添付資料 F
第２回ワークショップ
関連資料

Workshop Program
List of Participants
Resume of Presentation
Q & A Summary

KINGDOM OF SAUDI ARABIA
Ministry Of Defence & Aviation
Meteorology & Environmental
Protection Administration (MEPA)
Eastern Province

المملكة العربية السعودية
وزارة الدفاع والطيران
مصلحة الارصاد وحماية البيئة
المنطقة الشرقية

الرقم : .....
التاريخ : .....
الموضوع : .....
المرفقات : .....

Appendix L (1) Workshop Program

MEPA/JICA PROJECT
Marine Monitoring and Management of the Gulf Coastal Waters
SECOND WORKSHOP
November 17, 1999

Introduction

According to the agreement between JICA (Japan International Cooperation Agency) and MEPA (Meteorology and Environmental Protection Administration), the second workshop will be held on at Dammam MEPA office.

Your presence and contribution to the project discussion will be greatly welcomed and appreciated.

Program

1 Title
Environmental Assessment and Water Quality Monitoring Program in the Arabian Gulf - Present Status of the Study

2 Location
Office of Eastern Province, Post Box # 117, Dhahran -31932
Phone 03-857-6260, Fax 03-857-6752

3 Date/Time
November 17, 1999 / 08:30 AM

4 Chairman
Dr. Abdul Rahman Al-Arfaj and Mr. Aziz Al-Omari

5 Schedule

0830 to 0840	Dr. Hamdan Al-Ghamdi (MEPA)	Welcome Speech
0840 to 0850	Mr. Yasuhiro Shimazu (JICA)	Present Status of the Study - Outline
0850 to 0920	Mr. Aziz Al-Omari (MEPA)	Requirements for Continuing the JICA/MEPA Project
0930 to 0950	Dr. Mishra Krishna K. (JICA)	Environmental Condition Analyzed from recent LANDSAT Images
0950 to 1010	Mr. Khaled Busbait (MEPA)	Findings During Actual Monitoring Work
1010 to 1030	Mr. Qusai Bohlaiqah (MEPA)	Laboratory Set-up
1030 to 1050		Coffee Break
1050 to 1140		Panel Discussion
1140 to 1150	Mr. Chairman	Summarization
1150 to 1200	Dr. Hamdan Al-Ghamdi or Representative of JICA's Riyadh Office	Closing Speech

6 Pray Time 1200 to 1230

7 Buffet Party 1230 to 1430

All participants in the workshop are invited to the party. During the party, the installed laboratory equipment will be exhibited.

Appendix L (2) List of Participant

KINGDOM OF SAUDI ARABIA
Ministry of Defence & Aviation
Meteorology & Environmental
Protection Administration (MEPA)
Eastern Province

المملكة العربية السعودية
وزارة الدفاع والطيران
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الموضوع : .....

" Environmental Assessment and Water Quality Monitoring Program in the Arabian Gulf "

MEPA - JICA

Second Workshop - November 17, 1999

The list of participants.

1. Ali Aldulaijan
   SAFCO

2. Ahmed S. A. Al-Badrani
   SAFCO/IBB

3. Manaa Abuslalarir Manaa Al-Qerni
   Civil Defence

4. Tariq Abdal Hadi Al-Qerni
   Civil Defence

5. Said Ali Mohammed Al-Qerni
   Civil Defence

6. Fahni H. Al-Waskeer
   SAFCO

7. Tariq S. Al-Essa
   SAFCO

8. Mohammed Abdullah Al-Saif
   SAFCO

9. Khalid Adi Al-Shamri
   Civil Defence

10. Habib Ali Al-Garni
    Civil Defence - Industrial & Safety

ص . ب ١١٧ مطار الظهران الدولي ٣١٩٣٢ - تلفون ١٤٢٨ / ٠٨٧٦ / ٦٢٦٠ / ٦٥٢٠ - ٨٥٧ (٠٣) - تلكس : ٨٠٣٤٨٩ مبيا س ج - فاكس : ٥٣٠٤ / ٦٧٥٢ - ٨٥٧ (٠٣)
P.O. Box 117 Dhahran INT. Airport 31932 - Phone 03 - 857-6520 / 6260 / 0876 / 1428 - Telex: 803489 MEPA SJ - Telefax 03-857-5304/6752

KINGDOM OF SAUDI ARABIA
Ministry of Defence & Aviation
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التـــاريخ : .....
المرفـقات : .....
الموضـــوع : .....

11. Dr. Abdul Salam A. Al-Shuail
Dammam - Municipality
Meat and food staff observation

12. Assad M. Alothman
Civil - Fire & Safety

13. Kahleen Abdul Zez Al-Samary
Civil Defence - Safety officer

14. Ihah Al-Sharkawi
JICA - Senior Program Manager
Riyadh

15. Masahiro Tsubaki
JICA - Embassy of Japan
Program Development officer
Riyadh

16. Saad I. Al-Inaizi
National Environmental Preservation Co.

17. Nabil I. A. Fita
Ministry of Agriculture - F.R.C.

18. Dr. Khaled Al-Abdulkader
Saudi Aramco - Environmental Specialist

19. Ron Williams
Saudi Aramco - Sr.Env. Specialist

20. Dr. Ali Al-Dakhil - Allah
KFUPM - Assistant Professor

21. Khalifa A. Al-Saad
Dammam - Municipality
Food Inspector

22. Dhaifallah Ali Al-Shamari
Arabian Oil Co. Ltd.
Supervisor Env. Prat. Sector

ص . ب ١١٧ مطار الظهـران الدولي ٣١٩٣٢ - تلفـون ١٤٢٨ / ٠٨٧٦ / ٦٢٦٠ / ٦٥٢٠ - ٨٥٧ (٠٣) - تلكس : ٨٠٣٤٨٩ مـيـبـا س ج - فـاكس : ٥٣٠٤ / ٦٧٥٢ - ٨٥٧ (٠٣)
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المرفقات : .....
الموضوع : .....

23. Hamad Raheel Al-Anazi
A.O.C - Inspector

24. Rashid Mubarak Al-Othaibi
Civil Defence - Al-Khobar

25. Dr. Mohammed O. Saeed
Research & Development Center
Saline water Conversion Corporation

26. Dr. Ahmed M. Al-Hassan
SWCC - Chemist Research

27. Richard Hunter Smith
Royal Commission - Jubail

28. Brian Meadows
R.C. / R.G.M.E.

29. Saleh Al-Jandal
W.S.D. - Sanitary Division

30. Ibrahim A. Al-Wayel
Water Authority

31. Saleh Al-Buthi
S.W.C.C.

32. Ibrahim A. Al-Tisan
S.W.C.C.

33. Ali Abrurab Rasoul Al-Hamza
Research and Devlopment Center
S.W.C.C.

ص . ب ١١٧ مطار الظهران الدولي ٣١٩٣٢ - تلفون ١٤٢٨ / ٠٨٧٦ / ٦٢٦٠ / ٦٥٢٠ (٠٣) ٨٥٧ - تلكس : ٨٠٣٤٨٩ مبيا س ج - فاكس : ٥٣٠٤ / ٦٧٥٢ (٠٣) ٨٥٧
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JICA

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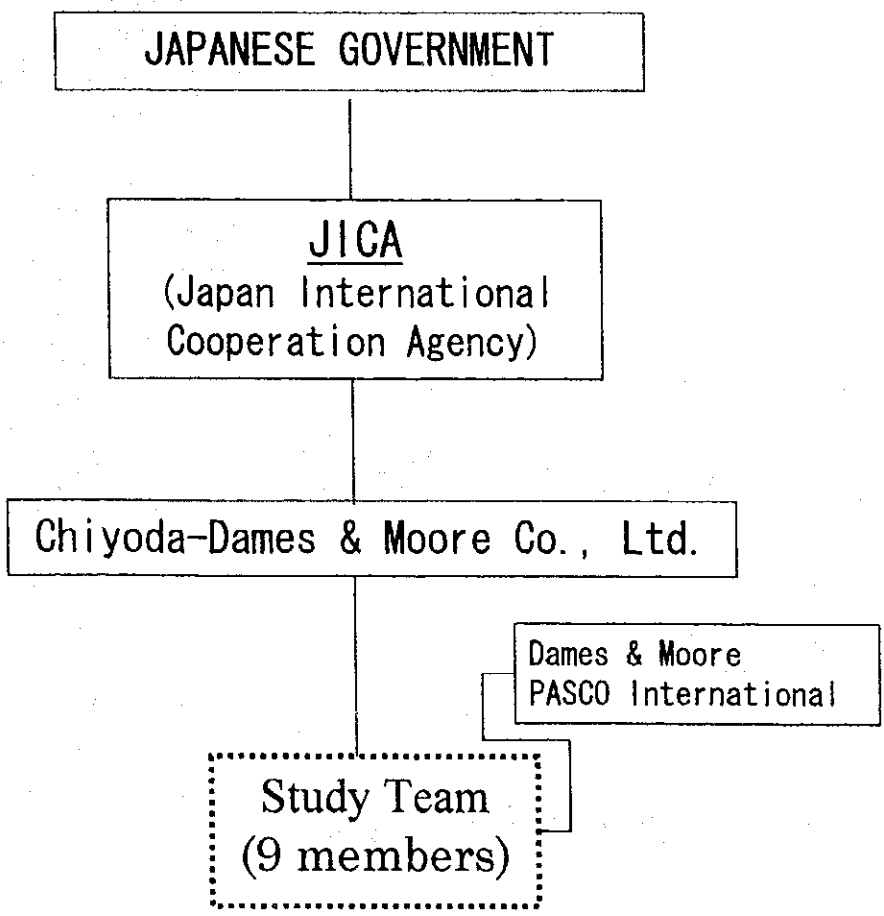
17 November 19...

MEPA & JICA

Present Status of the Study - Outline

by

Y. SHIMAZU



OBJECTIVES

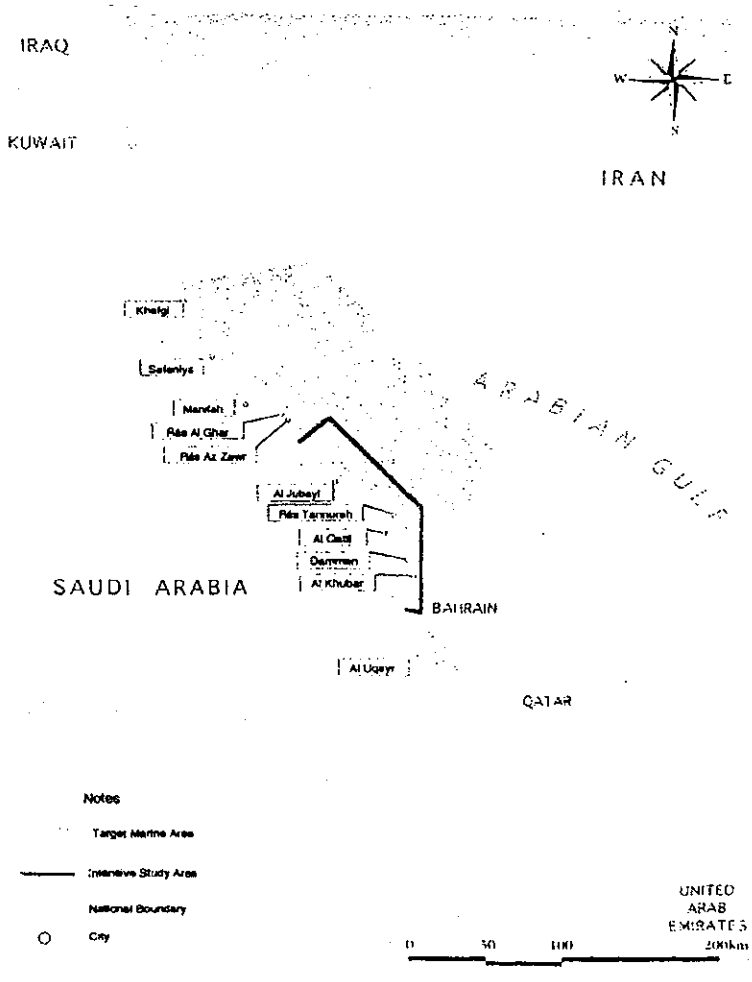
1) Investigate Water Quality and Cause of Degradation

2) Help Develop a Comprehensive Monitoring Program

3) Strengthen MEPA's Capability

Target Area and

Intensive Study Area



(1999)	
March	Planning of the Project
June-July	Field Pre-survey
	Monitoring Plan
	Workshop
Sept - Nov	Installation of Equipment
	1st Sampling and Analysis
	Data Analysis
	Workshop
(2000)	
June-July	2nd Sampling and Analysis
	Data Analysis
Sept	Evaluation
	Final Report
	Seminar

MEPA JICA PROJECT

PROJECT REQUIREMENTS

Aziz Al-Omari

PROJECT GOAL:

"ENHANCE MEPA'S CAPACITY TO MONITOR AND MANAGE THE GULF COASTAL WATERS"

PROJECT STRATEGY:

- *CONDUCT A TECHNOLOGY TRANSFER AND TRAINING PROGRAM AT MEPA EASTERN PROVINCE (DAMMAM OFFICE)*
- *UNDERTAKE A COLLABORATIVE STUDY OF THE INTENSIVE USE ZONE (ABU-ALI TO AL QURAYAH)*

PROJECT OBJECTIVES:

- *UPGRADE MEPA'S LABORATORY AT DAMMAM OFFICE*
- *UPGRADE MEPA'S FIELD SAMPLING AND MONITORING EQUIPMENT*
- *TRAIN MEPA PERSONNEL IN MARINE ENVIRONMENTAL MONITORING AND ANALYSIS TECHNIQUES BY A PRACTICAL 'HANDS-ON' APPROACH*

PROJECT TASKS:

1 *REVIEW EXISTING CAPACITIES AND EQUIPMENT AT MEPA DAMMAM.*

2 *SELECT, PURCHASE AND INSTALL LABORATORY & FIELD EQUIPMENT.*

3 *IMPLEMENT A COASTAL WATERS STUDY (INCLUDING SATELLITE REMOTE SENSING) FOR:*

(A) TRAINING PURPOSES, and

(B) INVESTIGATING PRESENT SITUATION.

PROGRESS TO DATE:

- Existing MEPA capacities and coastal water monitoring capabilities reviewed (Stages 1-2);
- Laboratory and field equipment selected and ordered from KSA & overseas suppliers (Stage 2);
- Investigative Study of Coastal Waters designed and trialled by a small pilot program (Stages 1-2);
- Equipment items delivered and installed (Stage 3);
- Commissioning of new laboratory procedures and analyses (Stage 3);
- Study of Coastal Waters implemented, including remote sensing by LANDSAT (Stage 3).

FUTURE TASKS

- Review and identify MEPA's precise role and responsibilities within the range of existing KSA policies and regulations for protecting Gulf coastal water qualityand natural marine resources.
- Conduct further training on field, laboratory and satellite data analysis procedures and techniques to achieve an adequate level of technology transfer.
- Colloborate with key outside organisations to continue the Study.

PROJECT REQUIREMENTS

- Increase the number of pre-qualified MEPA personnel at Eastern Province to achieve effective laboratory training and technology transfer.
- Continue developing the close working relationship with Coastguard for use of its vessels for field work.
- Colloborate with the following key agencies for the Investigative Study of Coastal Water Quality: *(next slide...)*

REQUIREMENTS (continued)

- Colloborate with the following key agencies:
  - Royal Commission of Jubail
  - King Faisal University
  - Research Development Centre - SWCC
  - Muncipalities and Sewage Treatment Authorities
  - KFUPM Research Institute
  - Ministry of Agriculture Research Centres
  - Ministry of Petroleum
  - NCWCD
  - Private Sector

THE STUDY ON AN ENVIRONMENTAL ASSESSMENT AND MONITORING

OF ARABIAN GULF IN THE KINGDOM OF SAUDI ARABIA

Environmental Condition Analyzed from Recent LANDSAT Images

by, Dr. Krishna Kumar MISHRA, JICA TEAM

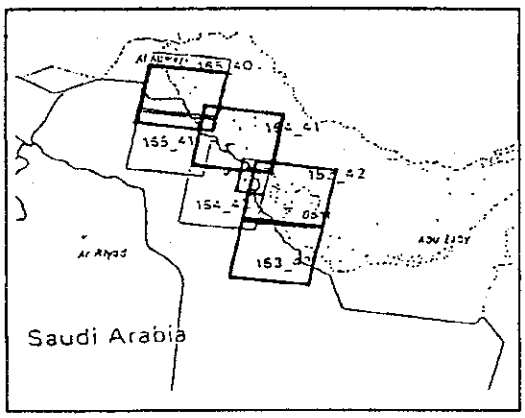
Environmental Condition Analyzed from Recent LANDSAT Images

Dr. Krishna Kumar MISHRA

Member, JICA Team

Abstract

The multispectral satellite data have the inherent properties of being able to provide synoptic observations with high observational density over relatively large areas. Satellite images have shown great potential for monitoring coastal environment. This project utilized the LANDSAT Thematic Mapper (TM) data to cover the Arabian Gulf, coastal region, of the Kingdom of Saudi Arabia (KSA) and analyzed the situation of the sea-pollution.



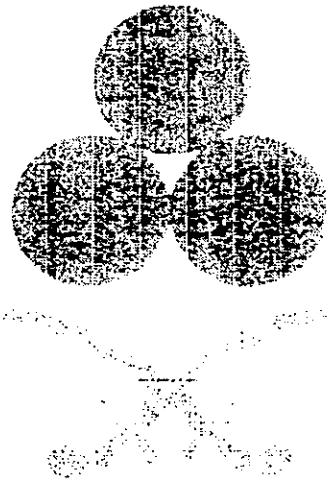
The utilized TM data were, Path/Row: 165/040-041 - Jan 20 1999, 164/041 - Dec 12 1998, 164/042 - Dec 12 1998, 163/042 - Dec 21 1998, 163/043 - Nov 03 1998. The TM data were analyzed for the preparation of moasaicked False Color Composite Image.

