LIST OF TABLES

Table 2.1 Usage Condition of Equipment of Existing 6 Laboratories (CCC & 5 RBOs)

Code No.	Equipment Name	Rank of Planning Eqiuipment*			Usage Condition of Existing Equipment**						Issues for Usage	Remarks
		AST	**ASW**	**HGD**	**ALX**	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**		
C. Commom Analytical Equipment												
C-4	A.A.S.Flameless Type with Flame Compartment	A	A	A	○	○	○	○	○	○	Shortage of Graphite Tubes	
C-6	UV/VIS Spectrophotometer (Double Beam)	A	A	A	○	○	○	○	○	○		
C-12	Ion Chromatograph	A	A	A						○		Not installed in existing RBOs
C-13	Stereoscopic Microscope	A	A	A	△	△	△	△	△	△		
C-14	Microscope	A	A	A	△				○	○		
C-15	Handy Type pH Meter	A	A	A	○	○	○	○	○	○		
C-16	Laboratory pH Meter	A	A	A	○	○	○	○	○	○	Shortage of Glass Electrode	
C-18	Mercury Analyzer	A	A	A	△	○	○	○	○	△	Problem on Calibration (ALX)	
C-19	Glass Wares Set	A	A	A	○	○	○	○	○	○		
C-20	Reagents (w/Standard Samples)	A	A	A	○	○	○	○	○	○		
G. General Laboratory Equipment												
G-1	Semi-Micro Analysis Balance	A	A	A	○	○	○	○	○	○	Upgrade Balance with Expanded Maximum Weight is Necessary	Max: 160-200g, Figure: 0.0001g
G-2	Macro Analysis Balance	A	A	A	○	○	○	○	○	○		Druggist's Scale
G-4	Tabletop Type Centrifuge	A	A	A	△	○	○	○	○	○		
G-6	Muffle Furnace (for Organic)	A	A	A	○	○	○	○	○	○		
G-8	Constant Temperature Oven	A	A	A	○	○	○	△	○	○		
G-9	Middle Temperature Oven	A	A	A	△					○		
G-11	Oven for Glass Wares (Dryer)	A	A	A	○	○	○	○	○	○		
G-12	Autoclave (Vertical Type)	A	A	A	△	○	△	△	○	○		
G-13	Incubator	A	A	A	○	○	○	○	○	○		
G-14	Low Temperature Incubator	A	A	A	△	○	△	△	○	○		
G-15	Rotary Evaporator	A	A	A	△	△	△	×	△	△		
G-20	Shaker (Middle)	A	A	A	○	○	○	○	○	○		
G-23	Mixer	A	A	A	△	○	○	○	○	○		
G-24	High Speed Homogenizer	A	A	A	×	○	×	○	○	○		For Food Processing
G-25	Hot Plate (Small)	A	A	A	○	○	○	○	○	○		
G-26	Magnetic Stirrer (w/Hop Plate)	A	A	A	○	○	○	○	○	○		
G-27	Multi Magnetic Stirrer w/ Magnetic sets	A	A	A	○	○	○	○	○	○		
G-28	Constant Temperature Water Bath	A	A	A	△	△	×	△	○	△		

* Note A: To be Essential, B: Further Examination, C: Low Priority

**Note ○ : Frequently used, △ : Sometimes used, × : Seldom used or not used

Table 2.1 Usage Condition of Equipment of Existing 6 Laboratories (CCC & 5 RBOs)

Code No.	Equipment Name	Rank of Planning Eqiuipment*			Usage Condition of Existing Equipment**						Issues for Usage	Remarks
		AST	**ASW**	**HGD**	**ALX**	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**		
G-32	Water Bath	A	A	A	○	○	○	○	○	○		
G-33	Cooling Unit	A	A	A	△	○	○	○	○	○	More compact size is required	
G-34	Ultrasonic Cleaner	A	A	A	○	○	○	○	○	○		
G-37	Ultrasonic Pipette Cleaner	A	A	A	○	○	○	○	○	○		
G-38	Ion Exchanger	A	A	A	○	○	×	○	○	○		
G-39	Water Distillation Unit	A	A	A	○	○	○	○	○	○		
G-40	Clean Bench	A	A	A	△	×	△	△		△	Needed to be trained	
G-41	Draft Chamber w/Gas Cleaning Device	A	A	A	○	○	○	○	○	○		
G-42	Draft Chamber	A	A	A	○	○	○	○		○		
G-43	AC Stabilizer	A	A	A	○	○	○	○	○	○		For AAS
G-46	Refrigerator	A	A	A	○	○	○	○	○	○		
G-47	Freezer	A	A	A	○	○	○	○	○	○		
G-48	Ice Maker (Cube Ice)	A	A	A	△	○	△	○	○	×	Needed to be more small size	
G-49	Copy Machine	A	A	A	○	○	○	○	○	○		
G-50	Monitoring Car	A	A	A	○	○	○	○	○	○		
G-51	Tool Set	A	A	A	○	○	○	○	○	○		
G-53	Locker for Reagents	A	A	A	○	○	○	○	○	○		
G-55	Balance (6kg)	A	A	A	○	○	○	○	○	○		
G-56	Infrared Heater (Lamp)	A	A	A	△	△	△	△	○	△	Lamp has not been used	
G-57	Colony Counter	A	A	A	○				△	△		
G-58	Personal Computer (Arabic/English)	A	A	A	○	○	○	○	○	○		
G-59	Video Camera w/Video Monitor Unit	A	A	A	○	○	○	○	○	○		
G-60	Camera	A	A	A	○	○	○	○	○	○		
G-61	Over Head Project (w/Screen) and Data Show Equipm	A	A	A	○	○	○	○	○	○		
W. Water Quality Monitoring Equipment												
W-1	Total Organic Carbon Analyzer	A	A	A	△	○				△		
W-2	Handy Type DO Meter	A	A	A	○	○	○	○	○	○		
W-3	Laboratory Type DO Meter	A	A	A	○	○	○	○	○		Shortage of DO Electrode	
W-4&5	Total Nitrogen/Total Phospate Analyzer	A	A	A	×	×				×	Useless for Small Number of Samples	Recommended to bo another type
W-6&7	Tint Meter/Turbidity Meter	A	A	A	○	○	○	○	○	○		
W-8	Handy Type Conductivity/Temp. Meter	A	A	A	○	○	○	○	○	○		

* Note A: To be Essential, B: Further Examination, C: Low Priority

**Note ○ : Frequently used, △ : Sometimes used, × : Seldom used or not used

Table 2.1 Usage Condition of Equipment of Existing 6 Laboratories (CCC & 5 RBOs)

Code No.	Equipment Name	Rank of Planning Eqiuipment*			Usage Condition of Existing Equipment**						Issues for Usage	Remarks
		AST	**ASW**	**HGD**	**ALX**	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**		
W-9	Conductivity Meter	A	A	A	○	○	○	○	○	○		
W-10	Salt Meter (Na Ion Meter)	A	A	A	○	○	○	○	△	○		
W-11A	Water Sampler(Hyroht Type)	A	A	A	○	○	△	○	○	○		
W-11B	Water Sampler(Pettenkohrfer Type)	A	A	A	○	○	○	○	○	○		
W-13	Ekman Barge Grab Sampler	A	A	A	○	○	○	○	○	×	Weight must be added	
W-14	Plankton Net	-	-	A	○			○				
W-15	Distillation Apparatus(for CN,NH4,F)	A	A	A	×	△	○	○		△	Shortage of Glass Spare Parts	Recommended to bo another type
W-16	Oil Content Meter	A	A	A	×	×	×	×	△	×		No Criteria in Regulation
W-18	BOD Analyzing Apparatus(Incubator)	A	A	A	○	○	△	○	○	○		
W-19	COD Analyzing Apparatus w/Closed Reflux (Cr	A	A	A	△	○	○	○	○	○		
W-22	Wastewater Treatment Equipment	A	A	A	○	○	○	○	○	○		
W-23	Portable Waste Water Chest (90L)	A	A	A	○				○			
W-24	Portable Waste Water Chest (50L)	A	A	A	○	○	○	○	○	○		
W-26	Water Quality Analysis (Temp.pH,Conductivity,Turbidity and DO)	A	A	A	○	○	○	○	○	○	Shortage of Spare Electrode	
W-29	Water Proof Camera	-	-	A	○	○	×	○	×	○		
W-30	Automatic Titrator	A	A	A	△	△	×	○	△	△		
W-31	Ion Analyzer (Electrode Set)	A	A	A	○	○	○	○	○	○		
W-32	Portable Water Quality Test Kit	A	A	A	○	○	○	○	○	○		
W-33	Vacuum Filter w/Manufold	A	A	A	○	○	○	○	○	○		
A. Air Quality Monitoring Equipment												
A-1	Mobile Unit											
A-1A	SO2 Monitor(UV Fluorescence Method)	A	A	-	○	○	○	○	○	○		
A-1B	Nox Monitor(Chemiluminescence Method)	A	A	-	○	○	○	○	○	○		
A-1C	CO Monitor (Non-dispersive IR Method)	A	A	-	○	○	○	○	○	○		
A-1D	Ozone Monitor (UV Absorption Method)	A	A	-	○	○	○	○	○	○		
A-1E	Hydrocarbon Monitor(FID-GC Method)	A	A	-	△	○	△	△	○	△	Out of order	
A-1F	Dust Monitor (Beta-ray Absorption)	A	A	-	○	○	○	○	○	○		
A-1G	Combined Wind Vane and Anemometer	A	A	-	○	○	○	○	○	△	Out of order	
A-1H	Thermo-hygrometer	A	A	-	○	△	○	○	○	△	Out of order	
A-1J	Solar Radiation Meter	A	A	-	○	△	○	○	○	○		

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Table 2.1 Usage Condition of Equipment of Existing 6 Laboratories (CCC & 5 RBOs)

Code No.	Equipment Name	Rank of Planning Eqiuipment*			Usage Condition of Existing Equipment**						Issues for Usage	Remarks
		AST	**ASW**	**HGD**	**ALX**	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**		
A-1K	Data Logger	A	A	-	○	○	○	○	○	○		
A-1L	Standard Voltage Regulator	A	A	-	○	○	○	○	○	○		
A-1M	Chassis Cabin	A	A	-	○	○	○	○	○	○		
A-10	Stack Gas Sampler (for NOx)	A	A	A	△	○	△	△	△	△	Has not been used but basecally needed	
A-25	Standard Gas w/Cylinder & Regulator	A	A	-	○	○	○	○	○	○		For Mobile Unit
A-3	Portable Black Fume Monitor	A	A	A	△	△	△	△	△	△	Has not been trainned	
A-4	Orsat Analyzer	A	A	A	△	○	△	△	△	△	Has not been used but basecally needed	
A-5	Wet Type Gas Collector	A	A	A	△	○	△	△	△	△		
A-6	Gas Sampler (Detector Tube)	A	A	A	○	○	○	○	○	○	Validity have expired	Many kinds of detector are required
A-7	Zero Gas Generator	A	A	-	○	○	○	○	○	○		For Mobile Unit
A-8	Span Gas Dilutor	A	A	-	○	○	○	○	○	○		For Mobile Unit
A-9	Stack Gas Sampler (for Dust)	A	A	A	△	○	△	△	△	×	Has not been used but basecally needed	
A-11	Gas Meter	A	A	A	○	○	○	○	○	○		
A-12	Rotor Meter	A	A	A	○	○	○	○	○	○		
A-13	Mass Flow Meter	A	A	A	○	○	○	○	○	○		
A-15	Auto-Dry Desicator	A	A	A	○	○	○	○	○	○		
A-17	Portable Auto. HC/CO Analyzer for Stack G	A	A	A	△	○	○	○	○	○	Weight must be lighter	
A-18	Portable Auto. SOx Analyzer for Stack Gas	A	A	A	○	○	○	○	○	○	Weight must be lighter	
A-19	Portable Auto. NOx Analyzer for Stack Gas	A	A	A	○	○	○	○	○	○	Weight must be lighter	
A-20	High-volume Air Sampler	A	A	A	○	○	○	○	○	○		
A-21	Low-volume Air Sampler	A	A	A	○	○	○	○	○	○		
A-22	Deposit Gauge	A	A	A	×	×	×	×	×	×		No Criteria in Regulation
A-23	Andersen Air Sampler	A	A	A	△	○	△	△	△	△		
A-26	Air Bacteria Sampler (2-stage)	A	A	A	△				○	×		
A-28	Ambient Air Analyzer	A	A	A						○	For Workspace	Very Useful
A-29	Total Dust Meter (Light-scattering)	A	A	A								
A-30	PM 10 Meter (Portable)	A	A	A								
M. Marine Survey Equipment												
M-1	Mobile Laboratory	-	-	C								Not necessary
M-2	Boat for Monitoring/Sampling	-	-	A								Within 10 m in length

