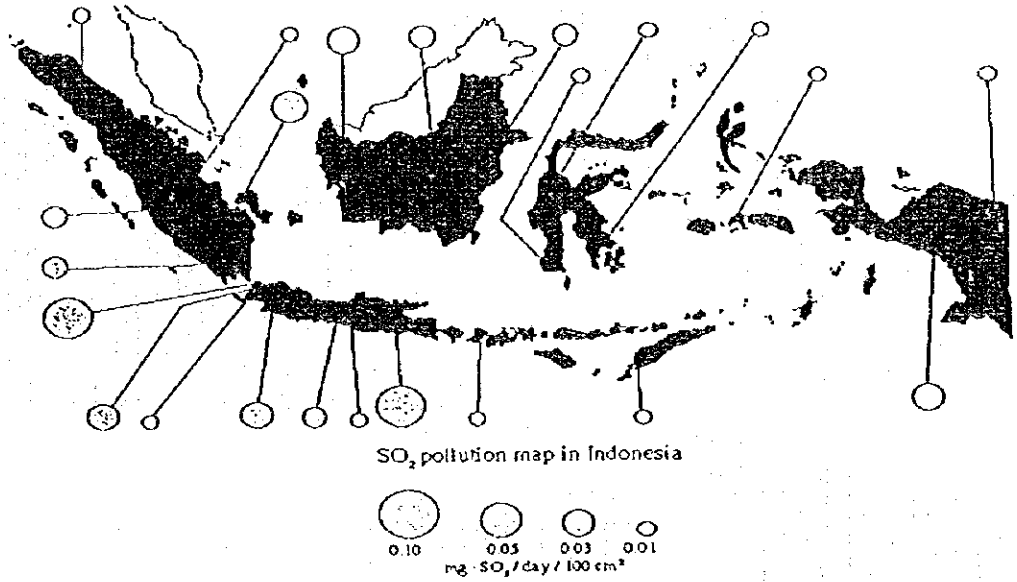
3. PASSIVE SAMPLER AIR QUALITY MONITORING

- Pb O2 Candle
- Tea Plate Method

NO2 pollution map in Indonesia



SO2 pollution map in Indonesia

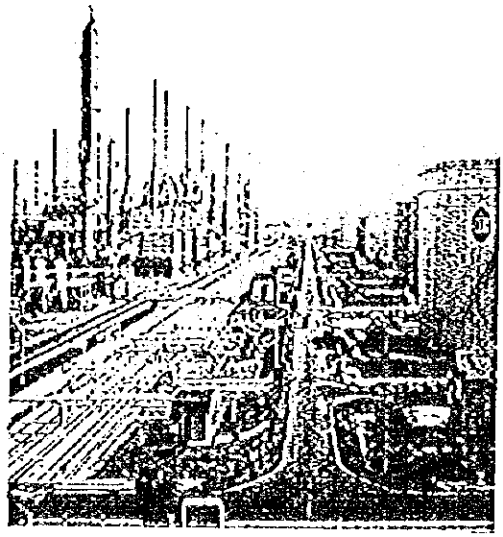


EMISSION MEASUREMENT

Emission From Stationary Sources	Mobile Sources Emission From
- Parameter : * SO2 * NOX * HCl * HF * F2 * Cl2 * CO * Dust	- Vehicle Types : * Motor Cycle * Passanger Car * Bus * Truck - Fuel Types : * Gasoline * Solar

Type of Industries :

* Pulp & Paper
* Cement
* Power Generator
* Steel
* Food
* Milk
* Soap
* Incinerator
* Textile
* Ceramic
* Glass
* Hotel



EMISSION MEASUREMENT

FACILITIES MEASURED

* Boiler
* Generator
* Industrial Process
* Diesel Engine
* Gas Turbine
* Combine Cycle
* Electric Furnace
* Melting Furnace
* Reheating Furnace

NOISE & VIBRATION LABORATORY

1994

1. Enviromental Noise Measurement in Jakarta
2. Research of Characteristic of Hemianechoi Room
3. Joint Research on Vehicle Noise Emission with KIM - LIPI

NOISE & VIBRATION LABORATORY

1995
Joint Research on Noise Criteria for Room with KIM - LIPI

1995 - 1996
Enviromental Noise Level Monitoring (Medan, Denpasar, U. Pandang, Bandung, Balikpapan)

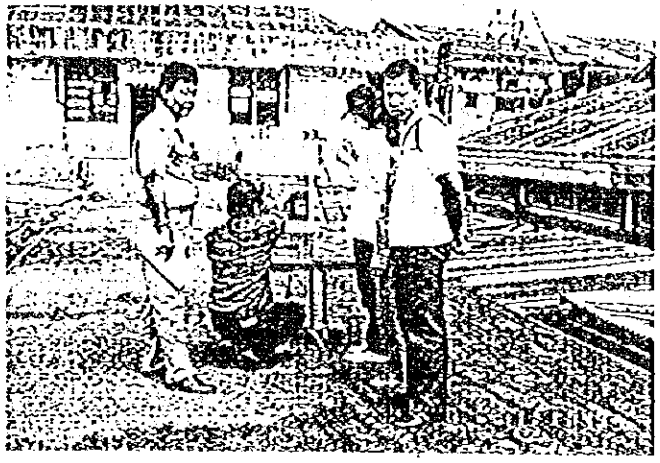
1996
Acustic Room Measurement

1996 - 1997
Enviromental Noise Level Monitoring Medan,Denpasar, U. Pandang, Bandung,Balikpapan

1997 - 1998
Research on Traffic Noise

VISIT LOCAL LABORATORIES & LOCAL GOVERNMENTS

PURPOSE :
- To obtain information about their activities and to promote cooperation
- To measure NO2 & TSP in ambient air



The Number of Local Goverment visited :
around 20 local governments

COLLABORATION WITH BAPEDAL

PURPOSE

To strengthen Environmental Management Capability

ACTIVITY

1. Blue Sky Programme
   Emission measurement (Surabaya, Semarang, Bandung, Jakarta)
2. The Study on Air Pollution in Jabotabek

FUTURE PLAN

EXPECTING JICA COOPERATION

1. Short / Long Term Noise Expert
2. Transfer of Knowledge of Noise & Vibration Analysis
3. Transfer of Knowledge of GC Analysis
4. Transfer of Knowledge of Offensive Odor and Sensing Analysis
5. Transfer of Knowledge of VOC, POHC Analysis
6. Supporting Acid Rain National Monitoring Programme
7. Transfer of Knowledge of Toxic Subtance Analysis in Ambient & Stack Gas
8. Providing Mobile Noise Monitoring Terminal
9. Developing Passive Sampler Method using Filter Method

水質ラボ

Activities of Water Quality Laboratory from 1993 to 1997

Adnan Rahman
Coordinator of Water Quality Laboratory

Monitoring of Water Quality

1. Planning
2. Field Sampling
3. Analysis of Sample
4. Data handling and Evaluation
5. Report Writing

Field Sampling

1. Lake Water (1993)
   Toba, Bratan, Singkarak, Saguling
2. River Water (1993, 1994, 1995)
   Ciliwung and other 27 rivers
3. Industrial Waste Water (1996)
   27 factories
4. Water For Human Life (1995)
   5 major cities
5. Green Mussel (1995)
   5 Industrial sea area

Analytical Technologies

Basic parameters: pH, DO, SS, COD, BOD, heavy metals

Special parameters: T-CN, T-N, T-Hg, Cr^{6+}, organo halogens

Microbiology: Coliform group, Fecal coliform bacteria

± 40 parameters required by water quality control can be analyzed

Visiting Local Laboratories And BLH of Provinces

26 local laboratories and 9 BLH of provinces were visited from July 1994 to March 1996

1. Analytical technologies and instruments required by local laboratories were clarified
2. Water pollution problems in provinces were clarified

Report For BAPEDAL

1. 30 total number of reports about laboratory visits and sampling travels were reported to head of EMC
2. Information and impression obtained on the visits and travels were included in those reports. They were useful for policy development and environmental management in BAPEDAL

7

Output from Water Quality Laboratory

8

Analytical Equipment Utilized

Parameters / Equipment	Heavy Metals	Anions	Cations	Organic Halogen	T-Hg	TOC
AAS	O					
Spectrophotometer	O	O	O			
Ion Chromatograph		O				
Ion Meter		O	O			
Gas Chromatograph				O		
Mercury Analyzer					O	
TOC Analyzer						O

9

Technical reports of monitoring or research

1. Monitoring of Lake Water Quality in Indonesia
2. Environmental Concentration of Mercury Along the Kapuas River, West Kalimantan
3. BOD Measurement by Room Temperature Incubation
4. A Trial of Analysis of Total Cyanide in Waste Water
5. Microorganism Pollution in Water For Human Life in Indonesia
6. Correlation Between COD_C and COD_{Mn}
7. Correlation Between TOC and BOD, COD
8. Monitoring of Pollution in Ciliwung River
9. Monitoring of Heavy Metal Pollution in Sea Water by Green Mussel Watching
10. Chemical Kinetics Study of BOD Reaction in Tropical Country
11. Survey of Industrial Waste Water Treatment

10

Improvement of Local Laboratory by Training Courses

1. Basic parameter training courses
   - 30 attendants, Jan. 23 – Jan. 27, 1995
   - 20 attendants, Feb. 15 – Feb. 19, 1995
   - 15 attendants, Apr. – , 1997
2. Special parameter training courses
   - Microbiology; 2 attendants, Sep. 12–16, 1995
   - Mercury, 2 attendants, Oct. 13–15, 1995
   - Sampling technology, 2 attendants, Oct. 25, 1995
   - Mercury & heavy metals, 2 attendants, 1997

11

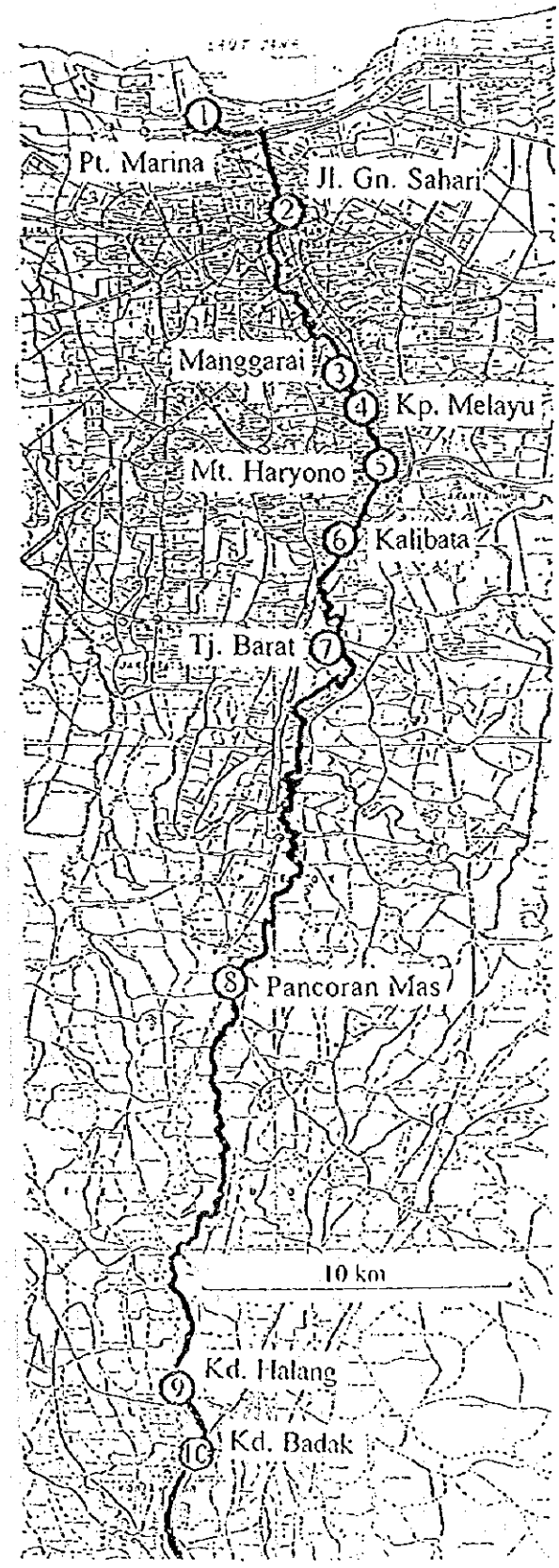
Analytical Results of Sample From Private Sector

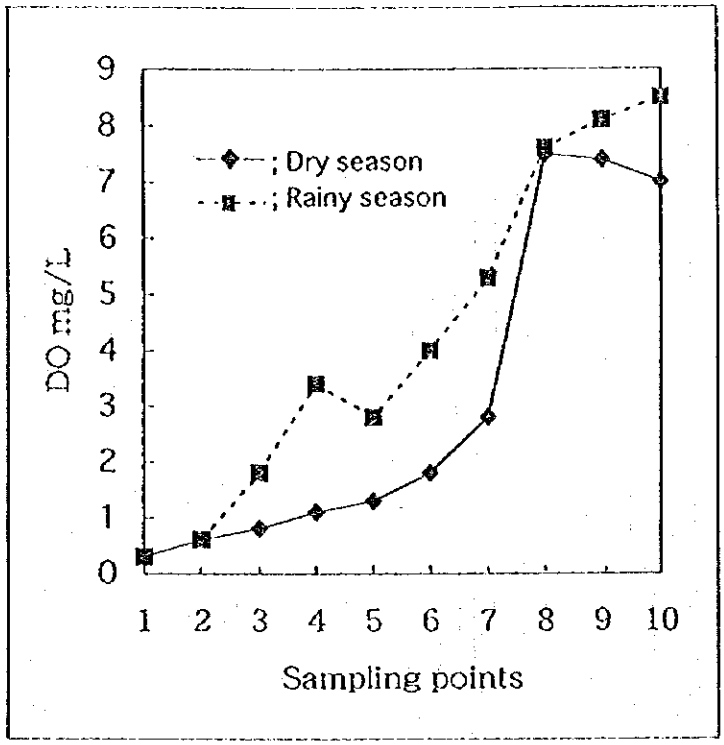
1. Number of factories at : Tangerang ± 103 factories
2. Number of sample : from June1995 to January 1996 ± 60 / month