Also distribution maps at 1:500,000 scale were prepared for the distribution of suspended solids, chlorophyll *a* and oil pollution. These maps show variations for suspended solids, chlorophyll *a* and possible oily surface water micro-layers, and can be referenced for assessment and monitoring purposes.

Marine and coastal processes are complex, interrelated systems, and remote sensing data may not always provide sufficient information for the efficient monitoring purposes. In general amounts of *in situ* measurements are necessary to enhance and facilitate the interpretation of the synoptic remote sensing imagery. Further analysis with additional objectives, e.g., coral reef, sea surface temperature and seashore vegetation mapping are proposed for the fourth stage of this Project.

Note: The numbers of animated Slides shown were 48 through *PowerPoint* Presentation.

MEPA



JICA

PROJECT

FIELD MONITORING WORK

Khalid Busbait

OUTLINE OF FIELD WORK

- FIELD MONITORING DESIGN
- FIELD INSTRUMENT MANAGEMENT
- COLLECTION OF WATER & SEDIMENT SAMPLES
- FIELD DATA RECORDS
- DATA ANALYSIS & INTERPRETATION

OBJECTIVES OF THE STUDY OF INTENSIVE USE ZONE

- TO FACILITATE THE TECHNOLOGY TRANSFER AND TRAINING PROGRAM
- TO EXAMINE COASTAL SEAWATER QUALITY AND THE CAUSES OF WATER QUALITY DEGRADATION ALONG THE ARABIAN GULF
- TO REVIEW EXISTING WATER QUALITY MONITORING ACTIVITIES BY MEPA AND OTHER PARTIES
- TO HELP DEVELOP A MORE INTEGRATED, COMPREHENSIVE AND APPROPIATE COASTAL WATER QUALITY MONITORING PROGRAM

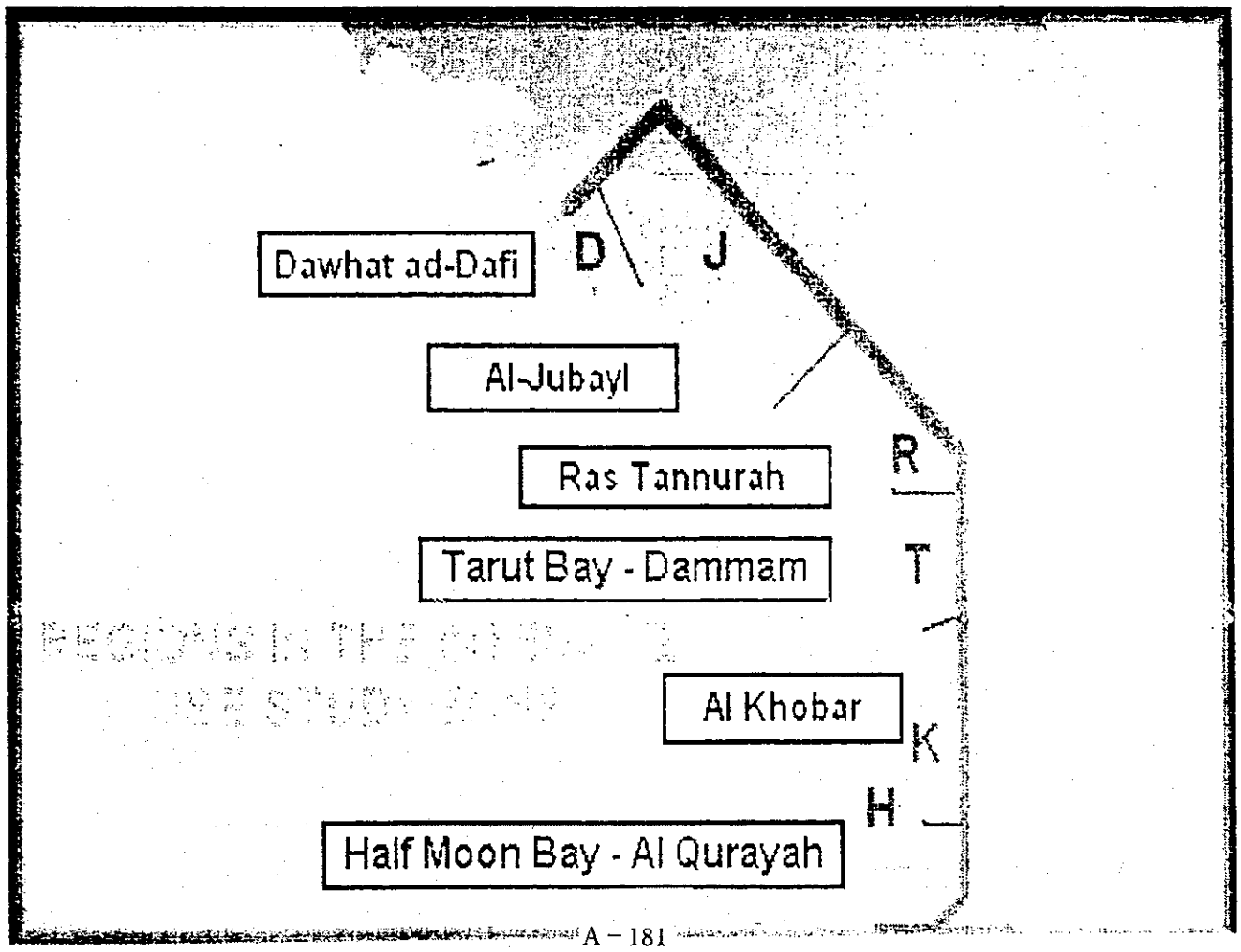
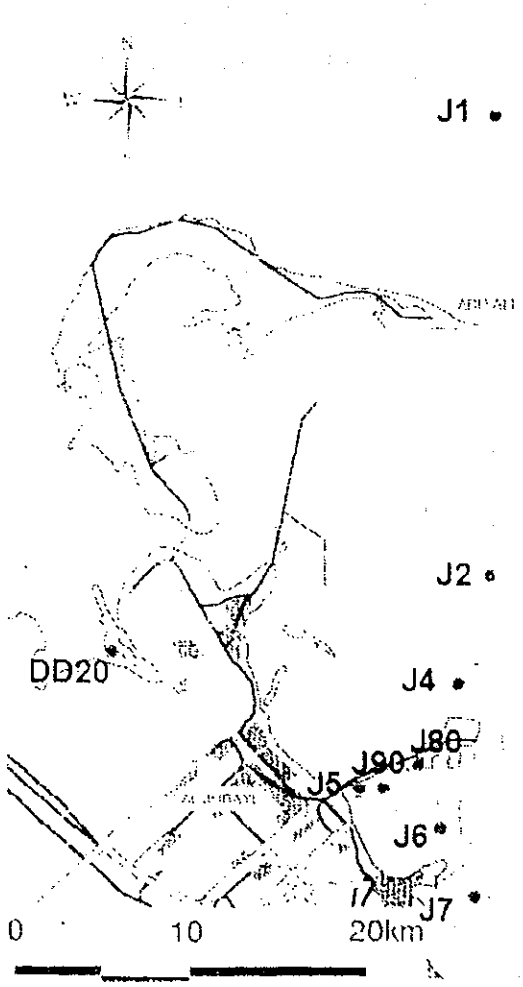
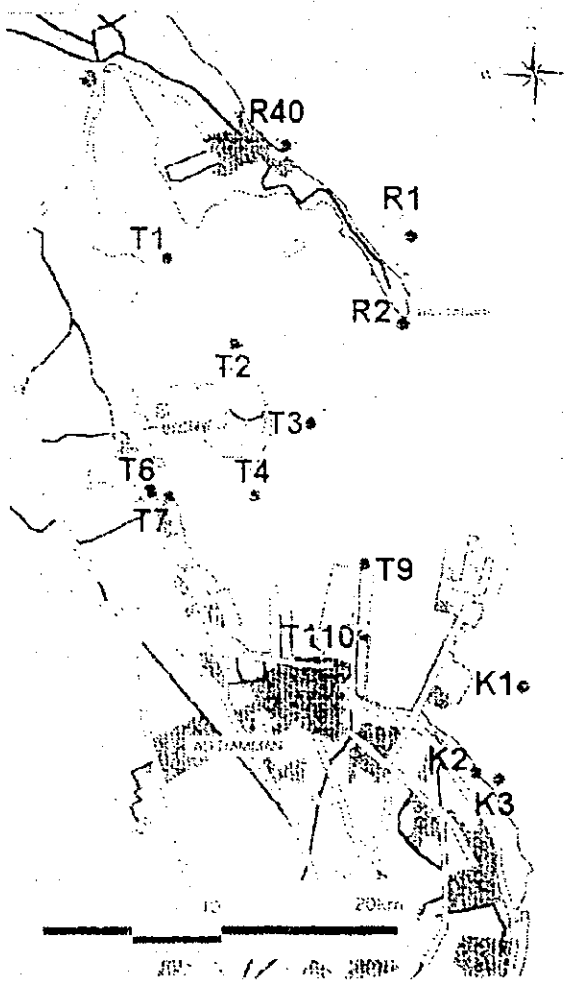
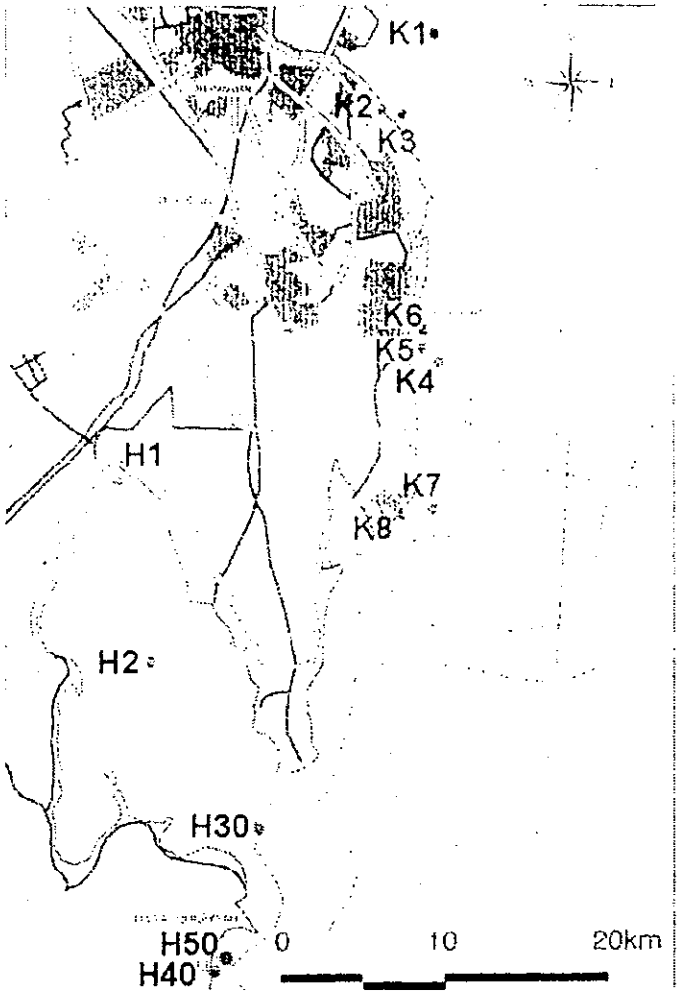


TABLE OF SAMPLING SITES FOR STAGE 3*

No.	Site	Region	Site Name	Latitude	Longitude	Purpose	Site Description
1	D20	Dafi Dawhat	Qumah Island	-	-	Oil pollution zone and impressive rehabilitation	West Qumah Island - mangroves recovering from 1991 spill
2	J1	Jubail	Abul Ali North	27o 23.4'	49o 44.6'	Regional Water quality background - Outer Level	Regional baseline 5 km N of Abu Ali at 28 m depth. Strong south current
3	J2	Jubail	Berri Oil Field	27o 16.8'	49o 42.1'	Offshore oil field	South Berri oil field 30 m deep. Sediment effected by drilling
4	J4	Jubail	North Jubail	27o 07.6'	49o 41.1'	Water Quality background Jubail Port Entry Level	1.5km north of Jubail port (5 m deep)
5	J5	Jubail	Jubail Shared Outfall	27o 03.5'	49o 38.2'	Water quality of shared industrial outfall	Shared outfall (2 m deep). High temperature (>30°C), blue green algae
6	J7	Jubail	South Jubail	27o 01.0'	49o 42.2'	Zone J Water Quality Background clear Level	2.5km SE of Jubail port (7 m deep). Port pollutants flow through
7	J6	Jubail	Jubail Harbour	27o 02.5	49o 41.0'	Assess WQ in harbour	General mixing zone of Jubail port
8	J80	Jubail	Jubail Boat Harbour	27o 01.9	49o 39.1'	Workboat harbour water & sediment quality	Small boat marina in Jubail port (3 m deep). Refuelling and maintenance
9	J90	Jubail	Near Jubail Outfall	27o 03.8'	49o 37.6'	Outfall. Water quality in the mixing zone	Almost same as No 5. Sediment conditions may be better
10	R3	Ras Tan	Sea Island Terminal	26o 36.0'	50o 12.0'	Zone R Background Water Quality	Deep water area. 2 x 2 km. Water flows through this site to Tanut
11	R2	Ras Tan	Ras Tanura Spit	26o 37.1'	50o 11.0'	To assess oil pollution levels in sediments	The site is in shallow water area where tar balls are present in sands
12	R40	Ras Tan	Refinery Outfall			Water and sediment quality near refinery outfall	Water depth about 2 m. Seagrass beds present in area
13	T1	Tanut Bay	North Tanut Bay	-	-	To assess water & sediment quality	Shallow zone with urban inputs of nutrients and wastes
14	T2	Tanut Bay	Tanut - Pier	26o 36.8'	50o 05.0'	Assess effect of diffuse residential HW discharges	1.5 km north of STP on Tanut Is. (2 m deep). Nutrient levels look high
15	T3	Tanut Bay	Tanut - East			Zone T Water Quality Background (central area)	East of Tanut. Extensive seagrass in relatively clear water (depth 2-3 m)
16	T4	Tanut Bay	Tanut - Dam	26o 31.5	50o 04.5'	Assess water & sediment quality in fishing harbour	Fish pens (2-3 m deep) affected by sewage, cleaning and maintenance
17	T6	Tanut Bay	Qatif-Awamiyah urban dram	26o 31.2'	50o 02.3'	Assess WQ at mouth of major urban drainage	Drain from Qatif STP which enters Tanut Bay
18	T7	Tanut Bay	Qatif-Awamiyah dram mouth	26o 31.2'	50o 02.3'	Assess effect of dram on nearby mangrove	Mangrove habitat to the south side of Qatif dram
19	T9	Dammam	Entrance of Fish Harbour	-	-	PCB at entrance	Harbour - fish boat maintenance, lay-ups and repairs (2-3 m deep)
20	T10	Dammam	Middle Fishing Harbour	26o 27.8	50o 08.6'	To determine extent of existing pollution	Narrow harbour (2-3 m deep). PCBs found in previous years.
21	K1	Khobar	Dammam South	26o 22.8	50o 15.6'	Zone K Water Quality Background (Entry Level)	5 km west of Ras Ras (depth 12m). Clean, high seagrass present
22	K2	Khobar	SAFCO outfall	26o 24.0	50o 13.6'	To assess water quality of a fertiliser plant outfall	Close by SAFCO outfall
23	K3	Khobar	SAFCO - mid-	26o 23.5'	50o 13.2'	Assess WQ [illegible]	2 km south of SAFCO outfall. Sediment [illegible]
24	K4	Khobar	Khobar Central	26o 20.0	50o 13.2	Zone K Water Quality Background	2 km north of Khobar STP. Water depth about 5 m
25	K5	Khobar	Khobar STP outfall	26o 18.0'	50o 13.2'	Assess WQ in the STP outfall mixing zone	At Khobar STP outfall. Depth 5 m. Water clarity low
26	K6	Khobar	Khobar South	26o 13.0'	50o 13.2	To assess water quality south of STP mixing zone	South of initial Khobar STP mixing zone
27	K7	Khobar	Desalination Plant Intake	26o 10.5	50o 13.5	Zone K WQ Background (Southern Area)	2 km South of STP outfall. Water depth about 8m
28	K8	Khobar	Desalination Outfall	26o 9.5'	50o 13.0'	Assess effect of desalination plant discharge	Close to the desalination plant intake. Water depth about 4m
29	H1	Half Moon	Half Moon Bay - North	26o 10.0'	50o 02.0'	Water Quality and Circulation Profile (North)	Inner part of Halfmoon bay. High salinity (>50). Water depth about 5-6m
30	H2	Half Moon	Half Moon Bay - mid	26o 08.0'	50o 05.0'	WQ and circulation profile (Central)	Center of Halfmoon Bay. Water depth about 5m
31	H30	Half Moon	Half Moon Bay - South	26o 03.0'	50o 10.0'	WQ and Circulation Profile (Entrance)	Mouth of the Halfmoon Bay. Open water
32	H40	Qurayah	Power Station Intake	-	-	Water Quality Background	Accessible by car
33	H50	Qurayah	Power Station Outfall	-	-	Check WQ near powerhouse mixing zone	Accessible by car







ORIGINAL SCHEDULE OF SITE SAMPLING WORK FOR STAGE 3 (OCT-NOV 1999)

