平成１２年度

特別案件調査

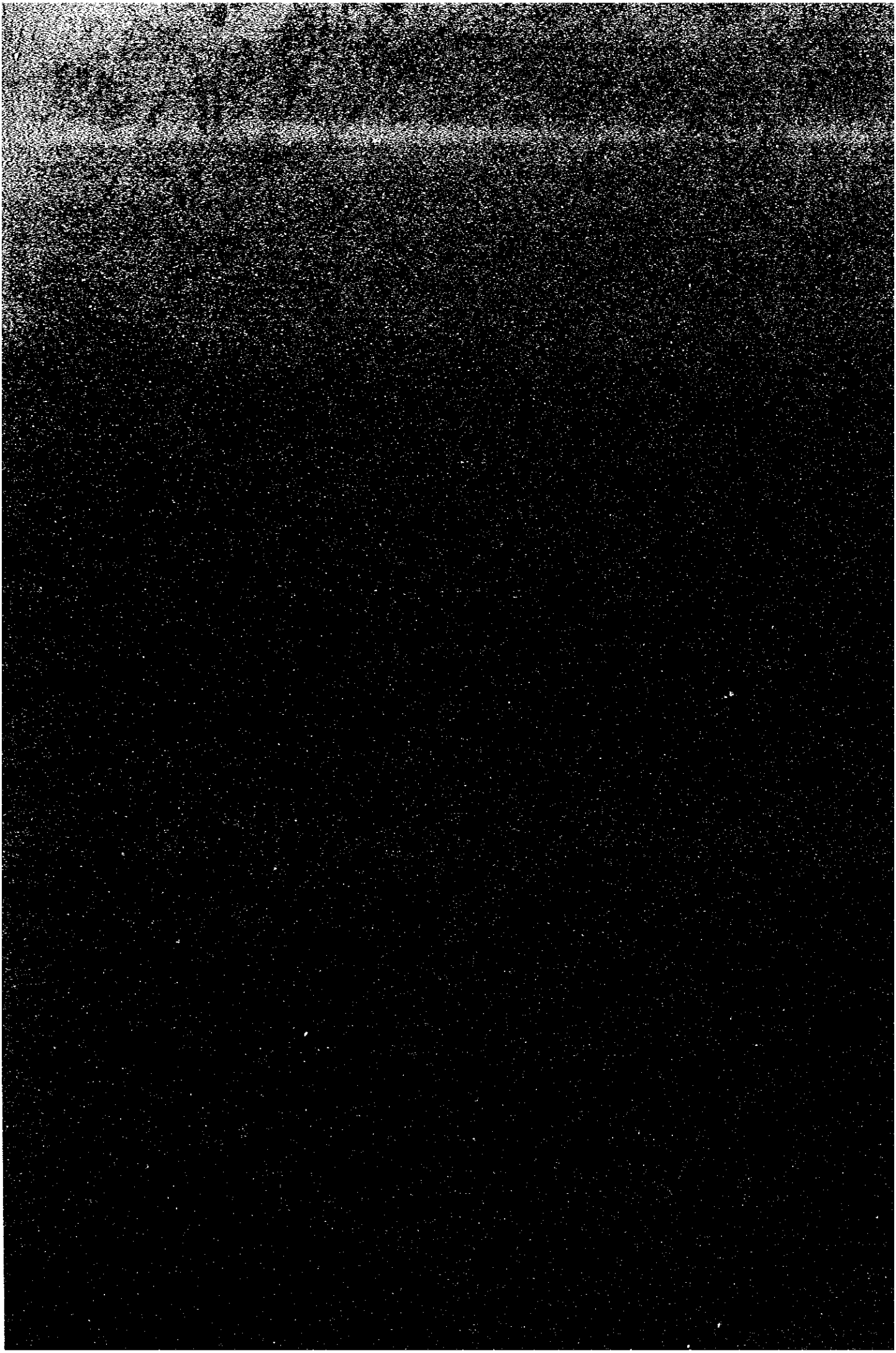
報告書

インドネシア国別特設環境中微量有害化学物質分析コース

平成１２年９月

国際協力事業団

兵庫インターナショナルセンター



序文

インドネシアにおいては、我が国で既に使用が禁止または厳しく制限されている有害化学物質の使用に伴う汚染や我が国と同様に廃棄物の焼却過程の有害化学物質による汚染が危惧されています。しかしながら、環境中に微量に存在するこれらの有害化学物質のモニタリングは、高度な機器を用いた熟練技術を必要とすることから、現在、インドネシアに於いては実質的にほとんど手がつけられていない状況にあります。

このため、環境中微量有害化学物質のモニタリングについて、国立の分析機関の技術者を対象に平成１１年度に環境中微量有害化学物質分析コースが設立されました。本件研修コースは平成１１年度及び１２年度は大気汚染物質分析、平成１３年度以降は水質汚染物質分析を研修することが計画されています。大気と水質では研修内容が全く変わることから、平成１２年度中に次年度の研修プログラムの検討開始することが必要となるため、現地のニーズ及び技術レベルを確認し適切な内容の研修となることを目的に本調査団は派遣されました。

調査は平成１２年８月１０日から８月１９日まで（１０日間）実施されましたが、コース運営に多大な協力をいただいている神戸市環境保健研究所環境化学部から伊藤　義明氏、長谷川　明彦氏、三谷　明恒氏にご参加、ご協力をいただきました。本報告書においては、研修事業のみならず JICA 事業全体として如何に協力することができるか、現地の実情や要望を踏まえた貴重なご意見が述べられており、皆様のご活用を願う次第です。

