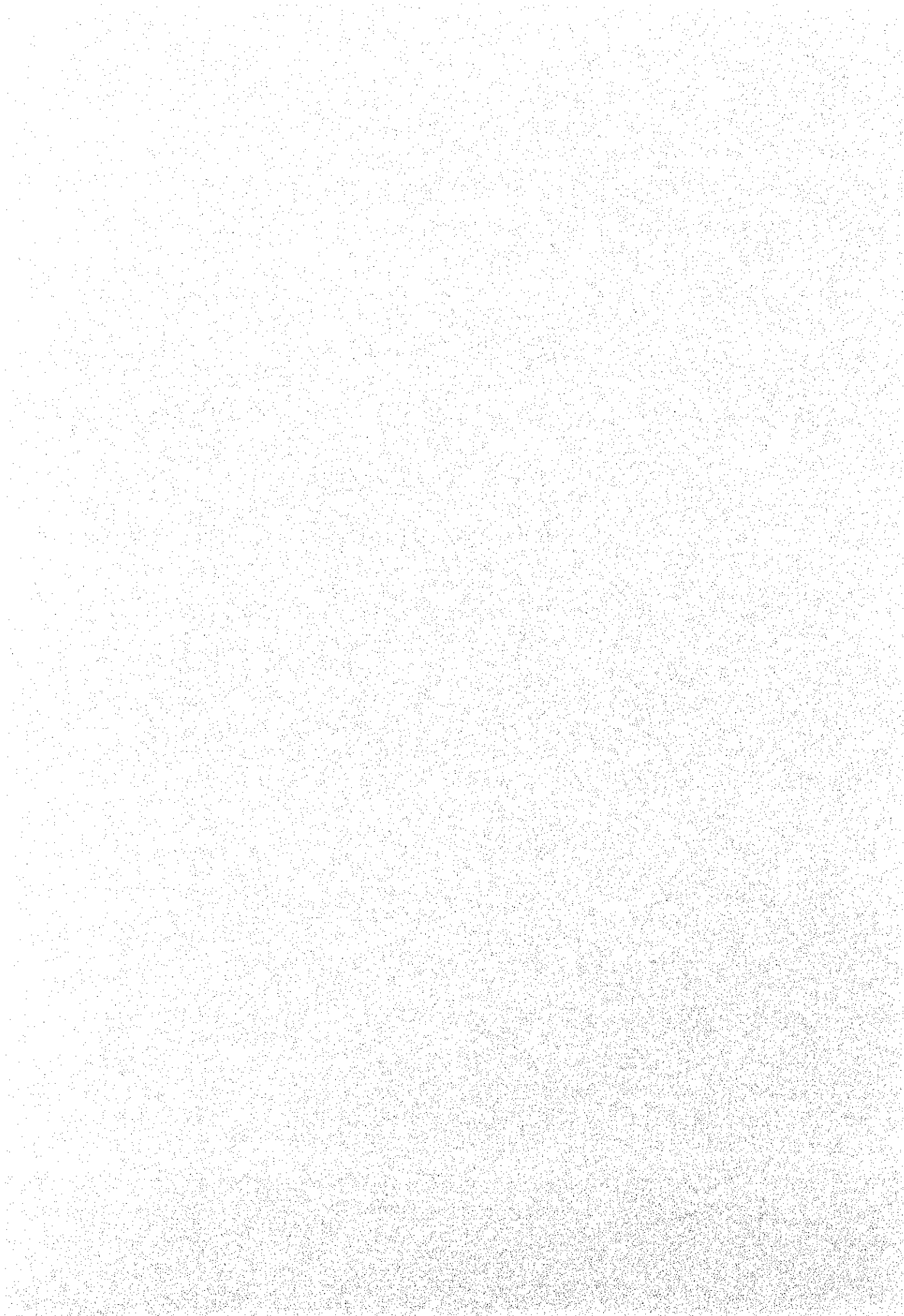


## 収 集 資 料

1. 水管理、水文解析分野
2. 情報システム管理分野
3. 水利施設設計分野



## 収 集 資 料

### 1 水管理、水文解析分野

#### (1) 流出解析報告書(抜粋)

- Fig. 1 Schematic map of the Chao Phraya River Basin.
- Fig. 2 Division of the Upper Chao Phraya River Basin.
- Fig. 3 A simple Tank Model (4x1 series)
- Fig. 4 Division of the drainage basin
- Fig. 5 Top Tank of a Composite Tank Model
- Fig. 6 A Composite Tank Model (4x4 series)
- Fig. 7 Base-Coef and First-Tank Windows of TANK-MODEL for Windows.
- Fig. 8 Initial-Values and Calculated Windows of TANK-MODEL for Windows.
- Fig. 9 Comparison of Observed and Calculated Hydrographs in the Upper Chao Phraya River Basin in 1986.
- Fig. 10 Comparison of Observed and Calculated Hydrographs in the Upper Chao Phraya River Basin in 1987.

#### (2) R I D地方水文観測事務所配置図

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- Fig. 13 年降水量(1952-1985年の平均)
- Fig. 14 年降水量の傾向 Annual Rainfall Trends Nan, A. Muang.
- Fig. 15 年降水量の傾向 Annual Rainfall Trends Sirikit Dam

#### (4) 水質観測項目・観測地点数一覧表

- Table. 1 Number of Water Quality Measurement Stations and Items  
Hydrological Research and Application Div. as of December, 1990

#### (5) 水質基準マニュアル(抜粋)

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- Table. 3 Water quality standard in Thailand
- Fig. 16 水質観測結果(浮遊土砂 1/2)
- Fig. 17 水質観測結果(浮遊土砂 2/2)
- Fig. 18 水質観測結果(pH)

## 2 情報システム管理分野

Fig.19 Water Management Information Network System

Fig.20 The Water Management Database

Fig.21 The Hydrology Database

Fig.22 Data in the W.M.D.(except for cropping and pumping data)

- (1) Sample Output of the Water Management Monitoring Display System
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Fig.23 ダム観測計器の測定結果例

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Table.4 PROGRESS OF CRITERIA DEVELOPMENT AND DIFFUSION

## 収 集 資 料

### 1. 水管理、水文解析分野



(1) 流出解析報告書 (抜粋)

REPORT  
on  
Runoff Analysis  
in the Upper Chao Phraya River Basin  
( Part II )

by

Dr. Yoshio HAYASE  
(National Research Institute of  
Agricultural Engineering, MAFF)  
Mr. Masahisa YAGIHASHI  
(JICA Expert to IEC)  
Mrs. Amporn Chongvanitswat  
(Hydrology Division, RID)  
Mr. Attaporn Buddapalit  
(ditto)  
Mr. Snguan Kanthawong  
(ditto)  
Mr. Veeravut Pomrattaphan  
(ditto)  
Mr. Sawattachat Srisurat  
(ditto)

November 2, 1993

Irrigation Engineering Center (Phase II)  
Royal Irrigation Department

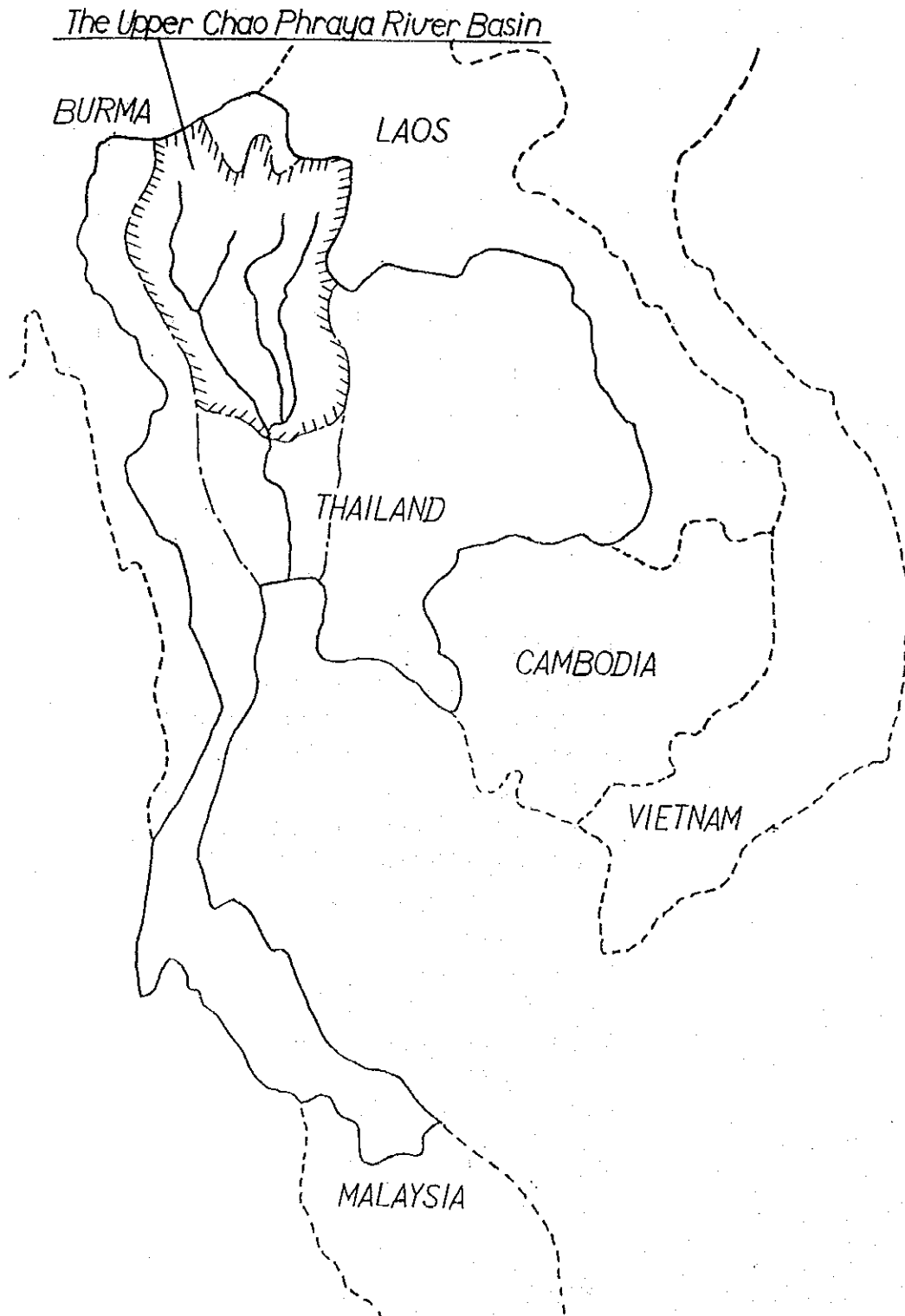


Fig. 1 Schematic map of the Chao Phraya River Basin.



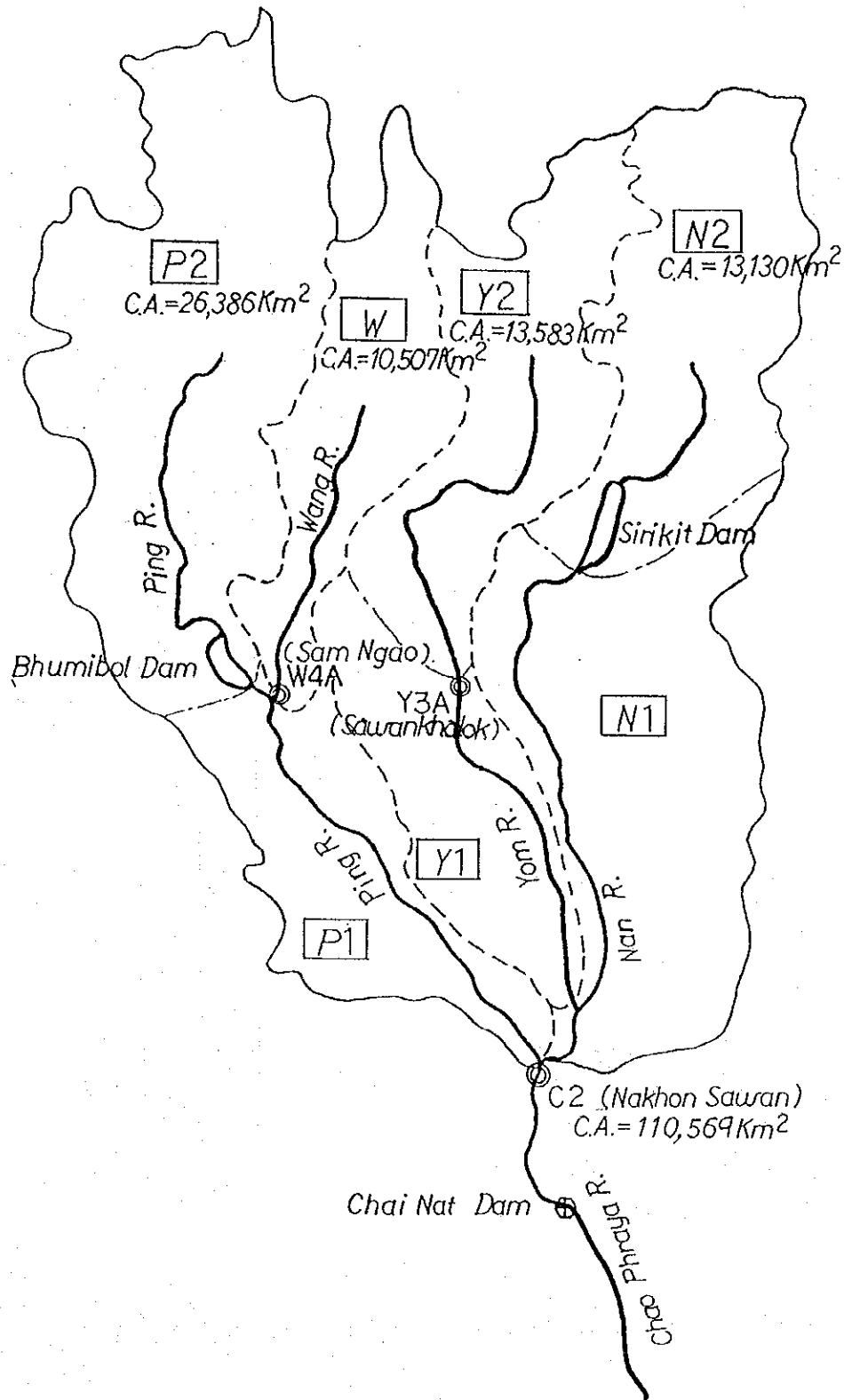


Fig. 2 Division of the Upper Chao Phraya River Basin.

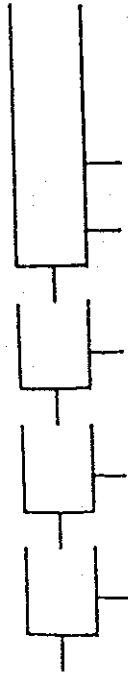


Fig. 3 A simple Tank Model (4x1 series)