Date	Region	Transport	Sampling stations					Comment	Tide times and heights (m)
Saturday 16-Oct	KHOBAR	Cars only	K2	-	-	-	-	4WD	0816 / 1.7; 1431 / 0.5; 2101 / 1.8
Sunday 17-Oct	TARUT	Cars only	TI20	T6	T7	-	-	4WD	0856 / 1.6; 1521 / 0.6; 2156 / 1.7
Monday 18-Oct	TARUT	Qatif Marina	T4	T3	T2	-	-	Coast Guard	0417 / 1.0; 0951 / 1.6; 1628 / 0.8
Tuesday 19-Oct	RAS TANURA	Ras Tanura	R2	R1	R40	(T1)	-	Coast Guard	0554 / 1.1; 1112 / 1.5; 1751 / 0.8
Wednesday 20-Oct	-	-	-	-	-	-	-	Helpin Lab.	0720 / 1.0; 1247 / 1.6; 1909 / 0.7
Thursday 21-Oct									0821 / 0.9; 1359 / 1.7; 2013 / 0.7
Friday 22-Oct									0905 / 0.8; 1452 / 1.9; 2105 / 0.6
Saturday 23-Oct	TARUT	Dammam Port	TI10	I9	K1	K3	-	Coast Guard	0326 / 2.0; 0942 / 0.6; 1537 / 2.0
Sunday 24-Oct	-	-	(K2)	-	-	-	-	Helpin Lab.	0404 / 2.1; 1017 / 0.5; 1619 / 2.2
Monday 25-Oct	KHOBAR	Khobar Marina	K4	K5	K6	K7	K8	Coast Guard	0440 / 2.1; 1051 / 0.3; 1701 / 2.3
Tuesday 26-Oct	HALF MOON	HM Marina	H1	H2	H3	H40	-	Coast Guard	0517 / 2.1; 1127 / 0.2; 1743 / 2.3
Wednesday 27-Oct	HALF MOON	Cars only	H50	(H40)	-	-	-	Coast Guard	0556 / 2.1; 1205 / 0.2; 1827 / 2.3
Thursday 28-Oct									
Friday 29-Oct									0719 / 2.0; 1332 / 0.2; 2004 / 2.2
Saturday 30-Oct	JUBAIL	Cars only	Pack gear, drive to Jubail, meet Coastguard					Travel by Car	0755 / 1.4; 1427 / 0.3; 2107 / 1.8
Sunday 31-Oct	JUBAIL	Jubail Port	J1	J2	J4	J80	-	Coast Guard	0849 / 1.3; 1527 / 0.4; 2210 / 1.7
Monday 1-Nov	JUBAIL	Jubail Port	J7	J6	J5	J90	J5	Coast Guard	0349 / 0.8; 1060 / 1.2; 1640 / 0.5
Tuesday 2-Nov	DAFI DAHWAT	Dafi Marina	DD20			Return to MEPA Laboratory		Coast Guard	0621 / 0.7; 1136 / 1.2; 1804 / 0.5
Wednesday 3-Nov	-	-	-	-	-	-	-	Helpin Lab.	0745 / 0.7; 1316 / 1.3; 1928 / 0.5

LIST OF MEPA-JICA FIELD EQUIPMENT - OCTOBER 1999

Equipment	Specification	Q'ty
Sampling Equipment		
Water sampler (Van Dorn 6 litre)	rubber band closing type, 6 litter	1
Water sampler (Van Dorn 10 litre)	rubber band closing type, 10 litter	1
Messengers for water samplers	chrome-brass	3
Eckman grab sediment sampler	chrome plated; 0.04 m² gape	1
Van Veen grab sediment sampler	stainless steel; 0.12 m² gape	1
Soil samplers	polycarbonate tube corer + cap	10
Plankton nets	NXX-13 mesh size	2
Sampling buckets and bins	Assorted, 40 litre	4
Assorted ropes	50 m, 25 m, 15 m	4
Stainless scoops and sterile spatulas	Assorted pkts	6
Stainless Trays	Various	4
Plastic Trays	Various	2
Shackles	stainless steel	4
Cable Ties	Narrow	100
Field Instruments		
Water current meter	electromagnetic, 0 - 250 cm/s	1
Hydrolab portable multi-probe meter	Temp, pH, DO, conductivity, turbidity	1
Portable ORP meter	Redox measurement	1
Secchi plate	dia. 30cm white plate, rope 30m	2
Sounding lead	3.2 kg, rope 30m	1
Pocket colorimeter for Residual chlorine	Electronic with powders	1
Glass Thermometer	0-50 °C	2
Portable GPS	Battery powered non-DGPS	2
KVH Datascope	Compass and range finder	1
Wind Speedometer	Silva pocket type	2
Preservatives and Containers		
Crushed water ice	20 kg	
Whirl Pak sterile polythene bags	L (15x23cm) : 13 (Yellow), 13 (White)	26
	M (11x23cm) : 21 (Yellow)	21
	S (7.5x18.5cm) :55 (White)	55
Ziploc resealing bags	L (22x33cm) : 10	10
	M (12x22.5cm) : 15	15
Cooler Boxes (55 litre & 120 litre)	Assorted sizes	5
Formalin	1 litre bottle of 10% Solution	1

Equipment	Specification
Field Record Items	
Field Record and COC Sheets	Printed White paper - assorted forms
Canon land camera with films	Films 36 x 10 packs
Disposable underwater cameras	Plastic type
Waterproof Labels	Assorted
Diver's board with pens	Magnetic self-cleaning
Waterproof marker pens, pencils & tape	Various
Miscellaneous	
Adhesive Tapes	Various
Razor blades	Packets of ss blades
Trash bags	Various
Disposable sterile polyethylene gloves	Box of latex disposable type
Kimwipes	Box
Replacement batteries	Various
Small hand tools	Packet of various hand tools
Distilled water in wash bottle	Various sizes
Health, Safety & Diving Equipment	
Spray jackets, hats, sun glasses	personal items
Protective cotton gloves	packet
Field First Aid Kit	
Sunprotection lotion	bottles
Fins, snorkel and masks	personal sets

1999/10/16

FIELD RECORD SHEET
MEPA/JICA PROJECT

Samplers name:

Site No.: K1 Location:

GPS [illegible]	Latitude [illegible]	Longitude [illegible]	
Date	8 nov 99	Time	12:35

Weather Condition

Weather	[illegible]	Temperature (°C)	[illegible]	Cloudiness	[illegible]
Wind Direction	[illegible]	Wind Speed (m/s)	[illegible]	Wave height	< 1

Water Condition

Tide		Depth (m)	[illegible]
Current Direction	[illegible]	Current Speed (m/s)	[illegible]

Water Quality Surface

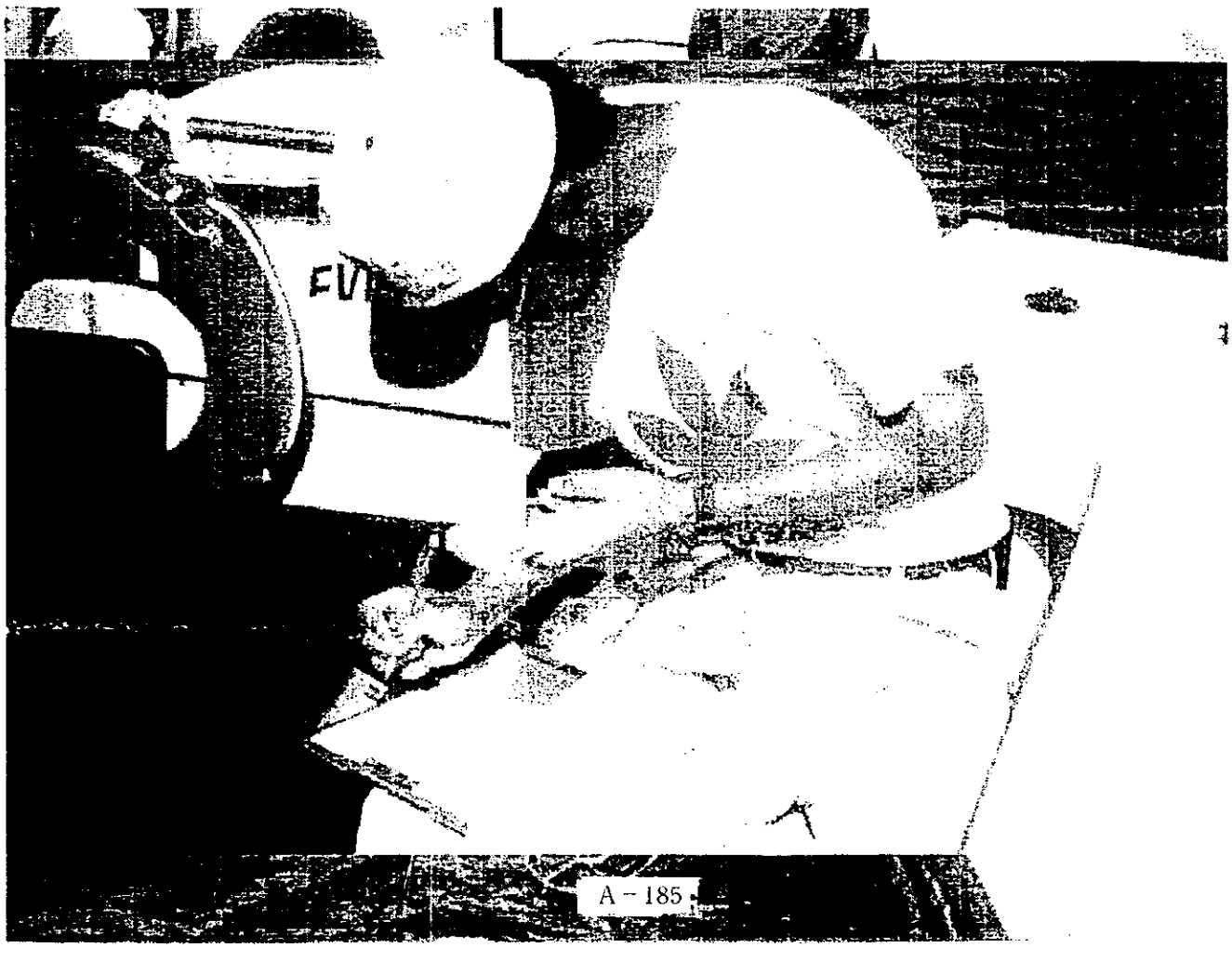
Temperature (°C)	27.65	Water color	[illegible]
Salinity	[illegible]	Odor	[illegible]
pH	8.20	Sheen	[illegible]
DO (mg/l)	[illegible]	Debris	[illegible]
Turbidity (NTU)		Res. Chlorine	0.07
[illegible]	[illegible]	[illegible]	[illegible]

Sediment Quality

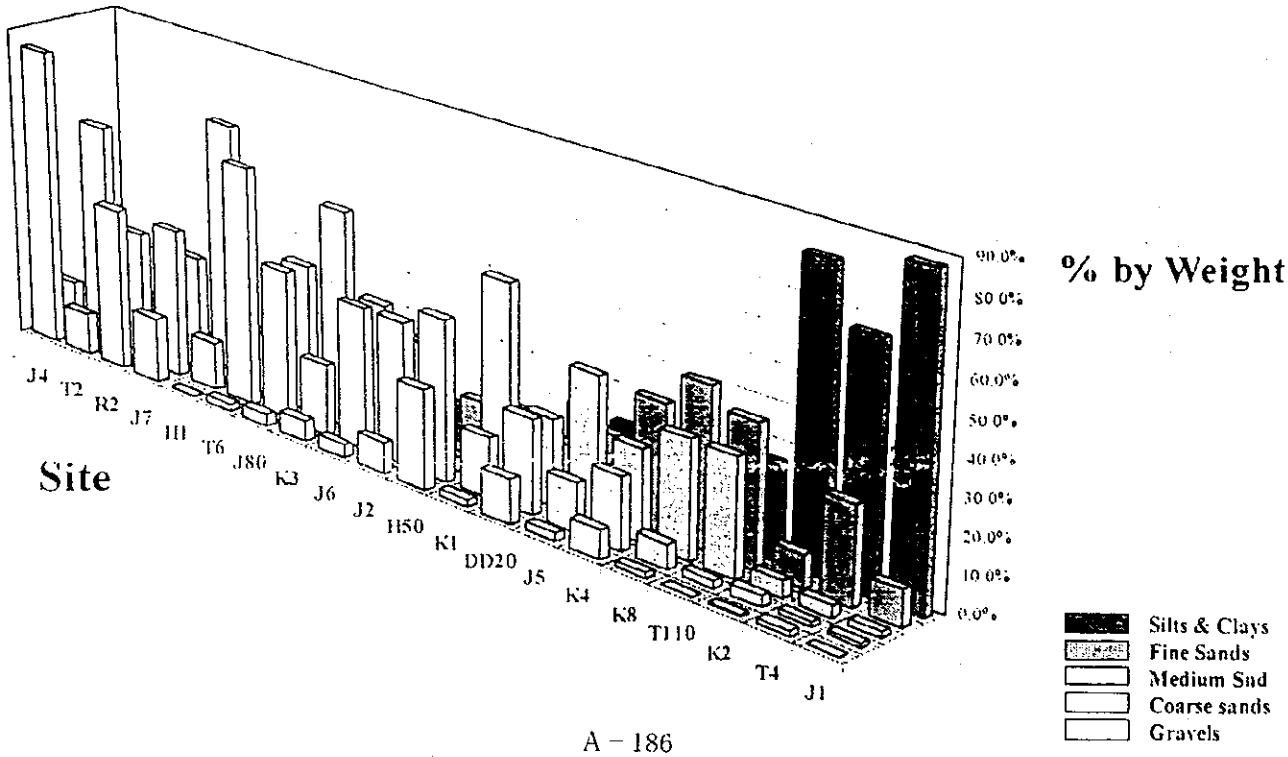
Sediment Color	[illegible]	Temperature (°C)	[illegible]
Odor	[illegible]	ORP (mv)	[illegible]
Texture		[illegible]	[illegible]

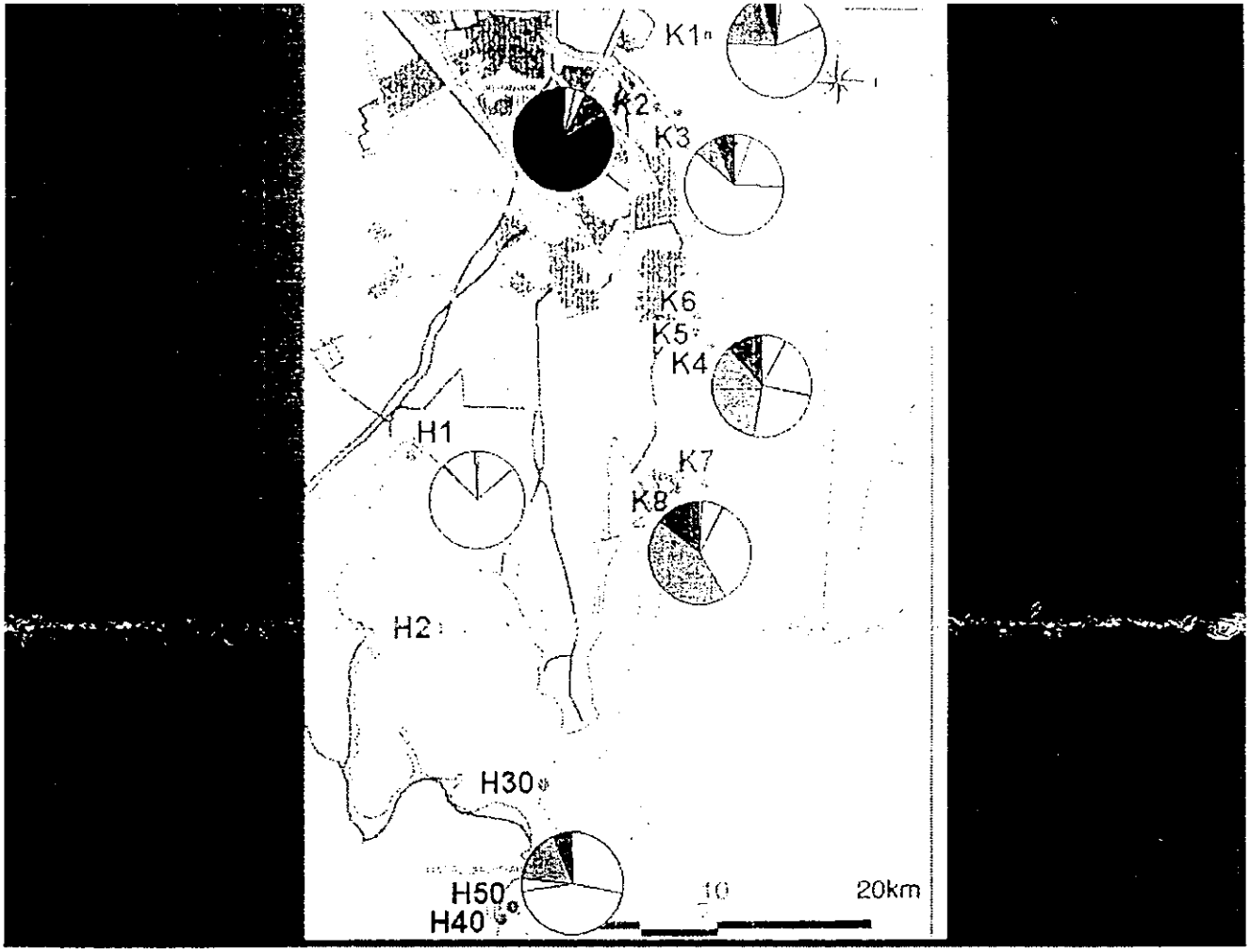
Observations and Comments

[illegible]



