VI. Questionnaire

QUESTIONNAIRE

ON

DISTRIBUTION SYSTEM DISPATCHING CENTER PROJECT

MARCH, 1986

Preliminary Study Team of JICA

CONTENTS OF QUESTIONNAIRE

1. General

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Published Statistics	(1) Statistical annuaries of economy, industry, trade, population, etc. (2) Electric power annual report in Thailand (3) Long-term program of economy, industry, trade, population, etc. (4) Long-term program of Electric power in Thailand (5) How to obtain the above statistics		-THAILAND ENERGY SITUATION 1984 -ELECTRIC POWER IN THAILAND 1984 -LOAD FORECAST FOR THAILAND ELECTRIC SYSTEM
2. Published maps	(1) Area (2) Scale (3) How to obtain maps		-Whole Country -1/12500,50000,250000 and 1000000 -Buy from ROYAL THAI SURVEY DEPT.,MINISTRY OF DEFENCE
3. Currency	(1) Local currency (2) Exchange rate (US$, currency) (3) How to obtain import and re-export license (4) Time required for customs clearance		-BATH and SATANG (1BATH=100SATANG) -1US$=26BATH -Non Available -Non Available
4. Customs clearance	(1) The authority concerned (2) Address, tel. and telex (3) How to obtain import and re-export license (4) Time required for customs clearance		-COSTOMS DEPT.,MINISTRY OF FINANCE -ARD NARONG ROAD,KLONG TOEY,BANGKOK 10110 -Non Available Tel. 286-1010-9 -Non Available

2. PEA Situation

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Organization chart	(1) Head office (2) Local office		-ORGANIZATION CHART OF PEA -REGIONAL ORGANIZATION CHART
2. Office	(1) Number of offices (2) Address of head office and regional offices (3) Daily working hours (4) Holiday and days off (5) Number of employees		-Available in "ANNUAL REPORT" -Available -Available -Available -Available in "ANNUAL REPORT"
3. Financial data			-Available in "ANNUAL REPORT"
4. Tariff of electricity			-ELECTRICITY TARIFFIS
5. Operation, maintenance and management cost			-Available in "ANNUAL REPOET"
6. Published reports	(1) Annual report (2) Long-term demand forecast		-ANNUAL REPORT 1984 and 1983 -LOAD FORECAST FOR THAILAND ELECTRIC SYSTEM -PEA LOAD FORECAST

3. Electric Power Situation

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Power demand in Thailand	(1) Energy generated (2) Energy imported (3) Energy sold (4) Power loss (5) Peak demand (6) Electrification rate	Table 3-1 Table 3-2	-Available in "ELECTRIC POWER IN THAILAND", "LOAD FORECAST FOR THAILAND ELECTRIC SYSTEM", and "ANNUAL REPORT of EGAT,MEA and PEA"
2. Power Demand in PEA		Table 3-3 Table 3-4	-Availavle in "ANNUAL REPORT" and "PEA LOAD FORECAST"
3. Power demand in the pilot project area required by PEA		Table 3-5 Table 3-6	-Available in "PEA LOAD FORECAST"
4. Fault records	(1) Date (2) Location (3) Duration (4) Type (5) Loss energy (kWh)	Table 3-7	-Available

4. Power Facilities in PEA

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Summary of power facilities in PEA (including under construction and planning)			-Available in "ANNUAL REPORT"
2. Power plant	(1) Region (2) Name (3) Location (4) Type (5) Capacity (6) No. of units (7) Project objective	Table 4-1	-Available
3. Substation	(1) Region (2) Name (3) Locaiton (4) Capacity (5) Voltage (6) No. of transformers (7) Type of circuit breaker (8) No. of circuit breakers (9) Project objective	Table 4-2	-Available
4. Transmission line	(1) Region (2) Voltage (3) Circuit length (4) Conductor type (5) Transmission system diagram in PEA and Thailand	Table 4-3	-Available in "ELECTRIC DISTRIBUTION SYSTEM"

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with corrected item No. and title)
5. Distribution line	(1) Region (2) Voltage (3) Circuit length (4) Conductor type (5) No. of pole mounted switches (6) Type of pole mounted switches (7) Distribution system diagram in PEA and the pilot project area	Table 4-4	-Available in "ELECTRIC DISTRIBUTION SYSTEM"
6. Telecommunication	(1) Region (2) Type (3) Frequence (4) No. of channels (5) Fault records (6) Telecommunication system diagram	Table 4-5	-Available in "VHF RADIO TELEPHON DIAGRAM"
7. Under construction and planning	(1) Power plant (2) Substation (3) Transmission line (4) Distribution line (5) Telecommunication		-Available in "ANNUAL REPORT"

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
8. System of dispatching, operation and maintenance (existing)	(1) Outline of direction and order (2) Shift for dispatching and operation (3) Relation with EGAT (4) Used telecomunication system (5) Outline of data transmission system, if using (6) Outline of SCADA system, if using (7) Location of dispatching center (8) Location of operation and maintenance offices (9) Area and No. of substation, feeder and line length (10) Location of base station, movable station and switching stations		-OPERATION SYSTEM OF DISPATCHING CENTER" -4 teams 3 shifts/1:0-8,2:8-16,3:16-24 -OPERATION SYSTEM OF DISPATCHING CENTER RELATING TO EAGT CONTROL CEjTER" -FACILITIES AND MOTIVE POWER -Not Using -Not Using -Available -Available -FACILITIES AND MOTIVE POWER
9. Relaying system	Outline of relaying system on substation, transmission line and distribution line		-TYPICAL RELAYING SYSTEM AND CO-ORDINATION

5. The Project

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. The department directly and indirectly concerned with the implementation of F/S on the projcet	(1) Name of the department, section and/or local office (2) Address, tel. and telex. (3) Responsible person (4) Available counterpart list for the F/S of the project		
2. The pilot dispatching center site	(1) Location (2) Soil data (3) Information		-RAGSIT and NAKHON PATHOM -Non Available
3. The pilot project area map			-AREA MAP OF H.T. DISTRIBUTION SYSTEM/REGIONAL AREA C1 and C3
4. Access to the pilot project site	Head office of PEA (60)km (1)hr. by (Car) Pilot dispatching center (Nakhon Pathom)	Head office of PEA (15)km (20)min.by (Car) Pilot dispatching center (Rangsit)	
5. Climatic condition of the pilot project area	(1) Rain fall (2) Temperature (3) Relative humidity (4) Wind velocity (5) IKL (6) Earthquake	Table 5-1	-Available
6. Applicable code and standard	(1) Thailand (2) Internaitonal (3) Foreign		-TIS (THAI INDUSTRIAL STANDARDS) -IEC -USA and GERMAN

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
7. Substaiton	(1) System diagram (2) Available drowing - Single line diagram - Three lines diagram - Back connection - Sequence diagram - Layout of control room - Arrangement of control panel - Layout of switchyard		-SWITCHING DIAGRAM and SWITCHING DIAGRAM OF 12 REGION IN PEA -Available
8. Large Customers	(1) Name (2) Location (name of supply substation) (3) Voltage (4) Capacity (kW)		
9. Private owned power plants	(1) Name (2) Location (3) Voltage (4) Capacity (kW) (5) Type		-Available in "ELECTRIC POWER IN THAILAND 1984"
10.Tele communication	(1) System diagram (2) Available radio frequency		-VHF RADIO TELEPHON SYSTEM -FACILITIES AND MOTIVE POWER

6. Construction Cost Estimation Data and Economic Evaluation

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Price list of materials and equipment	Cement, agregate, reinforcing bar, steel materials, mould made of steel, sheet piles, wood, etc.		-Available
2. Construction machinery	Type and acquistion cost of domestic construction machinery; bulldozer, wheel loader, dump truck, tamping roller, truck mixer, compressor, cocrete pump, vibrator, jack hammer, etc.		-Available
3. Unit cost of labour	Senior foreman, foreman skilled labour, semi-skilled labour, unskilled labour, carpenter, bar bender, driver, operator, etc.		-Rates of minimum wage (bath/day) 1/ Bangkok and 5 neighbouring provinces= 66 Central and Southern Regions = 63 Nothern and Northeastern Regions = 56
4. Custom duties for import	Construction materials and machinery		- 30-50%
5. Unit cost of indemnification	Land, house, etc.		-Non Available
6. Interest rate	(1) Thailand (2) Internaitonal (3) Foreign		-Non Available
7. Escalation rate of commodity price			-Inflation Rate of Thailand in 1984 ≃ 4%
8. operation, maintenance and management cost			-Non Available

1 Samut Prakan,Nonthabri,Pathum Thani, Samut Sakhon and Nakhon Pathom Province

7. Matters during the F/S Survey Period

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
1. Access to local office	(1) Route from head office of PEA (2) Means of transportation (3) Distance from the projected dispatching center (4) Time required		-Central Region 1 (Ayutthaya)-Phaholyothin Road Central Region 3 (Nakhon Pathom- -Car Phetkagem Road -about 60 kilometres -1 hour
2. Hotel appropriate as working base or office near local office	Name, address, tel, and charge of the hotel		-Ayutthaya : No first class hotel Nakhon Pathom : Whale Hotel
3. Power (voltage, frequency) and communication facilities			-220 volt and 50 Hz -Telephone
4. Epidemics and local diseases			-Non Available
5. Use of equipment generating electric waves (transceivers)	(1) Name of laws and regulations pertaining to the matter (2) Authorities with jurisdiction on the matter (3) How to obtain authorization		-Non Available -POST AND TELEGRAPH DEPT.,MINISTRY OF COMMUNICATION -Non Available

Item	Description	Table No.	Availability (Attach document as space allows or at end of report with correct item No. and title)
6. Labour	(1) Labour laws and regulations (2) holiday and day off (3) Daily working hours (4) Additional wages when working on holiday, days off and overtime (5) How to employ local labour (procedures)		-Announcement of the Revolutionary Party No.103, dated 16th April 1972 Notification of Ministry of Interior, Re:: Labour Protection, dated 16th April, 1972

Table 3-1 Power demand in Thailand

Items	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Energy generated (GWh)										
Energy imported (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-2 Power demand forecast in Thailand

Items	1986	1987	1988	1989	1990	1991	1992	1993	19771994	1995
Energy generated (GWh)										
Energy imported (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-3 Power demand in PEA

Items	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Energy generated (GWh)										
Energy purchased (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-4 Power demand forecast in PEA

Items	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Energy generated (GWh)										
Energy purchased (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-5 Power demand in the pilot project area (Region)

Items	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Energy generated (GWh)										
Energy purchased (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-6 Power demand forecast in the pilot project area (Region)

Items	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Energy generated (GWh)										
Energy purchased (GWh)										
Energy sold (GWh)										
- Residential										
- Large business										
- Small industrial										
- Large industrial										
- Others										
Power loss (GWh)										
Peak demand (MW)										
Electrification rate										

Table 3-7 Fault records in the pilot project area

Date	Region	Location	Duration	Type and Description	Loss energy (kWh)

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Notes
NR1	CHIANG RAI	CHIANG RAI PROVINCE		8,251		SPARE	
	CHIANG KHONG	CHIANG KHONG, CHIANG RAI PROVINCE		318		"	
	PI	PI, CHIANG RAI PROVINCE		565		"	
	CHIANG DAO	CHIANG DAO, CHIANG PROVINCE		1,236		"	STOP OPERATE 1986
NR2	MAE SOD	MAE SOD, TAK PROVINCE		4,700		"	
	NAKHONTHAI	NAKAHONTHAI PHITSANULOK PROVINCE		720		"	
	CHATTRAKRAN	CHATTRAKRAN, PHITSANULOK PROVINCE		275		"	" 1988
	SA	SA, NAN PROVINCE		1,250		"	
NER1	DAN SAI	DAN SAI, LOEI PROVINCE		556		"	
	CHIANG KAN	CHIANG KAN, LOEI PROVINCE		1,178		"	
	BUNG KRAN	BUNG KRAN NONG KHAI PROVINCE		668		"	

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Note
CR2	TAPHRAYA	TAPHRAYA, PRACHINBURI PROVINCE		205		SPARE	
	TRAD	TRAD PROVINCE		1,326		"	
	KHLONG YAI	KHLONG YAI, TRAD PROVINCE		432		"	
SR1	KRABURI	KRABURI, RANONG PROVINCE		165		"	STOP OPERATE 1987
	TUBLEE	TUBLEE, CHUMPHON PROVINCE		165		"	" 1987
SR3	BAETONG	BAETONG, YALA PROVINCE		3,151		"	
	YALA	YALA PROVINCE		6,064		"	" 1987
	SATUN	SATUN PROVINCE		1,600		"	" 1988

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Note
NR2	PHOPPHRA	PHOPPHRA, TAK PROVINCE		220		PERMANENT	
	AUMPHANG	AUMPHANG, TAK PROVINCE		450		"	
	THA SONG YANG	THA SONG YAN, TAK PROVINCE		634		"	
CR2	KO SICHANG	KO SICHANG, CHONBURI PROVINCE		630		"	
	KO LAN	KO LAN, CHONBURI PROVINCE		335		"	
CR3	SUNGKLABURI	SUNGKLABURI, KANCHANABURI PROVINCE		665		"	
SR2	KO SAMUI	KO SAMUI, SURAT THANI PROVINCE		1,968		"	
	KO PANGUN	KO PANGUN, SURAT THANI PROVINCE		485		"	
	KO LANTA	KO LANTA, KRABI PROVINCE		192		"	
	KO YAO	KO YAO, HANNGA		165		"	

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Notes
NR1	MAE HONG SON	MAE HONG SON, MAE HONG SON PROVINCE		1,390		PEAK LOAD	receiving from PHABONG DAM
	MAE SARIANG	MAE SARIANG MAE HONG SON PROVINCE		2,343		"	
	FHANG	FHANG, CHIANG MAI PROVINCE		5,871		"	receiving from MAE KUM LUANG DAM
NR2	NAN	NAN, NAN PROVINCE		6,744		"	
	BAO	BAO, NAN PROVINCE		2,060		"	
CR2	ARAYAPHRATHET	ARAYAPHRATHET, PRACHINBURI PROVINCE		2,459		"	receiving from PRACHINBURI SUBSTATION
SR2	LAEM TALUMPUK	LEAM TALUMPUK, NAKAHON SI THAMMARAT		75		"	receiving from NAKHON SI THAMMARAT SUBSTATION

Table 4-2 Substation

Region	Name	Location	Capacity (kW)	Voltage (kV)	No. of transformers	Type of CB's	No. of CB's	Project objective	Notes

Table 4-3 Transmission line

Region	Voltage (kV)	Circuit length (km)	Conductor type	Notes

Table 4-4 Distribution line

Region	Voltage (kV)	Circuit length (km)	Conductor type	No. of pole mounted switches	Type of Pole mounted switches	Notes

Table 4-5 Telecommunication

Region	Type	Frequence	No. of channels	Notes

Table 5-1 Climatic condition

Item		Unit	Region (CR 1)	Region (CR 3)
Rainfall	Annual max./month min./month Rainy season	mm mm mm from~through	2,040 130/day 0 June - September	1,020 60/day 0 June - September
Tempreature	Max. Min.	°C °C	39 15	41 13
Relative humidity	Max. Min.	% %	96 23	98 14
Wind velocity	Max.	m/sec.	10	11
IKL		day/year	87	42
Earthquake		G		

Table 5-2 Available drawing of substations

Region	Name of substation	Available drawings							Notes
		Single line diagram	Three lines diagram	Back conneciton	Sequence diagram	Layout of control room	Arrangement of Control ponels	Layout of sitchyard	

Table 5-3 Large Customers

Region	Name	Location	Name of supply substation	Voltage (kV)	Capacity (kW)	Notes

Table 5-4 Private owned power plants

Region	Name	Location	Name of connection substation	Voltage (kV)	Capacity (kW)	Type	Notes

Ⅶ　現地訪問先及び主要面談者

在タイ王国日本国大使館

知久　多喜真　　（一等書記官）

JICAタイ事務所

後藤　教基　　（所長）

四釜　嘉総　　（所員）

JICA派遣専門家

柿本　仁司　　（PEA／配電線システム自動化）

谷　　順一　　（EGAT／水資源開発）

山川　弘勝　　（EGAT／発電機器）

日本貿易振興会（JETRO）バンコック・ジャパン・トレードセンター

西村　保孝　　（所長）

西田　宗且　　（次長）

米原　高史

バンコック日本人商工会議所

PEA (Provincial Electricity Authority)

1) Head Office

Dr. Vira Pitrachat (General Manager)
Mr. Surasukdi Senavongse (Deputy General Manager/Technique)
Mr. Sakol Wongbuddha (Manager, Planning and Civil Works Dept.)
Mr. Sunthorn Tanthavorn (Director, Project and Planning Div.)
Mr. Chakchai Chandarasupsang (4th grade Engineer, Project and Planning Div.)
Mr. Kamol Permpipat (Assistance Director, Research Div.)
Mr. Pravit Chiradeja (Director, Electrical and Mechanical Engineering Div.)
Mr. Kayjorn Songkakul (Director, Distribution System Dispatching Center)
Mr. Chaiwat Udomratanasirichai (Assistance chief, Project area 3 section, Project and Planning Div.)

2) Regional Office of Central Region 3

Mr. Songkarn Pibarchon (Director)
Mr. Prasarn (Asst. Chief of Technique)

3) Regional Office of Central Region 1

Mr. Paichitr Nakapan (Chief of Technique)
Mr. Suchat Dontri (Manager of Rangsit District Office)

MEA (Metropolitan Electricity Authority)

Mr. Wichit S. Kovitchai (Chief of System Operation Section)

EGAT (Electricity Generating Authority of Thailand)

Mr. Uthai Songtis (Chief, System Control and Load Dispatching Div.)

DTEC (Department of Technical and Economic Cooperation)

Mr. Wanchai (Director General)
Mr. Sutin Susila (Chief, Japan-Sub Div.)
Mr. Sarayuth Kungsadan (Staff, Japan-Sub Div.)

Ⅷ　参考資料

参　考　資　料　リ　ス　ト

Actual Load and Load Forecast in Thailand

Power Demand and Forecast in Thailand

			Actual										Forecast									
			1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
ENERGY PURCHASE	GNERATED BY EGAT (GWh)		8,211.57	9,414.48	10,950.62	12,371.67	13,964.56	14,753.73	15,959.97	16,881.95	19,066.30	21,066.44	23,471.00	25,747.00	28,261.00	30,620.00	32,975.00	35,203.00	37,349.00	39,518.00	41,728.00	43,967.00
	GNERATED BY PEA (GWh)		110.20	117.90	97.60	84.10	82.10	69.60	44.90	25.00	26.80	20.50	20.70	26.70	28.70	33.00	37.50	38.10	42.90	44.80	45.30	49.10
	Total Ⓐ		8,321.77	9,532.38	11,048.22	12,455.77	14,046.66	14,823.33	16,004.87	16,906.95	19,093.10	21,086.94	23,491.70	25,773.70	28,289.70	30,653.00	33,012.5	35,241.10	37,391.90	39,562.80	41,774.90	44,016.10
ENERGY SALES	Total of SALES Ⓑ		7,340.80	8,348.00	9,705.86	10,944.48	12,312.30	13,006.97	13,892.52	14,772.17	16,456.03	18,039.45	20,197.36	22,145.56	24,427.12	26,459.98	28,490.73	30,394.08	32,219.88	34,058.65	35,931.83	37,827.73
	CLASSIFIED	Residon-cial	1,373.12	1,540.10	1,880.28	2,221.62	2,627.82	2,884.55	3,128.12	3,461.13	4,091.38	4,572.74	5,139.75	5,726.71	6,326.42	6,965.98	7,557.75	8,192.36	8,836.40	9,496.07	10,166.77	10,843.40
		Large Business	2,422.38	2,915.25	3,347.83	3,565.84	4,009.94	1,904.26	1,906.66	2,084.73	2,236.01	2,420.51	2,722.13	3,003.98	3,255.17	3,516.96	3,788.25	4,069.72	4,360.69	4,660.45	4,968.99	5,286.34
		Small industrial	—	—	—	—	—	1,883.79	2,054.03	2,185.58	2,390.54	2,571.40	2,763.11	2,962.87	3,172.22	3,384.48	3,599.84	3,818.39	4,039.94	4,264.60	4,492.36	4,722.31
		Large industrial	—	—	—	—	—	3,746.25	4,243.34	4,436.94	4,554.14	4,894.77	5,473.75	5,987.82	6,878.26	7,550.94	8,238.97	8,765.63	9,175.52	9,564.97	9,960.74	10,362.54
		Others	3,114.41	3,446.30	4,000.78	4,668.78	5,221.86	2,144.39	2,059.75	2,109.46	2,573.84	2,890.30	3,187.62	3,494.51	3,720.18	3,951.68	4,191.34	4,436.96	4,689.75	4,948.71	5,212.50	5,476.14
		EGAT Directly Supply	430.89	446.35	476.97	488.24	452.68	443.73	500.61	494.33	610.12	689.73	911.00	969.67	1,074.87	1,089.94	1,104.58	1,111.02	1,117.38	1,123.85	1,130.47	1,137.05
Power Loss and own use Ⓐ−Ⓑ (GWh)			980.97	1,184.38	1,342.36	1,511.29	1,734.36	1,816.36	2,112.35	2,134.78	2,637.07	3,047.49	3,294.34	3,628.14	3,862.58	4,193.02	4,521.77	4,847.02	5,172.02	5,504.15	5,843.07	6,188.32
Peak Demand(MW)			1,372.62	1,617.08	1,820.71	2,048.52	2,240.52	2,447.73	2,600.79	2,862.88	3,247.80	3,579.95	3,974.46	4,390.18	4,812.21	5,214.09	5,555.25	5,917.46	6,261.92	6,604.55	6,950.90	7,298.91
Electrification rate			21.8	24.6	26.7	30.25	33.0	36.6	41.4	46.3	49.4	53.5	59.1	64.2	68.7	71.5	73.1	74.6	76.0	77.1	78.1	78.8

TABLE 2-1 EGAT'S TOTAL GENERATION REQUIREMENTS

Fiscal Year	Peak Generation		Energy Generation		Annual Load Factor
	MW	% Increase	GWh	% Increase	(%)
			ACTUAL		
1973	1,199.30	16.57	6,872.84	20.34	65.42
1974	1,256.30	4.75	7,258.62	5.61	65.96
1975	1,406.60	11.96	8,211.57	13.13	66.64
1976	1,652.10	17.45	9,414.48	14.65	64.87
1977	1,873.40	13.40	10,950.62	16.32	66.73
1978	2,100.60	12.13	12,371.67	12.98	67.23
1979	2,255.00	7.35	13,964.56	12.88	70.69
1980	2,417.40	7.20	14,753.73	5.65	69.48
1981	2,588.70	7.09	15,959.97	8.18	70.38
1982	2,838.00	9.63	16,881.95	5.78	67.91
1983	3,204.30	12.91	19,066.30	12.94	67.92
1984	3,547.30	10.70	21,066.44	10.49	67.61
			FORECAST		
1985[1/]	3,935.00	10.93	23,471.00	11.41	68.09
1986	4,346.00	10.44	25,747.00	9.70	67.63
1987	4,764.00	9.62	28,261.00	9.76	67.72
1988	5,162.00	8.35	30,620.00	8.35	67.53
1989	5,500.00	6.55	32,975.00	7.69	68.44
1990	5,858.00	6.51	35,203.00	6.76	68.60
1991	6,199.00	5.82	37,349.00	6.10	68.78
1992	6,539.00	5.48	39,518.00	5.81	68.80
1993	6,881.00	5.23	41,728.00	5.59	69.23
1994	7,226.00	5.01	43,967.00	5.37	69.46

Remark : 1/ The actual records for FY.1985 are 3,878.40 MW and 23,356.74 GWh.

