7　研究活動の評価

ＥＲＴＣ研究活動（専門家作成資料）

Thai FY		92	93	94	95	96～
水質汚濁	当初目標	*水質汚濁研究の基盤整備* 1)分析、解析能力等の向上 2)測定法の改善、開発 3)データの互換性、信頼性の向上 4)水質監視データの水質保全行政施策への活用の推進		*汚濁地域の水質に対する研究* 1)水質汚濁のサーベイランスの推進 2)水質毎の汚濁の特性、原因、影響の解明 3)適切な水質保全施策の策定		*地域特性に根ざした水質汚濁防止技術の開発* 1)安価で効率的な水処理技術の開発 2)タイに適した水質汚濁予測技術の開発 3)アセスメントの質の向上
	プロジェクト	1)環境水及び排水の標準測定法の改善及び開発 2)水質測定データの評価解析システムの開発 3)主要水域の水質モニタリング		1)発生源毎の汚濁負荷量の把握(工場、生活系、農業系) 2)水質汚濁の原因究明 3)水質汚濁の影響調査 4)主要水域の水質モニタリング		1)適正水処理技術の開発（浄化槽、酸化池） 2)実働水処理施設の性能調査（除去物質、除去率、トラブル、コスト） 3)水質汚濁予測技術の開発（自然浄化率、予測式） 4)主要水域の水質モニタリング
	実績	1)標準測定法は技術移転済 2)94.10から短専が指導 3)91年から四大河川で実施中。		1)未実施（PCDとの業務の調整） 2)バトゥムタニ県の工場で有害物質による地下水汚染状況を調査中 3)同上		1)エビ養殖池の排水処理技術開発実施中 2)未実施 3)未実施
	課題	1)ERTCは標準測定法の見直しと新測定法の指定を計画している 2)コンピュータシステムの基本的構想、ソフト開発については指導が必要 3)地下水のモニタリングを94/95で計画中		1) 2)排水による汚染実態調査が必要 3)		1)Wetland方式の技術開発を計画中 2) 3)
大気汚染	当初目標	*大気汚染研究の基盤整備* 1)分析、解析能力等の向上 2)測定法の改善、開発 3)データの互換性、信頼性の向上 4)大気汚染監視データの大気保全行政施策への活用の推進		*汚染地域の大気に対する研究* 1)大気汚染のサーベイランスの推進 2)地域毎の汚染の特性、原因、影響の解明 3)適切な大気保全施策の策定		*地域特性に根ざした大気汚染対策技術の開発* 1)安価で実現可能な大気汚染対策技術の開発 2)タイに適した大気汚染予測技術の開発 3)アセスメントの質の向上
	プロジェクト	1)環境大気、工場排ガス及び自動車排ガスの標準測定法の改善及び開発（含簡易測定法） 2)大気自動測定機の保守管理手法の開発 3)大気監視データの評価システムの開発 4)主要地域の大気モニタリング		1)発生源毎の汚染負荷量の把握(工場毎、自動車系、生活系) 2)自動車走行パターンの検討 3)大気汚染の原因究明 4)大気汚染の影響調査 5)主要地域の大気モニタリング		1)実働排ガス処理施設の性能調査（除去物質、除去率、トラブル、コスト） 2)適正大気汚染対策技術の検討(燃料、煙突、燃焼方式、処理装置、自動車の改良) 3)大気汚染予測技術の開発（気象条件、予測式） 4)主要地域の大気モニタリング
	実績	1)標準測定法（環境大気、工場排ガス、自動車排ガス、炭化水素の測定）は技術移転済 2)機器の維持管理は不完全 3)94.10から短専が指導 4)実施中		1)未実施 2)未実施 3)未実施 4)実施予定		1)未実施 2)未実施 3)未実施 4)未実施
	課題	1)分析実施回数が少なく計画的調査の実施が必要 2)マニュアルが必要 3)システム開発、実用化までの指導が必要		1)解析手法はセミナー等で技術移転が可能。発生源毎の排出濃度の把握は困難。 2) 3)		

Thai FY		92	93	94	95	96~
騒音	当初目標	*騒音研究の基盤整備* 1)測定、解析能力等の向上 2)測定法の改善、開発 3)データの互換性、信頼性の向上 4)騒音測定データの騒音防止行政施策への活用の推進		*騒音汚染地域に対する研究* 1)騒音のサーベイランスの推進 2)発生源の類別毎の汚染の特性、原因、影響の解明 3)適切な騒音防止施策の策定		*地域特性に根ざした発生源騒音低減防止技術の開発* 1)実現可能な発生源対策技術、地域計画等の検討 2)騒音対策の効果予測シミュレーションモデルの開発 3)対策の推進
	プロジェクト	1)環境騒音及び発生源騒音の標準測定法の改善及び開発 2)騒音測定データの評価解析システムの開発 3)主要地域の騒音モニタリング		1)発生源毎の騒音到達ゾーンの把握 2)騒音の影響調査 3)主要地域の騒音モニタリング		1)既存の騒音防止対策の効果の実態調査（遮断率、トラブル、コスト） 2)無響室での騒音低減のための地域計画案の比較検討 3)騒音予測シミュレーションモデルの開発 4)主要地域の騒音モニタリング
	実績	1)標準測定法（環境騒音、自動車廃棄騒音、エンジンボード騒音）は技術移転済 2)94.10からの短専が指導 3)バトゥムタニ県の騒音測定を実施 日本騒音制御学会で発表		1)未実施 2)未実施 3)未実施		1)未実施 2)未実施。施設がなく実施不可能 3)道路交通騒音予測モデルの開発。国際学会で発表 4)
	課題	1)今後は騒音（航空機、建設工事）、振動（道路交通、建設工事）のデータ収集が必要。 2) 3)バンコク市街（騒音振動源が無数存在する）でのモニタリング調査が必要		1)実態調査が必要 2)同上		1)実態調査が必要 2) 3)工場騒音（高速道路への応用）の予測モデル、航空機騒音のアセスメント手法の開発の指導が必要
廃棄物	当初目標	*廃棄物研究の基盤整備* 1)測定、解析能力等の向上 2)廃棄物処理計画策定に必要なデータの信頼性の向上		*地域毎の廃棄物処理に対する研究* 1)地域毎の一般廃棄物の発生量、性状、処分法の調査 2)自治体の処理計画策定の支援 3)主要産業からの産業廃棄物の発生量、性状、処理処分の実態調査		*地域特性に根ざした廃棄物対策技術の開発* 1)実現可能な処理処分技術の改善策の検討 2)オープンダンピングの代替案の提示 3)有害産業廃棄物の分離、無害化処理及び最終処分方法の検討
	プロジェクト	1)一般廃棄物の標準分類方法の改善及び開発 2)産業廃棄物の標準組成分析法の改善及び開発 3)廃棄物試料の分析		1)一般廃棄物の発生原単位及び性状の調査 2)産業廃棄物の発生量、組成及び処理処分方法の調査 3)廃棄物の収集運搬に伴う環境影響の実態調査 4)廃棄物試料の分析		1)既存の廃棄物最終処分場の環境実態調査（浸出液、地下水汚染、悪臭、衛生等） 2)埋立処分の可能性調査 3)業種別有害廃棄物の処理処分方法の検討 4)廃棄物試料の分析
	実績	1)未実施 2)未実施 3)実施済		1)10県の廃棄場の調査 2)未実施 3)実施済 4)実施済		1)浸出液の実態調査中 2)未実施 3)未実施 4)実施済
	課題					

Thai FY		92	93	94	95	96～
有害物質	当初目標	*有害物質による環境汚染の研究の基盤整備* 1)分析、解析能力等の向上 2)測定法の改善、開発 3)データの互換性、信頼性の向上 4)測定データの有害物質行政施策への活用の推進 5)標準試料による分析の精度管理		*有害物質に対する研究* 1)有害物質による汚染のサーベイランスの推進 2)汚染の特性、原因、影響等の解明 3)適切な有害物質対策の策定支援		*実態を踏まえた有害物質による汚染防止対策の開発* 1)有害物質の使用の実態を踏まえた有害物質による汚染防止対策の検討 2)有害物質の適正な取扱い、使用方法等のマニュアルの作成
	プロジェクト	1)農作物、土壌、魚介類、食品、環境試料等の有害物質標準測定法の改善及び開発 2)測定データの評価解析システムの開発 3)標準環境試料の調整及びそれによる環境関連試験室の分析の精度管理 4)有害物質モニタリング		1)タイで使用されている有害物質の種類、量、使用形態、環境濃度、運命等の実態調査 2)有害物質による影響調査 3)有害物質の挙性等の知見の収集 4)有害物質モニタリング		1)有害物質の使用方法、使用量等の変動に伴う環境、作物等への残留量の変化の解明 2)代替有害物質の使用の可能性の検討 3)有害物質の環境中での分解性の検討 4)有害物質モニタリング
	実績	1)分析法（大気、水、土壌、生物指標に残留する有機塩素系、リン系、カーバイト系農薬）の開発 2)未実施 3)未実施 4)イガイ残留有機塩素系農薬の調査（学会発表、論文発表）		1)農薬リスト作成中 2)未実施 3) 4)		1) 2)未実施 3)ゴルフ場農薬調査を計画 4)イガイ中の有機塩素化合物対策、メコン河流域対策実施中
	課題	1)種類、使用量及び有機スズ化合物、界面活性剤等の分析法の開発 2)				

