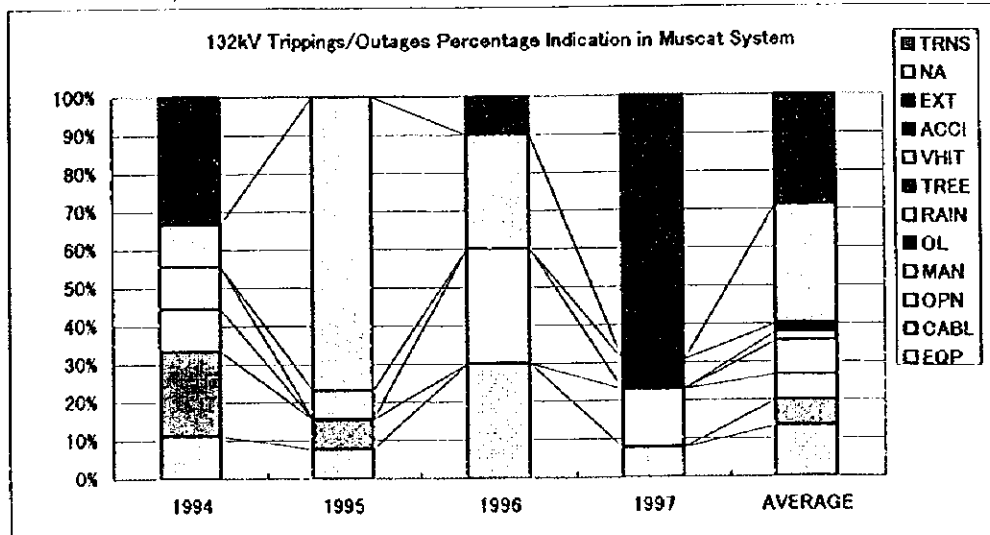
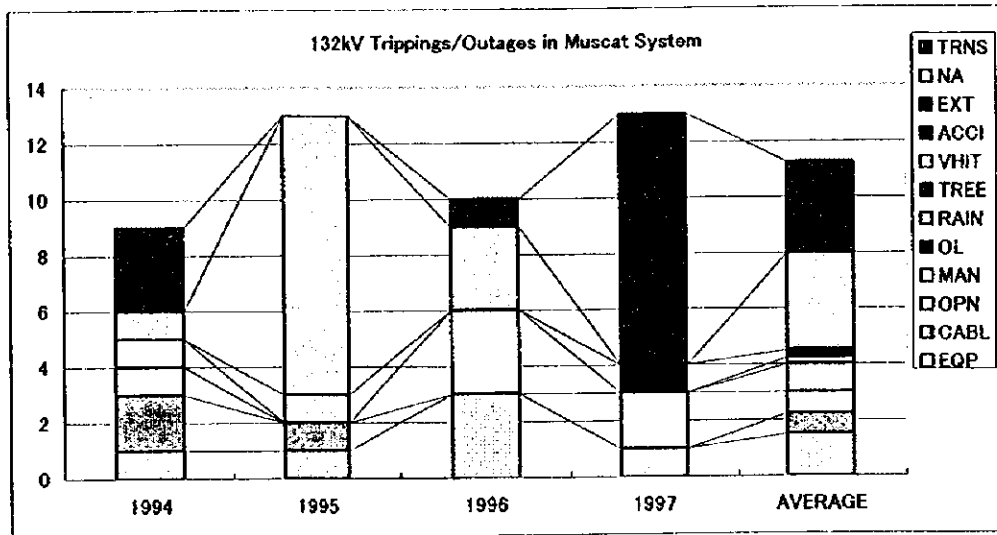


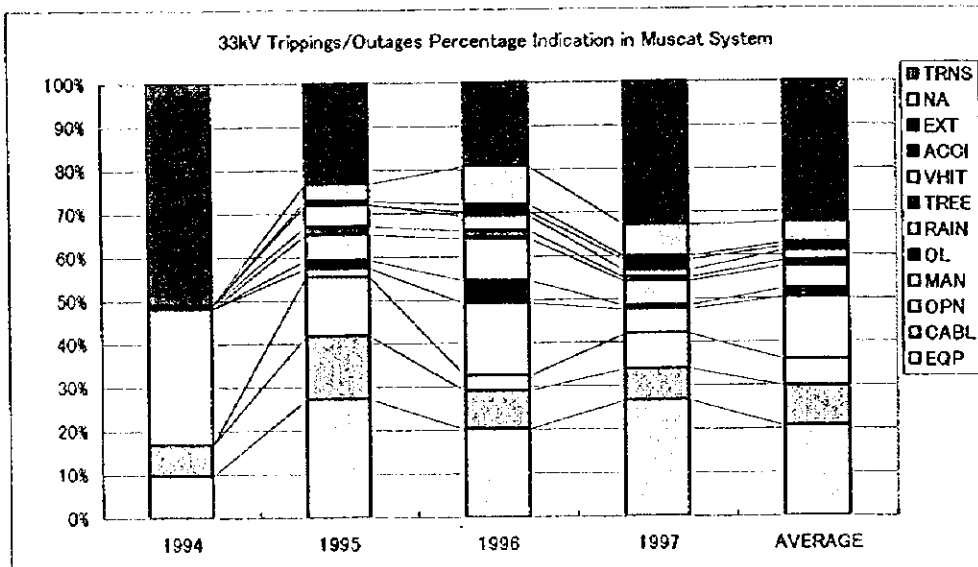
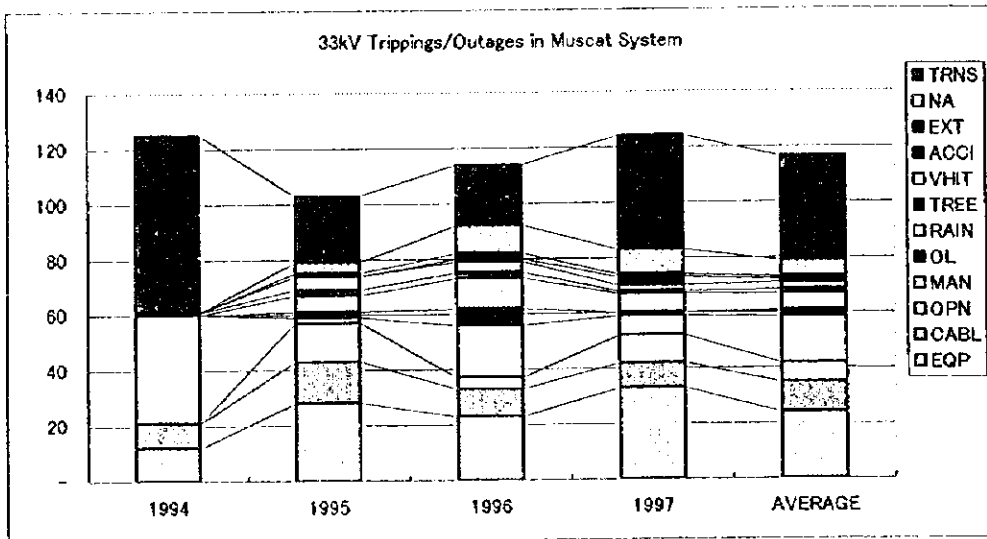
4-1-a Summary of 132kV Trippings/Outages(1994~1997 Muscat System)