TABLE 2-2 SUM OF TOTAL DEMAND OF MEA, PEA AND EGAT'S DIRECT CUSTOMERS

Fiscal Year	Peak Demand		Energy Demand		Annual Load Factor
	MW	% Increase	GWh	% Increase	(%)
			ACTUAL		
1973	1,146.43	12.67	6,415.09	20.90	63.88
1974	1,217.67	6.21	6,700.57	4.45	62.82
1975	1,372.62	12.73	7,606.35	13.52	63.26
1976	1,617.08	17.81	8,708.33	14.49	61.31
1977	1,820.71	12.59	10,164.86	16.73	63.73
1978	2,048.52	12.51	11,534.44	13.47	64.28
1979	2,240.52	9.37	12,933.63	12.13	65.90
1980	2,447.73	9.25	13,672.84	5.72	63.59
1981	2,600.79	6.25	14,561.90	6.50	63.92
1982	2,862.88	10.08	15,402.50	5.77	61.42
1983	3,247.80	13.45	17,563.15	14.03	61.73
1984	3,579.95	10.23	19,361.51	10.24	61.57
			FORECAST		
1985	3,974.46	11.02	21,642.62	11.78	62.16
1986	4,390.18	10.46	23,741.25	9.70	61.73
1987	4,812.21	9.61	26,167.91	10.22	62.08
1988	5,214.09	8.35	28,351.46	8.34	61.90
1989	5,555.25	6.54	30,532.14	7.69	62.74
1990	5,917.46	6.52	32,595.29	6.76	62.88
1991	6,261.92	5.82	34,582.32	6.10	63.04
1992	6,604.55	5.47	36,590.56	5.81	63.07
1993	6,950.90	5.24	38,637.29	5.59	63.45
1994	7,298.91	5.01	40,710.55	5.37	63.67

TABLE 2-3. MEA'S DEMAND

Fiscal Year	Maximum Power Demand		Energy Received from EGAT		Annual Load Factor
	MW	% Increase	GWh	% Increase	(%)
			ACTUAL		
1973	738.77	14.15	4,435.64	20.10	68.54
1974	751.90	1.78	4,467.90	0.73	67.83
1975	833.70	10.88	5,050.83	13.05	69.16
1976	958.35	14.95	5,606.70	11.01	66.60
1977	1,058.50	10.45	6,392.28	14.01	68.94
1978	1,170.80	10.61	7,146.21	11.79	69.68
1979	1,268.00	8.30	7,970.27	11.53	71.75
1980	1,391.50	9.74	8,286.06	3.96	67.79
1981	1,388.40	-0.22	8,495.98	2.53	69.85
1982	1,498.80	7.95	8,718.70	2.62	66.41
1983	1,630.63	8.80	9,665.67	10.86	67.67
1984	1,775.83	8.90	10,497.51	8.61	67.30
			FORECAST		
1985	1,822.86	2.65	11,087.72	5.62	69.44
1986	1,972.42	8.20	11,734.48	5.83	67.91
1987	2,089.70	5.95	12,434.34	5.96	67.93
1988	2,209.05	5.71	13,145.82	5.72	67.93
1989	2,330.83	5.51	13,871.36	5.52	67.94
1990	2,454.88	5.32	14,609.77	5.32	67.94
1991	2,581.39	5.15	15,362.34	5.15	67.94
1992	2,710.35	5.00	16,129.11	4.99	67.93
1993	2,841.61	4.84	16,908.92	4.83	67.93
1994	2,974.50	4.68	17,697.50	4.66	67.92

Remarks : 1/ FY.1977-1981 demand including Siam Metal Enterprises demand.

2/ Responsibility for three high tension locations, where PEA purchased electricity from MEA, were transferred to PEA on January 16, 1983.

3/ Part of MEA's Pathum Thani Service Area was transferred to PEA on March 1, 1985, the rest is expected to be entirely transferred by 1986.

TABLE 2-4 PEA'S DEMAND

Fiscal Year	Peak Demand		Energy Received from EGAT		Annual Load Factor
	MW	% Increase	GWh	% Increase	(%)
			ACTUAL		
1973	328.00	15.78	1,574.80	27.47	54.81
1974	385.00	17.38	1,797.10	14.12	53.29
1975	455.50	18.31	2,124.60	18.22	53.25
1976	575.50	26.34	2,655.30	24.98	52.53
1977	681.80	18.47	3,314.70	24.83	55.50
1978	790.00	15.87	3,916.10	18.14	56.59
1979	889.30	12.57	4,542.20	15.99	58.31
1980	973.90	9.51	4,966.10	9.33	58.05
1981	1,115.36	14.53	5,569.22	12.14	57.00
1982	1,261.75	13.12	6,189.70	11.14	56.00
1983	1,493.38	18.36	7,287.34	17.73	55.71
1984	1,684.10	12.77	8,173.90	12.17	55.25
			FORECAST		
1985	1,980.80	17.62	9,643.60	17.98	55.58
1986	2,228.50	12.51	11,037.10	14.45	56.54
1987	2,531.00	13.57	12,658.70	14.69	57.09
1988	2,811.30	11.07	14,115.70	11.51	57.16
1989	3,028.40	7.72	15,556.20	10.20	58.64
1990	3,265.50	7.83	16,874.50	8.47	58.99
1991	3,482.40	6.64	18,102.60	7.28	59.34
1992	3,695.00	6.10	19,337.60	6.82	59.58
1993	3,909.00	5.79	20,597.90	6.52	60.15
1994	4,123.00	5.47	21,876.00	6.20	60.57

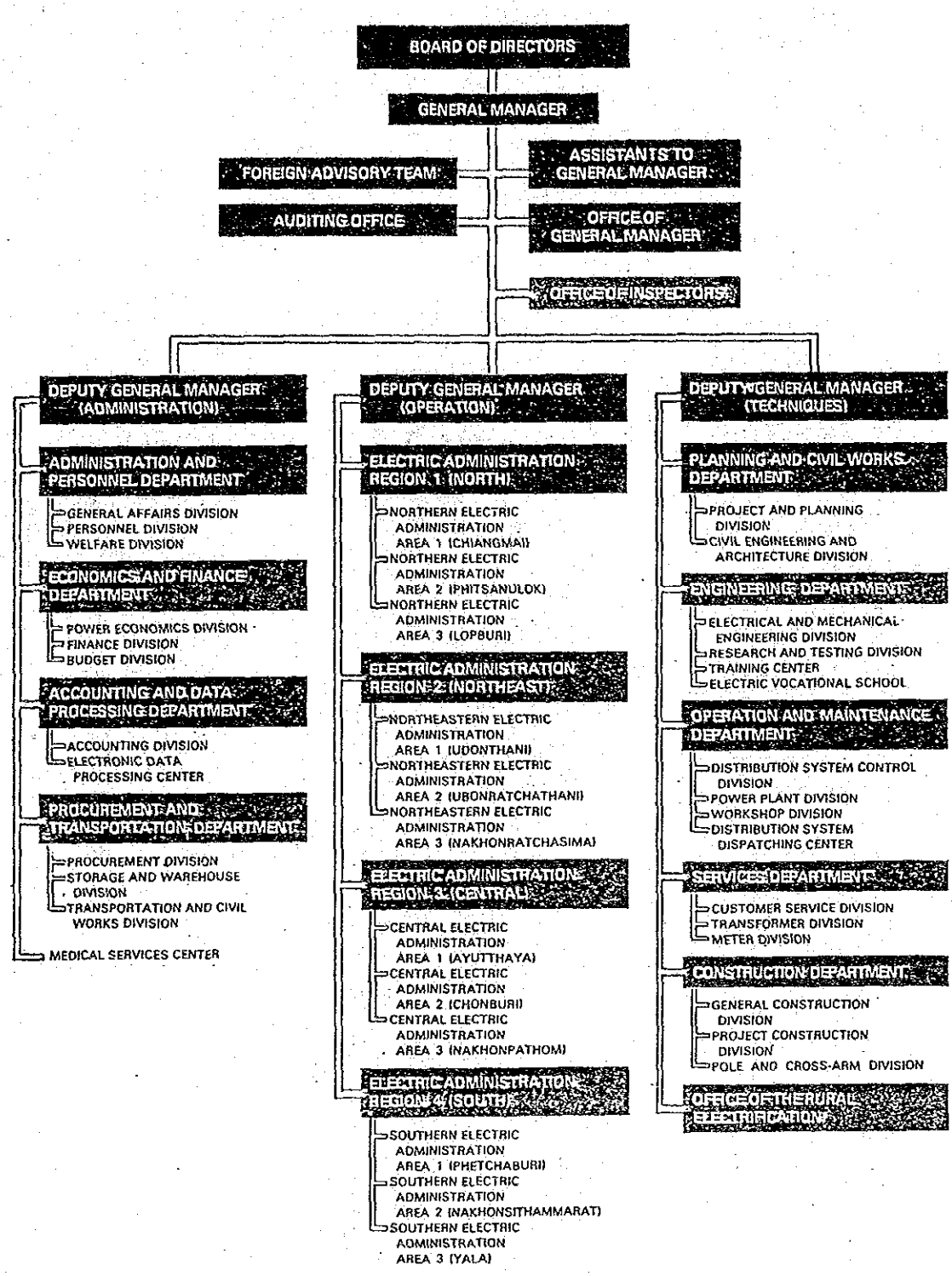
Remark : FY.1977-1982 demand including Siam Metal Enterprises' demand.

TABLE 2-5 EGAT'S DIRECT CUSTOMER DEMAND

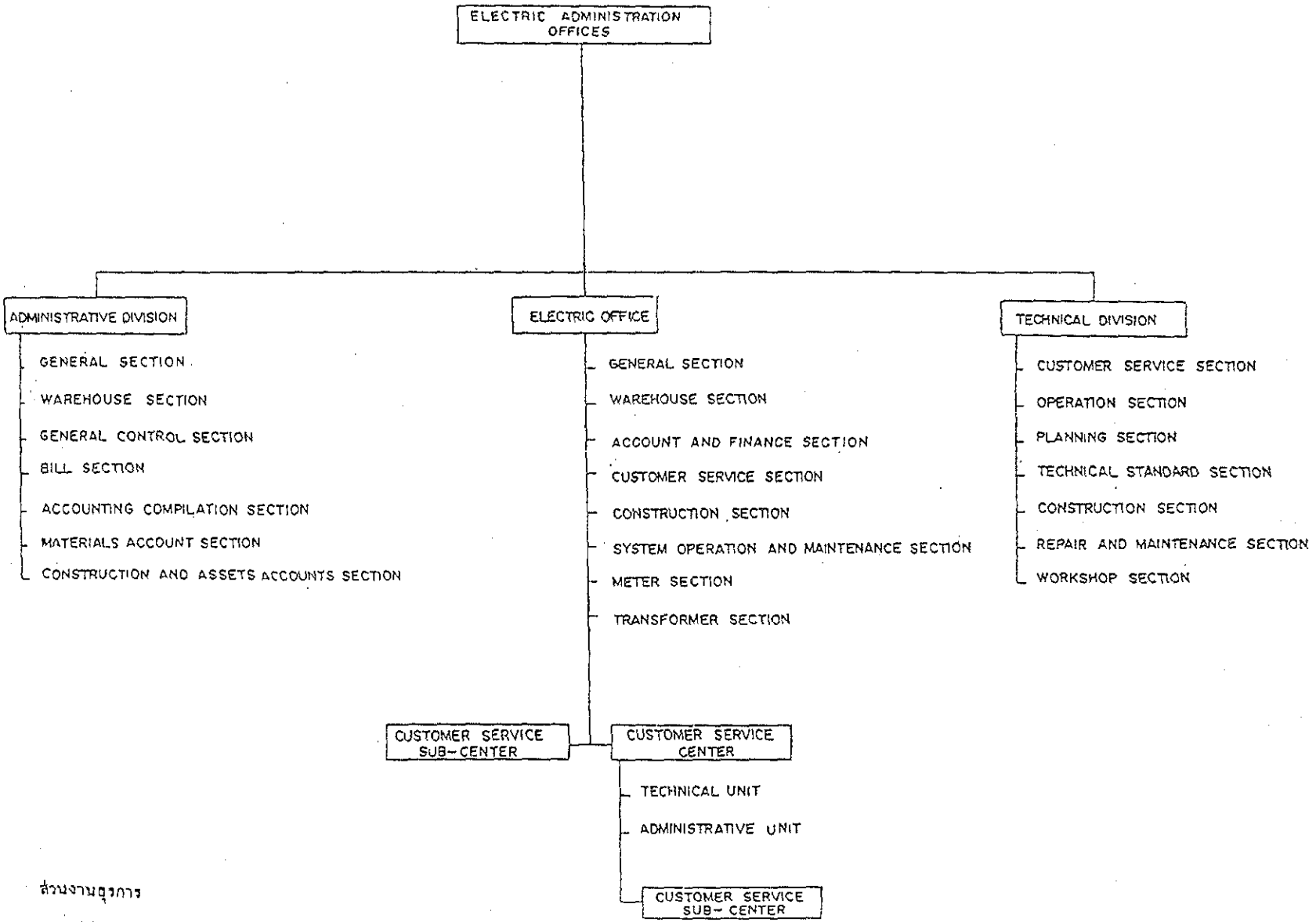
Fiscal Year	Peak Demand		Energy Demand		Annual Load Factor
	MW	% Increase	GWh	% Increase	(%)
			ACTUAL		
1973	77.21	-11.23	404.67	7.19	59.83
1974	80.74	4.57	436.03	7.75	61.65
1975	83.40	3.29	430.89	-1.18	58.98
1976	83.27	-0.16	446.35	3.59	61.02
1977	83.72	0.54	476.97	6.86	65.04
1978	91.74	9.58	488.24	2.36	60.75
1979	87.54	-4.58	452.68	-7.28	59.03
1980	85.83	-1.95	443.73	-1.98	58.86
1981	100.18	16.72	500.61	12.82	57.04
1982	102.33	2.15	494.33	-1.25	55.15
1983	124.55	21.71	610.12	23.42	55.92
1984	129.17	3.72	689.74	13.05	60.79
			FORECAST		
1985	170.80	32.22	911.00	32.08	60.89
1986	189.26	10.81	969.67	6.44	58.49
1987	191.51	1.19	1,074.87	10.85	64.07
1988	193.74	1.16	1,089.94	1.40	64.05
1989	196.02	1.18	1,104.58	1.34	64.33
1990	197.08	0.54	1,111.02	0.58	64.35
1991	198.13	0.53	1,117.38	0.57	64.38
1992	199.20	0.54	1,123.85	0.58	64.40
1993	200.29	0.55	1,130.47	0.59	64.43
1994	201.41	0.56	1,137.05	0.58	64.45

Organization Chart of PEA

ORGANIZATION CHART



REGIONAL ORGANIZATION CHART



ส่วนงานธุรการ

สำนักผู้ว่าการ

Actual Load and Load Forecast in PEA

Power Demand and Forecast in Thailand

Actual ⟷ Forecast

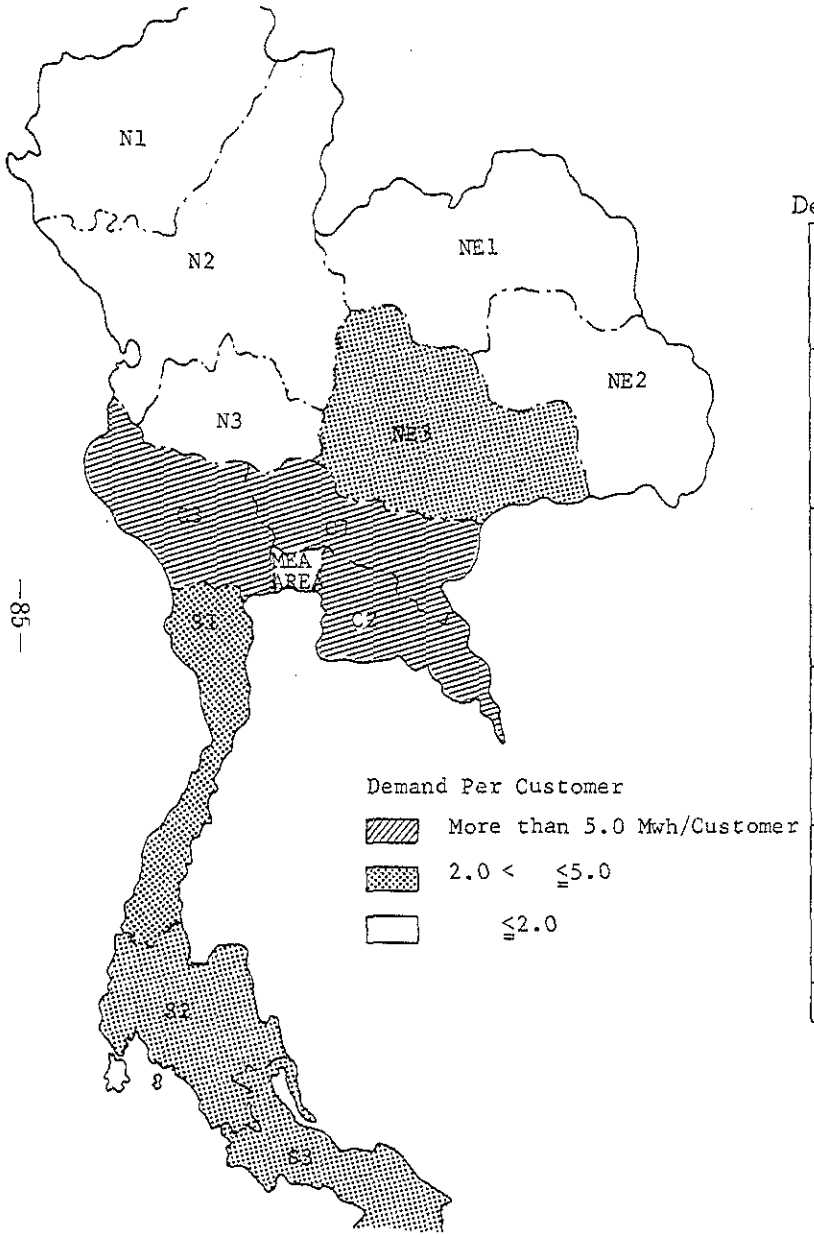
		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
GENERATED	ENERGY GENERATED (GWh)	110.20	117.90	97.60	84.10	82.10	69.60	44.90	25.00	25.80	20.50	20.70	26.70	28.70	33.00	37.50	38.10	42.90	44.80	46.90	49.10
	ENERGY Purchaced (GWh)	2,198.77	2,757.73	3,397.19	4,020.13	4,646.78	5,107.44	5,757.51	6,428.09	7,384.89	8,221.91	9,562.99	10,927.61	12,640.76	14,235.43	15,728.55	17,044.65	18,270.58	19,503.07	20,760.88	22,036.16
	Total Ⓐ	2,308.97	2,875.63	3,494.79	4,104.23	4,728.88	5,177.04	5,802.41	6,453.09	7,411.69	8,242.41	9,583.69	10,954.31	12,669.46	14,268.43	15,766.05	17,082.75	18,313.48	19,547.87	20,807.78	22,085.26
ENERGY SALES (GWh)	TOTAL of SALES Ⓑ	2,120.00	2,616.70	3,174.40	3,649.60	4,253.70	4,695.80	5,209.71	5,839.84	6,679.53	7,432.56	8,775.20	10,051.60	11,564.50	12,907.80	14,236.10	15,433.00	16,539.00	17,644.40	18,771.70	19,913.50
	CLASSIFIED Residential	547.20	620.70	804.30	981.30	1,176.60	1,364.20	1,582.12	1,841.75	2,220.83	2,571.50	2,960.00	3,381.30	3,837.10	4,330.00	4,782.40	5,254.90	5,744.10	6,246.20	6,756.60	7,270.20
	CLASSIFIED Large Business	659.20	850.50	970.30	966.50	1,111.70	492.80	537.66	597.42	609.14	641.71	706.60	769.30	832.90	899.30	967.40	1,037.90	1,110.30	1,183.30	1,257.50	1,332.70
	CLASSIFIED Small industrial	—	—	—	—	—	842.70	935.05	1,033.21	1,128.15	1,204.80	1,346.10	1,476.40	1,605.00	1,736.50	1,871.10	2,008.90	2,149.70	2,293.60	2,440.60	2,589.80
	CLASSIFIED Large industrial	—	—	—	—	—	1,294.90	1,517.56	1,699.99	1,845.46	1,988.41	2,634.60	3,183.20	3,940.90	4,481.40	5,037.80	5,433.40	5,712.80	5,972.30	6,238.70	6,511.70
	CLASSIFIED Others	913.6	1,145.5	1,399.8	1,701.8	1,965.4	701.2	637.32	667.47	875.94	1,026.13	1,127.90	1,241.40	1,348.60	1,460.60	1,577.40	1,697.9	1,822.1	1,949.10	2,078.3	2,209.1
Power Loss and own use Ⓐ−Ⓑ (GWh)		188.97	258.93	320.39	454.63	475.18	481.24	592.7	613.25	732.16	809.85	808.49	902.71	1,104.96	1,360.63	1,529.95	1,649.75	1,774.48	1,903.47	2,036.08	2,171.76
Peak Demand(MW)		516.9	640.1	740.8	851.7	949.1	1,040.1	1,180.7	1,336.3	1,555.1	1,703.8	2,013.8	2,257.0	2,559.5	2,839.5	3,058.2	3,292.9	3,511.3	3,725.0	3,940.1	4,124.1
Electrification rate		15.9	17.9	20.1	23.3	26.0	30.4	35.7	41.0	44.7	48.9	55.2	60.9	65.8	68.6	70.2	71.7	72.9	73.9	74.8	75.4