終わりに、本調査にご支援とご協力をいただいた関係各位に対し、心より御礼申し上げます。

平成１２年８月

国際協力事業団
兵庫インターナショナルセンター
所長　河合　恒二

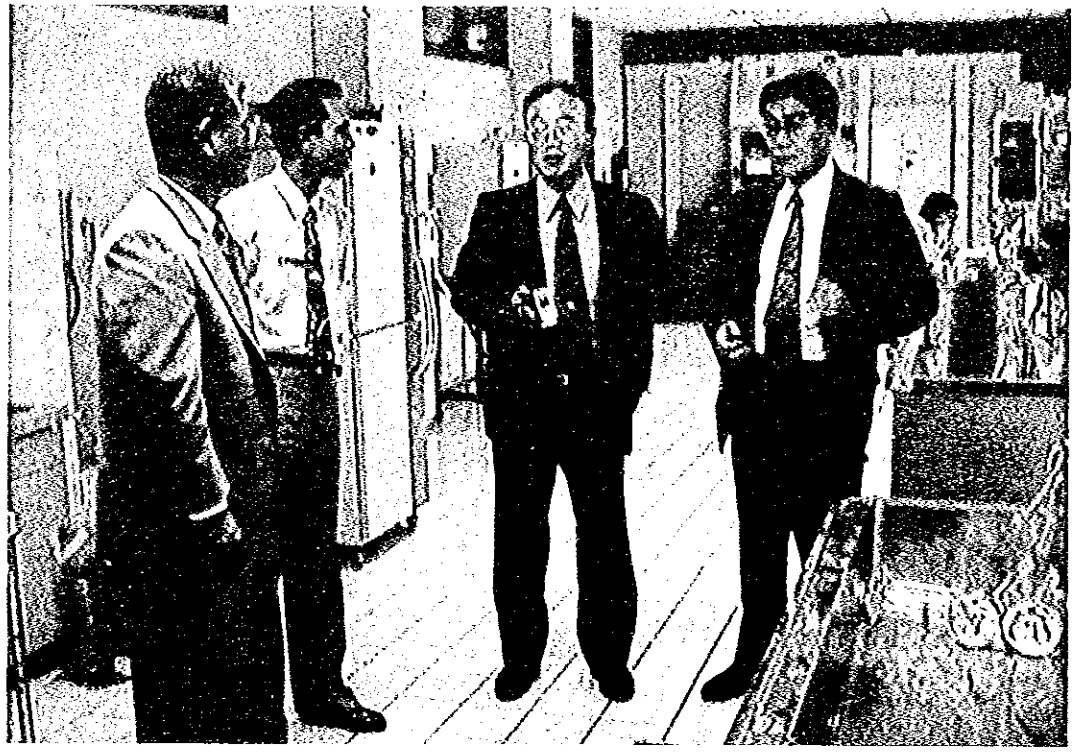
BAPEDAL　研修員候補者

(左から三谷団員・伊藤団長・長谷川団員・石岡団員)