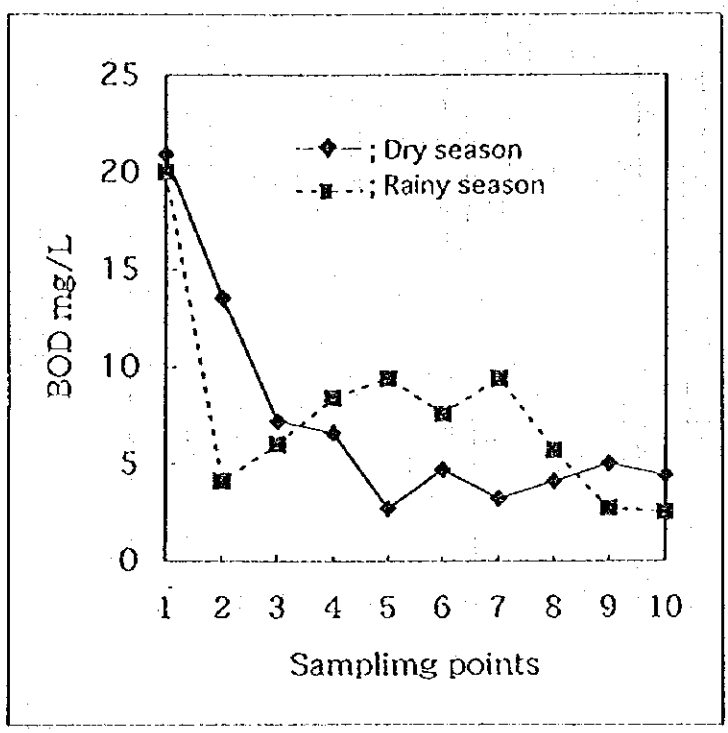
12

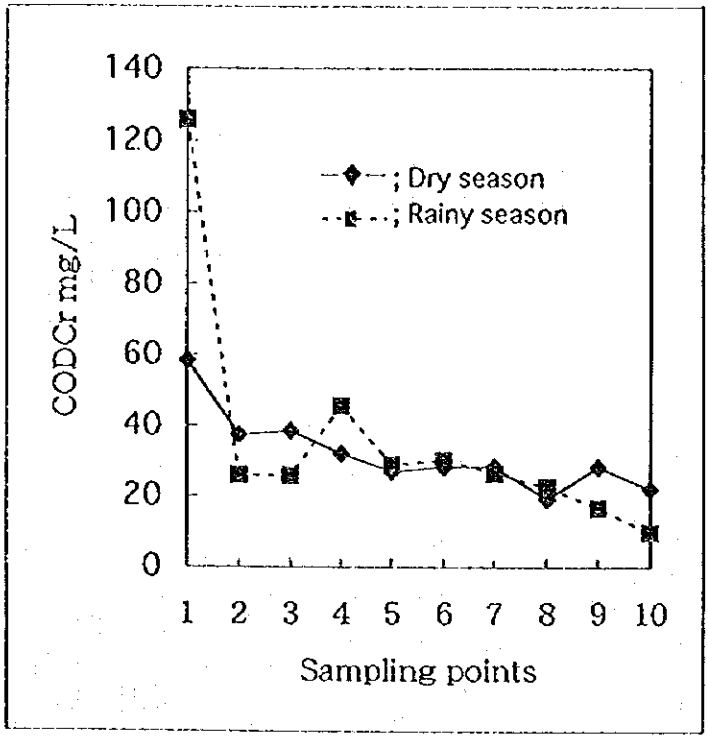
Conclusion

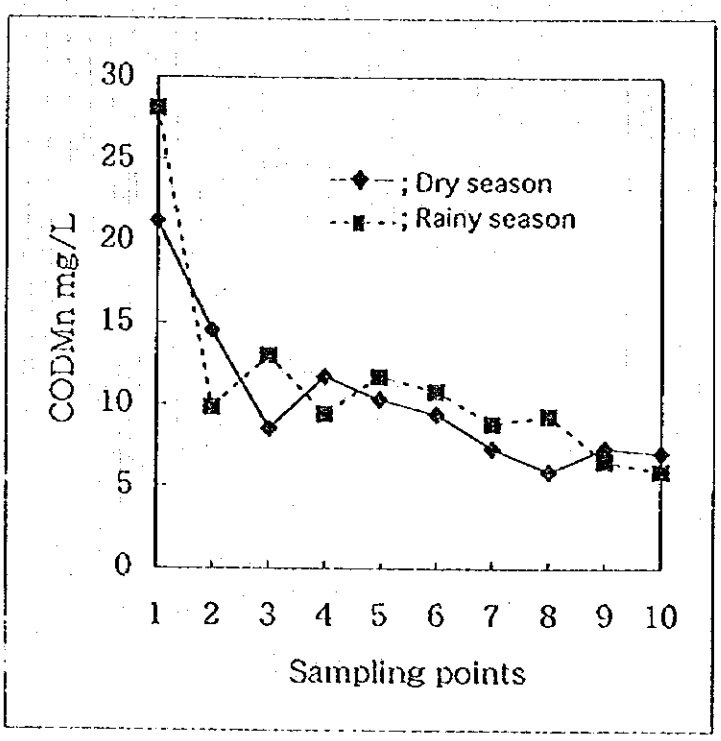
1. Basic analytical technology has been mastered by Water Quality Laboratory Staff
2. Trainer ability for local laboratory staff need more improvement
3. Research ability has to be strengthen more


1
Pt. Marina
Jl. Gn. Sahari
2
Manggarai
3
4
Kp. Melayu
Mt. Haryono
5
6
Kalibata
Tj. Barat
7
8
Pancoran Mas
10 km
Kd. Halang
9
Kd. Badak
10


DO mg/L
9
8
7
6
5
4
3
2
1
0
; Dry season
; Rainy season
1 2 3 4 5 6 7 8 9 10
Sampling points


BOD mg/L
25
20
15
10
5
0
; Dry season
; Rainy season
1 2 3 4 5 6 7 8 9 10
Samplimg points


140
120
100
80
60
40
20
0
CODCr mg/L
; Dry season
; Rainy season
1 2 3 4 5 6 7 8 9 10
Sampling points


30
25
20
15
10
5
0
CODMn mg/L
; Dry season
; Rainy season
1 2 3 4 5 6 7 8 9 10
Sampling points

有害物質ラボ

TOXIC LABORATORY STAFF MEMBERS

Coordinator
Drs. Bagus B. Edvantoro

- Dra. Halimah
- Dra. Harmin Manurung
- Drs. Darmaerius
- Dra. Aris Saladini
- Dra. Inny Nurbaety
- Dra. Susy Lahliani Apt.
- Dra. Asiah
- Dra. CH. Netty
- Ir. Dewi Ramaningsih
- Rita
- Henny

THE ACTIVITIES OF TOXIC SUBSTANCES LABORATORY, E M C

EMC WAS ESTABLISHED IN THE MID OF 1993, THE ACTIVITIES MAINLY OCUSED ON THE TECHNICAL TRAINING FOR LABORATORY STAFF

- THE ACTIVITIES FOCUSED ON THE TRAINING OF INSTRUMENTATION IN GENERAL : AAS, GC, KPLC, GC-MS, SPECTROPHOTOMETER S.E.M AND OTHERS.
- SAMPLES PREPARATION WAS GIVEN BY JICA EXPERT : METAL ANALYSIS AND PESTICIDE ANALYSIS
- PRACTICE OF SAMPLES COLLECTION IN THE FIELD : RIVER WATER, RIVER SEDIMENT, SEA WATER, SEA SEDIMENT, DUMPING SITE AND INDUSTRIAL ZONE
- SOME TRAININGS ABROAD HAS BEEN SET UP TO ENHANCE THE SKILL AND CAPABILITIES OF EMC'S STAFF RELATED TO ENVIRONMENTAL LABORATORY MOSTLY IN JAPAN

3

CAPABILITY OF TOXIC'S STAFF IN OPERATING INSTRUMENTS

NO.	INSTRUMENTS	PARAMETERS	REMARKS
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]

THE PRIMARY ACTIVITIES OF TOXIC LABORATORY CONSIST OF

1. ENVIRONMENTAL MONITORING PROGRAM

ONE OF EMC'S DUTIES IS TO STRENGTHEN ENVIRONMENTAL MONITORING PROGRAM AT SOME SPECIFIC AREAS ACROSS THE NATION :

- IN THE [illegible] FISCAL YEAR, TOXIC LABORATORY CONDUCTED ENVIRONMENTAL QUALITY MONITORING ACTIVITIES IN 10 PROVINCES WHICH EMPHASIZED ON RIVER SEDIMENT SAMPLES FOR ANALYSIS OF METALS AND PESTICIDE RESIDUE

LOCATION : NORTH SUMATERA, WEST SUMATERA, JAMBI, WEST JAVA, CENTRAL JAVA, YOGYAKARTA, EAST JAVA, JAKARTA, EAST KALIMANTAN AND IRIAN JAYA.

PARAMETER : METALS :
Pb, Cd, Cu, Cr, Mn, Ni, Fe, Zn

ORGANOCHLORINE PESTICIDE :
18 KINDS (BHC, HEPTACHLOR, ALDRIN, CHLORDANE, DDT, ENDRIN, ETC)

2. IN THE 1995/1996 FISCAL YEAR, WE CARRIED OUT THE MONITORING PROGRAM PARTICULARLY IN INDUSTRIAL SITES, SUCH AS NICKEL MANUFACTURER, LEATHER TANNING, PULP & PAPER, OIL REFINERY, FERTILIZER AND PLYWOOD

LOCATION : SOUTH EAST SULAWESI, YOGYAKARTA, RIAU, SOUTH SUMATERA, SOUTH KALIMANTAN
PARAMETER : METALS :
Pb, Cd, Cr, Cu, Zn, Mn, Ni, Fe
ORGANOCHLORINE PESTICIDE :
18 KINDS
PHENOL AND ITS DERIVATES

3. IN THE 1996/1997 FISCAL YEAR, TOXIC LABORATORY UNDERTOOK THE MONITORING IN VARIOUS TYPES OF INDUSTRY SUCH AS :
LIQUID NATURAL GAS, TEXTILE, GOLD MANUFACTURER, ELECTROPLATING, WASTE TREATMENT PLANT, STEEL MANUFACTURER.

LOCATION : ACEH, WEST JAVA, LAMPUNG, EAST JAVA, SOUTH SULAWESI
PARAMETERS : METALS :
As, Cd, Cr, Cr6+, Cu, Fe, Hg, Mn, Ni, Pb, Zn
TCLP (for insoluble compound)

4. ON GOING PROJECTS FROM 1997/1998 FISCAL YEAR

A. TOXIC WASTE ASSESSMENT FROM TEXTILE AND PAPER INDUSTRIES
LOCATIONS : WEST JAVA & EAST JAVA
PARAMETERS : METALS AND PHENOL

B. TOXIC WASTE CHARACTERISTIC FROM OIL REFINERY
LOCATION : RIAU, SOUTH SUMATERA, EAST KALIMANTAN, WEST JAVA
PARAMETERS : TEST OF REACTIVITY, FLAMMABLE, CORROSIVE

C. METHODOLOGY ASSESSMENT OF ORGANOCHLORINE AND PCB ANALYSIS
LOCATION : JAKARTA
PARAMETERS : ORGANOCHLORINE PESTICIDE AND PCBs

D. TOXICOLOGICAL TEST FROM ELECTROPLATING INDUSTRIES
LOCATION : WEST JAVA, EAST JAVA
PARAMETERS : DETERMINATION OF LC-50

E. METALS AND ORGANOTIN CONCENTRATION AT HARBOR'S
LOCATION : JAKARTA, EAST JAVA AND CENTRAL JAVA
PARAMETERS : METALS AND ORGANOTIN

II. ENVIRONMENTAL RESEARCH FROM SPECIFIC ACTIVITIES

1. SURVEY ON ENVIRONMENTAL QUALITY DUE TO GOLD MINING ACTIVITY ALONG KAPUAS RIVER, WEST KALIMANTAN (EPID)

SAMPLING POINT : 6 NUMBERS AT DIFFERENT REGENCY

PARAMETERS : TOTAL MERCURY IN RIVER WATER, RIVER SEDIMENT, AND FISH SAMPLES METHYL MERCURY IN HUMAN HAIR SAMPLE

2. ENVIRONMENTAL MONITORING AND ANALYSIS IN THE EAST ASIAN REGION IN MARCH 1994 (COLLABORATION WITH UNU, JAPAN)

LOCATION : TANGERANG, JAKARTA, BOGOR, WEST JAVA, EAST JAVA

PARAMETERS : ORGANOCHLORINE PESTICIDE RESIDUE (ENDRIN, AND BHC ... ETC.) PCB IN RIVER SEDIMENT AND SLUDGE SAMPLES THIS PROJECT WILL BE CONTINUED IN THE NEXT YEAR EMPHASIZING THE PARAMETERS OF ORGANOTIN AND VOC IN FISH AND SEDIMENT SAMPLES

3. ORGANOTIN CONCENTRATION AT TANJUNG PRIUK HARBOR (1995)

LOCATION : TANJUNG PRIUK HARBOR AT NORTH JAKARTA
PARAMETERS : ORGANOTIN IN SEA SEDIMENT

4. ENVIRONMENTAL MONITORING PROJECT AT TANGERANG AND NORTH JAKARTA (COOPERATION WITH CITI, JAPAN, 1996)

LOCATION : ALONG CISADANE RIVER (TANGERANG) AND CIDENG RIVER (NORTH JAKARTA)
PARAMETERS : TOTAL MERCURY, METHYL MERCURY AND PCBs IN SEDIMENT SAMPLES

III. METHODOLGY ASSESSMENT

A. METALS ANALYSIS IN VARIOUS TYPES OF SAMPLE

B. RESIDUE PESTICIDES ANALYSIS COMPRIZED ORGANOCHLORINE, ORGANOPHOSPHAT, CARBAMAT

C. TEST OF TOXIC WASTE CHARACTERISTIC

D. TEST OF TOXICOLOGY FOR DETERMINATION OF LD-50

IV. TRAINING FOR TECHNICAL STAFF OF LOCAL ENVIRONMENTAL LABORATORY

A. TOXIC LABORATORY HAD ORGANIZED THE TECHNICAL TRAINING FOR LOCAL ENVIRONMENTAL LABORATORIES' STAFF TWICE IN 1994 AND 1995

B. SPECIAL TRAINING FOR GAS CHROMATOGRAPHY WAS ALSO PROVIDED TO INDUSTRIAL LABORATORY'S STAFF

V. LOCAL LABORATORY VISIT

- B P P I (INDUSTRIAL LABORATORY)
- B L K (HEALTH LABORATORY)
- P U (PUBLIC WORK LABORATORY)
- B T K L (TECHNICAL HEALTH LABORATORY)

CONCLUSION

1. Transfer technology regarding technical work analysis at laboratory has been provided by three Japanese experts particularly in metals analysis, pesticide residue analysis, PCBs analysis and other types of hydrocarbon analysis.

2. Toxic Laboratory staff have already had capabilities in operating some analytical instruments in general such as AAS, HPLC, GC, GC-MS

3. The areas which shall be improved in enhancing the laboratory staff capability are :
   - Mastering the specific instrument into more detail especially GC and GC-MS
   - Maintenance and calibration of instruments
   - Data interpretation
   - Other type of organic analysis using GC and GC-MS shall be developed such as P.A.H, Chlorobenzene, Chloroform and etc.