* Note A: To be Essential, B: Further Examination, C: Low Priority
**Note ○ : Frequently used, △ : Sometimes used, × : Seldom used or not used

Table 2.1 Usage Condition of Equipment of Existing 6 Laboratories (CCC & 5 RBOs)

Code No.	Equipment Name	Rank of Planning Eqiuipment*			Usage Condition of Existing Equipment**						Issues for Usage	Remarks
		AST	**ASW**	**HGD**	**ALX**	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**		
M-3	Ocean Observation Buoy, Land Based Station for Data Collection and Analysis	-	-	C								Not necessary
M-4	Remotely Operated Vessel (ROV)	-	-	C								Not necessary
M-5	Tide Gauge	-	-	A								
M-6	Echo-sounder	-	-	A								
M-7	Under Water Video Digital Camera	-	-	A								
M-8	Under Water Light Meter	-	-	A								
M-9	Gerographical Position System with Handled Unit & USP/PDA Adapter & Different GPS Receiver And Recorder	-	-	A								
M-10	Binoculars	-	-	A								
M-11	Fish Finder	-	-	A								
M-12	Marine Radio w/built in Hailer	-	-	A								
M-13	Handled VHF Radio	-	-	A								
M-14	Zoo Plankton Counting Tray	-	-	A								

* Note A: To be Essential, B: Further Examination, C: Low Priority
**Note ○ : Frequently used, △ : Sometimes used, × : Seldom used or not used

Table 2.2 Evaluation of Necessity on Requested Equipment

Code No.	Equipment Name	Existing Condition			Consideration						Total Estimation **	Remarks
		ALX RBO	The other RBOs	Usage Frequency *	Request for New RBOs **	Request of Additional Equipment **	Monitoring Items	Training Records ***	JICA Expert's Suggestion **	Study Team's Proposal **		
C. Commom Analytical Equipment												
C-1	X-Ray Fluorescence Spectrophotometer					B,C			B	C	C	
C-2	FT-IR Spectrophotometer					B,C			B	C	C	
C-4A	A.A.S.Flameless type with Flame Compartment	1	4	○	A		○	○	A	A	A	
C-4B	Flame Component for A.A.S					B	○	○	A	A	A	
C-5	UV/VIS Spectrophotometer (Single Beam)	1	4	○								
C-6	UV/VIS Spectrophotometer (Double Beam)		1	○	A		○	○	A	A	A	
C-7	Gas Chromtograph Mass Spectrometer					C	○		C	C	C	
C-8	FID/FPD Gas Chromatograph	1		○		B	○	○	C	C	C	
C-9	FID/FTD Gas Chromatograph	1		○		B	○	○	A	A	A	Only for SEZ
C-10	ECD/FID Gas Chromatograph	1		○		B	○	○	C	C	C	
C-11	High Performance Liquid Chromatograph	1		○		C	○	○	C	C	C	
C-12	Ion Chromatograph			○	A	B	○	○	A	A	A	
C-13	Stereoscopic Microscope	1	4	△	A			○	A	A	A	
C-14	Microscope	1	1	○	A			○	A	A	A	
C-15	Handy Type pH Meter	1	4	○	A	B	○	○	A	A	A	Only for New RBOs
C-16	Laboratory pH Meter	1	4	○	A		○	○	A	A	A	
C-18	Mercury Analyzer	1	4	○	A		○	○	A	A	A	
C-19	Glass Wares Set	1	4	○	A	B		○	A	A	A	Only for New RBOs
C-20	Reagents (w/Standard Samples)	1	4	○	A	B		○	A	A	A	Only for New RBOs
G. General Laboratory Equipment												
G-1	Semi-Micro Analysis Balance	1	4	○	A	B	○	○	A	A	A	max160g, div0.1mg
G-2	Macro Analysis Balance	1	4	○	A			○	A	A	A	max200g, div0.01g
G-4	Tabletop Type Centrifuge	1	4	○	A		○	○	A	A	A	
G-6	Muffle Furnace (for Organic)	1	4	○	A		○	○	A	A	A	
G-8	Constant Temperature Oven	1	4	○	A		○	○	A	A	A	
G-9	Middle Temperature Oven	1	1	△	A				A	A	A	
G-11	Oven for Glass Wares (Dryer)	1	4	○	A				A	A	A	
G-12	Autoclave (Vertical Type)	1	4	○	A		○		A	A	A	
G-13	Incubator	1	4	○	A		○		A	A	A	
G-14	Low Temperature Incubator	1	4	○	A		○		A	A	A	

*Note ○: Frequentry used, △: Sometimes used, ×: Seldom used or not used
**Note A: To be Essential, B: Further Examination, C: Low Priority
***Note ○: Well trained, △: Under Training, ×: Not yet trained

Table 2.2 Evaluation of Necessity on Requested Equipment

Code No.	Equipment Name	Existing Condition			Consideration						Total Estimation **	Remarks
		ALX RBO	The other RBOs	Usage Frequency *	Request for New RBOs **	Request of Additional Equipment **	Monitoring Items	Training Records ***	JICA Expert's Suggestion **	Study Team's Proposal **		
G-15	Rotary Evaporator	1	4	△	A				B	C	C	
G-16	Centrifugeing Type Test Tube Evaporator					B			C	C	C	
G-17	Test Tube Evaporator					B			C	C	C	
G-20	Shaker (Middle)	1	4	○	A	B			A	A	A	Only for New RBOs, ALX and SEZ
G-23	Mixer	1	4	○	A				A	A	A	
G-24	High Speed Homogenizer	1	4	×	A				B	C	C	
G-25	Hot Plate (Small)	2	8	○	A				A	A	A	
G-26	Magnetic Stirrer (w/Hot Plate)	2	8	○	A				A	A	A	
G-27	Multi Magnetic Stirrer w/Magnetic sets	1	4	○	A				A	A	A	
G-28	Constant Temperature Water Bath	1	4	○	A				A	A	A	
G-32	Water Bath	2	8	○	A				A	A	A	
G-33	Cooling Unit	1	4	○	A				A	A	A	
G-34	Ultrasonic Cleaner	1	4	○	A				A	A	A	
G-37	Ultrasonic Pipette Cleaner	1	4	○	A				A	A	A	
G-38	Ion Exchanger	1	4	○	A				A	A	A	
G-39	Water Distillation Unit	1	4	○	A				A	A	A	
G-40	Clean Bench	1	3	△	A				A	A	A	Necessary to be trained
G-41	Draft Chamber w/Gas Cleaning Device	1	4	○	A				A	A	A	
G-42	Draft Chamber	1	3	○	A				A	A	A	
G-43	AC Stabilizer	3	8	○	A				A	A	A	
G-46	Refrigerator	1	4	○	A				A	A	A	
G-47	Freezer	1	4	○	A				A	A	A	
G-48	Ice Maker (Cube Ice)	1	4	○	A				A	A	A	
G-49	Copy Machine	1	4	○	A				A	A	A	
G-50	Monitoring Car	1	4	○	A				A	A	A	
G-51	Tool Set	1	4	○	A				A	A	A	
G-53	Locker for Reagents	1	4	○	A				A	A	A	
G-55	Balance (6kg)	1	4	○	A				A	A	A	
G-56	Infrared Heater ~~(Lamp)~~	1	4	△	A				B	C	C	
G-57	Colony Counter	1	1	△	A				A	A	A	
G-58	Personal Computer (Arabic/English)	1	4	○	A				A	A	A	

*Note ○: Frequentry used, △: Sometimes used, ×: Seldom used or not used
**Note A: To be Essential, B: Further Examination, C: Low Priority
***Note ○: Well trained, △: Under Training, ×: Not yet trained

Table 2.2 Evaluation of Necessity on Requested Equipment

Code No.	Equipment Name	Existing Condition			Consideration						Total Estimation **	Remarks
		ALX RBO	The other RBOs	Usage Frequency *	Request for New RBOs **	Request of Additional Equipment **	Monitoring Items	Training Records ***	JICA Expert's Suggestion **	Study Team's Proposal **		
G-59	Video Camera w/Video Monitor Unit	1	4	○	A				A	A	A	
G-60	Camera	1	4	○	A	B			A	A	A	Only for New RBOs
G-61A	Over Head Projector w/Screen	1	4	○	A				A	A	A	
G-61B	Data Show Equipment (Projector)				A				A	A	A	
W. Water Quality Monitoring Equipment												
W-1	Total Organic Carbon Analyzer	1	1	○	A	B		○	A	A	A	
W-2	Handy Type DO Meter	1	4	○	A		○	○	A	A	A	
W-3	Laboratory Type DO Meter	1	4	○	A		○	○	A	A	A	
W-4	Total Nitrogen/Total Phospate Analyzer	1	1	×	A			×	C	C	C	
W-6	Tint Meter/Turbidity Meter	1	4	○	A		○	○	A	A	A	
W-8	Handy Type Conductivity/Temp. Meter	1	4	○	A		○	○	A	A	A	
W-9	Conductivity Meter	1	4	○	A		○	○	A	A	A	
W-10	Salt Meter (Na Ion Meter)	1	4	○	A			○	A	A	A	
W-11A	Water Sampler(Hyroht Type)	1	5	○	A			○	A	A	A	
W-11B	Water Sampler (Pettenkohrfer Type)	1	3	○	A			○	A	A	A	
W-13	Ekman Barge Grab Sampler	1	4	○	A			○	A	A	A	
W-14	Plankton Net	1	1	○	A				A	A	A	Only for HGD
W-15	Distillation Apparatus(for CN,NH4,F)	1	3	△	A		○	○	A	A	A	
W-16	Oil Content Meter	1	4	×	A			×	C	C	C	
W-18	BOD Analyzing Apparatus(Incubator)	1	4	○	A		○	○	A	A	A	
W-19	COD Analyzing Apparatus(Cr)	1	4	○	A	B	○	○	A	A	A	Only for New RBOs
W-22	Waste Water Treatment Equipment	1	4	○	A				A	A	A	
W-23	Portable Waste Water Chest (90L)	1	4		A				A	A	A	Existing one is 180L
W-24	Portable Waste Water Chest (50L)	3	8	○	A				A	A	A	
W-26	Water Quality Analysis (Temp.pH,Conductivity,Turbidity and DO)	1	4	○	A		○	○	A	A	A	
W-29	Water Proof Camera	1	4	○	A	B			A	A	A	Only for New RBOs
W-30	Automatic Titrator	1	4	△	A				B	C	C	
W-31	Ion Analyzer w/ Electrode Set	1	4	○	A			○	A	A	A	
W-32	Portable Water Quality Test Kit	1	4	○	A	B		○	A	A	A	Only for New RBOs
W-33	Vacuum Filter w/ Manifold	1	4	○	A			○	A	A	A	

*Note ○: Frequentry used, △: Sometimes used, ×: Seldom used or not used
**Note A: To be Essential, B: Further Examination, C: Low Priority
***Note ○: Well trained, △: Under Training, ×: Not yet trained