Past Record of Power Demand classified by Region

( ) : Peak Demand (MW)
(GWh=10³MWH)

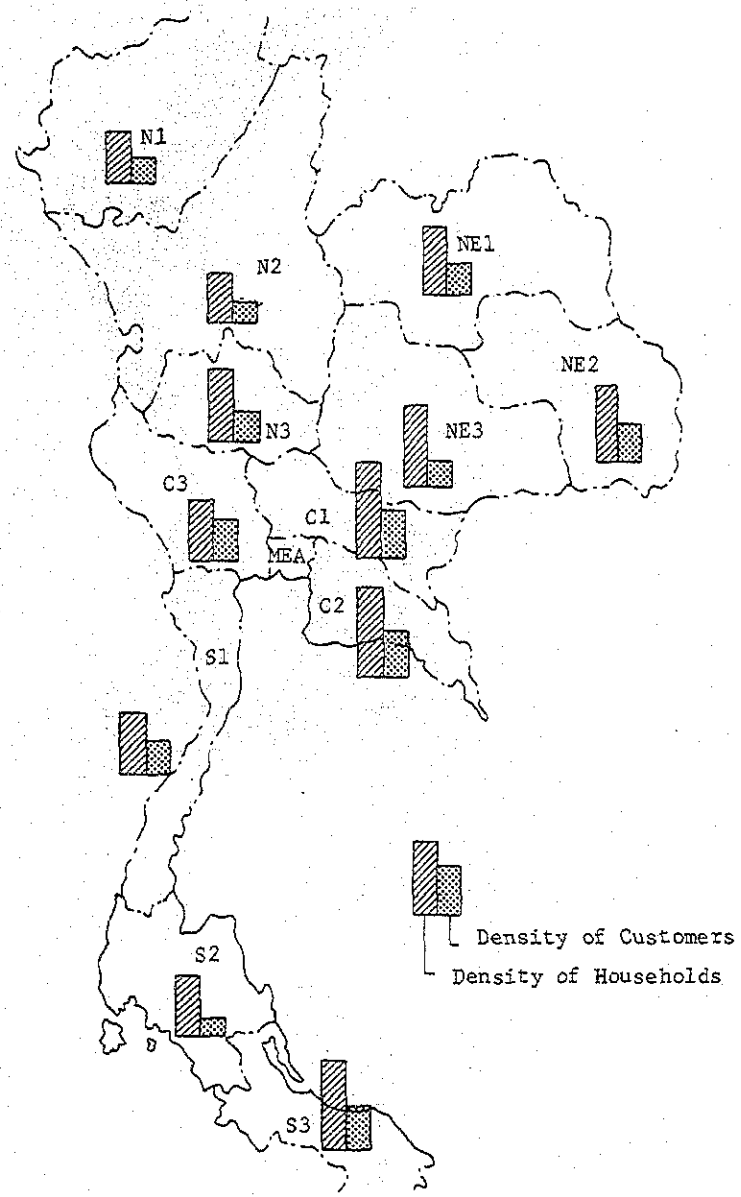
			1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	Increase Gwh/Year,%
PURCHASED FROM EGAT	CENTRAL	Region1	(59.14) 264.24	(73.67) 351.45	(89.35) 457.66	(100.57) 518.91	(103.08) 548.28	(114.20) 612.26	(154.00) 704.03	(170.10) 822.74	(236.05) 1076.03	(244.99) 1278.00	[19.1] 112.6
		Region2	(50.83) 221.79	(61.48) 278.24	(75.44) 339.33	(95.93) 442.88	(103.10) 505.24	(112.35) 571.53	(131.34) 650.16	(143.18) 712.38	(169.37) 863.10	(197.07) 979.54	[17.9] 84.2
		Region3	(99.27) 464.06	(120.44) 608.21	(139.60) 709.13	(155.11) 808.08	(172.82) 972.72	(189.61) 1022.60	(190.31) 1082.78	(202.83) 1136.66	(237.00) 1275.71	(246.37) 1386.51	[12.9] 102.5
		Total	(209.24) 950.09	(255.59) 1237.90	(304.39) 1506.12	(351.61) 1769.87	(379.00) 2026.24	(416.16) 2206.39	(475.65) 2436.97	(516.11) 2671.78	(642.42) 3214.84	(688.43) 3644.05	[16.1] 299.3
	NORTHERN	Region1	(29.07) 121.49	(43.26) 152.92	(55.17) 208.90	(65.09) 247.15	(70.40) 283.81	(78.38) 304.21	(94.40) 336.94	(104.10) 383.44	(122.93) 460.99	(137.77) 512.46	[17.3] 43.4
		Region2	(23.93) 88.92	(30.64) 112.49	(40.37) 144.84	(46.23) 179.10	(52.61) 210.45	(65.18) 252.76	(81.63) 302.42	(87.73) 342.96	(98.05) 404.89	(112.90) 459.56	[20.0] 41.2
		Region3	(33.10) 133.72	(40.30) 161.87	(52.97) 212.73	(58.82) 249.75	(67.51) 277.36	(71.12) 304.50	(75.51) 338.90	(86.03) 367.04	(96.00) 421.14	(104.00) 459.08	[14.7] 36.2
		Total	(86.10) 344.13	(114.20) 427.28	(148.51) 566.47	(170.14) 767.00	(190.52) 771.62	(214.68) 861.47	(251.54) 978.26	(277.86) 1093.44	(316.98) 1287.02	(354.67) 1431.10	[17.2] 120.8
	NORTHEAST	Region1	(42.73) 161.57	(48.32) 186.83	(55.70) 215.33	(64.9) 257.40	(71.30) 282.47	(76.19) 309.42	(95.56) 365.10	(117.94) 438.91	(138.55) 502.62	(154.02) 561.78	[14.9] 44.5
		Region2	(20.40) 71.16	(26.70) 88.83	(31.25) 113.07	(37.96) 142.40	(44.55) 160.43	(51.19) 184.02	(69.82) 225.36	(71.78) 253.16	(98.03) 307.90	(107.46) 359.72	[19.7] 32.1
		Region3	(38.87) 172.49	(46.01) 209.65	(56.84) 250.89	(66.20) 294.61	(74.26) 337.93	(79.23) 383.38	(95.01) 433.13	(115.44) 472.52	(126.97) 543.76	(147.48) 622.98	[16.0] 50.1
		Total	(102.00) 405.22	(121.03) 485.31	(143.79) 579.29	(169.06) 694.41	(190.11) 780.83	(206.61) 876.82	(260.39) 1023.59	(305.16) 1164.59	(363.55) 1354.28	(408.96) 1544.48	[16.0] 126.7
	SOUTHERN	Region1	(41.24) 179.60	(46.60) 207.22	(58.96) 246.84	(65.04) 274.56	(65.92) 342.76	(66.60) 328.22	(82.72) 372.62	(90.61) 429.77	(93.30) 479.06	(109.17) 511.58	[12.3] 36.9
		Region2	(35.40) 164.49	(41.98) 188.60	(48.34) 230.99	(55.62) 272.88	(63.87) 318.02	(69.73) 354.29	(77.14) 391.84	(82.60) 417.88	(93.34) 471.05	(101.76) 513.74	[13.5] 38.8
		Region3	(18.05) 81.14	(30.01) 109.12	(37.24) 166.28	(46.42) 212.11	(57.02) 271.24	(63.67) 315.78	(77.91) 362.27	(90.22) 412.00	(109.01) 481.04	(111.32) 528.86	[23.2] 49.7
		Total	(94.69) 425.23	(118.59) 504.94	(144.54) 644.11	(167.08) 759.55	(186.81) 932.02	(200.00) 998.29	(237.77) 1126.78	(263.43) 1259.65	(295.65) 1431.15	(322.25) 1554.18	[15.5] 125.4
	Total		(492.03) 2124.67	(609.41) 2655.43	(741.23) 3295.99	857.89) 3899.83	(946.44) 4510.71	(1037.45) 4942.97	(1225.35) 5565.55	(1362.56) 6189.46	(1618.60) 7287.29	(1774.31) 8173.81	[16.1] 672.2
Purchased from MEA NEA			(21.57) 74.10	(19.56) 102.30	(18.20) 101.20	(22.50) 120.30	(23.78) 136.07	(31.10) 164.47	(35.80) 191.96	(45.18) 238.63	(39.59) 97.60	(16.50) 48.10	[4.9] 2.9
PEA GENERATED			(39.76) 110.20	(45.10) 117.90	(40.80) 97.60	(39.10) 84.10	(35.90) 82.10	(35.00) 69.60	(29.50) 44.90	(27.60) 25.00	(22.10) 26.80	(21.50) 20.50	[20.5] 10.0
GRAND TOTAL			(516.9) 2308.97	(640.1) 2875.63	(740.8) 3494.79	(851.7) 4104.23	(949.1) 4728.88	(1040.1) 5177.04	(1180.7) 5802.41	(1336.3) 6453.09	(1555.1) 7411.69	(1703.8) 8242.41	[15.2] 659.3

Remarks : This data is purchased Energy(include Loss), Grand Total of Peak Demand is dcreased by diversity factor



Density of Population and Customers at 1984

		Area (S9-Km) Ⓐ	No of Population 1000 Persons Ⓑ	Density of Population Persons /S9-Km Ⓑ/Ⓐ	No of Households Ⓒ	Density of Households Ⓒ/Ⓐ	No of Customers Ⓓ	Density of Customers Ⓓ/Ⓐ
CENTRAL	Region1	22,644.0	2,693.4	118.9	469.063	20.7	250.032	11.0
	Region2	21,962.5	2,231.5	101.6	403.476	18.4	205.916	9.4
	Region3	27,863.9	2,256.9	81.0	369.853	13.3	225.625	8.1
	Total	72,470.4	7,181.8	99.1	1,242.392	17.1	681.573	9.4
NORTHERN	Region1	71,946.4	3,974.2	55.2	821.664	11.4	412.614	5.7
	Region2	74,147.3	4,100.9	55.3	759.661	10.2	322.170	4.3
	Region3	40,654.7	3,418.5	84.1	630.324	15.5	281.318	6.9
	Total	186,748.4	11,493.6	61.5	2,211.649	11.8	1,016.102	5.4
NORTHEAST	Region1	61,034.1	5,825.9	95.5	906.116	14.8	428.650	7.0
	Region2	57,640.0	6,389.8	110.9	912.592	15.8	443.892	7.7
	Region3	49,474.6	5,422.3	109.6	875.075	17.7	279.853	5.7
	Total	168,148.7	17,638.0	104.9	2,693.783	16.0	1,152,395	6.9
SOUTHERN	Region1	28,145.1	2,119.0	75.3	377.229	13.4	204.269	7.3
	Region2	37,349.1	3,035.0	81.3	499.034	13.4	144.321	3.9
	Region3	24,830.1	2,822.3	113.7	481.893	19.4	230.263	9.3
	Total	90,324.3	7,976.3	88.3	1,358.156	15.0	578.853	6.4
GRAND TOTAL		517,691.8	44,289.7	85.6	7,505.980	14.5	3,428.923	6.6



Density of Demand

Donsity is Actual deta at 1985

		Area (S9-Km) Ⓐ	Donsity of Load		Special Customers		No of Customer Ⓕ	Demand Per Customer Ⓑ/Ⓕ	
			Demand (MWH) Ⓑ	Donsity (MWH/S) Ⓒ=Ⓑ/Ⓐ	Large Industry Ⓓ	Large Business Ⓔ			
CENTRAL	Region1	22,644.0	1,756.300	77.6	53	90	250.032	7.0	
	Region2	21,962.5	1,113.200	50.7	53	229	205.916	5.4	
	Region3	27,863.9	1,421.200	51.0	67	111	225.625	6.3	
	Total	72,470.4	4,290.700	59.2	173	430	681.573	6.3	
NORTHERN	Region1	71,946.4	579.400	8.1	4	215	412.614	1.4	
	Region2	74,147.3	517.000	7.0	1	130	322.170	1.6	
	Region3	40654.7	504.300	12.4	3	123	281.318	1.8	
	Total	186,748.4	1,600.700	8.6	8	468	1,016.102	1.6	
NORTHEAST	Region1	61,034.1	609.500	10.0	12	189	428.650	1.4	
	Region2	57,640.0	405.400	7.0	4	77	443.892	0.9	
	Region3	49,474.6	682.800	13.8	32	162	279.853	2.4	
	Total	168,148.7	1,697.700	10.1	48	428	1,152.395	1.5	
SOUTHERN	Region1	28,145.1	567.500	20.2	12	71	204.269	2.8	
	Region2	37,349.1	580.500	15.5	19	138	144.321	4.0	
	Region3	24,830.1	577.500	23.3	15	183	230.263	2.5	
	Total	90,324.3	1,725.500	19.1	46	392	578.853	3.0	
GRAND TOTAL		517,691.8	9,314.600	18.0	275	1718	3,428.923	2.7	

Remnrks : Includc in Bom Mai Sub Statron from MEA to PEA

Special Customers

(1) Large Industry not Less than 500Kw (Demand Peak)

(2) Large Busivess not Less than 30 Kw (〃)

Load Forecast classified by Region

( ) : Peak Demand (MW)
(GWh =10^6MWH)

			1984 (ACTUAL)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Increase GWh Per Year, %
PURCHASED FROM EGAT	CENTRAL	Region1	(244.99) 1278.00	(359.13) 1857.24	(422.59) 2299.03	(487.40) 2796.53	(540.94) 3095.30	(582.73) 3416.11	(610.00) 3581.87	(637.63) 3751.28	(665.70) 3924.89	(694.08) 4101.92	(723.44) 4280.68	[12.8] 300.3
		Region2	(197.07) 979.54	(219.68) 1134.42	(250.11) 1323.18	(294.03) 1539.46	(398.35) 1903.49	(422.05) 2247.43	(474.02) 2540.73	(505.95) 2713.69	(530.79) 2862.07	(555.54) 3011.76	(579.73) 3160.17	[12.4] 218.1
		Region3	(246.37) 1386.51	(273.47) 1549.27	(299.88) 1707.79	(330.16) 1887.66	(359.78) 2068.48	(387.88) 2242.84	(417.55) 2428.78	(447.94) 2621.33	(479.16) 2821.07	(511.05) 3027.25	(543.35) 3238.22	[8.9] 185.2
		Total	(688.43) 3644.05	(852.28) 4540.93	(972.58) 5330.00	(1111.59) 6223.65	(1299.07) 7067.27	(1392.66) 7906.38	(1501.57) 8551.38	(1591.52) 9086.30	(1675.65) 9608.03	(1760.67) 10140.93	(1846.52) 10679.07	[11.4] 703.6
	NORTHERN	Region1	(137.77) 512.46	(148.24) 562.78	(168.20) 639.38	(190.67) 727.25	(215.89) 826.17	240.30) 926.01	(264.60) 1029.78	(287.79) 1133.19	(310.95) 1239.06	(333.41) 1344.49	(356.19) 1453.10	[11.0] 94.1
		Region2	(112.90) 459.56	(123.91) 515.58	(138.22) 578.50	(153.17) 645.04	(168.17) 712.18	(182.33) 776.38	(197.12) 843.92	(212.38) 914.13	(227.87) 986.04	(243.47) 1059.13	(258.99) 1132.57	[9.4] 67.3
		Region3	(104.00) 459.08	(110.89) 500.91	(121.38) 550.67	(151.73) 717.09	(162.47) 768.99	(172.86) 819.78	(183.86) 873.87	(195.01) 929.19	(206.04) 986.42	(218.01) 1044.92	(229.62) 1104.15	[9.2] 64.5
		Total	(354.67) 1431.10	(383.04) 1579.27	(427.80) 1768.55	(495.57) 2089.38	(546.53) 2307.34	(595.49) 2522.17	(645.58) 2747.57	(695.18) 2976.51	(745.26) 3211.52	(794.89) 3448.54	(844.80) 3689.82	[9.9] 225.9
	NORTHEAST	Region1	(154.02) 561.78	(165.71) 608.11	(180.42) 669.41	(195.74) 734.14	(210.79) 799.01	(224.94) 861.38	(240.09) 928.47	(255.93) 999.25	(271.86) 1071.55	(287.83) 1145.10	(303.61) 1219.03	[8.1] 65.7
		Region2	(107.46) 359.72	(118.60) 403.48	(133.20) 457.99	(148.10) 514.53	(163.10) 572.58	(177.36) 629.18	(192.79) 690.94	(208.47) 754.84	(224.29) 820.48	(240.16) 887.54	(255.88) 955.26	[10.3] 59.6
		Region3	(147.48) 622.98	(154.07) 682.54	(167.88) 749.56	(183.18) 824.69	(198.01) 898.39	(211.60) 967.40	(225.48) 1038.62	(239.40) 1111.12	(253.41) 1185.19	(267.73) 1261.48	(281.91) 1338.24	[7.9] 71.5
		Total	(408.96) 1544.48	(438.38) 1694.13	(481.50) 1876.96	(527.02) 2073.36	(571.90) 2269.98	(613.90) 2457.96	(658.36) 2658.03	(703.80) 2865.21	(749.56) 3077.22	(795.72) 3294.12	(841.40) 3512.53	[8.6] 196.8
	SOUTHERN	Region1	(109.17) 511.58	(108.28) 542.05	(120.13) 605.71	(132.86) 674.68	(155.75) 804.96	(168.37) 875.54	(181.72) 950.90	(195.22) 1028.20	(208.82) 1107.15	(222.35) 1186.91	(235.85) 1267.63	[9.5] 75.6
		Region2	(101.76) 513.74	(115.43) 585.87	(129.17) 655.98	(153.16) 778.37	(166.72) 879.23	(180.04) 954.29	(194.12) 1034.28	(208.53) 1117.04	(223.25) 1202.47	(238.17) 1290.00	(253.23) 1379.36	[10.4] 86.6
		Region3	(11.32) 528.86	(124.44) 584.74	(140.41) 664.61	(162.84) 774.32	(183.69) 878.15	(204.28) 982.11	(220.93) 1070.69	(238.16) 1163.62	(255.98) 1260.98	(274.31) 1362.48	(293.02) 1467.55	[10.7] 93.9
		Total	(322.25) 1554.18	(348.15) 1712.66	(389.71) 1926.30	(448.86) 2227.37	(506.16) 2562.34	(552.69) 2811.94	(596.77) 3055.87	(641.91) 3308.86	(688.05) 3570.60	(734.83) 3839.39	(782.10) 4114.54	[10.3] 256.1
	TOTAL		(1774.31) 8173.81	(2021.85) 9526.99	(2271.59) 10901.81	(2583.04) 12613.76	(2923.66) 14206.93	(3154.74) 15698.45	(3402.28) 17012.85	(3632.41) 18236.88	(3858.52) 19467.37	(4086.11) 20722.98	(4314.82) 21995.96	[10.4] 1382.4
Purchased from MEA, NEA			(16.50) 48.10	(11.90) 36.00	(6.30) 25.80	(6.60) 27.00	(7.10) 28.50	(7.50) 30.10	(8.00) 31.80	(8.50) 33.70	(9.10) 35.70	(9.60) 37.90	(10.20) 40.20	[1.8] 0.8
PEA GENERATED			(21.50) 20.50	(21.10) 20.70	(22.20) 26.70	(21.90) 28.70	(21.10) 33.00	(22.30) 37.50	(19.40) 38.10	(20.40) 42.90	(20.90) 44.80	(21.50) 46.90	(22.00) 49.10	[9.1] 2.9
GRAND TOTAL			(1703.8) 8242.41	(2013.8) 9583.69	(2257.0) 10954.31	(2559.5) 12669.46	(2839.5) 14268.43	(3058.2) 15766.05	(3292.9) 17082.75	(3511.3) 18313.48	(3725.0) 19547.87	(3940.1) 20807.78	(4124.1) 22085.26	[10.4] 1384.5

Remarks : This data is purchased Emergy (Includl Loss) estimated at 1984
Grand Total of Peak Demand is dcreased by diversity factor

Electricity Tariffs

PROVINCIAL ELECTRICITY AUTHORITY

ELECTRICITY TARIFFS

1. Residential Service

Application

Electric service for lighting and electric appliances used in households and adjoining area, including monasteries of all faiths, by being served through a single meter.