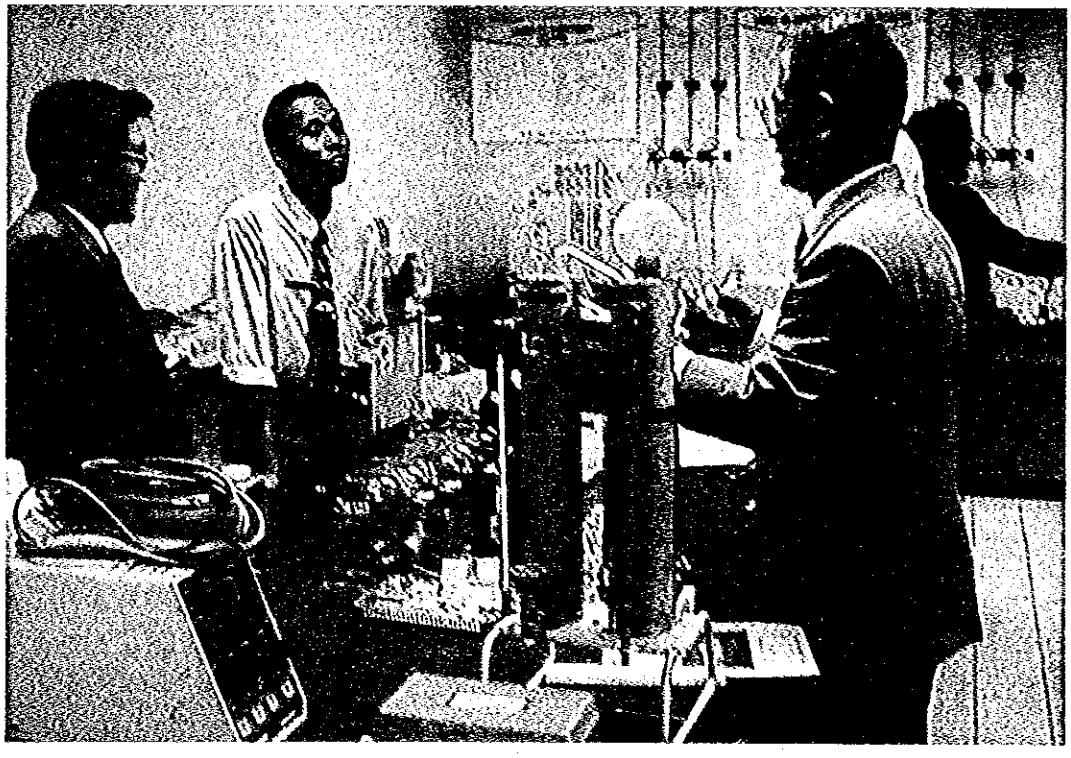
BAPEDAL　打合せ

BAPEDALDA DKI JAKARTA　ラボ視察

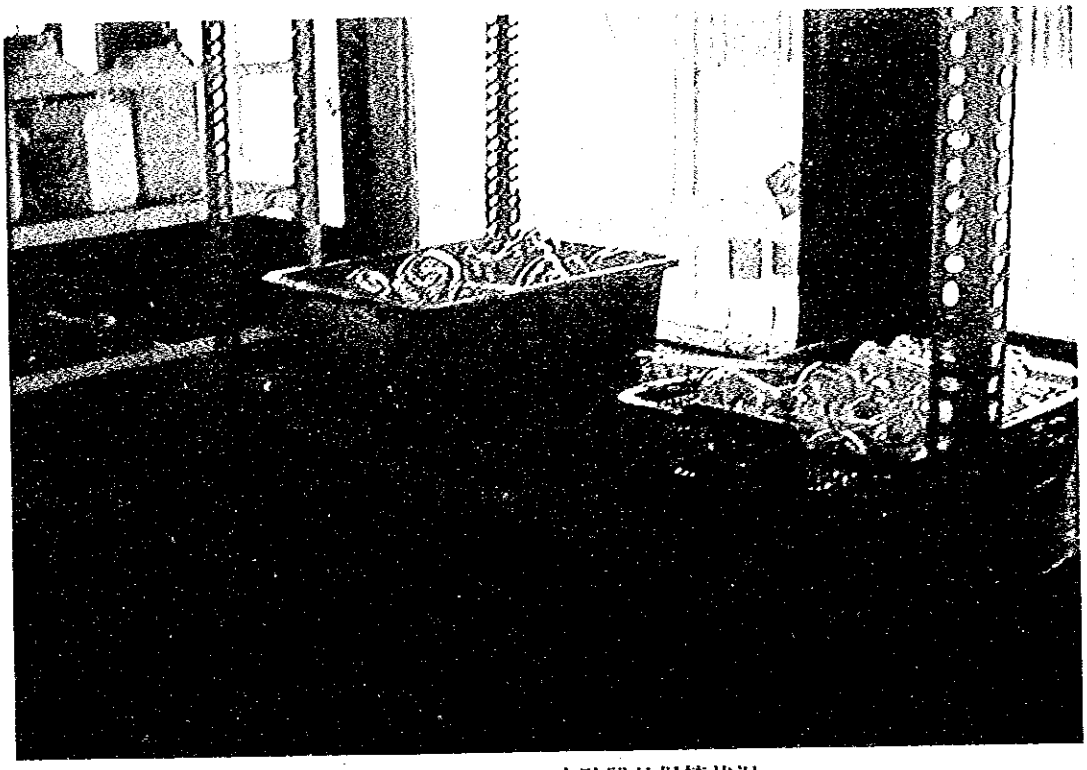
BAPEDALDA DKI JAKARTA　ラボ視察



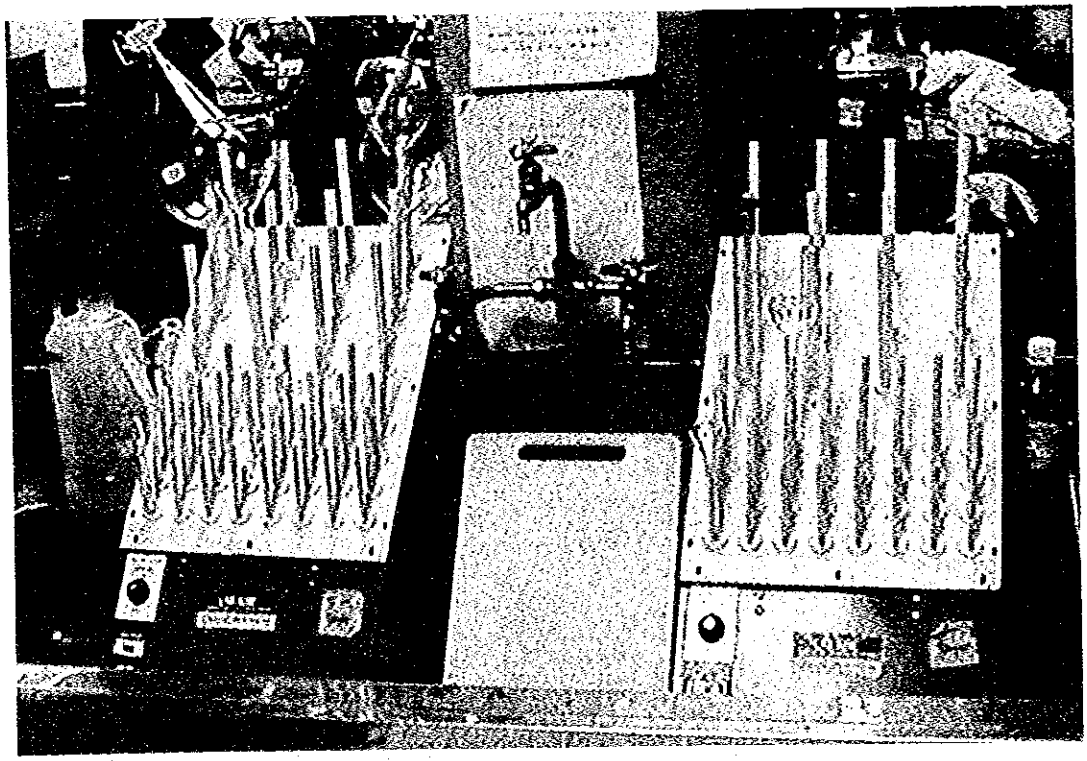
EMC　ラボ視察



EMC　ラボ視察



DKI JAKARTA　実験器具保管状況



EMIC　実験用器具保管状況

目　次

Ⅰ　調査団派遣

1．　対象コース：　インドネシア国別特設環境中微量有害化学物質分析コース

2．　背景及び目的：インドネシアにおいては、我が国で既に使用が禁止または厳しく制限されている有害化学物質の使用に伴う汚染や我が国と同様に廃棄物の焼却過程の有害化学物質による汚染が危惧されている。しかしながら、環境中に微量に存在するこれらの有害化学物質のモニタリングは、高度な機器を用いた熟練技術を必要とすることから、現在、インドネシアに於いては実質的にほとんど手がつけられていない状況にあった。このため、環境中微量有害化学物質のモニタリングについて、国立の分析機関の技術者を対象に平成１１年度に環境中微量有害化学物質分析コースが設立された。本件研修コースは平成１１年度及び１２年度は大気汚染物質分析、平成１３年度以降は水質汚染物質分析を研修することが計画されている。大気と水質では研修内容が全く変わることから、平成１２年度中に次年度の研修プログラムの検討開始することが必要となるため、本件調査にて現地のニーズ及び技術レベルを確認し適切な内容の研修となることを目的に本調査団は派遣された。