Table 2.2 Evaluation of Necessity on Requested Equipment

Code No.	Equipment Name	Existing Condition			Consideration						Total Estimation **	Remarks
		ALX RBO	The other RBOs	Usage Frequency *	Request for New RBOs **	Request of Additional Equipment **	Monitoring Items	Training Records ***	JICA Expert's Suggestion **	Study Team's Proposal **		
A. Air Quality Monitoring Equipment												
A-1	*Mobile Unit*											Except HGD
A-1A	SO2 Monitor (UV Fluorescence Method)	1	4	○	A		○	○	A	A	A	Except HGD
A-1B	NOx Monitor (Chemiluminescence Method)	1	4	○	A		○	○	A	A	A	Except HGD
A-1C	CO Monitor (Non-dispersive IR Method)	1	4	○	A		○	○	A	A	A	Except HGD
A-1D	Ozone Monitor (UV Absorption Method)	1	4	○	A		○	○	A	A	A	Except HGD
A-1E	Hydrocarbon Monitor (FID-GC Method)	1	4	○	A		○	○	A	A	A	Except HGD
A-1F	Dust Monitor (Beta-ray Absorption)	1	4	○	A		○	○	A	A	A	Except HGD
A-1G	Combined Wind Vane and Anemomeer	1	4	○	A	B	○	○	A	A	A	Except HGD
A-1H	Thermo-hygrometer	1	4	○	A		○	○	A	A	A	Except HGD
A-1J	Solar Radiation Meter	1	4	○	A		○	○	A	A	A	Except HGD
A-1K	Data Logger	1	4	○	A		○	○	A	A	A	Except HGD
A-1L	Standard Voltage Regulator	1	4	○	A		○	○	A	A	A	Except HGD
A-1M	Chasis Cabin w/ Tractor	1	4	○	A		○	○	A	A	A	Except HGD
A-7	Zero Gas Generator	1	4	○	A			○	A	A	A	Except HGD
A-8	Span Gas Dilutor	1	4	○	A			○	A	A	A	Except HGD
A-25	Standard Gas Cylinder w/ Regulator	1	4	○	A		○	○	A	A	A	Except HGD
A-3	Portable Black Fume Monitor	1	4	△	A			△	A	A	A	
A-4	Orsat Analyzer	1	4	△	A	B		○	B	C	C	
A-5	Wet Type Gas Collector (for SOx, HCl)	1	4	△	A			×	B	A	A	
A-6	Gas Sampler (Detector Tube)	1	4	○	A			○	A	A	A	
A-9	Stack Gas Sampler (for Dust)	1	4	○	A			○	A	A	A	
A-10	Portable Stack Gas Sampler (for NOx)	1	4	△	A		○	○	B	C	C	
A-11	Gas Meter	1	4	○	A				A	A	A	
A-12	Rotor Meter	1	4	○	A	B			A	A	A	Only for New RBOs
A-13	Mass Flow Meter	1	4	○	A				A	A	A	
A-15	Auto-Dry Desicator	1	4	○	A				A	A	A	
A-17	Portable HC/CO Analyzer for Stack Gas	1	4	○	A	B		○	A	A	A	Only for New RBOs
A-18	Portable Auto. SOx Analyzer for Stack Gas	1	4	○	A	B		○	A	A	A	Only for New RBOs
A-19	Portable Auto. NOx Analyzer for Stack Gas	1	4	○	A	B		○	A	A	A	Only for New RBOs
A-20	High-volume Air Sampler	4	7	○	A	B		○	A	A	A	

*Note ○: Frequentry used, △: Sometimes used, ×: Seldom used or not used
**Note A: To be Essential, B: Further Examination, C: Low Priority
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Table 2.2 Evaluation of Necessity on Requested Equipment

Code No.	Equipment Name	Existing Condition			Consideration						Total Estimation **	Remarks
		ALX RBO	The other RBOs	Usage Frequency *	Request for New RBOs **	Request of Additional Equipment **	Monitoring Items	Training Records ***	JICA Expert's Suggestion **	Study Team's Proposal **		
A-21	Low-volume Air Sampler	4	7	○	A	B		○	A	A	A	
A-22	Deposit Gauge	1	4	×	A			○	B	C	C	
A-23	Andersen Air Sampler	1	4	△	A			○	B	C	C	
A-26	Air Bacteria Sampler (2-stage)	1	1	×	A			×	C	C	C	
A-28	Ambient Air Analyzer			○	A	B		○	A	A	A	
A-29	Total Dust Meter (Light-scattering)			○	A				A	A	A	
A-30	PM 10 Meter (Portable)				A			○	A	A	A	
A-31	Ambient Temp./Humidity Meter					B			A	A	A	
A-32	Noise meter			○		B		○	A	A	A	
M. Marine Survey Equipment												Only for HGD
M-1	Mobile Laboratory				C				C	C	C	
M-2	Boat for Monitoring/Sampling				A				A	A	A	Only for HGD
M-3	Ocean Observation Buoy, Land Based Station for Data Collection and Analysis				C				C	C	C	
M-4	Remotely Operated Vessel (ROV)				C				C	C	C	
M-5	Tide Gauge				A				C	C	C	Only for HGD
M-6	Echo-sounder				A				C	C	C	Only for HGD
M-7	Under Water Video Digital Camera				A				A	A	A	Only for HGD
M-8	Under Water Light Meter				A				A	A	A	Only for HGD
M-9	Gerographical Position System with Handled Unit & USP/PDA Adapter & Different GPS Receiver And Recorder				A				A	A	A	Only for HGD
M-10	Binoculars				A				A	A	A	Only for HGD
M-11	Fish Finder				A				C	C	C	Only for HGD
M-12	Marine Radio w/built in Hailer				A				C	C	C	Only for HGD
M-13	Handled VHF Radio				A				A	A	A	Only for HGD
M-14	Zoo Plankton Counting Tray				A				A	A	A	Only for HGD

*Note ○: Frequentry used, △: Sometimes used, ×: Seldom used or not used
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Table 2.3 Necessary Equipment and Target Parameter (Water Quality)

Code No.	Equipment and Materials	Priority *			Egyptian Standards	Parameters Concerned
		A	B	C		
C-4	Atomic Absorption Analyzer (AAS)	○			○	Metals: Al, As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Ag, Zn, Hg
C-6	UV/VIS Spectrophotometer	○			○	Nitrate, Nitrite, Total Nitrogen, Phosphate, Total Phosphorus, Phenol, Fluoride, Sulfide, Chlorine, Cyanide, Surfactants, Chromium Hexavalent
C-7	Gas Chromatograph Mass Spectrometer			○	○	Organic Compounds and Pesticides
C-8	FID/FPD Gas Chromatograph			○	○	Organic Compounds and Pesticides
C-9	FID/FTD Gas Chromatograph			○	○	Organic Compounds and Pesticides
C-10	ECD Gas Chromatograph			○	○	Organic Compounds and Pesticides
C-11	High Performance Liquid Chromatograph			○	○	Organic Compounds and Pesticides
C-12	Ion Chromatograph	○			○	Inorganic Ions (F, Cl, NO2, NO3, SO4)
C-13	Stereoscopic Microscope	○				Micro organisms
C-14	Microscope	○				Micro organisms
C-15	Handy Type pH Meter	○			○	pH
C-16	Laboratory pH Meter	○			○	pH
C-18	Mercury Analyzer	○			○	Mercury
C-19	Glassware Set	○				General
C-20	Reagents (w/ Standards Samples)	○				General
G-1	Semi-Micro Analysis Balance	○				General
G-2	Macro Analysis Balance	○				General
G-4	Tabletop Type Centrifuge	○			○	TSS, etc.
G-6	Muffle Furnace	○			○	VSS, VTS, etc.
G-8	Constant Temperature Oven	○			○	TS, TDS, TSS, etc.
G-9	Middle Temperature Oven	○				General
G-11	Oven for Glassware	○				General
G-12	Autoclave (Vertical Type)	○				Total Nitrogen, Total Phosphorus, Total Coliform, Bacteria, etc.
G-13	Incubator	○				BOD, Total Coliform, Bacteria
G-14	Low Temperature Oven	○				General
G-15	Rotay Evaporator			○		General
G-20	Shaker (Middle)	○				General
G-23	Mixer	○				General
G-24	High Speed Homogenizer		○			General
G-25	Hot Plate	○				General
G-26	Magnetic Stirrer (with Hot Plate)	○				General
G-27	Multi Magnetic Stirrer	○				General
G-28	Constant Temperature Water Bath	○				General
G-29	Rotary Vacuum Pump	○				General
G-32	Water Bath	○				COD_{Mn}, etc.
G-34	Ultrasonic Cleaner	○				General
G-37	Ultrasonic Pipette Cleaner	○				General
G-38	Ion Exchanger	○				General
G-39	Water Distillation Unit	○				General
G-41	Draft Chamber with Gas Cleaning Device	○			○	Metals: Al, As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Ag, Zn
G-43	AC Stabilizer	○				General
G-46	Refrigerator	○				General
G-47	Freezer	○				General
G-48	Ice Maker (Cube Ice)	○				General
G-49	Copy Machine	○				General
G-50	Monitoring Car	○				General
G-51	Tool Set	○				General
G-53	Locker for Reagents	○				General
G-55	Balance (6 kg)	○				General
G-56	Infrared Heater (Lamp)		○			General
G-57	Colony Counter	○			○	Total Coliform, Bacteria
G-58	Personal Computer (Arabic/English)	○				General
G-59	Video Camera w/Video Monitor Unit	○				General
G-60	Camera	○				General
G-61	OHP (w/Screen) and Data Projector	○				General
W-1	Total Organic Carbon Analyzer	○				TOC
W-2	Handy Type DO Meter	○				DO.BOD
W-3	Laboratory DO Meter	○				DO, BOD
W-4&5	Total Nitrogen/Total Phosphate Analyzer			○	○	Nitrate, Nitrite, Total Nitrogen, Phosphate, Total Phosphorus
W-6&7	Turbidity Meter/Tint Meter	○			○	Color, Turbidity
W-8	Handy Type Conductivity/Temperature Meter	○				Electric Conductivity, Temperature
W-9	Conductivity Meter	○			○	Temperature, Conductivity, Salinity
W-10	Salt Meter (Na Ion Meter)	○				Salinity
W-11	Water Sampler	○				Sampling
W-13	Ekman Barge Grab Sampler	○				Sampling
W-14	Plankton Net		○			Plankton
W-15	Distillation Apparatus(for CN,NH4,F)	○				COD_{Cr}
W-16	Oil Content Meter			○		Oil
W-18	BOD Analyzing Apparatus(Incubator)	○			○	BOD
W-19	COD Analyzing Apparatus w/Closed Reflux (Cr)	○			○	COD_{Cr}
W-22	Wastewater Treatment Equipment	○				General
W-23	Portable Waste Water Chest (90L)	○				General
W-24	Portable Waste Water Chest (50L)	○				General
W-26	Potable Water Analyzer	○			○	Temperature, pH, Electric Conductivity, DO, Turbidity, Salinity
W-29	Water Proof Camera	○				General
W-30	Automatic Titrator			○		General
W-31	Ion Analyzer (Electrode Set)	○			○	Ammonia, Nitrate, Nitrite, Phenol, Fluoride, Sulfide, Chlorine, Cyanide
W-32	Portable Water Quality Test Kit	○				General
W-33	Vacuum Filter w/Manufold	○				General

*Note: A: To be Essential, B: Further Examination, C: Low Priority

Table 2.4 Necessary Equipment and Target Parameter (Air Quality)

Code No.	Equipment and Materials	Priority *			Egyptian Standards	Parameters Concerned
		A	B	C		
A-1	**Mobile Unit**	○			○	Ambient air
A-1A	SO2 Monitor (UV Fluorescence Method)	○			○	Sulfer dioxide (SO2)
A-1B	NOx Monitor (Chemiluminescence Method)	○			○	Nitrogen oxides (NO, NO2, NOx)
A-1C	CO Monitor (Non-dispersive IR Method)	○			○	Carbon monoxide (CO)
A-1D	Ozone Monitor (UV Absorption Method)	○			○	Ozone (O3)
A-1E	Hydrocarbon Monitor (FID-GC Method)	○			○	Non-methane hydrocarbon (NMHC), Methane, Total Hydrocarbon
A-1F	Dust Monitor (Beta-ray Absorption)	○			○	PM10 (particulete matter less than 10 micrometer)
A-1G	Combined Wind Vane and Anemometer	○				Winde direction, Wind speed
A-1H	Thermo-hygrometer	○				Ambient temperature, Relative humidity
A-1J	Solar Radiation Meter	○				Solar radiation
A-1K	Data Logger	○				—
A-1L	Standard Voltage Regulator	○				—
A-1M	Chassis Cabin	○				—
A-7	Zero Gas Generator	○				SO2, NOx, CO, O3, HC
A-8	Span Gas Dilutor	○				SO2, NOx, CO, O3, HC
A-25	Standard Gas w/Cylinder & Regulator	○				SO2, NOx, CO, HC
Stack Gas Monitoring Equipment						
A-3	Portable Black Fume Monitor	○				Stack smoke density (Ringelman index)
A-4	Orsat Analyzer		○			CO2 and O2 in stack gas
A-5	Wet Type Gas Collector		○		○	SOx (sulfer oxides) or HCl in stack gas
A-9	Stack Gas Sampler (for Dust)		○		○	Dust in stack gas
A-10	Stack Gas Sampler (for NOx)		○		○	NOx in stack gas
A-17	Portable Auto. HC/CO Analyzer for Stack Gas	○			○	HC, CO in stack gas
A-18	Portable Auto. SOx Analyzer for Stack Gas	○			○	SO2 in stack gas
A-19	Portable Auto. NOx Analyzer for Stack Gas	○			○	NOx, Oxigen in stack gas
A-6	Gas Sampler (Detector Tube)	○			○	SO2, CO, HCl, Cl2, O3, HCN, NOx, HF, H2S, NH3, Acethyren, Ethyl chloride, Benzen, Folmaldehyde
A-11	Gas Meter	○			○	General, (Dust, SO2, HCl) in stack gas or ambient air
A-12	Rotor Meter	○			○	General, (Dust, SO2, HCl) in stack gas or ambient air
A-13	Mass Flow Meter	○				General
A-15	Auto-Dry Desicator	○			○	General, PM in air、Dust in stack gas, Suspended solid in water
A-20	High-volume Air Sampler	○			○	PM in ambient air
A-21	Low-volume Air Sampler	○			○	PM in ambient air or work place
A-22	Deposit Gauge			○		Dust fall, Rain
A-23	Andersen Air Sampler			○		PM in ambient air
A-26	Air Bacteria Sampler (2-stage)			○		PM, Airborne bacteria
A-28	Ambient Air Analyzer	○			○	VOCs in ambient air (Benzene, Toluene, Xylen,Styrene, Cyclohexane) and work place
A-29	Total Dust Meter (Light-scattering)	○			○	PM in work place
A-30	PM 10 Meter (Portable)	○			○	PM10 in ambient air,

PM: Particulate matter
VOCs: Volatile organic comopounds

Note: A: To be Essential, B: Further Examination, C: Low Priority

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
Bold Type Number :Planning equipment number of this B/D.

Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
C. Common Analytical Equipment											
C-3	A.A.S.Flame type						1				
C-4	A.A.S.Flameless type	1	1	1	1	1	1				
C-4A	Flame Component for A.A.S	**1**	**1**	**1**	**1**	**1**					Necessary for expanding usage frequency of the atomic absorption spectrophotometer..
C-4B	A.A.S.Flameless type with Flame Compartment							**1**	**1**	**1**	Indispensable for analyzing heavy metals designated at the environmental standard..
C-5	UV/VIS Spectrophotometer (Single Beam)	1	1	1	1	1	1				
C-6	UV/VIS Spectrophotometer (Double Beam)					1	1	**1**	**1**	**1**	Indispensable for calorimetric analysis widely used as the fundamental equipment
C-7	Gas Chromatograph Mass Spectrometer						1				
C-8	FID/FPD Gas Chromatograph	1					1				
C-9	FID/FTD Gas Chromatograph	1			**1**		1				Necessary for monitoring the oil spill incident of the Red Sea.
C-10	ECD/FID Gas Chromatograph	1					1				
C-11	High Performance Liquid Chromatograph	1					1				
C-12	Ion Chromatograph	**1**	**1**	**1**	**1**	**1**	1	**1**	**1**	**1**	Necessary as a convenient equipment for analyzing extensive inorganic ions.
C-13	Stereoscopic Microscope	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for biological observation.
C-14	Microscope	1				1	1	**1**	**1**	**1**	Necessary for identification of plankton.
C-15	Handy Type pH Meter	1	1	1	1	1	1	**1**	**1**	**1**	It can be measured, while the most fundamental pH within the water quality is moved, and it is the indispensable equipment.
C-16	Laboratory pH Meter	1	1	1	1	1	2	**1**	**1**	**1**	Indispensable for measuring of pH at the good accuracy.
C-18	Mercury Analyzer	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for analyzing of mercury.
C-19	Glass Wares Set	1	1	1	1	1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
C-20	Reagents (w/Standard Samples)	1	1	1	1	1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G. General Laboratory Equipment											
G-1	Semi-Micro Analysis Balance-1	1	1	1	1	1	1				
G-1B	Semi-Micro Analysis Balance-2	**1**	**1**	**1**	**1**	**1**	1	**1**	**1**	**1**	Indispensable in order to measure weighing of the reagent and the suspended materials, and upper limit of the weighing should be necessary at about 200g.
G-2	Macro Analysis Balance	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable in order to conveniently and quickly measure weighing of the reagent and samples.
G-4	Tabletop Type Centrifuge	1	1	1	1	1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-6	Muffle Furnace (for Organic)	1	1	1	1	1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-8	Constant Temperature Oven	1	1	1	1	1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-9	Middle Temperature Oven	1				1	1	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-11	Oven for Glass Wares (Dryer)	1	1	1	1	1	2	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-12	Autoclave (Vertical Type)	1	1	1	1	1	2	**1**	**1**	**1**	Indispensable for measuring of coliform number described in water quality standard.
G-13	Incubator	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable for measuring of coliform number described in water quality standard.

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
Bold Type Number :Planning equipment number of this B/D.

Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
G-14	Low Temperature Incubator	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable for measuring of coliform number described in water quality standard.
G-15	Rotary Evaporator	1	1	1	1	1	1				Main purpose is to use for the concentration of the organic solvent, however, gaschromatograph is not requested, so it is unnecessary at this time.
G-18	Fraction Collector	1	1	1	1	1	1				Unnecessary due to the reason of low usage frequency at the existing RBOs.
G-20	Shaker (Middle)	2	2	2	2	2	3	**1**	**1**	**1**	Important item as a basic equipment for laboratory.
G-22	Shaker (Reciprocal)	2	2	2	2	2	1				Unnecessary due to the reason of low usage frequency at the existing RBOs.
G-23	Mixer	1	1	1	1	1	1	**2**	**2**	**2**	Important item as a basic equipment of laboratory.
G-24	High Speed Homogenizer	1	1	1	1	1	1				Unnecessary due to the reason of low usage frequency at the existing RBOs.
G-25	Hot Plate (Small)	2	2	2	2	2	3	**3**	**3**	**3**	Indispensable for decomposition procedures of samples for heavy metal, etc..
G-26	Magnetic Stirrer (w/Hot Plate)	2	2	2	2	2	2	**2**	**2**	**2**	Necessary for mixing of the sample, and an important item as a basic equipment.
G-27	Multi Magnetic Stirrer w/Magnetic sets	1	1	1	1	1	2	**1**	**1**	**1**	Necessary for mixing of the sample, and an important item as a basic equipment.
G-28	Constant Temperature Water Bath	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for temperature control of the sample, and an important item as a basic equipment.
G-32	Water Bath	2	2	2	2	2	1	**2**	**2**	**2**	Necessary for temperature control of the sample, and an important item as a basic equipment.
G-33	Cooling Unit	1	1	1	1	1	2				Unnecessary due to the low usage frequency in existing RBO.
G-34	Ultrasonic Cleaner	1	1	1	1	1	2	**1**	**1**	**1**	Important item as a basic equipment of laboratory.
G-37	Ultrasonic Pipette Cleaner	1	1	1	1	1	2	**1**	**1**	**1**	Important item as a basic equipment of laboratory.
G-38	Ion Exchanger	1	1	1	1	1		**2**	**2**	**2**	Important item as a basic equipment of laboratory.
G-39	Water Distillation Unit	1	1	1	1	1	2	**1**	**1**	**1**	Important item as a basic equipment of laboratory.
G-40	Clean Bench	1	1	1	1		1	**1**	**1**	**1**	Indispensable for the experiment on the microorganism.
G-41	Draft Chamber w/Gas Cleaning Device	1	1	1	1	1	1	**1**	**1**	**1**	Fundamental item necessary for the treatment of the noxious gas.
G-42	Draft Chamber	1	1	1	1		1	**1**	**1**	**1**	Fundamental item necessary for the treatment of the noxious gas.
G-43	AC Stabilizer	3	2	2	1	3	3	**1**	**1**	**1**	Indispensable for precise instruments such as atomic absorption spectrophotometer.
G-44	Cold Storage (Prefabricated-type)	1	1	1	1	1	1				Unnecessary equipment because of low uasage condition in existing laboratories.
G-46	Refrigerator	1	1	1	1	1	1	**3**	**3**	**3**	Three (3) refrigerators are needed instead of the cold storage (prefabricated.type) that was not requested.
G-47	Freezer	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable for saving of unstable reagents and samples.
G-48	Ice Maker (Cube Ice)	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for providing ice used for keeping of water quality samples collected in the field.
G-49	Copy Machine	1	1	1	1	1	1	**1**	**1**	**1**	Useful equipment for the management of laboratories.
G-50	Monitoring Car	1	1	1	1	1		**1**	**1**	**1**	Indispensable for field sampling and observation of water/air quality for the transportation of collected samplse.
G-51	Tool Set	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for repair and adjustment of the equipment.
G-53	Locker for Reagents	1	1	1	1	1	2	**3**	**3**	**3**	Indispensable for stock of reagents.
G-55	Balance (6kg)	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable for conveniently and quick use of measuring samples/reagents in order to grasp summary weight of them.

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
Bold Type Number :Planning equipment number of this B/D.

Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
G-56	Infrared Heater ~~(Lamp)~~	1	1	1	1	1	1				Unnecessary equipment because of low usage condition in existing laboratories.
G-57	Colony Counter	1				1	1	**2**	**2**	**2**	Indispensable for the measurement of number of coliforms described in water quality standard.
G-58	Personal Computer (Arabic/English)	1	1	1	1	1	1	**2**	**2**	**2**	Useful equipment for the management of laboratories such as the data analysis.
G-59	Video Camera w/Video Monitor Unit	1	1	1	1	1	1	**1**	**1**	**1**	Useful equipment for making a photograph of pollution source and situation related to samples.
G-60	Camera	1	1	1	1	1	1	**1**	**1**	**1**	Useful equipment for making a photograph of pollution source and situation related to samples.
G-61A	Over Head Projector w/Screen	1	1	1	1	1	1	**1**	**1**	**1**	Necessary in training and in the announcement of the result.
G-61B	LC Projector	1	1	1	1	1	1	**1**	**1**	**1**	Necessary in training and in the announcement of the result.
W. Water Quality Monitoring Equipment											
W-1	Total Organic Carbon Analyzer	1	1	**1**	**1**		1	**1**	**1**	**1**	The aqueous organic carbon can be conveniently measured, and it is useful for the estimation of the dilution degree of COD.
W-2	Handy Type DO Meter	1	1	1	1	1	2	**1**	**1**	**1**	DO as the most fundamental parameter within the water quality can be measured on the field, and it is the indispensable equipment.
W-3	Laboratory Type DO Meter	1	1	1	1	1		**1**	**1**	**1**	DO can be measured at the good accuracy, and it is the indispensable equipment.
W-4&5	Total Nitrogen/Total Phosphate Analyzer	1	1				1				Though it is useful for analyzing the large number of samples at once, it seems to be unnecessary at present. Because the sample number can not be so large and existing laboratories have not sufficiently utilized this item up to now. Hence, it is recommendable to use the flow cell added at C-6 as the attachment instead of this item in order to raise the efficiency of calorimetric analysis.
W-6&7	Tint Meter/Turbidity Meter	1	1	1	1	1	1	**1**	**1**	**1**	Color and turbidity within the water quality as the most fundamental parameters can be measured, and it is the indispensable equipment.
W-8	Handy Type Conductivity/Temp. Meter	1	1	1	1	1	1	**1**	**1**	**1**	Electro conductivity as the fundamental parameter can be measured in the field, and it is the indispensable equipment.
W-9	Conductivity Meter	1	1	1	1	1	1	**1**	**1**	**1**	Elactro conductivity can be measured at the good accuracy, and it is the indispensable equipment.
W-10	Salt Meter (Na Ion Meter)	1	1	1	1	1	1	**1**	**1**	**1**	Salinity can be measured at the good accuracy, and it is the indispensable equipment.
W-11A	Water Sampler(Hyroht Type)	1	1	1	1	2	2	**1**	**1**	**1**	Indispensable for sampling of water quality.
W-11B	Water Sampler (Pettenkohrfer Type)	1	1	1	1						Because sampling size of water quality is very small, and it is unnecessary.
W-11C	Water Sampler (Bandon Type)							**1**	**1**	**1**	Indispensable for sampling of water quality.
W-13	Ekman Barge Grab Sampler	1	1	1	1	1	2	**1**	**1**	**1**	Indispensable for taking samples of sediment.
W-14	Plankton Net	1			1		1			**1**	Indispensable for taking sample of the plankton of the seawater.
W-15	Distillation Apparatus(for CN,NH4,F)	1	1	1	1		1	**1**	**1**	**1**	Necessary equipment for analysis of cyanogen, ammonia, fluorine described in water quality criterion.
W-16	Oil Content Meter	1	1	1	1	1	1				Unnecessary because oil content is not regulated in Low No.4 and existing oil content meter has not been utilized well.
W-18	BOD Analyzing Apparatus(Incubator)	1	1	1	1	1		**1**	**1**	**1**	Indispensable for the measurement of the BOD which is an important index described at the water quality criterion.
W-19	COD Analyzing Apparatus(Cr)	1	1	1	1	1		**1**	**1**	**1**	Indispensable for the measurement of the COD which is an important index described in the water quality criterion.
W-22	Waste Water Treatment Equipment	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable equipment for the wastewater treatment which comes out of the laboratory by the end of the analysis.
W-23	Portable Waste Water Chest (180L)	1				1	3				Though it is the indispensable equipment, when it deals with it by the container which stocks the waste water after it finished the analysis, the capacity is changed, since the capacity is excessive.