	Code	1994	1995	1996	1997	AVERAGE	TOTAL
Equipment	EQP	1	1	3	1	2	6
Cable problem	CABL	2	1			1	3
Operation related	OPN	1			2	1	3
Manually opened	MAN	1		3		1	4
Load/Functuation/UF	OL					0	0
Weather related reasons	RAIN		1			0	1
Tree branches touching line	TREE					0	0
Vehicle hit	VHIT					0	0
(Human)Accident	ACCI				1	0	1
External reasons	EXT					0	0
Others/Not explained	NA	1	10	3		4	14
Transient/Temporary faults	TRNS	3		1	9	3	13
TOTAL		9	13	10	13	11	45



4-1-b Summary of 33kV Trippings/Outages(1994~1997 Muscat System)

	Code	1994	1995	1996	1997	AVERAGE	TOTAL
Equipment	EQP	12	28	23	33	24	96
Cable problem	CABL	9	15	10	9	11	43
Operation related	OPN		14	4	10	7	28
Manually oppened	MAN	39	2	19	7	17	67
Load/Functuation/UF	OL		2	6	1	2	9
Weather related reasons	RAIN		6	11	7	6	24
Tree branches touching line	TREE	1	2	2	1	2	6
Vehicle hit	VHIT		5	4	2	3	11
(Human)Accident	ACCI			1	3	1	4
External reasons	EXT		1	2	1	1	4
Others/Not explained	NA		4	10	9	6	23
Transient/Temporary faults	TRNS	64	24	22	41	38	151
TOTAL		125	103	114	124	117	466



The Study on Demand Supply Management for Power Sector
In the Sultanate of Oman

JICA Final Report

4-1-C Load Flow Calculation Result(132k Muscat System)

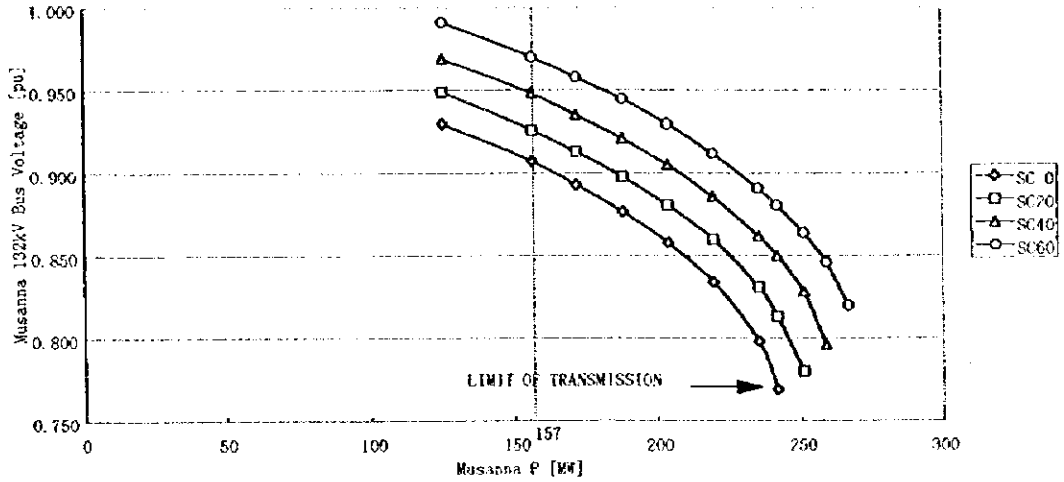
	Peak (Tr Tap ratio=1.0)						Off Peak (Tr Tap ratio=1.0)					
	Present			Improvement			Present			Improvement		
	generation		load	132kV bus voltage (p.u.)	Peak load Pf improvement (Pf=0.87-0.95) SC increase (MVA)	132kV bus voltage (p.u.)	generation		load ((Peak load)x0.7)	132kV bus voltage (p.u.)	Peak load Pf improvement (Pf=0.87-0.95) SC (MVA)	132kV voltage (p.u.)
	P (MW)	Q (MVAR)	P (MW)	Q (MVAR)			P (MW)	Q (MVAR)	P (MW)	Q (MVAR)		
RUSAIL FS (132kV)	(29)527	(84)458						364	273			
GHUBRAH FS (132kV)	463	(77)424					324	257				
GHUBRAH FS (33kV)	78	54					55	35				
MANAH FS	96	63					67	39				
RUSAIL FS			131	80	0.992					92	56	1.015
GHUBRAH FS			99	47	1.000					69	33	1.019
MADINAT QABOOS SS			132	80	0.985					92	56	1.010
WADI ADAISS			139	100	0.965					97	70	0.988
ALFALAJ SS			115	70	0.963					81	49	0.996
WADI KABIL SS			106	65	0.955					74	46	0.991
SEEB SS			102	60	0.967					71	42	0.989
BAIT BARKA SS			86	30	0.952					60	21	0.982
MUSANNA SS			157	60	0.897					110	42	0.960
IZKI SS			14	8	0.988					10	6	1.012
NIZWA SS			42	25	0.989					29	17	1.016
BAHIA SS			30	18	0.980					21	13	1.005
TOTAL	(29)1164	(161)999	1153	643(Pf=0.87)			810	604	806	451	255	
	Load shedding quantity = 29 (over load) + 95 (largest unit) = 124 (MW)											
SYSTEM LOSS (MW)												10.7
												7.9
												4.5
												3.2

NOTE: 1.105 \geq target of voltage \geq 0.95 (p.u.)