3．　派遣国：インドネシア

4．　派遣期間：平成１２年８月１０日から８月１９日まで

5．　団員構成：

総　　括	伊藤　義明	神戸市環境保健研究所環境化学部
水質汚染物質分析技術	長谷川　明彦	神戸市環境保健研究所環境化学部
水質汚染モニタリング技術	三谷　明恒	神戸市環境保健研究所環境化学部
研修計画	石岡　秀敏	JICA 兵庫インターナショナルセンター

6．調査日程

日順	月日	曜日	訪問機関、面会者等　　調査すべき事項、収集すべき資料等
1	8/10	木	関空 12:10→19:45 ジャカルタ JL713
2	8/11	金	8:45　JICA インドネシア事務所表敬打合せ 11:00　在インドネシア大使館表敬打合せ 14:00　SEKNEG 15:30 JICA 廃棄物処理政策分野長期専門家の若林専門家よりインドネシア環境汚染状況聴取
3	8/12	土	資料整理
4	8/13	日	協議用資料準備
5	8/14	月	10:00　BAPEDALDA DKI Jakarta 調査事項に係る説明 BAPEDALDA DKI Jakarta ラボ所属の水質分析担当スタッフとの面談を通して彼等の現状、技術レベル等を確認する。
6	8/15	火	10:00 環境管理庁 調査事項に係る説明 環境管理庁の水質分析担当スタッフとの面談を通して彼等の現状、技術レベル等を確認する。
7	8/16	水	10:00 EMC 調査事項に係る説明 小林専門家及び EMC の水質分析担当スタッフとの面談を通して彼等の現状、技術レベル等を確認する。
8	8/17	木	収集情報分析・整理調査報告書原稿作成
9	8/18	金	9:30　環境管理庁 11:30 日本大使館 15:30 JICA インドネシア事務所 調査結果報告 ジャカルタ 21：20→ JL714
10	8/19	土	→06:00　関空　　帰国

7．主要面談者

JICA インドネシア事務所

佐原次長

紫村所員

在インドネシア日本大使館

河野二等書記官

SEKNEG

Mr. Arwandrija Rukma, Head, Colombo Plan Project Sub-division, Division of Bilateral Cooperation, Bureau for International Technical Cooperation, State Secretariat of Republic of Indonesia

公共事業省

廃棄物処理政策 若林専門家

BAPEDALDA DKI

Mr. Aboejoewono, Head of Bapedalda DKI Jakarta

MS. Liliansari Loedin, Bapedalda DKI Jakarta

Ir. Suryadarma, Head of Environmental Laboratories, Bapedalda DKI Jakarta

Mr. Johanes Karel Kaunang, Analyst, Toxicology Laboratory, Bapedalda DKI Jakarta

MS. Vera Dwisanti, Staff of Phyc-Chem Laboratory, Bapedalda DKI Jakarta

BAPEDAL

Mr. Imam Hendargo A. Ismayo, Head of Planning and International Cooperation Bureau

MS.Hermien Roosita, Head of Division for Bilateral & Multilateral Government Foreign Aid

MS.Yani Asiani, Staff, Planning and International Cooperation Bureau

MS.Laksmi Widyajayanti, Staff, Water Pollution Control

MS. Yulia Suryanti, Staff of Directorate for Hazardous Waste and Substance Management

MS. Nilfa Rasyid, Staff of Water Pollution Directorate

Mr. Gagan Firmanstah, Staff of Water Pollution Control

MS.Ratna Kartikasari, Head of Sub Directorate of Urban & Domestic Pollution Control

Mr. Safrudin, Staff of Water Pollution Directorate

EMC/Pusarpedal

Dr. Mohammad Helmy, Director, Pusarpedal

小林専門家

MS. Helimah Syafrul, Head of Research & Development Division

Mr. Adnan Rafman, Staff, Research & Development Division

MS. Yunesfi Syufyan, Staff, Toxic Substances Section

MS. Eti Sumiati, Staff, Water Laboratory

Mr. Heny Puspita Rokhwani, Staff, Toxic Substance Laboratory

Ⅲ.　現地調査結果

1．現地における水質汚染分析に関する現場の技術レベル

平成１３年度以降の環境中微量有害化学物質分析コース（水質汚染分析技術）におけるターゲットグループについて、BAPEDAL 、BAPEDALDA DKI JAKARTA 及び EMC/Pusarpedal 等の意向を確認した。

その結果、BAPEDALDA DKI JAKARTA では、環境研究所に所属する水質汚染分析技術者が研修員候補と考えられているとの事であった。同研究所の技術者は現場からサンプルを採取し、研究所で分析する職務にあり、本件研修対象として適当と思われる。同研究所において分析作業を見学したが、所有している機材は旧式で、PPM オーダーの分析ができるレベルであった。実験用機具の保管状況も十分といえず、微量を扱うレベルでは無かった。本件研修の中で、分析の基本知識として、実験室の整理・整頓、実験器具の洗浄方法、保管方法について、講義することで、現状の機材で微量を扱うレベルに近付ける事に役立てるものと思われる。

BAPEDAL では環境保全を担当する行政官に本件研修を受講させたいとのことであった。

EMC/Pusarpedal では有害物質分析部門及び水質汚染分析部門に所属する分析技術者が研修員候補と考えられているとの事であった。

EMC/Pusarpedal からは、重金属、環境ホルモン、トリハロメタン及び窒素、燐等の分析技術について研修の要望が出された。その中で特に海水からの重金属分析に係る分析方法が緊急の課題とのことであった。地方のラボに技術指導する立場にある EMC/Pusarpedal に対し、海水を含むサンプルの処理方法を教えることは、今後のインドネシアの環境モニタリング技術の向上に寄与するものと思われる。