4. Dispatch of expert must be right person on the right job.

環境情報

Activities (Information Section)

Item		Activities	C/P	memo
1. Basic Design	Basic Design (include Monitoring Plan)	Short Term Expert (Mr.Hayase)	6 person	Report of Mr.Hayase
	Monitoring Network	Discuss with PPIPL about Monitoring Mechanism.	7 person	Network Configlation of BAPEDAL
2. Programming	General Computer	Lecture by other JICA's Expert.	8 person	Lecture Note I
	FORTRAN Basic I	FORTRAN SYNTAX I	8 person	(Same as above)
	Data Input	Data Input from keyboard with Display	8 person	(Same as above)
	Programming I	Programming (Calculating in four arithmetical operations)	8 person	(Same as above)
	Programming II	Min Max Programming	8 person	(Same as above)
	Programming III	Basic Statistics (Ave. dispersion, Correration etc.)	8 person	Lecture Note II and Program Lists
	FORTRAN Basic II	FORTRAN SYNTAX II (Input / Output data from File)	6 person	(Same as above)
	Programming IV	Sorting of Data	6 person	(Same as above)
	Programming V	Programming (Calculate the determinant (Matrix) and Simultaneous Equations)	6 person	(Same as above)
	Programming VI	Programming (Analysis in regression (Linear Trend/ Exponential Trend /Logarithmic Trend))	6 person	(Same as above)
	Programming VII	Programming (Analysis in regression)	6 person	(Same as above)
	HTML		2 person	
3. Infrastructure & Network	Network I (Stage I)	Stage I means OJT. Using small network to understand How network works.	5 person	Network Configuration (EMC)
	Network II (Stage II)	EMC Local Area Network System)	5 person	Network Configuration (EMC)
	Basic Design of Network	Understanding of Concept.	5 person	Network Configuration (EMC)
	Operation Rule	Making Rules of Operation & Administration of LAN	5 person	
	WAN (planning)			
4. DataBase	Practice I	Environmental Clipping (Starts with Texts(HTML files), Not DataBase. Currently in DataBase and develop application and, link to WWW.)	4 person	List of DataBase
	Practice II	Law Regulation (same as above)	3 person	List of DataBase
	Practice III	Staff (Developing application and Link to WWW)	2 person	List of DataBase
	Practice IV	Library Management(Design and Developing. In Progress)	5 person	List of DataBase
	Practice V	Chemical Inventory (As a introduction of LIMS(Laboratory Information Management System). Developing DataBase and Input Data and Managing the Chemical In Progress)	15 person	List of DataBase
	Practice VI	Visitors (Creating a DataBase and Input Data)	2 person	List of DataBase
	Practice VII	PSL(Management Research Center) (Creating a DataBase)	2 person	List of DataBase
	Practice VIII	NGOs related to Environment (Creating a DataBase)	2 person	List of DataBase

Activities (Information Section)

Item		Activities	C/P	memo
5. Construct the Intranet	Construct the HTTP Server	Start up WWW(HTTP) Server	1 person	Network Configuration (EMC)
	Mail Service	Introduce Mail System	1 person	
	Construct the Mail Server	Start up Mail(SMTP/POP) Server	1 person	
	WWW-DataBase Link	WWW-DataBase Link.	3 person	
		Understanding Concept(Application Cost, Developing cost and Maintenance Cost) and Technical Background.		
6.Publication and Presentation	DTP	Create the publication.	4 person	
		Technical guide(Application oriented)		
	Presentation	Create the Presentation Documents and Style.	All	
		Technical guide(Application oriented)	person	
	OCR	Using the OCR as a Program to aid data input.	4 person	
7.others	GIS	Introduction of GIS(Geographical Information System)	5 person	
		Short Term Expert(Mr. Hashimoto)		
	Monitoring Data Handling	Working together with JICA survey team	3 person	
		Automatic Analyzer (Data Logger Program)		

Change the number of Information Section C/P '93 8person, '94 8person, '95 6person, '96 5person, '97 5person.

研修

TRAINING SECTION ACTIVITIES

TRAINING SECTION MEMBERS

1. Ir. Hari Wahyudi	- Head of Training Section
2. Drs. Nuntut Barus	- Training Coordinator
3. Ir. Diana Yani Nur	- Training Section Staff
4. Restu Yuliani SH	- Training Section Staff
5. Drs. Pramana Budi P	- Training Section Staff
6. Dra. Ulfah	- Training Section Staff
7. Yati Yuniati	- Library Coordinator
8. Siti Nurhomsah	- Library Staff
9. Winarti	- Library Staff

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9. Winarti	- Library Staff

1994

WORKSHOP ON AIR QUALITY MONITORING

SUBJECTS :

- Introducing Passive Sampler Method (Pb O2 and TEA Plate) to monitor SO2 and NO2

PARTICIPANT

- Laboratory Analyst
- Local Government Staff

from 24 Provinces

32 person

TIME

23rd - 25th March 1994

1995

TRAINING ON WATER LABORATORY FOR KEY PARAMETER ANALYSIS

OBJECTIVE

To increase technical skill of laboratory analyst in analyzing key parameters of water and waste water

PARTICIPANTS

Laboratory Analyst from 18 Provinces

TIME

15th - 21st February 1997

1995

TRAINING OF TRAINER

TIME

24th - 29th July 1995

PARTICIPANTS

BAPEDAL and PUSARPEDAL staff

25 persons

1996

TRAINING FOR LOCAL LABORATORY STAFF

Sampling And Analysis of
- Water Pollutants
- Air Pollutants
- Hazardous Waste

OBJECTIVE

To increase technical skill of laboratory analyst in environmental quality analysis

PARTICIPANTS

Local Laboratory Staff from 26 provinces

47 persons

1996

TRAINING ON QA/QC FOR ENVIRONMENTAL LABORATORY

OBJECTIVE

To introduce the elements of QA/QC environmental quality analysis

PARTICIPANTS

PUSARPEDAL Laboratoy Staff

25 persons

TIME

20th
I
31 St.
May
1996

TRAINING ON CHEMICAL ANALYSIS FOR ENVIRONMENT

1996

OBJECTIVE

To introduce and to increase analytical capability of Laboratory Staff in analysis of Environmental Parameters

PARTICIPANT

Laboratory Staff from Research Development Center for Applied Chemistry (P3KT - LIPI)

19 Persons

TIME

20th - 31st May 1996

REPORT WRITING COURSE 1996

OBJECTIVE
To introduce the basic of Report Writing

PARTICIPANTS	TIME
PUSARPEDAL Staffs 22 persons	18th - 21st June 1996

1997 TRAINING OF TRAINER FOR ENVIROMENTAL IMPACT ASSESSMENT

PARTICIPANTS	TIME
BAPEDAL & PUSARPEDAL 11 Persons	17th - 21st March 1997

1997

TRAINING ON WATER QUALITY ANALYSIS

OBJECTIVE

To increase technical skill for laboratory analist in water quality analysis

TIME

1st - 4th April 1997

PARTICIPANTS

Local Laboratory Staff

15 persons

LIBRARY

BOOK COLECTIONS

- General colection : 664 titles
- EIA Document : 433 titles

ACTIVITIES

1. Book Circulation
2. Abstract Editing
3. Development of Book Colection Data Base

The other activities :

1. Produced the trainning instruction material for :
   - Water Lab. Training
   - Air and Noise Lab. Training
   - Toxic and Hazardous Lab. Training

2. Curriculum and silabus for training on measurement of environmental quality

---

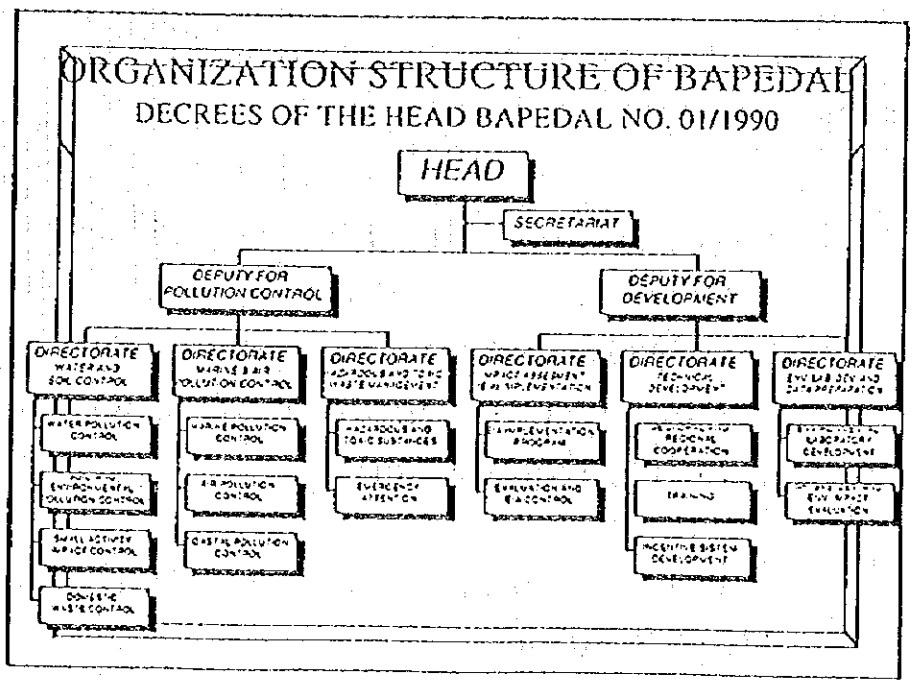
3. RECEIVE VISITOR FROM:

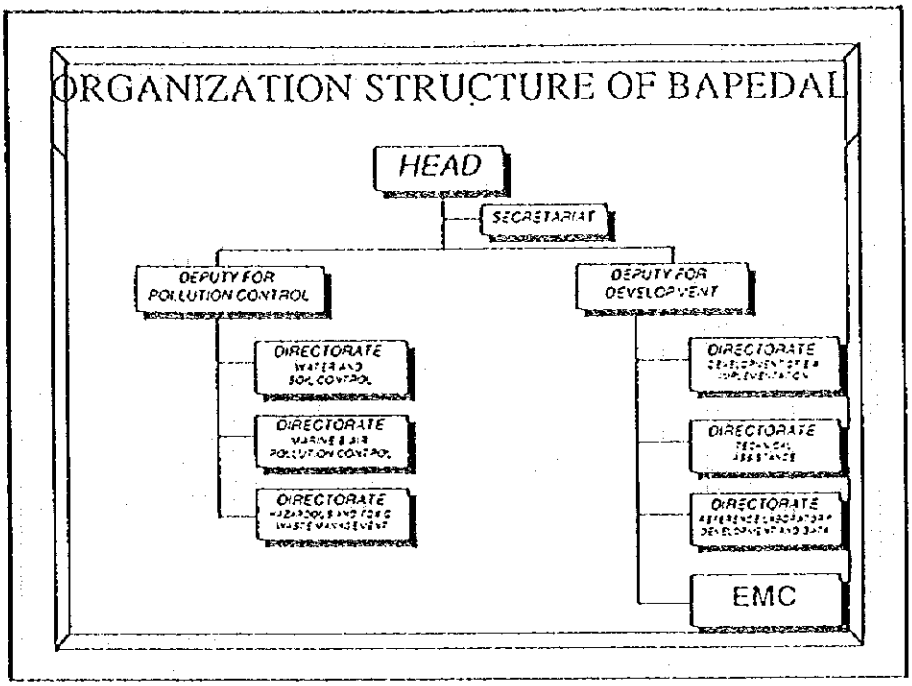
3.1. Government Officials
- **Research Institution**
- **LEMHANAS Course Participants**
- **House Representative Members**
- **Police Department**

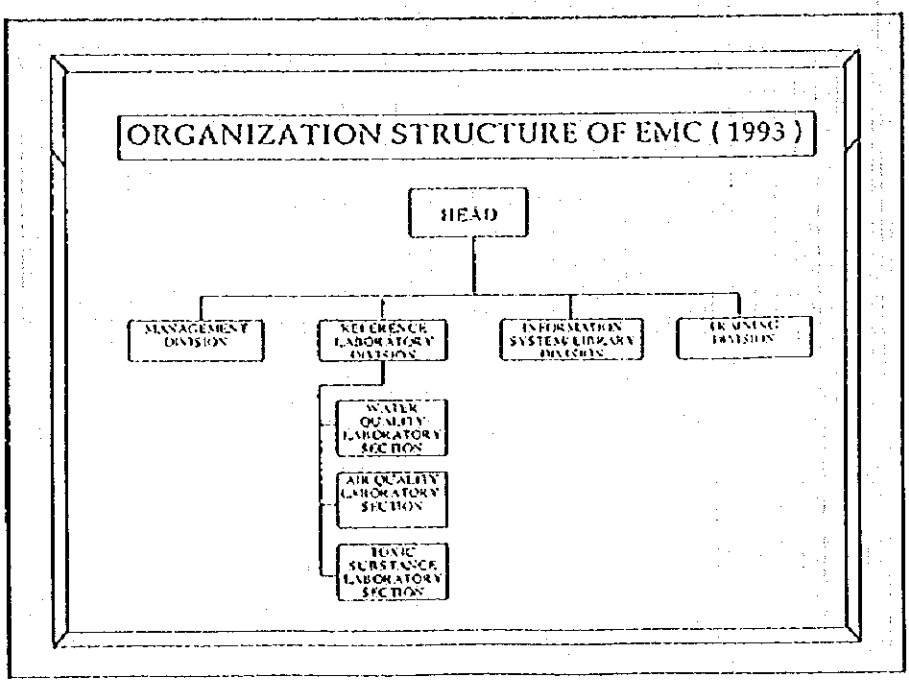
3.2. Various Student of University & Senior High School

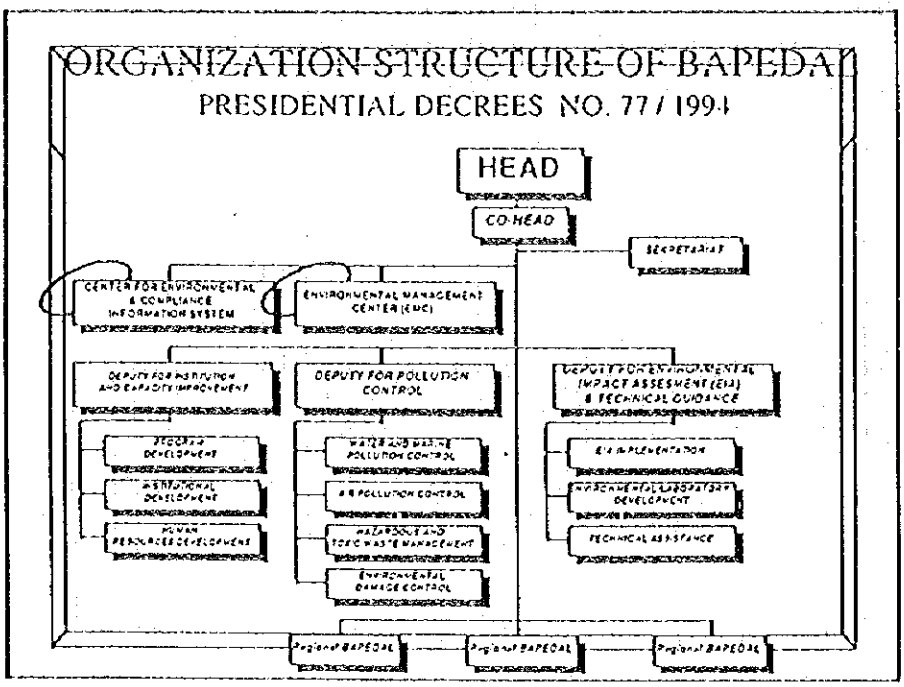
Organization , Personnal , Budget
PUSARPEDAL