Table 5(1)-2 Research Program (Air Pollution) （タイ側作成資料）

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
I	- Development or improvement of standard analytical method for ambient air, industrial emission gas and automobile exhausted gas	1) Ambient air - SPM, CO, HC, NO_x, O_3, SO_2 are being developed by dry method - NO_x, SO_2 are being developed by wet method pararelly - Industrial emission gas NO_x SO_2 and dust are being developed by wet method (JIS) and will be compared with EPA method - Automobile exhausted gas - Study on HC composition by using Gas Chromatograph with capillary column and pack colum	- handbook for analytical method is being prepared - on going - lacking of emission gas sampling devices - lacking of Chassis Dynamometer facilities	- Dry analytical method for oxidant and CFC, and wet analytical method for CO, C_x, H_2S, VOC, PAH should be developed - Dry analytical method for industrial emission gas should be developed - The efficiency of catalytic converter should be checked

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
		2. Developing analytical method for NO_x and SO_2 by using long term passive sampler	- on going	
	- Development of analytical method for offensive odor	- has not yet been done	- no facilities of odor free room.	
	- Development of maintenance method of automatic air quality	- The maintenance method for SPM, CO, HC, NO_x, O_3, SO_2 have already been done except oxidant	- no dealer for oxidant measuring equipment in Thailand	
	- Development of the system to analyze and evaluate air quality monitoring data	- The data was analyzed and evaluated by using some computer software but the system has not yet been developed	- Continuing of know how from short term expert to set up the system	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
	- Air quality monitoring in major areas	1) Ambient air quality monitoring in Bangkok by automatic air quality monitoring stations in 1991	- Due to the Environmental law in 1992, the routine monitoring has been transfered partly to Pollution Control Department since 1992	
		2) Ambient air quality monitoring in major cities (Chieng mai, Khon-kaen, Had yai and industrial area at Mabtapud and Leam Chabang) by mobile automatic air quality monitoring unit in 1991	- ditto	
		3) Study on gas composition from biomass burning in Narathiwat Province in 1991	- finished	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
		4) Air quality monitoring in Pathumthani in 1992-1993	- finished	
		5) Measurement of SO_2 and NO_2 in Mae Moh lignite mine by using long term passive sampler	- Comparing the measument data with automatic air quality monitoring station in Mae Moh mine	- Study will be continued in 1995
		6) Acid rain monitoring in Kanjanaburi and Sakolnakorn provinces in 1992-1994		- The investigation of acid rain problem in Thailand will be starting in 1995
		7) Air quality monitoring in the area of Air Force Army in 1993	- finished	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
II	- Study on air pollution loads (industrial, automsbile and domestic)	- has not yet been done		- Study on air pollution load from industrial activity in Pathumthani in 1995
	- Study on traffic mode to control automatic air pollution	- ditto		
	- Study on the cause of air pollution	- ditto		
	- Study on the health and ecological effect of air pollution	- Plan to study on the ecological effect of acid rain is being formulated	- Due to the lack of know how on ecological effect of acid rain experts on plant specialist are required.	
	- Air quality monitoring in major areas	- as mentioned in phase I		

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
III	- Study and improvement of existing exhausted gas treatment facility (pollutants removed, removal rate, cost, trouble, etc.)	- has not yet been done		
	- Study on the appropriate air pollution control technology (fuel, stack, burning system, treatment facility, automobile device, etc.)	- has not yet been done		
	- Air quality monitoirng in major areas	- as mentioned in Phase I		

Table 5 (1)-1 Research Program (Water Pollution)

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
I	- Development or improvement of Standard analytical method for water and wastewater	- All parameters related to water and wastewater analysis have been developed except for volatile organic compound and radioactive substances - Analytical method for ionic species in water resources is being developed	- No analytical facilities for radioactive substances	- Water quality analysis by using autoanalysis should be developed
	- Development of the system to analyze and evaluate water quality monitoring data	- The data was analyzed and evaluate by using some computer programs but the system has not yet been developed	- continuing of know from short term expert to set up the system	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
	- Water quality monitoring in major water areas	1) Water quality monitoring of 4 major rivers in central river basin (Chao Phraya, Tha-Chin, Bang Pa-kong, Mae Klong) in 1991	- Due to environmental law in 1992, the routine monitoring has been transfered partly to Pollution Control Department (PCD) since 1992	1) Ground water quality monitoring in Pathumthani province (start in 1995)
		2) Water quality monitoring in Eastern Sea Board in 1991	- ditto	
		3) Water quality monitoring in Songkhla lake in 1991	- ditto	
		4) Water quality monitoring in Pathumthani province since 1992-1994	- finished	
		5) Study on ionic species distribution of 4 major rivers in central river basin since 1994	- on going	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
II	- Study on water pollution loads (industrial, domestic and agricultural)	- has not yet been done		- Water pollution load from industrial activity in Pathumthani province will be studied in 1995
	- Study on the cause of water pollution	1) Effects of salty soil problem on water quality in Moon river and tributaries	- finished	
		2) Study the cause of water pollution in Tapee and Pum-Duang river in Suratthani province	- finished	
	- Study on the health and ecological effect of water pollution	- has not yet been done		
	- Water quality monitoring in major water areas	- as mentioned in Phase I		

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
III	- Development of appropriate waste water treatment technology (septic tank, oxidation pond, etc.)	- Developing of treatment system for shrimp-farming discharge	- A laboratory scale pilot study to investigate the use of constructed wetlands to treat shrimp farm discharge was set up at ERTC. The removal efficiencies of the constructed wetlands was good.	- In the following step a small-scale treatment model was set up at shrimp-farming area at Chuntaburi - The removal efficiency will be checked - The next step is to study on domestic and industrial wastewater treatment by constructed wetlands.
	- Study and improvement on the existing wastewater treatment facility (pollutant removed, removal rate, cost trouble, etc)	- Studying on the wastewater treatment by using complex treatment unit.	- Studying on the heavy metal wastewater is going on.	
	- Development of simulation model for water quality prediction (Self purification rate, dispersion factor, dispersion equation, etc.)	- has not yet been done		
	- Water quality monitoring in major water areas	- As mentioned in Phase I		

Table 5(1)-5 : Research Program (Toxic Substance)

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
I	- Development or improvement of standard analytical method for agricultural products, soil, fish, food, environmental samples etc.	- Standard analytical method is being developed for		
		1) Organochlorine pesticides in water, soil, sediment, fish and green mussel	- on going	- Standard analytical method for volatile organic compound should be developed
		2) Organophosphorus pesticides in water, soil, sediment, vegetables and fruits	- on going	- to develop analytical method for elements by using X-ray fluorescence (XRF)
		3) PCBs in water, soil, air sediment, fish and green mussels	- finished	
		4) Polyaromatic hydrocarbon in water, soil sediment	- the efficiency of analytical method by using GC/MS is being checked	
		5) Carbamate in water	- The facilities of post column has just been installed	
		6) Heavy metals in water, soil sediment, fish, green mussels and human hair		

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
	- Development of standard environmental samples and distribution to environment related laboratories	- has not yet been done	- no certified standard reference materials	
	- Development of the system to analyze and evaluate toxic substance monitoring data	- the system has not yet been developed		
	- Toxic substance monitoring	1) Monitoring of organophosphorus pesticide residue in agricultural area since 1992	- on going	
		2) Monitoring of heavy metal, pesticides and PCBs residue in green mussel in the area of coastal zone since 1993	- on going	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
		3) Monitoring of organochlorine pesticide residue in fish and water in Mekong river	- on going	
		4) Monitoring of PCBs in the open duming storage	- finished	
II	- Preparation of inventory of toxic substance used in Thailand on their quality, quantity, type of use, environmental level, fate, etc.	- The inventory of pesticides used in agricultural area is being prepared by distributing 280 questionairs for 12 provinces in north and northeastern part of Thailand	- on going	
	- Study on the health and ecological effect of toxic substance	- Study on the contamination of lead in human hair from battery factory in Pathumthani province	- finished	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
		- Study on the ecological effect from arsenic residue in plankton, fish, water and sediment	- on going	
	- Preparation of inventory on toxicity	- has not yet been done		
	- Toxic substance monitoring	- as mentioned in phase I		
III	- Study on the residue of toxic substance in environment	- The residue of heavy metal in water resources (Ping, Wung, Yom and Nan River) was studied. All of fish water amd sediment samples were analyzed	- going on the process of data analysis	- The residue of Polycyclic Aromatic Hydrocarbons (PAHs) in food chains of water resources in urban and industrial areas will be studied.