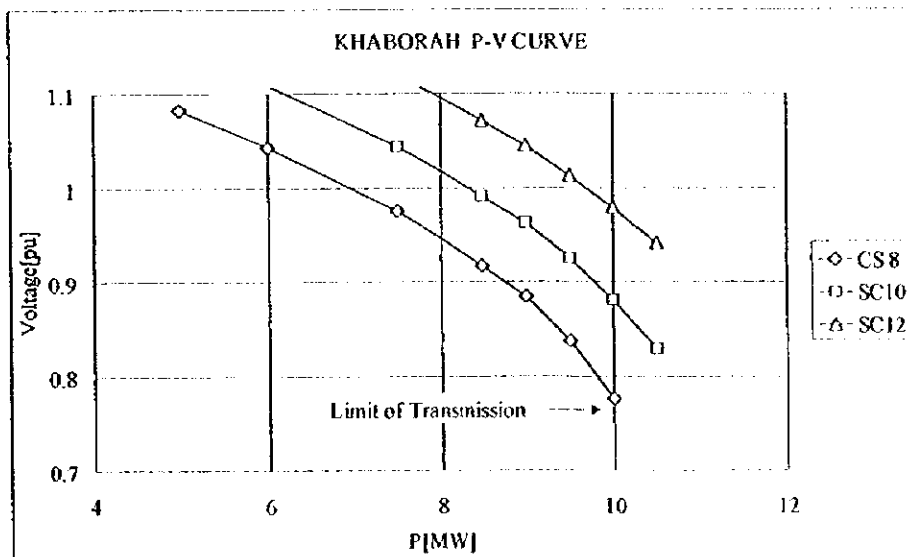
4-1-d Load Flow Calculation Result(Musanna SS 33kV System)

Load Point	Name	Load			Capacitor MVAR	33kV Bus Voltage p.u.
		P	Q			
		MW	MVAR			
	Musanna 33kV Bus-1					1.03
	Musanna 33kV Bus-2					1.03
1	Khadra-2	5	3	3		0.96
2	Khaborah-1	7	5	6		0.93
3	Khaborah-2	10	7	4		0.77
4	Awabi	4	3	3		1.00
5	Rustaq-1	8	4	5		0.96
6	Thermad	11	6	5		1.00
7	Wudam Naval Base	-	-	-		
8	Bidaya-1	6	3	5		0.99
9	Bidaya-2	6	3	5		0.99
10	Khadra-1	6	3	3		0.93
11	Sana Bani Gafar	2	1			0.93
12	Musanna-1	7	4	5		1.02
13	Rustaq Hospital	6	4	5		0.92
14	Rustaq-2	10	6			0.88
15	Al Hazam-1	6	4	3		0.94
16	Al Hazam-2	6	4	3		0.94
17	Wadi Bani Gafar	4	3	3		0.92
18	Suweiq-2	9	6	5		0.87
19	Al Nasr Marble Fctory	5	3			0.68
20	Wai Jawahir	5	3			0.67
21	Suweiq-1	12	8	5		0.95
22	Billa-2	8	6	5		0.96
23	Billa-1	8	6	5		0.96
24	Musanna-2a	4	3			1.00
25	Musanna-2b	8	6	5		1.00

4-1-e Musanna SS P-V Curve



4-1-f Khaborah SS P-V Curve(Musanna SS 33kV System)