Monthly Rate Energy Charge :

First	5 kWh	or less	5.00	Baht
Next	10 kWh	(6 - 15)	0.70	Baht/kWh.
Next	10 kWh	(16 - 25)	0.90	Baht/kWh.
Next	10 kWh	(26 - 35)	1.17	Baht/kWh.
Next	65 kWh	(36 - 100)	1.65	Baht/kWh.
Next	50 kWh	(101 - 150)	1.75	Baht/kWh.
Next	150 kWh	(151 - 300)	1.83	Baht/kWh.
Next	100 kWh	(301 - 400)	2.04	Baht/kWh.
Over	400 kWh	(401 up)	2.11	Baht/kWh.

Minimum Charge : 5.00 Baht/month.

Notes:

(1) For customers who have a free-of-charge privilege for a certain amount of energy, whenever consumption exceeds the amount permissible, the charge for the excess will follow this schedule.
(2) This schedule will also be applied to business, government agency or state enterprise with the total use of electrical appliances not more than 6 kW.

2. Small Business Service

Application

Electric service for power used in small business or combined business with residence, government agency or state enterprise, having a combined lighting and electrical equipment installation of 6 kW. or over, but less than 30 kW., by being served through a single meter.

Monthly Rate Energy Charge :

First	40 kWh	or less	89.72	Baht
Next	260 kWh	(41 - 300)	1.81	Baht/kWh.
Next	700 kWh	(301 - 1,000)	1.92	Baht/kWh.
Next	2,000 kWh	(1,001 - 3,000)	2.04	Baht/kWh.
Over	3,000 kWh	(3,001 up)	2.21	Baht/kWh.

Minimum Charge : 89.72 Baht/month.

Notes:

(1) Any customer who first registered on Schedule 2, if later on prefers to follow Schedule 1, must have electric appliances installed less than 6 kW., which is inspected by PEA's provincial office, then Schedule 1. shall be applied.
(2) This schedule is applied to industry having a maximum demand less than 30 kW.

3. Large Business Service

Application

Electric service for business, government agency or state enterprise and its adjoining area, with a maximum 15 - minute integrated demand of 30 kW. or over and supplied at a voltage of not less than 11 kV.

Monthly Rate

3.1 Demand Charge :	All kW. of maximum demand	95.00	Baht/kW.
3.2 Energy Charge :	For all kWh.	1.52	Baht/kWh.
Minimum Charge :	The monthly charge, calculated from or calculated from Note (4) below, shall not be less than Demand Charge which calculated from 60% of the highest demand occurring in any month of the past 12 months, ending with the current month.	3.1	plus 3.2

Notes:

(1) For below 11 kV. delivery, the Demand Charge will be increased 3 Baht/kW.
(2) For delivery at 69 or 115 kV., the Demand Charge will be reduced 2 Baht/kW.
(3) If demand and energy meter is installed on the load side of the transformer, another 2% must be added to both total demand and energy consumption to be calculated in accordance with Schedules under 3.1 and 3.2 above, to cover the unmeasured transformer loss.
(4) In any month during which the maximum demand does not reach 30 kW. the charge will be changed to follow Schedule 2. However, the charge shall not be less than the above Minimum Charge.
(5) Applications for the use of Schedule 3 must be approved by PEA.'s Central Office and a Purchase Contract must be made.

4. Small Industrial Service

Application

Electric service for industry at a plant and its adjoining area, with a maximum 15 - minute integrated demand between 30 to 499 kW. and supplied at a voltage of not less than 11 kV.

Monthly Rate

4.1 Demand Charge :	All kW. of maximum demand	95.00	Baht/kW.
4.2 Energy Charge :	First 50 kWh per kW. of maximum demand	1.46	Baht/kWh.
	Next 150 kWh per kW. of maximum demand	1.45	Baht/kWh.
	Next 200 kWh per kW. of maximum demand	1.44	Baht/kWh.
	Over 400 kWh per kW. of maximum demand	1.43	Baht/kWh.
Minimum Charge :	The monthly charge, calculated from 4.1 plus 4.2 or calculated from Note (5) below, shall not be less than Demand Charge which calculated from 60% of the highest demand occurring in any month of the past 12 months, ending with the current month.		

Notes:

(1) This schedule also be applied to government agency or state enterprise, which is industrial, if the maximum demand from 30 to 499 kW.
(2) For below 11 kV. delivery, the Demand Charge will be increased 3 Baht/kW.
(3) For delivery at 69 or 115 kV., the Demand Charge will be reduced 2 Baht/kW.
(4) If demand and energy meter is installed on the load side of the transformer, another 2% must be added to both total demand and energy consumption to be calculated in accordance with Schedules under 4.1 and 4.2 above, to cover the unmeasured transformer loss.
(5) In any month during which the maximum demand does not reach 30 kW. the charge will be changed to follow Schedule 2. However, the charge shall not be less than the above Minimum Charge.
(6) Applications for the use of Schedule 4 must be under the regulation of setting up the industry plant and approved by PEA.'s Central Office and a Purchase Contract must be made.

5. Large Industrial Service

Application

Electric service for industry at a plant and its adjoining area, with a maximum 15 - minute integrated demand of 500 kW. or over and supplied at a voltage of not less than 11 kV.

Monthly Rate

5.1 Demand Charge :	All kW. of maximum demand	95.00	Baht/kW.
5.2 Energy Charge :	First 200 kWh per kW. of maximum demand	1.44	Baht/kWh.
	Next 280 kWh per kW. of maximum demand	1.43	Baht/kWh.
	Over 480 kWh per kW. of maximum demand	1.41	Baht/kWh.

Minimum Charge : The monthly charge, calculated from 5.1 plus 5.2 or calculated from Note (5) below, shall not be less than Demand Charge which calculated from 60% of the highest demand occurring in any month of the past 12 months, ending with the current month.

Notes:

(1) This schedule also be applied to government agency or state enterprise, which is industrial, if the maximum demand from 500 kW. or over,
(2) For below 11 kV. delivery, the Demand Charge will be increased 2 Baht/kW.
(3) For delivery at 69 or 115 kV., the Demand Charge will be reduced 5 Baht/kW.
(4) If demand and energy meter is installed on the load side of the transformer, another 2% must be added to both total demand and energy consumption to be calculated in accordance with Schedules under 5.1 and 5.2 above, to cover the unmeasured transformer loss.
(5) In any month during which the maximum demand does not reach 500 kW. the charge will be changed to follow Schedule 4. However, the charge shall not be less than the above Minimum Charge.
(6) Applications for the use of Schedule 5 must be under the regulation of setting up the industry plant and approved by PEA.'s Central Office and a Purchase Contract must be made.

6. Agricultural Pumping and Public Water Pumping Service

Application

Electric service for agricultural pumping having a combined load of not less than 25 horsepower and electric service for public water pumping of all capacities, which is proceed by government or agricultural group or agricultural cooperative, by being served through a single meter. Daily load during 18.00 - 21.000 hours is prohibitted.

Monthly Rate

Energy Charge :			
First 100 kWh or less		117.00	Baht
Over 100 kWh (101 up)		1.17	Baht/kWh.

Minimum Charge : 117.00 Baht/month.

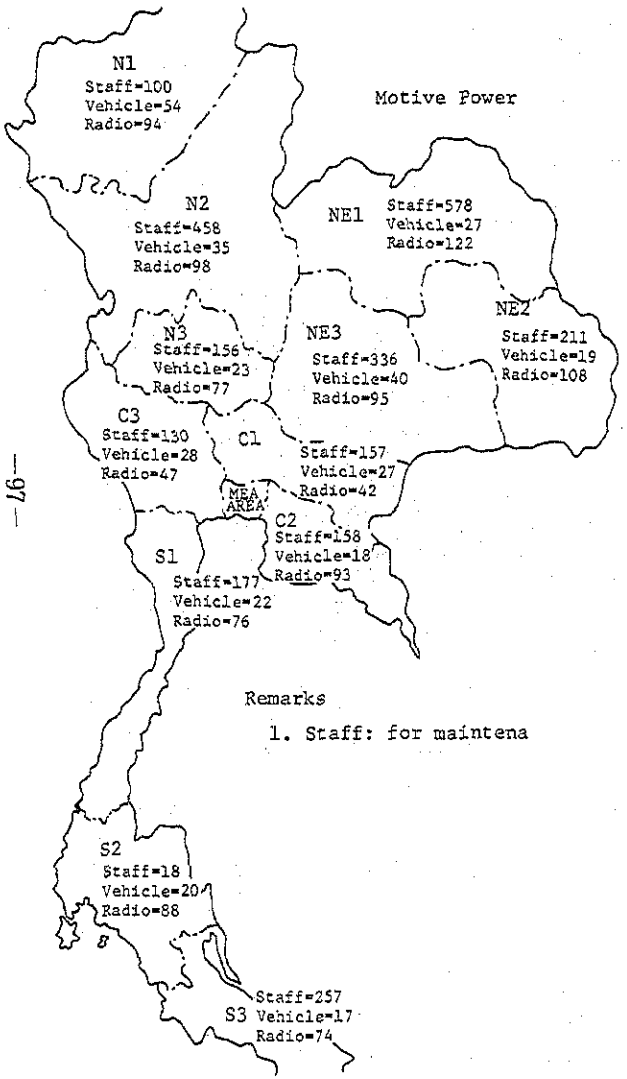
Notes:

(1) In case using the agricultural pumping during 18.00 - 21.00 hours, PEA.'s Central Office will change to the other higher rate.
(2) Application for using Schedule 6 must be first approved by PEA.'s Central Office.

These electric rate schedules effect form April 1, 1983.

Provincial Electricity Authority
Bangkok, Thailand
April 8, 1983

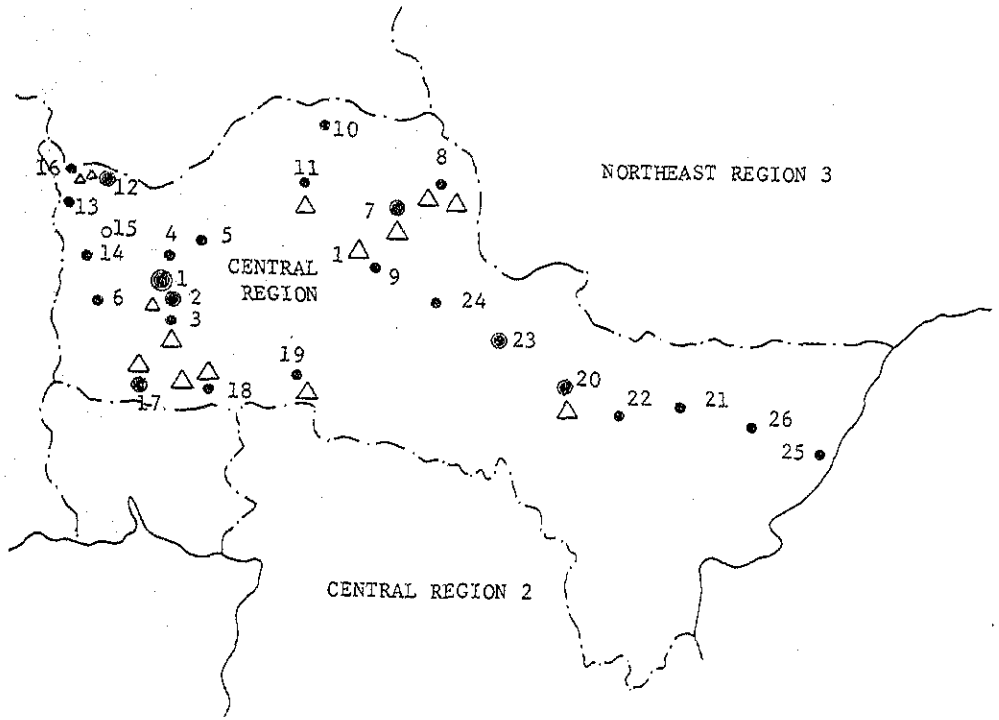
Facilities and Motive Power



Facilities and Motive Power

facilities

		Substation			Distribution Line						Telc communication			office	
		No.of Tr	Capacity (MVA)	No.of CB or Recloser	Voltage	Length (Km)	Equipment				TYPE	Friquence (MHZ)	No.of channel	Provincial	District
							Recloser	Switch	Regulator	Switching Capacity					
CENTRAL	Region1	18	466	91	22kv	7087.0	15	113	5	5	VHF UHF	165.60,171.35 457.025,460.175	1 1		
	Region2	19	510	56	22kv	6084.0	17	166	4	2	VHF	165.55,171.30	1		
	Region3	15	1408.3	52	22kv	8566.12	19	134	3	1	VHF UHF	165.55,171.30 457.125,460.275	1 1		
	Total	52	1384.3	199	—	21737.12	51	413	12	8	—	—	—		
NORTHERN	Region1	28	243.1	46	11kv 22kv 33kv	925.0 4446.0 2253.0	27	201	7	13	VHF UHF	165.50,171.25 165.55,171.30 457.025,460.175	2 1		
	Region2	13	234	36	22kv	7256.0	25	209	8	8	VHF	165.60,171.35 165.65,171.40	2		
	Region3	10	197.7	24	22kv	6616.0	25	192	8	5	VHF	165.55,171.30	1		
	Total	51	675.8	106	—	21496.0	77	602	23	26	—	—	—		
NORTHEAST	Region1	17	292.9	41	22kv	11824.0	64	267	13	9	VHF	165.60,171.33 165.65,171.40	2		
	Region2	13	258.2	26	22kv	11768.0	55	153	7	9	VHF	165.50,17.25	1		
	Region3	16	270.5	49	22kv	736.30	26	268	17	4	VHF	165.50,171.25 165.55,171.30	2		
	Total	46	821.6	116	—	30955.0	145	688	37	22	—	—	—		
SOUTHERN	Region1	12	250.0	36	22kv 33kv	3850.0 350.0	26	145	2	1	VHF	165.60,171.35	1		
	Region2	18	307.5	41	33kv	5626.0	15	76	4	1	VHF	165.55,171.30	1		
	Region3	9	193.0	24	33kv	5059.0	30	99	7	1	VHF	165.55,171.30	1		
	Total	39	750.5	101	—	14876.0	71	320	13	3	—	—	—		
GRAND TOTAL		188	3632.2	522	—	89064.12	344	2023	85	59	—	—	—		

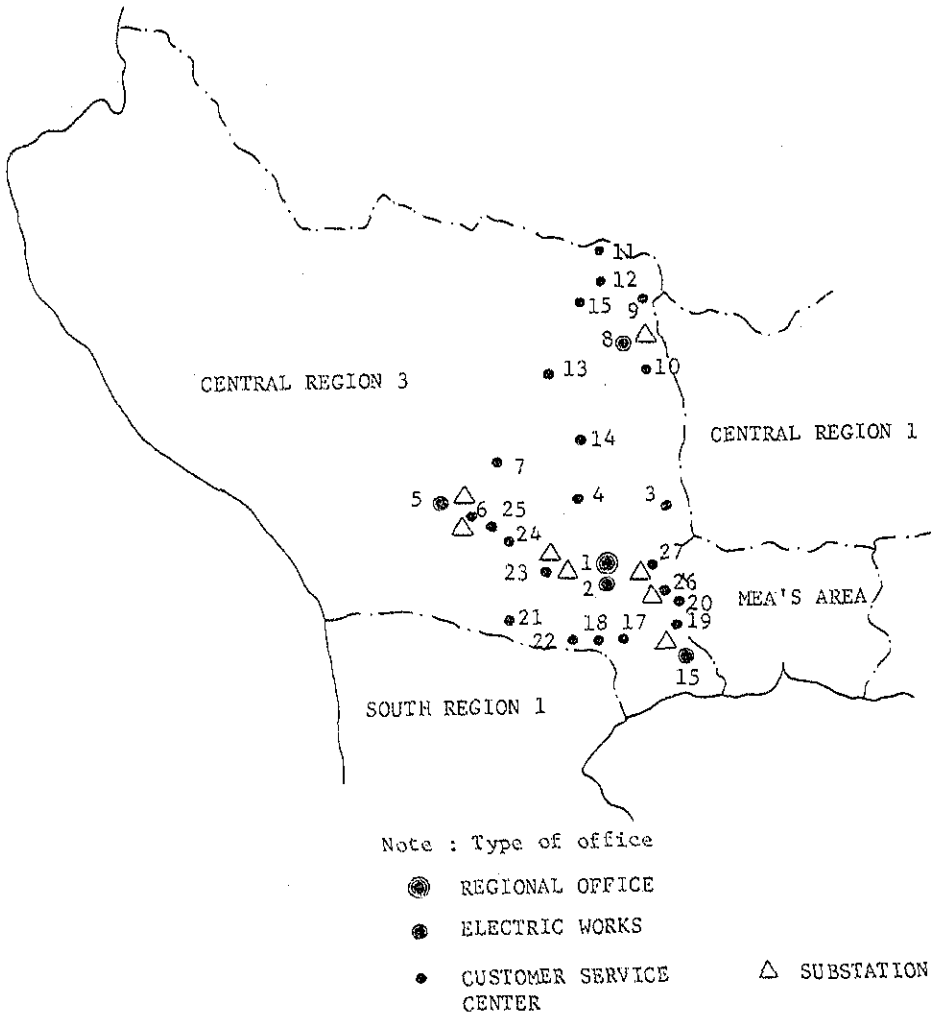


Note: Type of office

- ◉ REGIONAL OFFICE
- ◉ ELECTRIC WORKS
- • CUSTOMER SERVICE CENTER
- △ SUBSTATION

Number or staffs and Vehicles for maintenance in Central Region 1

No.	PEA Offices	No. of Staffs	No. of Vehicles	No. of VHF	NO, UHF
1	Ayutthaya	12	2	2	1
2	Ayutthaya	11	1	2	-
3	Bang Pa In	2	1	1	1
4	Gang Pra Han	2	1	1	-
5	Nakhonluang	2	1	1	-
6	Sena	5	1	1	-
7	Sara Buri	16	1	2	-
8	Khaeng Khoi	2	1	1	-
9	Hin Kong	2	1	1	-
10	Praphuttabat	4	1	2	-
11	Tharua	4	1	1	-
12	Angthong	7	1	2	-
13	Viset-Chai-Chan	2	1	1	-
14	Phukhai	2	1	1	-
15	Pamok	2	1	1	-
16	Phothong	2	1	1	-
17	Pathumthani	8	1	1	1
18	Rangsit	25	1	4	2
19	Thanya Buri	2	1	-	1
20	Prachin Buri	9	1	2	-
21	Kabin Buri	2	1	1	-
22	Simahapho	2	1	1	-
23	Nakhon Nayok	7	1	2	-
24	Banna	2	1	1	-
25	Aranyaprathet	14	1	1	-
26	Sakaeo	2	1	2	-
	Total	157	27	36	6



Number or staffs and Vehicles for maintenance in Central Region 3

No.	PEA Offices	No. of Staffs	No. of Vehicles	No. of VHF	No. UHF
1	Nakhonpathom	10	2	2	1
2	Nakhonpathom	12	1	2	1
3	Bang Len	2	1	1	1
4	Kamphaengsaen	2	1	1	1
5	Kanchana Buri	10	1	1	1
6	Thamuang	2	1	1	1
7	Phanomthun	2	1	1	1
8	Suphun Buri	10	1	1	1
9	Siprachan	2	1	1	-
10	Bangprama	2	1	1	-
11	Doembangnangbuat	2	1	1	-
12	Samchuk	2	1	1	-
13	Uthong	2	1	1	1
14	Songphinong	2	1	1	-
15	Donchedi	2	1	1	-
16	Samut Sakhon	12	1	1	1
17	Banphaeo	2	1	1	-
18	Donphai	2	1	1	-
19	Krathumbaen	4	1	1	1
20	Omnoi	2	1	1	1
21	Photharm	7	1	1	1
22	Damnoensaduak	2	1	1	1
23	Banpong	11	1	1	1
24	Thamaka	2	1	1	1
25	Tharua	2	1	1	1
26	Samphran	18	1	1	1
27	Nakhonchaisi	2	1	1	1
	Total	130	28	29	18

Power Plant Facilities

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Notes
NR1	CHIANG RAI	CHIANG RAI PROVINCE		8,251		SPARE	
	CHIANG KHONG	CHIANG KHONG, CHIANG RAI PROVINCE		318		"	
	PI	PI, CHIANG RAI PROVINCE		565		"	
	CHIANG DAO	CHIANG DAO, CHIANG PROVINCE		1,236		"	STOP OPERATE 1986
NR2	MAE SOD	MAE SOD, TAK PROVINCE		4,700		"	
	NAKHONTHAI	NAKAHONTHAI PHITSANULOK PROVINCE		720		"	
	CHATTRAKRAN	CHATTRAKRAN, PHITSANULOK PROVINCE		725		"	
	SA	SA, NAN PROVINCE		1,250		"	
NER1	DAN SAI	DAN SAI, LOEI PROVINCE		556		"	
	CHIANG KAN	CHIANG KAN, LOEI PROVINCE		1,178		"	
	BUNG KRAN	BUNG KRAN NONG KHAI PROVINCE		668		"	