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
	- Feasibility study for alternative substance	- has not been done		
	- Study on the degradation of toxic substance in environment	- Study on the fate and distribution of PCBs in the tropical environment : A case study of Thailand	- finished	

Table 5(1)-4 : Research Program (Solid Waste)

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
I	- Development or improvement of standard classification method for domestic solid waste	- has not yet been done		
	- Development or improvement of standard analytical method for industrial solid waste	- has not yet been done		
	- Analysis of solid waste sample	- has been initiated and done by ONEB		
II	- Study on per capita loads and characteristics of domestic solid waste	- Monitoring of domestic solid waste from 10 municipal dumping site has been done in 1992		
	- Study on the quality and quantity of industrial solid waste	- has not yet been done		

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
	- Study on the environmental effect caused by the collection and transportation of solid waste	- has been initiated and done by ONEB		
	- Analysis of solid waste samples	- has been initiated and done by ONEB		
III	- Study on the environmental effect of existing solid waste disposal sites (leachate, ground water pollution, offensive odor sanitation, etc.	- Study on the effect of leachate from open dumping site		- Study on the contamination of heavy metals in fly ash from incinerator
		- Study on the efficiency of solid waste treatment by using Effective Microorganismm (EM)		
	- Feasibility study on sanitary landfill	- has not yet been done		

Phase	Research Theme	Situation	Evaluation/Problems	Exected Subject
	- Study on the appropriate treatment and disposal method of industrial solid waste by type of industry	- has not yet been done		
	- analysis of solid waste samples	- has been initiated and done by ONEB		

Table 5(1)-3 : Research Program (Noise pollution)

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
I	- Development or improvement of stapdard measuring method for noise	- Measuring method for noise is being developed by using Leq 10 related to Leq 24	- finished	
	- Development of the system to analyze and evaluate noise monitoring data	- the same situation as air monitoring data		
	- Noise monitoring in major areas	- The noise measurement on curbside of major roadway in Bangkok in 1991	- Due to Environmental law in 1992 the routine monitoring has been transfered partly to PCD since 1992	- Survey of noise level from industrial source will be done in 1995
		- The noise measurement at the international airport in Chiengmai and Phuket in 1991	- transfered to PCD since 1992	- know how of site selection for measuring of noise from residential and industrial area should be transfered
		- Survey of existing noise condition in Pathumthani in 1992-1993	- finished	

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
II	- Study on the noise affected zone by the type of sources	- Developing of road traffic noise prediction model	- on going	- To develop appropriate noise prediction model for elevated road, tollway, railway, skytrain and air craft - to develop noise prediction model from industrial area
	- Study on the health effect of noise pollution	- health effect of noise pollution from longtail boat and motor tricycle have been initiated and done by ONEB		
	- Noise monitoring in major areas	- as mentioned in phase I		

Phase	Research Theme	Situation	Evaluation/Problems	Expected Subject
III	- Study and improvement existing noise prevention facility (prevention rate, cost, trouble etc.)	- has not yet been done	- no facilities	
	- Study on the effect of city or regional planning in terms of noise reduction by setting up miniature model in noise-free room	- has not yet been done	- no facilities	
	- Noise monitoring in major areas	- as mentioned in phase I		

8 モニタリング活動実績

2. 1 : Monitoring in 1994

(1) Theme :

Study on Environmental Quality in Pathumthani Province

(2) Description :

Pathumthani province is in the vicinity of Bangkok with the area of 1521 sq.kilometers. The rapid expansion of economic growth from domestic, industrial and agricultural sector caused the increase of environmental pollution problem in the province. The wastes occurred from these activities were discharged into the surrounding environment without proper management.

ERTC has conducted the study on environmental quality in Pathumthani Parovince in order to indicate the situation of environmental problem in the province. The information from this study will be used for setting up control and abatement plan, management strategies and inplementation in order to improve environmental quality of the province.

The purposes of this study are as follows :

1) To study and survey on environmental problem including water pollution, air and noise pollution and solid wastes problem.

2) To establish data base for natural resouces and environment of Pathumthani province by using the technique of Geographical Information System (GIS)

3) To monitor and evaluate water quality in the river and klongs in Pathumthani province

(3) Duration :

April 1992 - September 1994

(4) Name of JICA Expert (s) and his (their) participation in detail :

1. Dr. M. SAKATA (1990-1993) - air quality measurement
2. Mr. S. AOI (1991-1993) - noise level measurement

(5) Expenditure :

100,000 Baht per year

(6) Cooperation with other Department or other organization :

Pathumthani province

(7) Outcome and further action :

It has been found that water pollution and solid wastes problem is the majority issue of environmental problem in Pathumthani province. The cause of pollution mostly came from domestic and industrial wastes.

The type and load of wastes will be surveyed in 1995 to study the pollution problem from industries.

2. 2 : Monitoring in 1994

(1) Theme :

Pesticide Monitoring Program in the Mekong Basin in Thailand

(2) Description

The monitoring of pesticides in the Mekong Basin in Thailand is one of the program under the Water Quality Monitoring Network Project phase II which four countries, Lao PDR; Thailand; Cambodia and Vietnam, in the lower Mekong basin is covered by the project with financial support from the Swedish International Development Authorities (SIDA).

The purposes of this study are as follows :

1) To monitor the regional trends of pesticide residues in fishes and water in the Mekong river and its tributaries.

2) To evaluate the possible impact of pesticide residues on different species of fish in various location.

(3) Duration :

April 1994 - March 1995

(4) Name of Jica Expert (s) and his (their) participation in detail

Dr. S. WATANABE (1994) advised in analytical technique

(5) Expenditure :

3000 us $ and chemical substances/accessories funded by the Secretariat of the Lower Mekong Committee.

(6) Cooperation with other Department or other organization :

- Department of Energy Affairs, Ministry of Sciences, Technology and Environment.
- The Secretariat of the Lower Mekong Committee

(7) Outcome and further action :

Five typical species of fishes and one water sample from each of 11 stations covering the Mekong river and its tributaries in Thailand (Song Kram river, Chi river, Pong river, Pao river, Mun river and Kok river) were collected in May and November 1994 to represent dry and rainy season respectively.

These samples are being analyzed to determine the qualitative and quantitative of organochlorine pesticide residue by using Gas Chromatography

The trend of pesticide residue in the Mekong river and its tributaries will be evaluated and reported to the Lower Mekong Committee in 1995.

2. 3 : Monitoring in 1994

(1) Theme :

The Study on Arsenic Contamination in Park Pa-Nang Marine Ecosystem

(2) Description :

A survey study of Arsenic (As) contamination problems occurred in Ron-pibool district, Nakorn Sri-Tammaraj province, where several tin minings are still operational, has been taken by many organizations between 1987-1992. It was reported that more than 1500 people were affected. Among those, 6 people were suffered from skin cancer, 80% of some school students contained excess arsenic levels in their hair and nails. The poisoning occurred from daily consumption of As contaminated water.

Due to the problem occurred from Arsenic contamination, the development on the monitoring methodology of Arsenic residue in Pak-Pa-Nang bay has been studied by ERTC since 1992.

The purposes of this study are as follows :

1) To use the biologicol samples such as plankton, fish and mussel as indicator for Arsenic residue monitoring in Pak-Pa-Nang bay.

2) To develop the analytical method of Arsenic residue in biological samples.

3) To monitor and evaluate the situation and trend of arsenic residue in biological samples in Pak-Pa-Nang bay.

(3) Duration :

October 1992 - September 1995

(4) Name of JICA Expert (s) and his (their) participation in detail :

(5) Expenditure :

300,000 Baht per year

(6) Cooperation with other Department or other organization :

(7) Outcome and further action :

In 1993-1994, More than 150 samples of sediment, water and many kinds of biological samples such as fish, mussel, plankton etc, were collected at those alleged-poisoning site in Ron-Pibool district and Park Pa-Nang bay. The result has been found that the level of arsenic residue in water samples around the tin-mining site were in the range of 0.087-0.691 ppm, which were strikingly higher than the level of 0.05 ppm of the national standard for

surface water as notified by the Office of the National Environment Board (ONEB). The As concentration in water samples collecting from Park Pa-Nang river and Park Pa-Nang bay were in the range of 0.003-0.410 ppm. which mostly were lower than the level of surface water quality standard (0.05 ppm). If comparing with the standard for sea water level of 0.008 ppm. it was found that most samples were higher than the standard. We found that As concentration in soil samples at tin-mining site and sediment samples from Park Pa-Nang river and Park-Pa-Nang bay including many kinds of biological samples collecting from Park Pa-Nang area have tendency to be contaminated by Arsenic residue.

In 1995, the Arsenic residue in some kinds of biological samples will be analysed and selected for the proper indicator of Arsenic residue monitoring in Park-Pa-Nang marine ecosystem. Furthermore, the Cadmium residue in the biological samples will also be analysed to study the related effect with Arsenic.

2. 4 : Monitoring in 1994

(1) Theme :

The Development of Monitoring Method of Pesticide Residues in Agricultural Area

(2) Description :

The use of pesticides in Thailand is being widespread especially in agricultural use. Misuse and mishandling by the farmers and the users could cause pesticide residual problem and human health hazards. Those pesticides will be remained in foods, agricultural products including human being and environment. ERTC has conducted the monitoring of pesticide residues in agricultural area in the central and northeastern including northern part of Thailand since 1992 to 1994.

The purposes of this study are as follows

1) To monitor and evaluate the situation of pesticides residues in the environment and agricultural products from the project area.

2) To develop the monitoring method of pesticide residues in agricultural products .

3) To survey and evaluate the use of pesticides in agricultural area in both types and quantities.