2．研修ニーズ

BAPEDALDA DKI JAKARTA からの研修プログラムに関し、COD、BOD、窒素、燐、水質汚染監視体制及び重金属について研修の要望が出された。

BAPEDAL の研修員候補対象者から希望を聴取したところ、農薬、重金属、COD、BOD、窒素、燐、水質汚染監視体制等について研修の要望が出された。彼等の職務内容から見て、分析法の基礎理論等の講義に重点をおく研修内容を希望すると思われたが、実習等による分析技術の習得も適正な環境保全対策、規制に係る計画を策定するにあたり必要であり、本件研修にて受講したいとの要望が出された。要望内容は妥当と思われる。

EMC/Pusarpedal からは、重金属、環境ホルモン、トリハロメタン及び窒素、燐等の分析技術について研修の要望が出された。その中で特に海水からの重金属分析に係る分析方法が緊急の課題とのことであった。地方のラボに技術指導する立場にある EMC/Pusarpedal に対し、海水を含むサンプルの処理方法を教えることは、今後のインドネシアの環境モニタリング技術の向上に寄与するものと思われる。　上記の結果を踏まえ、本研修コースの水質汚染分析技術研修にお

いて別添のプログラム案にて実施する方向で検討する。

研修のレベルは平成１３年度（水質分析の１年目）は比較的高度な分析機材を使用しているEMC のスタッフをメインターゲットとする研修を、１４年度、１５年度は地方政府環境局のスタッフをメインターゲットとする基本的な機材に重点をおいた研修を実施することを検討している。また、いずれのコースにおいても、分析の基礎理論、器具洗浄、保管、サンプリング試料の前処理等の事前作業についてその重要性を教えるために、重点をおく事とする。上記については環境管理庁に調査団の感触を報告した際に説明し、同意を得ている。

平成１３年度（第３回）インドネシア国別特設環境中微量有害化学物質分析コース研修概要案

1　コース名等

（1）和　文　名　：　インドネシア国別特設環境中微量有害物質分析コース

　　英　文　名　：　Analysis of Low Density Toxic Chemicals in Environment

（2）研修期間：　自　平成13年7月下旬
　　至　平成13年9月上旬

（3）定　　員：　5名

（4）受入人数：　5名（1ヵ国）

2　コースの目的

（1）　目　　的：　環境汚染(水質汚濁）の分析測定業務に従事する中央または地方の公的機関に所属する研究者または技術者を対象とし、水環境中の環境リスクや健康リスクの高い微量有害化学物質について、そのサンプリング方法、分析方法、そしてデータの統計的取り扱い方法を教え、研修を通じて、環境モニタリングに係る技術の向上を図ると共に、インドネシア国の環境汚染状況の実態把握、及び環境保全に資する。

3　研修プログラム概要

1）水環境中微量有害化学物質に係る分析法の基礎理論の理解とモニタリング調査の意義を理解する。

2）分析対象物質ごとのサンプリング手法を習得する。

3）海水を含む試料の前処理法を習得する。

4）ガスクロマトグラフ質量分析計、高速液体クロマトグラフ、ガスクロマトグラフ、ICP発光分析装置、原子吸光光度計、可視・紫外分光光度計そして水銀分析計による測定方法を習得する。

5）観測データの取り扱い方法を理解する。

平成１３年度（第３回）インドネシア国別特設環境中微量有害化学物質分析コースカリキュラム案
CURRICULUM　(draft)

Lectures　2days

1) The basis on analysis for low density toxic chemicals in water
2) The outline on analytical method for endocrine disrupting.
3) The outline on analytical method for volatile organic compounds.
4) The outline on analytical method for agricultural chemicals.
5) The outline on analytical method for heavy metal.
6) The outline on monitoring system for water pollution in Kobe city.

Practice　3weeks

1) Sampling of river water.
2) Determination of endocrine disrupting chemicals
such as bisphenol A, 4-n-octylphenol and nonylphenol
by means of gas chromatography-mass spectrometry(GC-MS).
3) Determination of volatile organic compounds
such as 1,1,1-trichloroethane, trichloroethylene and tetrachloroethylene
by means of gas chromatography-mass spectrometry(GC-MS).
4) Determination of agricultural chemicals
such as simazine, diazinon and isoprothiolane
by means of gas chromatography-mass spectrometry(GC-MS).
5) Determination of heavy metal such as Hg, As, Cr, Pb and Cu
by means of atomic absorption spectrometry.
6) Data evaluating and handling.
7) Drawing up a report and discussion.

Observation and study tour　2days

Total　about 4weeks

Ⅳ　総括・団長所感

BAPEDAL 、BAPEDALDA DKI JAKARTA 及び EMC/Pusarpedal 等との協議、実験室の状況確認、ジャカルタ近郊の環境汚染状況踏査等を通し、インドネシアの水環境汚染分析技術の向上のために本件研修コースで何をどこまで教える必要があるのかを検討した。その結果、EMC も含めインドネシアの環境汚染分析に従事する技術者達には、微量のレベルになればなるほど必要となる分析技術の基本的な思想が欠けているように思われる。

現時点の汚染状況であれば、微量レベルの高精度な分析自体がそれほど強く必要とはされていないので、当面は今のままで実害はでないとおもわれるが、将来、本格的にインドネシアの環境保全のレベルを先進国並みにしていくためには、今の分析業務レベルを基本的な心構えから鍛えなおすことが必要と思われる。

ジャカルタに到着して、まず気になったことは、空がどんよりとしており、きれいな青空が見えないことであった。この原因が車の排気ガスによるものであることは、バジャイ・オートバイも含めた車の多さ、あるいはいまだに有鉛の燃料を使っていることなどから、すぐに分かった。また、アンチョール公園の近くにあるアンチョール・マリーナの水が臭かったこと、この河川のどぶ臭のひどさには閉口した。このような環境汚染状況の中で、微量有害物質の分析が本当に必要なのかどうか、非常に疑問に思った。

しかしながら、インドネシアの将来を考えた時には、すでに上で述べたように、微量分析に携わる者としての基本的な考え方、あるいは微量分析の基礎技術に重点を置いた当研修は、インドネシアの分析技術者にとって意義のあるものとなり得ると確信する。

Appendix 1

BAPEDAL

2/5

Questionnaire

to

Related Organization

on

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please provide us the information on the following items.