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Note
CR2	TAPHRAYA	TAPHRAYA, PRACHINBURI PROVINCE		205		SPARE	
	TRAD	TRAD PROVINCE		1,326		"	
	KHLONG YAI	KHLONG YAI, TRAD PROVINCE		432		"	
SR1	KRABURI	KRABURI, RANONG PROVINCE		165		"	STOP OPERATE 1987
	TUBLEE	TUBLEE, CHUMPHON PROVINCE		165		"	" 1987
SR3	BAETONG	BAETONG, YALA PROVINCE		3,151		"	
	YALA	YALA PROVINCE		6,064		"	" 1987
	SATUN	SATUN PROVINCE		1,600		"	" 1988

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Note
NR2	PHOPPHRA	PHOPPHRA, TAK PROVINCE		220		PERMANENT	
	AUMPHANG	AUMPHANG, TAK PROVINCE		450		"	
	THA SONG YANG	THA SONG YAN, TAK PROVINCE		634		"	
CR2	KO SICHANG	KO SICHANG, CHONBURI PROVINCE		630		"	
	KO LAN	KO LAN, CHONBURI PROVINCE		335		"	
CR3	SUNGKLABURI	SUNGKLABURI, KANCHANABURI PROVINCE		665		"	
SR2	KO SAMUI	KO SAMUI, SURAT THANI PROVINCE		1,968		"	
	KO PANGUN	KO PANGUN, SURAT THANI PROVINCE		485		"	
	KO LANTA	KO LANTA, KRABI PROVINCE		192		"	
	KO YAO	KO YAO, HANNGA		165		"	

Table 4-1 Power plant

Region	Name	Location	Type	Capacity (kW)	No. of Units	Project Objective	Notes
NR1	MAE HONG SON	MAE HONG SON, MAE HONG SON PROVINCE		1,390		PEAK LOAD	receiving from PHABONG DAM
	MAE SARIANG	MAE SARIANG MAE HONG SON PROVINCE		2,343		"	
	FHANG	FHANG, CHIANG MAI PROVINCE		5,871		"	receiving from MAE KUM LUANG DAM
NR2	NAN	NAN, NAN PROVINCE		6,744		"	
	BAO	BAO, NAN PROVINCE		2,060		"	
CR2	ARAYAPHRATHET	ARAYAPHRATHET, PRACHINBURI PROVINCE		2,459		"	receiving from PRACHINBURI SUBSTATION
SR2	LAEM TALUMPUK	LEAM TALUMPUK, NAKAHON SI THAMMARAT		75		"	receiving from NAKHON SI THAMMARAT SUBSTATION

Substation Facilities

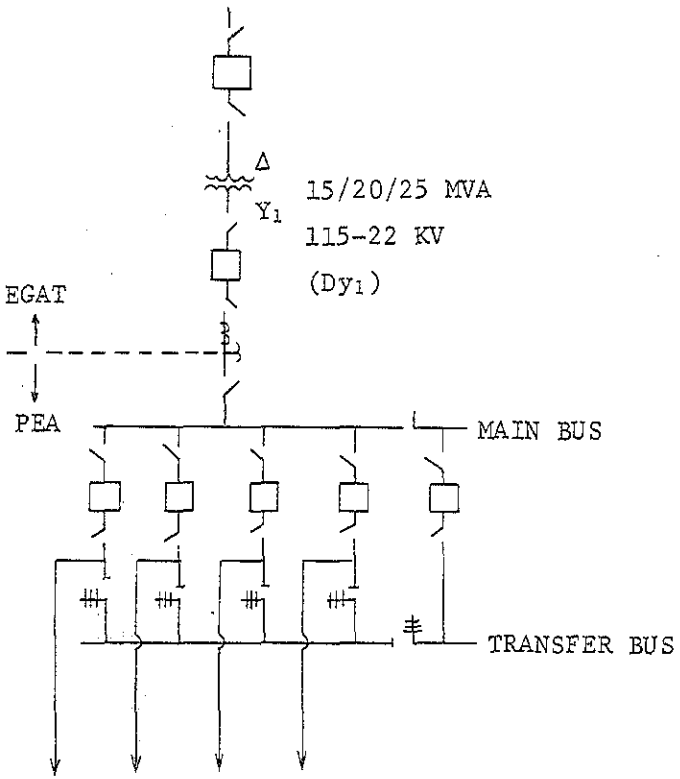
SUBTATION AND HIGH VOLTAGE DISTRIBUTION
FEEDERS BY REGION IN THAILAND

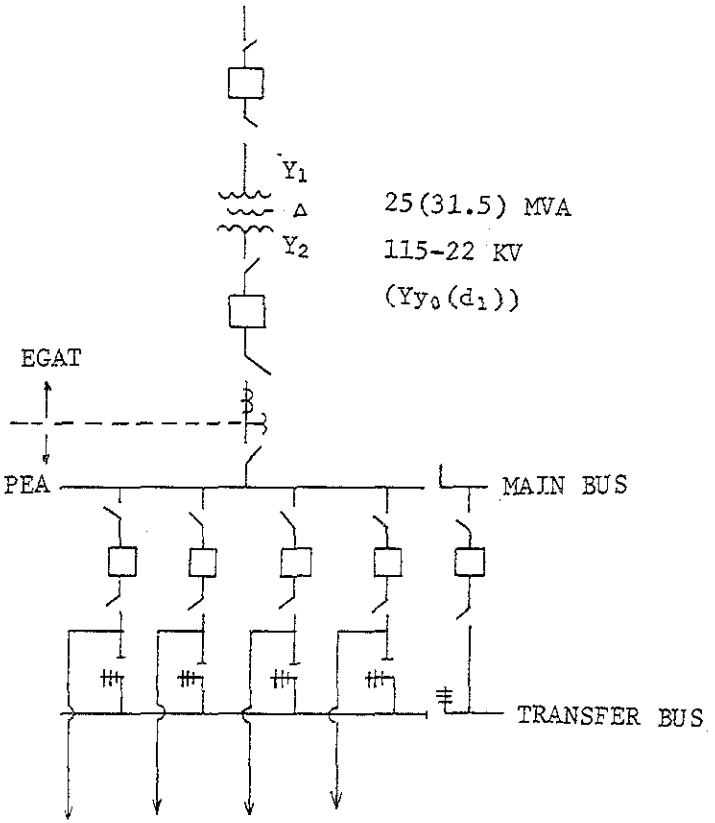
REGION		NO. OF SUBSTATION	NO. OF FEEDER
NORTHERN REGION	NORTHERN REGION 1	11	49
	NORTHERN REGION 2	9	35
	NORTHERN REGION 3	6	28
CENTRAL REGION	CENTRAL REGION 1	13	58
	CENTRAL REGION 2	11	54
	CENTRAL REGION 3	8	59
NORTHEASTERN REGION	NORTHEASTERN REGION 1	12	47
	NORTHEASTERN REGION 2	8	33
	NORTHEASTERN REGION 3	8	50
SOUTHERN REGION	SOUTHERN REGION 1	9	33
	SOUTHERN REGION 2	11	29
	SOUTHERN REGION 3	8	23
	TOTAL	114	498

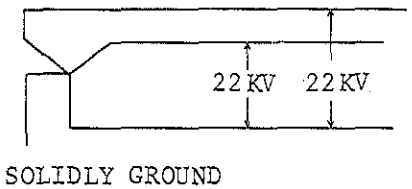
Substation facilities

	CENTER					NORTH					NORTHEAST					SOUTH				
	SUBSTATION NAME	NO. X CAPACITY (MVA)	SYSTEM VOLTAGE (KV)	CB TYPE	CB NO.	SUBSTATION NAME	NO. X CAPACITY (MVA)	SYSTEM VOLTAGE (KV)	CB TYPE	CB NO.	SUBSTATION NAME	NO. X CAPACITY (MVA)	SYSTEM VOLTAGE (KV)	CB TYPE	CB NO.	SUBSTATION NAME	NO. X CAPACITY (MVA)	SYSTEM VOLTAGE (KV)	CB TYPE	CB NO.
REGION 1	THALAN	1×6 1×25	6.6 22	R	A	CHIANG MAI 1	1x13.3	11	R	3	UDONTHANI 1	1x31.5	22	R	3	PHETCHABURI	2x12.5	22	B	4
	BANMAI	2x40	22	SF6	11	CHIANG MAI 2	2×25.0 1×13.3	11/22	B	9	UDOMTHANI 2	2x25	22			SAMUTSONGKHRAN	1x25.0	22	M	4
	BANG PA-IN	1x25	22	B	5	LAMPHUN 1	3×3.3 1×6.5 1×1.0	22	R	2	KHON KAEN	2x25	22	V	6	RATCHABURI 1	2x12.5	22	R M	1 3
	PRACHIN BURI	2x25	22	B	9	LAMPHUN 2	1x13.3	22	B	8	NAMPHONG	1x22.5	22			RATCHABURI 2	1x25.0	22	R	2
	AYUTTHAYA	2x12.5	"	R	4	MAE HONG SON	1×1.0 1×1.0	22	R	2	PHANGKHON	2x13	22	V	4	CHA-AM	2x20.0	22	R V	1 5
	ANGTHONG 1	1x10	"	R	1	FANG	1×4.0 2×2.0	22	R	2	SAKONNAKHON	1x23	22	B	4	PRAN BURI	1x25.0	22	M	4
	ANGTHONG 2	1x25	"	R	3	LAMPANG 1	3×6.5 1×5.0	11	M	5	NONGKHAI	1x31.5	22	B	2	PRACHUAPKHIRIKHAN	1x25.0	22	V	4
	SARABURI 1	1x25	"	M	7	THOEN	2x2.5	11	R	1	LOEI	1x25	22			CHUMPHON	1x25.0	22	V	5
	SARABURI 2	1x25	"	M	5	CHIANG RAI	2x25.0	33	B	8	CHUMPHAE	3x6.25	22	R	3	RANONG	1x25.0	33	M B	2 1
	SARABURI 3	1x25	"	M	4	PHA YAO	1×25.0 1×16.7	33	B	4	NAN PHUNG	1x3.6	22	B	1					
	SARABURI 4	1x25	"	M	5	MAE SARIANG	1×7.0 2×0.8	22	M	2	THATPHANOM	1x6.5	22	R	2					
	BANGKHAN	2x40	6.6 22								NAKHONPHANOM	1x12.5	22							
	PATHUMTHANI	1x40	6.6 22	SF6	7		(28)					(17)								
	TOTAL	(18) 166	-		91	TOTAL	(28)245.1			46	TOTAL	292.85			41	TOTAL	(12)250.0			36
REGION 2	CHANTHABURI	2x25	22	M	7	PHITSANULOK 1Y2		22	B	7	UBONRATCHATHANI	2x31.5	22	B	5	NAKHONSRITHAMMARAT	2x25.0	33	B	6
	CHACHOENSAO	2x25	"	V	7	PHICHIT	1x25.0	22	B	4	MAHASARAKHAM	2x25	22	B	2	PHUNPHIN	2x25.0	33	B	5
	CHONBURI	2×25 1×40	"	V	10	KAMPHAENG PHET	2x12.5	22	V	4	YASOTHOM	2x25	22	V	3	THUNG SONG	2x13.0	33	B	3
	BAN BUNG	1x25	"	V	6	SUKHOTHAI	1x25.0	22	B	5	SOMDET	1x6.25	22	R	3	LAMPOORA	4x7.5	33	B	5
	BANG LAMUNG	2x25	"	V	8	UTTARADIT	1x25.0	22	B	4	SISAKET	2×10 1×25	22	V	4	PHUKET 1	2x25.0	33	M B	3 2
	RAYONG 1	2x25	"	M M	1 4	TAK	1x12.5	22	M	3	YALASIN	1x25	22	V	4	KRABI	1x25.0	33	B	2
	RAYONG 2	1x25	"	R	2	PHARE	2x25.0	22	B	5	MUKDAHAN	1x13	22	R	3	PHANG NGA	1x13.0	33	R	2
	RAYONG 3	2x40	"	B	4	NAN	1x4.0	22	M	3	SIRINDHON	1x6	22	B	2	TAKUA PA	1x6.0	33	B	2
	STRACHA	2x12.5	"	M	4	STRIKIT	1x5.0	22	R	1						KHANOM	1x25.0	33	B	2
	AO PHAI	1x40	"	R	2											CRIEOLAN	1x7.5	33	B	1
	SATTAHIP 2	1x25	"	M	1											PHUKET 2	1x25.0	33	B	3
												(13)					(18)			
	TOTAL	(19)510			56	TOTAL	(13)234			36	TOTAL	258.25			26	TOTAL	307.5			41
REGION 3	KANCHANABURI	1x25	22	M	3	LOPBURI 1		22	B	6	NAKHONRATCHASIAM 1	2x31.5	22	M	10	YALA	2x25.0	33	B	5
	THAMUANG	1x13.3	"	B	4	SING BURI	1x25.0	22	B	3	NAKHONRATCHASIMA 2	1x25	22	V	10	PHATTALUNG	1x25.0	33	M	1
	NAKHONCHAISI	1×40 2×25	"	B	7	MANOROM	2x12.5	22	V	3	STKHIU	1x31.5	22	V	8	HATYAI 1		33	B	9
	SAMUT SAKHON 1	2x25	"	M B	1 9	TAKHLI 2	1x6.25	22	R	2	PAKCHONG	1x25	22	V	4	NARATHIWAT	1x25.0	33	B	4
	SAMPHAN	2x40	"	B	8	NAKHON SAWAN	2x40.0	22	M	6	SURIN	2x25	22			BANG LANG	1x7.5	33	B	1
	SUPHANBURI	2x25	"	B V	1 4	PHETCHABUN	1x25.0	22	M	4	BURIRAM	2x12.5	22			SADAO	1x7.5	33	B	4
	BANPONG 1	2x25	"	V	7						PHON	1x25	22	V	5	NAKHONSRITHAMMARAT	-			
	BANPONG 2	2x25	"	B	8						CHAIYAPHUM	2x13	22	V	4	LAMPOOLA	-			
	TOTAL	(15)408.3			52	TOTAL	(10)198.7			24	TOTAL	(16)270.5	22		49	TOTAL	(9) 193			24
	GRAND TOTAL	(52) 1384.3			199	GRAND TOTAL	(51)675.8			106	GRAND TOTAL	(46) 821.60			116	GRAND TOTAL	(39)750.5			101

TYPE OF CB: SF_6 : SF_6 CIRCUIT BREAKER
B -
V - VACUUM
R - Recloser
M - Minimumoil

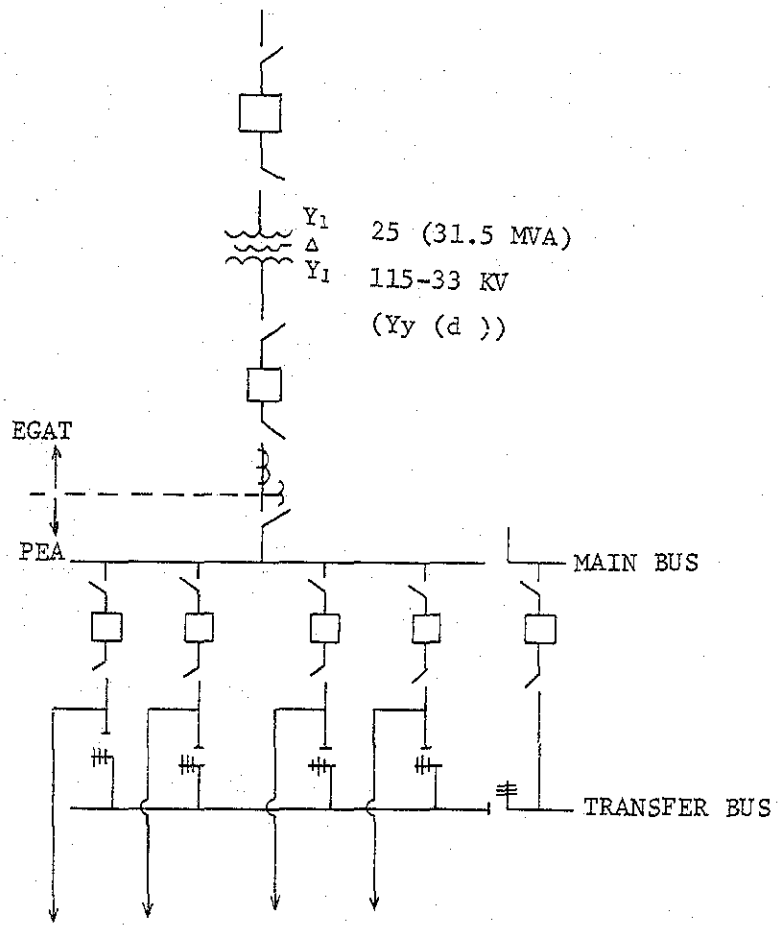




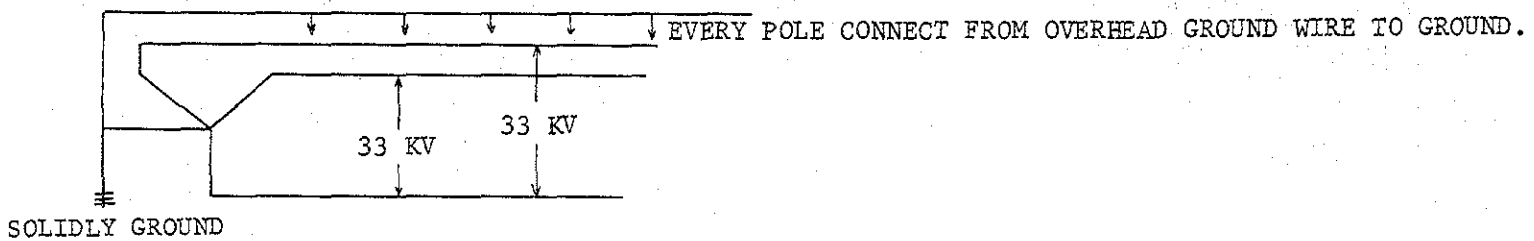


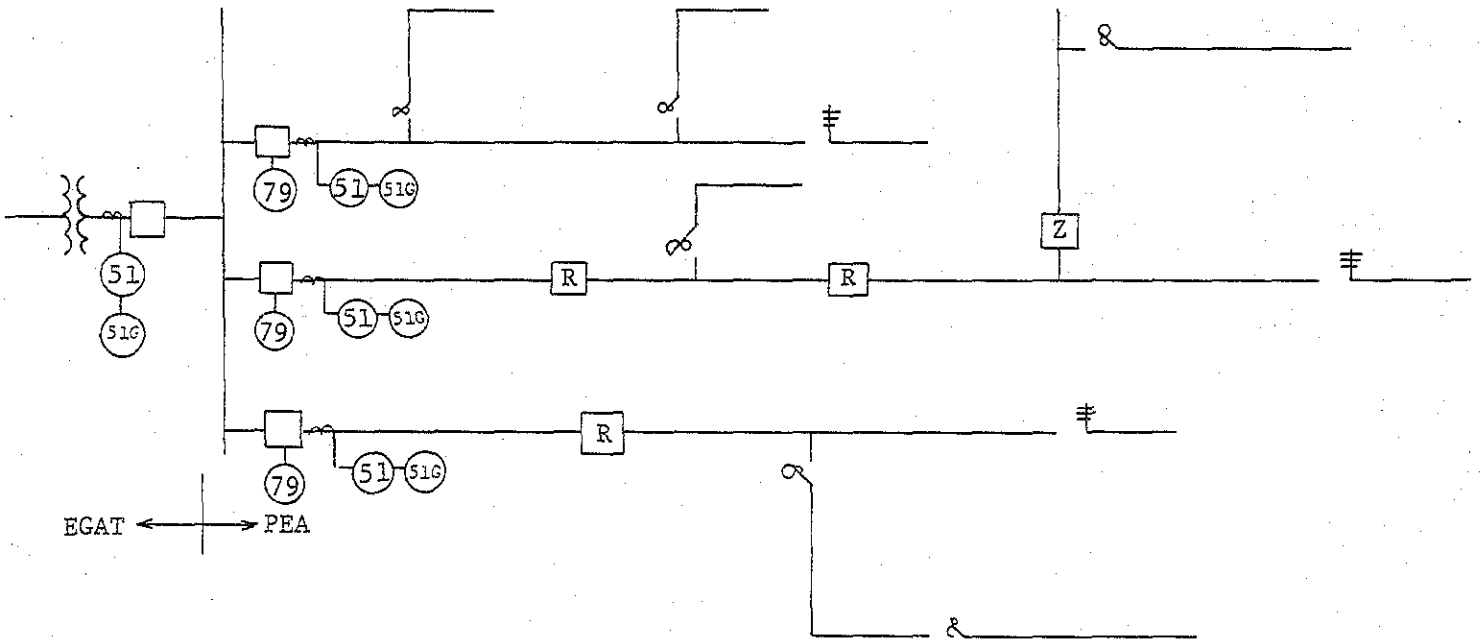
LEGEND

	CIRCUIT BREAKER
	DISCONNECTING SWITCH, NORMALLY CLOSE
	TRIPPLE POLE AIR BREAK SWITCH, NORMALLY OPEN
HV LV	TWO WINDING TRANSFORMER WITH HV/LV VOLTAGE
HV LV	THREE WINDING TRANSFORMER WITH HV/LV/TV VOLTAGE
TV	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER



FOR 33 KV SYSTEM (3 PHASE 4 WIRE) THE POWER TRANSFORMER AT SUBSTATIONS ARE ALL THREE WINDING.