(3) Duration :

October 1992 - September 1994

(4) Name of JICA Expert (s) and his (their) participation in detail :

Dr. S. WATANABE advised in analytical technique

(5) Expenditure :

500,000 Baht per year

(6) Cooperation with other Department or other organization :

(7) Outcome and further action :

Two hundred ninety samples of agricultural product such as fruits, vegetables, cereal grains, etc and sixty three soil samples as well as seventeen water samples were collected from 19 provinces at the river source and agriculture areas in the northern part, northeastern part and central part of the country during 1993-1994. Seven pesticides (Diazinon, Pyrimiphos-methyl, Parathion-ethyl, Isofenfos, Prothiophos, Butamiphos and Phofenofos) were detected in 52 agricultural product from 111 analyzed samples. The residue levels were mostly lower than safety limit. In addition, two hundred fifty farmers were interviewed for obtaining quantitative background information.

2. 5 : Monitoring in 1994

(1) Theme :

Monitoring Method for Toxic Chemical Residue in Coastal Areas by Using Green Mussel (Perna viridis) as Indicator

(2) Description :

The rapid increasing population and developing agroindustrial activities in Thailand caused the increase of environmental pollution in the country. Both industrial and agricultural waste water which are discharged into the river containing both organic and inorganic pollutants such as pesticides and heavy metals. Thus Green mussel (Perna viridis) was selected as biological indicator to monitor toxic chemical residues namely PCB_s, heavy metals and organochlorines in the coastal areas by ERTC since 1993

The purposes of this study are as follows :

1) To monitor and evaluate the situation of toxic chemical residues in green mussel in the coastal areas of the country.

2) To develop the monitoring method of PCB_s, heavy metal and organochlorines in green mussel.

3) To study the sources of toxic chemicals discharged to the coastal environment.

(3) Duration :

October 1992 - September 1994

(4) Name of JICA Expert (s) and his (their) participation in detail :

Dr. S. WATANABE advised in analytical technique

(5) Expenditure :

400,000 Baht per year

(6) Cooperation with other Department or other organization :

(7) Outcome and further action :

During 1993-1994, green mussels were collected from 13 location along the coastal area in the wet season. Those sample were transferred from sampling site to analyse in the laboratory of ERTC. The result showed that the level of PCB_s in mussels in 1993 can not be detected. The analysis of heavy metal and organochlorine pesticide residues in mussels are on-going.

2. 6 : Monitoring in 1994

(1) Theme :

Measurement of SO_2 and NO_x by Long Term Passive Sampler at Lignite Power Plant in Lampang, Thailand

(2) Description :

The Mae-Moh Electric Power Plant has been operated by the Electricity Generating Authority of Thailand with the capacity of 2025 MW locating in Lampang Province in the northern part of Thailand. Lignite coal with high sulphur content of 2.5-3.0 % W/W was used as the fuel for power generation. The result from fuel burning caused the distribution of sulphur dioxide (SO_2), nitrogen oxide (NO_x) and suspended particulate matter to the atmosphere. These both gaseous pollutants are toxic and caused the deterioration effects to the health of local people and ecosystem in wide area especially in down the wind area.

Due to this reason, ERTC has conducted the study on the measurement of SO_2 and NO_x distribution by using long term passive sampler since 1993

The purposes of this study are as follows :

1) To develop the monitoring technique of SO_2 and NO_x distribution in the ambient air.

2) To monitor and evaluate the situation and future trend of SO_2 and NO_x distribution in the project area.

(3) Duration :

October 1992 - September 1994

(4) Name of JICA Expert (s) and his (their) participation in detail :

1. Mr. HIRANO (1992), Yokohama Environmental Research Institute
2. Dr. M. SAKATA (1990 - 1993)
3. Dr. K. KUME (1994 - 1995)

(5) Expenditure :

120,000 for survey and sampling

(6) Cooperation with other Department or other organization :

1. Electricity Generating Authority of Thailand (EGAT)
2. Pollution Control Department
3. Office of the Environmental Policy and Planning

(7) Outcome and further action :

Long term passive sampler developing in Japan was applied for measuring of SO_2 and NO_x distribution in the ambient air during March 9, 1993 to March 16, 1994. Ten locations around Mae-Mah mine were sited namely Ban Sob-pad, Ban Mae-chang, Ban Pha-maew, Ban Hang-hung Ban Mae-luang, Ban Hua-fai, Ban Tha-Si, Ban Hua-nam-chem, Lampang Agricultural Research and Training Institute and Wanalai garden. The samples were collected monthly and analysed by using Ion-Chromatograph for SO_2 and Spectrophotometer for NO_x . The data will be interpreted and compared with automatic air quality measurement to check the reliability.

2. 7 : Monitoring in 1994

(1) Theme :

Monitoring Program of Acid Rain in Thailand

(2) Description

The situation with respect to acidic deposition and the occurrence of acidification effects in Thailand remains unclear and requires attention. It is probable that acidification and concurrent adverse environmental consequences may already be occurring. An increasing rate of acidic deposition may occur in Thailand as a result of the very high rate of industrilization within Thailand, as well as increasing rates in neighbouring countries, which will lead to more widespread problem. From the experiences of some countries in Europe and part of North America, acidic deposition can have adverse impacts on aquatic and terrestrial ecosystems, building materials and human health, reductions in the diversity and populations of aquatic fauna and flora in lakes. Since 1991 the ERTC and the Department of Meteorology, Stockholm University, Sweden have established a joint project: the "Chemical Composition of Thai Precipitation : a Comparative Study". Rainwater samplers are located in Sakon-Nakorn in the north east, and in Kanchanaburi, western Thailand, in order to assess the chemical composition of background rainwater.

Since 1994 a network of acid rain monitoring in Thailand has been built up in order to assess current level and spatial distribution of acidic deposition across the country.

The purposes of this study are as follows.

1) To establish acid rain monitoring network in Thailand
2) To assess current levels and spatial distribution of acidic deposition

3) To develop the sampling and analytical methods of chemical composition in precipitation

4) To evaluate the current and future status of the acid rain problem in Thailand and provide information relevant to the formulation of abatement strategies

(3) Duration : 1994 - 1997

(4) Name of JICA Expert (s) and his (their) participation in detail

Dr. K. KUME

(5) Expenditure

900,000 Baht for 3 automatic rain samplers

100,000 Baht for 3 set of pH meter and conductivity meter

(6) Cooperation with other Department or other organization :

1. Pollution Control Department
2. Office of Environmental Policy and Planning
3. Department of Meteorology
4. Department of Health

(7) Outcome and further action :

Analytical results of chemical composition in rain water samles from Sakon-Nokorn and Kanchanaburi showed that the acid rain problem has tendency to be occurred. Three more sampling sites in north, south and central plain are considering for future plan to monitor and assess the acid rain problem across the country.

2. 8 : Monitoring in 1994

(1) Theme :

Study on Ionic Species Distribution of 4 Major Rivers in Central Basin

(2) Description :

Water quality of 4 major rivers namely Chao Phraya, Tha-Chin, Bang Pa-Kong and Mae-Klong river have been monitored for many parameters according to the Surface Water Quality Standard, notifed by the Office of National Environment Board, since 1977.

Ionic species is the important parameters which can indicate the situation of water quality and the effects of waste discharged from domestic, agricultural and industrial activities

The study on ionic species distribution of 4 major rivers has been conducted by ERTC since 1994 in order to study the distribution pattern of ionic species in both cation and anion vary with the seasonal change and develop the analytical technique for ionic species monitoring by using Ion-Chromatograph.

(3) Duration :

1994 - 1996

(4) Name of JICA Expert (s) and his (their) participation in detail :

Dr. MISOBUCHI

(5) Expenditure :

200,000 Baht for sampling survey and analysis in 1994

(6) Cooperation with other Department or other organization :

(7) Outcome and further action :

Water and sediment samples were collected from 18 stations in Chao Phraya river, 13 stations in Tha-Chin river, 28 stations in Bang-pakong river and 10 station in Mae-Klong river during June - September 1994. The samples were analyzed for temperature, salinity, pH, Conductivity, Dissolved Oxygen, BOD, COD, TOC, SS, TS, NO_3-N, NH_4-N, TKN, TP, heavy metals and ionic species

In 1995, sampling survey and analysis will be done in each river 4 times per year

2. 9 : Monitoring in 1994

(1) Theme : ASEAN Network on Environmental Monitoring (ASNEM)

(2) Description :

The Association of South East Asia Nations (ASEAN) consists of six members which are Brunai Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand. All countries in this region are faced to environmental problems. Over the past two decades, the tremendous growth of industrialization and commercialization in the region has deteriorated the quality of environment. At present, such serious environmental problems as wastewater, air quality degradation, noise problem, contamination of toxic substances, etc, are unfortunately prevailing among member countries.

Due to this reason, the Royal Thai Government proposed the project on ASEAN Network on Environmental Monitoring (ASNEM) to be approved by the ASEAN Senior Official on Environment (ASOEN) through the ASEAN Working Group on Environmental Information, Public Awareness and Education. The ASOEN meeting held in Singapore in 1992 agreed with the proposal to extend the ASNEM project into an ASEAN project and the financial support will be requested from Japanese Government. The main objectives of this project are as follows :

1. To improve and exchange appropriate technology on air quality monitoring, water quality monitoring, noise monitoring and data analysis, for both ambient and source monitoring.
2. To formulate uniform standards in all aspects of environmental quality monitoring and analysis, including environmental quality standards.
3. To establish a central repository of environmental quality data from ASEAN countries and promote exchange of environmental quality data.