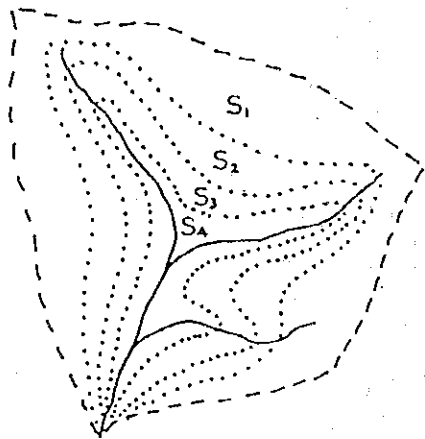


Fig. 4 Division of the drainage basin

CONSTANTS

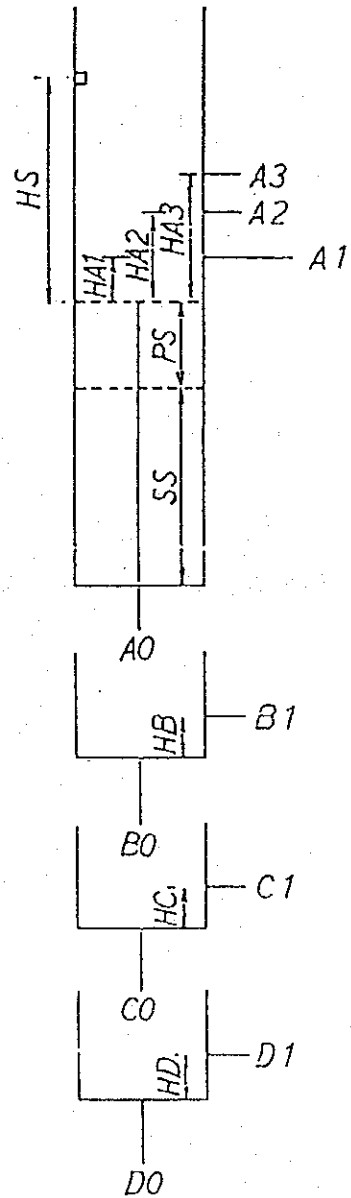


Fig. 5 Top Tank of a Composite Tank Model

# VARIABLES

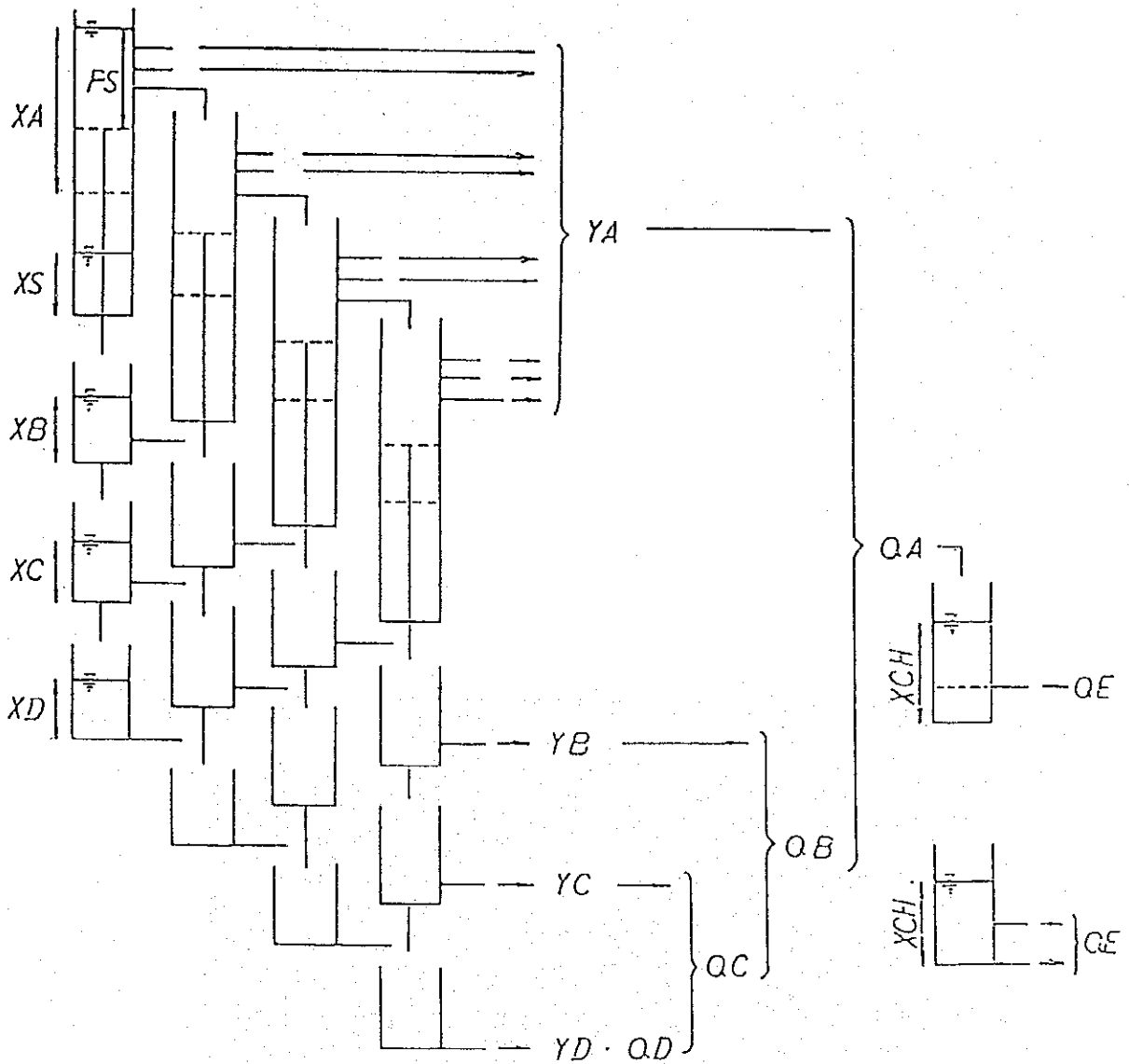


Fig. 6 A Composite Tank Model (4x4 series)

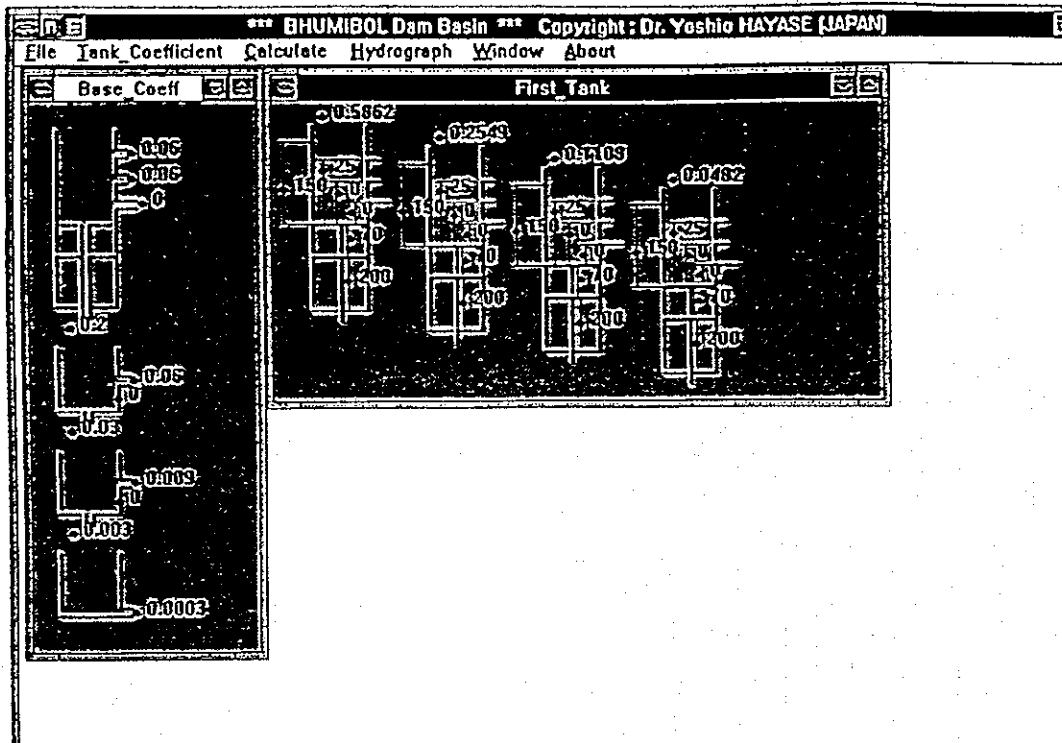


Fig. 7 Base-Coeff and First-Tank Windows of TANK-MODEL for Windows.

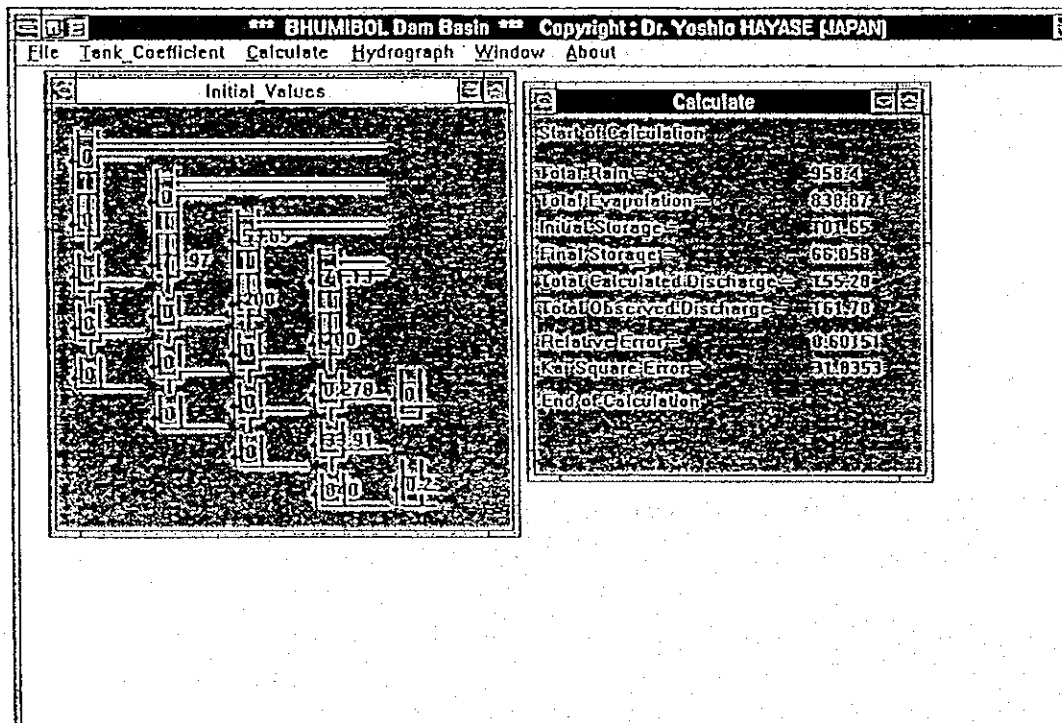


Fig. 8 Initial-Values and Calculated Windows of TANK-MODEL for Windows.

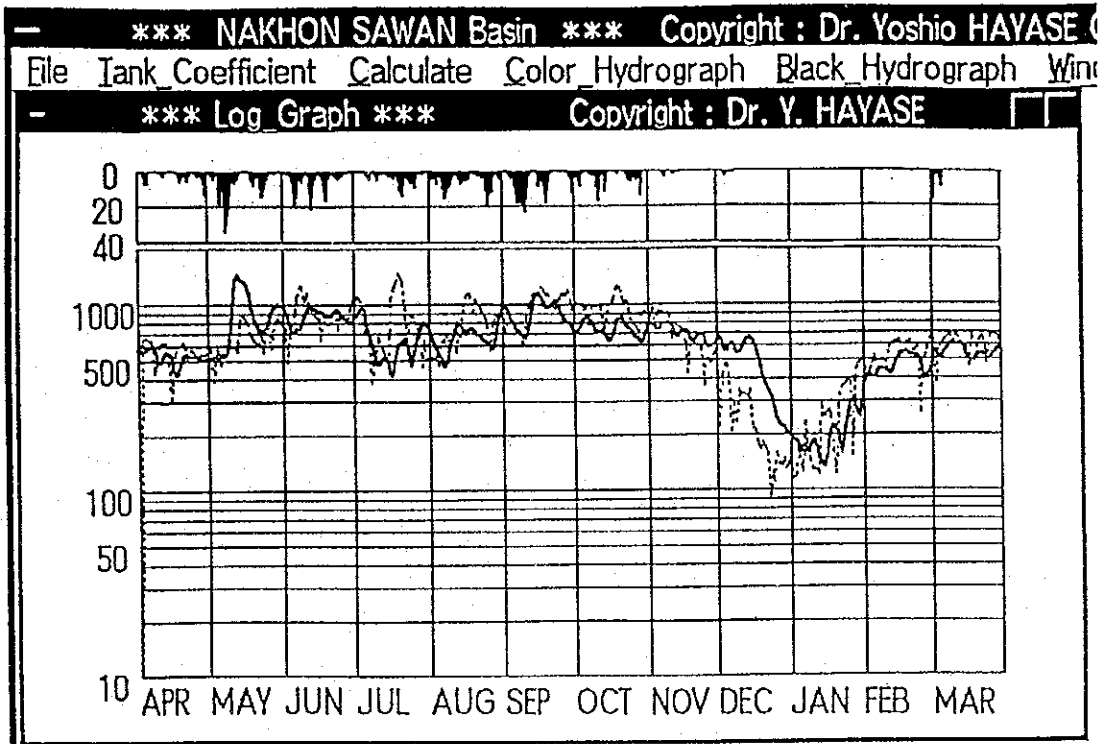


Fig. 9 Comparison of Observed and Calculated Hydrographs in the Upper Chao Phraya River Basin in 1986.

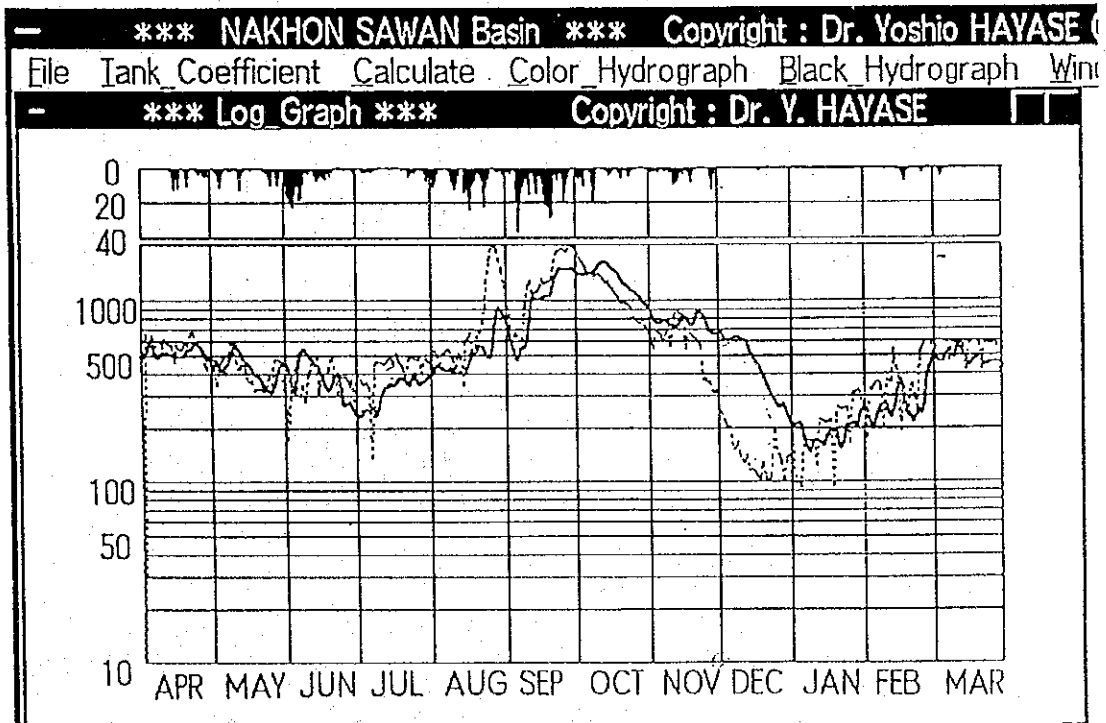


Fig.10 Comparison of Observed and Calculated Hydrographs in the Upper Chao Phraya River Basin in 1987.