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
Bold Type Number :Planning equipment number of this B/D.

Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
W-23B	Portable Waste Water Chest (90L)							**2**	**2**	**2**	It is the indispensable equipment, when it deals with it by the container which stocks the waste water after it finished the analysis.
W-24	Portable Waste Water Chest (50L)	3	2	2	1	3	3	**2**	**2**	**2**	Indispensable for the stock of wastewater before the treatment.
W-26	Water Quality Analysis (Temp.pH,Conductivity,Turbidity and DO)	1	1	1	1	1	1	**1**	**1**	**1**	It can conveniently and quickly measure the water quality in the field, and it is the useful equipment.
W-29	Water Proof Camera	1	1	1	1	1	1			**1**	Indispensable for the observation of aquatic lives in the coral reef which inhabit seawater.
W-30	Automatic Titrator	1	1	1	1	1	1				Though it is useful for analyzing a large number of samples, it is unnecessary because number of sample is not so large and exisying laboratories have not utilized enough.
W-31	Ion Analyzer w/ Electrode Set	1	1	1	1	1	1	**1**	**1**	**1**	useful for measurement of the ion of water such as ammonia, cyanogen, chlorine ion and fluorine.
W-32	Portable Water Quality Test Kit	1	1	1	1	1	1	**2**	**2**	**2**	Necessary for measurement of the water quality in the field.
W-33	Vacuum Filter w/ Manifold	1	1	1	1	1	1	**1**	**1**	**1**	Indispensable for the measurement of SS.
A. Air Quality Monitoring Equipment											
A-1	*Mobile Unit*										Useful for the air monitoring of around sources such as the factory. it often utilizes even in existing RBO, and indispensable for new RBOs except for HGD.
A-1A	SO2 Monitor (UV Fluorescence Method)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of sulfur dioxide.
A-1B	NOx Monitor (Chemiluminescence Method)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of carbon dioxide/monooxide.
A-1C	CO Monitor (Non-dispersive IR Method)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of carbon monooxide.
A-1D	Ozone Monitor (UV Absorption Method)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of ozone.
A-1E	Hydrocarbon Monitor (FID-GC Method)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of hydrocarbon.
A-1F	Dust Monitor (Beta-ray Absorption)	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of SPM.
A-1G	Combined Wind Vane and Anemomeer	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of wind velocity/direction.
A-1H	Thermo-hygrometer	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of atomospheric temperature/humidity.
A-1J	Solar Radiation Meter	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the continuous measurememt of solar radiation.
A-1K	Data Logger	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the data processing.
A-1L	Standard Voltage Regulator	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1 for the power supply.
A-1M	Chasis Cabin	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1for the installation of all the meters related to the mobile unit.
A-1N	Tractor	1	1	1	1	1	1	**1**	**1**		Necessary item equipped at A-1for the traction of the mobile unit.
A-7 (A-1O)	Zero Gas Generator	1	1	1	1	1	1	**1**	**1**		Necessary item for the calibration of the zero point.
A-8 (A-1P)	Span Gas Dilutor	1	1	1	1	1	1	**1**	**1**		Necessary item for the calibration of the maximum point.

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
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Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
A-25 (A-1Q)	Standard Gas Cylinder w/ Regulator	1	1	1	1	1	1	**1**	**1**		Necessary item for the calibration of the gas analyzer.
A-3	Portable Black Fume Monitor	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for the measurement in the practical use relate to the color of the smoke discharged from the chimney in the visual observation.
A-4	Orsat Analyzer	1	1	1	1	1	1				Though the concentration of carbon dioxide and oxygen in exhaust gas can be measured by this item, the effectiveness is not so large, because continuous measurememt is possible by A-19 NOx analytical instrument.
A-5	Wet Type Gas Collector (for SOx, HCl)	1	1	1	1	1	1	**1**	**1**	**1**	Fundamental instrument for the sampling of sulfur oxide (SOx) in the exhaust gas.
A-6	Gas Sampler (Detector Tube)	1	1	1	1	1	1	**1**	**1**	**1**	Necessary instrument set related to the measurement of the dust in exhaust gas, it is collected on the filter paper.
A-9	Stack Gas Sampler (for Dust)	1	1	1	1	1	1	**1**	**1**	**1**	Necessay for the measurement of exhaust gas and gas concentration in work environment.
A-10	Portable Stack Gas Sampler (for NOx)	1	1	1	1	1	1				Though it is the fundamental instrument related to the sampling of nitrogen oxide (NOx) in exhaust gas, it is unnecessary because the continuous measurement can be done by A-19.
A-11	Gas Meter	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for the measurement of the sampling gas quantity in exhaust gas and environmental air. it is used at A-5, A-9 and A-10.
A-12	Rotor Meter	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for the measurement of the flow rate in the sampling of exhaust gas and environmental air. it is also used at A-5, A-9 and A-10.
A-13	Mass Flow Meter	1	1	1	1	1	1	**1**	**1**	**1**	Necessary for the measurement of the flow rate in the sampling of exhaust gas and environmental air. it is also used at A-5, A-9 and A-10.
A-15	Auto-Dry Desicator	1	1	1	1	1	1	**2**	**2**	**2**	The necessity as filter paper or water SS sample for collector ingredient (A-9、A-20,A-21) of the dust dry.
A-17	Portable HC/CO Analyzer for Stack Gas	1	1	1	1	1	1	**1**	**1**	**1**	It is essential for the continuous measurememt of carbon monoxide and hydrocarbon in exhaust gas.
A-18	Portable Auto. SOx Analyzer for Stack Gas	1	1	1	1	1	1	**1**	**1**	**1**	It is essential for the continuous measurememt of sulfur dioxide in exhaust gas.
A-19	Portable Auto. NOx Analyzer for Stack Gas	1	1	1	1	1	1	**1**	**1**	**1**	It is essential for the continuous measurememt of nitroge oxide in exhaust gas.
A-20	High-volume Air Sampler	4	1**+2**	1**+2**	1**+2**	4	2	**3**	**3**	**2**	Basic instrument for sampling of dust in the ambient air, and it indispensable for the investigation.
A-21	Low-volume Air Sampler	4	1**+2**	1**+2**	1**+2**	4	2	**3**	**3**	**2**	Basic instrument for sampling of dust in the ambient air, and it indispensable for the investigation.
A-22	Deposit Gauge	1	1	1	1	1	1				Though it is for the sampling of rain and fall dust, it is unnecessary because there is no standard in Egypt.
A-23	Andersen Air Sampler	1	1	1	1	1	1				By the instrument for the respective grain diameter collection of the particle in the environmental air, though the origin can be estimated by analyzing the sample, the use frequency is yet low even in existing RBO.
A-24	Sulfur Content Meter	1	1	1	1	1	1				Unnecessary for the inspection of sulfur content in fuel because necessity of this item is low.
A-26	Air Bacteria Sampler (2-stage)	1				1	1				It is unnecessary since it has not been utilized well in existing laboratories.
A-28	Ambient Air Analyzer	**1**	**1**	**1**	**1**	**1**	1	**1**	**1**	**1**	Necessary for the quick measurement of VOCs (volatile organic compounds) in roadside and work place.
A-29	Total Dust Meter (Light-scattering)							**1**	**1**	**1**	Indispensable for the measurement of dust concentration in work place, and expected to be high use frequency.
A-30	PM 10 Meter (Portable)							**1**	**1**	**1**	Indispensable for the measurement of small pariculate less than 10 micron contained in dust.
A-32	Noise Meter					**1**					In the Cairo metropolitan area, there is a complaint of much noise, therefore, it is necessary to measure noise by this item.
M. Marine Survey Equipment											
M-1	Mobile Laboratory										Unnecessary since the analysis of the sample is carried out in the laboratory after the transportation to RBO.
M-2	Boat for Monitoring/Sampling									**1**	Indispensable for marine survey/sampling/transportation.

Table 2.5 Plan of Equipment for New 3RBOs and Existing 6 Laboratories

Note: Lean Type Number :Equipment number for existing laboratories provided by previous
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Code No.	Equipment Name	Additional Equipment for Existing RBOs and CCC*						Equipment for New RBOs*			Appropriateness for each Item
		ALX	**TNT**	**MSR**	**SEZ**	**GC**	**CCC**	**AST**	**ASW**	**HGD**	
M-3	Ocean Observation Buoy, Land Based Station for Data Collection and Analysis										Unnecessary since it is the equipment for the marine research and it deviates from the purpose and concept related to the monitoring plan of RBO.
M-4	Remotely Operated Vessel (ROV)										Unnecessary since it is the equipment for the marine research and it deviates from the purpose and concept related to the monitoring plan of RBO.
M-5	Tide Gauge										Unnecessary since it is the equipment for the marine research and it deviates from the purpose and concept related to the monitoring plan of RBO.
M-6	Echo-sounder										Unnecessary since it is the equipment for the marine research and it deviates from the purpose and concept related to the monitoring plan of RBO.
M-7	Under Water Video Digital Camera									**1**	Indispensable for the observation of the situation related to the pollution/ecology/marine lives.
M-8	Under Water Light Meter									**1**	Necessary for obtaining the important information on depth distribution of under water light in seawater.
M-9	Gerographical Position System with Handled Unit & USP/PDA Adapter & Different GPS Receiver And									**1**	Necessary for understanding of actual sampling position on the sea .
M-10	Binoculars									**1**	Basic equipment for navigation.
M-11	Fish Finder										Unnecessary since it is the equipment for the marine research and it deviates from the purpose and concept related to the monitoring plan of RBO.
M-12	Marine Radio w/built in Hailer										Sampling and survey area is limited in 2 km apart from the coast, hence, the marine radio is unnecessary.
M-13	Handled VHF Radio									**1**	Necessary for the communication between base and survey boat while the investigation.
M-14	Zoo Plankton Counting Tray									**1**	Indispensable for the measurement of the Zooplankton.

Table 2.6 Additional Spare Parts for New RBOs and Existing RBO/CCC

Code No.	Equipment	Additional Spare Parts	Quantity	Appropriateness for each Item	Target RBO
C. Commom Analytical Equipment					
C-4B	A.A.S.Flameless type with Flame Compartment	Hollow cathode lamp （Cd, Cu, Pb, Zn, Fe, Mn, Ni, Hg, Na）	1 each	Since the hollow cathode lamp deteriorates with the use, it is necessary to replace the lamp frequently used. In the existing laboratory some of them have broken down in about 2 years, so preparatory lamps are needed.	AST,ASW,HGD
		Graphite tube (2 kinds)、Deuterium lamp, Nebulizer	5 each	It is necessary to analyze the heavy metal 1000 samples annually. Replenishment of graphite tube and deuterium lamp for the 2～3 piece/year seems to be necessary, since it is required to replace them at the analysis of the about every 500 samples.	
C-6	UV/VIS Spectrophotometer (Double Beam)	Light source lamp (2 kinds)	5 each	Since the light source lamp deteriorates with the use. The replacement of lamp is required in about 4 months.	AST,ASW,HGD
C-9	FID Gas Chromatograph	Micro-syringe (5), Capillary column (1), Glass insert (5)	1 each	Those items are very important composition of the equipment but very fragile since the material is made of the glass. Therefore, the preparative spare is necessary.	SEZ
C-15	Handy Type pH Meter	pH glass electrode	1 each	Since the electrode deteriorates in about a year, spare of the electrode is necessary.	AST,ASW,HGD
C-16	Laboratory pH Meter	pH glass electrode	1 each	Since the electrode deteriorates in about a year, spare of the electrode is necessary.	AST,ASW,HGD
'W. Water Quality Monitoring Equipment					
W-1	Total Organic Carbon Analyzer	Combustion pipe (2), Cooling coil (1), Halogen scrubber (3), Rotor (1)	1 each	Those items are very important composition of the equipment, however, combustion pipe is very fragile since the material is made of the glass. Moreover, the other parts are also deteriorate with the use. Therefore, the preparative spare is necessary.	MSR,SEZ,AST,ASW,HGD
W-2	Handy Type DO Meter	DO electrode	1	Since the electrode deteriorates in about a year, spare of the electrode is necessary.	AST,ASW,HGD
W-3	Laboratory Type DO Meter	DO electrode	1	Since the electrode deteriorates in about a year, spare of the electrode is necessary.	AST,ASW,HGD
W-15	Distillation Apparatus(for CN,NH4,F)	Glass distillation parts	1 each	Since the parts of distillation unit are very difficult to manufacture through the local production, therefore, the spare is necessary.	AST,ASW,HGD
W-26	Water Quality Analysis (Temp.pH,Conductivity,Turbidity and DO)	pH glass electrode、DO electrode	1 each	Since the electrode deteriorates in about a year, spare of the electrode is necessary.	AST,ASW,HGD
W-31	Ion Analyzer w/ Electrode Set	Various ion electrode	1 each	Since the electrode deteriorates in a year, each ion electrode should be stored as spare parts.	AST,ASW,HGD
'A. Air Quality Monitoring Equipment					
A-5	Wet Type Gas Collector (for SOx, HCl)	Gas suction pipe (14φx500mm)(1), Mercury thermometer (1), Ribbon heater (40x1000mm)(1), 3 way cock (1)	1 each	It is necessary to be stored as spare parrts for the periodical/irregular replacement.	AST,ASW
A-9	Stack Gas Sampler (for Dust)	Gas suction pipe (1pc each), Needle valve (2)	1 each	ditto	AST,ASW,HGD
A-11	Gas Meter	U type manometer (1), Thermometer (1)	1 each	It is necessary to be stored as spare parrts for the replacement at the time of damage.	AST,ASW,HGD
A-17	Portable HC/CO Analyzer for Stack Gas	Memory card (2), Battery for memory card (1)	1 each	It is necessary for the normal operation and the periodical maintenance since installation.	AST,ASW,HGD
A-18	Portable Auto. SOx Analyzer for Stack Gas	Memory card (2), Battery for memory card (1)	1 each	ditto	AST,ASW,HGD
A-19	Portable Auto. NOx Analyzer for Stack Gas	Reaction pipe (1), Memory card (2), Battery for memory card (1)	1 each	ditto	AST,ASW,HGD