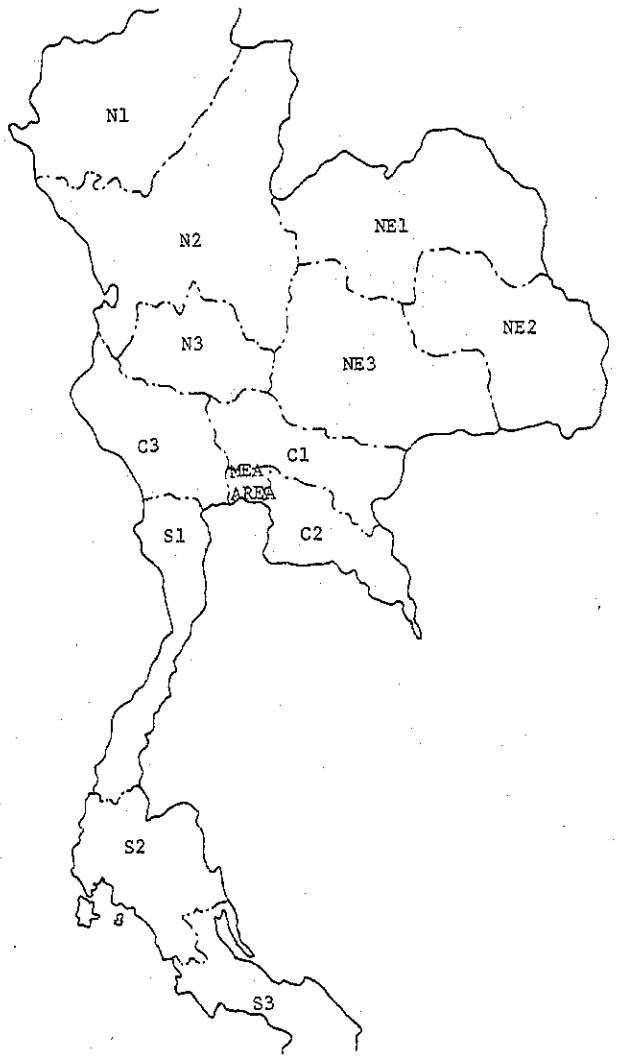


LEGEND

- CIRCUIT BREAKER
- AUTOMATIC RECLOSER
- AUTOMATIC SECTIONALIZER
- DROPOUT FUSE CUTOUT
- TRIPPLE POLE LOAD BREAK SWITCH

- (51) 3 PHASE OVERCURRENT RELAY
- (51G) EARTH FAULT RELAY
- (79) MULTISHOT AUTO RECLOSE RELAY

Fault Record of Pistribution Line

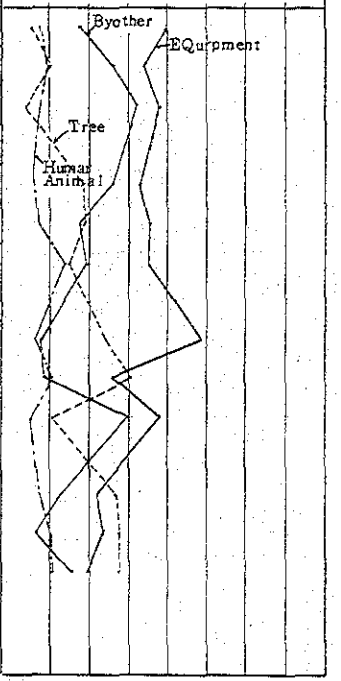


Fault Record Crassified By Reason

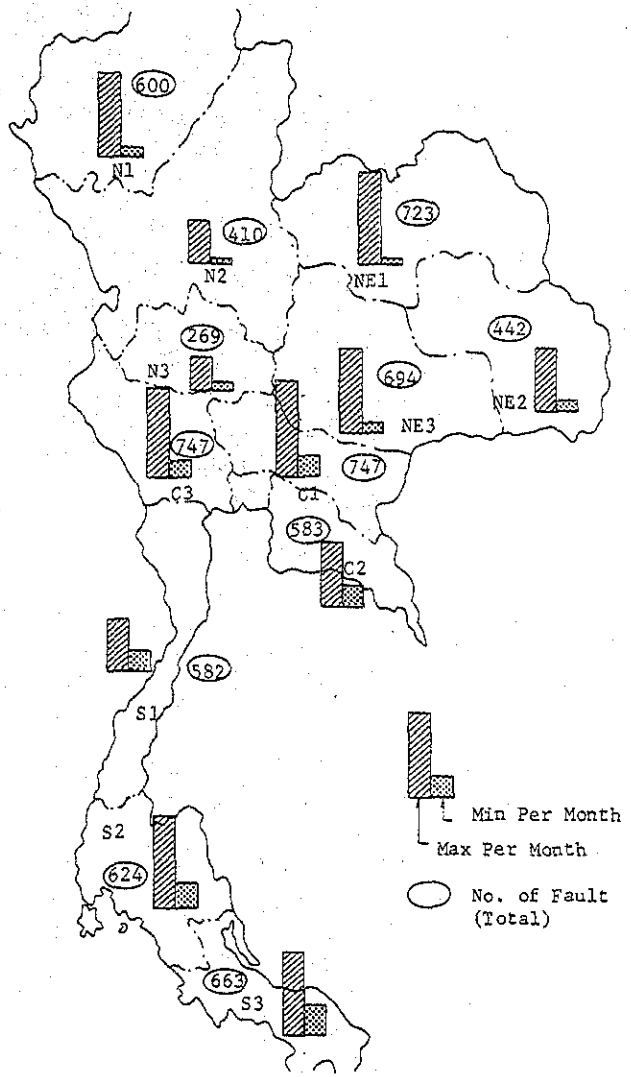
(JAN'85~DEC'85)

		BY TREE	BY Hu MAN ANi Mal	BY EQUIP-MENT	BY OTHER	UN-KNOWN	TOTAL
CENTRAL	Region1	40	57	302	138	210	747
	Region2	62	56	199	152	114	583
	Region3	33	53	277	243	141	747
	Total	135	166	778	533	465	2077
NORTHERN	Region1	112	40	202	160	86	600
	Rigion2	74	30	147	70	89	410
	Region3	41	38	95	53	42	269
	Total	227	108	444	283	217	1279
NORTHEAST	Region1	178	42	352	55	96	723
	Region2	135	46	115	38	108	442
	Region3	78	37	262	210	107	694
	Total	391	125	729	303	311	1859
SOUTHERN	Region1	158	45	130	76	173	582
	Region2	173	64	150	44	193	624
	Region3	184	71	132	107	169	663
	Total	515	180	412	227	535	1869
GRAND TOTAL		1268	579	2363	1345	1528	7084

Graph



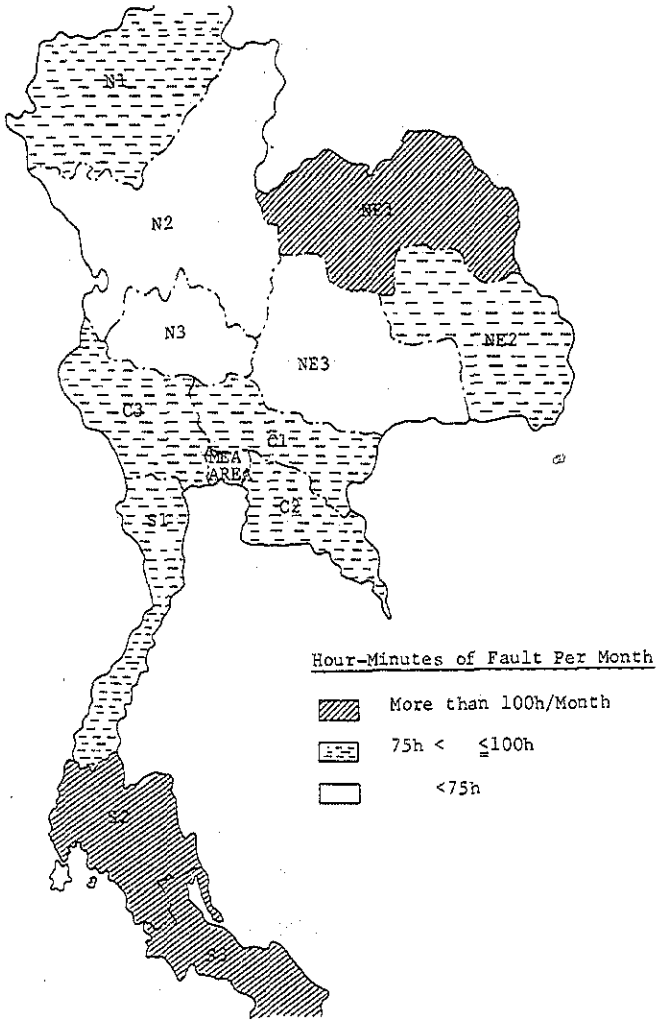
Remarks : Except plan and Branch Line
By others : Liging Natural



FAULT RECORD of DISTRIBUTION LINE (Number of Fault)

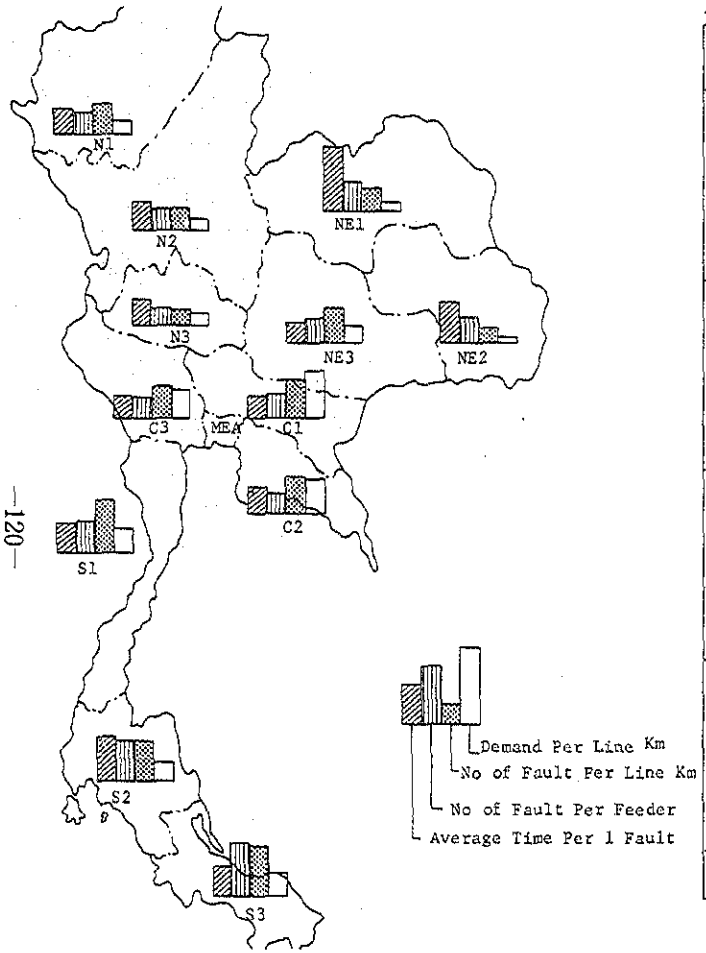
		'85 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	'85 DEC	Total	AVR/Mon
CENTRAL	Region1	24	25	55	80	79	63	87	88	113	53	50	30	747	62.25
	Region2	26	24	38	59	71	59	44	74	62	53	40	33	583	48.58
	Region3	20	27	28	55	97	72	78	63	105	79	67	56	747	62.25
	Total	70	76	121	194	247	194	209	225	280	185	157	119	2077	173.08
NORTHERN	Region1	35	33	61	17	98	87	61	46	73	46	30	13	600	50.00
	Region2	7	63	31	39	50	43	32	20	40	33	42	10	410	34.17
	Region3	10	14	20	27	40	13	17	14	26	34	30	24	269	22.42
	Total	52	110	112	83	188	143	110	80	139	113	102	47	1279	106.58
NORTHEAST	Region1	8	65	43	78	108	98	83	72	56	46	32	34	723	60.25
	Region2	17	12	27	20	75	44	74	41	37	45	29	21	442	36.83
	Region3	12	24	48	64	101	69	80	93	91	40	39	33	694	57.83
	Total	37	101	118	162	284	211	237	206	184	131	100	88	1859	154.92
SOUTHERN	Region1	25	25	40	53	54	67	63	64	41	52	64	34	582	48.50
	Region2	30	41	31	60	87	109	54	42	41	34	56	39	624	52.00
	Region3	32	33	48	60	63	51	59	96	60	35	59	67	663	55.25
	Total	87	99	119	173	204	227	176	202	142	121	179	140	1869	155.75
GRAND TOTAL		246	386	470	612	923	775	732	713	745	550	538	394	7084	590.33

Remarks : Except Plan and Branch Line



Fault Record of Distribution Line (Hour Minutes of Fault)

		'85 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	'85 DEC	Total	AVR/ Mon
CENTRAL	Region1	17.23	16.51	197.35	109.56	95.21	48.13	59.50	77.45	134.17	37.42	58.07	56.53	909.53	75.49
	Region2	54.15	33.10	60.29	84.25	113.56	78.04	47.31	188.03	76.27	86.58	54.56	30.35	908.51	75.44
	Region3	25.04	38.25	52.55	79.36	156.37	61.14	90.30	62.19	155.52	112.05	68.12	48.54	951.43	79.19
	Total	96.42	88.26	310.59	273.57	365.54	187.31	197.51	328.07	366.36	236.45	181.117	136.22	2770.27	230.52
NORTHERN	Region1	50.33	57.0	157.13	20.27	153.38	80.23	60.53	84.59	121.49	63.48	41.05	42.09	934.04	77.50
	Region2	27.24	188.02	47.38	92.54	71.43	74.52	40.36	59.11	83.01	55.44	33.45	14.50	789.40	65.48
	Region3	3.23	26.32	13.23	48.54	88.13	15.01	15.18	26.23	33.25	67.15	47.09	31.21	416.17	34.41
	Total	81.20	271.41	218.14	162.15	313.34	170.16	116.47	170.33	238.15	186.47	121.59	88.20	2140.01	178.20
NORTHEAST	Region1	48.17	370.25	397.53	211.20	243.51	216.21	202.29	324.31	235.39	134.17	55.06	152.41	2592.50	216.04
	Region2	40.25	33.40	68.55	29.22	105.37	99.51	154.16	163.39	72.54	174.36	52.20	35.25	1031.00	85.55
	Region3	18.54	30.34	57.40	138.43	158.03	49.31	84.06	71.17	93.32	56.25	34.38	55.03	848.26	70.42
	Total	107.36	434.39	524.28	379.25	507.31	365.43	440.51	559.27	402.05	365.18	142.04	243.09	4472.16	372.41
SOUTHERN	Region1	37.31	36.58	53.57	93.35	115.21	171.36	85.23	147.53	51.46	60.39	128.08	103.16	1086.03	90.30
	Region2	47.15	68.26	89.06	186.19	203.18	355.55	117.42	99.54	91.40	79.22	100.21	82.41	1521.59	126.50
	Region3	45.43	60.04	74.33	106.18	83.44	68.33	120.21	268.11	110.18	75.48	119.32	182.49	1315.54	109.40
	Total	130.29	165.28	217.36	386.12	402.23	596.04	323.26	515.58	253.44	215.49	348.01	368.46	3923.56	326.60
GRAND TOTAL		416.07	960.14	1271.117	1201.49	1569.27	1319.34	1078.55	1574.05	1260.04	1004.39	793.21	836.37	13306.40	1108.53



Amalysis of Fault Data Demand

Data at 1985 (MWH/)

		Number of INT Ⓐ	Time of INT Ⓑ	Ar Time Ⓑ/Ⓐ	Number of Feeder Ⓒ	Line Length Ⓓ	Ⓐ/Ⓒ	Ⓐ/Ⓓ	Demand GWh Ⓔ	Demand km Ⓔ/Ⓓ	Special Custemer
CENTRAL	Region1	747	909.53	1.13	58	7087.0	12.88	0.105	1756.3	247.8	(53) 143
	Region2	583	908.51	1.33	54	6084.0	10.80	0.096	1113.2	183.0	(53) 282
	Region3	747	951.43	1.16	59	8566.1	12.66	0.087	1421.2	165.9	(67) 178
	Total	2077	2770.27	1.20	171	21737.1	12.15	0.095	4290.7	197.4	(173) 603
NORTHERN	Region1	600	934.04	1.33	49	7624.0	12.24	0.079	579.4	76.0	(4) 219
	Region2	410	789.40	1.55	35	7256.0	11.71	0.056	517.0	71.3	(1) 131
	Region3	269	416.17	1.32	28	6616.0	9.61	0.040	504.3	76.2	(3) 126
	Total	1279	2140.01	1.40	112	21196.0	11.42	0.059	1600.7	74.5	(8) 176
NORTHEAST	Region1	723	2592.50	3.35	47	11824.0	15.38	0.061	609.5	51.5	(12) 201
	Region2	442	1031.00	2.19	33	11768.0	13.39	0.037	405.4	34.4	(4) 81
	Region3	694	848.26	1.13	50	7363.0	13.88	0.094	682.8	92.7	(32) 194
	Total	1859	4472.16	2.24	130	30955.0	14.30	0.060	1697.7	54.8	(48) 476
SOUTHERN	Region1	582	1086.03	1.51	33	4200.0	17.64	0.138	567.5	135.1	(12) 83
	Region2	624	1521.59	2.26	29	5626.0	21.52	0.110	580.5	103.2	(19) 157
	Region3	663	1315.54	1.59	23	5050.0	28.83	0.131	577.5	114.4	(15) 198
	Total	1869	3923.56	2.05	85	14866.0	21.99	0.125	1725.5	116.0	(46) 438
GRAND TOTAL		7084	13,306.40	1.52	498	89064.12	14.22	0.079	9314.60	104.6	(275) 1993

Remarks : Except Planand Branch Line

Distribution System Dispatching Center

Distribution System Dispatching Center

1. Objective

1.1 To control high voltage distribution system which emphasize on efficiency, reliability, economy and safety

1.2 To organize, collect data reports and authorize about distribution system between substations

2. Structure

Distribution System Dispatching Center are divided in-to 6 units are as follow :

2.1 Distribution System Dispatching center at PEA Head office

2.2 Distribution System Dispatching center at Regional electric works

2.3 Provincial electric works

2.4 District electric works

2.5 Communal electric works

2.6 Distribution Control station

The operation system between eachunits are shown in chart

3. Duty and Responsibility

3.1 Distribution System Dispatching Center at PEA Head office

3.1.1 System Analysis and Planning Section 10 persons

- Sets up and organizes all regulations, standards and operations electric dispatching system
- Analysis, planning and providing electric dispatching system for more efficiency, reliability, economy and safety
- Apply new technology, consider new equipment to be use in PEA electrical system
- Training the DDC staff

3.1.2 Dispatching Center Section 6 persons

- Cooperates with Distribution System Dispatching Center at Regional electric works on solving problem which occur in that area

3.1.3 Operational System Control Section (North, Northeast, Central, South) 7 persons 7 persons 7 persons 6 persons

- Authorizes the Distribution System Dispatching Center at Regional electric works, including, set up the amount of staff members, provide the facilities and training the officers to have experiences with electric dispatching system
- Solves and rectifies electric dispatching problem

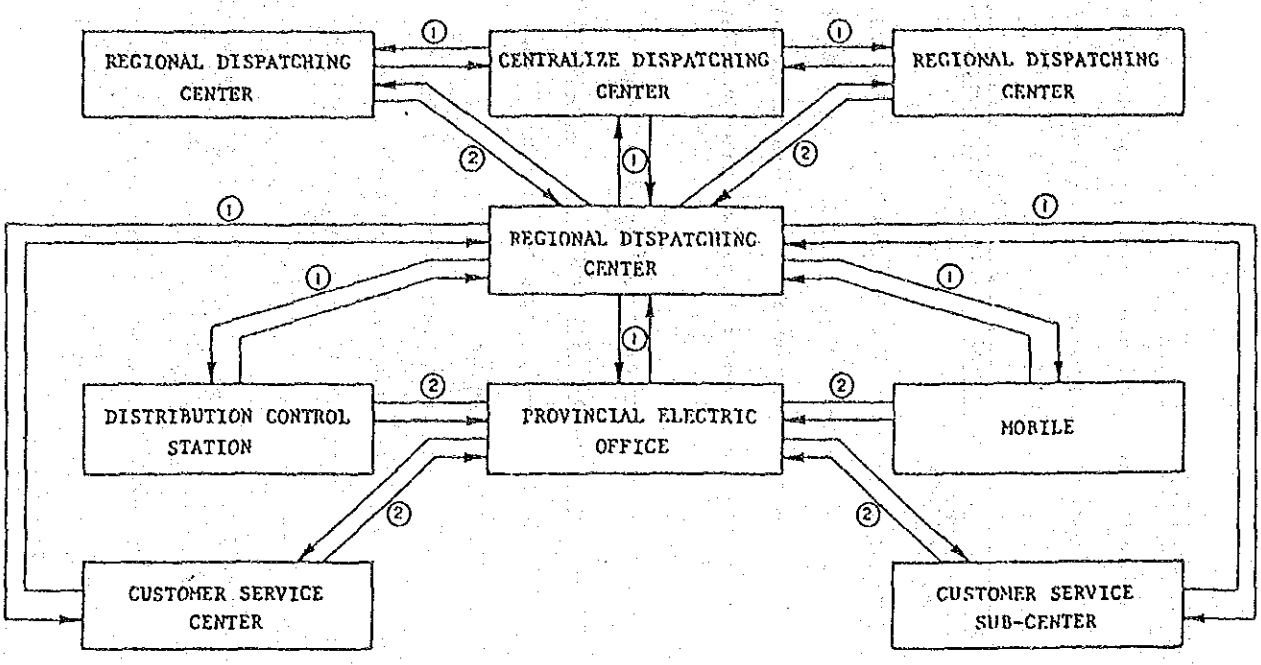
3.2 Distribution System Dispatching Center at Regional electric works