(2) RID地方水文観測事務所配置図

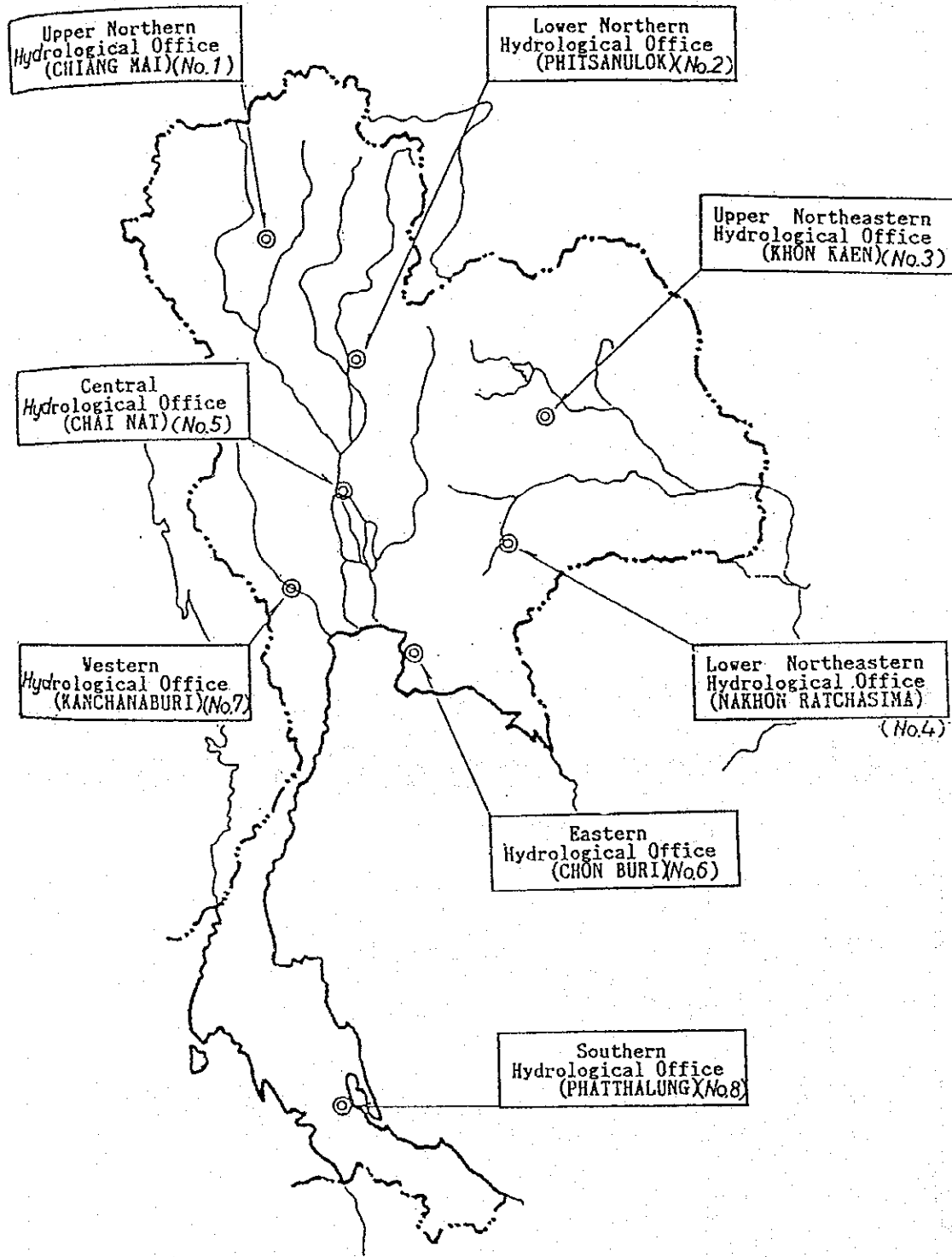
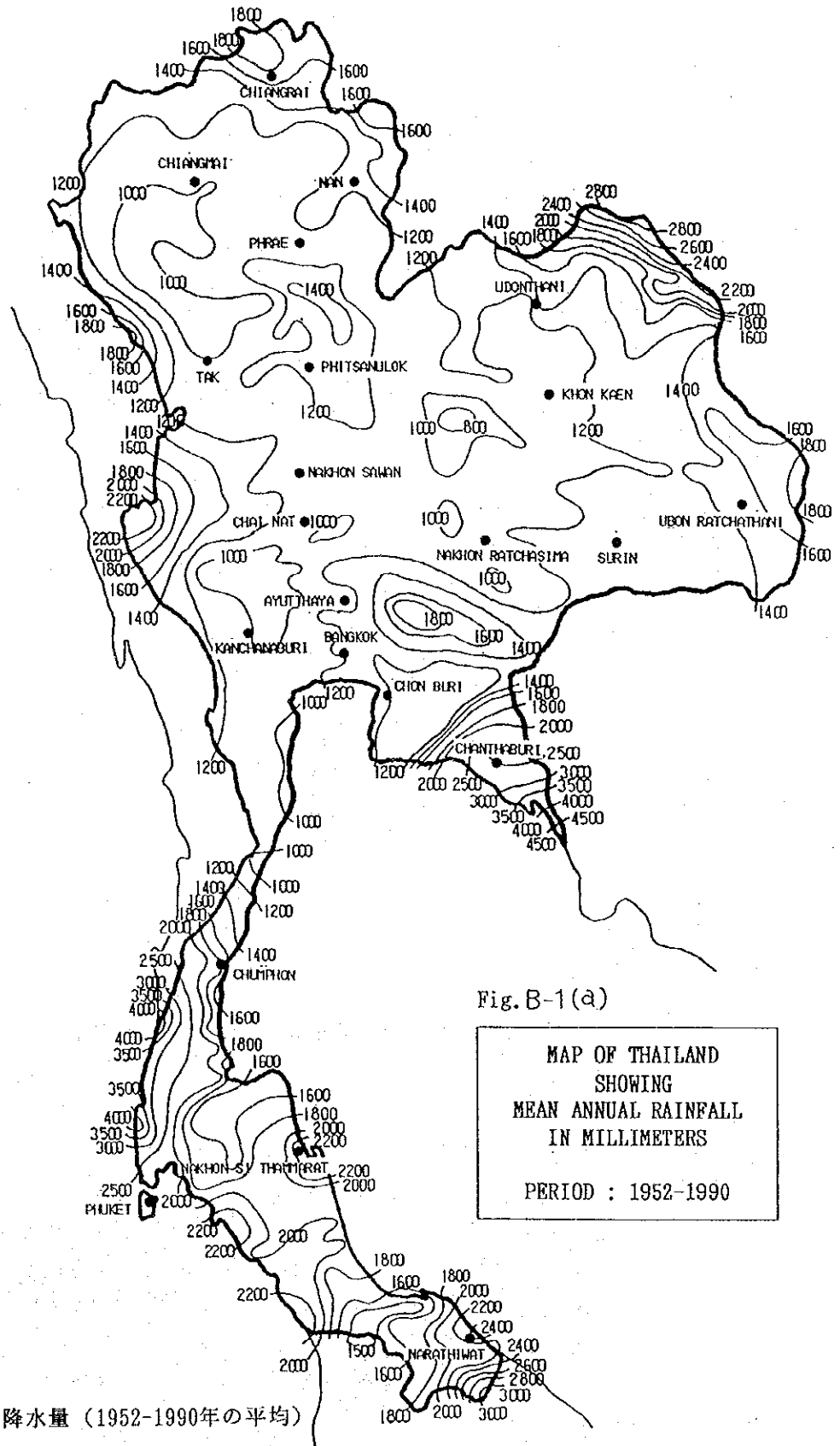


Fig.11 Locations of Hydrology Office

(3) 年降水量



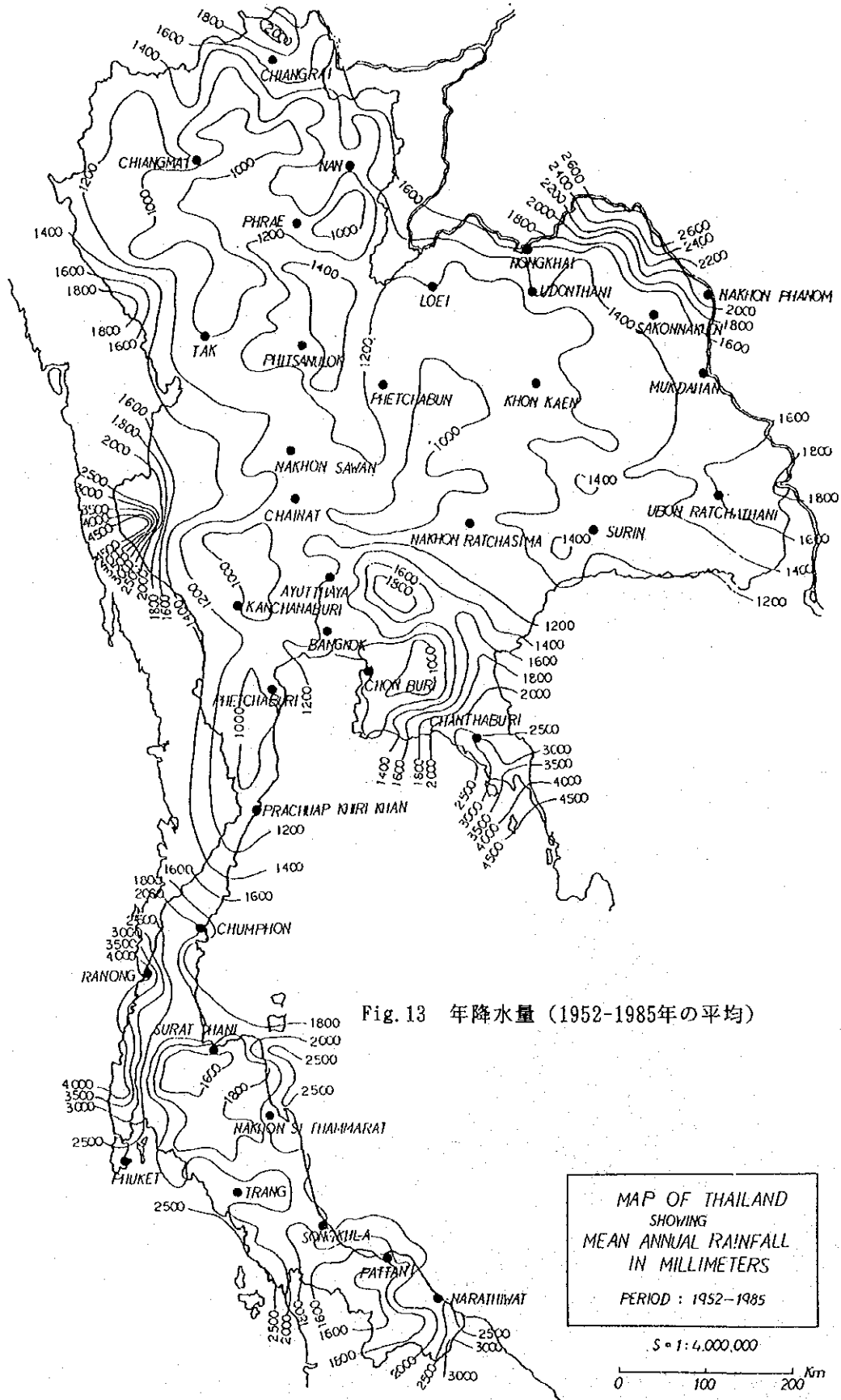


Fig. 13 年降水量 (1952-1985年の平均)



# 年降水量の傾向

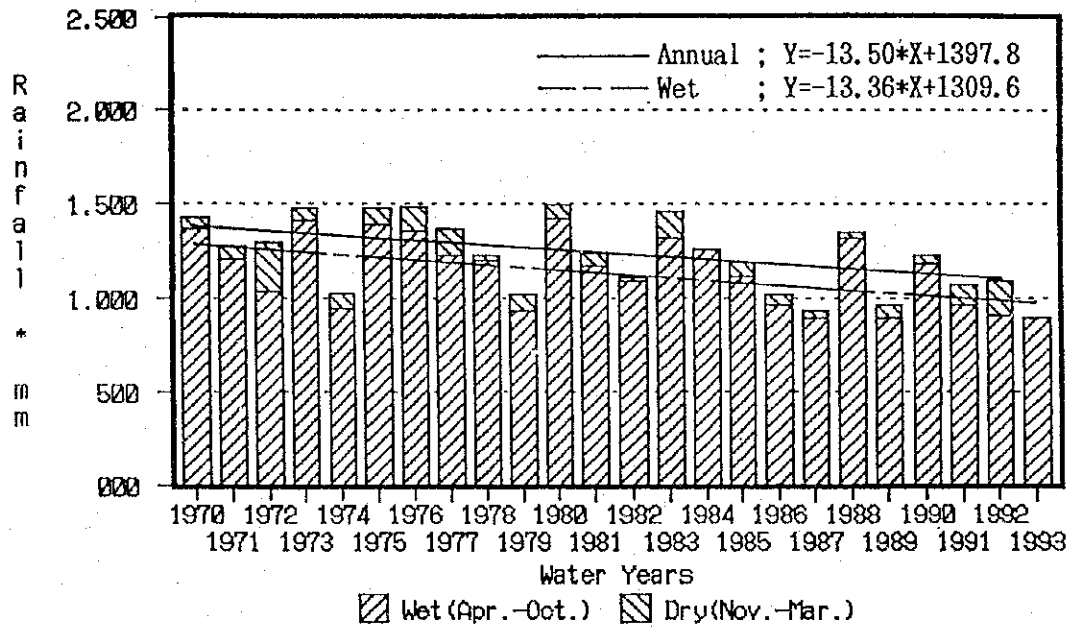


Fig. 14 年降水量の傾向 Annual Rainfall Trends Nan A Muang.

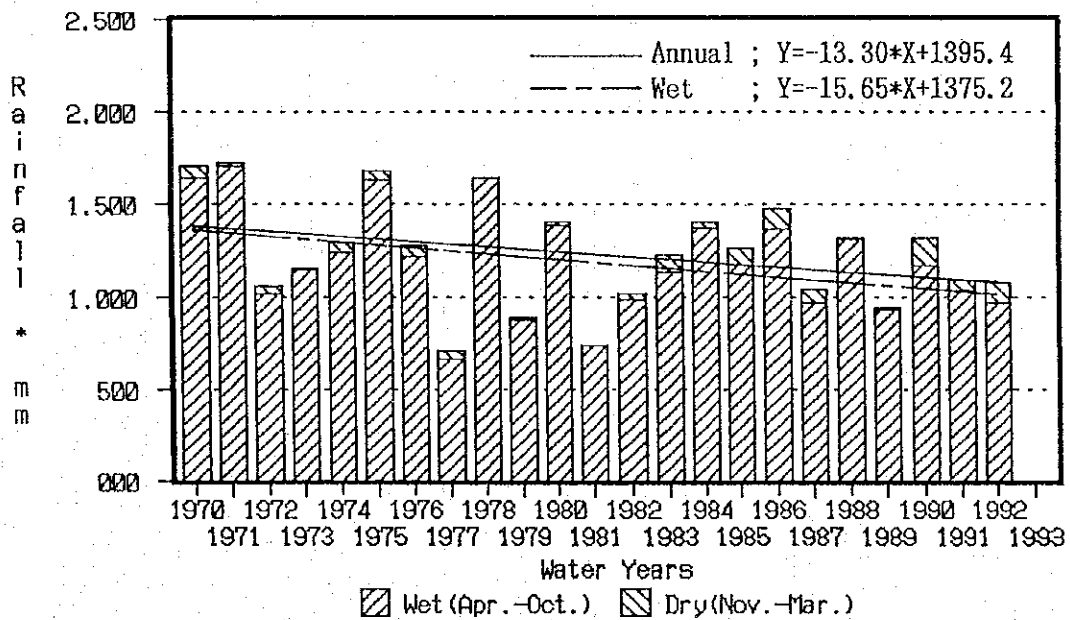


Fig. 15 年降水量の傾向 Annual Rainfall Trends Sirikit Dam

## (4) 水質観測項目・観測地点一覧表

Table. 1 Number of Water Quality Measurement Stations and Items  
Hydrological Research and Application Div. as of December, 1990

Items	River name	Mae Klong River	Tha Chin River	Chao Phraya River	Bangpakong River
Number of stations		12	25	17	11
Hydrogen ion activity (pH)		12	25	17	11
Electrical Conductivity EC x 10 <sup>6</sup> at 25°C		"	"	"	"
Oxygen Consumed (O.C.)	ppm.	5	8	7	3
Biochemical Oxygen demand(BOD <sub>20</sub> )	ppm.	"	"	"	"
Dissolved Oxygen (D.O.)	ppm.	12	25	17	11
Hydrogen Sulfide (H <sub>2</sub> S)	ppm.	5	8	7	3
Ammonia Nitrogen (NH <sub>3</sub> - N)	ppm.	"	"	"	"
Organic Nitrogen (Org - N)	ppm.	"	"	"	"
Nitrite (NO <sub>2</sub> )	ppm.	"	"	"	"
Nitrate (NO <sub>3</sub> )	ppm.	"	"	"	"
Phosphate (PO <sub>4</sub> )	ppm.	"	"	"	"
Total Iron (T. Fe)	ppm.	"	"	"	"
Dissolved Iron (d. Fe)	ppm.	"	"	"	"
Copper (Cu)	ppm.	"	"	"	"
Chromium (Cr)	ppm.	"	"	"	"
Cadmium (Cd)	ppm.	"	"	"	"
Manganese (Mn)	ppm.	"	"	"	"
Chemical Oxygen Demand (COD)	ppm.	"	"	"	"
Lead (Pb)	ppm.	"	"	"	"
Zinc (Zn)	ppm.	"	"	"	"
Arsenic (As)	ppm.	"	"	"	"
Mercury (Hg)	ppb.	-	-	-	-
Turbidity	NTU	12	25	17	11
Concentration of Sediment by wt.	ppm.	5	8	7	3
Cations : - Calcium (Ca)	mg/l	"	"	"	"
Magnesium (Mg)	"	"	"	"	"
Sodium (Na)	"	"	"	"	"
Potassium (K)	"	"	"	"	"
Anions : - Carbonate (CO <sub>3</sub> )	"	"	"	"	"
Bicarbonate (HCO <sub>3</sub> )	"	"	"	"	"
Chloride (Cl)	"	"	"	"	"
Sulphate (SO <sub>4</sub> )	"	"	"	"	"

(5) 水質基準マニュアル (抜粋)

**MANUAL  
FOR  
WATER QUALITY  
MEASUREMENT METHODS**

**SEPTEMBER , 1992  
IRRIGATION ENGINEERING CENTER**

Table. 2 Draft of classification of water in the field (Thailand)

Classification	Water condition	Purpose of water utilization
1	Very very clean	1. Drinking water 2. Preservation of ecology system
2	Very clean	1. Drinking water 2. Preservation of fishes for fishery an for eating 3. Fishery 4. Recreation
3	Clean	1. Domestic use 2. Agriculture
4	Semi-clean	1. Domestic water use 2. Industry 3. Miscellenous use
5	Out of 1-4	1. Navigation

Table. 3 water quality standard in Thailand

Index of water quality	Unit	Classify water quality level according to utilization				
		level				
		1	2	3	4	5
1. Temperature	°C	T'	T'	T'	T'	-
2. pH Value		T	5-9	5-9	5-9	-
3. Dissolved Oxygen	mg/l	T	6			-
4. BOD (5 days, 20°C)	mg/l	T	1.5			-
5. Coliform Bacteria						
-Total Coliform	MPN/100ml	-	5,000	20,000	-	-
-Fecal Coliform	MPN/100ml	-	1,000	4,000	-	-
6. NO <sub>3</sub> -N (Nitrate-N)	MPN/100ml	T	←-----5.0----->			-
7. NO <sub>3</sub> -N (Ammonia-N)	MPN/100ml	T		0.5		-
8. Phenols	MPN/100ml	T		0.005		-
9. Copper (Cu)	MPN/100ml	T		0.1		-
10. Nickel	MPN/100ml	T		0.1		-
11. Manganese (Mn)	MPN/100ml	T		1.0		-
12. Zinc (Zn)	MPN/100ml	T		0.1		-
13. Cadmium (Cd)	MPN/100ml	T	0.005*	0.05*		-
14. Chromium (Cr) (Hexavalent)	MPN/100ml	T		0.05		-
15. Lead (Pb)	MPN/100ml	T		0.05		-
16. Total mercury (Total Hg)	MPN/100ml	T		0.002		-
17. Arsenic (As)	MPN/100ml	T		0.01		-
18. Cyanide (CN)	MPN/100ml	T		0.005		-
19. Radioactivity Substance						
-Gross X	Becquerel/l	T		0.1		-
-Gross B	Becquerel/l	T		1.0		-
20. Pesticides (Total)	mg/l	T		0.05		-

T - Natural

T' - Natural but cannot change to over 3 °C

\* - Hardness of water lower than 100mg/l in CaCO<sub>3</sub>

\*\* - Hardness of water higher than 100mg/l in CaCO<sub>3</sub>

Fig. 16 水質観測結果 (浮遊土砂 1/2)

WATER QUALITY DATA OF CHAO PHRAYA RIVER

TABLE 30. Concentration of Sediment by weight. - ppm.