Table 2.7 Necessary Glassware and Its Quantity

(For New RBOs)

No.	Equipment/Materials	Required Number of Package/Box	Required Quantity		Remarks (Purpose)
			Number	Unit	
1	Volumetric Flask, 10ml, class A, Borosilicate glass	1	10	pcs	Indispensable for preparation of standard solution
	Volumetric Flask, 20ml, class A, Borosilicate glass	1	10	pcs	〃
	Volumetric Flask, 25ml, class A, Borosilicate glass	1	10	pcs	〃
	Volumetric Flask, 50ml, class A, Borosilicate glass	2	20	pcs	〃
	Volumetric Flask, 100ml, class A, Borosilicate glass	2	20	pcs	〃
	Volumetric Flask, 100ml, class A, Borosilicate glass (amber)	1	10	pcs	〃 (Preventable for decomposition)
	Volumetric Flask, 200ml, class A, Borosilicate glass	2	10	pcs	〃
	Volumetric Flask, 250ml, class A, Borosilicate glass	2	10	pcs	〃
	Volumetric Flask, 500ml, class A, Borosilicate glass	2	4	pcs	〃
	Volumetric Flask, 1000ml, class A, Borosilicate glass	2	4	pcs	〃
2	Volumetric Pipets, 1ml, one mark, class A, Borosilicate glass	1	10	pcs	Indispensable for quantitative sampling of samples or reagents
	Volumetric Pipets, 2ml, one mark, class A, Borosilicate glass	1	10	pcs	〃
	Volumetric Pipets, 5ml, one mark, class A, Borosilicate glass	1	10	pcs	〃
	Volumetric Pipets, 10ml, one mark, class A, Borosilicate glass	1	10	pcs	〃
	Volumetric Pipets, 20ml, one mark, class A, Borosilicate glass	1	5	pcs	〃
	Volumetric Pipets, 25ml, one mark, class A, Borosilicate glass	1	5	pcs	〃
	Volumetric Pipets, 50ml, one mark, class A, Borosilicate glass	1	5	pcs	〃
	Volumetric Pipets, 100ml, one mark, class A, Borosilicate glass	1	5	pcs	〃
3	Mohr Pipet, 1ml, 1/100, long tip	1	10	pcs	Indispensable for quantitative sampling of samples or reagents
	Mohr Pipet, 2ml, 1/100, long tip	1	10	pcs	〃
	Mohr Pipet, 5ml, 1/10,long tip	1	10	pcs	〃
	Mohr Pipet, 10ml, 1/10,long tip	1	10	pcs	〃
4	Pipet support (Horizontal type)	-	4	pcs	Necessary for stable supporting of pipet
5	Serological Pipet, 1ml (100pcs/box)	1	100	pcs	Necessary for addition of reagents
	Serological Pipet, 5ml (100pcs/box)	1	100	pcs	〃
6	Sample bottle, wide mouth, 1000ml	1	10	pcs	Necessary for sampling and keeping of water samples
7	Regent bottle, 1000ml, glass	2	20	pcs	Necessary for keeping of reagents
	Regent bottle, 500ml, glass	2	20	pcs	〃
	Regent bottle, 100ml, glass	1	10	pcs	〃
8	Regent bottle, 1000ml, glass, wide mouth	1	10	pcs	〃
	Regent bottle, 500ml, glass, wide mouth	1	10	pcs	〃
	Regent bottle, 500ml, glass, wide mouth(amber)	2	20	pcs	〃 (Preventable for decomposition)
	Regent bottle, 250ml, glass, wide mouth(amber)	2	20	pcs	〃 (Preventable for decomposition)
9	Regent bottle, 100ml, polyethylene	1	10	pcs	〃
10	Washing bottle, 500ml, polyethylene	1	12	pcs	Necessary for washing by distillation water
11	Filter flask, 500ml, w/side arm	-	5	pcs	Indispensable as a instrument for filtration
	Filter flask, 1000ml, w/side arm	-	1	pc	〃
12	Erlenmeyer flask, 100ml	2	12	pcs	Indispensable for preparation of reagents
	Erlenmeyer flask, 200ml	1	6	pcs	〃
	Erlenmeyer flask, 300ml	2	8	pcs	〃
13	Erlenmeyer flask, 24/40 $joint, borosilicate,500ml	-	20	pcs	Indispensable as a instrument for decomposition
14	Aspirator filter pump (metal)	-	2	pcs	Necessary item for suction of samples
15	Crucible, porcelain, 50ml	1	10	pcs	Indispensable for high temperature heating
16	Flat bottom flask, 24/40$ joint 500ml	-	10	pcs	Indispensable as a instrument for decomposition
17	Desiccator, glass, 180mm (dia.)	-	2	1pc	Necessary for dry keeping of reagents and samples
18	Spatula, Stainless Steel (180mm)	-	5	pcs	Necessary item for weighing of reagents
19	Forceps, straight tip, stainless steel 300mm	-	2	pcs	Necessary for handling of filter papers
	Forceps, straight tip, stainless steel 600mm	-	2	pcs	Necessary for handling of filter papers
20	Test Tube, 18(dia.) x 180 (L) mm $16	1	50	pcs	Necessary for operation of coloring
	Test Tube, 24(dia.) x 250 (L) mm $19/18	1	30	pcs	〃
21	Test Tube Rack, stainless steel	-	2	1pc	Necessary for supporting of test tubes
	Test tube rack, plastic	-	5	pcs	Necessary for supporting of test tubes
22	Tube support for color comparison 360(W)x100(D)x280(H)mm	-	2	pcs	Necessary for measuring of color
23	Gloves, heat resistance	-	1	pcs	Indispensable for protection against high temperature
	Disposable Gloves, polyethylene	1	100	pcs	Necessary for protection against acid and alkali
	Disposable Gloves, vinyl	1	100	pcs	Necessary for protection against acid and alkali
24	Beaker, 25ml, borosilicate glass	1	72	pcs	Indispensable for heating treatment of samples and reagents
	Beaker, 50ml, borosilicate glass	1	72	pcs	〃
	Beaker, 100ml, borosilicate glass	1	36	pcs	〃
	Beaker, 200ml, borosilicate glass	1	36	pcs	〃
	Beaker, 500ml, borosilicate glass	1	12	pcs	〃
	Beaker, 1000 ml, borosilicate glass	1	12	pcs	〃
25	Conical beaker, 300ml	1	24	pcs	Indispensable for titration of BOD and COD
	Conical beaker, 200ml	1	35	pcs	〃
26	Coiled condenser, 300mm,(24/40 TS Joint)	-	5	pcs	Necessary for distillation apparatus
	Libeg condenser, 300mm, (24/40 TS Joint)	-	3	pcs	〃
	Fridrsh condenser, 300mm,(24/40 TS Joint)	-	3	pcs	〃

Table 2.7 Necessary Glassware and Its Quantity

(For New RBOs)

No.	Equipment/Materials	Required Number of Package/Box	Required Quantity		Remarks (Purpose)
			Number	Unit	
27	Circles filter paper, 15cm, (42)ashless	-	3	pk	Necessary for filtration
28	Fiber glass filter, circles, 47(dia.)mm	-	3	1pk	〃
29	Separatory funnels, 200ml, glass	-	10	pcs	Indispensable for extraction
	Separatory funnels, 500ml, glass	-	10	pcs	〃
	Separatory funnels, 1000ml, glass	-	5	pcs	Indispensable for extraction of oil
30	Filter funnel, glass, Top dia. 60mm	1	10	pcs	Indispensable for filtration
31	Glass rods, 150 (L) x 5(dia.)mm	-	5	pcs	Indispensable for mixing of samples and reagents
	Glass rods, 250(L) x 10(dia.)mm	-	5	pcs	〃
32	Glass beads (1 bottle x 500g)	1	1	bottle	Indispensable for prevention of sudden boiling
33	Inhoff Cone, 1 L, Polystylene Acrylonitrile	-	3	sets	Necessary item for measuring of SVI
34	Cone Support	-	3	sets	Necessary item for supporting of above cone
35	Glass Filter Funnel, mesh G4	1	3	sets	Indispensable for extraction
36	Cork borer sets saw-shaped edge (No. of borers, 12)	-	1	pc	Indispensable general item for laboratory use
37	Pinchcok (Size M)	-	10	pcs	Necessary as a clasp of rubber tube
38	Brush φ30 x 950 mm	-	10	pcs	Necessary item for washing of glassware
39	Burner (bunsen)	-	2	pcs	Indispensable for high temperature heating of samples and reagents
40	Measuring cylinder 500 ml	2	4	pcs	Indispensable for quantitative sampling of samples or reagents
	Measuring cylinder 200 ml	1	4	pcs	〃
	Measuring cylinder 100 ml	2	20	pcs	〃
	Measuring cylinder 50 ml	2	20	pcs	〃
41	Adjustable volume micropipet 0.1 to 1.0 ml.	-	1	pc	Necessary for addition of small size of reagents
	Adjustable volume macropipet 1.0 to 5.0 ml.	-	1	pc	〃
42	Adjustable volume dispensers from 2 to 10.0 ml.	-	2	pcs	Necessary for addition of reagents
43	PVC hand vacuum pump for field filtration	-	1	pcs	Indispensable for filtration in the field
44	Flask tongs	-	1	pcs	Necessary item for protection against high temperature
45	Porcelain dish tongs	-	2	pcs	Necessary item as a material for picking up of ceramic crucibles
46	Clamps for burrets	-	5	pcs	Indispensable as a fixing material for burrets
47	Burret brush - long	-	2	pcs	Indispensable for washing of burrets
48	Imhoff cone brush	-	2	pcs	Necessary item for washing of cone
49	Tygon tubes (different diameters)	-	1	pc	Indispensable for assembling of analysis equipment
50	Semimicro Kjeldahl Digesting apparatus with one exhaust pipe, six Kjeldahl flask, (complete set)	-	1	pc	Indispensable for analysis of nitrogen
51	Membrane filters 0.45um, 0.47mm with pad (presterelized)	1	100	pcs	Indispensable for analysis of chlorophyll
52	Petri dishes 50 mm diameter (presterelized)	1	100	pcs	Indispensable vessel for biological analysis
	Petri dishes 120 mm diameter (presterelized)	1	10	pcs	Indispensable vessel for biological analysis
53	Rack for drying washed glassware	-	2	pcs	Necessary item for drying of glassware
54	Lab. Cart (small)	-	1	pc	Necessary for transportation of samples and equipment in laboratory
	Lab. Cart (big)	-	1	pc	Necessary for transportation of samples and equipment in laboratory
55	Whatman filter paper (fast, medium) 100 circles/box	1	5	boxes	Indispensable filter paper for analysis of suspended solids
	Whatman filter paper (150mm dia, 3 types) 100 circles/box	1	1	box	Indispensable filter paper for analysis of suspended solids
56	Beaker tongs	-	2	pcs	Indispensable for picking up heated beaker
57	Jumbo crucible tongs for use with muffle furnace	-	1	pc	Necessary item for protection against muffle furnace
58	Burret 25 ml. With Teflon stopcock	-	5	pcs	Indispensable for titration of BOD and COD samples
59	Burret 50 ml. With Teflon stopcock	-	5	pcs	Indispensable for titration of BOD and COD samples
60	Burret stand	-	4	pcs	Necessary for fixing of burret
61	Automatic burret 25 ml w/1l. Reservoir	-	2	pcs	Indispensable for titration of BOD and COD samples
62	Automatic burret 50 ml w/1l. Reservoir	-	2	pcs	〃
63	Plastic bottles 2000 ml, for sampling 10/box	2	20	pcs	Indispensable for keeping and taking samples
	Plastic bottles 1000 ml, for sampling 10/box	2	20	pcs	〃
	Plastic bottles 500 ml, for sampling 10/box	2	20	pcs	〃
64	Polyethylene bottles 250ml(amber)	1	20	pcs	〃 (Preventable for decomposition)
	Polyethylene bottles 500ml(amber)	1	10	pcs	〃 (Preventable for decomposition)
65	Labelling paper for reagents	1	100	pks	Necessary label for preparated reagents
66	Rubber Pippeter	-	5	pcs	Necessary for suction of pipet (protection against swallow)
67	Rubber Tube (1m)	-	20	pcs	Indispensable rubber tubes for laboratory use
68	Ceramic plate	1	20	pcs	Indispensable for analysis of ignition loss
69	Stainless Spoon (micro size)5pc/box	1	5	pcs	Indispensable for weighing of chemical reagents
	Stainless Spoon (middle size)5pc/box	1	5	pcs	Indispensable for weighing of chemical reagents
70	Weighting Paper 500pcs/box	1	500	pcs	Indispensable for weighing of chemical reagents
71	Wiping Tissue (Big Size;25pack/box)	1	25	pcs	Indispensable for basic item of laboratory
	Wiping Tissue (Small Size 72pack/box)	1	72	pcs	Indispensable for basic item of laboratory
72	pH Paper (Roll Type)	4	4	pcs	Necessary for simple measurement of pH
73	Evaporation Dish (100mm dia)	1	10	pcs	Indispensable for measurement of residual materials
74	Dropping Bottle (30ml amber)	1	10	pcs	Necessary for dropping of chemical reagents
75	Platinum Dish (f 30mm)	1	1	pcs	Indispensable for treatment of chemical reagents
76	Flask Pear Shape(250ml)	1	4	pcs	Oil Analysis
77	Bulbs, Connecting	1	1	pc	Oil Analysis
78	Chromatographic Column	1	1	pc	Oil Analysis