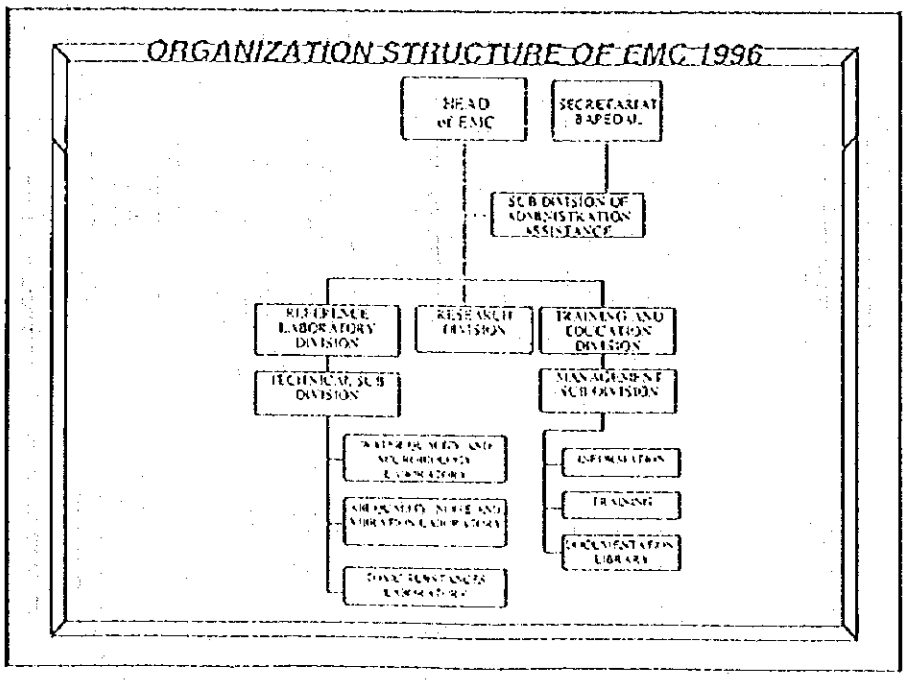
By Dra. Halimah

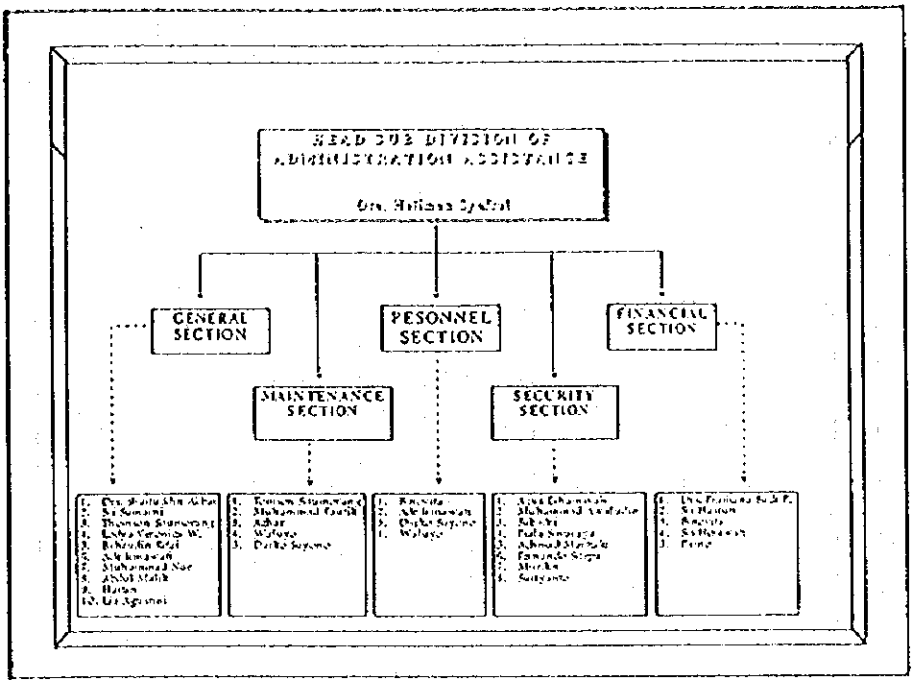



ORGANIZATION STRUCTURE OF BAPEDAL
HEAD
SECRETARIAT
DEPUTY FOR POLLUTION CONTROL
DEPUTY FOR DEVELOPMENT
DIRECTORATE
DIRECTORATE
DIRECTORATE
DIRECTORATE
DIRECTORATE
EMC


ORGANIZATION STRUCTURE OF EMC (1993)
HEAD
MANAGEMENT DIVISION
REFERENCE LABORATORY DIVISION
INFORMATION SYSTEM/LIBRARY DIVISION
WATER QUALITY LABORATORY SECTION
AIR QUALITY LABORATORY SECTION
TOXIC SUBSTANCE LABORATORY SECTION


ORGANIZATION STRUCTURE OF BAPEDAL
PRESIDENTIAL DECREES NO. 77 / 1994
HEAD
CO-HEAD
SECRETARIAT
CENTER FOR ENVIRONMENTAL & COMPLIANCE INFORMATION SYSTEM
ENVIRONMENTAL MANAGEMENT CENTER (EMC)
DEPUTY FOR POLLUTION CONTROL
WATER AND MARINE POLLUTION CONTROL
AIR POLLUTION CONTROL
HAZARDOUS AND TOXIC WASTE MANAGEMENT
ENVIRONMENTAL DAMAGE CONTROL
EIA IMPLEMENTATION
TECHNICAL ASSISTANCE


ORGANIZATION STRUCTURE OF EMC 1996
HEAD of EMC
SECRETARIAT BAPEDAL
SUB DIVISION OF ADMINISTRATION ASSISTANCE
RESEARCH DIVISION
TRAINING AND EDUCATION DIVISION
TECHNICAL SUB DIVISION
MANAGEMENT SUB DIVISION
TRAINING
LIBRARY



DUTIES

1. GENERAL SECTION:
   - correspondence/ mailing
   - Reference laboratory service
   - File management
   - Transportation

2. PERSONNEL SECTION:
   - Personnel data
   - Leave / Holiday
   - Food for personnel

3. FINANCIAL SECTION :
- *Salary*
- *Plan of Annual Budget*
- *Request Budget to BAPEDAL*

4. MAINTENANCE SECTION :
- *Take care of equipment, building, etc.*
- *Inventory of equipment / instrument*

5. SECURITY SECTION :
- *Secure of EMC area*

PERSONNEL OF EMC

1993 - 1997

YEAR	TOTAL	P	C	T
1993	64	6	49	9
1994	69	53	5	11
1995	84	54	11	19
1996	86	64	4	18
1997	88	69	5	14

NOTE : P = PERMANENT (PNS)
C = CANDIDAT TO BE PERMANENT (CPNS)
T = TEMPORARY (HONORER)

PERSONNEL OF EMC
1993 - 1997

NO	YEAR	TOTAL	STAFF			ADM	TRAINING SECTION	COMPLAINTS WATCH SECTION	LIBRARY	WATER QUALITY LABORATORY	AIR POLLUTION LABORATORY	TOXIC SUBSTANCE LABORATORY	SECURITY
			P	C	T								
1	1993	64	6	49	9	16	5	5	3	5	5	7	9
2	1994	69	53	5	11	17	5	5	3	5	9	9	9
3	1995	84	54	11	19	19	5	5	3	14	13	13	5
4	1996	80	64	4	13	19	7	5	3	17	12	13	5
5	1997	85	69	5	11	21	6	5	3	19	13	11	5

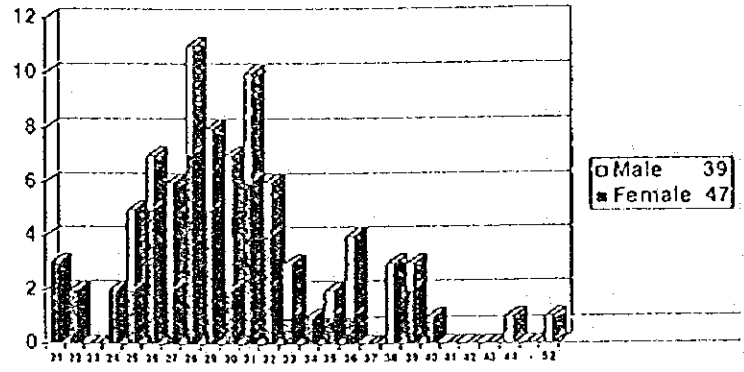
NOTE : P = PERMANENT (PNS)
C = CANDIDAT TO BE PERMANENT (CPNS)
T = TEMPORARY (HONORER)

ADM = ADMINISTRATION

EDUCATIONAL BACKGROUND OF EMC STAFF
1993 - 1997

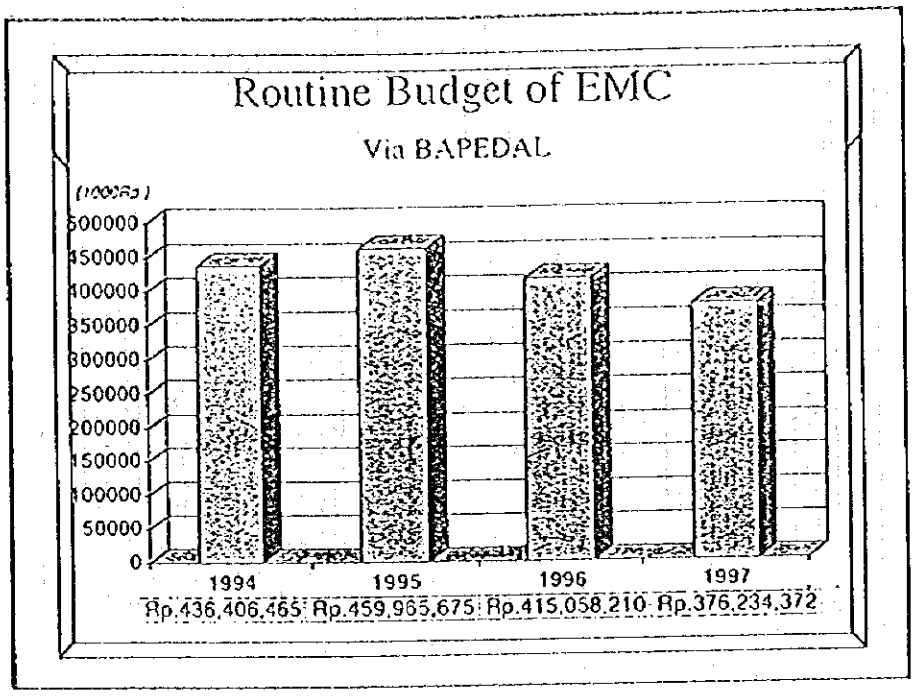
NO	YEAS	TOTAL STAFF	EDUCATION					
			ELEMENTARY SCHOOL	JUNIOR HIGH SCHOOL	SENIOR HIGH SCHOOL	DIPLOMA	UNIVERSITY	POST GRADUATE
1	1993	64	-	-	-	-	-	-
2	1994	69	2	1	27	7	32	-
3	1995	84	2	1	33	11	37	-
4	1996	80	1	2	31	12	39	1
5	1997	85	1	2	31	13	39	1

PERSONNEL OF EMC



Three kinds of Budget Sources

- Routine Budget
- Project Budget
- Others Budget
  Ex : JICA Support

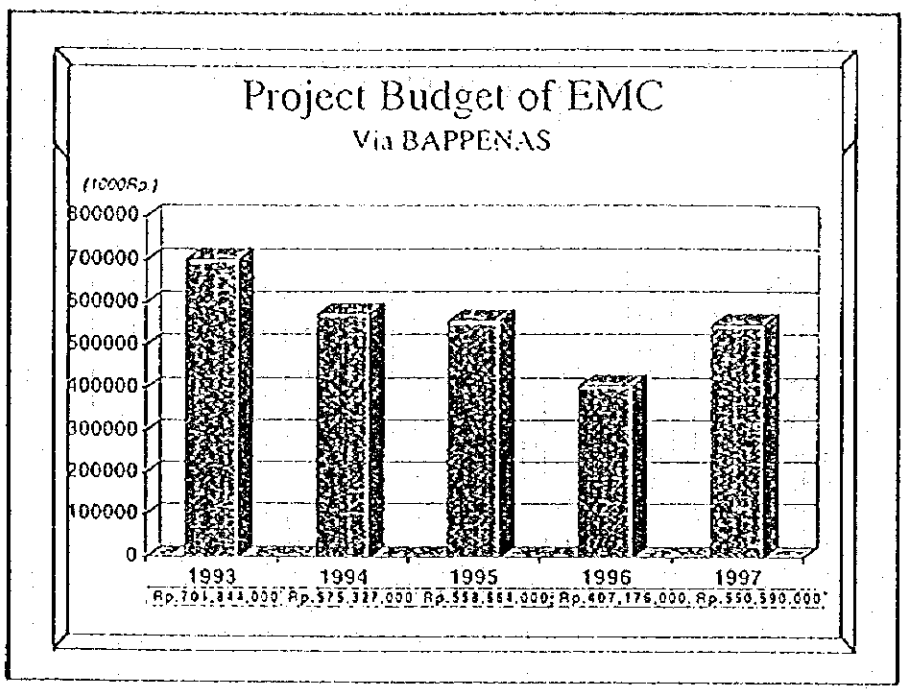


ROUTINE BUDGET

Via BAPEDAL 1994 - 1997

No	ITEM	1994 - 1995	1995 - 1996	1996 - 1997	1997 - 1998
1	Electricity	156,135,095	166,265,095	168,235,105	84,106,050
2	Telephone	12,108,370	14,602,580	11,085,105	5,628,012
3	Cleaning Service	151,992,000	151,992,000	151,992,000	151,992,000
4	Salary	10,875,000	11,250,000	12,750,000	17,000,000
5	Chemical / Gases	25,800,000	20,500,000	15,000,000	-
6	Postage	3,600,000	4,800,000	4,120,000	4,600,000
7	Stationary	20,000,000	29,280,000	20,000,000	-
8	Maintenance	20,000,000	24,350,000	20,180,000	-
9	Transportation	20,000,000	21,000,000	5,000,000	3,960,000
10	Fieldtrip (SPPD)	-	-	-	105,600,000
11	Security Salary	6,696,000	6,696,000	6,696,000	3,348,000
12	Car Maintenance	9,200,000	9,200,000	-	-
	TOTAL	436,406,465	459,965,675	415,058,210	376,234,372

Note : Until June 1997



What have been done with PTTC

- (1) MANAGEMENT OF CHEMICAL WAREHOUSE
- (2) MAINTENANCE OF EQUIPMENT / INSTRUMENT

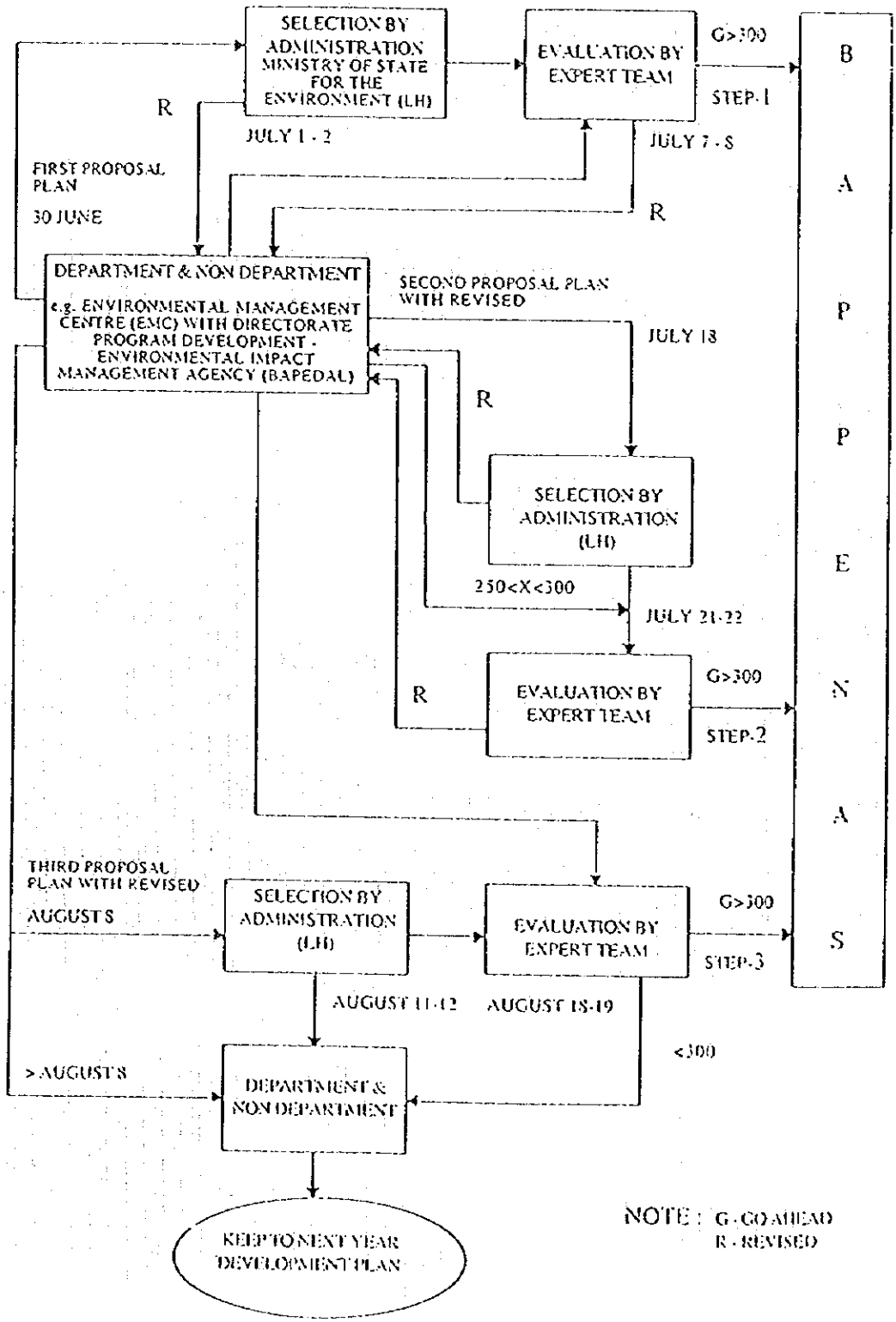
PROBLEMS

1. *Administration Division of EMC is still under responsibility of Bapedal*
2. *Budget for all of building maintenance,equipment and medical not enough from Bapedal routine budge*