4. To exchange information on the problems encountered in establishing and operating systematic and effective environmental quality monitoring and analysis systems.
5. To produce an annual report on the state of environmental quality across ASEAN countries.
6. To establish a training programme in all technical aspects of air quality monitoring, water quality monitoring and noise monitoring.
7. To develop a range of numerical air pollution models, water pollution models, and noise models for assessment and predictive purposes.
8. To promote interaction between ASNEM and other related international activities in the region.

(3) Duration : 1991 - 1997

(4) Name of JICA Expert (s) and his (their) participation in ditail :

Dr. M. SAKATA (1990 - 1993)
Dr. K. KUME (1994 - 1995)

(5) Expenditure :

1. ASEAN Workshop on ASEAN Network on Environmental Monitoring held in Bangkok during March 12 - 15, 1991
   - supported by JICA
2. ASEAN - Network on Environmental Monitoring Study Tour to ASEAN member countries in December 1991
   - supported by JICA
3. ASEAN Training Course on Air Pollution Monitoring and analysis during February 19 to March 1, 1995

- supported by JICA

(6) Cooperation with other Department or other organization :

1. Concerned organization in ASEAN member countries
2. Pollution Control Department
3. Office of the Environmental Policy and Planing

(7) Outcome and further action :

- On March 12 - 15, 1991, ASEAN workshop on ASEAN Network on Environmental Monitoring (ASNEM) was held in Bangkok. This is the beginning of the further cooperation on the ASEAN network on environmental quality monitoring programme. The workshop was arranged by the Environmental Research and Training Center (ERTC), a division in Environmental Quality Promotion Department, under the sponsorship of the Japan International Cooperation Agency (JICA). About 25 participants from ASEAN member countries including Japan participated the meeting for the purpose of finalized objective and workplan of this project. The ambient air monitoring network is the first step of the ASEAN, and the next plan will be focus on water quality, sound level monitoring network, solid waste and toxic substances problems.

- During December 1991, ASEAN Network on Environmental Monitoring Study Tour to ASEAN member countries has been conducted by JICA expert and Thai counterparts to discuss and exchange views on the existing condition of each net-work on air quality in member countries.

- On 19 February to 1 March 1995, ASEAN Training Course on Air Pollution Monitoring and Analysis will be held at ERTC and 12 participants from member countries will be invited to the training course.

9　主要供与機材使用状況

機材の管理状況表　1

(1６０万円以上の機材)

平成６年度　第３四半期現在

供与年度	番号	機材名（メーカー名／型式）	数量	利用（保管）場所	備考（特記事項）
平成　3	A31-携	マイクロバス　NISSAN Urban	1	ERTC	ERTC管理
	A32-携	ジープ　NISSAN Patrol	1	ERTC	専門家チーム管理
	A33-供	ガスクロマトグラフ　GC-14APF　島津	1	301	大気
	A34-供	ガスクロマトグラフ　GC-8APF　島津	1	301	大気
	A35-供	プラズマリアクター　PR-31　ヤマト	1	228	水質
平成　4	A41-供	廃棄物焼却炉　GHS00　インシナー	1	ERTC屋外	廃棄
	A42-供	サインノイズ信号発生器　1049A　B&K	1	316	騒音
	A43-供	ゲルダー蒸留装置　21276　Labconco	2	1台／226,1台/304	水質
平成　5	A51-供	ガスクロマトグラフ　HP 5890	1	122	有害
	A52-供	ガスクロマトグラフ　GC-8AIT　島津	1		(2-35)
	A53-供	ガスクロマトグラフ　GC-8APF　島津	1		(2-36)
	A54-供	騒音／振動移動測定車　Urban Long Body 日産	1		騒振(3-1)
	A55-供	環境騒音観測装置　NA33　リオン	1		騒振(3-2)

利用状況　A：頻繁に使用　D：あまり利用されていない
B：良く利用　E：使用されていない
C：特定の時期に使用

管理状況　A：点検整備が十分、常に使用可能な状態
B：使用に際して問題なし、管理はおおむね良好
C：整備すれば使用可能　D：使用不可能

4. 1995 WORK PLAN

(1) Research Section

Work Plan

Project : Toxicity of environmental contaminants on aquatic organisms

Fiscal Year 1995

Activities	Budgets (Baht)	Duration												Remarks
		1994			1995									
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
Project : Toxicity of environmental contaminants on aquatic organisms														
Sub-title 2 : Determination of heavy metals accumulated in water resources														
1. Data evaluation of water samples from Chao Praya, Ping, Wang, Yom, and Nan River	5,000	←	→											
2. Analyzing of heavy metal residue in fish samples from Chao Praya, Ping, Wang, Yom, and Nan River	40,000	←	—	→										
3. Preparing of sediment samples from Chao Praya, Ping, Wang, Yom, and Nan River	20,000			←	—	→								
4. Analyzing of heavy metal residue in sediment samples	100,000				←	—	—	—	→					
5. Recollecting of water, fish and sediment samples for confirming	50,000						←	→			←	→		
6. Analyzing of recollected samples	35,000								←	—	—	—	→	
7. Data conclusion and report												←	→	
Total budgets	250,000													

Research in 1995-1997

Theme : Toxicity of Environmental Contaminants on Aquatic Organisms

Sub-title 2 : Determination of heavy metals accumulated in water resources (1993-1995)

1. Name of researchers :

1. Mrs. Phaka Sukasem
2. Ms. Vanvimol Patarasiriwong
3. Ms. Chuanpit Boonyoy
4. Mr. Jakkaphol Noichumphae

2. Duration : Thai fiscal year 1993-1995

3. Experts : 1. Mr. Seiji Watanabe

2. Mr. Munihiko Mizobuchi

4. Objectives : 1) To understand the status of heavy metals pollution of freshwater ecosystems

2) To evaluate their quality as water resources

5. Outcome : 1) To obtain the residue levels of heavy metals in freshwater fish

2) Based on the above results, to elucidate the state of heavy metal pollution in revers in Thailand

6. Research procedure :

1. Preliminary survey on heavy metal residues in freshwater fish were carried out in 1993. 120 fish samples , 32 water samples and 32 sediment samples were collected and analyzed for Cd, Cr, Cu, Ni, Pb, Fe, Mn and Zn.
2. Then, state of regional pollution by heavy metals were discussed.

7. Evaluation : Evaluation for the work in 1993-1994

1. 32 water samples were analyzed for Cd, Cr, Cu, Ni, Pb, Fe, Mn and Zn. We found that the level of metal concentration in water samples are within the Standard of Surface Water in Thailand.
2. 120 fish samples are analizing.
3. 32 sediment samples are preparing.

8. Work Plan : See attach.

Work Plan

Research and Development of Treatmemt Methodology for Industrial and Domestic Wastewater

Fiscal Year 1995

Procedure	Budget (Bath)	Duration											
		1994			1995								
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Sub-Project 1 : Study on Development of Wastewater Treatment for Shrimp - Farming Discharge													
1.Modify an experimental - scale treatment model for shrimp - farming discharge, including of three trenches, ie. trench no 1 consists of graval, no 2 consists of gravel and plants, and no 3 consists of soil and plant	130,000	←	—	—	→								
2.Check treatment efficiencies of the three trenches	60,000		←	—	—	—	→						
3.Confirm the data in case of any failure results	50,000							←	—	→			
4.Summary and report preparation	10,000										←	—	→
Total Budget	250,000												
Short - term expert specializing in fixed - bed anaerobic treatment system for wastewater and having an experince in conducting a research concerning low - cost treatment of wastewater								←	→				

Research in 1995 - 1997

Theme : Research and Development of Treatment Methodology for Industrial and Domestic Wastewater

Sub-Title 1 : Study on Development of Wastewater Treatment for Shrimp - Farming Discharge

1. Name of Researchers :

1. Mr. Piya SANSANAYUTH
2. Ms. Amnarapom PHADUNGCHEAP
3. Mr. Siddhiporn NGAMMONTHA

2. Duration :

Thai Fiscal Year 1993 -1995

3. Experts :

1. Dr. Yoshio MATSUI
2. Mr. Munehiko MIZOBUSHI
3. Mr. Masami MATSUI

4. Objective :

The objective of the research is to develop a wastewater treatment system for shrimp farming operation. The research attempts to develop the system that can be implemented by shrimp farmers. The system will be studied based on environment technology and engineering principles as well as social and economic aspects.

5. Outcome (1993 - 1994) :

1. According to the previous study on implementation of the treatment model using oyster shells, it was found that :

- Coagulation treatment needs high technology operation and instruments such as chemical feeder and mixing equipment . Therefore, it seems not to be suitable for practical use.

- The volume of wastewater is really huge, and moreover, the treatment concept of using oyster shells as media needs to circulate wastewater in the system for a period of time. Therefore , it is difficult to modify the model for practical use.

It was found that every shrimp-framing areas have wastewater pathways along shrimp frams. It would be useful if these pathways are improved to act as treatment system. Therefore, the constructed wetlands system is studied for treating shrimp-farming discharge in 1994 .

2. At the beginning, a laboratory-scale constructed wetlands model was studied by applied an artificial shrimp-farming discharge. The model could reduce BOD, TN and TP in the water up to 80 %, 61 % and 44 %, repectively. In the next step, the actual shrimp-farming discharge was applied to the model. The removal efficiencies of the model for BOD, TN and TP are 66% , 64% and 54%, repectively.