The Study on Demand Supply Management for Power Sector
In the Sultanate of Oman

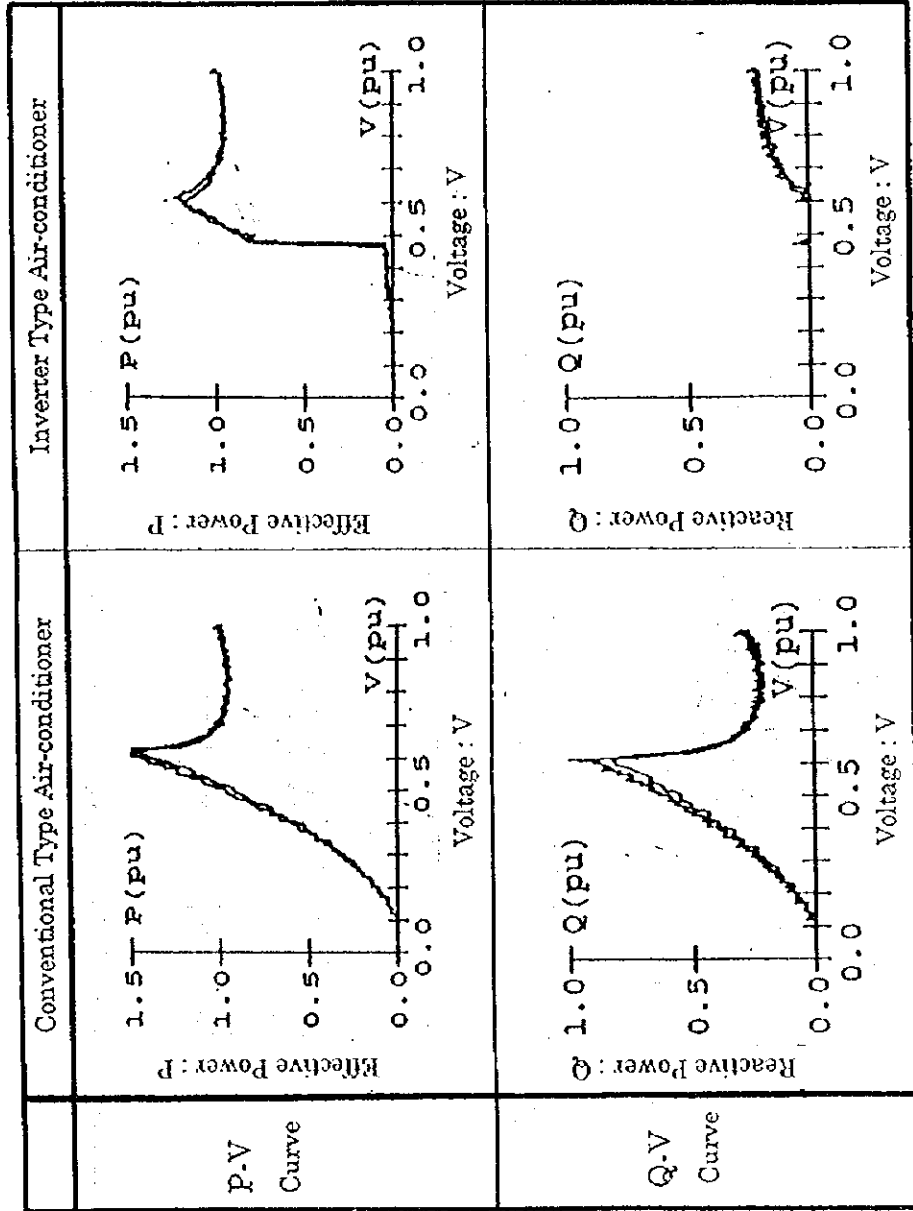
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4-1-g Load Flow Calculation Result(132kV Wadi Jizzi System)

	Present method(Base)						Improvement method			
	generation			load (total pf=0.83)			case 1		case 2	case 3
	P (MW)	Q (MVAR)		P (MW)	Q (MVAR)		load,Pf improvement (PF=0.83-0.95)	transmission line increase(AL WASIT~DANK) 132kV bus voltage (p.u.)	IBRISS load (35MW) ↓ MANAHIPS system 132kV bus (p.u.)	
WADI JIZZI PS (132kV)	288	263								
WADI JIZZI PS (66kV)	36	25								
WADI JIZZI PS (66kV)				18	12	0.985	6	1.022	0.993	1.004
SOHAR SS				120	84	0.960	40	1.010	0.968	0.979
UM ALINA SS				18	12	0.960	6	1.006	0.968	0.979
AL WAST SS				10	6	0.936	3	0.996	0.955	0.961
BUREIM SS				35	23	0.899	10	0.972	0.918	0.946
DANK SS				8	5	0.719	3	0.889	0.878	0.933
IBRI SS				35	20	0.638	10	0.847	0.819	-
AL HAIL SS				13	7	0.636	5	0.879	0.860	0.917
TOTAL	274	288		257	169		83			
Load shedding quantity = 29 (largest unit) -- 1 (reserve) = 28 (MW)										
SYSTEM LOSS (MW)						16.5		7.2	7.8	3.2

NOTE: 1. Tr Tap ratio = 1.05 ~ 0.85
2. 1.05 ≥ target of voltage 0.95 (p.u.)

4-1-h P-V,Q-V Curve (when the voltage dropped slowly)



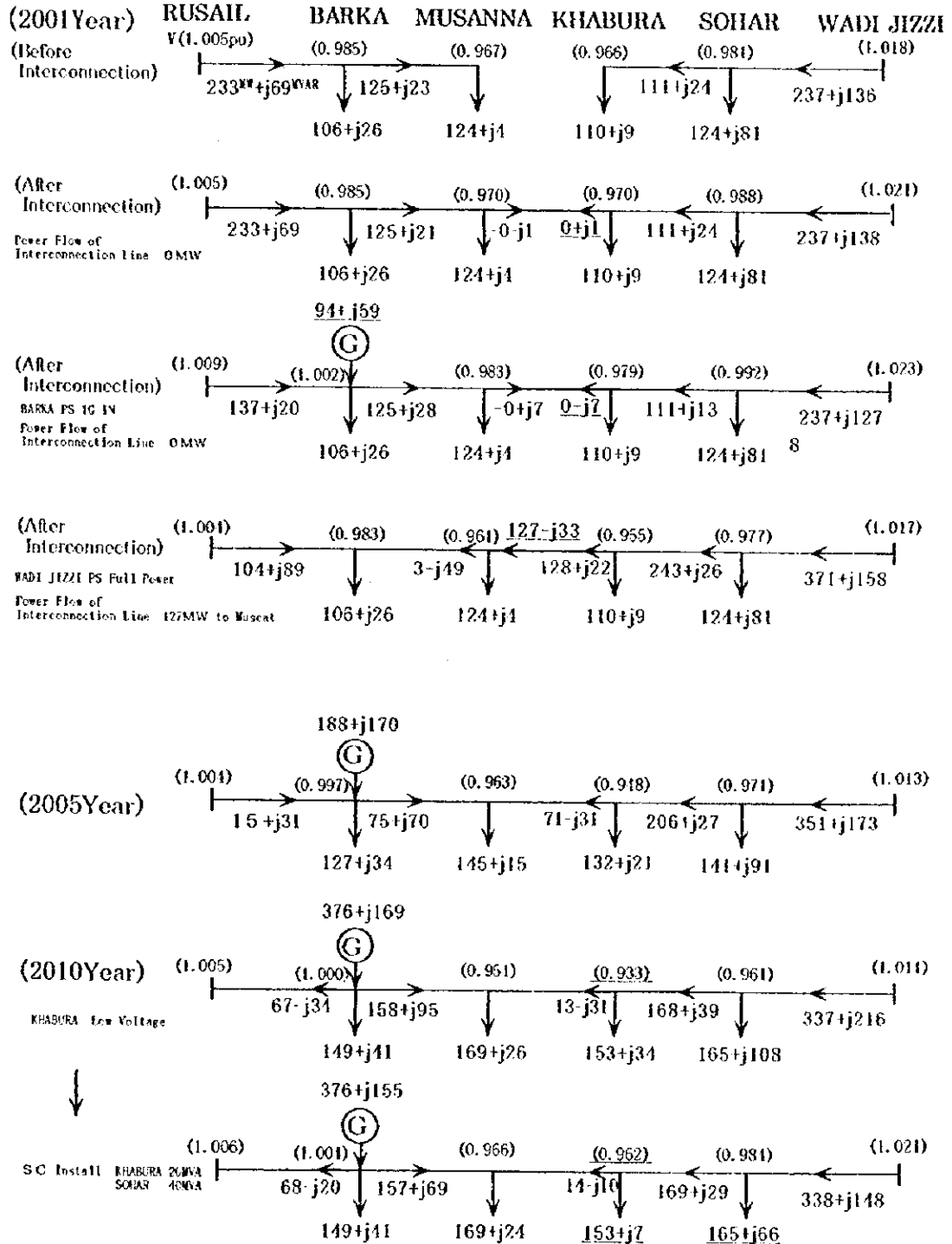
4-1-i Load and Supply Balance at 2001 Year