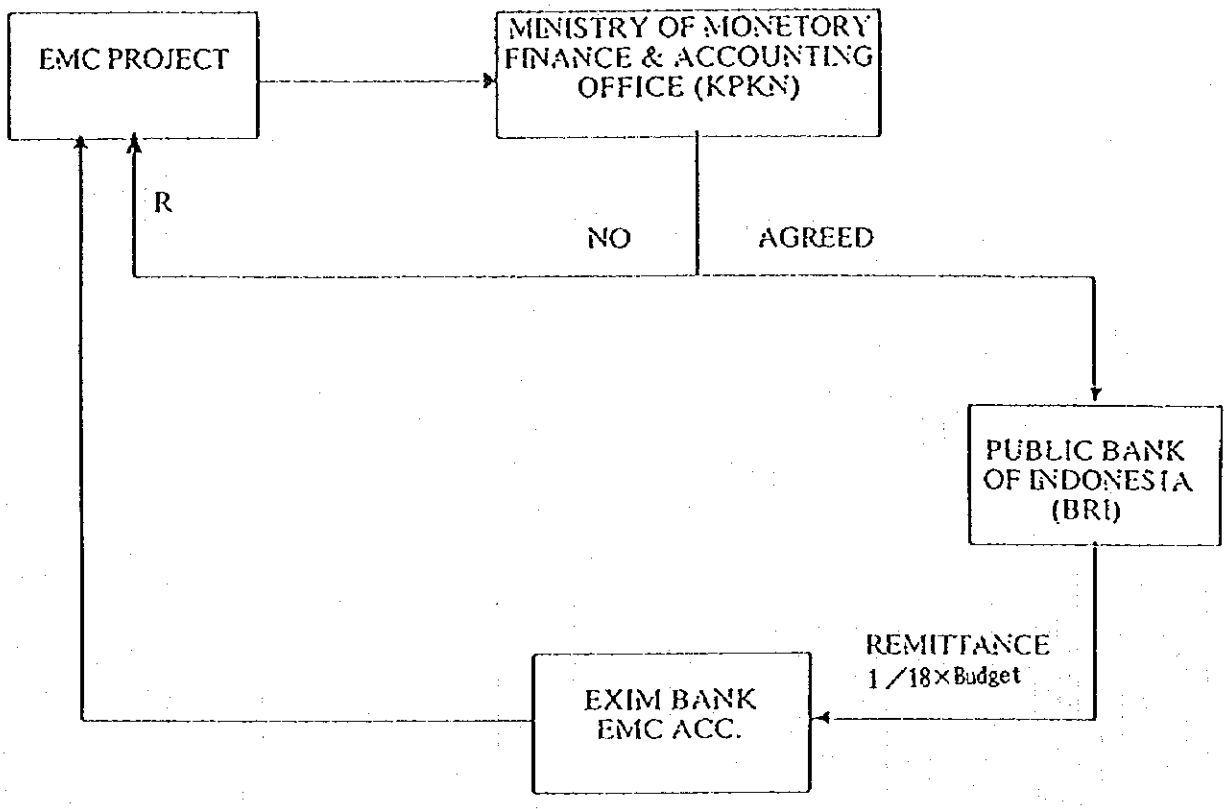
SUGGESTIONS

1. *Need to be establish head of Administration*
2. *Need more financial support from Bappenas and others donors (JICA,PCI, BDTAP, etc)*

PROCEDURE AND SCHEDULE OF APPLICATION ON ENVIRONMENT PROJECT



FINANCIAL FLOW OF EMC PROJECT



EMC の将来計画

Scope of the future work in PUSARPEDAL and the priority for technical cooperation

	0		1		2		3		4	5
	FY1997		FY1998		FY1999		FY2000		FY2001	FY2002
	~Dec1997	Jan.1998~ Mar.1998	Apr.1998 ~ Sep.1998	Oct.1998 ~ Mar.1999	Apr.1999 ~ Sep.1999	Oct.1999 ~ Mar.2000	Apr.2000 ~ Sep.2000	Oct.2000 ~ Mar.2001	Apr.2001 ~ Mar.2002	Apr.2002 ~ Mar.2003
Guidelines development on environmental monitoring	NEMP(National Environmental Monitoring Program)support on system development = preparation of manuals			Continue PUSARPEDAL monitoring activity based on NEMP technical improvement for sampling technique, analysis and monitoring data management →						
Technical advice for regional laboratories and BLH concerning environmental monitoring		Manual for round tour for guidance Manual for maintenance of analytical instrument Calibration Manual		preparation for round tour for guidance	start of operation on the round tour for guidance →					
Information and Data Management on monitoring activities	- NEMP support on system development and preparation for information system maintenance - Lab data management system development			- monitoring data base design and development			- start operation of monitoring data base			
Training courses for laboratories and information	TOT on Air, Water	Support for AusAID/RELD,OECF/ RMCD project on trial/operation training TOT(program, text preparation) for PUSARPEDAL training					continue PUSARPEDAL training for laboratories →			
QA／QC	problem identification and making strategy for the priority issue	preparation for international audit and accreditation (making QA/QC manual, QA/QC concept, preparation and implementation)			Training for QA/QC improvement based on the experience in PUSARPEDAL →					
The role of "Center for Technology" on environmental analysis including to deal with difficult problems for regional laboratories		review on the present standard of analytical methods			continue standardization of analytical methods, revision of SNI(Indonesian National Standard) →					
			TOT on Standard Sample Preparation Standard Bank Development		Training on Standard Sample Preparation, Operation and Maintenance of Standard Sample Bank →					
Technical proposals for BAPEDAL	proposal for review and revision of parameters and standards for environmental management, identification of countermeasures based on the outcomes of monitoring →									

	0	1		2		3		4	5
	FY1997	FY1998		FY1999		FY2000		FY2001	FY2002
	~Dec1997	Jan.1998~ Mar.1998	Apr.1998 ~ Sep.1998	Oct.1998 ~ Mar.1999	Apr.1999 ~ Sep.1999	Oct.1999 ~ Mar.2000	Apr.2000 ~ Sep.2000	Oct.2000 ~ Mar.2001	Apr.2001 ~ Mar.2002	Apr.2002 ~ Mar.2003
Research		mid-term plan as total	mid-term plan for each subject, preparation		start of research activity		step-by-step development of research activities →			
Acid Rain Monitoring		The first inter governmental meeting	preparation of the Network, Second inter-governmental meeting		full-implementation of the network →					
Environmental Education			Open Lab for Env. day		continue Open Lab and establish permanent facilities for environmental education with exhibition →					
			training for inspectors and planners in local government		school teachers training		continue environmental education activities →			
Renewal of facilities and equipment		Mid term plan for Facilities and Equipment			Design of facilities, Preparation for equipment renewal		Construction of new facilities, renewal of equipment			
Seminars and Workshops	E M C Seminar	NEMP Monitoring Workshop		Annual Workshop		Annual Workshop		Annual Workshop	Annual Workshop	Annual Workshop
Publications and Public Relations	News	Annual Report	News	Annual Report	News	Annual Report	News	Annual Report	News, Annual Report	News, Annual Report
OECD/RMCD										
AusAID/RELD										
ADB(BRNP)										

（7） ＥＭＣプロジェクト予算（1992～1996）＝インドネシア側負担額

EMC Projewct Budget (FY.1992~1996)

(Unit.Rp.)

１９９２年度	印刷製本費	交通費	雑役務費	資機材購入	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	一般合計
一般現地業務費	720,000	947,550	2,905,008	4,752,000	2,388,675	2,286,705	547,000	-	4,135,415	2,640,500	-	21,322,853
	720,000	947,550	2,905,008	4,752,000	2,388,675	2,286,705	547,000	-	4,135,415	2,640,500	-	21,322,853

１９９３年度	印刷製本費	交通費	雑役務費	資機材購入	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	一般合計
一般現地業務費	3,203,200	5,702,150	7,222,259	24,749,993	8,599,640	11,177,085	16,821,200	28,868,760	5,648,222	2,594,000	-	114,586,509
技術普及	42,230,000	-	-	-	-	-	-	-	-	-	-	42,230,000
セミナー開催費	1,163,500	-	400,000	3,210,350	3,465,500	300,000	-	34,857,400	40,000	300,000	1,500,000	45,236,750
	46,596,700	5,702,150	7,622,259	27,960,343	12,065,140	11,477,085	16,821,200	63,726,160	5,688,222	2,894,000	1,500,000	202,053,259

１９９４年度	印刷製本費	交通費	雑役務費	資機材購入	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	一般小計
一般現地業務費	14,452,850	7,587,400	15,295,477	37,547,594	10,218,525	20,311,243	25,508,750	-	1,707,977	-	640,000	133,269,816
調査ネットワーク強化費	11,550	11,510,900	-	10,000	-	64,360	-	20,623,100	-	1,212,675	-	33,432,585
環境セミナー	2,540,000	31,287,000	-	-	-	950,000	-	-	-	-	-	34,777,000
技術交換	7,537,130	2,459,600	22,480	-	-	-	-	-	1,889,420	-	-	11,908,630
	24,541,530	52,844,900	15,317,957	37,557,594	10,218,525	21,325,603	25,508,750	20,623,100	3,597,397	1,212,675	640,000	213,388,031

１９９５年度	印刷製本費	交通費	雑役務費	資機材購入費	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	一般合計
一般現地業務費	14,110,575	7,473,340	21,867,365	37,980,180	25,834,384	23,120,092	24,392,554	510,000	1,407,800	-	-	156,696,290
調査ネットワーク強化費	-	10,298,210	1,274,450	-	-	-	-	15,826,600	-	-	-	27,399,260
技術需要成対策費	-	47,768,640	4,402,995	6,515,000	2,055,750	692,900	-	42,634,715	-	-	-	104,070,000
	14,110,575	65,540,190	27,544,810	44,495,180	27,890,134	23,812,992	24,392,554	58,971,315	1,407,800	-	-	288,165,550

１９９６年度	印刷製本費	交通費	雑役務費	資機材購入費	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	合計
一般業務費	1,836,300	2,984,175	24,542,496	6,038,000	3,144,875	10,806,555	25,305,375	-	1,195,000	-	-	75,852,976
調査ネットワーク強化費	50,000	22,941,000	10,614,022	423,050	-	2,927,725	-	28,467,000	-	-	-	65,422,797
技術需要成対策費	1,576,415	2,905,100	6,368,600	50,000	5,778,560	351,000	-	3,851,700	625,600	-		21,155,975
	3,462,715	28,830,475	41,525,118	6,511,050	8,923,435	14,085,280	25,305,375	32,318,700	1,820,600	-	-	162,431,748

92~96年度合計	印刷製本費	交通費	雑役務費	資機材購入費	消耗品費	通信運搬費	傭人費	域内旅費	会議費	借料	調査謝金	合計
一般業務費	34,322,925	24,694,815	71,832,605	111,067,767	50,186,099	67,701,680	92,574,879	29,378,760	14,094,414	5,234,500	640,000	501,728,444
調査ネットワーク強化費	42,291,550	44,750,110	11,888,472	433,050	-	2,992,085	-	64,916,700	-	1,212,675	-	168,484,642
技術需要成対策費	12,817,045	84,420,340	11,194,075	9,775,350	11,299,810	2,293,900	-	81,343,815	2,555,020	300,000	1,500,000	670,213,086
	89,431,520	153,865,265	94,915,152	121,276,167	61,485,909	72,987,665	92,574,879	175,639,275	16,649,434	6,747,175	2,140,000	1,340,426,172

＊１９９４年度の途中から会計システムに変更があり、セミナー関連は養成対策費と、技術普及並びに技術交換はネットワーク強化費に統合して計算した。

（8） 機材リスト

Water

	Name	Spec / Model_No	Q'TY	Maker
G-W-01a	DO Meter	Laboratory type / OM-14-L1	2	Horiba
G-W-01b	DO Meter	Portable type / UC-100M	2	Central
G-W-02a	Conductivity Meter	Laboratory type / ES-12	1	Horiba
G-W-02b	Conductivity Meter	Portable type / ES-14	2	Horiba
G-W-03	Salinity Analyzer,	/ UC-77	1	Central
G-W-04	TOC Analyzer,	/ TOC-500	1	Shimadzu
G-W-05	Oil Meter	Portable type / OCMA-220	1	Horiba
G-W-06	Residual chlorine Meter	Portable type / UC-5	1	Central
G-W-07a	Turbidity Meter	Portable type / #16800	1	Central
G-W-07b	Water Quality Analyzer	Portable type / DREL-2000	1	Central
G-W-07c	Mercury Analyzer	Portable type / HG-1	1	Hiranuma
G-W-10	Refracto Meter	/ S/Mill	1	Atago
G-W-12	Hirout Water Sampler	/ 8052-01001	2	Shibata
G-W-13	Van Dorn Water Sampler	/ 5026-C	2	Rigosha
G-W-14	Ekman Berge Dredge	/ 5141-AW	2	Rigosha
G-W-15	Core Sampler	/ #5166	1	Rigosha
G-W-16	Price's Elec. Current Meter	/ #5361	1	Rigosha
G-W-17	Jar Tester	/ JR-12S	2	Isuzu
G-W-18	Digital Colony Counter	/ CL-560	2	Shibata
G-W-20	Steam Sterilizer	/ PT-12S	1	Isuzu
G-W-21	Dry Sterilizer	/ SP-650	1	Advantec
G-W-22	Autoclave	/ AS-400	1	Shibata
G-C-13b	pH Meter	Laboratory type / F-11	1	Horiba
G-C-13c	pH Meter	Portable type / D-12	2	Horiba