SEDIMENT COMPOSITION

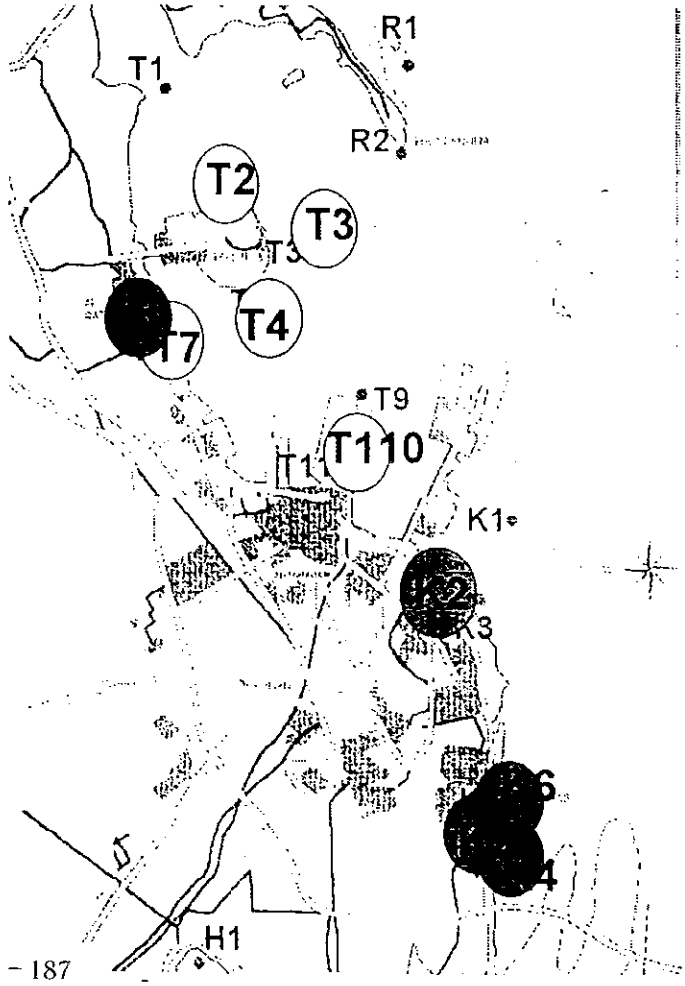




PRELIMINARY BACTERIA RESULTS

- <2,500 cfu
- >5,000 cfu
- >10,000 cfu
- >20,000 cfu

24-48 hr incubation with M-ENDO at 35°C, pH 7.2



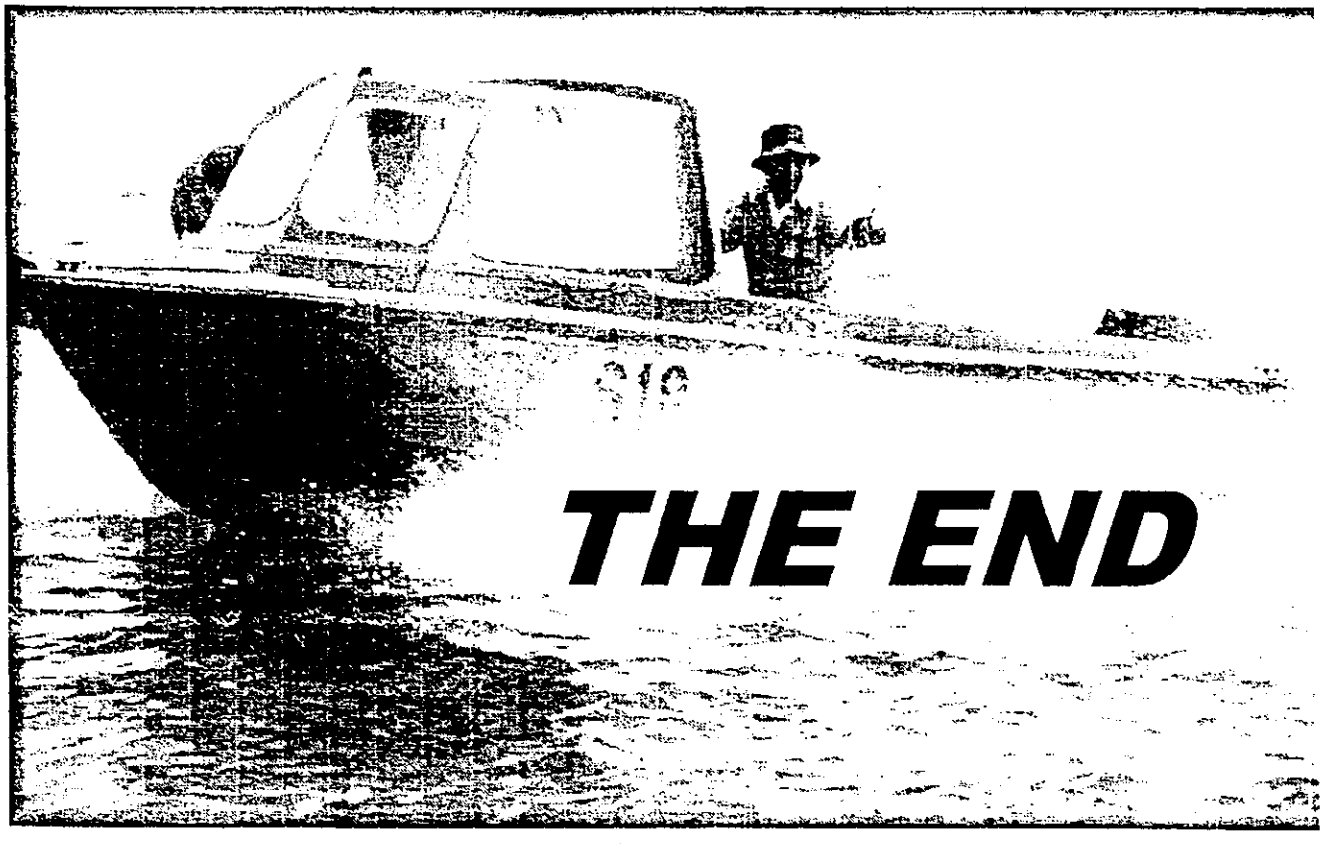
NUMBER OF REGIONS, SITES, SAMPLES, FIELD PARAMETERS AND LABORATORY ANALYSES IN STAGE 3

Regions	Sites	Field Data Records	Parameters Analysed	No. of Lab Analyses
6	34	544	33	353

RECORDED FIELD WATER PARAMETERS									
GPS & Met Data	°C	pH	DO	Sal.	Free Cl	Clarity	Current Flow	Current Directn	Sediment Descriptn
34	34	34	34	34	34	34	22	22	24

LABORATORY WATER ANALYSES									
Plankton	TDS	TSS	Total KN	Total P	NH4	Chlor. A	TOC/ COD	Mg^{++}	As
28	9	21	20	20	12	15	16	5	8
Cr	Hg	8 other metals	CN	Oil + Grease	TPH	BTEX	Phenol	Resid. Cl	Total Coliform
8	5	11	4	9	4	3	3	8	9

LABORATORY SEDIMENT ANALYSES									
PSA	Ign. Loss	TOC	As	Cr	Hg	Vn	8 other metals	TPH	BTEX
21	13	16	14	16	5	10	22	13	5



Replacement of Speaker

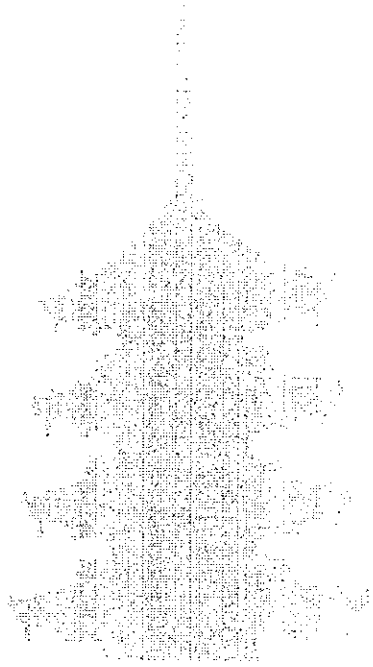
Because of the sudden unexpected happening to Mr. Qusai Bohlaiqah, Staff of Environment Section of MEPA Eastern Province, Mr. Aziz Al-Omari, Chief of Environment Section of MEPA Eastern Province presented the summary of various matters about the Laboratory Set-up including equipment installation.

According to the sudden request by the chairman after the presentation by Mr. Al-Omari, Mr. Mamoru Sato of JICA Study Team presented the issues he concerned.

Next few pages show his important items of presentation.

Laboratory Set Up

Mr. Mamoru SATO
JICA Project Team



Purpose

- Strengthen MEPA's ability of field monitoring
- Monitor the seawater and sediment quality of Eastern Province
- Improve the basic ability to manage laboratory

Analysis Items in This Study

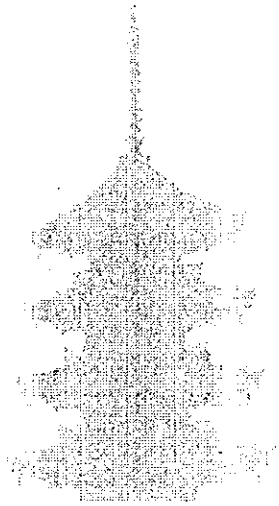
- Metals (include As and Hg)
- BTEX
- Nitrogen
- TOC
- Coliform
- Others

Major Equipment Introduced

- Gas Chromatography (GC-FID)
- Atomic Absorption Spectrometer (AAS)
- Total Organic Carbon meter (TOC)
- Distillation apparatus
- Spectrophotometer
- Oil Content Meter

Laboratory Management

- Analysis method
- Quality Control
- Health and Safety
- Equipment maintenance
- Education

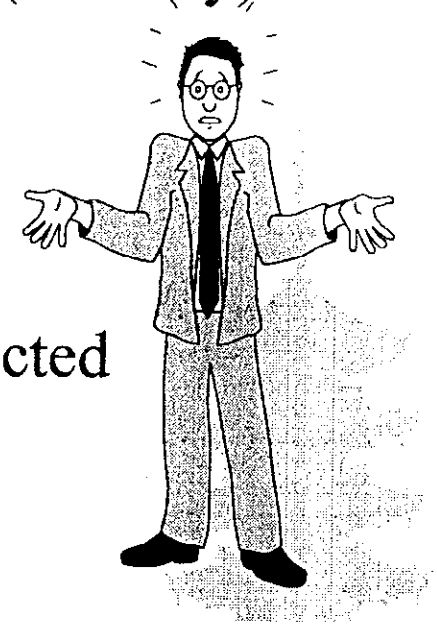


Documents for Management

- Analysis Procedures
- Health and Safety Plan
- Equipment Maintenance Procedure
- Daily Operational Manual of Equipment

Difficulties during Laboratory Set Up

- Purchase of the Laboratory Equipment and Chemicals (delivery)
- Personnel of MEPA
- Utilities of Laboratory
- National Standard Method
- Characteristics of the Collected Sample



Present Conditions and Future Plans

- Sample Analysis
- Preparation of the Documents
- Personnel (management, specialist)
- Future image of the laboratory
- Resources

Thank you for your Attention

Chiyoda Dames and Moore

MEPA/JICA PROJECT
Marine Monitoring and Management of the Gulf Coastal Waters
SECOND WORKSHOP
November 17, 1999

Panel Discussion

1. *Q.* *When did Project start on Satellite Analysis? KFUPM is willing to extend cooperation for satellite data analysis in particular reference to the oil spill system.*
   A (Mishra): The analysis was started at the start of 3rd stage. Due to lack of the opportunity the visit to KFUPM could not take place but hope to cooperate during 4th stage.

2. *Q:* *Land based sources were reviewed or not?*
   A (Hamdan): Many components to Study on regional and national level, including cooperation with many other agencies apart from JICA were considered.

3. *Q:* *What is the public opinion on oil spill? Positive news required because public is very negative.*
   A (Aziz): Study will focus on many sources not only on the oil spill.

4. *Q:* *What does the meaning of National Standard stands for?*
   A (Sato): Japan has National Standard but it seems KSA does not have National Standard Methods.
   (Hamdan): ROPME (Monaco Laboratory Agreement, UNESCO) exists and it will be provided to the Team.

5. *Q:* *Will laboratory be available after June 2000 for the use by the Ministry of Agriculture (Fisheries)?*
   A (Hamdan): MEPA, as a focal point, is ready to cooperate with all agencies – both Government Department and Private Sector. Long term outlook is very important.

6. *Q:* *What kinds of results you getting to indicate which activities are of most concern?*
   A (Robert): It is too early to say but ad-hoc coastal development is an issue; as is sewage discharge.
   (Aziz): It is only Team's observation. Till now no conclusion, we are evaluating needs and more further information.

7. *Comment:* *Concrete recommendation should not be mentioned at this stage. We are not in a stage to tell, recommendation should be done after examining the results.*

8. *Comment:* *Our fishes are examined and 100% healthy. Fishes are good and edible without any worry.*

A (Hamdan): The Team concentrated only on Field-work. No recommendation is going to be done at this stage.

9. *Q:* *Was the image 3-Dimensional? How oil spill will be monitored if occurred within 16 days (no TM coverage)?*

A (Mishra): There was no 3-D image shown during the presentation. As far as oil spill is concerned there are other satellites available for monitoring purposes. RADARSAT can be used for oil spills.

10. *Aziz:* *Please visit the laboratory.*
The release of the results is authorized only to MEPA. THANKS.

添付資料 G

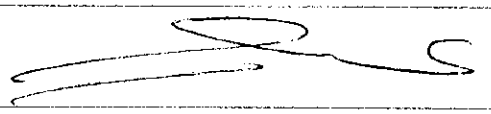
小セミナー関連資料

List of Participants
Resume of Speech

Lunch Time Seminar (1)

Date: 21, June, 00
Title: Laboratory Practice - 1 (Important Procedures)
Speaker: Yoshitaka Imaeda

Attendance

Name	Signature
Adel M. Kusti	
Yousef Al-Helal	
Qussi M Bohliegah	Qussi M.
HIROYUKI OHI	H. O.
Kozo Sakaguchi	坂口 幸三
Alam Nizami	

Laboratory Practice (1) - *Important Procedure* –

1. **Introduction:** Importance of Environmental Analysis
2. **Some Chemicals are harmful:** Protect your health by yourself
3. **Matrix (sample) is complex:** Why environmental analysis is complicated
4. **Concentration is low:** Prevention of contamination is very important
5. **Units of Measurement:** Meaning of ppm and ppb
6. **Significant Figure:** 1 is not equal to 1.0
7. **Sample Preservation**
8. **Chain of Custody Procedure:** Prevention of Mistakes
9. **Errors in Analysis**
10. **Precision and Accuracy**
11. **Standard and Calibration**
12. **Sensitivity**
13. **Detection Limit**
14. **Linear dynamic range**
15. **On the Job Training**

Contamination Control

Environmental measurement processes are prone to contamination problems. Analytes in many environmental samples are present at trace levels and contamination can be a significant source of error.

Potential sources of sample contamination

Sample collection

- Equipment
- sample handling
- sample preservative
- sample container
- ambient contamination

Sample transport and storage

- sample container
- cross contamination from other samples or reagents

Sample preparation

- sample handling
- dilutions
- glassware
- ambient contamination

Sample analysis

- instrument carry-over
- reagents
- glassware and apparatus

Table F-2 Sample Containers, Preservatives and Holding Times

Analysis Parameter	Container	Volume (ml)	Preservation	Holding Time
Total Suspended Solid	Plastic	1000	Cool, 4°C	48hrs
Residual Chlorine	Plastic	1001	Cool, 4°C	Immediately
COD / TOC Ammonia, Total Kjeidahl Nitrogen Total Phosphorus	Plastic	2000	Cool, 4°C	48hrs
Cyanogen	Plastic	500	Cool, 4°C add NaOH, pH>12	14days
Metals	Plastic	500	add HNO_3, pH<2	28days (Hg) 6 months (others)
Phenols	Glass	500	Cool, 4°C add N_2SO_4, pH<2	28days
Oil &Greese, TPH	Glass	1000	Cool, 4°C add HCl, pH<2	28days
BTEX (Benzen, Toluene, Etylbenzen, Xylene)	Glass with teflon liner cap	250	Cool, 4°C add HCl, pH<2	14days
Chloropyll	Plastic	1000	Cool, 4°C	Immediately to filtrate 28days (Frozen)
Total Coliform	Plastic (sterilized)	100	Cool, 4°C	24hours

Chain-of-Custody Procedures

It is essential to insure sample integrity from collection to data reporting. This includes the ability to trace possession and handling of sample from the time of collection through analysis and final disposition. This process is referred as chain of custody.

The following procedures summarize the major aspects of chain of custody.

Sample labels

Use labels for each sample to prevent sample misidentification. Gummed paper labels or tags generally are adequate.

The following information should be included at least: sample identification number, name of collector, date and time of collection, place of collection, and sample preservative.

Sample seals

Use sample seals to detect unauthorized tampering with samples up to the time of analysis.

Attach seal in such way that it s necessary to break it to open the sample container. Affix seal to container before sample leaves custody of sampling personnel.

Field log book

Record all information pertinent to a field survey or sampling in a bound log book.

As a minimum, include the following in the log book: purpose of sampling, location of sampling point, name and address of field contact, type of sample and method of preservation

Chain-of-Custody record

Fill out a chain-of custody record to accompany each sample or group of samples.

The record includes the following information: sample number, signature of collector, date and time of collection, sample type, signatures of parsons in the chain of possession, and inclusive dates of possession.

Sample analysis request sheet

The sample analysis request sheet accompanies samples to the laboratory. The collector completes the field portion of the sheet that includes most of the information noted in the log

Sample delivery to the laboratory

Deliver samples to laboratory as soon as practicable after collection. Insure that samples are accompanied by a completed COC record and a sample analysis request sheet.

Receipt and logging of sample

In the laboratory, the sample custodian inspects the condition of the sample, reconciles label information against the COC record, logs sample in the laboratory log book, and store it in a secured storage room until it is assigned to an analyst.