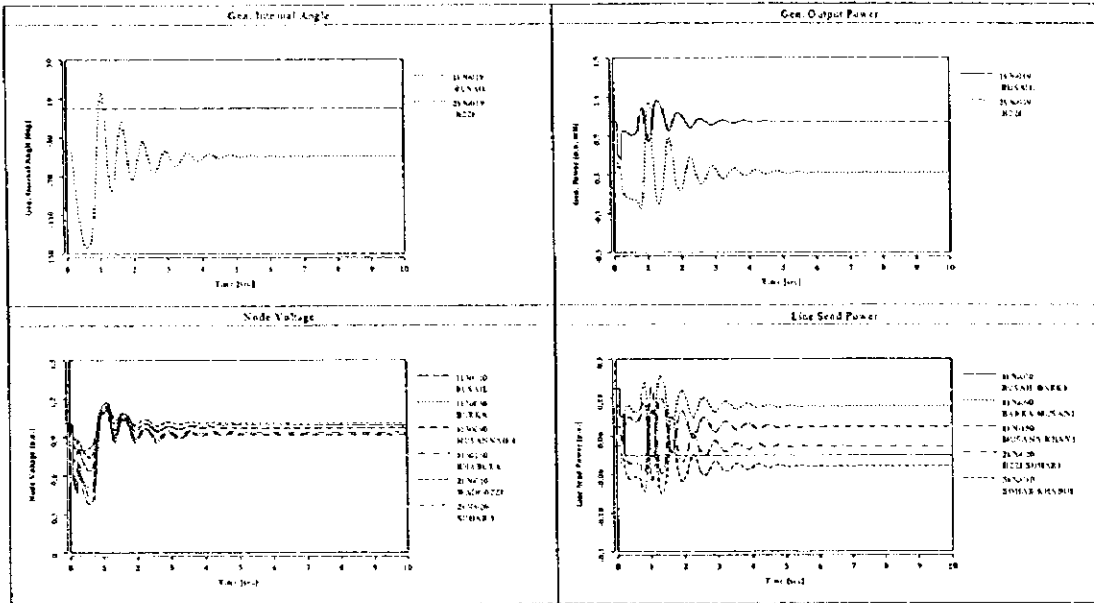
	2001				
	Generation		Load		SC (MVA) increase
	P (MW)	Q (MVAR)	P (MW)	Q (MVAR)	
RUSAIL PS	748	477	162	99	
GHUBRAH PS	568	484	122	58	
MANAH PS	181	109			
MADINAT QABOOS SS			163	99	
WADI ADAI SS			172	124	40
AL FAIAJ SS			142	87	20
WADI KABIR SS			131	80	20
SEEB SS			126	74	
BAIT BARKA SS			106	37	10
MUSANNA SS			124	47	40
IZUKI SS			17	10	
NIZWA SS			52	31	20
BAHILA SS			37	22	10
SHARQIYA			89	51	30
IBRI SS			41	26	20
KHABURA SS			110	53	40
SOHAR SS			124	81	
WADI JIZZI PS	365	217	19	7	
UMALINA SS			21	14	
AL WASIT SS			12	8	
BUREIMI SS			44	28	20
DANK SS			12	8	5
(IBRI SS)	to Manah system				
AL HAIL SS			17	11	10
TOTAL	1862	1287	1843	1055	285

4-1-j Voltage Power Flow of Interconnection Line

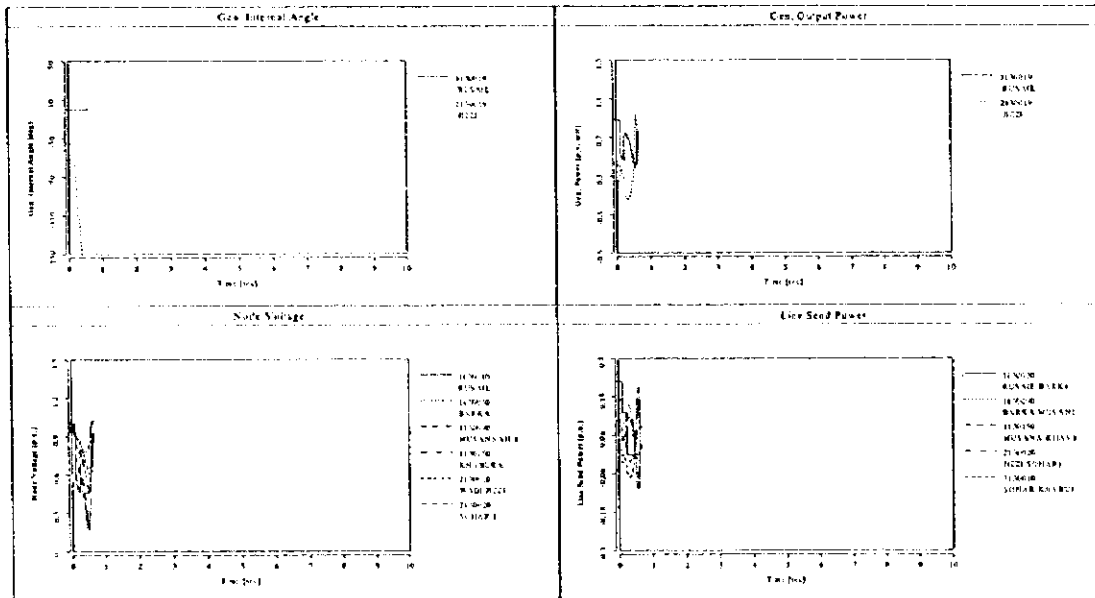
(MUSCAT System)