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	Name	Spec / Model_No	QTY	Water Maker
G-C-14	Ion Meter	/ N-8M	1	Horiba
G-C-15	Mercury Analyzer	/ HG-1	1	Hiranuma
G-C-17	Metallurgical Microscope	/ BH2-UMA	1	Olympus
G-C-18a	Biological Microscope	/ BH2-RFCA	1	Olympus
G-C-18b	Stereo Microscope	/ SZH-111	1	Olympus
G-G-01c	Indicated Balance	(3kg) / MP-3000	1	Chyo
G-G-02a	Balance	(5kg) / MP-6000	1	Chyo
G-G-02b	Balance	(10kg) / MW-10K	2	Chyo
G-G-03a	Centrifuge	Table-top type / CT5L	2	Hitachi
G-G-03b	Centrifuge	High-speed type / CR20B2	1	Hitachi
G-G-04	Automatic Muffle Furnace	/ CMR-25K	1	Isuzu
G-G-05	Electric Oven	/ SPO-600	1	Shibata
G-G-06	Vacuum Drying Oven	/ VOR-400	1	Shibata
G-G-07	Incubator	/ MIR-152	1	Sanyo
G-G-08	Automatic BOD Incubator	/ MIR-252	1	Sanyo
G-G-09a	Rotary Evaporator	(Water cooling) / RE-111B-SW	1	Shibata
G-G-10	Water Circuration Bath	Low Temp. / C-301	1	Shibata
G-G-11	Standard Water Bath	Standard type / T-22L	1	Thomas
G-G-12	Thermistor Water Bath	with Thermistor / 10-842	1	Ikemoto
G-G-13	Fraction Culti Shaker	Fraction type / SF-2120	1	Advantec
G-G-14	Rotary Culti Shaker	Rotary type / TRC-50	1	Shibata
G-G-15	Multi Labo Shaker	/ SR-II-D	1	Taiteck
G-G-16	Homogenizer	/ AM-4	1	Nihon Seiki
G-G-17	Magnetic Stirrer	/ MGP-305	2	Shibata

Water

	Name	Spec / Model_No	QTY	Maker
G-G-18a	Ultra Sonic Cleaner	/ SU-3TH	1	Shibata
G-G-19	Water Distilling Appatus	/ GS-200	1	Advantec
G-G-20	Ice Cube Maker	/ IM-35K	1	Hoshizaki
G-G-21	Refrigerator/Freezer	/ SR-25VE	1	Sanyo
G-G-22	Ultrasonic Cleaner	for Pipette / PU-100	1	Shibata
G-G-23	Soxhlet Extraction Apparatus	/ WB-6S	1	Shibata
G-G-24	Automatic Dispenser	/ DL-4	1	Nichiryo
G-G-26a	Automatic Pure Water System	/ GSH-500	1	Advantec
G-G-27	Peristaltic Pump	/ TPC-5	2	Shibata
G-G-28	Aspirator	/ WJ-15	1	Shibata
G-G-29	Freeze Storage Chamber	/ MDF-435	1	Sanyo
G-G-30	Cold Strage Chamber	/ MPR-510	1	Sanyo
G-G-31	Blender	V type / 1101-30	1	Yoshida
G-G-33	Mixer	/ 7011H	2	Daiichi-Rika
G-G-35	Hot Plate	small size / NP-6	1	Shibata
G-G-36	Hot Plate	Large size / HPS-045	1	Sanyo
G-G-37	Pipette Cleaner	Siphone type / 405-22-60-05	1	TGK
G-G-38	Stopwatch	/ SVAC007	1	Seiko
G-G-42	Mantle Heater	Small / SAFR-2	3	Shibata
G-G-43	Mantle Heater	Large / SAFR-10	3	Shibata
G-G-45	Mini Pump	/ MP-301CFT	3	Shibata
G-C-02a-1	HP Liquid chromatograph	UV/FL / M501	1	Waters
G-C-02b	HP Liquid chromatograph	UV/FL(Gradient) / L-6200	1	Hitachi
G-C-03	Ion chromatograph	/ QIC	2	Dionex

Water

	Name	Spec / Model_No	QTY	Maker
G-C-05b	Spectrophotometer(UV/VIS)	Double type ./ U-2000	2	Hitachi
G-G-51a	Draft Chamber	/ DC-112E/0.5	2	Dalton
G-W-01a	DO Meter	Laboratory type / OM-14-L1	3	Horiba
G-W-01b	DO Meter	Portable type / UC-100M	3	Central
G-W-02a	Conductivity Meter	Laboratory type / ES-12	2	Horiba
G-W-02b	Conductivity Meter	Portable type / ES-14	2	Horiba
G-W-03	Salinity Analyzer,	/ UC-77	1	Central
G-W-06	Residual chlorine Meter	Portable type / UC-5	1	Central
G-W-10	Refracto Meter	/ S/Mill	1	Atago
G-W-12	Hirout Water Sampler	/ 8052-01001	2	Shibata
G-W-13	Van Dom Water Sampler	/ 5026-C	2	Rigosha
G-W-14	Ekman Berge Dredge	/ 5141-AW	2	Rigosha
G-W-15	Core Sampler	/ #5166	1	Rigosha
G-W-16	Price's Elec. Current Meter	/ #5361	1	Rigosha
G-W-18	Digital Colony Counter	/ CL-560	2	Shibata
G-W-20	Steam Sterilizer	/ PT-12S	1	Isuzu
G-W-21	Dry Sterilizer	/ SP-650	1	Advantec
G-W-22	Autoclave	/ AS-400	1	Shibata
G-C-13b	pH Meter	Laboratory Type / F-11	1	Horiba
G-C-13c	pH Meter	Portable type / D-12	3	Horiba
G-C-14	Ion Meter	/ N-8M	2	Horiba
G-C-16	Mercury Analyzer	/ HG-1	1	Hiranuma
G-C-18a	Biological Microscope	/ BH2-RFCA	1	Olympus
G-C-18b	Stereo Microscope	/ SZH-10	3	Olympus

Water

	Name	Spec / Model_No	QTY	Maker
G-G-01c	Indicated Balance	(3kg) / MP-3000	2	Chyo
G-G-02a	Balance	(5kg) / MP-6000	1	Chyo
G-G-02b	Balance	(10kg) / MW-10K	1	Chyo
G-G-03a	Centrifuge	Table-top type / CT5L	1	Hitachi
G-G-04	Automatic Muffle Furnace	/ CMR-25K	1	Isuzu
G-G-05	Electric Oven	/ SPO-600	1	Shibata
G-G-07	Incubator	/ MIR-152	1	Sanyo
G-G-08	Automatic BOD Incubator	/ MIR-252	1	Sanyo
G-G-09a	Rotary Evaporator	(Water cooling) / RE-111B-SW	1	Shibata
G-G-10	Water Circuration Bath	Low Temp. / C-301	1	Shibata
G-G-11	Standard Water Bath	Standard type / T-22L	1	Thomas
G-G-12	Thermistor Water Bath	with Thermistor / 10-842	1	Ikemoto
G-G-14	Rotary Culti Shaker	Rotary type / TRC-50	1	Shibata
G-G-15	Multi Labo Shaker	/ SR-II-D	1	Taiteck
G-G-16	Homogenizer	/ AM-4	1	Nihon Seiki
G-G-17	Magnetic Stirrer	/ MGP-305	2	Shibata
G-G-18a	Ultra Sonic Cleaner	/ SU-3TH	1	Shibata
G-G-19	Water Distilling Appatus	/ GS-200	1	Advantec
G-G-20	Ice Cube Maker	/ IM-35K	1	Hoshizaki
G-G-21	Refrigerator/Freezer	/ SR-25VE	1	Sanyo
G-G-22	Ultrasonic Cleaner	for Pipette / PU-100	1	Shibata
G-G-23	Soxhlet Extraction Apparatus	/ WB-6S	1	Shibata
G-G-26a	Automatic Pure Water System	/ GSH-500	1	Advantec
G-G-27	Peristaltic Pump	/ TPC-5	1	Shibata

	Name	Spec / Model_No	QTY	Maker
G-G-28	Aspirator	/ WJ-15	1	Shibata
G-G-30	Cold Strage Chamber	/ MPR-510	1	Sanyo
G-G-33	Mixer	/ 7011H	2	Daiichi-Rika
G-G-35	Hot Plate	small size / NP-6	1	Shibata
G-G-36	Hot Plate	Large size / HPS-045	1	Sanyo
G-G-37	Pipette Cleaner	Siphone type / 405-22-60-05	2	TGK
G-G-38	Stopwatch	/ SVAC007	1	Seiko
G-G-42	Mantle Heater	Small / SAFR-2	1	Shibata
G-G-43	Mantle Heater	Large / SAFR-10	1	Shibata
G-G-45	Mini Pump	/ MP-301CFT	2	Shibata
G-C-02a-2	HP Liquid Chromatograph	UV/FL / L-6000	2	Hitachi
G-C-05a	Spectrophotometer(UV/VIS)	Single type / U-1100	3	Hitachi
G-C-05b	Spectrophotometer(UV/VIS)	Double type / U-2000	3	Hitachi
G-G-51	Draft Chamber	/ DC-112E/0.5	1	Dalton
P93-W-001	Mercury Analyzer	AMD Series	1	
P93-W-007	Flow Meter	Ditto	5	
P93-W-022	Digital DO Meter	YSI 58	2	
P93-W-024	pH Ion Analyzer	Orion EA 940	1	
P93-W-053	Fl Ion Steam Distillation Apparatus	Type 2	2	
P93-W-056	Cyan Ion Distillation Apparatus	SPC Joint	3	
P93-W-064	Desicator	Air Aging Box Type AD-3	3	
P94-W-023	Cyonide Ion Distilling Apparatus	Set Type I (T/S K0102)	5	
P94-W-024	Fluoride Ion Distillation Apparatus	Type II	2	
P94-W-072	Aspirator	PP with non return Valve	5	

Water

	Name	Spec / Model_No	QTY	Maker
P94-W-152	Rotary Vacuum Evaporator	R-114/V	2	
P94-W-153	Ice Machine	Cap. 56 kg/day model N-5	1	
P94-W-154	Aspirator	B - 169	2	
P94-W-155	Reverse Osmosis Water Purifier	RO-PureBench-mounted	1	
P94-W-156	Vacuum Pump	DOA-P 104 BN Portable	1	
P94-W-157	Refrigerated Showcase	for Medical	2	
P94-W-158	Cooler	ECS 50ss Temp.-50c—0c	1	EYELA
P94-W-159	Water Bath	SB-16,445*250*126	2	
P94-W-160	Water Bath	UA-11N,450*350*300 / SV	2	shibata
P94-W-161	Stirrer	MDC2NS, 40—1200rpm	3	
P94-W-162	Magnetic Stirrer with Heater	SP-72220-26, 18x18 cm	3	
P94-W-163	Peristaltic Pump	MP-6001 A	1	
P94-W-164	Peristaltic Pump	RP-5	1	
P94-W-165	Peristaltic Pump	RP-30	1	
P94-W-166	Glass Pump	GP-16	1	
P94-W-167	Flow Meter (Water)	F 11-163-77	1	
P94-W-168	Flow Meter (Water)	F-11-163-75 A	1	
P94-W-169	Strong Shaker	Bigger Blle M-73530-26	2	
P94-W-170	Hot Plate	HPA-2240M-26	1	
P94-W-171	Water Bath	WB-6S / WB-6S	1	
P94-W-172	Magnetic Stirrer	S-46410-26, 10x10 cm	5	
P94-W-173	ECD Detector	for Shimadzu GC	2	
P94-W-174	ECD Detector	for Hewlett Packard GC	2	
P94-W-236	Jack Laboratory	10x10 cm	5	

	Name	Spec / Model_No	QTY	Maker
P94-W-237	Jack Laboratory	20x20 cm	5	
P94-W-238	Oil (Vacumm Pump)	50M 4l	3	
P94-W-292	Piston Pump, 2400LG		1	
P95-W-001	Gas Chromatograph System	GC-14BsE, Complete Set, Option, Data Loger. /	1	Shimadzu
P95-W-033	Dispenser	Capacity 2-10 ml	20	Fortuna
P95-W-034	Dispenser	Capacity 10-50 ml	20	Fortuna
P95-W-059	Stop Watch	Laboratoryuse	2	
P95-W-069	Infrared Hot Plate	IR-6000	2	Iwaki
P95-W-089	Ultrasonic cleaner	Tankcapacity 20.8 liter,up to 60oC with	1	Yamato
96-W-122	COD reactor	COD Reactor, 115/230v / 45600-02	3	HACH
96-W-125	Digital buret	Burette Digital II, 25 ml	2	Brand
96-W-126	Digital timer		7	Tanita
96-W-127	Dispenser	5000 ฑl, / Disp 4028-590	2	Iwaki
96-W-128	Dispenser	200 - 1000 ฑl / Disp 4007-040	2	Iwaki
96-W-129	DO meter	code 2 m / CM-14	3	Horiba
96-W-130	Finnpipette Digital	Finnpipette Digital, 200-1000 ฑl	2	Labsystem
96-W-131	Finnpipette Digital	Finnpipette Digital, 1-6 ml	2	Labsystem
96-W-132	Finntip, dispenser	75pcs/box / FIN TIP-62	2	Iwaki
96-W-133	Finntip, dispenser	108pcs/box / FIN TIP-61	4	Iwaki
96-W-134	Flow meter	Model : TFD-IL / TFD-IL	1	EYELA
96-W-140	Hot plate	/ Iwaki IR 6000	1	Iwaki
96-W-141	Hot Plate & Stirrer	220v, max 510-C, 100 - 1500rpm / PC-320	2	Iwaki
96-W-144	Magentic stirrer	220v, 100 - 1000rpm / PC-141	2	Iwaki
96-W-149	PH meter	/ D - 12	3	Horiba

Water

	Name	Spec / Model_No	Q'TY	Maker
96-W-151	Stop watch	Laboratoryuse	1	
96-W-154	Water bath	95-C, AC 200V, 12A, W110 x 70(H) mm /	1	Shibata

Air

	Name	Spec / Model_No	QTY	Maker
G-A-01a	SO2 Analyzer	Portable type / APSA-350E	1	Horiba
G-A-02a	NOx Analyzer	Portable type / APNA-350	1	Horiba
G-A-03	CO Analyzer	Portable type / APMA-350E	1	Horiba
G-A-04	HC Analyzer	Portable type / APHA-350E	1	Horiba
G-A-06	Vehicle Emission Gas Analyzer	/ MEXA-574GE	1	Horiba
G-A-07	Auto Gas Bumer Exhost Gas Analyzer	/ COPA-2000	1	Horiba
G-A-08	High Volume Air Sampler	/ HVC-1000N	3	Shibata
G-A-09	Low Volume Air Sampler	/ L-30	3	Shibata
G-A-10	Andersen Particle Fract. Air Sampler	/ AN-200	2	Shibata
G-A-11	Deposit Guage	/ 8008-04S	3	Shibata
G-A-13	Wind System	Portable type / #15063	2	OSK
G-A-14	Thermo-Hydrograph	/ 3-1120-11	3	Isuzu
G-A-15	Recording Rain Guage	Siphon type / 3-1561-01	2	Isuzu
G-A-16	Precision Gas Detector	/ 8060-4	2	Shibata
G-A-17	Solar Radiation Meter	/ S-6	1	OSK
G-A-18	Black Fume Meter	Portable type / DSM-10	1	Banzai
G-A-19	Gas Sampler	Kitagawa Type / AP-1	2	Shibata
G-A-21	Stack Sampler	/ NG series	2	Nigorigawa
G-A-22	Gas Phase Diluter	/ SGD-SC5L	2	STEC
G-A-23	Zero Gas Generator	/ SGPU-22	2	STEC
G-A-24	Standard Gas Generator	/ SGGU-6000	2	STEC
G-A-25	Vacuum Sampler / Vacuum Pump Set	/ 8010-10000	2	Shibata
G-A-27	Oil Pump	/ G-50S	3	Shinku
G-A-28	Rotary Vacuum Pump	/ RC-20SC	2	Hitachi