Assignment of sample for analysis

Once sample is in the laboratory, the supervisor or analyst is responsible for its care and

Chain-of-Custody Sheet (Water Samples)

No. 2W Page: 1 of 1

Date Sampled: 17 Oct

Sampler:

Remarks:

Surface Seawater(SS), Bottom Seawater (BS), Waste Water (WW)
Glass (G), Plastic (P), WhirlPack (W), Acid (A), Sodium Hydroxide (S)

No.	Sample ID	Time Sampled	Type of Sample	Bottle Type	Volume (ml)	Q'ty	Residual Chroline	TSS	COD/TOC	NH_3 (Ammonia)	TKN (Kjeldahl Nitrogen)	T-P (Total Phosphorus)	CN (Cyanogen)	Mg (Magnesium)	Hg (Mercury)	As (Asenic)	Cr (Chromium)	Other Metals (Cd,Co,Cu,Ni,Pb,Zn)	Phenol	Oil & Grease	BTEX	TPH	Chlorophyll	Total Coliform	Chlorinated Hydrocarbons	Notes
	T120	12:35	SS	P	1000	1	✓																			
	T120	12:35	SS	PA	2000	1		✓	✓	✓	✓															
	T120	12:35	SS	PA	500	1							✓	✓	✓	✓	✓									Extra
	~~T120~~		~~SS~~	~~PA~~	~~500~~	~~2~~																	✓			~~including Spare~~
	T6	14:50	WW	P	1000	1	✓															✓				
	T6	14:50	WW	P	1000	1																				
	T6	14:50	WW	PA	2000	1		✓	✓	✓	✓															
	T6	14:50	WW	PA	500	1							✓	✓	✓	✓	✓									
	T6	14:50	WW	W	125	2																	✓			Including Spare
	T120	12:35	SS	P	1000	1																✓				
	T7	16:15	SS	P	1000	1	✓																			
	T7	16:15	SS	P	1000	1																✓				
	T7	16:15	SS	PA	2000	1		✓	✓	✓	✓															
	~~T7~~ T7	16:15	SS	W	125	2																	✓			
	~~T7~~																									

Supplied to Laboratory by :

(Name) Hashim AL-Zawad

(Signature)

(Date/Time) 17 oct 99

Received at Laboratory by :

(Name) HIROYUKI OHI

(Signature) H. Ohi

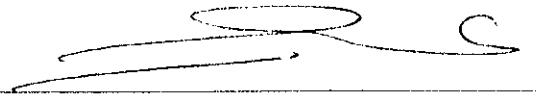
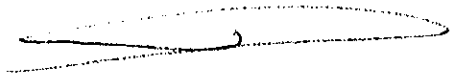
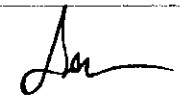
(Date/Time) 18 oct 99. 9:20

1999/10/6

Lunch Time Seminar (2)

Date: 2, July, 00
Title: Sampling Practice - 1 (Documentation and Recording System)
Speaker: Khaled Al Rasheed

Attendance

Name	Signature
Adel M. Kusti	
Yousef Al-Helal	
Qussai M. Bohlegah	Qussai M.
HIROYUKI OHI	H.O
Kozo Sakaguchi	
Alam Nizami	

FIELD TEAM TUTORIAL

Date: 2. July, 00

Title: Planning with Navigation Charts and Satellite Position Fixing

Planning Sampling

1) Sampling Site Selection

- Sensitivity/Detectability for Target contaminants
- Environmental conditions/Geographical features
- Accessibility/Convenience
- Unchangeability etc.

--->Navigation Charts, Aerial photography/Satellite Image, Site inspection

2) Sampling time, frequency and period

- Fluctuation of the Target contaminants
- Tides etc.

3) Number of Samples

- Reliability
- Statistical analysis

4) Sample handling methods.

- Sample number check
- Storage
- Transport
- Delivery

Chain-of-Custody Sheet (Sediment/Soil and Biota Samples)

No. Page : of

Date Sampled: 24-25/6/2000

Sampler: M-RASHEED, Sushail, Kusti

Remarks:

No.	Sample ID	Time Sampled	Type of Sample	Bottle Type	Volume (mL)	Q'ty	Particle Size	Ignition Loss	COD/TOC	Hg (Mercury)	As (Asenic)	Cr (Chromium)	V (Vanadium)	Other Metals (Cd,Co,Cu,Ni,Pb,Zn)	BTEX	TPH	PCBs	Plankton, Biota	Notes
	J1	12:00	SD	W	350	1	✓	✓	✓	✓	✓	✓	✓						
	J1	12:00	SD	W	125	1	✓												
	J1	12:00	SD	G	350	1									✓	✓			
	J1	12:00	B	W	125	1												✓	
	J2	14:30	SD	W	350	1					✓	✓	✓						
	J2	14:30	SD	W	125	1	✓												
	J2	14:30	SD	G	350	2									✓				1 for Beeah
	J4	15:20	B	W	125	1												✓	
	J80	8:00	SD	W	350	1					✓		✓						
	J80	8:00	SD	W	125	1	✓												
	J80	8:00	SD	G	350	2									✓	✓			1 for Beeah
	DD20	17:30	SD	G	350	1										✓			
	DD20	17:30	SD	W	350	1				✓	✓	✓	✓						
	DD20	17:30	SD	W	125	1	✓												

Supplied to Laboratory by : (Name) M-RASHEED

(Signature)

(Date/Time) 24/6/2000 / 10:30

Received at Laboratory by (Name) Alam Nizami

(Signature)

(Date/Time) 26/6/2000 11:10

Re-Read 7/2

FIELD RECORD SHEET

MEPA/JICA PROJECT

Samplers name :

Site No.: J80 **Location:**

GPS, DOP:	Latitude (N): 27 05 11	Longitude (E): 4940.34
Date 6/25/00	Time 5:50	

Weather Condition

Weather	fine	Temperature (°C)	35	Cloudiness	0
Wind Direction	335	Wind Speed (m/s)	3-4	Wave height	< 0.1

Water Condition

Tide		Depth (m)	6.9
Current Direction	—	Current Speed (m/s)	—

bottom **Water Quality** surface

29.86	Temperature (°C)	29.93	Water Color	pale green	
42.3	Salinity	42.25	Odor	no	
7.97	pH	8.00	Sheen	no	→ like
2.56 (43.9)	DO (mg/l)	2.75 (46.9)	Rubbish	no	
0.7	Turbidity (NTU)	0.0	Res. Cl (as Total)	0.06	
	Water Clarity (m)	6.0		0.12	

Sediment Quality

Sediment Color	dk gray	Temperature (oC)	30.2
Odor	none	ORP (mv)	-27
Texture	sandy		

Observations and Comments

5:54 Exit.

Lunch Time Seminar (3)

Date: 8, July, 00
Title: Interpretation and Presentation of Results (Graphs and Statistics)
Speaker: Robert Hilliard, Adel Qusti

Attendance

Name	Signature
Alam Nizami	
Khalid Busbait	
Khaled S. Al-Rasheed	
AZIZ Alomair	
Adel M. Kusti	
Rob Hilliard	
Y. SHIMAZU	
K. TANAKA	
T. Ike	
Yousef Al-Helal	
Qusai M. Bohdaigah	
Yozo Sakaguchi	
HIROYUKI OHZ	
JAMAL KAZIM	

DESIGNING AND INTERPRETING MONITORING PROGRAMS

1 "KNOW YOUR CONTAMINANTS"

A good environmental monitor and field sampler needs to understand the different types of 'contaminant' that occur in the marine environment, especially their sources, their characteristics and typical behaviour.

Without this knowledge, no one can develop a reasonable ability to plan a sampling program, or interpret its results. But what exactly is a contaminant? We already have a working definition at MEPA:

"Something that should not be there..."

but we should also add: ***"...above its expected and/or essentially benign concentration"***

There are two main types of contaminant:

A) **'Artificial' (Man-Made) Compounds**. For example - PCBs, DDT, dioxins, other OCLs including amines and many herbicides/insecticides (part of "POPs"), organo-phosphates, plutonium, uranium-235, cobalt-90, tributyl-tin (TBT), plastic co-polymers, poly-silicanes, etc. There are over 200,000 listed artificial chemicals in the world.

B) **Naturally-Occuring Compounds**; but which are present in water, sediment or inside biota at unusually high levels (that is - at levels which produce either **toxic** or **biostimulating** effects). For example:

- **aromatic hydrocarbons** (from oil and refined oil products, low-temperature burning of organic material, smoke, etc. Includes the heavy molecular weight *polycyclic aromatic hydrocarbons* (PAH; part of "POPs") - as well as the light and volatile 1-3 ring BTEX compounds (benzene, toluene, ethylene, xylene and their derivatives)

- **metals** (eg. barium, iron, magnesium, manganese) and **heavy metals** (eg. cadmium, cobalt, copper, chromium, lead, mercury, nickel, tin, vanadium, zinc, etc), and metalloids (eg. arsenic, selenium). At **low concentrations** many of these metals are also **essential nutrients** (needed to sustain normal healthy growth and reproduction in plants or animals (eg. copper, zinc, selenium and even arsenic....).

- **biostimulants** (= organic food for bacteria, and "fertilisers" for algae and plants). For example, almost all soluble molecules containing **nitrate (NO3), nitrite (NO2), ammonia (NH3/NH4), phosphate (PO3) and even silicate (SO3) are powerful fertilisers** - and stimulate unwanted and rapid algae growth. This process includes increase in number and severity of toxic planktonic 'red tides' of dinoflagellates or cyanobacteria, plus also stimulate the growth of both native or introduced 'choking weeds and plants' (which can rapidly cover the floor of coastal lagoons and smother seagrass beds; for example: *Chaetomorpha, Cladophora, Caulerpa*, water hyacinth, introduced reeds and grasses). 'Food' for bacteria includes any **organic (=carbon-based) molecules** containing carbohydrates (sugars, starches and cellulose), proteins (collagen, muscle fibres), plant oils and animals fats, etc. At warm temperatures (>20°C) **all of these can be quickly used by bacteria for their respiration, rapid growth and division** (the bacteria multiply - use more oxygen, release more carbon dioxide and so cause de-oxygenation events, fish kills, etc)

- **Halides** (chlorine, flourine, bromine, iodine - all are toxic at low concentrations, but can occur naturally - especially in volcanic gases....)

- **pH changers**: Many acids (HCL, H_2SO_4, HNO_3) do occur naturally (volcanic gases) - but they are usually associated with chemical spills from ships and road tankers..... Spills of caustic soda (alkali - NaOH) are also not uncommon - but usually this impact is very temporary if sufficient water is present for adequate dilution....

2 "*CONTAMINATED*" AND "*POLLUTED*" WATER - IS THERE A DIFFERENCE?

There is a difference!

For 'clean' water, this can be called '*pristine*' or '*near-pristine*' if all measured contaminants are below all 'screening' and 'alert' values in the international/national guidelines and standards for the PROTECTION OF AQUATIC ECOSYSTEMS; eg. Class A in Japan).

PROTECTION OF AQUATIC ECOSYSTEMS is the highest standard applied by nations and many international conventions - it is generally higher than the standards set for human drinking water, cattle drinking water, crop irrigation, fishing activities, fish farming, and prawn or mollusc aquaculture.

For samples of sea water taken from offshore areas of the semi-enclosed Gulf where there has been no recent oil spill, '***near pristine***' is the more accurate term (because of the long history of oil spills and regular tanker discharges - both illegal and legal - across the majority of its waterways).

Where water or sediment is found to contain **one or more contaminants** at levels above their '*screening*' or '*alert*' value, then they are **contaminated.** So is it *slightly* or *moderately* contaminated? This depends on how close or how far the contaminant/s are above the alert value, plus the number of such contaminants.

When water or sediment is found to contain **one or more contaminants** at levels above their respective '*maximum permissible*' values set by the internationa/national guidelines and standards, then it is said to be **polluted** . Whether it is *moderately* or *grossly* polluted also depends on how close or how far the contaminant/s are above the maximum permissible value, plus the number of such contaminants.

From 'best' to 'worst' can be summarised as follows:

Pristine --> Near Pristine --> Slightly contaminated --> Moderately contaminated -->

'Grossly contaminated' (**not used**) = Slightly polluted (**not used**) = Moderately polluted --> Grossly polluted.

3 SOURCES OF CONTAMINANTS:

When designing a sampling program and interpreting the results for any site or region, it is important to have a good understanding of all possible sources of the contaminants that (a) may be expected (predicted) to be present, or (b) are discovered by chance!

For sources of plastics, litter, rubbish: (= 'gross pollution' / 'large items')	Fishing boats, recreational boats, ships, port workers, beach visitors, illegal dumpers, wind-blown debris from landfill tips, etc.
For sources of radioactive materials:	Medical/hospital equipment; scientific equipment; military equipment; Research and Medical Isotope Reactors, Nuclear Power Stations, Nuclear Fuel Reprocessing Facilities, Nuclear Powered ships and submarines; atmospheric fall-out from nuclear accidents (Chernobyl) and weapons testing.

For the other contaminants, we should start to complete the Table on the next page.

Using the following symbols, we should spend no more than 30 minutes on the following table:

++	=	important or biggest source
+	=	minor source
?	=	potential source
??	=	a possible but very uncommon source
empty space	=	unlikely or typically very minor source

Contaminant	Artificial Compounds					Metals		Heavy Metals	Metalloids	Biostimulants	Organic
Source	PCBs	Dioxins	OCLs	HC/PAHs	TBT	Ba	Mg	(Cd,Cu,Pb,Vn,Zn)	(As, Ga Se)	(NO_3, NH_3, PO_4)	'food"
Cargo Vessels											
Oil Tankers											
Oil Terminals											
Oil/gas prodn fields											
Ship Repair and Maintenance yards											
Boating marinas											
Fishing harbours											
Smoke											
Dumping											
Coastal Landfill											
Reclamation wks											
Sewage plants											
G-Water Septics											
Urban drains											
Urban/Road dust											
Factory dust											
Factory outfalls											
Power stations											
Desalinatn plants											

NOTES / COMMENTS:

4 BASIC STATISTICS FOR SAMPLING PROGRAMS"

4.1 Why Take Replicate Samples and Use Statistics?

To overcome the problem of inaccurate results due to **natural variation** in the field (**sampling error**) and also due to **measurement error** (caused by the variations when repeating laboratory procedures, or the systematic contamination of a measuring instrument).

4.2 What are causes of sampling/laboratory contamination? (already discussed in Sato-san's Seminar)

4.3 What are the Causes of Natural Variation? (to discuss and note here):

4.4 What is the Value of 'Pooling' Samples?

To reduce the number of field sample replicates that need to be taken.

So **how does pooling work**? Pooling reduces the amount of natural variation present in each field sample

4.5 What is True Replication and False Replication (Pseudo-Replication) - in the use of Statistics? To discuss...

4.6 The Basic Statistics that must be Understood by all Monitoring Designers/Intepreters

Understand the difference between **Precision** and **Accuracy**. Read introductory texts to statistics to help you understand and remember what is the difference, and when/when not to use the following:

Mean (average) versus **Median**
Parametric tests versus **Non-Parametric tests**
Standard Deviation versus **Coefficient of Variation** versus **Standard Error**
Degree of Significance ($p<0.05$) and **Confidence Limits**
The importance and meaning of **'Testing the Null Hypothesis'** by Statistical Tests
Statistical Power and its associated **'Type I'** and **'Type II'** errors
Cost effectiveness of **Analysis of Variance** for **'Before-After/Control-Impact' [BACI] designs.**

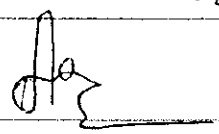
It is necessary only to understand these terms and their use - there is no need to become an 'expert'!

THE GOLDEN RULE: ***"IF QUANTITATIVE DATA AND STATISTICAL RESULTS ARE REQUIRED, ALWAYS CONSULT WITH A PROFESSIONAL STATISTICIAN WHEN DESIGNING YOUR SAMPLING PROGRAM!*** ***[so find one at a University and become friends!]***

Lunch Time Seminar (4)

Date: 9, July, 00
Title: Sampling Practice (Objectives, Logistics and Planning)
Speaker: Khalid Busbait

Attendance

Name	Signature
ALAM KIZAMI	
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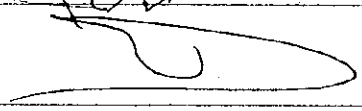
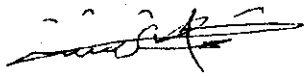
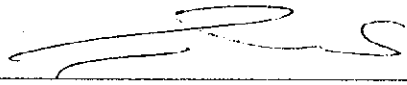
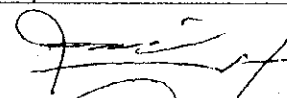
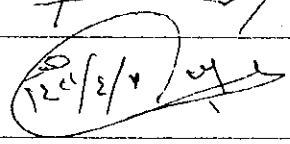
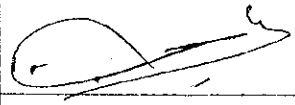
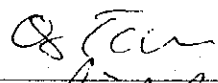
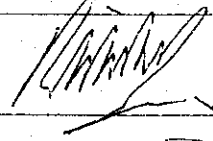
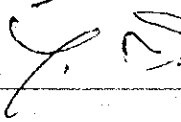
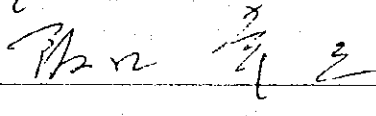
Yousef AL-Helal	
Qusai M. Bohlaigah	
Adel M. KUSTI	
Khaled S. Al-Rashood	
AZIZ W. Al-Omair	
Khalid Buskait	
KAZUTAKE TANAKA	
R. HIZUMO	
Y. SHIOMAZU	
Kozo Sakaguchi	

July 9, 2000
Khalid Busbait

Sampling Practice

Objectives, logistics and planning

• **Introduction**:
To examine the coastal seawater quality and the causes of water quality degradation along the Arabian Gulf you would need to consider the following things:

1. Monitoring Design:
Choosing the area of study
Identifying the sampling locations
Identifying the purpose of choosing those locations
Setting the kind of samples needed (Water, Sediment and Plankton) and the parameters for each location

2. Instrument Management

3. Data and Sample Analysis

What MEPA needs to run a good Water Quality Monitoring Program

1. One of MEPA requirement for each Facility activities is to make an Environmental Impact Assessment, so we can suggest to add one more requirement which is Water Quality Monitoring Program for each individual facility, for example, Desalination Plant, Power Plant and sewage system discharge.
2. Collect all the program reports from the facilities each year to come up with one complete report to give more details of the situation of water quality.

PRESENTING AND INTERPRETING RESULTS -

TABLES, GRAPHS, FIGURES AND PHOTOS

Introduction: To make reports that are useful for your boss and MEPA, it is important to present the data and, more importantly their meaning and implications, in a clear and easy-to-follow way. Good use of Tables, Graphs, Figures and Photographs helps you achieve this. If you learn how to use Excel and a simple paint/draw program such as Paint Shop Pro (PSP), you can achieve this goal effectively and easily.