I. what kind of technical staff, do you think most necessary in your organization, as the main target group of applicant of this training course,

Could you put mark to following.

Researcher

0 Examiner

0 Administrator

II. Number of staff related to Water Pollution Analysis. 6

III. What items are necessary for your staff training in this course?

Please check all items you think necessary.

☐ Volatile Organic Compounds

5 ☑ Agricultural Chemicals

☐ Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)

4 ☑ Heavy Metals

2 ☑ COD and BOD (Water Pollution by Organic Compounds)

3 ☑ Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)

1 ☐ Monitoring System for Water Pollution

6 ☐ Technical Skill on Administration with regard to Water Pollution

☐ Others : If you have the items that you would like to acquire except the above items, please write them in detail.

~~Toxicology Analysis~~

u/p I. Rani.

BAPEDALDA DKI JAKARTA

Questionnaire

to

Related Organization

on

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please provide us the information on the following items.

I, what kind of technical staff, do you think most necessary in your organization, as the main target group of applicant of this training course.

Could you put mark to following.

Researcher V
Examiner V
Administrator V

II. Number of staff related to Water Pollution Analysis. 30 Persons

III. What items are necessary for your staff training in this course?

Please check all items you think necessary.

V Volatile Organic Compounds

V Agricultural Chemicals

V Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)

4 V Heavy Metals

1 V COD and BOD (Water Pollution by Organic Compounds)

2 V Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)

3 V Monitoring System for Water Pollution

V Technical Skill on Administration with regard to Water Pollution

V Others : If you have the items that you would like to acquire except the above items, please write them in detail.

In order to strengthen the existing monitoring, we also need training on biological monitoring (field and laboratory work)

Questionnaire
to
Related Organization
on
Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please provide us the information on the following items.

I. what kind of technical staff, do you think most necessary in your organization, as the main target group of applicant of this training course,

Could you put mark to following.

V Researcher

Examiner

Administrator

II. Number of staff related to Water Pollution Analysis. 4

III. What items are necessary for your staff training in this course?

Please check all items you think necessary.

☑ Volatile Organic Compounds

☐ Agricultural Chemicals

☑ Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)

☑ Heavy Metals

☐ COD and BOD (Water Pollution by Organic Compounds)

☑ Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)

☑ Monitoring System for Water Pollution

☐ Technical Skill on Administration with regard to Water Pollution

☐ Others : If you have the items that you would like to acquire except the above items, please write them in detail.

BAPEDALDA DKI JAKARTA

IV. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID	√	V	Once / week	
GC : FPD	√	V	Once / week	
GC : ECD	√	V	Once / week	V
HPLC	√	V	Once / week	V
GC-MS				
AAS : FAAS	V		[illegible]	
AAS : GF-AAS	V	V	Twice / week → ?	✓
AAS : HG-AAS (for As, Se & Hg)	V	V		✓
ICP-AES				
UV	V		[illegible]	

The instruments shown in the above table are available at Kobe Institute of Health.

V. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C
1. Ion Chromatograph	Once / mounth	
2. Continous Flow Analyser	Routine	
3. Biological test Equipment	Routine	

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furene; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

Bapedalda DKI Jakarta

Appendix 2

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Questionnaire

Special Survey Team
for
Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name: SAFRUDIN
2. ☑Male ☐Female
3. Age: 31
4. Final Educational Record: CHEMICAL ENGINEERING
5. Institution or Facility: BAPEDAL
6. Present Post: STAFF OF WATER POLLUTION DIRECTORATE
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   ☐Volatile Organic Compounds
   ☑Agricultural Chemicals
   ☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   ☑Heavy Metals
   ☑COD and BOD (Water Pollution by Organic Compounds)
   ☑Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   ☑Monitoring System for Water Pollution
   ☐Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

10. Please write two items that you would especially like to acquire in this training course.

1)
2)

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				
GC-MS				
AAS : FAAS				
AAS : GF-AAS				
AAS : HG-AAS (for As, Se & Hg)				
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

Appendix 2

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Questionnaire

Special Survey Team

for

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).

Please fill out or check at the appropriate places of the following form.

1. Name RATNA KARTIKASARI
2. ☐Male ☒Female
3. Age 33
4. Final Educational Record UNIVERSITY DEGREE OF FISHERIES.
5. Institution or Facility ENV. IMPACT MANAGEMENT AGENCY
6. Present Post HEAD OF SUB DIRECTORATE OF URBAN & DOMESTIC WASTE POLLUTION CONTROL
7. Experience years of the job concerning water pollution

   ☐1-5years ☒6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?

   Please check all items you would like to acquire.

   ☐Volatile Organic Compounds

   4. ☒Agricultural Chemicals

   ☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)

   ☐Heavy Metals

   3. ☒COD and BOD (Water Pollution by Organic Compounds)

   ☐Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)

   1. ☒Monitoring System for Water Pollution

   ☐Technical Skill on Administration with regard to Water Pollution

   2. ☒Others : If you have the items that you would like to acquire except the above items, please write them in detail.

water pollution control [redacted] caused by solid waste (garbage). (technique).

10. Please write two items that you would especially like to acquire in this training course.

1) E. coli measurement in water pollution. (Biological).

2) Monitoring system for water pollution.