Table 2.8 Necessary Chemical Reagents and Its Quantity

(For New RBOs)

No.	Equipment	Quantity of Phase Ⅱ	Remarks (Purpose)
(1)	(CDTA) Trans-1,2-Diaminocyclohexane-*N,N,N′,N′*-tetraacetic acid	200 g	F
(2)	1,10 - Phenathroline. H_2O	10 g	Basic
(3)	1-Amino-2-naphthol-4-sulfonic acid (Ascorbic acid)	100 g	PO_4-P
(4)	4-Amino antipyrine	250 g	Phenol
(5)	Acetic acid, Glacial (99%)	2.5 l	Basic & F
(6)	Acetone	2.5 l	Basic & B
(7)	Ammonium chloride	2.5 kg	Phenol
(8)	Ammonium hydroxide	5 l	Basic
(9)	Ammonium molybdate. $4H_2O$	1 kg	Silica & PO_4-P
(10)	Ammonium thiocyanate	500 g	Basic
(11)	Antimony potassium tartrate. 1/2 H_2O	100 g	PO_4-P
(12)	Barium chloride	1 kg	SO_4
(13)	Boric acid (H_3BO_3)	1 kg	B
(14)	Bromophenol blue	10 g	Basic
(15)	Buffer solution pH 9 (500 ml)	2 bottles	pH
(16)	Buffer solution pH 4 (500 ml)	4 bottles	pH
(17)	Buffer solution pH 7 (500 ml)	4 bottles	pH
(18)	Butanol	2 l	Basic
(19)	Cadmium-Copper Soft drops (0.5-2 mm)	200 g	T-N
(20)	Butyl acetate	500 g	Heavy Metals
(21)	Calcium carbonate	1 kg	Basic
(22)	Calcium chloride dihydrate	1 kg	Basic
(23)	Calcium oxide (powder)	500 g	Basic
(24)	Ground curcumin	5 g	B
(25)	Chloramine T reagent	50 g	CN
(26)	Chloroform certified	5 l	Phenol
(27)	Cobaltous chloride (crystalline), $C_OCl_2.6H_2O$	10 g	Color (Egyptian Mehod)
(28)	Cupric sulfate.$5H_2O$ (or copper (Ⅱ) sulfate.$5H_2O$)	1 kg	Phenol
(29)	Dipotassium hydrogen phosphate (anhydrous)	1 kg	Basic
(30)	Disodium hydrogen phosphate (anhydrous)	2 kg	Basic
(31)	Diammonium hydrogen phoshate	500 g	Basic
(32)	Diphenyl carbazide	20 g	Cr^{6+}
(33)	Erichrom black T	5 g	Hardness
(34)	Ethanol (95%)	2.5 l	Basic
(35)	Ethanol, absolute	2.5 l	Basic
(36)	EDTA.(2Na).$2H_2O$	500 g	Hardness, CN
(37)	EDTA.(4Na)	500 g	Hardness, CN
(38)	Ferric ammonium sulfate. $12H_2O$	2 kg	Basic
(39)	Ferric chloride.$6H_2O$	500 g	Basic
(40)	Ferrous ammonium sulfate:$Fe(NH_4)_2(SO_4)_2.6H_2O$	1 kg	COD
(41)	Ferrous sulphate.$7H_2O$	1 kg	Basic
(42)	Formaline	500 g	Basic
(43)	Glucose	1 kg	Basic
(44)	Glycerine	2 kg	Basic
(45)	Hexamethylene tetramine	500 g	Turbidity (Egyptian Method)
(46)	Hydrazine sulfate	1 kg	Turbidity (Egyptian Method)
(47)	Hydrochloric acid	10 l	Basic
(48)	Hydrogen peroxide 30%	5 l	Basic
(49)	Hydroxylamine hydrochloride	500 g	Hg

Table 2.8 Necessary Chemical Reagents and Its Quantity

(For New RBOs)

No.	Equipment	Quantity of Phase II	Remarks (Purpose)
(50)	Iodine solution N/10	2.5 l	Basic
(51)	Isonicotinic acid	25 g	CN
(52)	L(+) Ascoribic acid (crystals)	1 kg	PO_4-P
(53)	Linear alkylbenzen sulfonate (ABS)	10 g	ABS
(54)	m-Endo broth MF	500 g	Coliform
(55)	M FC broth	500 g	Coliform
(56)	Magnesium chloride.$6H_2O$	1 kg	Basic
(57)	Magnesium sulfate.$7H_2O$	1 kg	BOD
(58)	Manganous sulfate.$4H_2O$	1 kg	BOD
(59)	Mercuric chloride	500 g	COD
(60)	Mercuric sulfate	500 g	COD
(61)	Mercuric thiocyanate	500 g	Cl
(62)	Metapresol purple	25 g	Heavy Metals
(63)	Methanol	2.5 l	Basic
(64)	Methyl orange	100 g	Basic
(65)	3-Methyl-1-phenyl--5-pyrazolone	25 g	CN
(66)	Methyl red pH indicator	100 g	Basic
(67)	Methylene blue	100 g	ABS
(68)	*N*,*N*-dimethylforamide	500 g	CN
(69)	*N*,*N*-dimethyl -p-phenylene diamine	100 g	S^{2-}
(70)	*N*,*N*-dimethyl-p-phenylene diamine sulfale	100 g	S^{2-}
(71)	*N*-1-Naphthyl ethylene diamine dihydrochloride	50 g	NO_2, Nox
(72)	n-Hexane (min.99%)	5 l	Basic
(73)	Nitric acid reagent	5 l	Basic, AAS
(74)	Ortho-Phosphoric acid (85%)	10 l	Basic
(75)	Oxalic acid	500 g	B
(76)	Pararosaniline	25 g	SO_2 Sampling
(77)	Petrolem ether	2.5 l	Basic
(78)	Phenol	500 g	Phenol & NH_4
(79)	Phenolphthalein	100 g	Basic
(80)	Phenol red, sodium salt	50 g	Basic
(81)	Potassium hydroxide	2 kg	DO
(82)	Potassium nitrite	1 kg	Basic
(83)	Potassium bromide	500 g	Basic
(84)	Potassium chloride	1 kg	Basic
(85)	Potassium chromate	500 g	Cl
(86)	Potassium cyanide	100 g	Hardness
(87)	Potassium dichromate	500 g	Basic
(88)	Potassium dihydrogen phosphate	1 kg	Basic
(89)	Potassium ferricyanide	500 g	Basic
(90)	Potassium ferrocyanide	500 g	Basic
(91)	Potassium hexachloroplatinate K_2PtCl_6	10 g	Color
(92)	Potassium hydrogen phthalate	500 g	Basic
(93)	Potassium iodate (anhydrous)	500 g	Phenol
(94)	Potassium iodide (crystals)	500 g	COD
(95)	Potassium nitrate	500 g	Basic
(96)	Potassium permaganate	1 kg	Basic

Table 2.8 Necessary Chemical Reagents and Its Quantity

(For New RBOs)

No.	Equipment	Quantity of Phase Ⅱ	Remarks (Purpose)
(97)	Pyrrolidine dithiocarbamic acid ammonium salt (APCD)	100 g	Heavy Metals
(98)	Mercuric oxide, Red	500 g	T-N
(99)	Silver nitrate	500 g	Cl
(100)	Silver sulfate	500 g	COD
(101)	Sodium acetate (anhydrous)	2 kg	Basic
(102)	Sodium acetate.$3H_2O$	1 kg	Basic
(103)	Sodium arsenite	500 g	Redual Cl_2
(104)	Sodium azide (granular, purified)	500 g	DO & BOD
(105)	Sodium bicarbonate	1 kg	Basic
(106)	Sodium carbonate (anhydrous)	1 kg	Basic
(107)	Sodium chloride	1 kg	Basic
(108)	Sodium dihydrogen phosphate.H_2O ($NaH_2PO_4.H_2O$)	2 kg	Basic & CN
(109)	Sodium hydrogen phosphate. (Na_2HPO_4)	2 kg	Basic
(110)	Sodium fluoride	500 g	Basic & F
(111)	Sodium formate	500 g	Basic
(112)	Sodium hydroxide	10 kg	Basic
(113)	Sodium hypochlorite (4-6%)	1 l	NH_4
(114)	Sodium Iodide	500 g	Basic
(115)	Sodium nitrate (anhydrous)	500 g	Basic
(116)	Sodium nitrite	500 g	Basic
(117)	Sodium silicate Na_2SiO_3 (solution)	2.5 l	Basic
(118)	Sodium sulfate	1 kg	Basic
(119)	Sodium sulfide.$9H_2O$	250 g	S^{2-}
(120)	Sodium sulfate (anhydrous)	500 g	Basic
(121)	Sodium tetraborate (anhydrous)	1 kg	Basic
(122)	Sodium thiosulfate N/40 solution	2 l	DO & BOD
(123)	Sodium thiosulfate.$5H_2O$	2 kg	DO & BOD
(124)	Stannous chloride or Tin(Ⅱ)chloride	1 kg	Basic
(125)	Starch, soluble	1 kg	BOD
(126)	Sulfanilamide	1 kg	NOx
(127)	Sulfamic acid, crystalline	500 g	Basic
(128)	Sulfanilic acid	1 kg	Basic
(129)	Sulfuric acid	5 l	Basic
(130)	Sulfuric acid solution 1N	2.5 l	Basic
(131)	Tin (IV)chloride (anhydous)	25 g	As
(132)	Zinc acetate	500 g	S^{2-}
(133)	Zinc sulfate.$7H_2O$	500 g	Basic
(134)	Silicagel	1 kg	Basic
(135)	Glasswool (JIS K8251)	500 g	Basic
(136)	Barium chloride 24-32 mesh Special Grade	24 g x 2	SOx
(137)	Sodium hydrogen-carbonate	25 g	SOx
(138)	Potassium gluconate	25 g	SOx
(139)	Sodium tetraborate (decahydrate)	25 g	SOx
(140)	Acetonitile	500 g x 2	SOx
(141)	p-Hydroxy-benzonic acid	25 g	SOx
(142)	Bis (2-hydroxyehyl)-iminotris (hydroxymethyl)-methan	5 g	SOx
(143)	Phtalic acid	25 g	SOx
(144)	2-Amino-2-hydroxymethyl-1,3-propanediol	25 g	SOx
(145)	Phenoledisulfonic acid solution	100 ml x 2	NOx
(146)	Calcium chloride (2-3mm.granule)	500 g x3	Basic
(147)	Perchloride acid	500 ml x 2	Ion chromatography