1. **Site Location Figure**: Always include a location diagram. Take the study area from a navigation chart is the best way to make the 'foundation' of your figure (charts are the most accurate). Use the enlargement facility of the photocopier to make the study area occupy most of the page (or scan this part of chart to make a .jpg file, and add your sites by using a simple computer application such as PSP).

2. **Table/s of Data:** Always include the site number, location, date and time. List the sites in a geographical order. Never have a blank cell - this reduces readability and adds to confusion:- "*why is it empty?*"; So cells in table where data are missing or lost should contain special character (eg. 'ns' = not sampled; 'na' = not analysed, etc). Cells with planned (deliberate) 'no result' should contain a simple '-'.

   Provide footnote/s for any important feature that had affected one or more of the results (eg. tidal condition or wind prevented the measurement, or altered the normal quality or expected features of the sample) .

   For laboratory analysis data, show the results of any duplicate tests (splits) and also the percentage recoveries if 'spikes' had been used.

3. **Table/s of Results**: Tables of results help summarise the data, and are made for the following reasons:

   (i) to show 'standardised' or 'normalised' results. For example, metals in sediment samples can be normalised to the finer fractions of sediment particle size (particles less than <0.2 mm diameter); organic compounds in sediments can be normalised to 1% organic carbon content);

   (ii) to compare the results with international or national guidelines and criteria;

   (iii) to compare the raw and/or standardised results with those from previous surveys of same sites; and/or

   (iv) to compare results with those from surveys in the same or similar regions;

3. **Plots/Graphs**: Use these to show the **trends** in your results over time or over distance (2D Histograms Scatter Plots and Line Plots can show one parameter over time or space; 3D plots to show more than one parameter over time or space).

   Follow the correct protocol when joining points together (difference in meaning between solid lines and dashed lines).

   Use the Excel computer program - it has a wide range of easy to use graphing features in its 'Chart' module. It also allows you to show any correlation between results, and can give you the regression and the goodness of fit. For complicated trends, you can plot the values onto the same base diagram you made for Location Diagram.

4. **Photographs:** *"One picture = one thousand words"*; use a photograph not only to provide interest but to demonstrate a key feature of the study. Photos can be used to show: (a) the main activity under investigation - such as the outfall or fishing harbour; (b) the conditions at a typical sampling site; (c) unusual conditions at a surprising sampling site; (d) the new or important field equipment that was used; or (e) how the sampling method was undertaken.

5. **General Tips:**

   Use colour **only** to help highlight a trend or a difference. Do not use colour only to make a figure look 'pretty'.

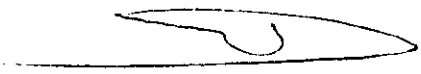
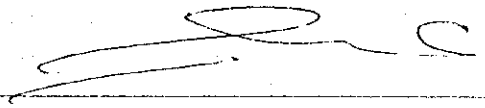
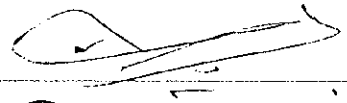
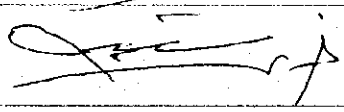
   Always give a **title,** and **always** show the **units of measurement** and the **site code** or **dates** on the graph axes. Every graph or figure must be able to 'stand alone' - so if your boss or someone else makes a photocopy of the figure, it shows enough information to make clear what is going on and what it means.

5. **Statistics**: Use of graphs to present the statistical results of quantitative data analysis (means, standard errors, confidence limits, multi-variate data, etc) will be addressed separately in the tutorial scheduled for Field Team.

Lunch Time Seminar (5)

Date: 12, July, 00
Title: MEPA Field Equipment (Calibration and Maintenance)
Speaker: Tomohiko Ike

Attendance

Name	Signature
Yousef AL-Helal	
Adel M. Kusti	
Khaled H. Busbait	
Khaled S. Al-Rasheed	
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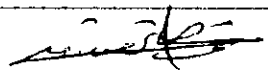
Ausaf M. Bohlaigah	
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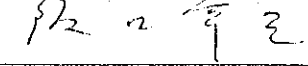
K. Sakaguchi	
HIROYUKI OHI	H. O
I. SHIMAZU	Y. S
K. Tamaka	K. Tam

MEPA Field Equipment
(Calibration and Maintenance)

1. Introduction

Maintenance and Calibration of the field equipment is basic and easy but one of the most important issue on the monitoring activity. Especially in KSA, where the maintenance work is more important than in other countries because of the following environmental factors. These are distinctive in KSA and can cause a rapid deterioration of the materials of the field equipment.

- Strong Sunlight (ultraviolet rays)
- High Temperature
- High Humidity
- High Salinity of seawater
- Dust and Sand

2. General matters

2.1 Qualified Staff

Without adequate management of maintenance and protection, all equipment is easily damaged. Thus, only qualified persons who have adequate knowledge for the equipment should manage maintenance and calibration works. Only under the supervision of the qualified person, can labor maintain and/or clean the equipment.

2.2 Maintenance

The frequency of maintenance depends mainly on the kinds of equipment and/or the frequency of their usage.

However, all equipment should be checked and maintained regularly, especially routine maintenance and calibration during the period of field surveys.

One of the most important issues on the field equipment maintenance is to keep all equipment clean, tidy and calibrated.

Equipment cleanness is an essential factor in ensuring that samples remain contaminant-free. All sampling devices must be cleaned and/or washed with fresh water before and after each sampling trip, and stored in new plastic bags or in clean boxes.

2.2 Calibration

Calibration should be conducted before the survey and it is better to calibrate again after one week and/or after the survey to check the instrument worked correctly in the field. Also, calibrations should be carried out at the time of installation and/or after repairing.

In general, "Zero" solutions and "Range" (Span) solution are usually used for the calibration of the water quality measurement instrument.
A "Zero" solution is the standard solution used to fix the zero (or basic) point of the instrument.
A "Range" (Span) solution is used to fix the slope ,range, or scale value of the instrument.
The accuracy of the concentration of these solutions is important to carry out the calibration correctly, so these solutions should be stored fresh and properly (check "use-by" date and store according to label instructions).

Calibration should be conducted under clean and tidy conditions to avoid contamination, and always use fresh standards. Do not let anyone tamper with the solutions.

All glassware and/or tools that are used for the calibration also should be kept clean.
The temperature of the Standard solution should be kept stable during the calibration. Generally, provide sufficient time for thermal stabilization on the standards. To reduce the time for stabilization, try to keep all calibration standards and instrument stored at the same temperature for at least 2 hours before the beginning of the calibration.
Standard solutions will contaminate with exposure to air so they should be kept in a container with an airtight lid when not in use.

2.3 Equipment Storage

Equipment should be stored in cool, shady and dry conditions after cleaning and/or washing.

If equipment is not used for a long time,

- For some metal parts such as spring, bolts, shackle etc, wipe each part with clean cloth and spray a small amount of "Moisture prevention liquid rust (= corrosion inhibitor such as WD40/CRC)" to prevent the.
- Remove the batteries from equipment. ----They can leak and corrode terminals.

3. MEPA Field Equipment

Field monitoring equipment held in the Eastern Province is listed in Table 1.

Table 1 Field Monitoring Equipment List

Equipment	Specification	Q'ty
Sampling Equipment		
Van Dorn Water sampler	rubber band closing type, 6 & 10 litter	3
Eckman grab sediment sampler	chrome plated; 0.04 m^2 gape	3
Van Veen grab sediment sampler	stainless steel; 0.12 m^2 gape	1
Soil samplers	polycarbonate tube corer + cap	10
Plankton net	NXX-13 mesh size	2
Sampling buckets and bins	Assorted, 40 litre	4
Stainless scoops and sterile spatulas	Assorted pkts	6
Stainless Trays	Various	4
Plastic Trays	Various	2
Field Instruments		
Water current meter	electromagnetic, 0 - 250 cm/s	1
Hydrolab portable multi-probe meter	Temp, pH, DO, cond/salinity, turbidity	1
Portable ORP meter	Redox measurement	1
Secchi plate	dia. 30cm white plate, rope 30m	2
Sounding lead	lead weight 3.2 kg, rope 30m	1
Portable GPS	Battery powered non-DGPS	2
Other		
Tool Box		1
First Aid Kit		1
Cooler Boxes	65 litre	5

4. Maintenance and Calibration of each Equipment

4.1 Van Dorn Water sampler

a. Description

The Van Dorn water sampler is used to collect water samples from a depth of more than 2 meters. The sampler is composed of rubber strings and lids, stainless steel parts and high density polyethylene tube. Sampling carried out by the dropping of the "messenger" along the rope to close the Rubber lids with the power of the rubber strings.

b. Maintenance

Wash the sampler with fresh tap water before and after the survey to fully remove salt and dirt. When sampling for trace substances, the sampler should be rinsed two or three times with distilled water after washing with tap water.

The Messenger also should be thoroughly washed and checked after the survey. After that, spray with "Moisture prevention liquid" to the moving parts of the messenger.

The sampler should be stored in the open position to prevent moisture being trapped. Possible deterioration of the rubber parts and corrosion of the steel parts (including the messenger) should be checked periodically.

4.2 Eckman grab sediment sampler

a. Description

The Eckman grab sediment sampler is generally used for sampling of sediments in shallow water area (<10m). The sampler has spring-tensioned, scoop-like jaws on the bottom and is made from stainless steel (Figure 2).

The sampling is carried out by dropping of the "messenger" along the rope to close the jaws with the tension of the spring.

b. Maintenance

Wash the sampler with fresh water before and after the survey.

Spray the "Moisture prevention liquid" to the moving parts of the sampler when not in use.

The "Messenger" also should be washed and checked after the survey. After that, spray with "Moisture prevention liquid" to the moving parts of the messenger.

The corrosion on the steel parts (including the messenger) should be checked.

4.3 Van Veen grab sediment sampler

a. Description

The Van Veen grab sediment sampler is generally used for the sampling sediments from deep water areas (>10m). This sampler is also suited to the collection of hard bottom material such as sand, gravel, and firm clay.

The sampler is made of stainless steel and consists of a pair of jaws and arms plus a stainless steel closing chain (Figure.3).

The jaws are held open by a trigger. Upon impact with the sediment, the trigger is released and

the jaws are closed by the tension of the rope, which acts on the closing chain.
The arms must be strongly tightened, with the "T" key in the hole. Otherwise the lock mechanism cannot be used.

b. Maintenance

Wash the sampler with fresh water before and after the survey.
Spray with the "Moisture prevention liquid" to the moving parts of the sampler when not in use.
The corrosion on the steel parts (including the messenger) should be checked for periodically.

4.4 Soil sampler

a. Description

The Soil sampler comprises a polycarbonate tube plus 2 silicon end caps.
The sampler is used to collect core samples and/or to collect the surface samples of exposed intertidal sediments.

b. Maintenance

Wash the tubes and caps with fresh water before and after the survey.
For sampling trace substances, the sampler should be first washed using a laboratory detergent. After that, dip into 5% HCl (Analas Grade) for one night and then rinse three times with distilled water.
For trace substances, a new sampler should be used from each site.

4.5 Plankton net

a. Description

The small plankton net is used for plankton sampling where only qualitative data or a large biomass is needed for analysis of plankton populations.
The plankton net comprises a tow line, nylon mesh "bolting" cloth, tap and plastic collecting cylinder (Figure 4).

b. Maintenance

Hang the net and wash by hosing down with lots of the tap water after the survey.
The collecting cylinder and tap should be detached from the net and washed separately.
Check regularly for corrosion of tap and other metal parts. Use a "Moisture prevention liquid" spray to prevent corrosion.

4.6 Water current meter

a. Description

The Portable electromagnetic water current meter has no moving external parts and is used for the real-time monitoring of current speed and direction. The portable current meter comprises a Sensor Sonde, Display Unit and cable (Figure 5).

Power can be supplied by AC 100 or by self-contained rechargeable battery inside the display unit.

b. Maintenance

Check and recharge the Battery before and after the survey, or weekly if the survey period is long.

After the survey, the current speed sensor and connecting cable should be rinsed in fresh water first. Then carefully rinse away with cleanser any oil or the like from the surface of the parts of the Sensor and cable.

For the Display Unit, wipe by the soft cloth with fresh water and remove the salt. Pay particular attention to the cable connectors. Make sure they are clean and spray a "Moisture prevention liquid" before storage.

When the instrument is not used for long time of period, the Battery voltage may drop. In this case, follow the battery rejuvenation procedure described in the manual.

c. Calibration

This meter is factory-calibrated so only a zero point adjustment (for confirmation) is needed.

The Zero Point Adjustment can be done by turning the Zero-Adjust Trimmer when the sensor is submerged in completely still water (for example – in a large sink or large bucket).

4.7 Hydrolab DS4 portable multi-probe meter

a. Description

The Hydrolab portable multi-probe meter is used to spot measure pH, temperature, DO, turbidity and Salinity at the surface and at depth..

This meter has both internal battery (9.5V inside the meter) and an external 12V rechargeable battery pack.

b. Maintenance

General

Check and recharge the internal and external batteries before the survey.

For temporary storage, fill the sensor cup with clean tap water (don't use the distilled water) and

screw the cup on the multi probe. For lonf term storage (>month) follow instruction manual (= Store upright with only 3cm of the water in the cup).

Lay the cable coils of at least 15cm in diameter at the bottom of the container.

pH sensor

The pH glass electrode should be gently cleaned when it is obviously coated with oil, sediment or biological growth. Slow response or non-reproducible measurements are signs that the electrode has become dirty or is scratched. Carefully clean the pH glass electrode using a clean, soft cloth with methanol to remove the film from the surface of the electrode. **Never** put methanol in the cup (this will destroy the DO probe!).

DO sensor

DO sensor maintenance is usually required when calibration becomes impossible or when the membrane covering the cell becomes wrinkled, bubbled, torn, dirty, or otherwise damaged. The membrane of the sensor should be replaced according to the procedure described in the Manual.

After replacing the membrane, allow it to soak overnight in the tap water before calibration.

Never use methanol or other solvent to wash the membrane. Use a gentle spray of distilled water only.

Temperature, Salinity sensor

The temperature sensor and salinity sensor does not require any special maintenance, except to keep clan and check for possible corrosion. **Do not** spray with "Moisture prevention liquid"---This will badly affect the pH and DO probe.

Turbidity sensor

Turbidity sensor maintenance is required when any of the lenses have a visible coating of dirt.

Rinse sensor with distilled water directed at the lenses to remove any large caked deposits and loose residue. Use soft lint cloth with methanol to remove any additional residue such as sand or grit. Be very careful not to scratch the lenses.

Wet the cloth with methanol. Wipe the lenses and be careful not to touch DO probe. Rinse the sensor and lenses with distilled water again, then dry.

b. Calibration

pH sensor

Calibration for pH is achieved by pouring a standard solution into the sensor cup. Then allow time for the solution to stabilize, and check/adjust the value of the standard according to the manual instructions.

Generally, calibrate "Zero point" with the "zero" standard solution (pH 7.) first.

Then calibrate the "Slope" with a "slope" standard solution (pH4 and/or pH9).

The pH value of the slope standard solution used for the calibration should be better to close the value that of the anticipated samples that will be measured in the field survey.
PH9 is best for sea water monitoring programs.

DO sensor

The basic procedure of Dissolved oxygen (DO) calibration is similar to that of pH sensor.
Pore the standard solution into the calibration cup. Then enter the calibration value after stabilize the value. First add sodium sulphite to sensor cup (2g), then fill to brik with distilled water and screw onto probe. Make sure there is minimum air bubble. Wait until DO reading has reached 0% saturation (10-15 minutes). If not stabilized, wait again. If stabilized above 0%, adjust zero according to Scout panel display (or computer link-refer manual). Then thoroughly wash cup and total probes with fresh water to remove every trace of $Na_2(SO_3)$. Then use air (or shake) to get 100% saturation check.

Temperature, Salinity sensor

Temperature and salinity does not require any calibration. These sensors are factory-calibrated.

Turbidity sensor

Turbidity sensor calibration must be done in a vessel with **at least a 2 inch** clearance between the vessel wall and the sensor's face. Prepare the zero (distilled water) and slope standards. The slope standard would be close to the expected NTU value of the deployment site (20 or 50 NTU is good).

4.8 Portable ORP meter

a. Description

The portable ORP meter and probe is used to measure the Oxidation Reduction Potential of the sediment. This is a measure of the ability of the sediment to remove oxygen from the water. Using the lower the value (-mV)---the bigger the capacity to remove oxygen.

b. Maintenance

After the survey, the ORP probe should be rinsed in fresh water.
For the Display Unit, wipe by the soft cloth with fresh water to remove the salt and dirt.
When the meter is not used for long time of period, the batteries should be removed.

c. Calibration

The portable ORP meter does not require any calibration. The probe is factory-calibrated.

4.9 Secchi plate

a. Description

The Secchi plate is a white and black plastic plate (30cm diameter). The plate used to measure water Clarity (by metres depth from surface).

b. Maintenance

Wash the plate with fresh water after the survey. Regulary check the connections to the tapeline and lead weight for corrosion. All shackle connections should be washed in tap water, dried and sprayed with a "Moisture prevention liquid" before storage.

4.10 Portable GPS

a. Description

The Portable GPS unit is used for navigating and taking position of the sampling site.
The default setting is WGS84—but many spheroids are available for selsction, according to the chart that is used.

b. Maintenance

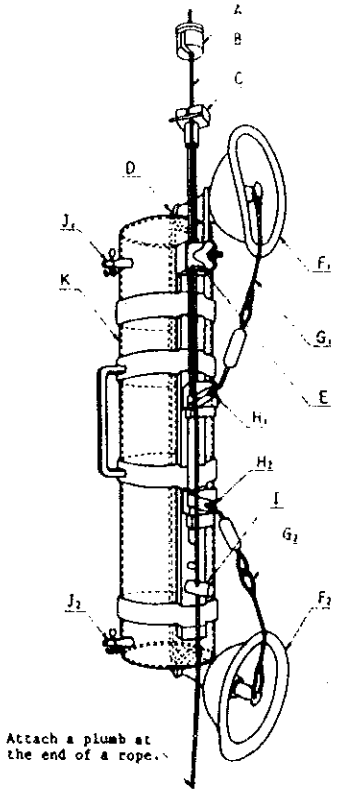
Wipe by the soft cloth with fresh water and remove the salt.
When the GPS is not used the long time of period, the batteries should be removed.
The GPS unit is particularly sensitive to heat because of the microprocessor chip and the color LCD crystal display. This unit must be protected from sunshine always.