The hydraulic retention time of the water in the model was also studied. The results show that the efficiencies of the model increases as the hydraulic retention time increases.

An experimental-scale treatment model of constructed wetlands system was set up at shrimp-framing area. The model can be devided into 3 trenches as follows;

Trench no. 1 consists of gravel and plants.

Trench no. 2 consists of gravel only.

Trench no. 3 consists of soil and plants.

6. Research Procedures :

1. Literature Review.

2. Laboratory experiment : Study on efficiencies of a laboratory-scale treatment model set up at ERTC.

3. Field experiment : Study on efficiencies of an experimental-scale treatment model set up at shrimp-framing area.

4. Study on implementation of the treatment model.

7. Evaluation :

The research was planned to be completed in September 1993. However, it took much more time than expected to find an appyopriate method for wastewater treatment. It has been found that

constructed wetland treatment seem to be an appropriate method. Therefore, the period of the research is extended in order to study in more details for the constructed wetland treatment.

8. Work plan :

See the attached paper.

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Work plan

Project : The research for Developing Prediction Model of Road Traffic Noise

Fiscal Year 1995 - 1997

Project/ Activities	Budgets (Baht.)	Duration: 1994 Oct.	Nov.	Dec.	1995 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1996 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	remark
Project : Road Traffic Noise Prediction Model for Surface road (1995-1996)																										Project requirement Short term experts - Expert on noise calculating system by computer - Expert on vibration analysis and evaluation Long term experts - Technique for noise prediction Equipment 1. 1/N Octave - band real - time analysis 1 equipment 2. Printer (For sound level meter, Rion) 2 equipment 3. Ultra low frequency sound meter 1 equipment
Sub-project 1																										
Checking the accuracy of Prediction Model (1994) at the point higher than 1.2 m.																										
1. Field survey , measurement of noise level (Leq) for 1,000 data and comparing with predicted noise level	120,000	←	—	—	—	→																				
2. Data analysis and program development	10,000			←	—	→																				
Sub-project 2	130,000																									
Making a Road Traffic Noise Prediction Model for Elevated road																										
1. Literature review						←→																				
2. Measurement of Correction Value from noise barrier and elevated road structure	50,000						←	→																		
total budget																										

Work plan

Project : The research for Developing Prediction Model of Road Traffic Noise

Fiscal Year 1995 - 1997

Project/ Activities	Budgets (Baht.)	Duration																						remark
		1994			1995												1996								
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
3. Making a Road Traffic Noise Prediction Model for elevated road	10,000							←	→																
4. Measurement of noise level (Laq) for 500 data at the height of 1.2 m. from ground surface and comparing with predicted noise level	50,000									←	→														
5. Data analysis and program development	10,000											←	→												
6. Checking the accuracy of Prediction Model for elevated road at the point higher than 1.2 m.for 500 data and comparing with predicted noise level	80,000													←	—	→	—	→							
7. Data analysis and program development	60,000																		←	—	—	→			
8. report	10,000																						←	—	→
total budget	270,000																								

Work plan

Project : The research for Developing Model for Airport Noise

Fiscal Year 1995 - 1997

Project/ Activities	Budgets (Baht.)	Duration																							remark
		1995			1996											1997									
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
Project : Airport Noise Prediction Model (1997)																									Project required
1. Literature reviews														←	→										Long term experts
2. Preparing equipments , computer and practice	50,000													←	—	→									- technique for airport
3. Field survey and planning for data collection	50,000																←	→							noise prediction
(Chiang Mai and Phuket)																									
4. Measurement of airport noise level	100,000																	←	—	—	→				
5. Data analysis and making an Airport Noise Prediction	20,000																			←	—	—	→		
Model																									
6. Checking the accuracy of prediction model	80,000																						←	→	
7. Program modification	10,000																							←	→
8. Report	10,000																							←	→
total budget	720,000																								

Research in 1995-1997

Theme : The study on Prediction Model of Road Traffic Noise Level

Sub-Title 1 Checking the accuracy of Prediction Model (1994) at the point higher than 1.2 m.

Sub-Title 2 Making a Road Traffic Noise Prediction Model for Elevated Road

1. Name of Researchers :

1. Ms.Phaka SUKASEM
2. Mr.Thanaphan SUKSAARD
3. Mr.Utein SIRMSRI
4. Mr.Chakapon NOICHUMPAE

2. Duration :

1993 - 1996

3. Experts :

Mr.Ichiro Aoi
Mr.Kiyotsugu Shirai

4. Objectives :

Road traffic noise has become a big social problem in Thailand. There is the "Scheme of Environmental Impact Assessment (EIA)" in Thailand, but there is no suitable prediction system for implementing this scheme. Therefore, a prediction system is considered to be necessary for solving the noise pollution problem in Thailand.

5. Outcomes :

We measured the power levels of running vehicles more than 5,000 data , and road traffic noise at measuring sites more than 500 data. As a result, the prediction accuracy of this model is comfirmed to be precise enough for practical use. We have published the outcome in the International Congress. And we have developed the computer programs for the calculation. Therefore , this prediction model is suitable for practical use for Environmental Impact Assessment.

6.Research Procedure :

Plan for the model Development

1. Study on noise measurement technology and noise prediction methodology

   This study was carried out in 1993.

2. Collection data of noise level and traffic of other kinds of roads.

   This collection of data was carried out in 1993.

3. Data analysis, model development, and programming for using computer

   This was carried out in 1994.

4. Conclusion and presentation a paper

   This was carried out in 1994.

7.Evaluation :

This present model is valid only for ground surface roads and 1.2 meters prediction height from ground surface. Therefore, it is necessary to improve the model so that it can be used for the prediction at the higher level than 1.2 m. The aircraft noise prediction model is also needed to be develop in 1997.

8. Research Plan :

See attached

Work Plan

'ect: Chemical Composition in Automobile Exhaust Gas.

Project 2 : Determinat. .f composition of Polycyclic Aromatic Hydrocarbons (PAHs) from p. .late matters in Urban areas in Thailand.

Fiscal Year 1995-1997

Activities	Budgets (Baht)	Duration	Remarks
		1994: Oct. Nov. Dec. / 1995: Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec. / 1996: Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec. / 1997: Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep.	
1. Study on the related reference data and select the appropriated analytical method		← →	Project requirements: - Long term experts or short term experts in the topic of research planning sampling design of air pollutants from stack and atmospheric environment in industrial areas - Technique for analysis of industrial exhausted gas Equipment requirements: - Air Sampler Anderson type (Model AN-200) - High Volume Air Sampler (Model HVC-500K) - GC-FPD Capillary Colum type - Refrigerator for keeping the PAH standards and samples (capacity of refrigerator : 476 liters)
2. Preparing of equipments (HPLC and GCMS)	250,000	← →	
3. Determination of the analysis method, setting of appropriated conditions by using standard references	60,000	← →	
4. Field survey, sample collection and preliminary studies	140,000	← →	
4.1 Bangkok area			
4.2 Principal Cities			
- Chiang Mai			
- Khon Kaen			
- Hat Yai			
4.3 Industrial areas			
- Bang Poo industrial estate in Samutprakarn			
- Laem Cha Bang industrial estate in Chonburi			
- Maab-Ta-Put industrial estate in Rayong			
5. Sample collection and quality and quantity analyses	220,000	← →	
5.1 Bangkok area			
5.2 Principal cities			
- Chiang Mai			
- Khon Kaen			
- Hat Yai			
5.3 Industrial areas			
- Bang Poo industrial estate in Samutprakarn			
- Laem Cha Bang industrial estate in Chonburi			
- Maab-Ta-Put industrial estate in Rayong			
6. Data analysis	160,000	← →	
7. Report	20,000	← →	
Total budgets	850,000	← →	

Research in 1995-1997

Theme : Chemical Composition in Automobile Exhaust Gas.

Sub-Title : Determination of Composition of Polycyclic Aromatic Hydrocarbons (PAHs) from particulate matters in Urban areas in Thailand.

1. Name of Researchers :

Ms. Hathairatana GARIVAIT

Ms. Wanna LAOWAKUL

Mr. Sunthorn NGODNGAM

2. Duration :

Oct 1994 - Sep 1997

3. Experts :

Dr. Kazunari KUME

4. Objectives :

1. To confirm the effects of ambient temperature on efficiency of traping airborne PAHs by glass fiber filter attached to high volume air sampler.
2. To survey the levels of airborns PAHs in different areas with different types of landuse.
3. To clarify the relationships between PAHs levels and different sources by consideration on daily, weekly and/or monthly changes of PAHs levels.

5. Outcomes:

1. To understand the qualities and quantities of polycyclic aromatic hydrocarbons compositions from particulate matters in urban areas according to PAHs sources, particle size and seasonal change.
2. The obtained data will give useful information for ambient air quality control for PAHs compounds that effect to human health.
3. The results from this study will be use the tool in set up a plan for imitigating air pollution problems and also as the improvement of the air quality standards in Thailand from both ambient and point source.

6. Research Procedure :

1. Study on the related referencce data and select the appropriated analytical method.
2. Preparing of equipments (HPLC and GCMS)

3. Determination of the analysis method, setting of appropriated conditions by using standard references.
4. Field survey, sample collection and preliminary studies
5. Sample collection and quality and quantity analysis
6. Data analysis
7. Report

7. Research Plan

See attached paper No.1.