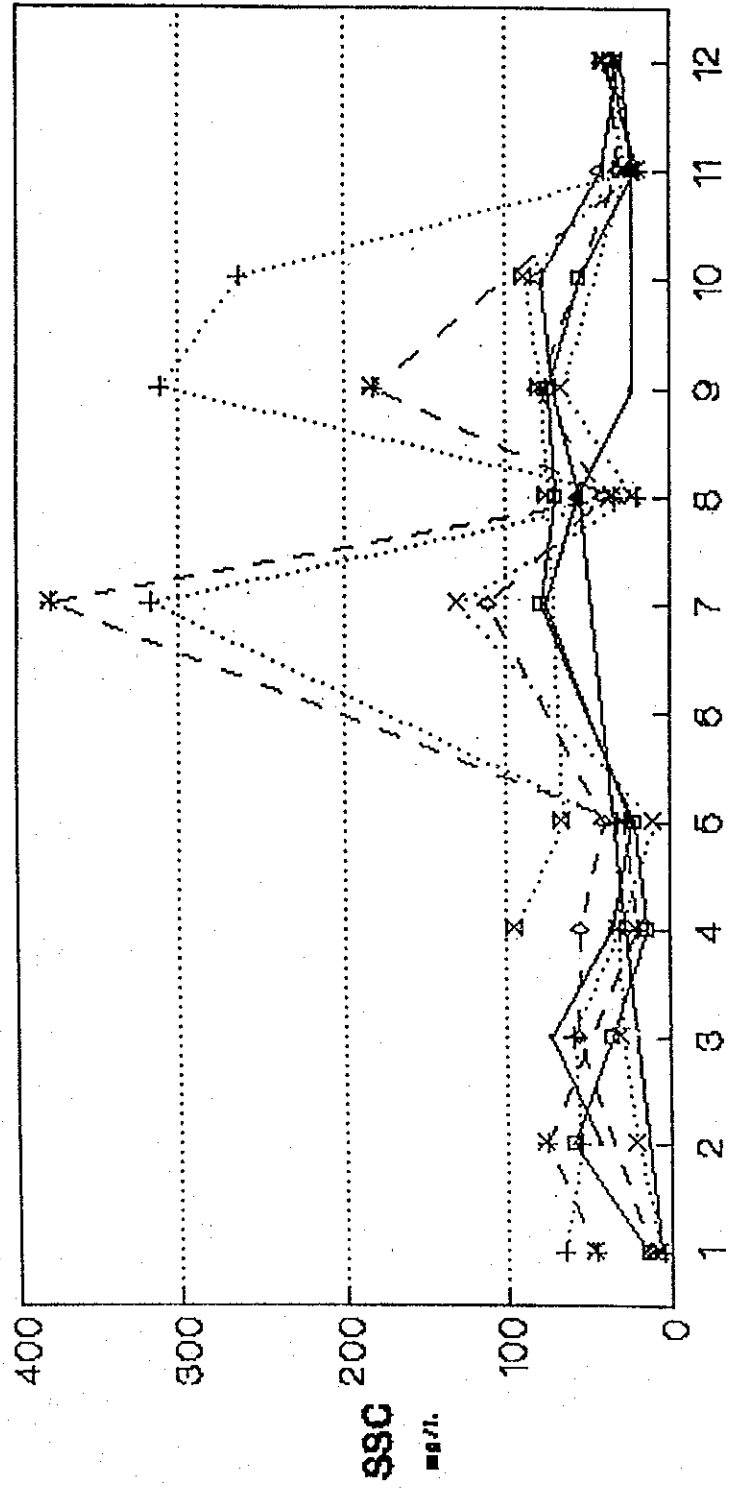
STATION DISTANCE FROM RIVER MOUTH - Km.	SUPPASAMIT CANAL SAMUTPRAKAN 3.50	A-MUANG PHRAPRAENG SAMUTPRAKAN 6.30	BANGKOK PORT 26.30	BANGKOK BRIDGE 40.10	MEMORIAL BRIDGE 46.40	IRRIGATION DEPT. 52.90	RAMA VI BRIDGE 56.10	MIN	MEAN	MAX
15-01-90		64.82	13.30	5.95	11.52	5.94		5.94	24.42	64.82
16-02-90		53.92	58.12	18.85				18.85	49.57	75.26
20-03-90	41.72	58.70	33.97	28.80	55.14			28.80	49.90	72.90
19-04-90	33.96	29.52	13.08	29.85	54.01		93.87	13.08	39.07	93.87
24-05-90	22.27	31.13	20.99	8.39	38.39		65.13	8.39	30.48	65.13
-06-90										
10-07-90	75.36	317.39	78.42	128.43	109.70			75.36	181.41	379.17
27-08-90	55.55	19.89	69.72	20.70	39.11	54.58	74.66	19.89	45.94	74.66
25-09-90	22.47	31.81	74.52	65.38	80.32	70.14	78.75	22.47	75.61	181.46
05-10-90	262.36	262.36	54.74			78.30	87.25	54.74	120.66	262.36
15-11-90	22.25	19.55	20.71	25.98	30.81	40.27	26.76	18.17	25.56	40.27
17-12-90	28.31	32.36	34.62	36.86	36.80	29.82	37.04	28.31	34.40	39.42
-01-92										
25-02-91	26.51	30.67	18.16	15.34	34.80	37.33	22.77	15.34	27.19	37.33
-03-92										
25-04-91	83.94	66.22	27.19	22.08	21.83	20.67	25.47	20.67	38.88	83.94
-05-92										
-06-92										
15-07-91		212.00	24.00	21.40	26.40	17.20	26.20	17.20	50.29	212.00
-08-91										
-09-91										
-10-91										
18-11-91	12.60	13.20	20.00	36.70	48.70	52.50		12.60	28.36	52.50
18-12-91	18.20	13.60	28.20	32.00	28.40	30.20	50.30	13.60	27.64	50.30
-01-92										
12-02-92	21.70	15.30	21.00	11.70	16.70	9.00	12.00	9.00	15.71	21.70
26-03-92	182.00	137.00	36.00	75.00	50.00	27.00	38.00	27.00	74.63	182.00
-04-92										
28-05-92	41.67	17.33	37.33	63.00	70.33	64.67	40.00	17.33	45.25	70.33
18-06-92	21.80	55.00	31.00	26.33	18.33	14.33	18.30	14.33	29.89	55.00
-07-92										
26-08-92	199.00	310.00	155.00	207.00	284.00	166.00	163.00	155.00	208.63	310.00
MIN	12.60	13.20	13.08	5.95	11.52	5.94	12.00	5.94	15.71	21.70
MEAN	54.57	85.32	41.43	43.99	55.54	44.87	53.72	28.38	58.26	115.45
MAX	199.00	317.39	155.00	207.00	284.00	166.00	163.00	155.00	208.63	379.17

Fig. 17 水質觀測結果(浮遊土砂 2/2)

# CHAO PHRAYA RIVER

## Suspended Sediment Concentration (SSC)

WHO  $\leq$  mg/l.



— Suppesamit C ····+··· A. Phra Pradae —□— Bangkok Port  
 ····x··· Bangkok Brid —◇— Memorial Brid —▲— RID, Samsen ····x··· Rama VI Brid

Fig. 18 水質觀測結果 (pH)

WATER QUALITY DATA OF CHAO PHRAYA RIVER

TABLE 1. Hydrogen Ion Activity (pH)										
STATION	SUPPASANIT	A. NUANG PHRAPRADEANG	BANGKOK	BANGKOK	MEMORIAL	IRRIGATION	RAMA VI	MIN	MEAN	MAX
DISTANCE FROM RIVER MOUTH - Km.	CANAL SAMUTPRAKAN	SAMUTPRAKAN	PORT	BRIDGE	BRIDGE	DEPT.	BRIDGE			
	6.30	16.85	26.30	40.10	46.40	52.90	56.10			
DATE										
15-01-90	7.70	7.60	7.50	7.50	7.40			7.40	7.54	7.70
16-02-90	7.70	7.60	7.80	7.90	7.90			7.50	7.72	7.90
20-03-90	7.60	7.70	7.60	7.20	7.10			7.10	7.52	7.90
19-04-90	7.90	7.50	7.30	6.90	6.80		6.80	6.80	7.27	7.90
24-05-90	7.80	7.50	7.10	6.90	6.90		7.00	6.90	7.27	7.80
-06-90										
10-07-90	7.50	7.60	7.50	7.40	7.40		7.40	7.40	7.48	7.60
27-08-90	7.40	7.50	7.50	7.40	7.40		7.40	7.40	7.46	7.70
25-09-90	7.40	7.20	7.10	7.20	7.20		7.20	7.10	7.24	7.40
05-10-90	6.90	7.20	6.70	7.20	7.10		7.00	6.50	6.78	7.00
15-11-90	7.10	7.20	7.20	7.20	7.10		7.30	7.10	7.20	7.30
17-12-90	7.40	7.60	7.60	7.60	7.60		7.50	7.40	7.55	7.60
-01-92										
25-02-91	7.80	8.00	8.00	8.20	8.10		7.80	7.80	7.99	8.20
-03-92										
25-04-91	7.80	7.90	8.00	8.10	8.10		8.00	7.80	7.98	8.10
-05-92										
-06-92										
15-07-91	7.80	7.80	7.70	7.70	7.80		7.70	7.70	7.76	7.80
-08-91										
-09-91										
-10-91										
18-11-91	7.50	7.50	7.50	7.50	7.40		7.40	7.40	7.47	7.50
18-12-91	7.60	7.50	7.70	7.60	7.60		7.60	7.50	7.59	7.70
-01-92										
12-02-92	7.70	7.60	7.90	7.80	7.70		7.80	7.60	7.73	7.90
26-03-92	7.50	7.50	7.50	7.40	7.40		7.30	7.30	7.45	7.50
-04-92										
28-05-92	7.60	7.60	7.50	7.50	7.40		7.40	7.40	7.53	7.70
18-06-92	7.70	7.60	7.60	7.50	7.50		7.60	7.40	7.56	7.70
-07-92										
26-08-92	7.40	7.40	7.40	7.30	7.40		7.40	7.30	7.39	7.40
MIN	7.10	7.20	6.70	6.90	6.80		6.80	6.50	6.78	7.00
MEAN	7.57	7.57	7.51	7.49	7.44		7.43	7.33	7.50	7.68
MAX	7.90	8.00	8.00	8.20	8.10		8.00	7.80	7.99	8.20