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	Name	Spec / Model_No	Q'TY	Maker
G- A-29	Gas Meter	Dry Type / DC-5C	3	Shibata
G- A-30	Gas Meter (10 Lit)	Wet Type / W-NK-1B	3	Shibata
G- A-31	Standard Vultage Generator	/ 2554-00	1	YEW
G- A-32	Handy Sampler for Gas Sampling	/ G-1/TS-3	3	Shibata
G- A-33	Standard Ozone Gas Generator	/ OZGU-75	1	STEC
G- A-34	Hydrogen Generator	/ OPGU-1500A	4	STEC
G- A-35	Osilloscope	/ 3060D	1	Leader
G- A-36	Air Purifier	for Lab.Atmospher / UDP-10H	3	Hitachi
G- A-37	Electric Desiccator	/ B-240	3	Shibata
G- A-38	Sequential Timer	/ LT-2	1	Shibata
G- A-39	Oxgen Analyzer	/ POT-101	1	Shimadzu
G- C-13b	pH Meter	Laboratory Type / F-11	1	Horiba
G- G-17	Magnetic Stirrer	/ MGP-305	2	Shibata
G- G-18a	Ultra Sonic Cleaner	/ SU-3TH	1	Shibata
G- G-25	Flow meter	/ 2833-01	2	Shibata
G- G-27	Peristaltic Pump	/ TPC-5	1	Shibata
G- G-28	Aspirator	/ WJ-15	1	Shibata
G- G-37	Pipette Cleaner	Siphone type / 405-22-60-05	2	TGK
G- G-38	Stopwatch	/ SVAC007	1	Seiko
G- G-42	Mantle Heater	Small / SAFR-2	1	Shibata
G- G-43	Mantle Heater	Large / SAFR-10	1	Shibata
G- G-51a	Draft Chamber	/ DC-112E/0.5	1	Dalton
G- A-05b	Data Logger	/ Special	3	DKK
G- A-05c-1	Automatic SO2 Analyzer	Dry type / GFS-32(S)	2	DKK

	Name	Spec / Model_No	QTY	Maker
G-A-05c-2	Automatic SO2 Analyzer	Wet type / GRH-72M(S)	1	DKK
G-A-05d-1	Automatic NOx Analyzer	Dry type / GLN-32(S)	2	DKK
G-A-05d-2	Automatic NOx Analyzer	Wet type / GPH-74M(S)	1	DKK
G-A-05e	Automatic CO Analyzer	/ GIA-72M(S)	3	DKK
G-A-05f	Automatic Hydrocarbon Analyzer	/ GHC-75M(S)	3	DKK
G-A-05g	Automatic Particulate Analyzer	/ DUB-32(S)	3	DKK
G-A-05h-1	Automatic Ozone Analyzer	/ GUX-32(S)	2	DKK
G-A-05h-2	Automatic Oxidant Analyzer	/ GXH-32M(S)	1	DKK
G-A-05i	Weather Observation Instrument	/ Special	3	Ogasawara
G-A-01b	SO2 Analyzer	Portable type / GRH-72M	1	DKK
G-A-02b	NOx Analyzer	Portable type / GPH-74M	1	DKK
G-A-03	CO Analyzer	Portable type / APMA-350E	1	Horiba
G-A-04	HC Analyzer	Portable type / APHA-350E	1	Horiba
G-A-06	Vehicle Emission Gas Analyzer	/ MEXA-574GE	1	Horiba
G-A-07	Auto Gas Bumer Exhost Gas Analyzer	/ COPA-2000	1	Horiba
G-A-08	High Volume Air Sampler	/ HVC-1000N	3	Shibata
G-A-09	Low Volume Air Sampler	/ L-30	3	Shibata
G-A-12	Dust Jar	Portable type / 8008-05	3	Shibata
G-A-13	Wind System	Portable type / #15063	2	OSK
G-A-14	Thermo-Hydrograph	/ 3-1120-11	3	Isuzu
G-A-16	Precision Gas Detector	/ 8060-4	2	Shibata
G-A-18	Black Fume Meter	Portable type / DSM-10	1	Banzai
G-A-19	Gas Sampler	Kitagawa Type / AP-1	2	Shibata
G-A-21	Stack Sampler	/ NC series	2	Nigorigawa

	Name	Spec / Model_No	QTY	Maker
G-A-25	Vacuum Sampler / Vacuum Pump Set	/ 8010-10000	2	Shibata
G-A-27	Oil Pump	/ G-50S	3	Shinku
G-A-28	Rotary Vacuum Pump	/ RC-20SC	2	Hitachi
G-A-30	Gas Meter (10 Lit)	Wet Type / W-NK-1B	3	Shibata
G-A-32	Handy Sampler for Gas Sampling	/ G-1/TS-3	3	Shibata
G-A-36	Air Purifier	for Lab.Atmospher / UDP-10H	3	Hitachi
G-A-37	Electric Desiccator	/ B-240	3	Shibata
G-A-38	Sequential Timer	/ LT-2	1	Shibata
G-C-13b	pH Meter	Laboratory Type / F-11	1	Horiba
G-G-17	Magnetic Stirrer	/ MGP-305	2	Shibata
G-G-25	Flow meter	/ 2833-01	2	Shibata
G-G-27	Peristaltic Pump	/ TPC-5	1	Shibata
G-G-28	Aspirator	/ WJ-15	1	Shibata
G-G-38	Stopwatch	/ SVAC007	1	Seiko
G-G-42	Mantle Heater	Small / SAFR-2	1	Shibata
G-G-43	Mantle Heater	Large / SAFR-10	1	Shibata
G-G-51a	Draft Chamber	/ DC-112E/0.5	1	Daiton
P93-A-001	Ozone Analyzer Ultra Violet Ray	HoribaAPOA-350E	1	
P93-A-005	Portable SPM Meter	Shibata 7020-01	1	SIBATA
P93-A-006	SO2 Auto Analyzer (Conductivity	DKK GRH-76M-1	1	
P93-A-007	CO Auto Analyzer (NDIR Method)	HoribaAPMA-350E	1	
P93-A-008	NOx Auto Analyzer (Saltzman Method)	DKK GPH-74M-1	1	
P93-A-009	Oxydants Auto Analyzer (NBRI Method)	DKK GXH-73M-1	1	
P93-A-010	High Volume Air Sampler	Kimoto 121FT	3	KIMOTO

	Name	Spec / Model_No	QTY	Maker
P93-A-010-	Orifice Calibrator	CB-10	1	
P93-A-011-	Low Volume Air Sampler	Shintaku FKS2	5	SINTAKU
P93-A-012	Standard Gas Generator (P-Tube	GL Science PD-1B	1	GASTEC
P93-A-013-	Zero Gas Generator	Kimoto RG-30A	1	KIMOTO
P93-A-013-	Pump	-	1	
P93-A-015	Wet Type Gas Meter	Sinagawa 1 l /rev. W-NK-1A	2	SHINAGAW
P93-A-016	Dry Type Gas Meter	Shinagawa 1 l /rev. DC-2C (5 ~ 2000 l/h)	2	SHINAGAW
P93-A-017-	Pure Water Generator	Yamato WL-21	3	
P93-A-018	Diaphragm Pump	Iwaki 20 l/m , YD-201-PT	3	Iwaki
P93-A-019	Diaphragm Pump	Iwaki 30 l/m , YD-201-PN	2	Iwaki
P93-A-020	Diaphragm Pump	Iwaki 50 l/m , YD-251-PT	2	Iwaki
P93-A-021	Stack Gas Sampler	Ishibashi NOS-7000+GSC-2000	1	ISHIBASHI
P93-A-022	Thermal Couple	Nigorigawa NG-7	1	NIGORIKA
P93-A-023	High Temperature Type Anemomaster	Kanomax 6161-DC	1	
P93-A-024	Vacume Pump (Oil Rotary)	Hitachi VR 16W	1	Hitachi
P93-A-025	Coolant (Electronic Handy Cooler)	Yamato BD-36	1	Yamato
P93-A-026	Mini Refrigerator	R-37D2MS	4	Hitachi
P93-A-027	Thermal Constant Flow Meter	Kojima Blux 0 -10 l MC-1A	2	
P93-A-028	Thermal Constant Flow Meter	Kojima Blux 0 -1 l MC-1A	1	
P93-A-029	Electronic Table Balance	3100 g / 0.1 g PB-3002	2	Mettler
P93-A-030	Table Type Conductivity Meter	Horiba DS-14	2	
P93-A-031	Automatic Recording Temp-Humid	Digital Recording YH-33R	1	
P93-A-032-	Handy Air Sampler	Kimoto HS-7	8	
P93-A-033	Spectrophotometer	ShimadzuSP-20A	2	

	Name	Spec / Model_No	QTY	Maker
P93-A-034	Water Bath	Yamato BS-45	2	Yamato
P93-A-035-	Ultrasonic Washer	AW-31	1	Yamato
P93-A-035-	Ultrasonic Washer	Yamato 2200J4	1	Yamato
P93-A-037	Electronic Balance For Dust Tube	AE-240	1	Mettler
P93-A-038	Piro Timer	Iuchi MT-604W (61-455-01)	3	
P93-A-043-	Digital Flow Meter	SEF-21+PAC-1J (Cable SC-JF-2M)	2	
P93-A-043-	Digital Flow Meter	SEF-1N	2	
P93-A-043-	Digital Flow Meter	SEF-1N+PAC-1F	1	
P93-A-044	Hot Stirrer	Yamato MH-81	2	
P93-A-045	Electronic Wind Dir & Speed Meter	Ohtakeihin 111-DG-533/112 (Cable 20 m)	1	
P93-A-046	Diffusion Sampler	Gaspack	50	
P93-A-048	DO Meter	Minolta UM-1	1	
P93-A-049	Illuminance Meter	Minolta T-1H	1	
P93-A-050	Ice Block Meter	Hitachi RI-152CA	1	
P93-A-051	Float Type Gas Meter	Kojima 10 ~ 100 ml/min	2	
P93-A-052	Float Type Gas Meter	Kojima 0.1 ~ 1 l/min	2	
P93-A-053	Float Type Gas Meter	Kojima 0.2 ~ 2 l/min	2	
P93-A-054	Float Type Gas Meter	Kojima 1.0 ~ 10 l/min	2	
P93-A-055	Float Type Gas Meter	Kojima 3.0 ~ 30 l/min	2	
P93-A-057	Mini Pump	Shibata MP-302CFT (Ni-cd Battery-BC-5)	2	Shibata
P93-A-058	Electric Generator	Honda EG-1400X	1	
P93-A-059	Closed Type Manometer	Nigorigawa NOx Sampling , NOx Vacume Type	2	
P93-A-060	Closed Type Manometer	Nigorigawa NOx Sampling , U Type Manometer	2	
P93-A-063	Dial Micrometer	Iuchi D-20T-(68-167-02) 0 ~ 20 mm	2	

	Name	Spec / Model_No	QTY	Maker
P93-A-067	Ice Box	Iuchi 10 l	2	
P93-A-068	Ice Box	Iuchi 20 l	2	
P93-A-076	Ribbon Heater	Nigorigawa NG-14 (40 mm × 1 m)	2	
P93-A-077	Metal Aspirator	Nishizawa	10	
P93-A-083	Bolt Nut Washer Set	Nakajima Neji φ3, 4, 5, 6, 8, 10, 12, 16 mm	1	
P93-A-091	Fluoride Distillation Apparatus	Shibata 8133-12	1	
P93-A-121	High Vacume Grace	Iuchi 56-375-01 (50 g)	5	
96-A-001	Automatic Ozone Analyzer	APOA 360	1	Horiba
96-A-002	Standard Ozone Generator	OZ - GU - S	1	Stec
96-A-003	Recorder for A-002	RU - 1800 U	1	Horiba
96-A-019	Auto Dispenser	Auto Macro 50 ml	1	Sibata
96-A-022	Refrigerated shouwcase	RC-M501, 2~14<	1	Tokyo
96-A-029	Diaphragm Pump	Type DAP-15	3	Sinkukikou
96-A-030	Diaphragm Pump	Type DAP-30	2	Sinkukikou
96-A-031	Quantitative Pippeter/pipette controller	1 ml, pipetus x 50 times	2	Iwaki
96-A-040	U-Tube Manometer	NG-5U, 300 mm with stand	3	Nigorikawa
96-A-041	Ribbon Heater	NG-14, 40 x 1000 mm	3	Nigorikawa
96-A-042	Vacume Manometer	NG-N-M56	3	Nigorikawa
96-A-046	Digital Dust Indicator	P-5,H-type	1	Nigorikawa

Toxic

	Name	Spec / Model_No	QTY	Maker
G-T-01	Milling Machine	/ 1029-C	1	Yoshida
G-T-02	Sieving Machine(Sieve Shaker)	/ SS-93	1	Everwell
G-T-03	Compact Balance	/ MK-2000B	1	Chyo
G-T-04	Platform Scale	/ MW-150K	1	Chyo
G-T-05	Hot Air Drying Oven	/ SOD-600	1	Shibata
G-T-06	Flash Point Tester	Automatic Tag Closed Cup / 200-ESR	2	Rigosha
G-T-07	Copper Corrosion Tester	/ 660-10T	2	Rigosha
G-T-08	Elemental Analysis Instrument	(CHN) / MT-5	1	Yanaco
G-T-09	Adibatic bomb Calorimeter	/ (1013B ?)	2	Yoshida
G-T-13	Blender	/ BL-2	1	Nihon Seiki
G-C-13b	pH Meter	Laboratory Type / F-11	1	Horiba
G-G-05	Electric Oven	/ SPO-600	1	Shibata
G-G-06	Vacuum Drying Oven	/ VOR-400	1	Shibata
G-G-09b	Rotary Evaporator	(Ice Cooling) / RE-111C-SW	1	Shibata
G-G-11	Standard Water Bath	Standard type / T-22L	1	Thomas
G-G-15	Multi Labo Shaker	/ SR-II-D	1	Taiteck
G-G-17	Magnetic Stirrer	/ MGP-305	2	Shibata
G-G-21	Refrigerator/Freezer	/ SR-25VE	1	Sanyo
G-G-22	Ultrasonic Cleaner	for Pipette / PU-100	1	Shibata
G-G-23	Soxhlet Extraction Apparatus	/ WB-6S	1	Shibata
G-G-26a	Automatic Pure Water System	/ GSH-500	1	Advantec
G-G-26b	Ultra Pure Water System	/ CPW-200	1	Advantec
G-G-27	Peristaltic Pump	/ TPC-5	1	Shibata
G-G-28	Aspirator	/ WJ-15	1	Shibata

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	Name	Spec / Model_No	QTY	Maker
G-G-35	Hot Plate	small size / NP-6	1	Shibata
G-G-37	Pipette Cleaner	Siphone type / 405-22-60-05	2	TGK
G-G-42	Mantle Heater	Small / SAFR-2	1	Shibata
G-G-43	Mantle Heater	Large / SAFR-10	1	Shibata
G-G-51b	Draft Chamber	/ DC-182E	1	Dalton
G-G-53	Heavy Metal Waste Treatment	/ LIP-50M	1	Dowa
G-T-01	Milling Machine	/ 1029-C	1	Yoshida
G-T-02	Sieving Machine(Sieve Shaker)	/ SS-93	1	Everwell
G-T-03	Compact Balance	/ MK-2000B	1	Chyo
G-T-04	Platform Scale	/ MW-150K	1	Chyo
G-T-05	Hot Air Drying Oven	/ SOD-600	1	Shibata
G-T-06	Flash Point Tester	Automatic Tag Closed Cup / 200-ESR	2	Rigosha
G-T-07	Copper Corrosion Tester	/ 660-10T	2	Rigosha
G-T-08	Elemental Analysis Instrument	(CHN) / MT-5	1	Yanaco
G-T-09	Adibatic bomb Calorimeter	/ (1013B ?)	2	Yoshida
G-T-13	Blender	/ BL-2	1	Nihon Seiki
G-C-13b	pH Meter	Laboratory Type / F-11	1	Horiba
G-G-04	Automatic Muffle Furnace	/ CMR-25K	1	Isuzu
G-G-05	Electric Oven	/ SPO-600	1	Shibata
G-G-09b	Rotary Evaporator	(Ice Cooling) / RE-111C-SW	1	Shibata
G-G-11	Standard Water Bath	Standard type / T-22L	1	Thomas
G-G-15	Multi Labo Shaker	/ SR-II-D	1	Taiteck
G-G-17	Magnetic Stirrer	/ MGP-305	2	Shibata
G-G-18a	Ultra Sonic Cleaner	/ SU-3TH	1	Shibata