(2) Analysis Section

WORK PLAN

Development of polyaromatic hydrocarbon analysis in sediment and biological tissue project

FISICAL YEAR 1995-1996

activity	budget (baht)	duration 1994 oct	nov	dec	1995 jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	duration 1996 jan	feb	mar	apr	may	jun	jul	aug	sep
1. Standard preparation	100,000	←	→																						
- PAH Standard 16 compounds																									
-Surrogate 6 compounds																									
- Internal standard 8 compounds																									
2. Determination of appropiate condition	50,000			←	—	→																			
for GC/MS																									
3. Test the analytical method by using	300,000				←	—	—	—	→																
CRM (certify referance material)																									
4.Qulity control and Qulity assurance test	300,000				←	—	—	—	—	—	→														
5.Conclusion and data analysis												←	→												
6.Sediment sample and mussel sample														←	—	—	—	—	—	→					
7.Sample analysis														←	—	—	—	—	—	—	—	—	—	→	
8.Conclusion and data analysis	200,000																							←	—
total budget	950,000	←	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

WORK PLAN

Development of carbamate analysis in water sample

Fesical year 1997-1999

Activity	Budget (baht)	Duration 1997			Duration 1998												Duration 1999								
		oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
1.Standard preparation	20,000	←	→																						
2.Determination of appropiate condition for HPLC (post column system)	20,000			←	—	→																			
3.Test the analytical method include Qulity control and Qulity assurance	200,000					←	—	—	—	—	→														
4. Conclusion and data analysis	10,000											←	→												
5.Planing for sampling and collect sample	20,000																								
6.Sample analysis	300,000													←	→										
7.Conclusion and data analysis	10,000															←	—	—	—	—	—	—	→		
Total budget	580,000	←	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

WORK PLAN

Developement of Dioxin analysis in sediment and biological tissue

Fesical year 1997-1998

Activity	Budget (Baht)	duration														duration								
		1996			1997											1998								
		oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
quipment and Standard chemical order	1,000,000	←	—	—	—	—	→																		
Isotope dilution use Internal standard	2,000,000																								
37Cl Native compound and lebeled conpound																									
Cleanup standard																									
etc																									
Laboratory set for Dioxin analysis				←	—	—	—	—	—	→															
Planing for prevent contamination from									←	—	→														
aboratory																									
Conclusion of the method Dioxin analysis									←	—	→														
EPA Method 1613																									
Test the analytical method include											←	—	—	—	—	—	—	—	—	→					
Quality control and Quality assurance)																									
Conclusion and data anlysis																					←	—	—	—	→
Total budget		←	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→

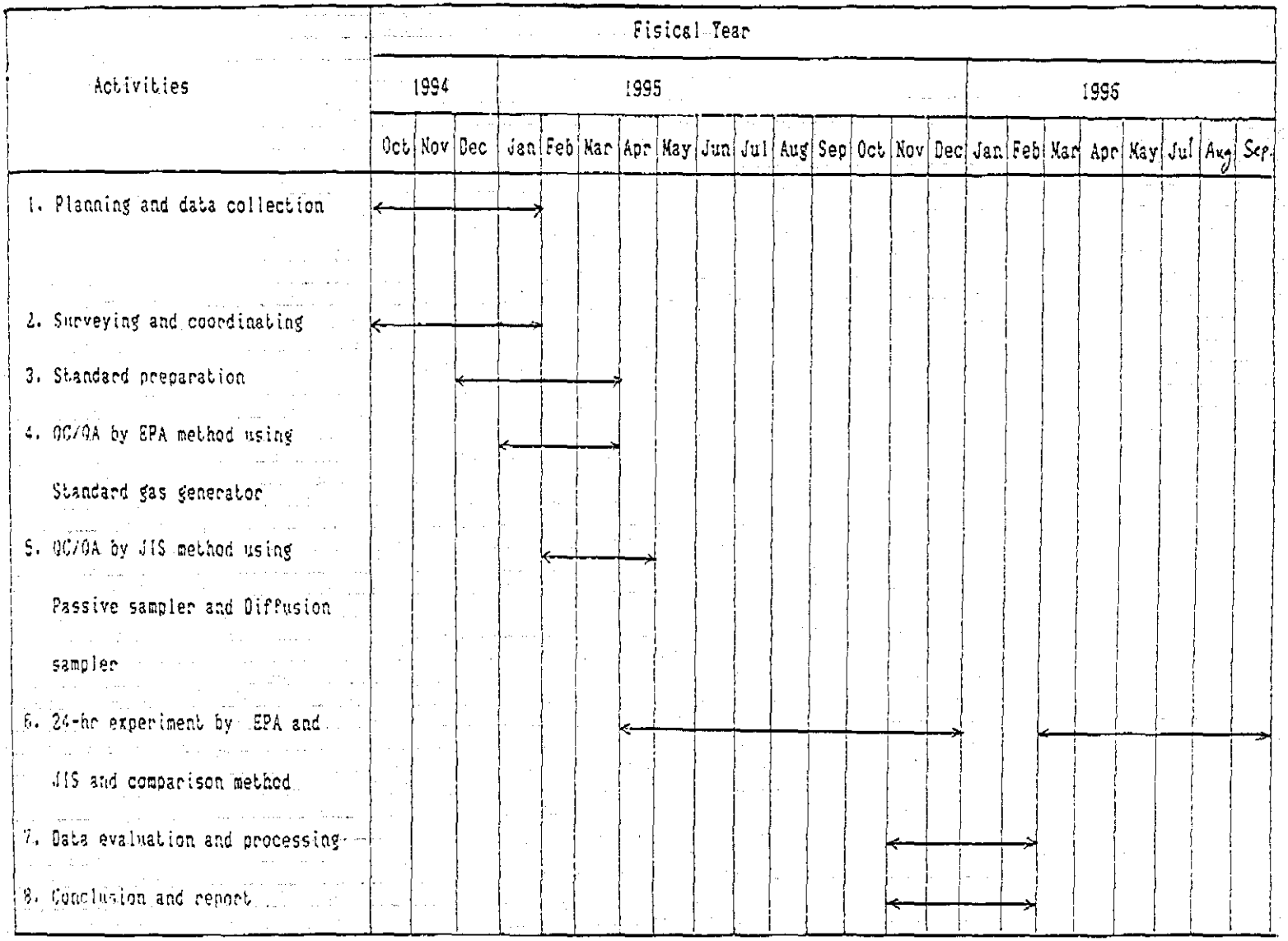
Work Plan

Environmental Sample Analysis and Methodology Development (Ionic Species)

Activities	Budget (Baht)	Fisical Year																					
		1994			1995												1996						
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jul	Aug	Sep
1. Preparation of the equipment	300,000	←			→																		
2. Analysis of ionic species in rivers of Thailand and the Khong river	50,000		←																				→
3. Analysis of ionic species in underground water in ERTC samples	10,000	←																					→
4. Data processing	200,000				↔		↔			↔		↔			↔					↔				
5. Document and report	10,000			↔			↔														↔			
Total	570,000																						

Work Plan

Environmental Sample Analysis and Methodology Development (NOx in air samples)



Work Plan

Environmental Sample Analysis and Methodology Development (Heavy Metals)

Activities	Budget (Baht)	Fisical Year																					
		1994			1995												1996						
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jul	Aug	Sep
1. Preparation of the equipment	200,000	←	—	→																			
2. Analysis of heavy metals (Pb,Cd,Cr, Cu,Ni,Mn,Fe,As,Zn) in sediment	75,000				←	—	—	—	—	—	—	—	—	—	—	→				←	—	—	—	→
3. Analysis of heavy metals in biological samples	75,000				←	—	—	—	—	—	—	—	—	—	—	→				←	—	—	—	→
4. Analysis of arsenic	150,000				←	—	—	—	—	—	—	—	—	—	—	→				←	—	—	—	→
5. Data processing	10,000				←	—	—	—	—	—	—	—	—	—	—	→				←	—	—	—	→
6. Document and report	10,000																←	—	→				
Total	520,000																						

(3) Monitoring Section

2. Monitoring Program in 1994

(Under Environmental Quality Monitoring and Methodology Development Section, ERTC)

2.1 Study on Environmental Quality in Pathumthani Province

2.2 Pesticide Monitoring Program in the Mekong Basin in Thailand

2.3 The Study on Arsenic Contamination in Park Pa-Nang Marine Ecosystem

2.4 The Development of Monitoring Method of Pesticide Residues in Agricultural Area

2.5 Monitoring Method for Toxic Chemical Residue in Coastal Areas by Using Green Mussel (Perna viridis) as Indicator

2.6 Measurement of SO_x and NO_x by Long Term Passive Sampler at Lignite Power Plant in Lampang, Thailand

2.7 Monitoring Program of Acid Rain in Thailand

2.8 Study on Ionic Species Distribution of 4 Major Rivers in Central Basin

2.9 ASEAN Network on Environmental Monitoring (ASNEM)

Environmental Quality Monitoring and Methodology Development Section

Monitoring Work Plan in F 1995

Theme	Objectives	Procedure framework in F.Y. 1995	Budget (Baht) F.Y.1995	Work plan in F.Y. 1995												
				1994			1995									
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1. Study on Ionic Species Distribution of 4 Major Rivers in Central Basin (F.Y. 1994 - 1996)	- To study the distribution pattern of ionic species in Chao Phraya, Tha - chin, Bang-Pakong and Mae-Klong river - To develop analytical technique for ionic species monitoring by using Ion-Chromatograph and comparing with the other technique	- Survey and collect basic informations from the source of wastes discharged into the rivers. - Sampling and analyze water and sediment sample in Chao Phraya river - Sampling and analyze water and sediment sample in Tha-Chin river - Sampling and analyze water and sediment sample in Bang Pakong river - Sampling and analyze water and sediment sample in Mae-Klong river -Sample analysis in Laboratory - Data evaluation	400,000	(----------)												