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				
GC-MS				
AAS : FAAS				✓
AAS : GF-AAS				
AAS : HG-AAS (for As, Se & Hg)				
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

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Questionnaire

Special Survey Team
for
Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course
(for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name: YULIA SURYANTI
2. ☐Male ☑Female
3. Age: 27 Years
4. Final Educational Record: BIOLOGY DEPARTMENT, ITB
5. Institution or Facility: BAPEDAL
6. Present Post: DIRECTORATE FOR HAZARDOUS WASTE SUBSTANCE MANAGEMENT
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.

(3) ☑Volatile Organic Compounds VHOX1ン等
(5) ☑Agricultural Chemicals
(4) ☑Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB) 環境ホルモン
(1) ☑Heavy Metals
☐COD and BOD (Water Pollution by Organic Compounds)
☐Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
(6) ☑Monitoring System for Water Pollution
☐Technical Skill on Administration with regard to Water Pollution
☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

(2) PERSISTEN ORGANIC POLUTANTS (POPs)
(7) ENVIRONMENTAL TOXICOLOGY

10. Please write two items that you would especially like to acquire in this training course.

1) MAJOR INDUSTRIAL WASTE (POPs, heavy metals, etc) MANAGEMENT AND MONITORING

2) INDUSTRIAL WASTE LABORATORY ANALYSIS

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				
GC-MS				✓
AAS : FAAS				
AAS : GF-AAS				
AAS : HG-AAS (for As, Se & Hg)				✓
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

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Questionnaire

Special Survey Team

for

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course
(for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name GAGAN FIRMANSYAH
2. ☒Male ☐Female
3. Age 32 YEARS
4. Final Educational Record ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT - IPB.
5. Institution or Facility BAPEDAL
6. Present Post DIRECTORATE FOR WATER POLLUTION CONTROL
7. Experience years of the job concerning water pollution
   ☒1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   ☐Volatile Organic Compounds
   ☐Agricultural Chemicals
   ☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   ☐Heavy Metals
   1 ☒COD and BOD (Water Pollution by Organic Compounds)
   ☐Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   2 ☒Monitoring System for Water Pollution
   ☐Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

10. Please write two items that you would especially like to acquire in this training course.

1) DOMESTIC WASTE pollution control.

2) DOMESTIC WASTE MINIMIZE PROGRAM.

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				
GC-MS				
AAS : FAAS				
AAS : GF-AAS				
AAS : HG-AAS (for As, Se & Hg)				
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

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Questionnaire

Special Survey Team

for

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).

Please fill out or check at the appropriate places of the following form.

1. Name LAKSMI WIDYAJAYANTI
2. ☐Male ☑Female
3. Age 33
4. Final Educational Record POST GRAD. DIPL IN ENVIRONMENTAL IMPACT ASSESSMENT
5. Institution or Facility BAPEDAL (ENVIRONMENTAL IMPACT MANAGEMENT AGENCY)
6. Present Post STAFF FOR WATER POLLUTION CONTROL / STAFF FOR PLANNING AND INTERNATIOD COOPERATION BUREAU
7. Experience years of the job concerning water pollution

   ☐1-5years ☑6-10years ☐11-15years ☐16-20years ☐≧21years

8. What would you like to acquire the technique or information on?

   Please check all items you would like to acquire.

5 ☑Volatile Organic Compounds

6 ☑Agricultural Chemicals

☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)

4 ☑Heavy Metals

3 ☑COD and BOD (Water Pollution by Organic Compounds)

☑Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)

2 ☑Monitoring System for Water Pollution

1 ☑Technical Skill on Administration with regard to Water Pollution

7 ☑Others : If you have the items that you would like to acquire except the above items, please write them in detail.

BIO ASSAY.
BIO MONITORING DESIGN FOR RIVER.
LAKE MONITORING

10. Please write two items that you would especially like to acquire in this training course.

4/5

1) MONITORING SYSTEM FOR WATER POLLUTION

2) PESTICIDE & BIOLOGICAL MONITORING

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				✓
GC-MS				✓
AAS : FAAS				
AAS : GF-AAS				✓
AAS : HG-AAS (for As, Se & Hg)				
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

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Questionnaire

Special Survey Team

for

Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course
(for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name NILFA RASYID
2. ☐Male ☑Female
3. Age 35
4. Final Educational Record CHEMICAL ENGINEERING
5. Institution or Facility BADEDAL
6. Present Post STAFF OF WATER POLLUTION DIRECTORATE - BUSINESS PERFORMANCE RATING PROGRAM (INDUSTRIAL)
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   ☐Volatile Organic Compounds
   ☑Agricultural Chemicals
   ☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   ☑Heavy Metals
   ☑COD and BOD (Water Pollution by Organic Compounds)
   ☑Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   ☑Monitoring System for Water Pollution
   ☐Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

   WASTE MANAGEMENT SYSTEM

10. Please write two items that you would especially like to acquire in this training course.
    1. MONITORING SYSTEM for WATER POLLUTION

1) MONITORING SYSTEM FOR WATER POLLUTION.
2)

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID				
GC : FPD				
GC : ECD				
HPLC				
GC-MS				
AAS : FAAS				
AAS : GF-AAS				
AAS : HG-AAS (for As, Se & Hg)				
ICP-AES				
UV				

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

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Questionnaire

Special Survey Team
for
Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name: Heny Puspita Rokhwani
2. ☐Male ☑Female
3. Age: 25'
4. Final Educational Record: Chemical Analysis School.
5. Institution or Facility: Environmental Management Center
6. Present Post: toxic substance Laboratory
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   ☑Volatile Organic Compounds
   ☐Agricultural Chemicals pesticida sect.
   ☑Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   ☑Heavy Metals
   ☐COD and BOD (Water Pollution by Organic Compounds)
   ☑Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   ☐Monitoring System for Water Pollution
   ☑Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

   *) Fatty acid ester from the sludge sample (sludge with oily) how to treatment of that sample.
   *) organotin sample analysis
   *) phenol analysis from ~~Sludge sample~~ from all type of dioxin analysis

10. Please write two items that you would especially like to acquire in this training course.

4/5

1)

2)

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID	✓	✓		
GC : FPD	✓			
GC : ECD	✓	✓	once/ month	
HPLC	✓			
GC-MS	✓	✓	once/ week	✓
AAS : FAAS	✓	✓	every day	✓
AAS : GF-AAS	✓	✓	once/week	✓
AAS : HG-AAS (for As, Se & Hg)	✓		once/week	✓
ICP-AES	✓			
UV	✓			✓

The instruments shown in the above table are available at Kobe Institute of Health.