# 収 集 資 料

## 2. 情報システム管理分野



Fig. 19 Water Management Information Network System

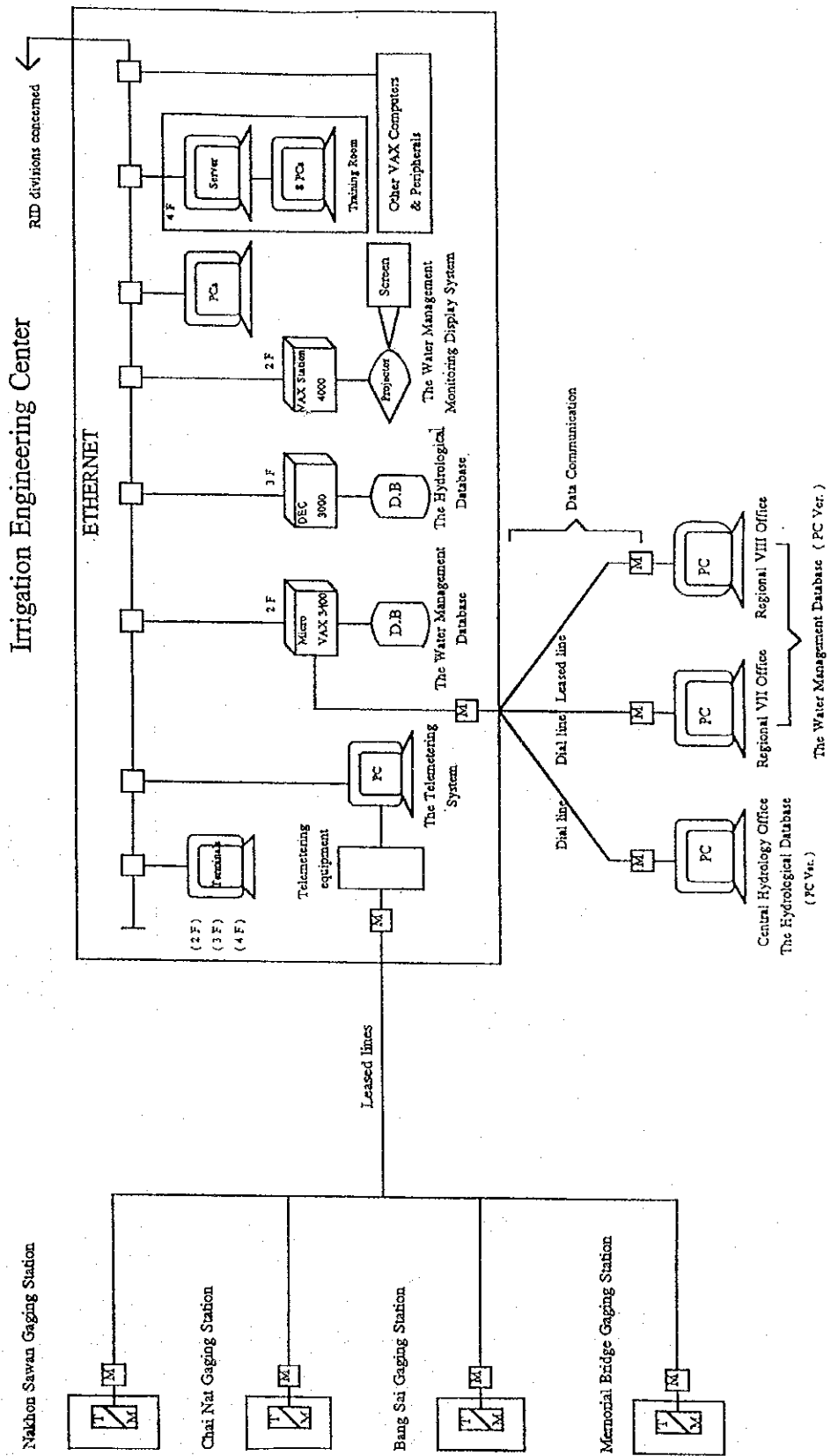


Fig. 20 The Water Management Database

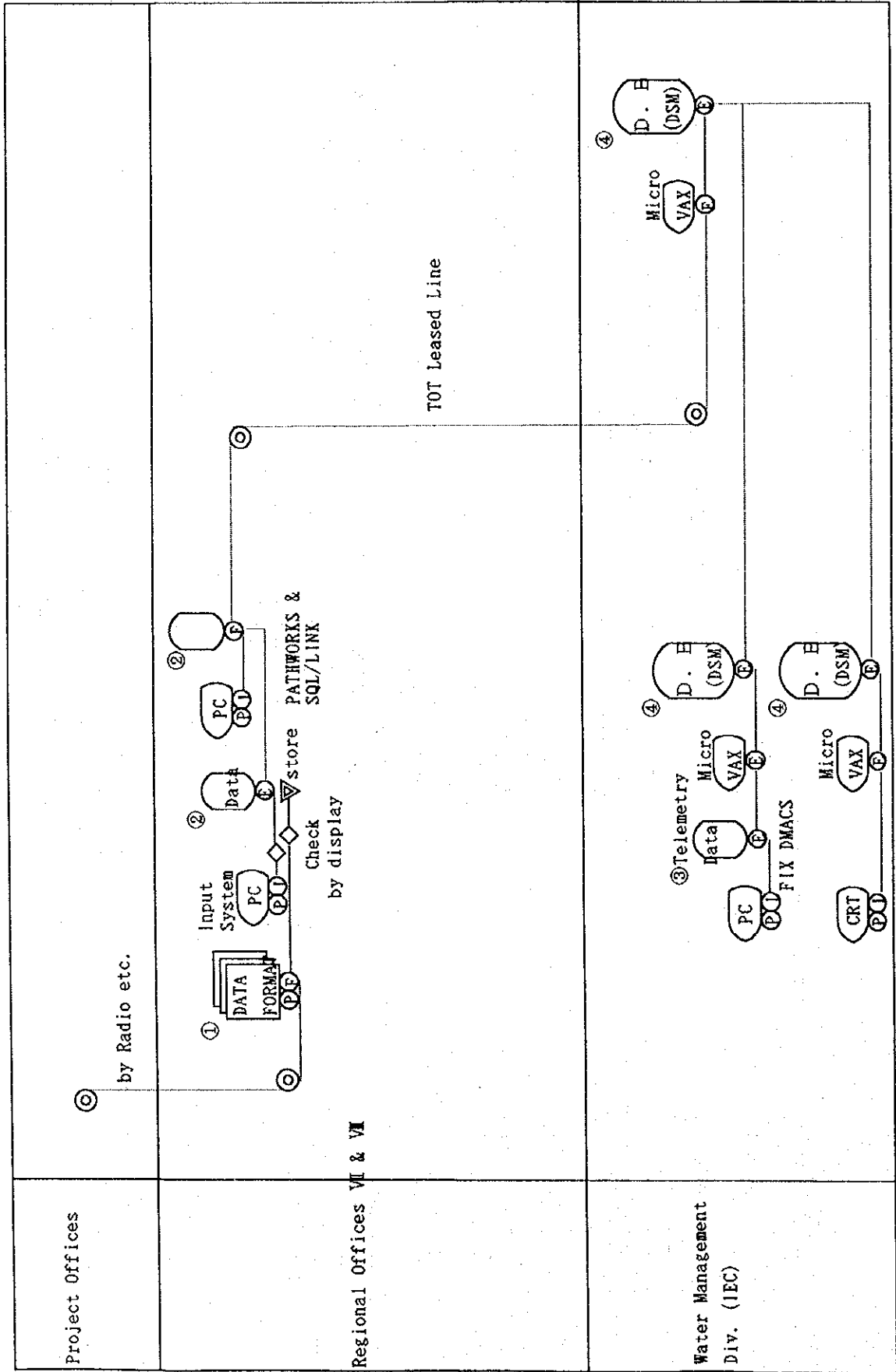


Fig. 21 The Hydrology Database

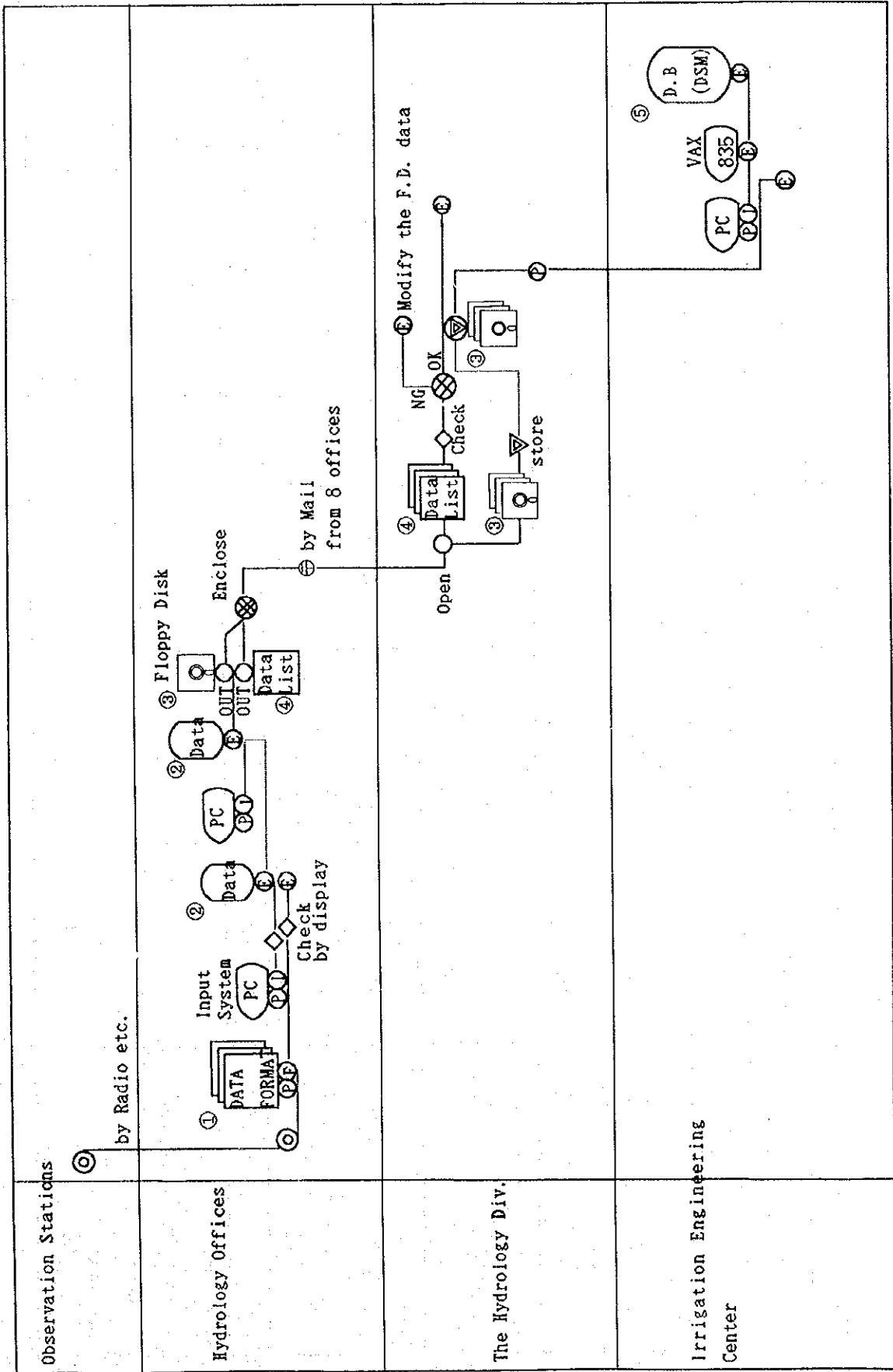


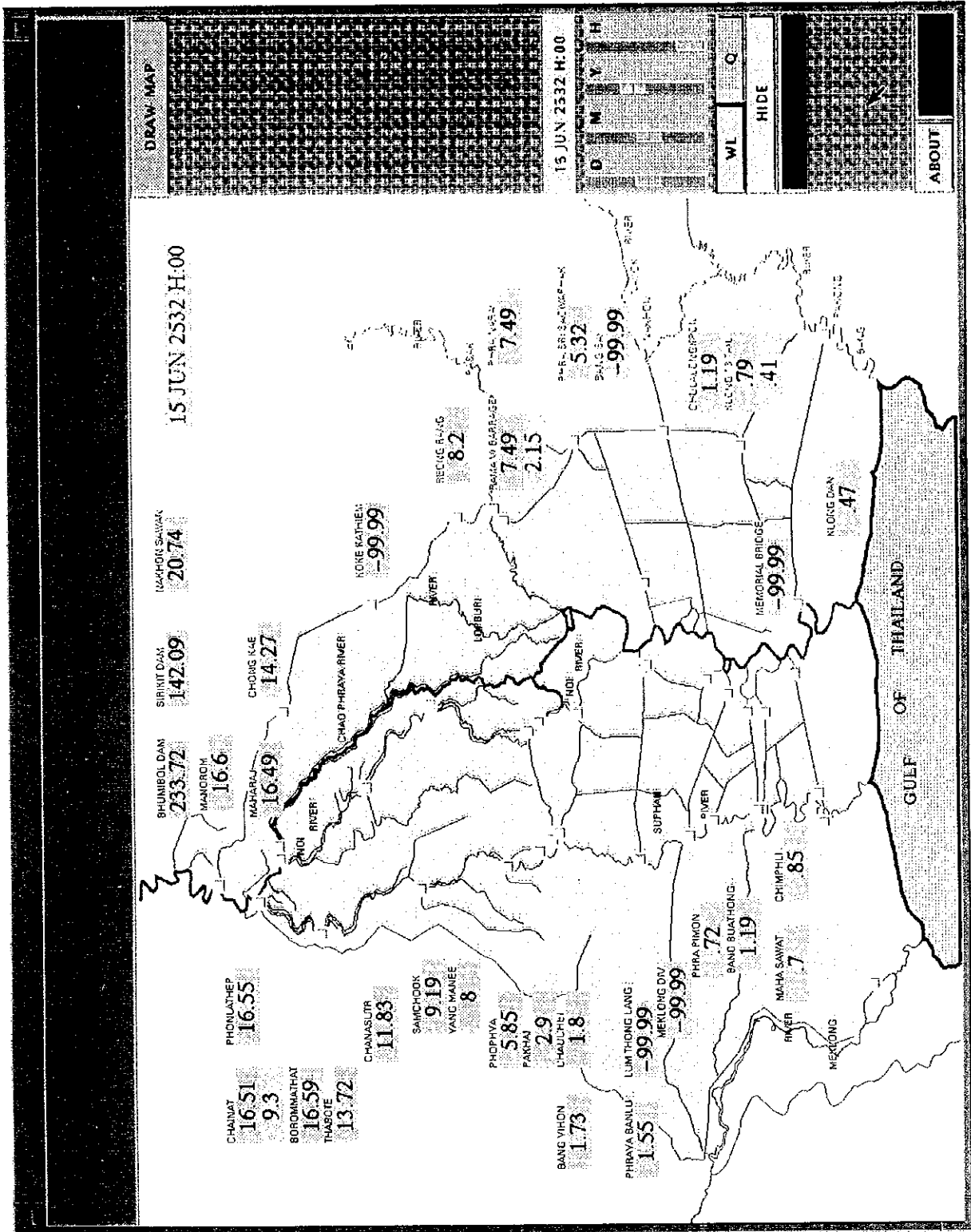
Fig. 22 Data in the W. M. D. (except for cropping and pumping data)

Stations	U/S Daily Water level	D/S Daily Water Level	Daily Mean			Daily Gate Opening	Daily Reservoir Volume	Hourly Rainfall	Daily Rainfall	Daily Reservoir Release Through Spillway
			Inflow	Release	Diversion					
Reservoirs - Bhumibol - Sirikit - Others	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○			○ ○ ○			○ (some of them)
Diversion dams - Chai Nat - Rama VI	○ ○	○ ○	○ ○	○ ○				○ ○	○ ○	
Regulators - Head - Cross - Offtake	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○				○ ○ ○	○ ○	
Weirs	○	○			○					
Telemetering - Nakhon Sawan - Chai Nat - Bang Sai - Memorial Bridge	○ ○ ○ ○	○						○ ○ ○ ○	○ ○ ○ ○	

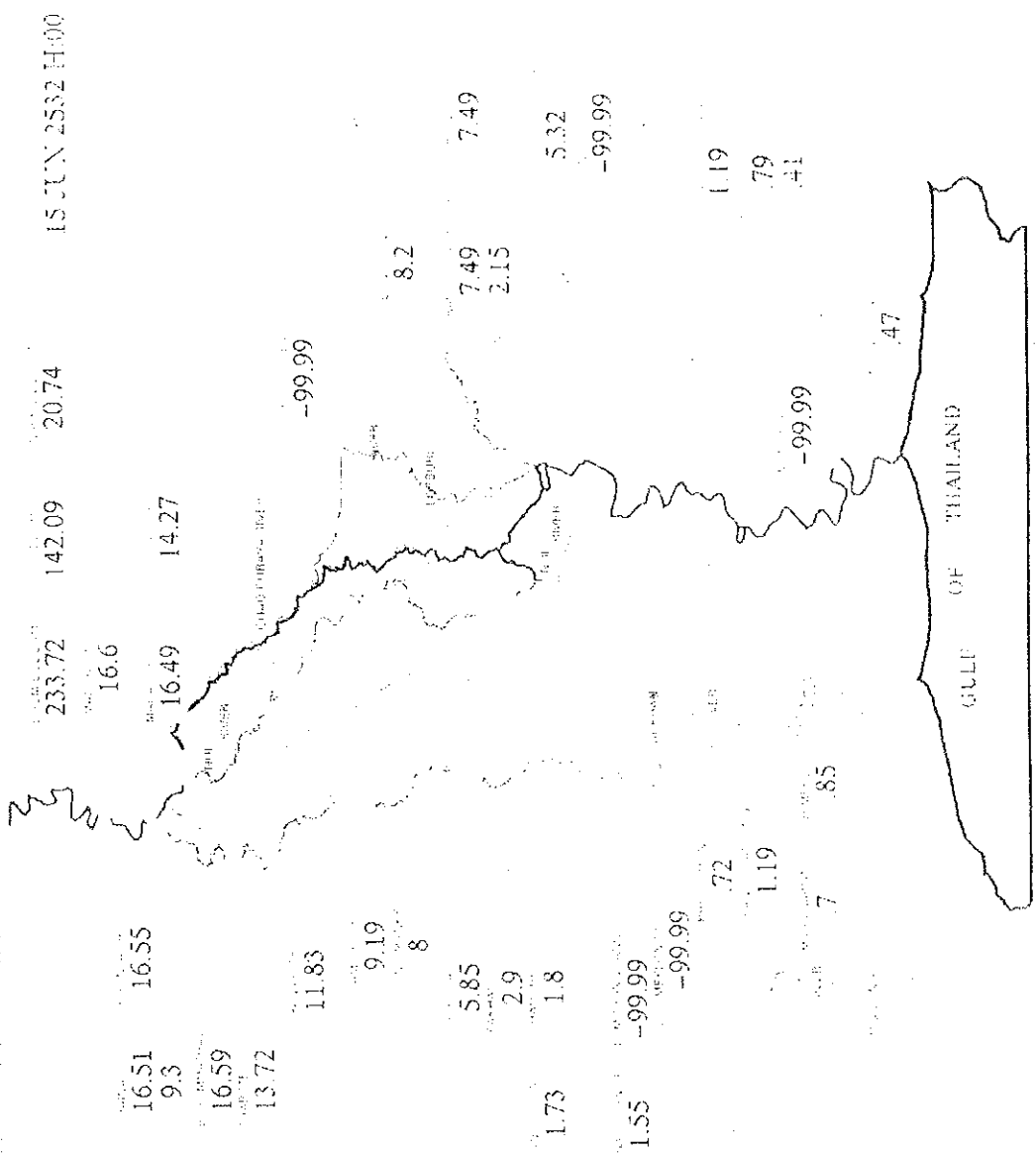
(1) Sample Output of the Water Management  
Monitoring Display System