(WADI JIZZI System)



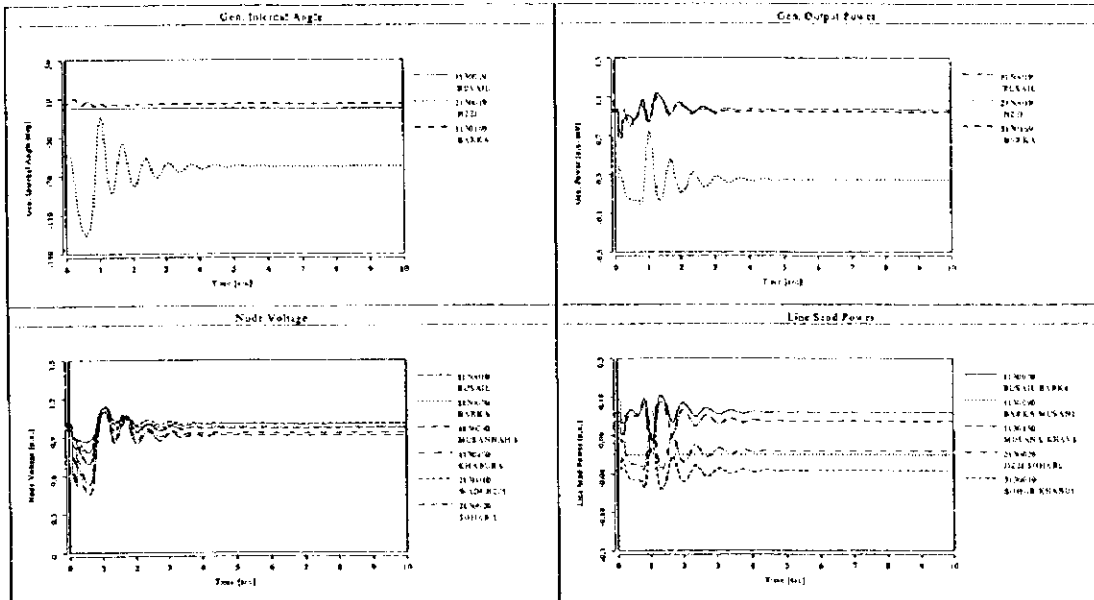


(a) Transmission Power = 173MW, $T_1=6$ cycle, $T_2=0.5$ sec

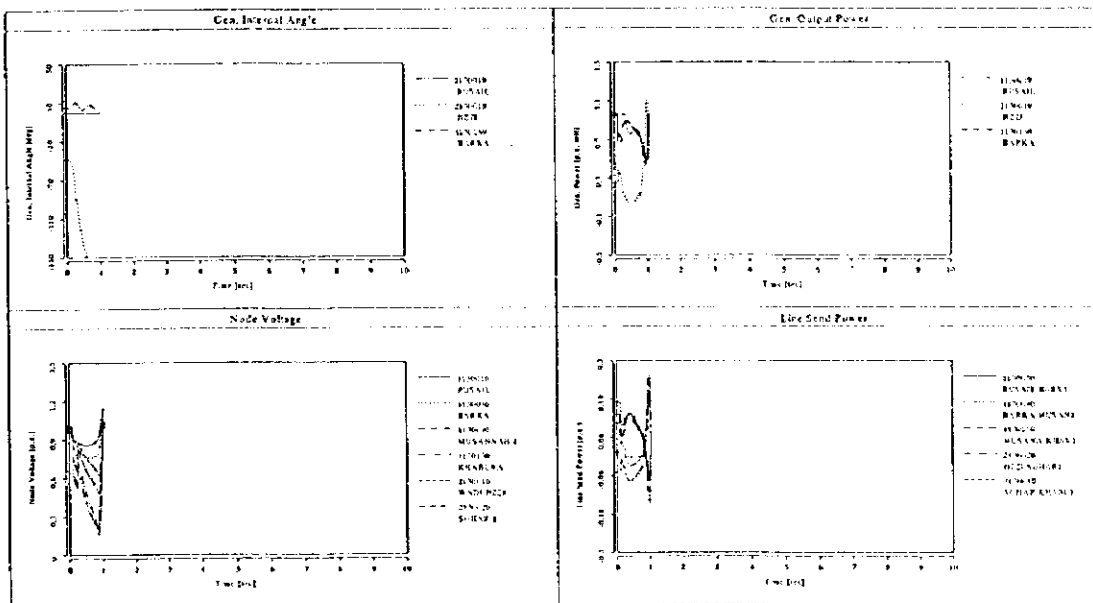


(b) Transmission Power = 212MW, $T_1=6$ cycle, $T_2=0.5$ sec

4-1-k Simulation Waveforms (Exclude Barka PS)