Please write the name and the usage frequency of instruments in the open line of below table , If there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C
TCLP	every day	✓
Flash Point	once/ month	
Corrosivity tester	once/month	

tions : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas graph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; gh Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

Appendix 2.

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Questionnaire

Special Survey Team
for
County Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name: Efi Sumiati
2. ☐Male ☑Female
3. Age: 31st
4. Final Educational Record: Academy of Analytical Chemistry
5. Institution or Facility: Environmental Management Center
6. Present Post: Water Laboratory Staff
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   ☑Volatile Organic Compounds
   ☐Agricultural Chemicals
   ☐Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   ☑Heavy Metals
   ☑COD and BOD (Water Pollution by Organic Compounds)
   ☑Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   ☑Monitoring System for Water Pollution
   ☑Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

   Preparation and treatment of sea water for heavy metal analysis

0. Please write two items that you would especially like to acquire in this training course.

1) Analysis of heavy metal in sea waters.

2) COD & BOD analysis in water sample.

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID	✓	✓	once / three months	
GC : FPD	✓	✓	once / three months	
GC : ECD	✓	✓	once / month	
HPLC	✓	✓	once / three months	
GC-MS	✓	✓	once / week	
AAS : FAAS	✓	✓	every day	✓
AAS : GF-AAS	✓	✓	once / week	
AAS : HG-AAS (for As, Se & Hg)	✓	✓	once / month	
ICP-AES	✓			✓
UV	✓	✓	every day	✓

The instruments shown in the above table are available at Kobe Institute of Health.

12. Please write the name and the usage frequency of instruments in the open line of below table , if there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C
pH - meter	every day	
Conductivity - meter	every day	
TDS - meter	every day	

Abbreviations : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, Coplanar Polychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas Chromatograph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; HPLC, High Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Absorption Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.

Appendix 2

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Questionnaire

Special Survey Team
for
Country Focused Training Course of Low Density Toxic Chemicals in Environment

Please answer the following questions, because we have to prepare for this training course (for example, making curriculum, textbook and so on).
Please fill out or check at the appropriate places of the following form.

1. Name: YUNESFI SYOFYAN
2. ☐Male ☑Female
3. Age: 26 YEARS
4. Final Educational Record: D-2. ANALYTICAL CHEMISTRY. OF IPB
5. Institution or Facility: ENVIRONMENTAL MANAGEMENT CENTRE (EMC)
6. Present Post: TOXIC SUBSTANCES SECTION
7. Experience years of the job concerning water pollution
   ☑1-5years ☐6-10years ☐11-15years ☐16-20years ☐≧21years
8. What would you like to acquire the technique or information on?
   Please check all items you would like to acquire.
   1 ☑Volatile Organic Compounds
   ☐Agricultural Chemicals
   3 ☑ Endocrine Disrupting Chemicals (Except PCDD, PCDF and Co-PCB)
   2 ☑Heavy Metals
   ☐COD and BOD (Water Pollution by Organic Compounds)
   ☐Nitrogen or Phosphorous Compounds (Compounds Related with Eutrophication)
   ☐Monitoring System for Water Pollution
   4 ☑Technical Skill on Administration with regard to Water Pollution
   ☐Others : If you have the items that you would like to acquire except the above items, please write them in detail.

   5) Fats and oil treatment (from sludge, sediment, and water)
   6) Organotin analysis
   7) Phenol analysis
   8) Pesticide analysis.

Please write two items that you would especially like to acquire in this training course.

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1)

2)

11. If the following instruments are in your institution or facility, please check in A column for the instruments. If you use the following instruments for your routine work, please check in B column and write the frequency of use for the instruments. Please check in C column for the instruments which you would like to master how to use in this training course.

Instrument	A	B	Usage Frequency (like once/week)	C
GC : FID	✓	✓	once / 4 months	
GC : FPD	✓			
GC : ECD	✓	✓	once / month	
HPLC	✓			
GC-MS		✓	once / week	
AAS : FAAS	✓	✓	every day	✓
AAS : GF-AAS 持ってない	✓	✓	once / week	
AAS : HG-AAS (for As, Se & Hg)	✓	✓	once / week	✓
ICP-AES	✓			
UV	✓	✓	every day	

The instruments shown in the above table are available at Kobe Institute of Health.

Please write the name and the usage frequency of instruments in the open line of below table , If there are other instruments than that shown in the above table in your institution or facility.

Instrument	Usage Frequency (like once/week)	C
Flash point	once / month	
TCLP	every day	
Corrosivitos tester	once / month	

ons : PCDD, Poly-Chlorinated Dibenzo-p-Dioxin; PCDF, Poly-Chlorinated Dibenzo-furane; Co-PCB, olychlorinated Biphenyl; COD, Chemical Oxygen Demand; BOD, Biochemical Oxygen Demand; GC, Gas aph; FID, Flame Ionization Detector; FPD, Flame Photometric Detector; ECD, Electron Capture Detector; Performance Liquid Chromatograph; GC-MS, Gas Chromatograph-Mass Spectrometer; AAS, Atomic Spectrometer; FAAS, Flame Atomic Absorption Spectrometer; GF-AAS, Graphite Furnace-Atomic

Absorption Spectrometer; HG-AAS, Hydride Generation Atomic Absorption Spectrometer; ICP-AES, Inductively Coupled Plasma Atomic Emission Spectrometer.