# WATER MONITORING IN CHAO PHRAYA BASIN



DRAW MAP

15 JUN 2532 H:00

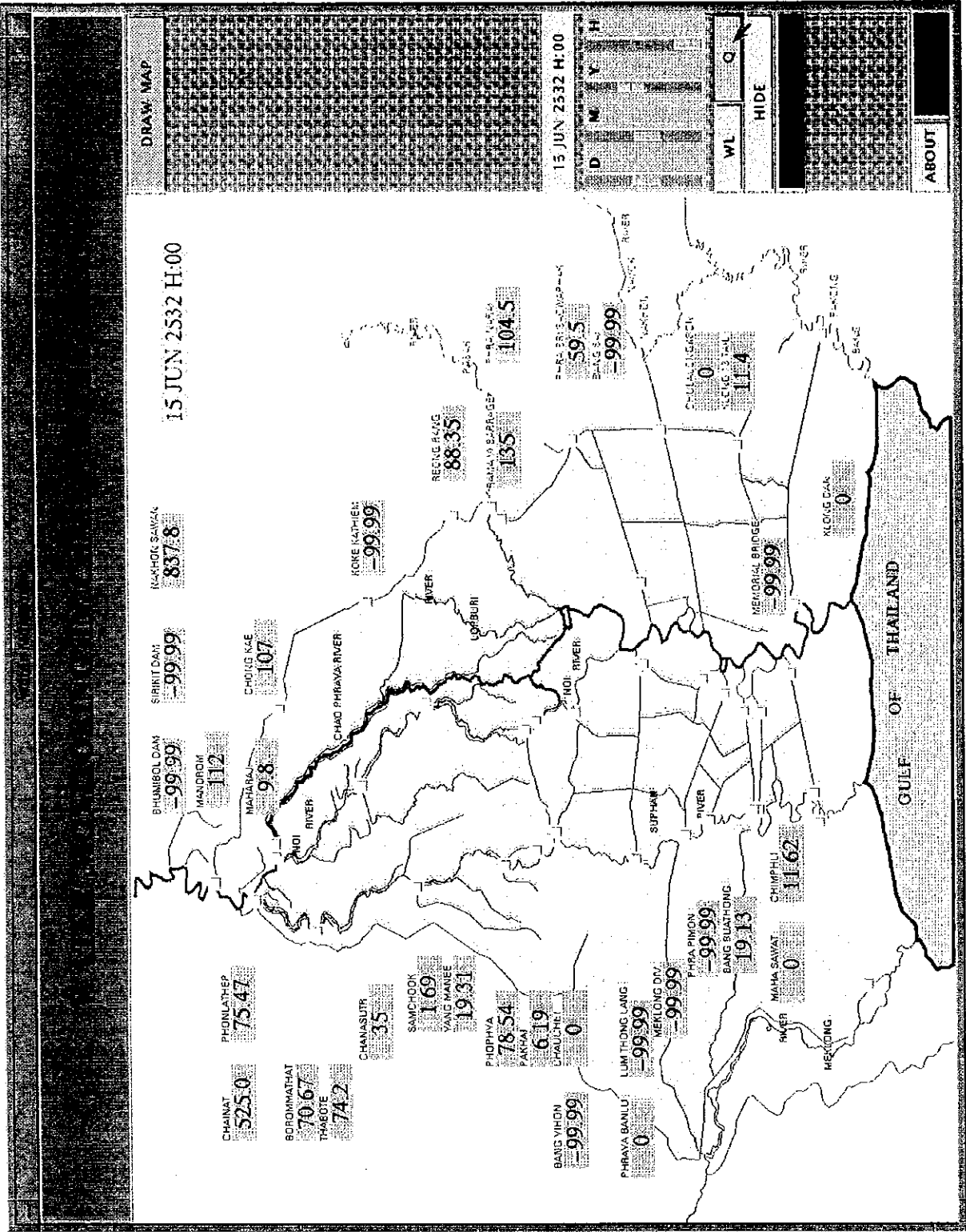
13 JUN 2532 H:00

D M Y H

WL Q

HIDE

ABOUT EXIT



DRAW MAP

15 JUN 2532 H:00

D M Y H

WL Q H

HIDE

ABOUT

15 JUN 2532 H:00

MAHOL SAKUL 837.8

SIRIKIT DAM -99.99

BHUMBOL DAM -99.99

MANDROK 112

MAHARAJ 9.8

PHONLATHEP 75.47

BOROMMATHAT 70.67  
THABOTE 74.2

CHANASURI 35

SAMCHOK 1.69  
SANGWANG 19.31

PHOPHYA 78.54  
KATHAN 6.19

BANIS VIRON -99.99

PHRAYA BANLU 0

LUM THONG LANG -99.99

MEKLONG DIV. 99.99

PHRA PINON -99.99

BANG SUATHONG 19.13

MAHA SAWAT 0

CHIMPHLI 11.62

MEKLONG

CHONG KAE 107

KONE KATHIEL -99.99

RECUE HANG 88.35

104.5

135

59.5

-99.99

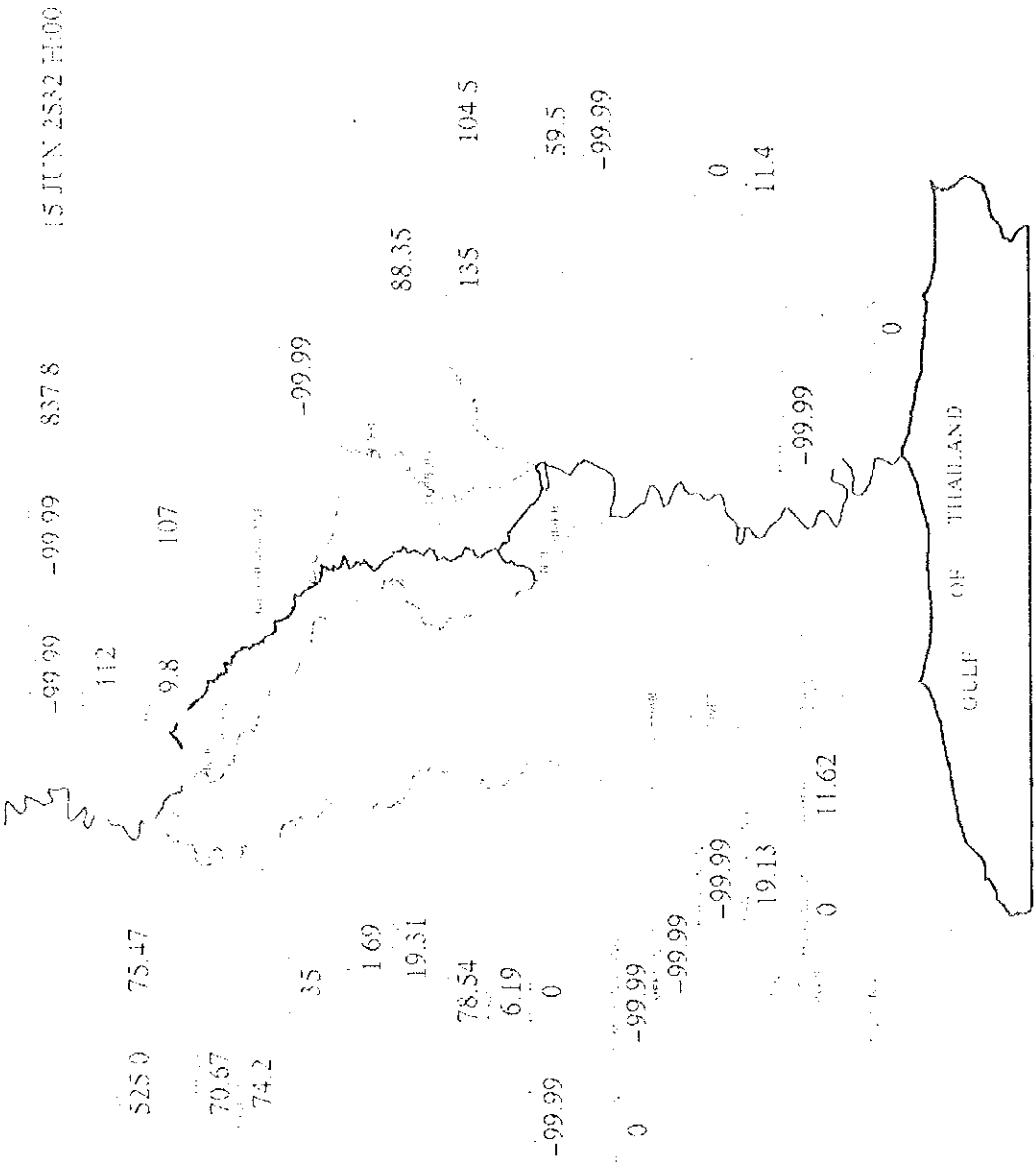
11.4

99.99

0

GULF OF THAILAND

# WATER MONITORING IN CHAO PHRAYA BASIN



DRAW MAP

15 JUN 2532 H:00  
D M Y H

WL

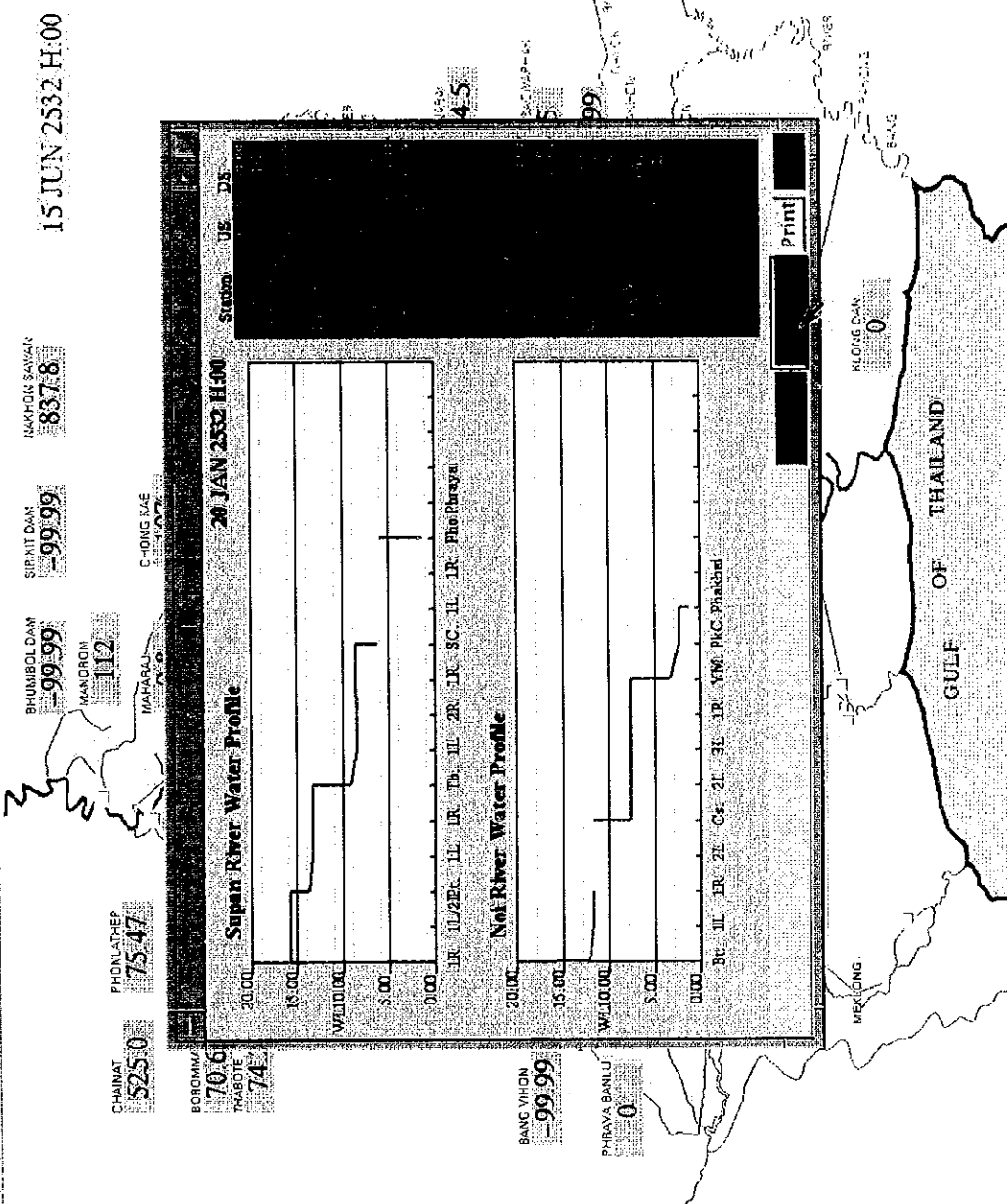
Q

HIDE

ABOUT

EXIT

Water Monitoring



20 JAN 2532 H:00

CHAINAT 525.0  
 PHONLATREP 75.47

BHUMBOLD DAM 99.99  
 MARDRON 112  
 MAHARAJA

SIPKIT DAM 99.99  
 CHONG SAE

MAKHONG SAWAN 837.8

BOROMMA 70.5  
 THABOTE 74

BANG VHOH 99.99  
 PHRAVA BANLU 0

MEKONG

ALONG DAM 0

GULF OF THAILAND

Water Monitoring

# WATER MONITORING IN CHAO PHRAYA BASIN

525.0      75.47      -99.99      -99.99      837.8      15 JUN 2532 H:00  
 70.6      112  
 74.4

Profile\_popup      20 JAN 2532 H:00

**Supan River Water Profile**

Station	US	DS
IR	15.72	-99.99
IL	15.70	0.00
Phranitaneq	15.72	15.72
IR	13.37	199.99
IR	13.37	0.00
Thaboe	8.37	8.37
IR	8.32	8.32
IR	8.26	7.30
IR	8.26	6.00
Siam Chuk	8.26	89.99
IR	8.26	89.99
IR	-99.99	89.99
Phr Phraya	5.91	1.23

**Noi River Water Profile**

Borommathat	15.81	12.15
IR	11.73	-99.99
IR	11.73	10.56
2L	-99.99	-99.99
Chamaeeur	11.72	7.71
2L	7.61	7.61
3L	7.66	8.05
IR	7.66	8.72
Rang M.	7.58	7.58
IR	7.58	9.25
Phakhal	3.29	1.05

B    IL    IR    IL    CH    2L    IL    IR    VM    Phr Phraya

4 5

20 JAN 2532 H:00  
D M Y H

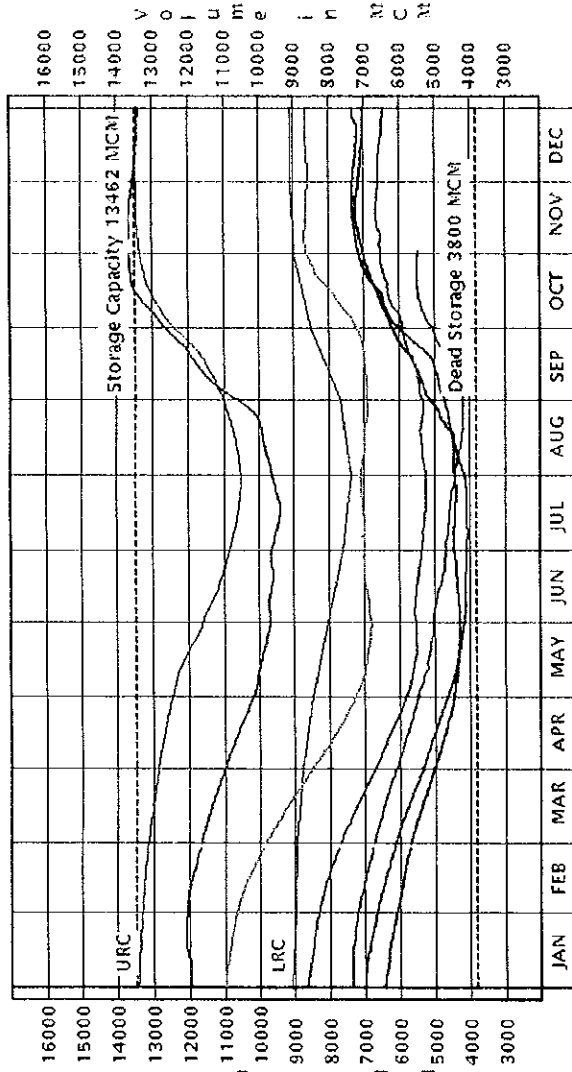
WL    Q

HIDE

ABOUT    EXIT

GULF OF THAILAND

# Bhumibol Dam



Water Control and Coordinating Branch, Operation and Maintenance Division, Royal Irrigation Department

Station Code, UDQVO, Name:

036305000V Bhumibol + Siri  
 037020001V Sirkit-Dam  
 036305000Q Bhumibol + Siri  
 036305002Q Release from BI

Year B.E.	Min	Max	D	Q	V	O
2536	2536	2536				
2529	2529	2529				
2527	2527	2527				
2526	2526	2526				

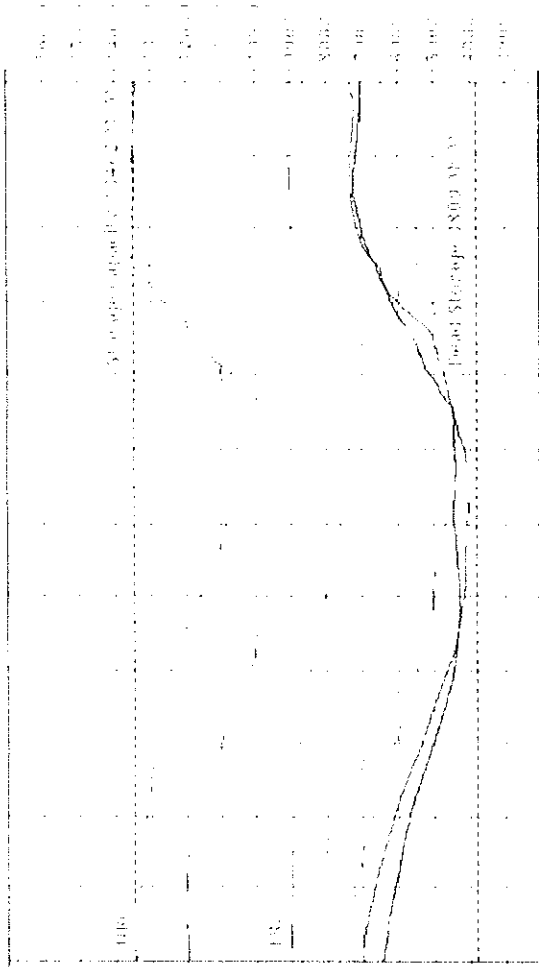
Code, UDQVO: 036305001V

YRIMAX = 3000-17000  
 YRMIN = 3000  
 YRMAX = 17000  
 YRISCB  
 Year B.E. = 2513  
 YRISCB  
 Year B.E. = 2536  
 YRISCB  
 Year B.E. = 2535  
 YRISCB  
 Year B.E. = 2534  
 YRISCB  
 Year B.E. = 2532  
 YRISCB  
 Year B.E. = 2533

Water Management Graphic Daily Maximum B, D, Q, V, O Data Presentation

Bhumibol Dam

Station Code: UDQVO, Name: 036305000V Bhumibol # Sir  
**036305001V Bhumibol Dam**  
 037020001V Sirikit Dam  
 036305000Q Bhumibol - Sir  
 036305002Q Release from BI



Year B.E.	Min	Max
2533	2533	2533
2536	2536	2530
2538	2538	2529
2539	2539	2534
2538	2538	2527
2532	2532	2526

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Code: UDQVO : 036305001V

Exit

Water Control and Coordination by Sirikit Dam, Operation and Maintenance Division, Royal Irrigation Department

MINMAX = 3000, 17000  
 VMIN = 3000  
 VMAX = 17000  
 YRLISC  
 Year B.E. = 2518  
 YRLISC  
 Year B.E. = 2536  
 YRLISC  
 Year B.E. = 2535  
 YRLISC  
 Year B.E. = 2534  
 YRLISC  
 Year B.E. = 2532  
 YRLISC  
 Year B.E. = 2533



(2) Sample Output of the Hydrological  
Database System (PC version)  
(システム概念図)



## Water Level Data Entry Program (PC version)

### Main Program & Related Files

WF	PAS	22,552	07-31-94	12:30a	- Source Program Written by using Turbo Pascal
WF	EXE	38,752	07-31-94	12:31a	- Execute Program
CODE	DAT	83,729	11-18-92	2:57p	- Station Code and Name
HX158	REP	9,443	06-27-94	9:45p	- Output Report File
HX158	DAT	2,202	06-27-94	9:45p	- Output Upload file to DSM Database