(a) Transmission Power = 212MW, $T_1=6$ cycle, $T_2=0.5$ sec

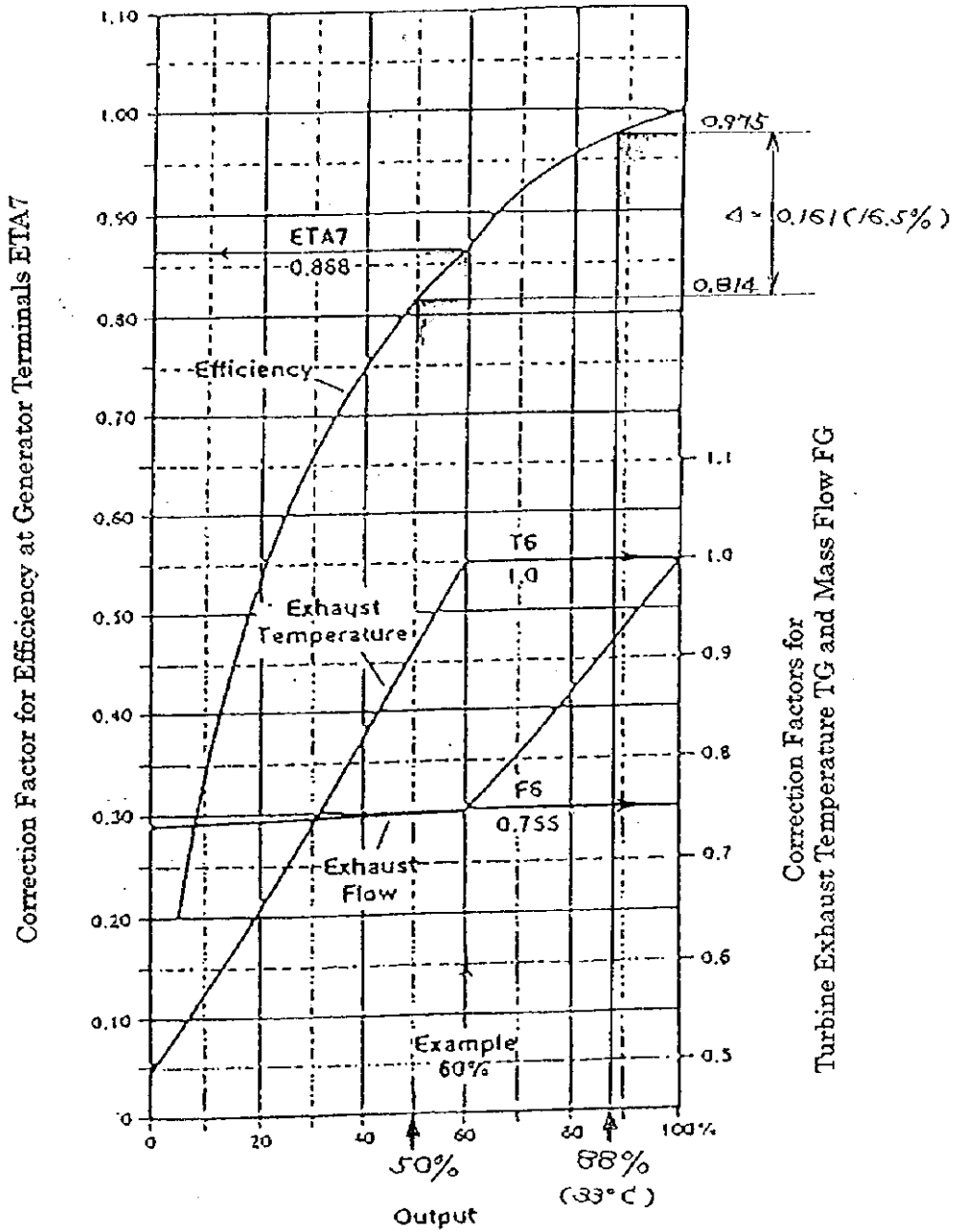


(b) Transmission Power = 212MW, $T_1=7$ cycle, $T_2=0.5$ sec

4-1-1 Simulation Waveforms (Include Barka PS)

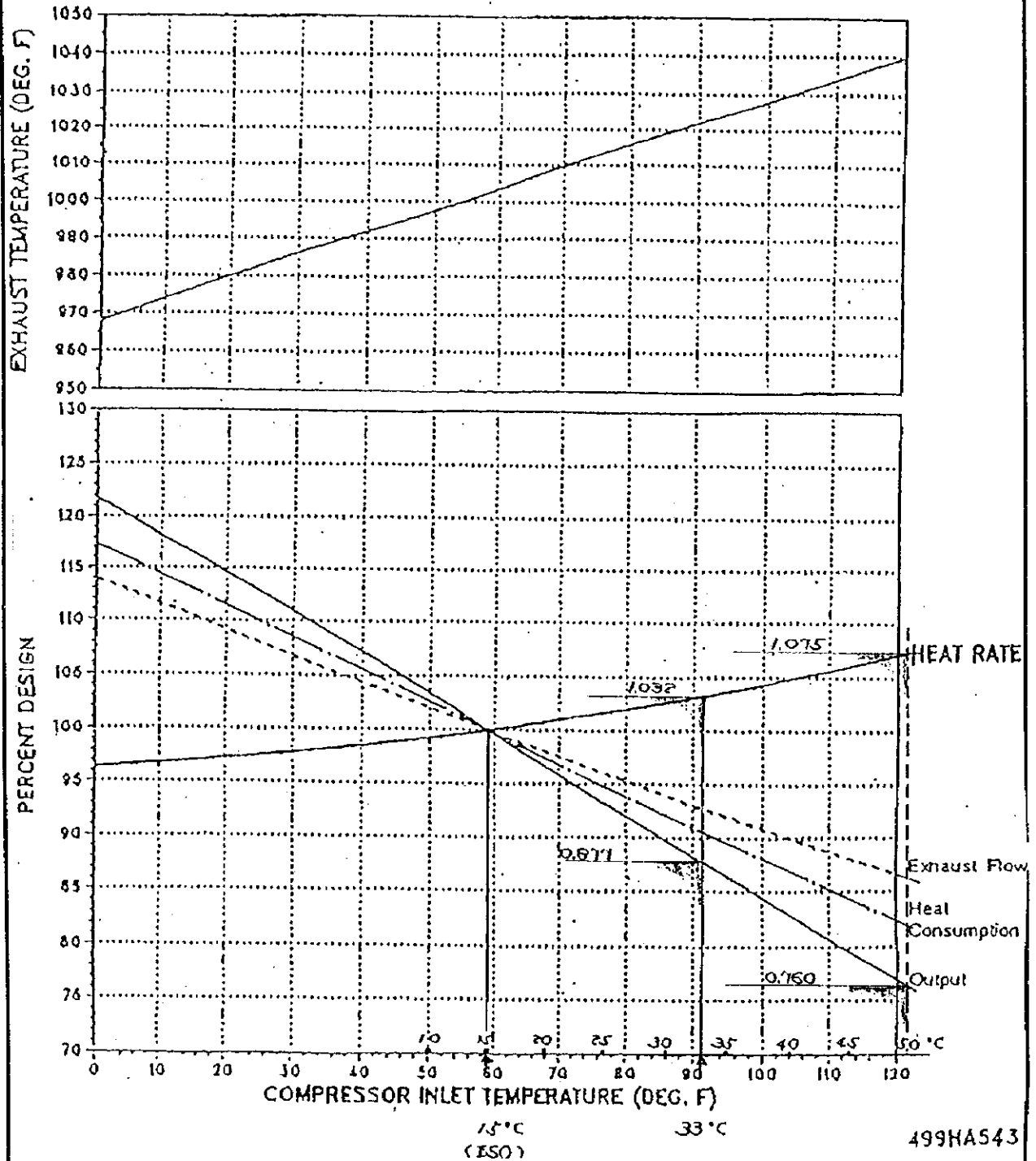
4-1-III Introduction of a Central Load Dispatching Center