5. Record Keeping

When any equipment is installed, used, repaired, maintained or calibrated, details of these works should be recorded. A record sheet should be prepared for each piece of equipment and kept at MEPA by the person responsible for managing all field equipment..
The Manager of equipment should check these records periodically and confirm that the works are being implemented properly. Examples of the recording sheet are attached.

Fig 1

Example of Vandorn water sampler



A: Messenger

B: Rope (or wire) for suspending

C: Messenger receiver

D: Rubber string

E: Fastening metal for rope

F_1, F_2: Rubber lid

G_1, G_2: Wire for rubber lid

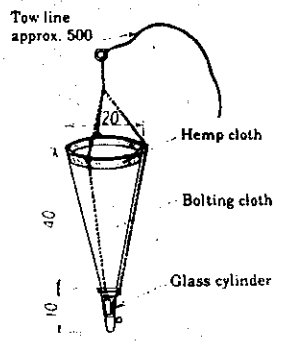
H_1, H_2: Fixing metal of wire for rubber lid

I: Fixing place of rope

J_1, J_2: Soft polyvinyl chloride tube with a pinch cock for taking out sample

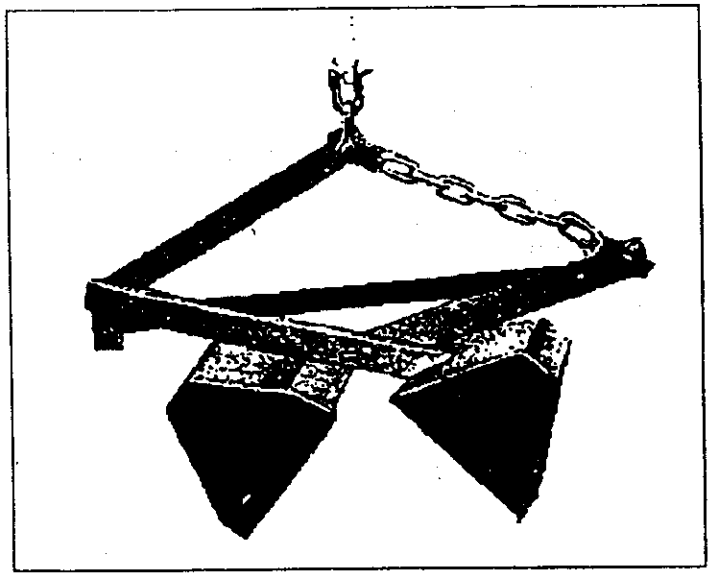
K: synthetic resin-made cylinder

Unit : cm



Example of plankton net

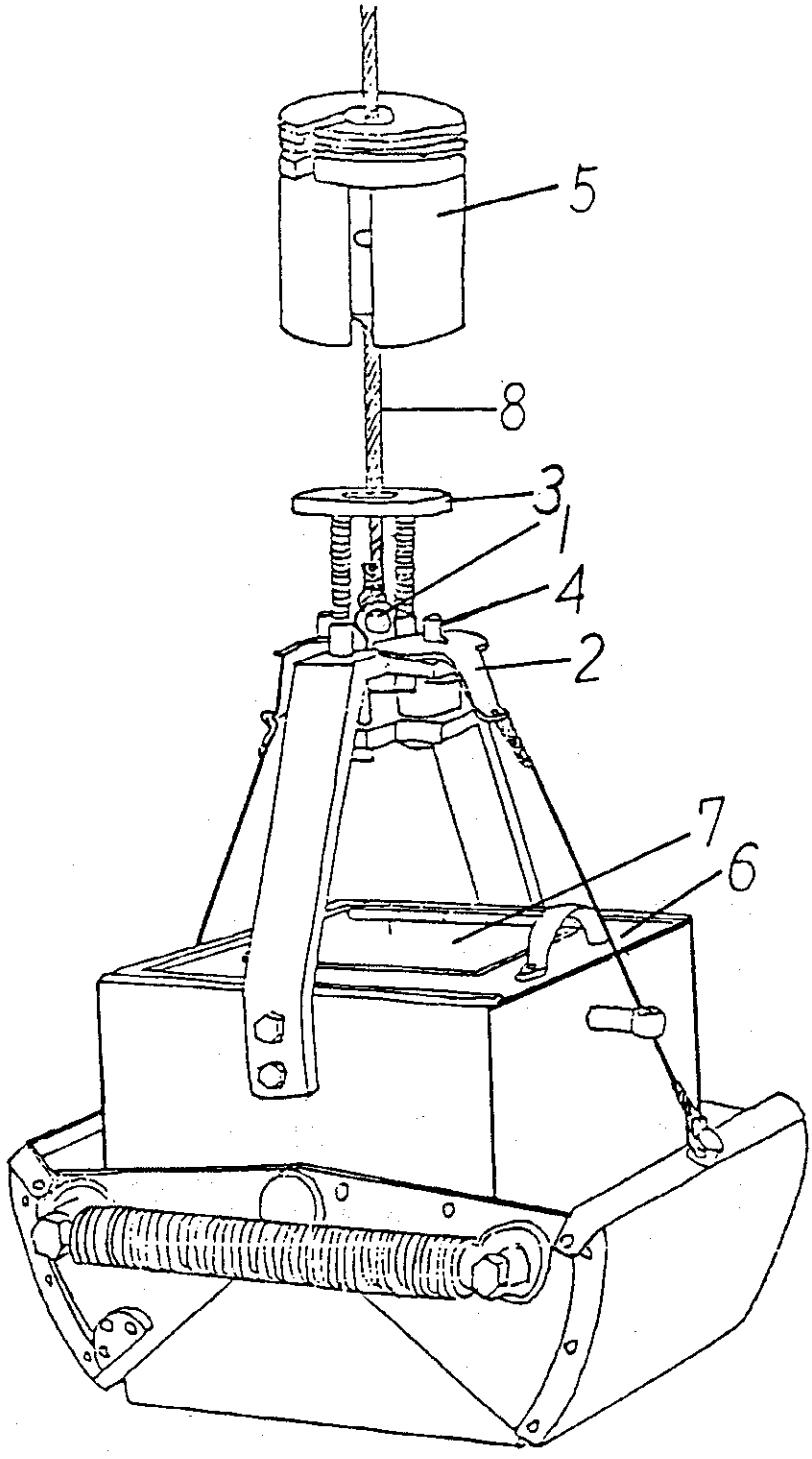
Fig 4



Van Veen Grab

Fig 3

Fig2. EKMAN-BERGE DREDGE



Name of Parts	
No.1	Hook for rope
No.2	Suspention metal fitting
No.3	Messenger receiver
No.4	Latch
No.5	Messenger 1 Kg
No.6	Top lid
No.7	Door
No.8	Rope

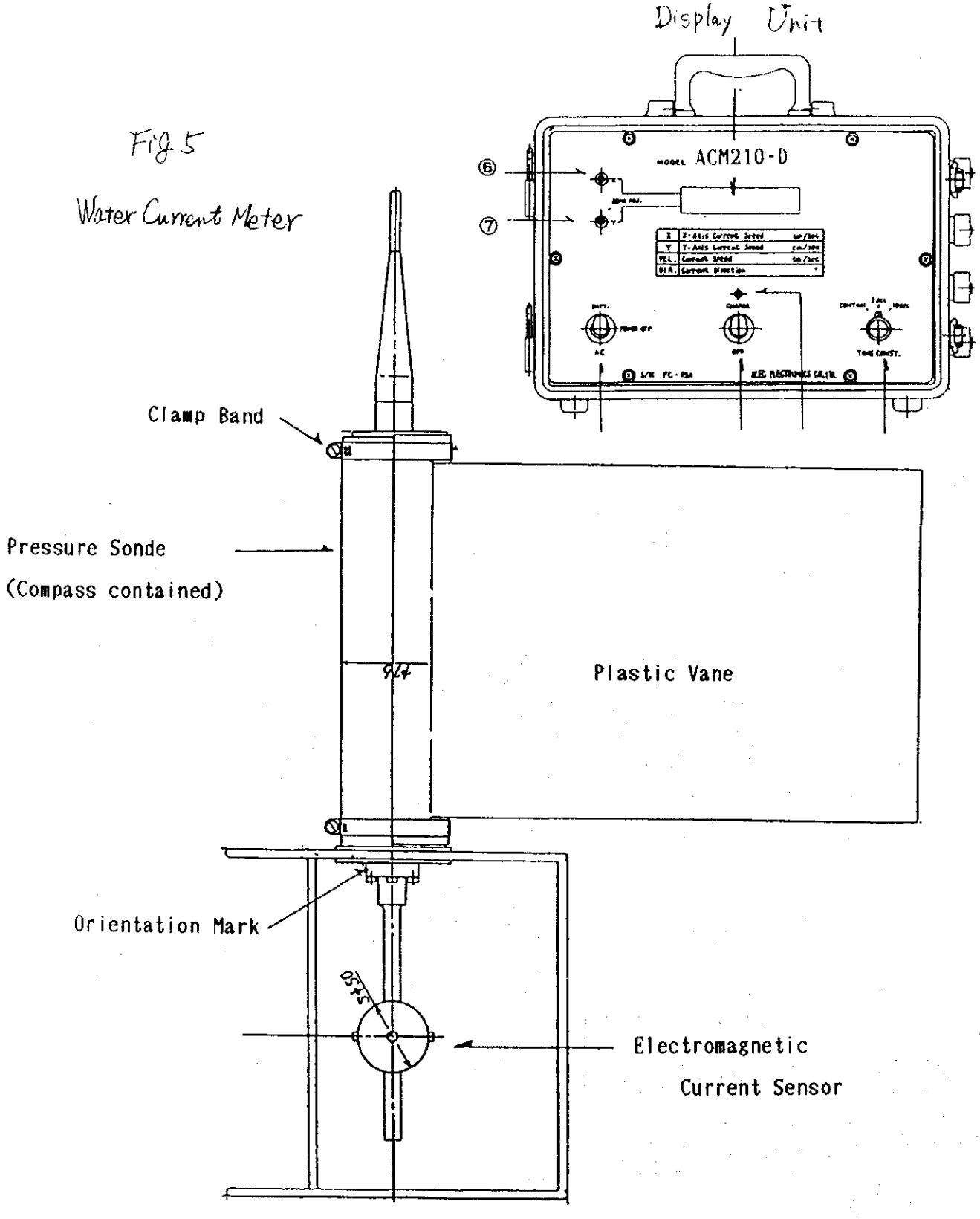
Material: Brass

Sampling area: 15 x 15 cm
20 x 20 cm

Accessories: Messenger
Wooden Case

Fig 5

Water Current Meter



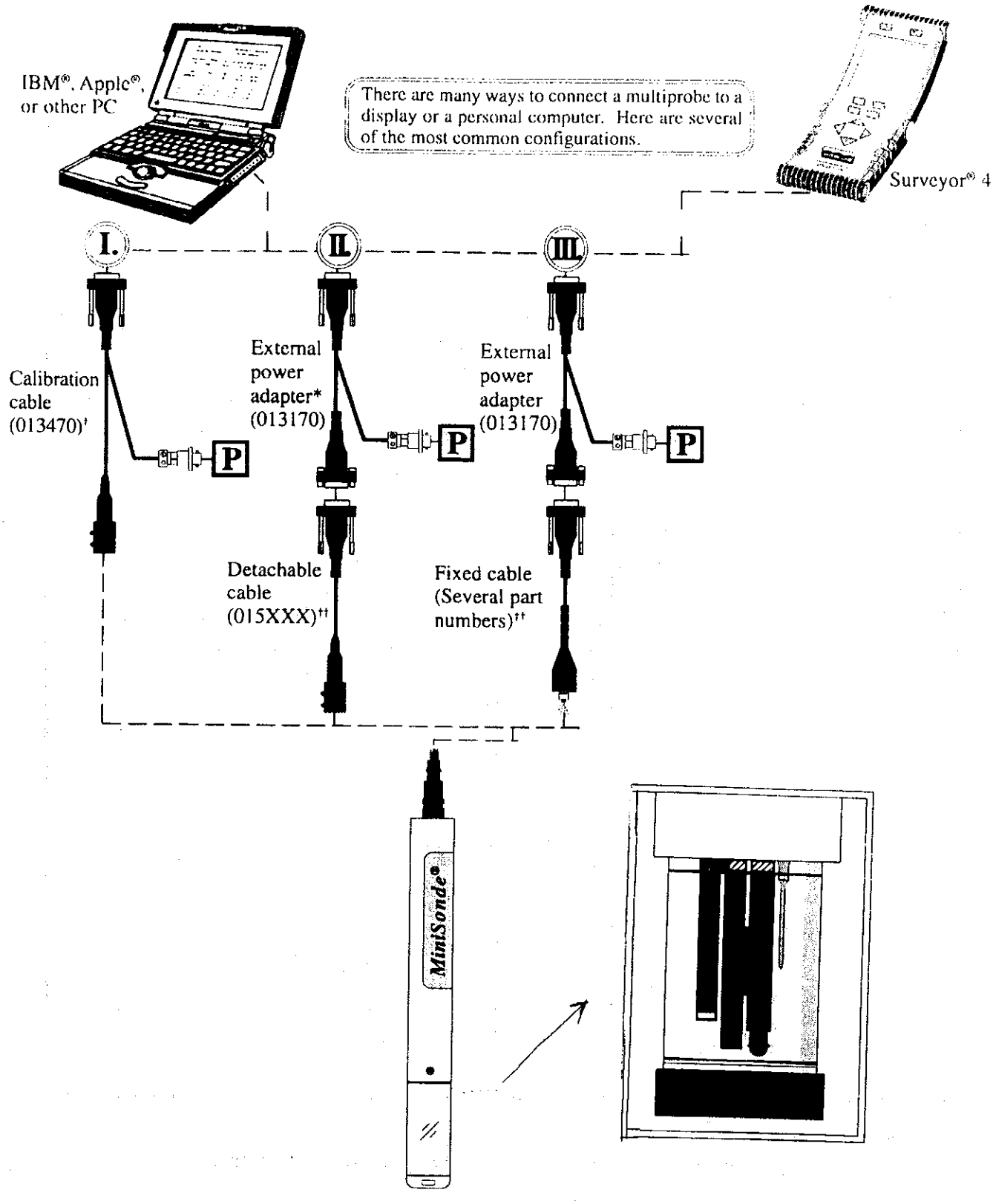


Fig 6. Hydrolab. multi-probe meter

Maintainance Record Sheet

Equipment Name	
Manufacturer/Model No.	
MEPA's Control No.	
Maitainance Date	
Maintainance Person/Company	
Responsible person (Signature)	

Detail content of Maintainance		
Maintained Items	Eqauipment Condition	Description
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

<Legend for Equipment Condition >
G: Good CA: Calibrated/Adjusted PC: Parts Changed R: Repaired NR:Need to Repair

Calibration Record Sheet (pH)

Date	Person	Calibration Results with Standard Solutions						Remarks
		pH7		pH4		pH9		
		Before	After	Before	After	Before	After	

Equipment Repair Record Sheet

Equipment Name	
Manufacturer/Model No.	
MEPA's Control No.	
Repaired Date	
Repaired Person/Company	
Responsible person (Signature)	
Symtoms and Cause	
Repaired Matters/Parts (detail extent of repairs)	
Results of Repair	
Other Remarks	

Lunch Time Seminar (6)

Date: 16, July, 00
Title: Laboratory Practice (2)
Speaker: Mamoru Sato

Attendance

Name	Signature
[illegible]	
Khaled S. Al-Rasheed	
Aziz W. Alomair	
Adel M. Kusti	
K. Tanaka	
Y. SHIMAZU	
Alam Nizami	
Ousai M. Bohlaigah	
Yousef Al-Helal	
Tomohiko Ito	
HIROYUKI OHI	
KRISHNA KUMAR MISHRA	
K. Sakaguchi	
Kunio Arai	
R. Hirahara	

[1] Contamination

What is the contamination?

Where dose it come from?

Example of the contamination

How to prevent the contamination

[2] QA/QC

Spike test (recovery test)

Duplicate analysis (sample)

Standard (reference) sample

Blank test

[3] Precision and Accuracy

Result of analysis, which is controlled by the statistical rules

What is the precision?

What is the accuracy?

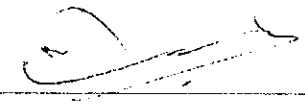
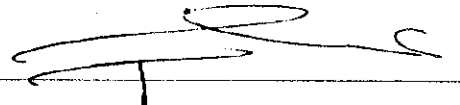
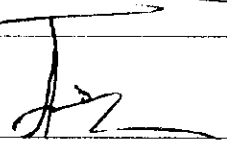
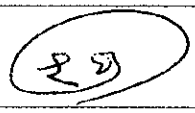
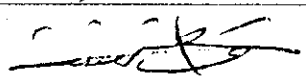
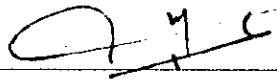
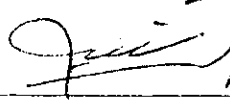
How to know the true value?