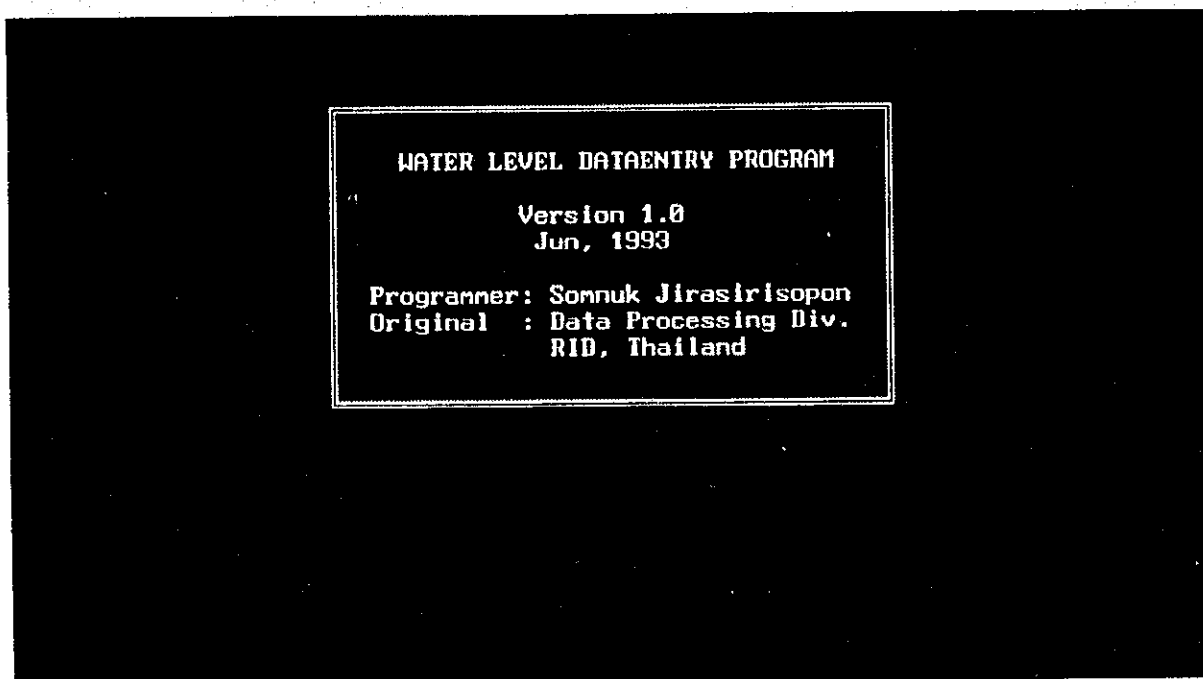
### How to use Program

At DOS prompt type

A:\> WF <enter> or

A:\> WF <output filename> <enter>

the title menu appear as shown



after few second the first entry form appear as shown

```
Water Level Data Entry Program (WF) Version 1.0
-----
Filename: test                               018
-----
Station Code: X.158
Calendar Year: 1992      Month: SEP
Zero Page: 0.000      A.D./M.S/L.S/A.D.
Data:
-----
Pgdn or F2 for Next Screen
-----
Ctrl+Y-Clear Field  ↑ Move between Field  Ctrl+Break-Stop Program
```

this form consist of Station information fields and some note .  
After input all fields user press PgDn Key then then next form will display

second screen entry form

```
Water Level Data Entry Program (WF) Version 1.0
Hourly Water Level
DATE  1    2    3    4    5    6    7    8    9   10
Time:  1
1 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99
2 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99
3 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99
PgUp - Prev Time          PgDn - Next Time
F2-Exit  ESC-Clear All Record  Ctrl+Y-Clear Field  f1 Move between Field
```

this form user input water level value at specify time for each day within one month, user can change to another time by press PgDn or PgUp key. After finish data entry for every hours and user press F2 key the program will calculate and generate the output and report file.

### Output File

The output for upload and report file format as shown in next page

### Upload Output File to VAX DSM Database

Each output file can be upload to VAX DSM Database by using DSM upload program , which is already developed by Staffs of Databank Section .

PC Version: H.1 (X.158)  
 Royal Irrigation Department  
 Thailand  
 Hydrology Division  
 Type of Gauge: Staff Gauge

RID Data Processing Division  
 Station : Ben Wang Khok, Tha Sao, Chumphon, (X.159)  
 Stream : Khlong Tha Sapao  
 River : Khlong Tha Sapao  
 River System : Panknule-East Coast

Hourly Gage Height  
 September 1992 (Water Year)

Date	Time and Gage Height in Meters (A.D.)																								Gage Height in M. (A.D.)					
	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	Mean	Max	Min	Time		
1	4.45							4.55				4.55					4.44								4.50	4.50	4.44	09:00	4.44	18:00
2	3.70	3.55					3.55					3.55					3.58								3.58	3.70	3.50	09:00	3.50	19:00
3	2.87	2.94					2.94					2.78					2.75								2.80	2.87	2.75	09:00	2.75	15:00
4	2.38	2.35					2.35					2.28					2.25								2.25	2.38	2.04	06:00	2.04	18:00
5	1.99	1.99					1.99					1.96					1.96								1.96	1.99	1.90	06:00	1.90	18:00
6	1.73	1.73					1.73					1.74					1.72								1.72	1.74	1.68	06:00	1.68	18:00
7	1.58	1.58					1.58					1.55					1.55								1.55	1.58	1.53	06:00	1.53	15:00
8	1.38	1.37					1.37					1.35					1.32								1.32	1.38	1.32	06:00	1.32	18:00
9	1.30	1.30					1.30					1.30					1.30								1.30	1.30	1.30	06:00	1.30	06:00
10	1.29	1.29					1.29					1.28					1.26								1.26	1.29	1.26	06:00	1.26	15:00
11	1.13	1.13					1.13					1.12					1.10								1.12	1.13	1.10	06:00	1.10	15:00
12	1.05	1.03					1.03					0.99					1.01								1.02	1.04	0.98	06:00	0.98	12:00
13	0.94	0.94					0.94					0.93					0.90								0.92	0.94	0.87	06:00	0.87	12:00
14	0.88	0.88					0.88					0.87					0.87								0.87	0.88	0.81	06:00	0.81	12:00
15	0.99	0.99					0.99					0.98					0.98								0.98	0.99	0.98	06:00	0.98	12:00
16	0.92	0.92					0.92					0.92					0.92								0.92	0.92	0.92	06:00	0.92	06:00
17	0.89	0.89					0.89					0.86					0.84								0.86	0.86	0.86	06:00	0.84	15:00
18	0.80	0.80					0.80					0.79					0.78								0.79	0.80	0.80	06:00	0.78	18:00
19	0.77	0.77					0.77					0.77					0.77								0.77	0.80	0.80	06:00	0.77	06:00
20	0.97	0.97					0.97					0.92					0.90								0.93	0.97	0.93	06:00	0.90	15:00
21	0.89	0.89					0.89					0.87					0.85								0.87	0.87	0.87	06:00	0.85	15:00
22	0.92	0.92					0.92					0.80					0.80								0.81	0.81	0.81	06:00	0.80	12:00
23	0.78	0.78					0.78					0.78					0.76								0.77	0.77	0.76	06:00	0.76	15:00
24	0.80	0.80					0.80					0.84					0.84								0.83	0.83	0.84	06:00	0.78	06:00
25	0.88	0.88					0.88					0.81					0.81								0.81	0.81	0.81	06:00	0.80	06:00
26	0.90	0.90					0.90					0.95					0.99								0.93	0.93	0.93	06:00	0.90	06:00
27	0.80	0.80					0.80					0.88					0.86								0.88	0.88	0.88	06:00	0.86	15:00
28	0.78	0.78					0.78					0.79					0.78								0.79	0.78	0.78	06:00	0.78	09:00
29	0.89	0.89					0.89					0.76					0.80								0.78	0.78	0.78	06:00	0.78	15:00
30	0.89	0.89					0.89					0.86					0.86								0.87	0.87	0.87	06:00	0.85	18:00

Maximum Gage Height : 4.55 M. (A.D.) on 1 SEP Time : 09:00  
 Minimum Gage Height : 0.76 M. (A.D.) on 23 SEP Time : 15:00

Mean Gage Height : 1.33 M. (A.D.)  
 Zero Gage at Bottom Elevation : 0.000 M. (A.D.)

Remarks

## Upload Output File Format

X.158	1992										
SEP	0.000	A.D.	1992								
NOTE											
06:001	4.45	3.70	2.87	2.38	1.99	1.73	1.58	1.38	1.30	1.29	
06:002	1.13	1.05	0.94	0.88	0.99	0.92	0.88	0.80	0.77	0.97	
06:003	0.89	0.82	0.78	0.78	0.80	0.88	0.90	0.80	0.78	0.89	
09:001	4.55	3.58	2.84	2.35	1.99	1.73	1.58	1.37	1.30	1.29	
09:002	1.13	1.03	0.94	0.88	0.99	0.92	0.88	0.80	0.77	0.97	
09:003	0.89	0.82	0.78	0.84	0.80	0.88	0.90	0.80	0.76	0.88	
12:001	4.55	3.55	2.78	2.28	1.96	1.74	1.55	1.73	1.30	1.28	
12:002	1.12	1.03	0.93	0.87	0.98	0.92	0.86	0.79	0.83	0.92	
12:003	0.87	0.80	0.78	0.84	0.81	0.95	0.88	0.79	0.76	0.86	
15:001	4.50	3.55	2.75	2.18	1.95	1.70	1.53	1.35	1.30	1.26	
15:002	1.10	1.01	0.90	0.95	0.98	0.92	0.84	0.79	0.82	0.90	
15:003	0.85	0.80	0.76	0.84	0.81	0.97	0.86	0.78	0.80	0.86	
18:001	4.44	3.50	2.75	2.04	1.90	1.68	1.53	1.32	1.30	1.26	
18:002	1.10	1.00	0.90	0.97	0.98	0.92	0.84	0.78	0.82	0.90	
18:003	0.85	0.80	0.76	0.84	0.81	0.99	0.86	0.78	0.80	0.85	
MEAN 1	4.50	3.58	2.80	2.25	1.96	1.72	1.55	1.43	1.30	1.28	
MEAN 2	1.12	1.02	0.92	0.91	0.98	0.92	0.86	0.79	0.80	0.93	
MEAN 3	0.87	0.81	0.77	0.83	0.81	0.93	0.88	0.79	0.78	0.87	
MAX 1	4.55	3.70	2.87	2.38	1.99	1.74	1.58	1.73	1.30	1.29	
MAX 2	1.13	1.05	0.94	0.97	0.99	0.92	0.88	0.80	0.83	0.97	
MAX 3	0.89	0.82	0.78	0.84	0.81	0.99	0.90	0.80	0.80	0.89	
TIME11	9:00	6:00	6:00	6:00	6:00	12:00	6:00	12:00	6:00	6:00	
TIME12	6:00	6:00	6:00	18:00	6:00	6:00	6:00	6:00	12:00	6:00	
TIME13	6:00	6:00	6:00	9:00	12:00	18:00	6:00	6:00	15:00	6:00	
MIN 1	4.44	3.50	2.75	2.04	1.90	1.68	1.53	1.32	1.30	1.26	
MIN 2	1.10	1.00	0.90	0.87	0.98	0.92	0.84	0.78	0.77	0.90	
MIN 3	0.85	0.80	0.76	0.78	0.80	0.88	0.86	0.78	0.76	0.85	
TIME21	18:00	18:00	15:00	18:00	18:00	18:00	15:00	18:00	6:00	15:00	
TIME22	15:00	18:00	15:00	12:00	12:00	6:00	15:00	18:00	6:00	15:00	
TIME23	15:00	12:00	15:00	6:00	6:00	6:00	15:00	15:00	9:00	18:00	
MEAN	1.33	MAX	4.55	DATE	1	TIME	9:00	MIN	0.76	DATE 23	TIME 15:00

(3) 地方事務所においてパーソナルコンピュータを活用した水管理の実務的運用例

**Hydromet Dataentry Program** (PC version)

**Main Program & Related Files**

HM	PAS	19,033	05-14-94	9:34p	- Source Program written by Turbo Pascal
HM	EXE	33,840	05-14-94	9:36p	- Execute Program
HMTABLE	DAT	8,954	04-26-93	9:45p	- Table for Calculate Humidity
HMCODE	DAT	80,040	04-19-93	1:24p	- Station Code & Name
07391	DAT	5,041	04-07-94	10:07p	- Sample Output File

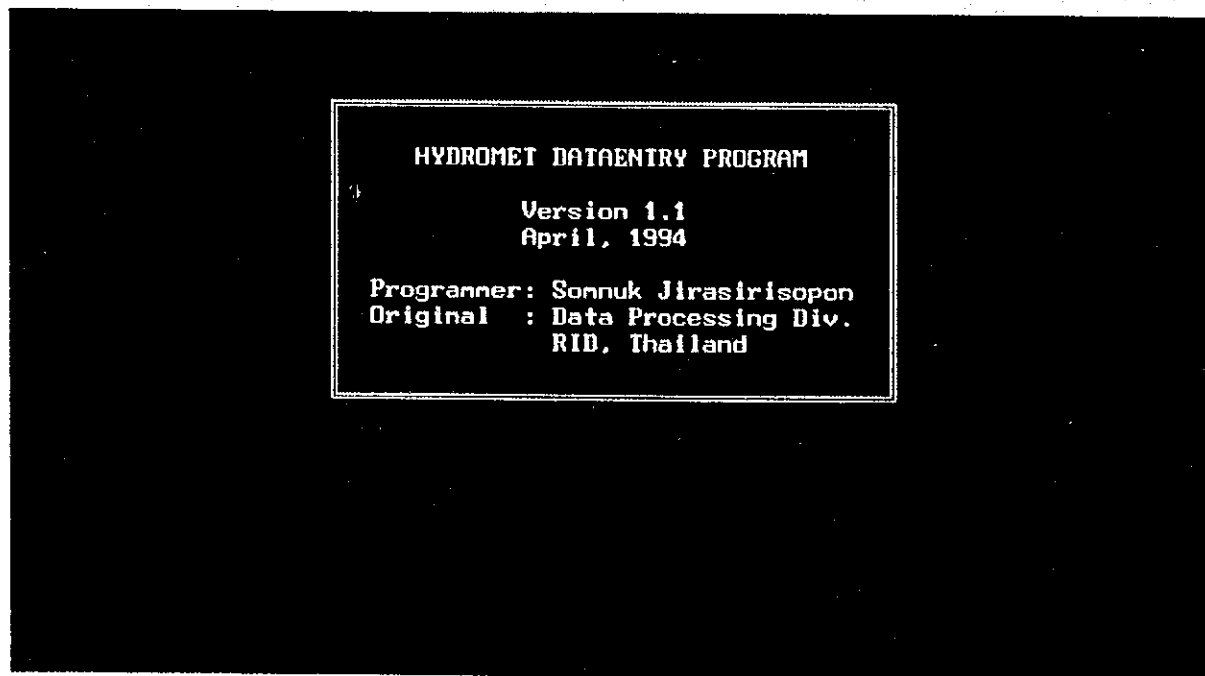
**How to use Program**

At DOS prompt type

A:\> HM <enter> or

A:\> HM <output filename> <enter>

the title screen appear as shown





after few second the entry form appear as shown

```
Hydro-Met Data Entry Program Version 1.0
-----
Station: test
-----
Code: 0739   Year: 1989   Month: 2   Date: 1
Rainfall: 0.0   Std: 0.0   Ratio: 0.0
Evaporat: 50.00   First: 46.50   Diff: 3.50
W.S. Temp: 30.0   Min: 14.5
Wind Spd: 3904.87   Diff: 24.12
W.S. Temp: 31.5   Dry: 16.3
           Min: 11.5   Wet: 15.2
PgUp = Prev Day   PgDn = Next Day
-----
Note:  F2 = Exit   Ctrl+V = Clear Field   Ctrl+Break = Stop
```

User input value for each field day by day until finish one month, then the program will calculate and generate the output report file.

#### Output Report File

The output report file format as shown in next page

#### Upload Output File to VAX DSM Database

Each output report file can be upload to VAX DSM Database by using DSM upload program, which is already developer staffs of Databank Section.