Toxic

	Name	Spec / Model_No	QTY	Maker
G-G-19	Water Distilling Appatus	/ GS-200	1	Advantec
G-G-21	Refrigerator/Freezer	/ SR-25VE	1	Sanyo
G-G-22	Ultrasonic Cleaner	for Pipette / PU-100	1	Shibata
G-G-23	Soxhlet Extraction Apparatus	/ WB-6S	1	Shibata
G-G-26a	Automatic Pure Water System	/ GSH-500	1	Advantec
G-G-27	Peristaltic Pump	/ TPC-5	1	Shibata
G-G-28	Aspirator	/ WJ-15	1	Shibata
G-G-35	Hot Plate	small size / NP-6	1	Shibata
G-G-37	Pipette Cleaner	Siphone type / 405-22-60-05	2	TGK
G-G-38	Stopwatch	/ SVAC007	1	Seiko
G-G-42	Mantle Heater	Small / SAFR-2	1	Shibata
G-G-43	Mantle Heater	Large / SAFR-10	1	Shibata
G-G-51	Draft Chamber	/ DC-112E/0.5	1	Daiton
G-G-53	Heavy Metal Waste Treatment	/ LIP-50M	1	Dowa
P94-T-073	(Cooling) Aspirator		1	Shibata
P94-T-077	Rotary Vacuum Evaporator	R-114/V	3	
P94-T-103	Heating Magnetic Stirrer	SP-72220-26, 18X18 CM	2	
P94-T-104	Balance	PB-3002, 3100g/0.01g, electronic	1	Mettler
P94-T-108	Ultrasonic pipette washer	AW-31	1	Yamato
P94-T-109	Ultrasonic Cleaner	(5200-J1)AU-300C / AU-300C	1	Aiwa
P95-T-024	Electronic Balance	AEG-220, 220g/0.1 mg	1	Shimadzu
P95-T-025	Atomic Absorption Spectrometer	Flame, Shimadzu 6601 with attachment	1	Shimadzu
P95-T-026	Hydride Generator	for AAS, Shmadzu HVG-1	1	Shimadzu
P95-T-027	Cold Show Case	300L, 2-10C, Sanden	1	Derby

Toxic

	Name	Spec / Model_No	QTY	Maker
P95-T-033	Draft Chamber	1.8 m width, incl. installation, shibata sci.	1	(Shibata)
P95-T-109	Hair drier	/ CH103	1	Crown
P95-T-123	Ekman Berge Sampler	15x15 cm, Rigosha	1	Rigosha
P95-T-124	Centrifuge	5000 rpm, 250 ml	1	kubota
P95-T-125	Mercury Analysis System	Model AMD + Pen-recorder (10mV)	1	Nippon
P95-T-128	Zero head space (ZHE) extractor	for TCLP, Air phenumatic(50PSD), YT32DRAHW	1	Millipore
P95-T-173	Shaker	One side, holder for separatory funnels	1	Kimoto-rika
96-T-001	Draft chamber w/ Blower	Width 18 m / DF - 17 RE,	1	Dalton
96-T-005	Water Bath, Const. temp.	Amb.+5~80. C, 70 liter, BK 5 type	1	Yamato
96-T-011	Hot Plate	60 x 30 cm	2	Thermolyne
96-T-012	Heater (for 6 flasks)	for Semimicro Kjeldahl digestion, 6-unit, SE-6	2	Shibata
96-T-013	Water Purifiers	0.5 L/min (WQ 500 Yamato)	1	Yamato
96-T-061	Conductivity detector	L-3720, cat. 060-0083	1	Hitachi
96-T-068	Air compressor		2	Hitachi
96-T-069	Test tube mixer	TM 152	3	Iwaki
96-T-070	Stirrer	Variable, max 1 mix 2	2	Thermolyne
96-T-073	Seaving machine	A5-2000incl CV,btm	1	Retch
T-***	Lab-Aire Glass Dryer	220v	2	

（9） 各種機材・機器の使用および測定等における習熟度についての カウンターパートによる自己評価

Table 表－6－1 Water Pollution(水質汚濁)

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
1. Atomic Absorption Spectrophotometer	操作については、AとB合わせ7割のC／Pが一応マスターしたと評価している。メンテナンスについてはエージェントに任せた方が良いであろう。70% of staffs are A or B operators in their self evaluation. However, it will be reasonable that the maintenanece will be handled by agents.	7	5	2	1	3	11	2	5	4
2. Gas Chromatograph	特殊な項目の分析に使うだけなので、3～4人が使えれば良い、Aマークにして使える程度までレベルアップが必要。The opportunity to use this equipment in water laboratory is limited for 3 or 4 staffs and this number is enough for operators. But they need to be A level operators.	1	6	1	0	3	5	3	3	2
3. Capillary Column Gas Chromatograph		1	3	4	0	3	5	2	4	0
4. Packed Column Gas Chromatograph	水質ラボで使っていないので回答者が少ない。There is no chance to use in water laboratory.	0	1	3	0	0	4	1	4	1
5. Ion Chromatography	水質分析には汎用性が高いので8人以上はAマークで操作できるようにすべき。The opportunity to use this equipment is quite high in water analysis and more than 8 staffs need to be A level operators.	1	6	1	0	3	5	2	4	1

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
6. Gas Chromatograph Mass Spectrometer	水質ラボで使っていない。There is no chance to use in water laboratory	0	1	2	0	0	3	0	2	2
7. Mercury Analyzer	操作については6名がAマークで満足すべき状態だが、メンテナンスについては3名以上Aマークが必要。Six A level operators are satisfactory level but more than three should be A level in maintenance.	6	1	3	1	5	7	2	2	6
8. HPLC	水質ラボで使っていない。There is no chance to use in water laboratory	1	3	3	0	2	5	1	4	1
9 X-ray Fluorescence Spectrophotometer	水質ラボで使っていない。There is no chance to use in water laboratory	0	2	0	0	1	1	0	1	1
10. UV/VIS Spectrophotometer	汎用性が高いので7割以上がAマークで操作できるようになったことは満足すべき状態。メンテナンスは難しいものではないので、少しのトレーニングで5～6名はAマークとなろう。The opportunity to use this equipment is so high that more than 70% of A level operators is satisfactory level. A level maintenance will be possible for 5 or 6 staffs with a little training opportunities, because it is not so difficult.	13	2	0	1	9	4	3	3	7

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
11. TOC Meter	４名がＡマークで操作できるのは満足すべき状態。It is satisfactory level that there are 4 A level operators.	4	5	1	1	3	6	2	3	4
12. Ion Meter	水質ラボで使っていない。There is no chance to use in water laboratory	2	3	1	0	2	4	0	3	2
13. Field Sampling	６名がＢマークとは意外な結果。It is unexpected that there are still six in B level.	7	6	0	6	5	1	5	4	0
14. Measurement of Suspended Solid	最も簡単な分析の一つだがＢマークにまだ数名いるのは意外な結果。One of the most simple analysis. It is unexpected that there are still three in B level.	12	3	0	8	4	1	7	3	0
15. Measurement of Turbidity		11	3	0	7	3	3	4	5	1
16. Analysis of Normal Hexane Extract		10	3	2	4	4	2	3	5	2
17. Measurement of Coliform Bacteria	微生物専攻が９名もいるのに、Ａマークで操作できるのが２名とは意外な結果。全員にトレーニング済みだが日常業務として仕事を行っていないため、このような結果になったものと思われる。Only two among nine biologists in water laboratoryin answered as A level operator was unexpected result. This may be caused by the reason that this measurement has not been executed as routine job after technology transfer was finished.	2	9	3	1	4	5	1	4	4
	Comments on	Self Evaluation								

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Name of Work/Instrument	Evaluation of Present Situation by JICA Expert	Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
18. Data Analysis	今後の課題。Further effort will be necessary.	3	2	4	1	0	3	2	2	4
19. Personal Computer	ワープロとしては大部分のC／Pが使える。 Almost staffs use computer as word processor.	6	9	0	0	4	5	0	0	2

Table 表－5－2　Udara（大気汚染）

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
1. Automic Ambient Analyzer	A申告については、Bが妥当。A should be understood as B.	3	6	1	0	4	6	0	8	1
2. Automic Emission Analyzer		2	5	3	0	2	8	0	6	2
3. Dust Fall (Sampling/Weighing)	原理的に難しい機器ではないので、申告どおりに解してもよいが、メンテナンスについては、A申告はBが妥当。The operation of these equipment is not difficult that the level of self evaluation is reflecting present conditions but A should still be understood as B.	7	3	0	5	3	1	5	4	0
4. PbO_2 Method (Preparation/Analysis)		8	2	0	7	3	0	6	3	0
5. TEA PlateMethod (Preparation/Analysis)		8	2	0	7	3	0	6	3	0
6. Hi-Vol Sample (Sampling/Weighing)		9	1	0	4	2	4	6	3	0
7. Low-Vol Sample		5	5	0	3	3	4	3	6	0
8. Andersen Sampler		4	6	0	1	6	3	2	7	0
9 Manual Stack Gas Analysis		5	5	0	1	5	4	4	5	0

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
10. Manual Ambient Air Anaiysis		7	3	0	3	5	2	4	4	0
11. Standard Gas Preparation	機器が活用されていないところから０ベース。オールCと解するのが妥当。There is no experience in this item and the condition should be understood as all C.	2	1	7	0	2	8	2	3	4
12. Atomic Absorption Spectrophotometer	利用率が少なく、オールCと解するのが妥当。The experience is so limited that the condition should be understood as all C.	2	5	3	0	1	9	2	4	2
13. Ion Chromatograph	全く使われていないので、オールCと解するのが妥当。There is no expenence in this item and the condition should be understood as all C.	1	4	5	0	2	8	0	4	4
14. Data Analysis(SO_2,NO,NO_2,O_3,SPM ,Noise etc.)	全体としてB評価。各パラメーターの相互連関をとっていない。The level should be understood as B in general because the correlation among parameters has not been evaluated.	3	6	1	1	3	4	1	5	3

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
15. Personal Computer	日常使用（文書作成）中心。機能をフル活用していない。 Computers are mainly used for documentation and not fully utilized in its capacity.	6	3	1	0	4	5	1	4	4
16. Real Time Wave Analyzer (Noise)	とりあえず使用し、測定しているという観点からは申告どおり。Reasonable evaluation from the point that the equipment are used for measurement.	1	1	3	0	1	5	0	1	5
17. Level Recorder (Noise)		1	1	3	0	1	5	0	1	

1．全体としてA申告は全てBと評価するのが妥当。 In general, evaluation A should be understood as B.

2．オペレーションは、機械の構造、原理をよくわきまえた上でのオペレーションとして考えると、厳密にいうと全てC。一応、測定、キャリブレーションができるよいう点でB評価。 Operation should be executed based on the good understanding of mechanism of equipment and theory. From the strict point of view, evaluation should be all C. However, from the point that the equipment is operated for measurement with calibration, the evaluation can be B.

Table 表-6-3　B 3 (有害物質)

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
1. Sample Treatment of Inorganic Constituents										
a). digestion of water	実験機会が多く、経験の長い無機物の前処理は、妥当な評価。The level of self evaluation is reasonable because there are a lot of experience in the treatment of inorganic substances.	4	5	0	4	3	2	4	5	0
b). digestion of sediments		4	5	0	4	4	1	4	4	1
c). digestion of biological samples		4	4	1	4	4	1	4	4	1
d). wet digestion of at low/medium temperature		4	4	2	4	4	2	3	5	2
2. Sample Treatment of Organic Constituents										
a). extraction/concentration	経験の浅い有機物前処理は、今後ｸﾞﾙｰﾌﾟ内の TT 要。The experience in the sample treatment of organic materials are still limited and more training opportunities among B3 group are necessary.	2	2	8	1	2	8	1	2	8
b). column chromatograph purifying		1	1	8	0	2	7	1	1	8
c). solid phase collection/concentration	農薬等の固相抽出は今後の課題。Further effort is necessary in solid phase extraction method especially for pesticides analysis.	0	2	8	0	2	7	1	1	8
3. AAS (Air-C_2H_2 flame, aqueous solution)	ほぼ、妥当な評価。The evaluation is reasonable.	3	4	4	3	2	6	3	3	5
4. AAS (N_2O-C_2H_2 flame)		2	2	5	2	2	5	3	2	4
5. AAS (Hydride method)	As,Se 分析専用、妥当な評価だが、TT 要。AAS is used only for the analysis of As and Se. Self evaluation is reasonable but more training	1	5	3	1	5	3	2	4	3

	opportunities among B3 group are necessary.										
Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation									
		Operation			Maintenance			Principle			
		A	B	C	A	B	C	A	B	C	
6. AAS (Graphite furnace method)	ほぼ、妥当な評価。The level of self evaluation is generally reasonable.	3	2	5	2	2	6	2	3	5	
7 GC-FID	検出器が異なるのみ、ルーチン分析が未熟であり、GC技術として、グループ内TT要。	1	0	0							
8. GC-ECD(Organo compounds)	More training opportunities among B3 group are necessary, because there is not so big difference among equipment except detectors.	2	1	1	2	0	2	2	2	2	
9. GC-FPD(Organo-P/Organo-compounds)	Routine job of GC analysis should be encouraged.	0	4	7	0	2	8	2	4	5	
10. GC-FTD(N-containing pesticide)		0	2	9	0	1	9	2	2	7	
11. GC-FID(Hazardous waste)		1	3	7	1	1	8	2	4	5	
12. GC-FID/ECD(Leachate)		1	2	7	1	2	6	1	2	7	
13. GC-MS(Organic pollutants)	現在担当者1人のみ、経験を重ね、TT要。B評価が妥当。There is only one operator in B3. The level of self evaluation is reasonable for B. More training opportunities among B3 group are necessary.	1	1	8	1	1	8	2	1	7	
14. Capillary column technique of GC	上記GCに同じ。Same with GC.	2	3	6	2	1	8	2	3	6	
15. HPLC	イオンクロマトも含め、今後の課題。Bが妥当。Further effort is necessary for HPLC including ion	1	3	6	0	3	7	2	2	8	

chromatography.

Name of Work/Instrument	Comments on Evaluation of Present Situation by JICA Expert	Self Evaluation								
		Operation			Maintenance			Principle		
		A	B	C	A	B	C	A	B	C
16. UV/VIS Spectrometer	蛍光法とも使用機会がすくないので、TT 要。There is very limited chance to use and more training opportunities among B3 group are necessary.	1	6	4	0	4	7	2	5	4
17. X-ray Fluorescence Spectrophotometer	殆ど使用していない。妥当な評価。There is very limited chance to use. The level of self evaluation is reasonable.	0	0	9	0	0	5	0	3	5
18. Data Analysis	今後更に応用要。Further implementation will be necessary.	3	4	4	1	0	0	1	7	2
19. Personal Computer	ｸﾛﾏﾄｸﾞﾗﾑ検量線作成に使用、ｸﾞﾙｰﾌﾟ内 TT 要。Computers are used for making calibration curve and more training opportunities among B3 group are necessary.	2	6	4	0	1	0			