Table 2.8 Necessary Chemical Reagents and Its Quantity

(For New RBOs)

No.	Equipment	Quantity of Phase II	Remarks (Purpose)
(148)	Silver nitrate solution o.1 mole/l	500 ml x 2	Ion chromatography
(149)	Nitrobenzene	500 ml	Ion chromatography
(150)	Ammonium thiocyanate solution 0.1 mole/l	500 ml x 2	Ion chromatography
(151)	Sodium hydroxide solution 1.0 N	500 ml x 2	Ion chromatography
(152)	Silicone dioxide JIS K 8885 100 -150 μ m	250 g	F
(153)	Phosphoric acid	500 ml	F
(154)	Alfusone	25 g x2	F
(155)	Palladium-Magnesiym matrix modifier	50 ml x 3	AAS
(156)	Lanthanum oxide	25 g x3	AAS
(157)	NN-Funmatsu	500 g	AAS
(158)	Ca Standard Solution	100 ml	AAS
(159)	Carbon disulfide	500ml	Oil Analysis
(160)	EPA 610 Polynuclear Aromatic	1ml	Oil Analysis
(161)	Florisil PR	500g	Oil Analysis

Table 2.9 Outline of Specifications, Usage and Quantity on the Major Equipment

Code	Equipment	Q'ty	Objectives	Main Specification
C.Common Analytical Equipment				
C-4	A.A.S.(Graphite Furnace)/Flame Conversion Unit	3	General uses for quantative analysis of heavy metals in river and channel waterway; also usable for metal component analysis in dust. It is far more sensitve than the flame type (C-3) and for lower concentration detection.	<Optical system> Wave length range: 190～900 nm; Wave-band width; 0.1～5.0 nm <Lamp> No. of attachable lamps; 8 ; D_2 lamp background correction: <Data processing> Software;: MS-Windows ver 2000 or later <Measurement mode> Flame-absorption method, Flame microsampling method <Concentration-conversion mode> Calibration-curve method, Standard addition method. <Temperature range> Room temp. 3000 ; Heat-control method: dry; Electric current control method: Ashing and atomizing; light temp. ; Automatic sampler.
C-4A	Flame Convervion Unit for A.A.S.(Graphite Furnace)	5	General uses for quantative analysis of heavy metals in river and channel waterway; also usable for metal component analysis in dust. It is far more sensitve than the flame type (C-3) and for lower concentration detection.	<Flame conversion unit> Gas control unit, Atomizer cahmber, ignition swich, Ignition <Attachment> Silent type compressor, Drainage separator, Burner head
C-6	UV-VIS spectrophotometer (Double Beam)	3	Quantitative analysis of inorganic and organic chemical components in water (nitrogen, phosphorous, cyanide, phenol,etc.); Common instrument for wide use.	Wave length range: 200 900 nm; Spector-band width; approx. 2nm; Meaurement method; double beam; Output; RS232C/V4 interface
C-9A	FID Gas Chromatography	1	Separation and qualitative and quantitative analyses of known and unknown compounds (pesticides, etc.) in water, air, solid, waste and soil; FID is mainly for organic compounds	Inner volume: about 10,000 cm^3; Temperature range; 10～450℃ ; No. of steps for temperature-elevation program; 3～5 steps; FID Detectable limit; 3 ×10-12 g/s. Dynamic range; 10^7. Nozzle iet; quartz
C-12	Ion Chromatography	8	Analysis of ambient water such as river water, rain water, lake water, fertilizers and foods. It is especially efficient for separation & analysis of minute amount of inorganic negative ions, alkali & alkali earth metals, ammonium ion.	<Pump unit> Non-metallic head & reciprocating piston system; Floe rate: 0.5～4.0 ml/min, Max. pressure: 4,000 psi; <Electric conductivity detector> Range: 0.01～1,000 μS, Cell volume: 1.25 μl; <Others> Sample injection: 25 μl, Recorder.

Table 2.9 Outline of Specifications, Usage and Quantity on the Major Equipment

Code	Equipment	Q'ty	Objectives	Main Specification
C-18	Mercury Analyzer	3	Atomic absorption spectrophotometer with no heating device specially designed for mercury analysis. Environmental regulation for mercury is very strict but it can be analysed using this simple analyser with high precision.	Measurement method: flameless reduction-vaporization atomic absorption spectrophotometry; Light source: low-pressure mercury lamp; Acceptor: photocell; Sensitivity: approx. 5 ppb; Range: 0 1,000 ng; Output: 10 mV full-scale (for recorder or RS232C)
C-19	Grass Wares Set	3	Glassware for laboratory.	Pipet, Flask, Glass pipe, Beaker, Test tube, Colorimeter, Petri dish, Separation funnel, Desiccator, Evaporating dish, Buret, Weighing bottle, Culture dish, Reagent beaker, Filter holder, Incubating bottle, Distillation appartus, Measuring cylinder, Crucible, Stirrer, etc.
C-20	Reagents	3	Chemical reagents for laboratory use	Acetone, HCl, NH_4Cl, $CaCl_2$, $NaNO_3$, $HClO_3$, $KMnO_4$, glycerin, NaOH, oxalic acid, acetic acid, HNO_3, Na_2CO_3, toluene, hexane, formaline, methyl alcohol, H_2SO_4, HNO_3, reference solution,etc.
G.General Laboratory Equipment				
G-39	Water distillation Unit	3	Supplyer of pure water for laboratory use	Manufacturing procedure: ion exchange and distilation; Quality of pure water: 0.4 1 l/hr; Water quality monitor; Function: dry-out, Spillage & water-supply stoppage protection.
G-40	Clean Bench	3	Use for microbiological analysis	Outside: cold rolled steel, baking finish with chemicals proof; Inside: non-asbest spwcially processed board; Lighting system; Working bench: ceramic, epoxy-resin, tile or lead lining; Water cock: 1 Gas cock: 2; AC receptacle (220V); 2 with earth line; Frontage width: 1,500mm.
G-41	Draft Chamber with Gas Cleaning Device	3	Use for hazardous gas experiments such as fluorides & sulfuric acid	Outside: cold rolled steel, baking finish with chemicals proof; Inside: non-asbest spwcially processed board; Lighting system; Working bench: ceramic, epoxy-resin, tile or lead lining; Water cock: 1 Gas cock: 2; AC receptacle (220V); 2 with earth line; Frontage width: 1,500mm.
G-42	Draft Chamber	3	Use for hazardous gas experiments	Outside: cold rolled steel, baking finish with chemicals proof; Inside: non-asbest spwcially processed board; Lighting system; Working bench: ceramic, epoxy-resin, tile or lead lining; Water cock: 1 Gas cock: 2; AC receptacle (220V); 2 with earth line; Frontage width: 1,500mm.

Table 2.9 Outline of Specifications, Usage and Quantity on the Major Equipment

Code	Equipment	Q'ty	Objectives	Main Specification
G-50	Monitoring Car (one box type)	3	Transportation of mesuring equipments and samples	4 or 6 cycle gasolin engine; Displacement: approx. 2,000 cc; Gear shift: 5 steps; Van-type wagon; Load-carring platform: approx. 2,500 (L)×1,500 (D)×1,300 (H); Max. load: 1,300 kgw; Power steering & air conditioning.
W. Water Quality Monitoring Equipment				
W-1	Total Organic Carbon Analyzer	5	Quantitative analysis of total organic carbon in water (important index for organic pollution of water)	Principle: incineration and non-dispersive infrared spectrophotometer; Measurement items: TC (total carbon), IC (inorganic carbon), & TOC (total organic carbon); Measurement range: 0～1,000 mg C; reproducibility: ± 2% of full scale; Measurement cycle: within 5 min; Supplement: printer
W-22	Waste Water Treatment Equipment (1.Effluent containing heavy metals, 2. Ferriccyanide)	3	Treatment of wastewater discharged from laboratory	Object of treatment: heavy metals & potassium hexacyanoferrate (III) ; Treatment capacity: about 50 l at a time; Treatment time: about 3 hr; Security device: superheat protection & overflow protection.
W-31	Ion Analyzer	3	Quantitative analysis of inorganic ion in water	1. Measurement range As ion concentration: 0.0001 - 1,999 g/l, mV: ± 1.999 mV, pH: 0.00 - 14.00 2. Temperature: 0 -100 ℃ 3. Ion electrode: Cyanide, Chloride, Fluorine, Ammonium, Sodium, Copper, Cadmium
A. Air Quality Monitoring Equipment				
A-1	Mobile Unit	2	Ambient air quality monitoring of urban area	A.SO2 Monitor (UV-Fluorescence method) B.NOx Monitor (Chemiluminescence method) C.CO Monitor (Non-distersive IR Spectro) D.Ozone Moitor (UV-absorption method) E.Hydro-carbon Monitor (FID-GC method) F.Dust Monitor (beta-ray absorption method) G.Combined Wind Vane H.Thermo-Hydrograph J.Solar Radiation Meter K.Data Loggar L.Standard Voltage Generator M.Chassis Cabin O.Zero Gas Generator P.Span Gas Dilutor Q.Standard Gas w/Cylinder & Regulator
A-1N	Mobile	2	Transportation of mobile unit for air monitoring (A-1)	Gasolin engine tractor; brake system; interlocking with tractor; Doble compler connectable with the trailer
A-7 (A-1O)	Zero Gas Generator	2	Supply of zero gas to each gas analyzer	Amount of gas generation: 10～20 l/min (at 20 psig); Kind of gas: air or nitrogen; Purification limit: SO_2,NO, NO_2,O_3,: <o.t ppb; CO & hydrocarbon: <100ppb.

Table 2.9 Outline of Specifications, Usage and Quantity on the Major Equipment

Code	Equipment	Q'ty	Objectives	Main Specification
A-9	Stack Gas Sampler (for dust)	2	Sampling of stack gas for dust monitoring	<Flow rate measurement> Western type Pilot tube; thermometer: 0～1200℃; Tilting manometer or Pitot tube flow-meter; <Water content measurement> Absorption tube (with heater and slide transformer), absorption bottles, cooling tank, vacuum pump (10 l/min), balance; <Dust collecting part> Dust sampling tube (holders for cylindrical filter paper & for circular filter paper), Suction pump (approx. 60 l/min), dry-seal gas meter (1.0 l/min), set triple-type pretreating device.
A-17	Portable HC/CO Analyzer for Stack Gas	2	Monitoring of hydrocarbon & CO in stack gas	Principle: CH_4 & CO: single light source, dual beam non-dispersive infrared spectrophotometer (ratio photometry), O_2: zirconia or magnetometric method; Measurement range: CH_4: approx. 0～200 ppm; CO approx. 0～100 ppm; O_2: approx 0～25 vol %; recording method: memory card or chart recorder (probe for flue-gas: combined use with A-18)
A-18	Portable Auto Sox Analyzer for Stack Gas	3	Continuous measurement of SO_2 in stack gas	Principle: SO_2: non-dispersed infrared spectrophotometer; O_2: zirconia or magnetometric method; Measurement range: SO_2: approx. 0～2,000 ppm; O_2: approx 0～25 vol %; Data recording method: memory card or chart recorder; Supplement: probe for flue-gas sampling and pretreatment apparatus.
A-19	Portable Auto Nox Analyzer for Stack Gas	3	Continuous measurement of NOx in stack gas	Principle: NOx: atmospheric pressure chemiluminescence method; O_2: zirconia or magnetometric method; Measurement range: NOx: approx. 0～2,000 ppm; O_2: approx 0～25 vol %; Data recording method: memory card or chart recorder; Sapplement: probe for flue-gas: combined use with A-18.
A-28	Ambient Air Analyzer	8	Measuring of VOC at working place	Principle: Infrared absorption Wave Length;7.7~14μm Suction Flow Rate; 20~30L/min Display; LCD Measuring Objects; Benzene.Toluene.Xylem.Styrene. Cyclohexane.Dichlorobenzene.
A-30	PM10 Meter (Potable)	3	Measurement of dust in ambient air and working place	Principle: Laser Light scattering Method Measuring Range; 0~10mg/m3 Data Storage: Built-in Data Loger
M. Marine Survey Equipment				
M-2	Boat for Monitoring/Sampling	1	Sampling for marine water quality and field survey	Type; Fishing Boat Full Crew; 6persons Material; FRP Engine;40Hpx2 Fuel; Gasoline Boat Length; 10m