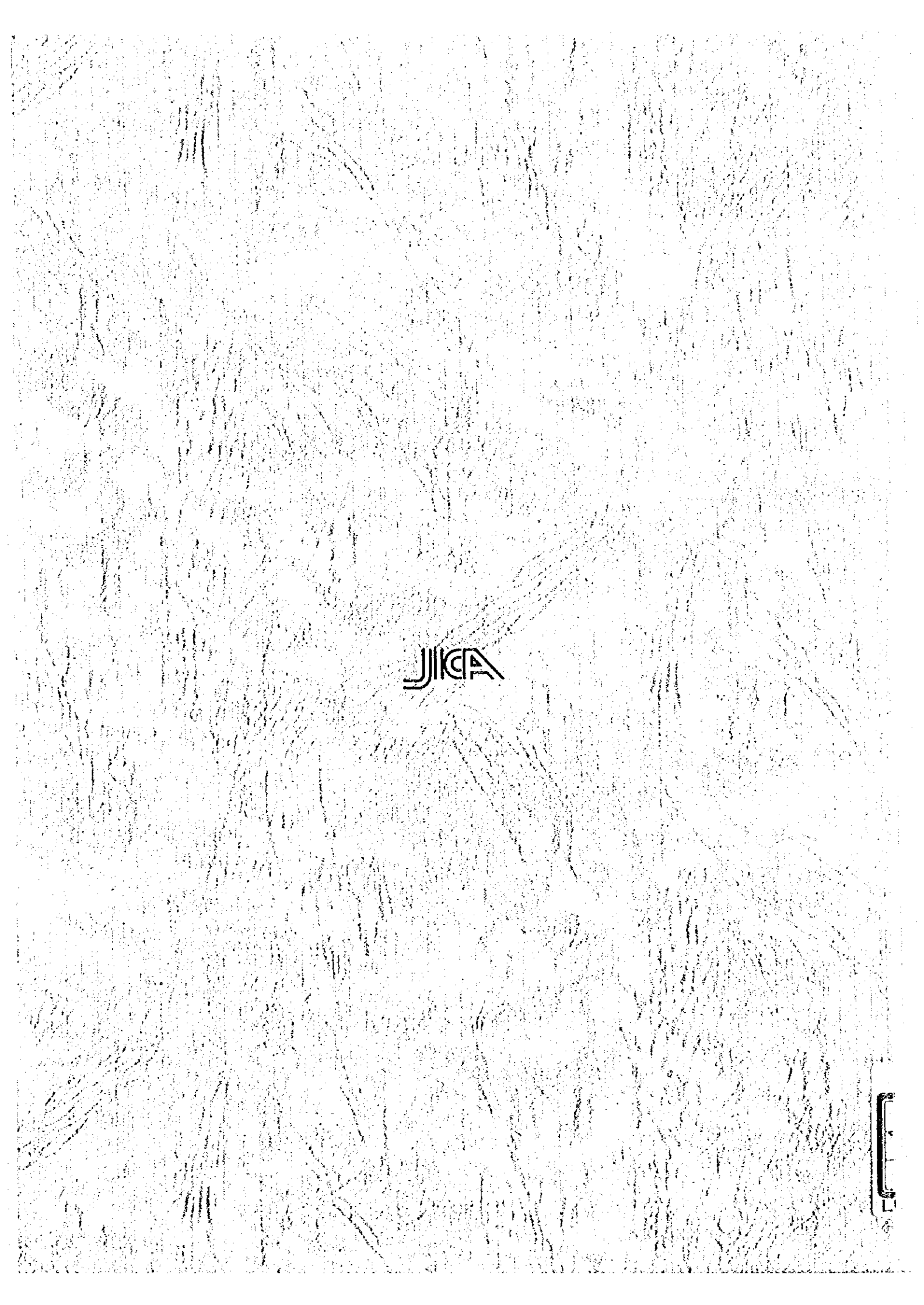
Theme	Objectives	Procedure framework in F.Y. 1995	Budget (Baht) F.Y. 1995	Work plan in F.Y. 1995											
				1994		1995									
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2. Study on ground-water contamination by hazardous waste from industry in Pathumthani province (F.Y. 1995 - 1997)	- To study and identify what kinds of industries that produce hazardous waste in the production process - To study the state of contamination and distribution of hazardous waste in the ground water - To study and develop method for monitoring of contaminated groundwater by hazardous waste from industry	- Literature review - To coordinate with other Departments to collect the basic informations such as characteristic of groundwater, list of total factories in pathumthani - Survey and collect data of raw materials, chemical substances used in production process, kind of waste and waste treatment by using questionairs - Survey and collect data of groundwater wells location and groundwater charactertic - Analyze and summarize of factory and groundwater data	300,000	(---)	(---)	(----------)			(----------)			(----------)	(----------)		

Theme	Objectives	Procedure framework in F.Y. 1995	Budget (Baht) F.Y. 1995	Work plan in F.Y. 1995											
				1994			1995								
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
3. Monitoring Program of Acid Rain in Thailand (1994-1997) (F.Y. 1994-1997)	- To establish acid rain monitoring network in Thailand - To assess current level and spatial distribution of acidic deposition - To develop the Sampling and analytical methods of chemical composition in precipitation	- Coordinate with other organizations in preparing the sites to establish acid rain monitoring network - Installation of automatic rain sampler at the site selection - Sample collection - Sample analysis - Data analysis and evaluation	300,000	(----------)			(----------)			(----------)				(---------)	
										(----------)				(----------)	
4. Study on Noise Problem from Stationary Source (F.Y.1995 - 1997)	- To study the source of noise problem from industrial activity - To assess the status of noise problem from various sources - To develop noise monitoring technique from stationary sources	- Literature review - Survey and collect the necessary informations from industrial activity relating to noise souce - Survey and measurement noise level around the industrial area - Data evaluation	200,000	(---------)											
					(---------)		(---)		(---)		(---)		(---)		
														(---------)	

Theme	Objectives	Procedure framework in F.Y. 1995	Budget (Baht) F.Y. 1995	Work plan in F.Y. 1995												
				1994			1995									
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
5. Study on Arsenic Contamination in Pak Pa - Nang Marine Ecosystem (F.Y. 1992-1995)	- To use the biological samples such as plankton, fish and mussel as indicator for Arsenic residue monitoring in Pak-Pa-Nang bay. - To develop the analytical method of Arsenic residue in biological samples. - To monitor and evaluate the situation and trend of arsenic residue in biological samples in Pak-Pa-Nang bay.	- Survey and collect samples of water, sediment and aquatic organisms such as fishes, crabs, shrimps, mussels and plankton at 21 sampling site selection in Pak-Panang Bay and down stream in Ron-Phiboon, Chian Yai and Cha-uad - Sample preparation and analysis for Arsenic in the laboratory - Data analysis and preparing report	300,000		(---)		(---)			(---)		(---)				
					(----------											
														(----------	)	

Theme	Objectives	Procedure framework in F.Y. 1995	Budget (Baht) F.Y. 1995	Work plan in F.Y. 1995												
				1994			1995									
				Oct.	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
5. Monitoring of Toxic Chemical Residue in Coastal Areas by using Green Mussel(Perna viridis) as Indicator (F.Y. 1993-1995)	- To monitor and evaluate the situation of toxic chemical residues in Green Mussel in the coastal areas of the country - To develop the monitoring method of PCB_s, heavy metal and organochlorine in Green Mussel	- Survey and collect samples from sediment and Green Mussel along the coastal area in the southern part - Survey and collect samples from sediment and Green Mussel along the coastal area in the eastern part - Sample analysis for organochloring PCB_s and heavy metal - Data analysis and preparing report	400,000							(---)	(---)	(----------)			(---)	

Tbese	Objectives	*Procedure framework* in F.Y. 1995	Budget (Baht) F.Y. 1995	Work plan in F.Y. 1995												
				1994			1995									
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
7. Developaent of Monitoring Method of Pesticide Residues in the cabbage planting area under the Royal project	- To monitor and evaluate the situation of pesticides residues in the environment and agricultural products from the project area. - To develop the monitoring method of pesticide residues in agricultural products. - To survey and evaluate the use of pesticides in agricultural-area in both types and quantities.	- Presurvey and collect basic informations such as planting areas, type of pesticides used in the project area, etc. - Questionair preparation - Information survey by using the questionairs and-collect samples from soil and agricultural products in the project area - Sample preparation and analysis for pesticides residue - Data analysis and preparing progress report.	400,000	(---)	(---)	(---)	(---)	(----------)				(---)	(---)	(---------)	(----------)	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