Errors, which scientists always struggle with

Lunch Time Seminar (7)

Date: 19, July, 00
Title: Performance Management (Position Duties and Responsiilities)
Speaker: Kazutake Tanaka

Attendance

Name	Signature
Khalid Busbait	
Adel M. Kusti	
Alam Nizami	
yousef AL-Helal	
SATO	
Qusai M. Boldaiyah	
AZIZ ALOMARI	
Khaled S Al. Rasheed	
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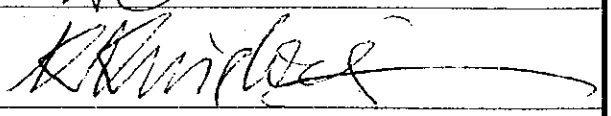
KRISHNA KUMAR MISHRA	
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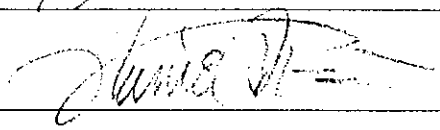
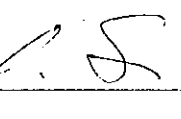
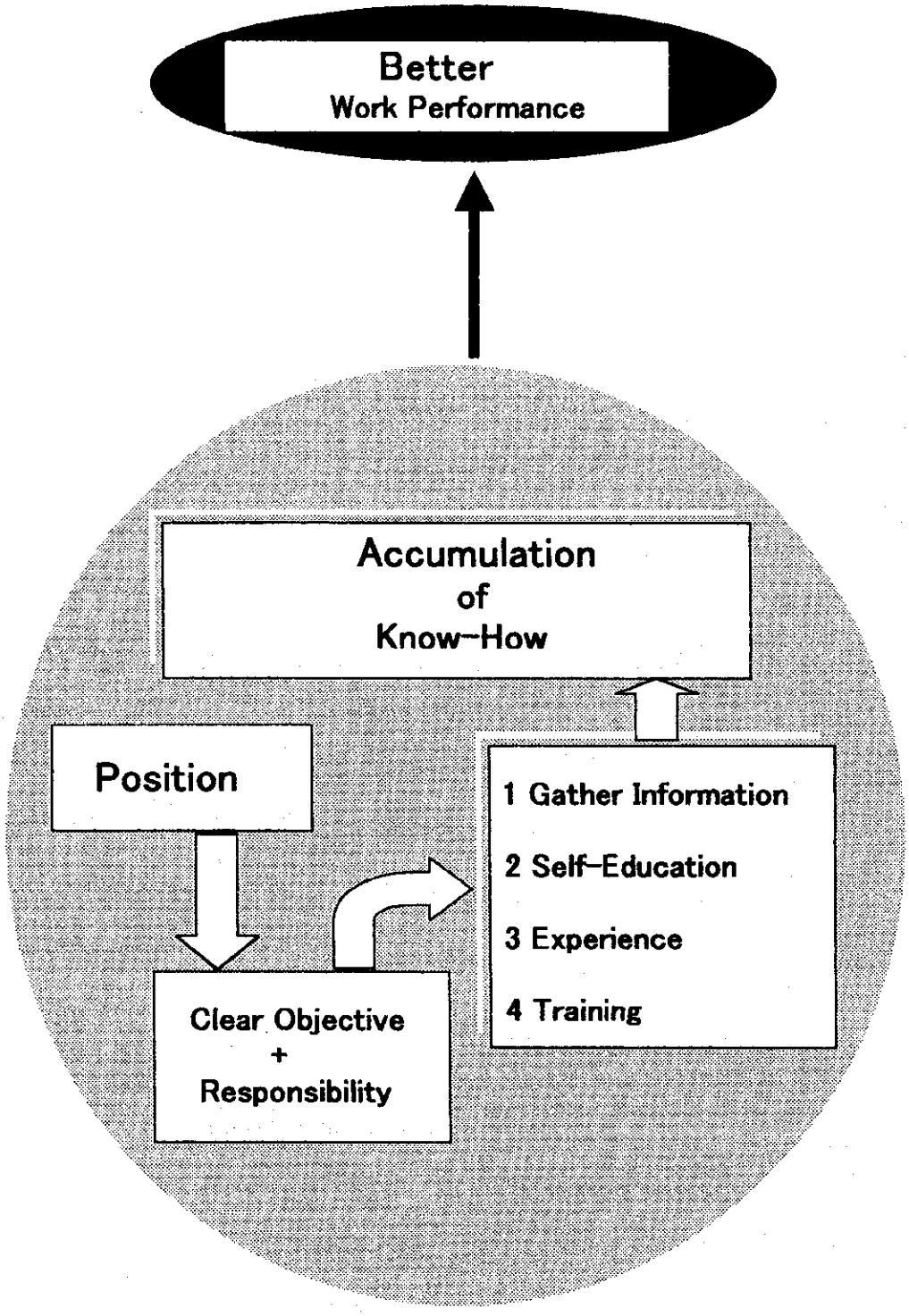
Kunio Arai	
Y. SHIMAZU	

BY K.Tanaka


Better
Work Performance
Accumulation
of
Know-How
Position
1 Gather Information
2 Self-Education
3 Experience
4 Training
Clear Objective
+
Responsibility

ATTACHMENT

Position Description and Responsibility

Position Description (sample)

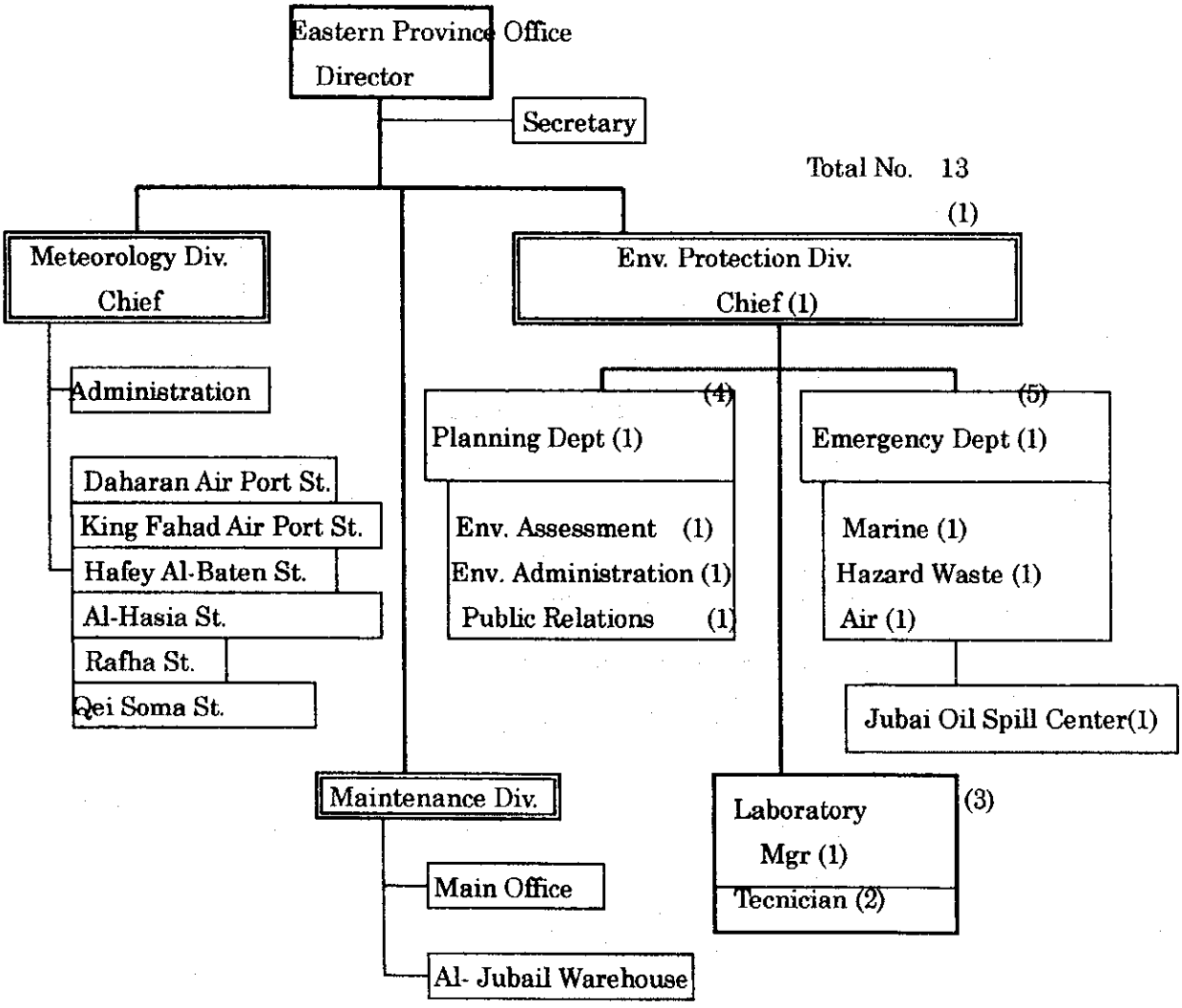
Name	Khalid Al-Rasheed
Department	Environment Protection Division -Marine Control Group
Title	Sea Water Quality Control Supervisor
Report to	Aziz Al-Omary
Supervise	A,B,C
Objective	Assist Manager in Gulf Sea Water Quality Protection
Responsibility	1. Plan an annual schedule for the group's activities 2. Plan better methods or system to protect sea water quality from pollution. 3. Design and update work-flow charts and procedures for efficient work for the group. 4. Gather as much information as possible of the environment related data including from international sources. 5. Keep updated the data of the Gulf water quality 6. Coordinate with persons in charge of Sewage Department, Fishery Department, Coast Guard and other public Departments for environment protection of the Gulf 7. Plan sea water monitoring program and schedule. 8. Lead monitoring work at sites. 9. Evaluate the result of monitoring in comparison with accumulated data, after receiving the analytical result at lab. 10. Prepare a warning letter to an organization which imperils the sea water condition. 11. Guide, train and help subordinates for better group work. 12.Perform other duties than the above to be given by his manager

Appendix E-1

Recommendation on Organization Structure

Of MEPA Eastern Province

July, 2000



Notes: 1.Recommendation is only on Environment Protection Division.

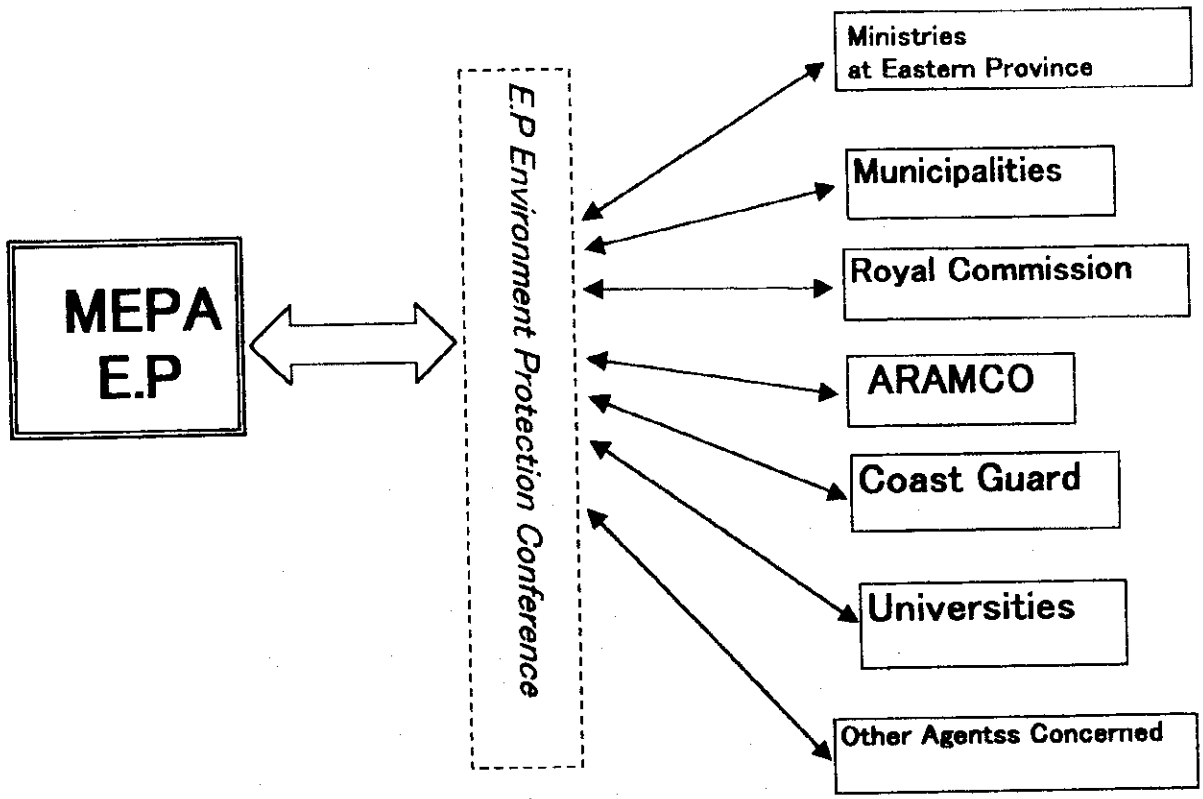
2.The figure in bracket ( ) shows the minimum required staff number.

3. Depending upon the requirement or emergency case, the assigned personnel should be flexible in helping each other by the order of the Chief.

Appendix E-2

Environment Management

(1) Relation with Public (governmental) organizations



Role of MEPA

1)Summon the Conference

2) Coordinate the Agents

3) Accumulation of Data

4)Guide for better E. Mangement

Topics to discuss

1) General Affairs for Environment Management

2) Dumping of Pollutants

3) Waste Water/Solid Waste

4) Dredging

5) Land Reclamation

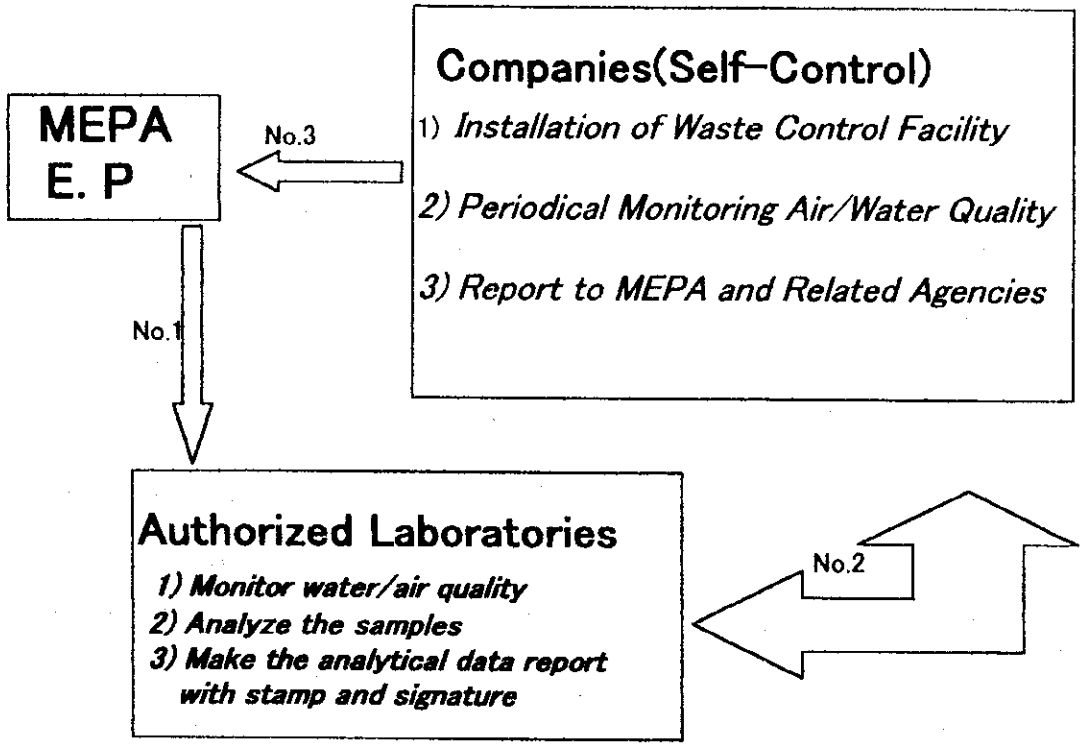
6) Large Scale Development

7) Define the Scope of Work among the Agents

Appendix E-3

Environment Management

(2) Relation with Industrial Companies/Factories



Notes:

No.1 MEPA encourages Saudi laboratories/institutes for monitoring and analytical work for air/water quality, and authorize them, under a certain condition, to undertake such work for an official report.

No.2 The individual company requests an authorized laboratory/institute to monitor, check and confirm the data on the report to be sent to MEPA and other Authorities.

No.3 The companies/factories are instructed to establish a self-control anti-pollution system and report periodically to MEPA including the related Agencies of the monitoring result which is confirmed and stamped by the said laboratory/institute.

Appendix E –4

Environment Management

(3) Example of Action Plan

Step	Major Action	Period
1st Step	**Demonstration of MEPA Presence** -Visit various agencies and factories -Issue questionnaires to the above -Interview with the above -Publicize about MEPA	Jan. 2001 ~ Jun. 2001
2nd Step	**Establishment of Collaboration with Agencies** -Creation of Environment Management Conference (EMC) -Clarification of Scope of Responsibilities -Exchange of Views for Environment Protection Management	Jul.. 2001 ~ Dec. 2001
3rd Step	**Establishment of Relationship with Major Industrial Companies** -Enlightening them for Environment Protection -Self-control system of Anti-Pollution by Individual Companies -Creation of Authorized Laboratories -Reporting System of Companies	Jan. 2002 ~ Jun. 2002
4th Step	**Establishment of MEPA as Data Center** -Collect All Information and Data in Eastern Province -Monitor Environment Status -Issue Periodical Report about Status	Jul. 2002 ~ Dec. 2002
5th Step	**Reinforcement of MEPA for Anti-Pollution Activities** -Actual Investigation into Industrial Sites -Warning Letter to Faulty Facilities -Order of Factory Closure	Jan. 2003 ~ Dec. 2003

Plenary Function of MEPA Eastern Province

Note: 1) The period (time table) can be adjusted.

2) "1st step to 6th step" shows the focal points of MEPA E.P activities.

3) At the 5th step, "Order of Factory Closure" will need reinforcement of laws and strong relationship with the relative agencies.