Daily Hydro - Met Data Table

Code 0739 Station RID Office Unit 1. A. Muang; Chiang Mai Month February Year 1989

Date	Rainfall		Evaporation		W.S.Temp		Wind Spd		Air Temperature (C)			Humidity		Remark	
	Std	Auto	First	Second	Diff	Max	Min	Read	Diff	Max	Min	Dry	Wet		dity
1	0.0	0.0	50.00	46.50	3.50	30.0	14.5	9904.07	24.12	31.5	11.5	16.3	15.2	88	
2	0.0	0.0	50.00	46.58	3.42	29.5	14.0	9928.19	-	31.0	11.5	11.5	11.0	94	
3	0.0	0.0	50.00	-	-	29.5	14.0	-	-	32.0	11.2	12.0	10.8	86	
4	0.0	0.0	50.00	47.04	2.96	29.1	14.0	9974.70	27.38	32.3	11.2	11.2	10.1	87	
5	0.0	0.0	50.00	47.02	2.98	29.5	14.2	10002.08	27.54	32.0	11.5	12.0	11.0	88	
6	0.0	0.0	50.00	47.10	2.90	29.0	15.0	10029.62	23.64	31.0	11.3	12.4	11.8	93	
7	0.0	0.0	50.00	47.44	2.56	30.0	15.0	10053.26	21.92	32.0	13.5	12.5	11.6	89	
8	0.0	0.0	50.00	46.92	3.08	30.2	16.0	10075.18	21.98	31.0	13.5	13.5	12.5	89	
9	0.0	0.0	50.00	47.64	2.36	30.4	16.2	10097.16	23.17	31.2	13.5	14.5	13.5	89	
10	0.0	0.0	50.00	45.86	4.14	31.0	16.0	10120.33	22.97	33.2	14.1	14.5	13.2	86	
11	0.0	0.0	50.00	46.50	3.50	30.0	16.0	10143.30	19.93	32.0	14.0	13.8	12.6	87	
12	0.0	0.0	50.00	46.60	3.40	30.2	16.4	10163.23	23.08	32.3	14.4	16.0	14.8	87	
13	0.0	0.0	50.00	47.76	2.24	31.5	17.0	10186.31	24.13	32.5	15.2	16.3	14.5	82	
14	0.0	0.0	50.00	47.60	2.40	31.4	17.2	10210.44	31.69	32.4	15.3	15.0	14.5	94	
15	0.0	0.0	50.00	45.36	4.64	31.0	16.0	10242.13	34.47	33.1	15.0	15.1	14.4	92	
16	0.0	0.0	50.00	46.22	3.78	31.0	16.2	10276.60	32.44	33.4	15.6	15.0	14.5	94	
17	0.0	0.0	50.00	45.80	4.20	32.0	16.5	10309.04	24.21	33.2	14.5	15.0	14.3	92	
18	0.0	0.0	50.00	45.59	4.41	32.0	16.5	10333.25	18.53	34.1	14.6	14.9	14.0	90	
19	0.0	0.0	50.00	45.68	4.32	31.0	16.5	10351.78	16.73	35.2	13.5	16.0	14.5	84	
20	0.0	0.0	50.00	45.32	4.68	31.2	16.4	10368.51	29.23	34.0	13.5	13.5	12.5	89	
21	0.0	0.0	50.00	46.60	3.40	31.4	16.5	10397.74	18.09	33.2	14.5	14.0	13.2	91	
22	0.0	0.0	50.00	45.90	4.10	32.0	19.0	10415.83	27.31	35.0	18.0	14.3	13.4	90	
23	0.0	0.0	50.00	45.08	4.92	32.0	20.2	10443.14	25.50	35.2	17.8	19.5	18.4	89	
24	0.0	0.0	50.00	44.27	5.73	32.0	16.5	10468.64	38.31	36.0	17.5	18.5	16.9	84	
25	0.0	0.0	50.00	47.47	2.53	28.5	16.5	10506.95	17.86	33.6	16.8	17.5	15.9	84	
26	0.0	0.0	50.00	46.52	3.48	30.0	17.6	10524.81	34.11	34.5	18.4	21.0	19.6	87	
27	0.0	0.0	50.00	46.56	3.44	30.2	17.4	10558.92	22.11	33.4	18.4	20.0	19.2	92	
28	0.0	0.0	50.00	46.34	3.66	33.0	19.0	10581.03	34.82	35.0	18.5	20.0	19.3	93	
1				10615.85											
TOT	0.0	0.0		96.73	858.6	456.3		665.27	925.3	408.3	425.8	397.2	2490		
AVR	0.0	0.0		3.58	30.7	16.3		25.59	33.0	14.6	15.2	14.2	89		

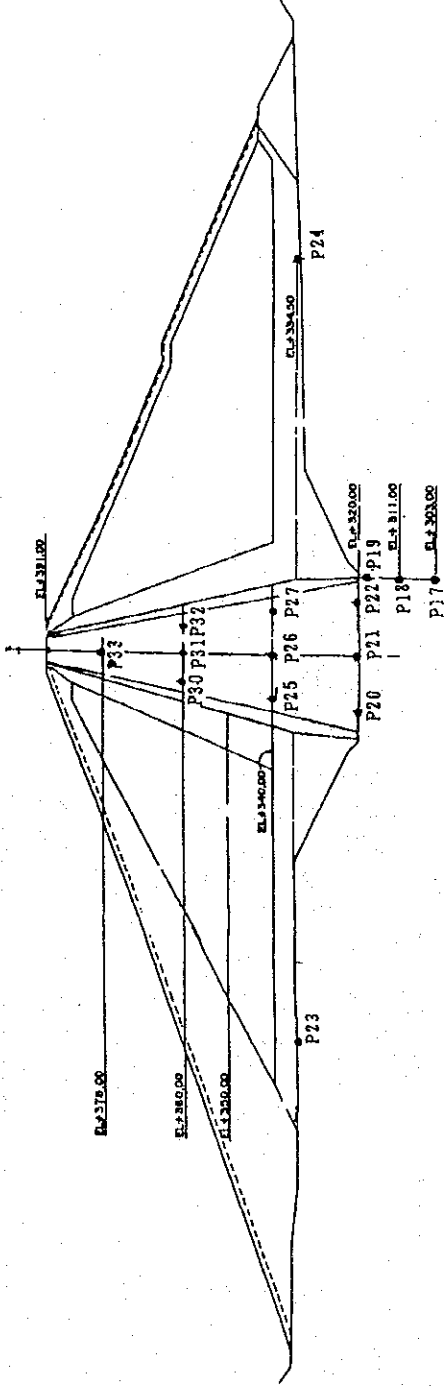
Number of Day in Month = 28  
 Constant (Evap.) = 0.7  
 Mean WS Temp = 23.48  
 Max. WS Temp = 33.0  
 Min. WS Temp = 14.0  
 Mean Air Temp = 23.81  
 Max. Air Temp = 36.0  
 Wind Speed = 1.07 Kms/hour  
 Monthly Evap. \* Constant = 67.71  
 Min. WS Temp = 14.0  
 Min. Air Temp = 11.2

Checked by

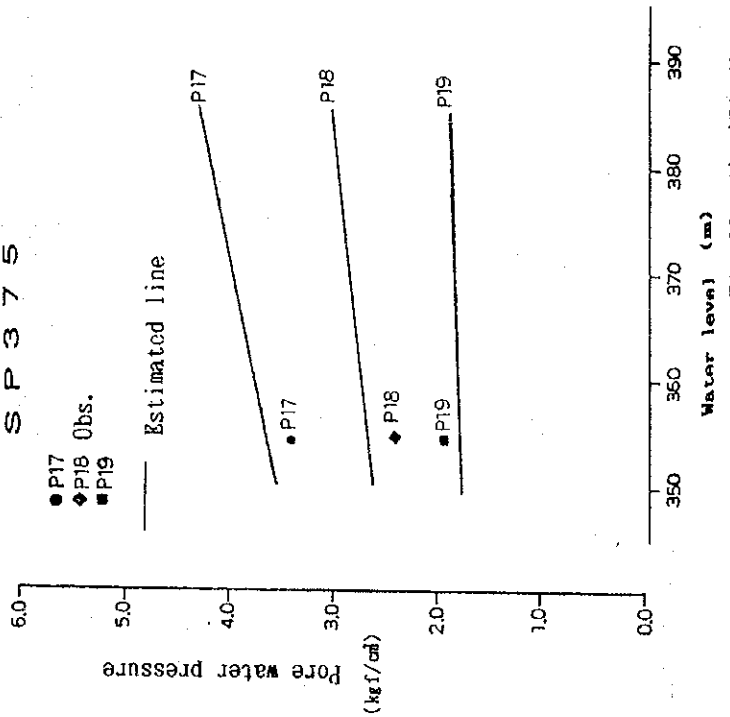
## 收 集 資 料

### 3. 水利施設設計分野





S P 3 7 5



S P 3 7 5

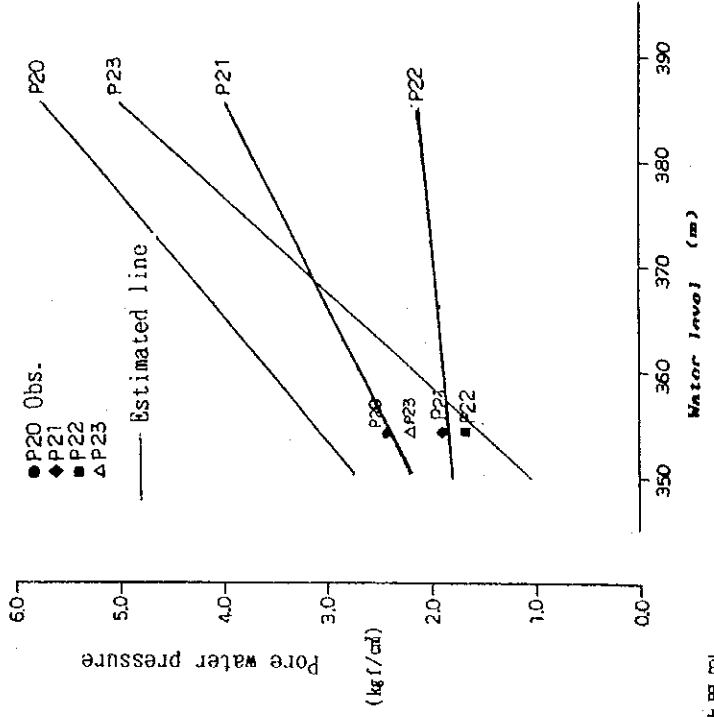


Fig. 23 ダム観測計器の測定結果例

RESULTS OF SEEPAGE FLOW ANALYSIS  
MAE KUANG DAM

VHAX = 5.0930 \*10\*\*8 M/S

NO DRAWING LESS THAN 5.0000 \*10\*\*9 M/S

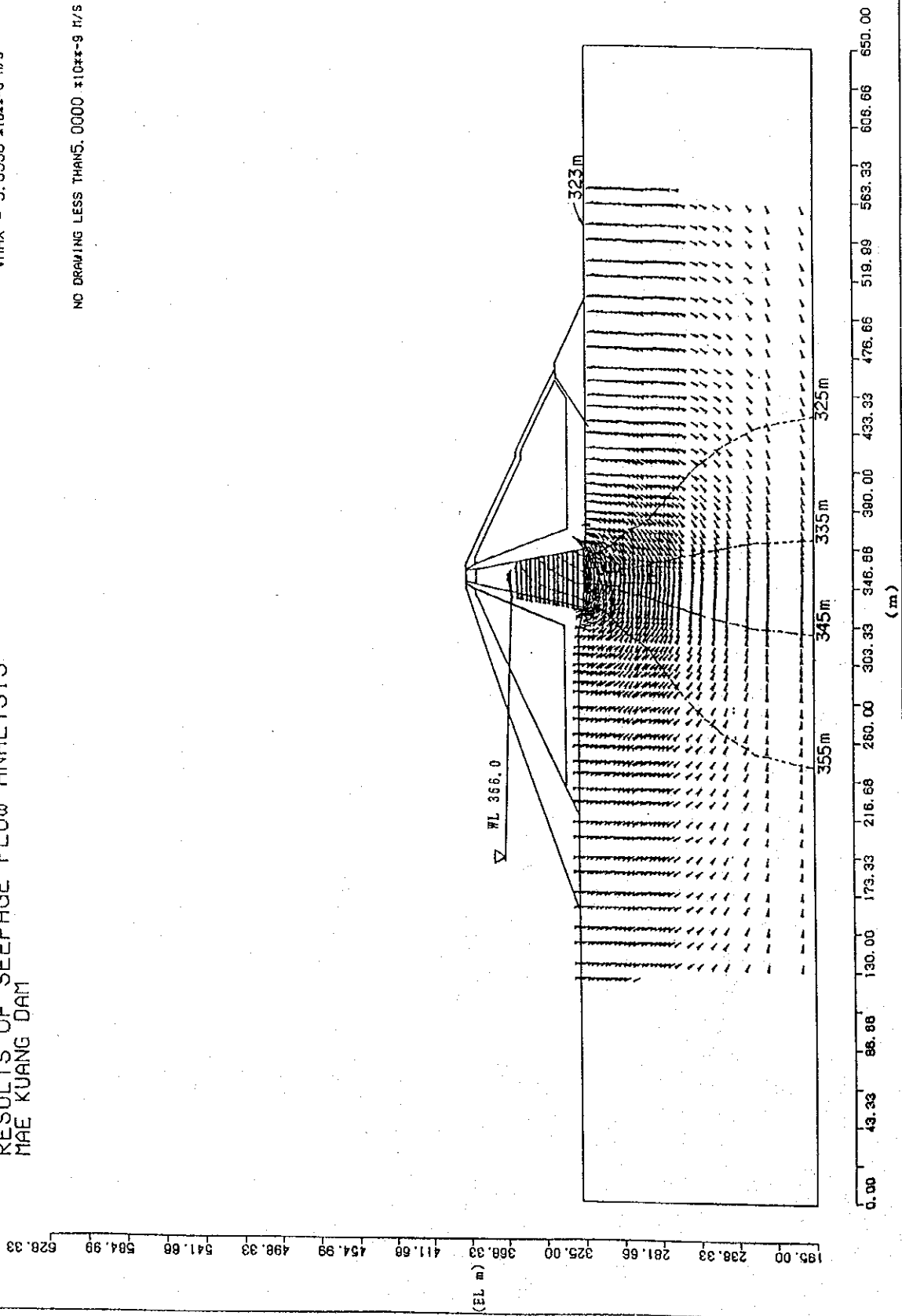


Fig. 24 ダム浸透流解析結果の出力例

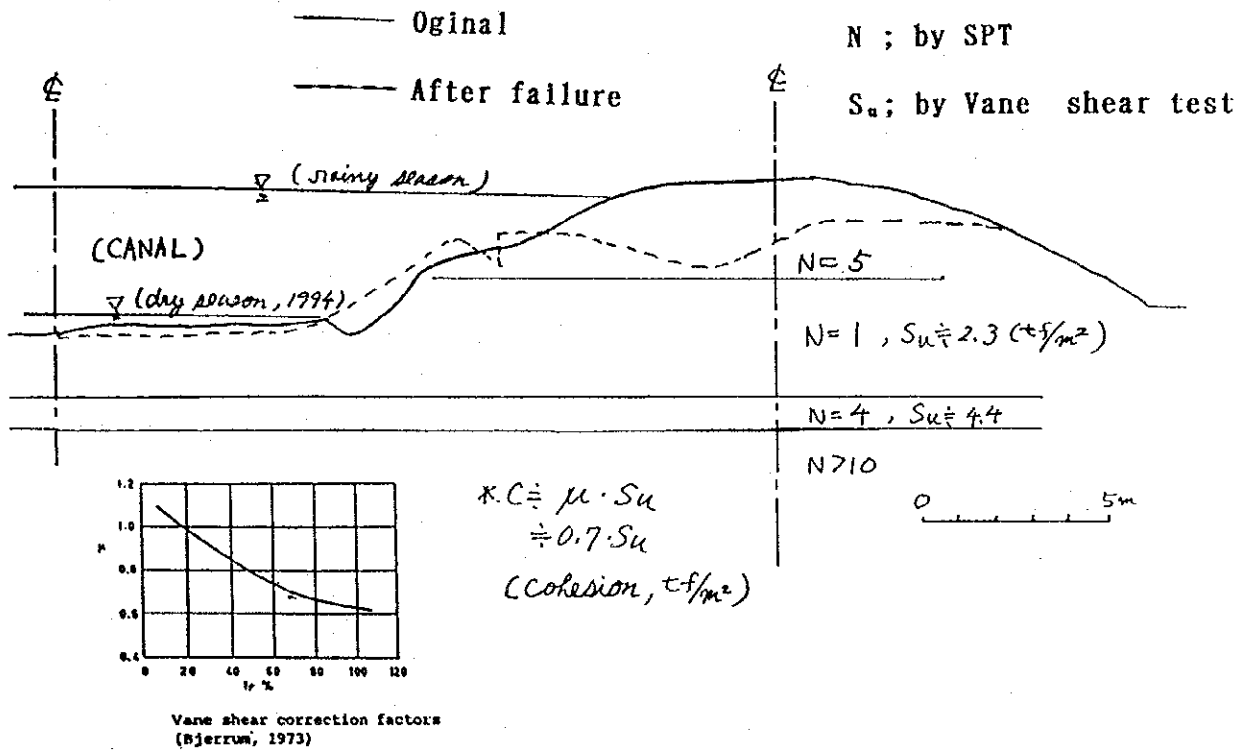


Fig. 25 軟弱地盤解析例

Table. 4 PROGRESS OF CRITERIA DEVELOPMENT AND DIFFUSION

As of 30 Nov. 1994

T o p i c s	Division Responsible	Progress of Preparation Work	Thai and/or English	Publication of Thai Version	Review by Japanese Supporting Committee	Seminar Requirement	Authorization by RID	Remarks
1 Geological and Material Investigation	GD	◎	T, E	◎	◎	◎	◎(1994)	
2 Irrigation Structures	DD	◎	T	●		◎	◎(1994)	
3 Construction Manuals	CD	◎	T		◎	◎		
4 Embankment Dams	DD	◎	T		◎	◎	◎(1994)	
5 Guidelines for Project Planning	PPD	◎	T, E	◎	◎	◎		
6 Gates and Lifting Devices	DD	◎	E		◎			
7 Diversion Dams	DD	◎	T, E	◎			★	
8 Hydrological Investigation	HD	◎	T, E	◎	◎	◎	◎(1991)	
9 Engineering Drafting	DD	◎	T, E	◎	◎	◎		
10 Pumping Works	DD	◎	E		◎		○	★
11 Topographical Investigation	TD	◎	T, E	◎	◎			
12 Safety of Existing Dams	CD	◎	T, E	◎	◎	◎	◎(1993)	
13 Reinforced Concrete Design	DD	◎	T	◎		◎	◎(1991)	
14 Reinforcement Details	DD	◎	T	◎		◎		
15 Guidelines for Remote Sensing	HD, PPD, TD, OH	◎	T	★		◎	★	
16 Dam Maintenance Manuals	DD	○	T					
Remarks		◎: Completed ○: Almost Completed	T: Thai Version E: English Version	◎: Published ●: Ongoing ★: Plan	◎: Completed	◎: Completed	◎: Completed by RID ○: Completed by each Division ★: Plan	