- Controls electric dispatching system for more efficiency, reliability, economy and safety
- Co-ordinates and organizes the operation of each departments that involve with high voltage distribution system such as solves and rectifies electric problems, transfer loads, energize and deenergize electricity through the system

3.3 Provincial electric works, District electric works, Communal electric works, and Distrubution Control station

- Co-operates with Regional electric works Distrubution System Dispatching Center
- Controls electric dispatching system
- Solves and retifies electric problems

OPERATIONAL SYSTEM OF PEA DISPATCHING CENTER

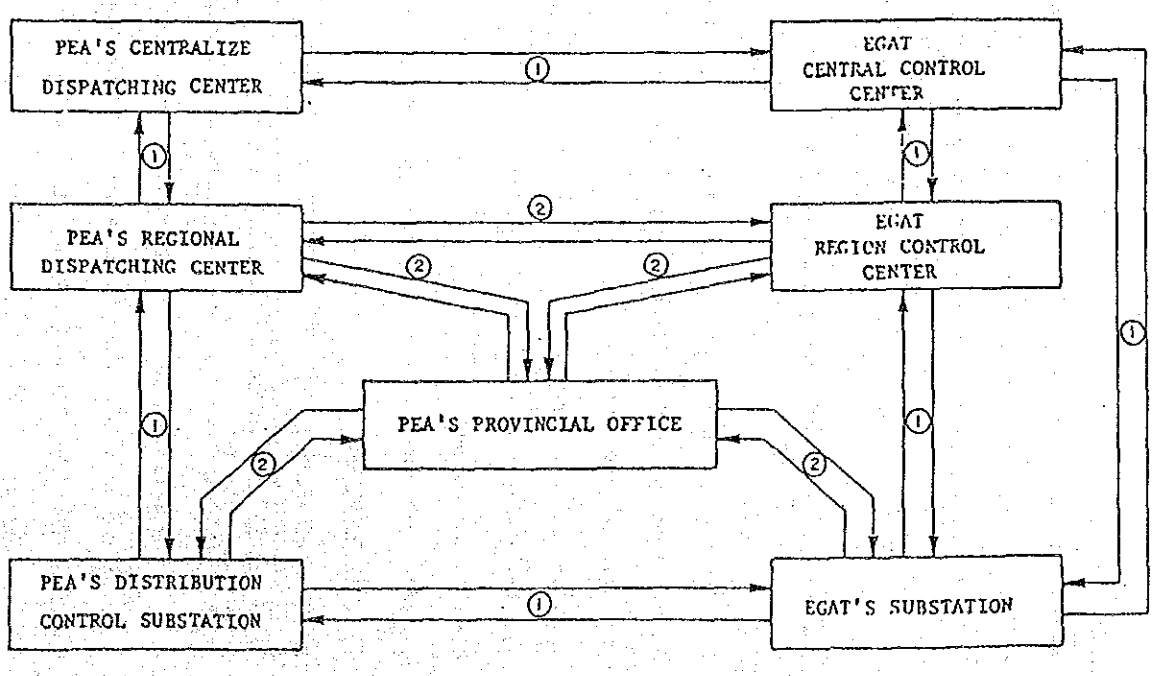


NOTE : ① FORMAL COMMUNICATION

② INFORMAL COMMUNICATION

OPERATIONAL SYSTEM OF PEA DISPATCHING CENTER

RELATING TO EGAT CONTROL CENTER

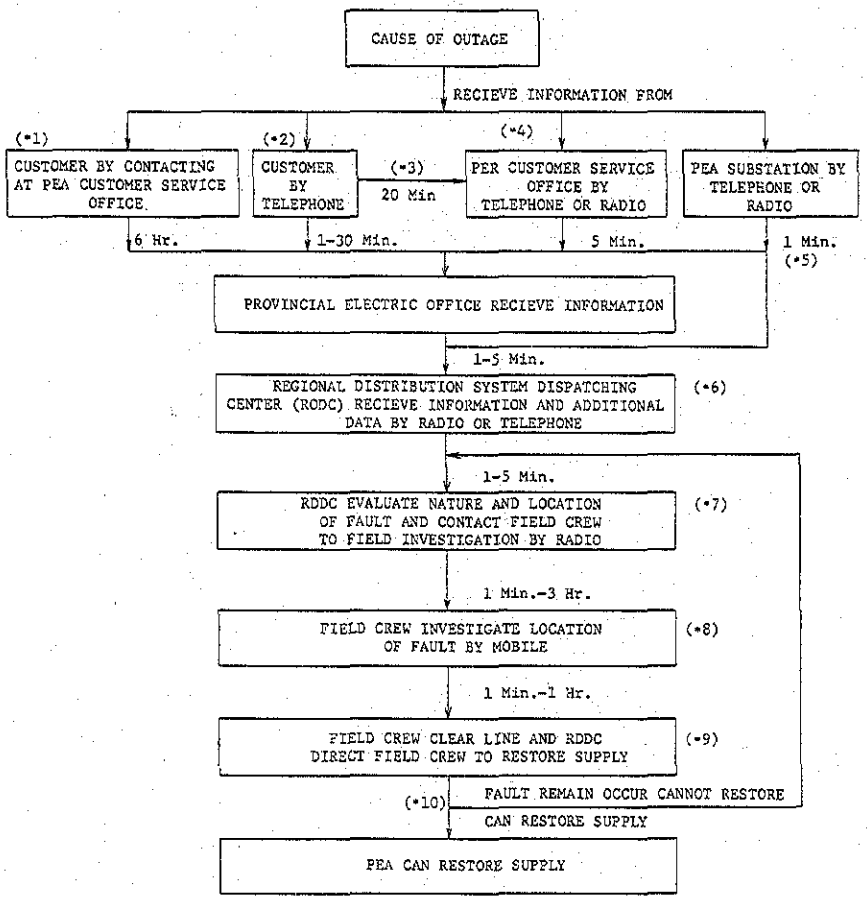


NOTE : ① FORMAL COMMUNICATION

② INFORMAL COMMUNICATION

PEA DISTRIBUTION SYSTEM DISPATCHING CENTER

REACTION TO CAUSE OF OUTAGE



CONCLUSION

1. Total time to restore supply when recieve information from customer between 5 Min.-9 Hr. 40 Min.
2. Total time to restore supply when recieve information from PEA office between 3 Min.-4 Hr. 15 Min.

〔Explanation in Japanese〕

(*1) 電話等情報連絡手段を有しない需要家からは直接ＰＥＡの営業所へ苦情申込みがあっている。

(*2) 同上で電話を有する需要家からの連絡。

(*3) ＰＥＡ営業所での電話受付後内容調査のうえ営業所へ連絡。

(*4) ＰＥＡ営業所から停電範囲に含まれる場合，営業所から営業所へ直接連絡。

(*5) 変電所のＣＢ動作時には変電所から営業所へ連絡。規模に応じて支店指令所への直接連絡。

(*6) 事故情報は支店指令所に報告され，支店指令のもとに調査が開始されるとともに中央指令所（本社）への電話連絡を行う。

(*7) 各地区に配置されたメンテナンス要員への調査依頼。

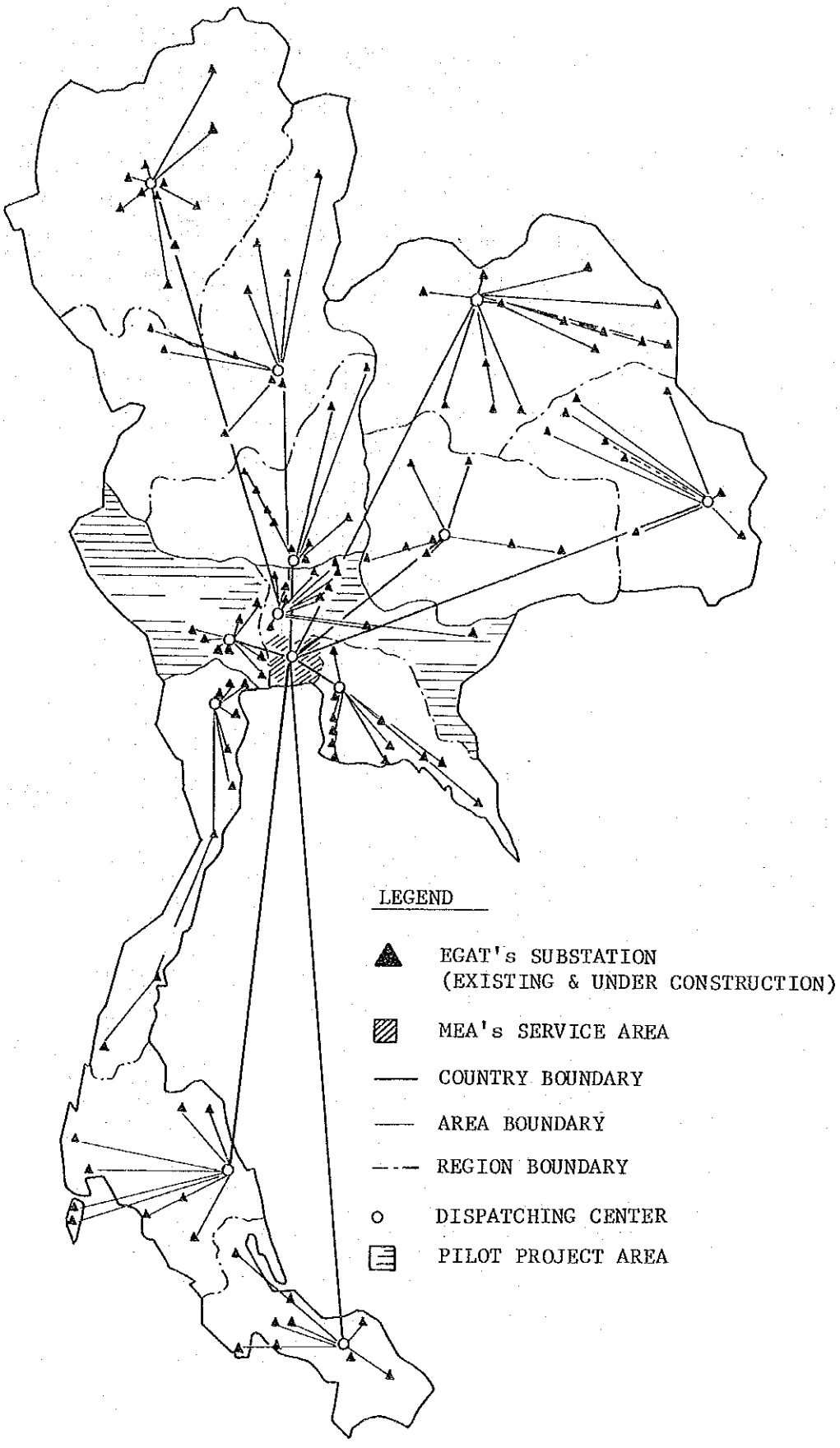
(*8) 車両を使ってパトロールを実施。

(*9) 復旧作業。

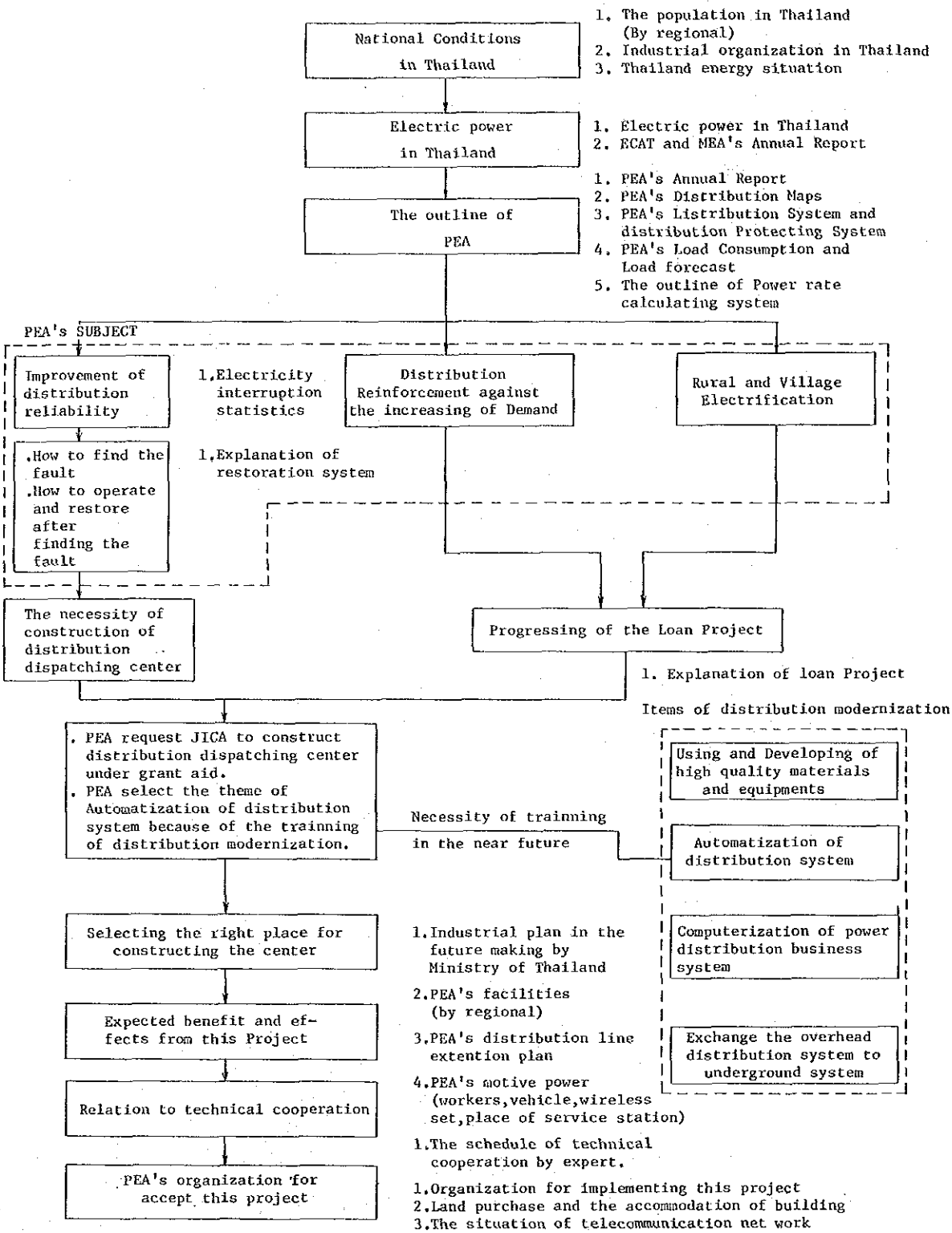
(*10) 復旧作業困難な場合は再度ＲＤＤＣは状況を報告して再指令を仰ぐ。

Step for PEA Scada System

LOCATION MAP OF PROPOSED DISPATCHING CENTERS AND SUBSTATIONS



EXPLANATION FLOW



Step for PEA Scada system

1st stage Scada system for central area region 3

Step 1 1. Install scada equipments at regional dispatching center for the purpose of doing this activity in the future:

1.1 monitor and record status and alarm signals of all protective and switching equipments in this region

1.2 control the operations of all circuit breaker reclosers and important switches in this region

1.3 monitor and record load and voltage of all feeders of all substations in this region

1.4 show the faulted sections in all areas of this region

2. Install RTU equipments in substation at least 3 substations for communication with scada equipment at regional dispatching center and doing all operation ordering from regional dispatching center

3. Install RTU equipments in one office for conversing pilot wire signals received from remote reclosers or switches (at least 10 units) and 20 remote C.T. to radio signal and send to regional dispatching center or vice versa

4. Install pilot wires between RTU at PEA office and 10 remote reclosers or switches and 20 remote current transformer to perform the function in 1.1, 1.2 and 1.4

5. Install 20 sets of current transformer and current magnitude detector to send magnitude of current in that section to RTU at PEA office and regional dispatching center to perform the function in 1.4

6. Install 10 sets of FRU at recloser or switches to communicate with RTU at office and regional dispatching center to perform the function in 1.1 and 1.2

Step 2 Install more equipment to expand the scada system through-out the whole area of this region

2^{nd} stage Scada system for central area region 1

3^{rd} stage Scada system for central area region 2

The function of scada system in the second and third stage are the same as the first stage.

参考資料　１１

Distribution System Dispatching Training

（現状）

DISTRIBUTION SYSTEM DISPATCHING TRAINING COURSE

1. Objective

To promote the working knowledge of PEA's personnel concerning with Distribution System Dispatching

2. Training Subjects

2.1 Structure and Equipment in Control Station

2.2 AC/DC Board

2.3 Switch

2.4 Circuit Breaker

2.5 Recloser (Hydraulic & Electronic)

2.6 Voltage Regulator

2.7 Relay

2.8 Control Board

2.9 Line Co-ordination

2.10 Battery Charger

2.11 Battery

3. Training Methodologies

3.1 Lecture in the classroom with visual aids such as

- Overhead projector
- Slide projector
- Video tape

3.2 Practice

- at Control Station Site
- at Working Site

4. Trainees - Technicians

5. Number of trainees per course - about 30 persons

6. Duration of training - 8 days

（計画）

DISTRIBUTION SYSTEM DISPATCHING TRAINING

1. Objective

To promote the working knowledge of PEA's personnel concerning the Distribution System Dispatching

2. Training Subjects

2.1 Structure and Equipments of Dispatching System

(1) Data transmission device

- Master terminal unit
- Remote terminal unit
- Feeder remote unit

(2) Man-machine interface devices

- Dispatching console
- Control panel
- CRT
- Typewriter, etc.

(3) Computer

(4) Communication system

- Radio wave and communication line
- Communication control unit

(5) Power source

(6) Circuit breaker

(7) Recloser

(8) Sectionalizing switch

2.2 Functions of Dispatching System

(1) Data aquisition

(2) Data processing

(3) Data logging

(4) Display

(5) Supervisory control

(6) Fault detection and isolation

(7) Service restoration

2.3 Operation Procedure

3. Training Methodologies

2.1 Lecture in the classroom with texts, manuals and visual aids such as

- Overhead projector
- Slide projector
- Video tape

2.2 Practice

- at Training center by means of simulator
- at Pilot dispatching center
- at Control station
- at Working site

4. Trainees

Engineers and Technicians

5. Number of trainees per course - about 30 persons

6. Duration of training - 10 days

7. Number of trainees to be trained

Dispatching center at Head office	43 persons
Dispatching center at Regional electric works	120
Control station	480
Operation & maintenance section	2400
Total	3043

参考資料　１２

PEAからのJICA研修員受入れ実績

ｹﾝｼｭｳｲﾝ　ｼﾒｲ,（ｶﾅﾒｲ）	ﾅｲﾀｲ	ﾀｲﾆﾁ ｷｶﾝ	ｹﾝｼｭｳ ｶﾓｸ	ｼｮｿﾞｸ ｻｷ　ﾒｲ, ﾌﾞｶ, ﾁｲ	ｼｮｿﾞｸ ｻｷ　ｼﾞｭｳｼｮ
7600260	10	76.07.29	ﾊｲﾃﾞﾝｷﾞｼﾞｭﾂ ｺｰｽ	METROPOLITAN ELECTRICITY AUTHORITY	121, CHAKPET ROAD,
MR. SUCHARIT NILLAKAMHAENG		76.10.21			BANGKOK 2, THAILAND
	3901		(76-A0160)	PROJECT ENGINEERING DEPT.	
(ﾀｲ)		(2-1-43)		CHIEF OF THE POWER SISTEM	
7601193	10	76.04.29	ｶﾘｮｸﾊｯﾃﾞﾝ ｺｰｽ	ELECTRICITY GENERATING AUTHORITY OF	BANG-KRUAY, NONTHABURI,
MR. SUMYOS POLACHAN		76.07.24		THAILAND	THAILAND
	3901		(76-A0056)	NORTH BANGKOK POWER PLANT	
(ﾀｲ)		(2-2-47)		2ND. GRADE SHIFT CHARGE ENGINEER	
7602108	10	76.10.21	ﾃﾞﾝｷｼﾞｷﾞﾖｳｹｲｴｲ ｺｰｽ	METROPOLITAN ELECTRICITY AUTHORITY	121 CHAKRAPETCH ROAD,
MR. SIRI TANDHAVATANA		76.12.11			BANGKOK, THAILAND
	3901		(76-A0153)		
(ﾀｲ)		(2-2-42)		ENGINEER	
7602109	10	76.10.21	ﾃﾞﾝｷｼﾞｷﾞﾖｳｹｲｴｲ ｺｰｽ	METROPOLITAN ELECTRICITY AUTHORITY	121 CHAKRAPETCH ROAD,
MR. SUANG MOOGDACANTONG		76.12.11			BANGKOK, THAILAND
	3901		(76-A0153)	THE SECTION OF DISTRIBUTIUN SYSTEM	
(ﾀｲ)		(2-2-42)		ENGINEER	
7605232	10	75.07.31	ﾊｲﾃﾞﾝｷﾞｼﾞｭﾂ ｺｰｽ		
MR. CHAINAPONG PINYO		75.10.23			
	3901		(76-A0160)		
(ﾀｲ)		(2-1-40)			
7605233	10	75.07.31	ﾊｲﾃﾞﾝｷﾞｼﾞｭﾂ ｺｰｽ		
MR. VICHITCHEEP SONSAK		75.10.23			
	3901		(76-A0160)		
(ﾀｲ)		(2-1-40)			
7605727	24	74.04.23	ﾃﾞﾝﾘｮｸ ｺｳｶﾞｸ		
MR. SOMEHET THIEMHUANG		77.05.31			
	3901				
(ﾀｲ)		(- -00)			
7700286	10	77.05.05	ｽｲﾘｮｸﾊｯﾃﾞﾝ ｺｰｽ	ELECTRICITY GENERATING AUTHORITY	ELECTRICITY GENERATING
MR. THAI NGARMCHARLEE		77.07.23		OF THAILAND	AUTHORITY OF THAILAND,
	3901		(77-A0055)	SUBSTATION ENGINEERING DESIGN	BANGKOK THAILAND
(ﾀｲ)		(3-1-54)		SUBSTATION DESIGN ENGINEER	
7700898	10	77.07.21	ﾊｲﾃﾞﾝｷﾞｼﾞｭﾂ ｺｰｽ	PROVINCIAL ELECTRICITY AUTHORITY	PROVINCIAL ELECTRICITY
MR. VIROCH CHARUVON		77.10.07			AUTHORITY 200 NGAMWONGWAN
	3901		(77-A0160)	PROJECT AND PLANNING DIVISION	BANGKHEN BANGKOK
(ﾀｲ)		(3-1-53)		CHIEF OF PROJECTING AREAS SECTION	
7701748	10	77.10.20	ﾃﾞﾝｷｼﾞｷﾞﾖｳｹｲｶｲ ｺｰｽ	PROVINCIAL ELECTRCITY AUTHORITY	BANGKOK THAILAND
MR. CHUTHARAT LEERABHANDH		77.12.10			
	3901		(77-A0153)	NORTH-EASTERN AREAS	
(ﾀｲ)		(3-1-56)		REGIONAL MANAGER	

ｺﾝｼｭｳｲﾝ ｼﾒｲ,(ｼﾞﾆﾒｲ)	ｹｲﾀｲ	ﾒﾝﾆｭｳ ﾋﾂﾞｹ	ｺﾝｼｭｳｲﾝ ｶﾀｸ	ｼｮｿﾞｸ ﾘｷ ﾒｲ, ﾌﾞｶ, ﾁｲ	ｼｮｿﾞｸ ﾌｷ ｼﾞｭｳｼｮ
7701846	24	77.10.10	ﾊｲﾃﾞﾝ ｶﾝｹｲ ｼｻﾂ ｶﾝﾘ	PRUVINCIAL ELECTRICITY AUTHORITY	PRUVINCIAL ELECTRICITY
MR. SUBSAK NITISARINGKARN		77.12.25			NGAMDUNGWAN ROAD BANGKHEN
	3901			ENINEERING DIVISION	BANGKOK THAILAND
(ﾀｲ)		(3-1-52)		CHIEF OF CONSTRUCTION STANDARD	
7702640	24	78.02.09	ｽｲﾘｮｸ ﾊｯﾃﾞﾝ	NATIONAL ENERGY ADMINISTRATION	PIBULTHAM VILLA BANGKOK
Mr. NIYOM MAPRAJUNG		78.03.31			THAILAND
	3901			INVESTIGATION AND PLANNING DIVISION	
(ﾀｲ)		(3-1-51)		CIVIL ENGINEER	
7801294	10	78.09.07	ﾊｲﾃﾞﾝｷﾎﾞｼﾞｭﾂ ｺｰｽ	PROVINCIAL ELECTRICITY AUTHORITY	200 NGAMDUNGWAN RD
MR. SURAI SUDABAN		78.11.25			BANGKHEN BANGKOK 9
	1001		(78-A0160)	PROJECT CONSTRUCTION DIVISION	THAILAND
(ﾀｲ)		(3-1-53)		CHIEF	
7801718	24	78.10.12	ﾊｲﾃﾞﾝ ｷﾎﾞｼﾞｭﾂ	PROVINCIAL ELECTRICITY AUTHORITY	200 NGAM DUNG WAN BANGKOK
MR. HAITREE LAKSANAKOSES		78.12.23			THAILAND
	1001			PROJECT & PLANNING DIVISION	
(ﾀｲ)		(3-1-51)		CHIEF OF SECTION	
7802921	26	79.05.20	ﾁｶﾗ ｴﾈﾙｷﾞｰ	THE DEPT. OF MINERAL RESOURCES	THE DEPT. OF MINERAL
MR. AMNUAYCHAI		79.06.02			RESOURCES BANGKOK 4
THIENPRASERT	3901			ECONOMIE GEOLOGY DIV,	THAILAND
(ﾀｲ)		(3-1-57)		SENIOR GEOPHYSICIST	
7802922	26	79.05.20	ﾁｶﾗ ｴﾈﾙｷﾞｰ	CHIANG MAI UNIVERSITY	CHIANG MAI THAILAND
MR. TAVISAKDI RAMINGWONG		79.06.02			
	3901			DEPT OF GEOLOGICAL SCIENCES	
(ﾀｲ)		(3-1-57)		ASST. PROFESSOR	
7802923	26	79.05.20	ﾁｶﾗ ｴﾈﾙｷﾞｰ	ELECTRICITY GENERATING AUTHORITY	BANGKRUAI NONPHABURI
MR. C. ASA		79.06.02			THAILAND
BHOTIRUNGWIYAKORN	3901			NATURAL ENERGY SECTION	
(ﾀｲ)		(3-1-57)		HEAD	
7901306	10	79.08.30	ﾊｲﾃﾞﾝｷﾎﾞｼﾞｭﾂ ｺｰｽ	METROPOLITAN ELECTRICITY AUTHORITY	JARG PET RD. BANGKOK
MR. KIREE SANGIAMPONG		79.11.17			THAILAND
	1001		(79-A0160)	YANNAWA DISTRICT CUSTOMER SERICE	
(ﾀｲ)		(3-1-53)		HEAD ASSISTINT	
7902019	24	79.10.25	ﾊｲﾃﾞﾝ ｷﾎﾞｼﾞｭﾂ	PROVINCIAL ELECTRICITY AUTHOR	200 NGAM SONG NAN ROAD
MR. SUVIN LAOHAPRASIT		79.12.22			BANGKOK 9 THAILAND
	1001			ENGINEERING DEPT.	
(ﾀｲ)		(3-1-56)		CHIEF OF SPECIFICATION SECTION	
7903006	24	80.04.10	ｽｲﾘｮｸ ﾊｯﾃﾞﾝ ｹｲｶｸ	ELECTRICITY GENERATING AUTHORITY OF	RAMA 4 BRIDGE KRUNGTHONBURI
MR. PAYAK RATNARATHORN		80.06.03		THAILAND	THAILAND
	1001			PLANNING DEPT.	
(ﾀｲ)		(3-1-56)		CHIEF OF WATER RESOURCES PLANNING	

ケンシュウイン シメイ，（クニメイ）	ケイタイ	タイニチ キカン	ケンシュウ カモク	ショゾク サキ メイ，ブカ，チイ	ショゾク サキ ジュウショ
7903007 MR. BHEANCHAI SUTTHIRUANGVONG (タイ)	24 1001	80.04.10 80.06.03 (3-1-58)	スイリョク ハツデン ケイカク	ELECTRICITY GENERATION AUTHULITY OF THAILAND SYSTEM PLANNING DIV. THECHNICIAL CLASS 6	PRAKAM 6 RD. NONTHABURI THAILAND
8000149 MR. CHAMRAT SAHAPANYARAT (タイ)	10 1001	80.05.07 80.07.28 (3-1-58)	スイリョクハツデン コース (80-A0055)	PROVINCIAL ELECTRICITY AUTHORITY GENERAL CONSTRUCION HEAD OF CIVIL WORK CONSTRUCTION	200 NGAMVONGVAN RD. BANGKOK THAILAND
8000156 MR. JIAMSAK WANTANAWATE (タイ)	10 1001	80.05.08 80.07.26 (3-1-55)	カリョクハツデン コース (80-A0056)	PROVINCIAL ELECTRICITY AUTHORITY ENGINEERING DEPT. TRAINING INSTRUCTOR	200 NGAM WONG WAN ROAD BANGKHEN BANGKOK 9 THAILAND
8001502 MR. ANAN KRATUEHON (タイ)	10 1001	80.08.27 80.11.15 (3-1-53)	ハイデンギジュツ コース (80-A0160)	PROJECT CONSTRUCTION DIVISION 1ST GRADE ENGINEER	200 NGAM WONG WAN ROAD BANGKHEN BANGKOK 9 THAILAND
8001503 MR. PAIROJ SAKHAKURU (タイ)	10 1001	80.08.27 80.11.15 (3-1-53)	ハイデンギジュツ コース (80-A0160)	METROPULITAN ELECTRICITY AUTHORITY DISTRIBUTION DEPT.	112 WATLIEB BANGKOK THAILAND
8002072 MR. RUKPONG BEJRACHANDRA (タイ)	10 1001	80.10.02 80.11.29 (3-1-56)	デンキジギョウケイエイ コース (80-A0153)	METROPOLITAN ELECTICITY AUTHORITY POWER ECONOMICS DIVISION SECTION CHIEF LOAD RESEARCH	121 CHAKAPET ROAD JAGUKUK THAILAND
8100311 MR. AKSORN SRISAHASDI (タイ)	10 1001	81.05.07 81.07.25 (3-1-55)	カリョクハツデン コース (81-A0056)	ELECTRICITY GENERATING AUTHORITY OF THAILAND NORTH BANGKOK POWER PLANT SHIFT CHARGE ENGINEER	NONDHABHURI BANGKUAY BANGKOK THAILAND
8100442 MR. RADEJ SANGSAWANG (タイ)	24 1001	81.05.10 81.06.05 (3-1-56)	ミズシゲン	NATIONAL ENERGY ADMINISTRATION INVESTIGATION AND PLANNING	PIBULTHAM VILLA KASATSUK NBRIDGE BANGKOK 5 THAILAND
8100443 MR. SAHRAN TUSGATE (タイ)	24 1001	81.05.10 81.07.05 (3-1-56)	スイリョクハツデン カイハツケイカク	NATIONAL ENERGY ADMINISTRATION ENGINEERING GEOLOGY SECTION	PIBULTHAM VILLA KASATSUK BRIDGE BANGKOK THAILAND
8101788 MR. WINAT KULWONGWIT (タイ)	10 1001	81.08.20 81.11.07 (3-1-55)	ハイデンギジュツ コース (81-A0160)	PROVINCIAL ELECTRICITY ELECTRONICS AND AUTOMATIC CONTROL SECOND GRADE ENGINEER	200 NGARM WONGWAN RD. BANGKHEN BANGKOK THAILAND

ケンシュウイン シメイ, (クニメイ)	カイタイ	タイニチ キカン	ケンシュウ カモク	ショゾク サキ メイ, ブカ, チイ	ショゾク サキ ジュウショ
8102618	10	81.10.08	デンキシキ ヨウケイエイ コース	PROVINCIAL ELECTRICITY AUTHORITY	PEA CENTRAL REGION 3
MR. TRIRAT SNOHSIANG		81.12.05			NAKORNPRATHOM THAILAND
	1001		(81-A0153)	CENTRAL REGION 3 NAKORNPRATHOM	
(タイ)		(3-1-5ロ)		CHIEF OF TECHNICAL DIVISION	
8102948	24	81.11.15	ハイデン キショツ	METROPOLITAN ELECTRICITY AUTHORITY	RAMA4 RD/ BANGKOK
MR. BORVORN JURAMONGKORN		81.12.14			
	1001			ENGINEERING DEPT.	
(タイ)		(3-1-59)		ELECTRICAL ENGINEER	
8102949	24	81.11.15	ハイデン キショツ	METROPOLITAN ELECTRICITY AUTHORITY	RAMA 4 RD. BANGKOK
MR. SUKIT KIATBOONSRI		81.12.14			
	1001			ENGINEERING DEPT.	
(タイ)		(3-1-59)		ELECTRICAL ENGINEERING	
8200487	10	82.05.06	カリヨクハツデン コース	PROVINCIAL ELECTRICITY AUTHORITY	200 NGAMWONGWAN ROAD
MR. SUCHART BUACHAN		82.07.24		BANGKOK THAILAND	BANGKOK THAILAND
	1001		(82-A005ロ)	PROVISIONAL ELECTRICITY AUTHORITY	
(タイ)		(3-1-54)		SENIOR ENGINEER WORKSHOP	
8201477	10	82.08.12	ハイデンキショツ コース	METROPOLITAN ELECTRICITY AUTHORITY	121 CHAKAPET ROAD BANGKOK
MR. UNGGOON MONDHATUPLIN		82.10.29			THAILAND
	1001		(82-A0160)	PROJECT ENGINEERING	
(タイ)		(3-1-56)		CHIEF OF SUBSTATION DESIGN SECTION	
8203581	24	83.03.14	チェンマイダイデン カイハツケイカク チ	CHIANGMAI UNIVERSITY	FACULTY OF SCIENCE
MR. KITTICHAI WATTANAIKORN		83.04.22	ヨウサ		CHIANGMAI UNIVERSITY
	1001			PHYSICS DEPARTMENT	CHIANGMAI THAILAND
(タイ)		(3-1-53)		ASSOCIATE PROFESSUR ASSUCIATE DEAN	
8203586	24	83.03.01	スイリョク ハツデン カイハツ ケイ	NATIONAL ENERGY ADMINISTRATION	17 RAMA 1 ROAD PATHUMWAN
MR. SUNGUK LEELITTAN		83.04.15	カク		BANGKOK THAILAND
	1001			ENERGY POLICY PLANNING DIVISION	
(タイ)		(3-2-61)		PLANNING ENGINEER	
8203587	24	83.03.01	スイリョク ハツデン カイハツ ケイ	NATIONAL ENERGY ADMINISTRATION	17 PHIBULTHAM VILLA RAMA
MR. THAWEE		83.04.15	カク		1 ROAD BANGKOK 10500
CHANTHAHASATHIEN	1001			ENERGY INVESTIGATION DIVISION	
(タイ)		(3-2-61)		GEOLOGIST	
8206391	10	83.05.05	カリョク ハツデン コース	METROPOLITAN ELECTRICITY AUTHORITY	1162 RAMA 4 ROAD KLONTOEY
MR. SUKIT KIATBOONSRI		83.07.21			BANGKOK THAILAND
	1001		(83-A0056)	PROJECT ENGINEERING DEPT.	
(タイ)		(3-1-59)		ELECTRICAL ENGINEERING	
8206392	10	83.05.05	カリョク ハツデン コース	ELECTRICITY GENERATING AUTHORITY OF	SYSTEM UPERATION DEPT.
MR. PITTAYA CHUNHATAKIJ		83.07.21		THAILAND	EGAT NONTHABURI 11000
	1001		(83-A005ロ)	PROVINCIAL SYSTEM LOAD DISPATCHING	THAILAND
(タイ)		(3-1-59)		HEAD SYSTEM LOAD DISPATCHING R-3	

ケンシュウイン シメイ，（クニメイ）	ケイタイ	タイニチ キカン	ケンシュウ カモク	ショゾク サキ メイ，ブカ，チイ	ショゾク サキ ジュウショ
8302327 MR. PICHYUN CHIDSIN （タイ ）	10 1001	83.09.08 83.11.25 (3-1-64)	ハイデン ギジュツ コース (83-A0160)	METROPOLITAN ELECTRICITY AUTHORITY OF THAILAND DISTRIBUTION DIVISION UNIT CHIEF	121 CHAKKAPETCH RD. BANGKOK THAILAND
8302328 MR. SUMCHAI TEPNAOWARAT （タイ ）	10 1001	83.09.08 83.11.25 (3-1-64)	ハイデン ギジュツ コース (83-A0160)	PROVINCIAL ELECTRICITY AUTHORITY GENERAL CONSTRUCTION DIV. CHIEF OF CONSTRUCTION CONTROLL	200 NGAMWANGWAN RD. BNAGKEN DIST. BKK THAILAND
8303326 MR. ADUL CHALAROON （タイ ）	24 1001	83.11.01 83.12.14 (3-1-38)	スイリョク ハツデン	NATIONAL ENERGY ADMINISTRATION ENERGY POLICY AND PLANNING DIV. SENIOR PLANNING ENGINEER	KASATSUK BRIDGE YOUSE RAMAI ROAD BANGKOK THAILAND 10500
8303327 MR. KAMOL KARUNAMIT （タイ ）	24 1001	83.11.01 83.12.14 (3-1-38)	スイリョク ハツデン	NATIONAL ENERGY ADMINISTRATION SURVEY ENERGY GEOLOGIST	NATIONAL ENERGY ADMINISTRATION YOUSE RAMAIROAD BANGKOK THAILAND 10500
8305397 MR. SUTHIRA PATRAPANUPAT （タイ ）	10 1001	84.05.03 84.07.19 (3-1-64)	カリョク ハツデン コース (84-A0056)	ELECTRICITY GENERATING AUTHORITY OF THAILAND THERMAL POWER PLANT DIVISION ASSISTANT HEAD OF DIVISION	EGAT BANGKROUY NONTHABURI 11000 THAILAND
8305398 MR. PRATOOM PATARUNGSI （タイ ）	10 1001	84.05.03 84.07.19 (3-1-38)	スイリョク ハツデン コース (84-A0055)	ELECTRICITY GENERATING AUTHORITY OF THAILAND DAM INSPECTION AND MAINTENANCE CHIEF RESERVOIR OPERATION	EGAT NONTHABURI THAILAND
8401589 MR. CHUMPUL SRIKACHORN （タイ ）	10 1001	84.08.23 84.10.19 (3-1-01)	デンキ ジギョウ ケイエイ コース (84-A0153)		
8402033 MR. NIWAT PUTTHAVORN （タイ ）	10 1001	84.09.06 84.11.23 (3-1-64)	ハイデン ギジュツ コース (84-A0160)	PROVINCIAL ELECTRICITY AUTHORITY GENERAL CONSTRUCTION DIVISION CHIEF OF SECTION	200 NGAMWONGWAN ROAD BANGKHEN BANGKOK 10900
8402034 MR. ANUSORN PRAJYABHURN （タイ ）	10 1001	84.09.06 84.11.23 (3-1-64)	ハイデン ギジュツ コース (84-A0160)	METROPOLITAN ELECTRICITY AUTHORITY BUSINESS POWER CONSUMPTION CONTROL CHIEF OF THE SECTION	121 CHAKPETCH RD BANGKOK 10200
8403497 MR. CHOKCHAI WATCHARASANSAB （タイ ）	24 1001	85.02.21 85.08.01 (3-1-38)	ミズ シゲン カイハツ	ELECTRICITY GENERATING AUTHORITY OF THAILAND WATER PRESOURCES PLANNING AND DEVEL ASSISTANT CHIEF OF WATER RESOURCES	CHARANSANITWONG RD.BANKRUAY NONTHABURI THAILAND 11000

ｹﾝｼｭｳｲﾝ ｼﾒｲ, (ｸﾆﾒｲ)	ｹｲﾀｲ	ﾗｲﾆﾁ ｷｶﾝ	ｹﾝｼｭｳ ｶﾓｸ	ｼｮｿﾞｸ ｻｷ ﾒｲ, ﾌﾞｶ, ﾁｲ	ｼｮｿﾞｸ ｻｷ ｼﾞｭｳｼｮ
8403861 MR. CHAMRAT SAHAPANYARAT (ﾀｲ)	24 1001	84.11.08 84.12.25 (3-1-38)	ﾊﾂﾃﾞﾝｼｾﾂﾉﾃﾞｻﾞｲﾝ	PROVINCIAL ELECTRICITY AUTHORITY GENERAL CONSTRUCTION ASSISTANT DIRECTOR	200 NGAMWUNGWAN ROAD, BANGKKKHEN,BANGKOK, THAILAND
8406032 MR. CHUSAK ANUSAKSATHIARA (ﾀｲ)	10 1001	85.05.09 85.07.25 (3-1-64)	ｽｲﾘｮｸ ﾊﾂﾃﾞﾝ ｺｰｽ (85-A0055)	PROVINCIAL ELECTRICITY AUTHORITY TECHNICAL TRAINING CENTER CHIEF EQUIPMENT TRAINING AND TEXTS	200 NGAM WONG WAN ROAD BANGKHEN BANGKOK 10900
8406077 MR. SEREE PRACHAYAKUL (ﾀｲ)	10 1001	85.05.09 85.07.25 (3-1-64)	ｶﾘｮｸ ﾊﾂﾃﾞﾝ ｺｰｽ (85-A0056)	PROVINCIAL ELECTIRCITY AUTHRITY POWER PLANT DIVISION ASST. CHIEF OF PLANNING	200 NGAM WONG WAN ROAD BANGKOK THAILAND
8501990 MR. CHATCHAI TRIWITTAYAPUN (ﾀｲ)	10 1001	85.08.22 85.10.18 (3-1-64)	ﾃﾞﾝｷ ｼﾞｷﾞｮｳ ｹｲｴｲ ｺｰｽ (85-A0153)		
8501991 MR. PHISANU SOMTO (ﾀｲ)	10 1001	85.08.22 85.10.18 (3-1-64)	ﾃﾞﾝｷ ｼﾞｷﾞｮｳ ｹｲｴｲ ｺｰｽ (85-A0153)		
8503932 MR. NIWAT PATANASENAKUL (ﾀｲ)	24 1001	86.01.20 86.03.20 (3-1-02)	ｽｲﾘｮｸ ﾊﾂﾃﾞﾝ		

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OUTPUT TOTAL = 000056