Present	The case introduced a Central Load Dispatching Center
<p>Main CC [Muscat]</p> <p>Region CC [Muscat] → Ghubrah PS, Rusail PS, Muroh PS (Muscat Area) (South, East, North Area) (Dahliya Area)</p> <p>Region CC [Nizawa] → Wadi Jizi PS (North, East, North Area) (Dhahirah Area)</p> <p>Region CC [Buraimi] → Wadi Jizi PS (North, East, North Area) (Dhahirah Area)</p>	<p>Central Load Dispatching Center</p> <p>Ghubrah PS, Rusail PS, Wadi Jizi PS</p> <p>Primary SS (132/33kV)</p> <p>Muscat CC, Nizawa CC, Buraimi CC</p> <p>Distribution SS (33/11kV) → EHV customer, Distribution SS (33/11kV) → EHV customer</p>
<ol style="list-style-type: none"> 1. Main CC Duties <ul style="list-style-type: none"> • Load dispatching and system operation of Muscat, Manah system • Sum up records of all Oman 2. Region CC Duties <ul style="list-style-type: none"> • System operation under control ... System monitoring control, Switching operation, Record keeping, Information and communication 	<ol style="list-style-type: none"> 1. Central Load Dispatching Center Duties <ul style="list-style-type: none"> • Demand and supply control • System monitoring control ... 132kV system (power flow, voltage, frequency) • Switching operation ... 132kV system (only instruction, not operation) • Record keeping ... 132kV system (power flow, voltage, generation, load, weather, etc) • Information and communication ... System operation status information of faults, etc 2. Control Center Duties <ul style="list-style-type: none"> • System monitoring control ... 33kV system (power flow, voltage) • Switching operation ... 33kV system and 132kV system (only operation) • Record keeping ... 33kV system (power flow, voltage, load, weather, etc) • Information and communication ... System operation status information of faults, etc • Extra high voltage customers ... Communication on operation, response to fault, etc



4-2-a Efficiency, Exhaust Temperature and Flow Correction for Part Load Operation (For 100% use 1.0)

FUELS: NATURAL GAS AND DISTILLATE
MODE: BASE LOAD

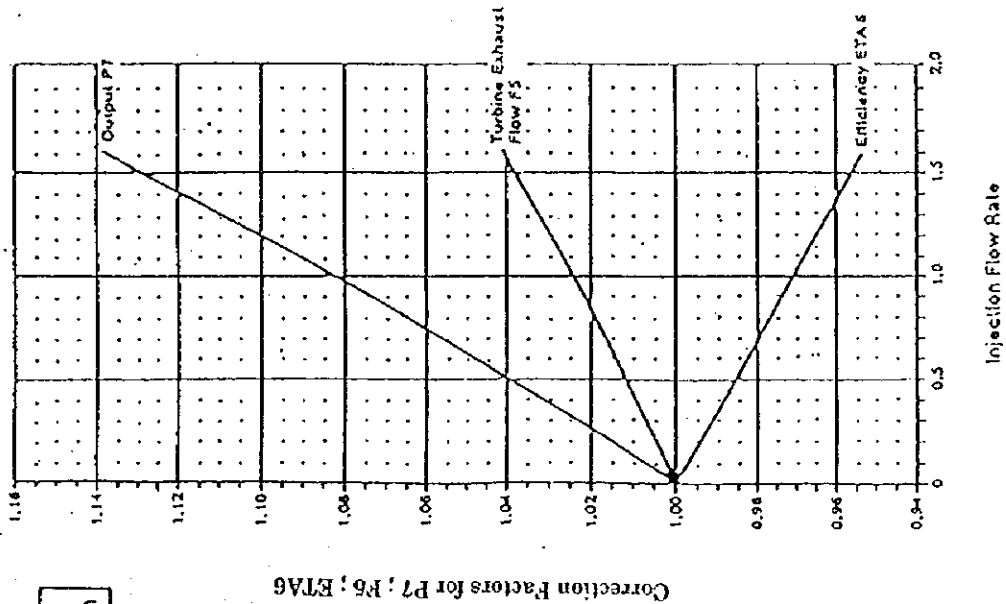


4-2-b GENERAL ELECTRIC MODEL PG6541(B) GAS TURBINE
ESTIMATED PERFORMANCE
OUTPUT, HEAT RATE, CONSUMPTION
EXHAUST FLOW AND EXHAUST TEMPERATURE AT 100% SPEED

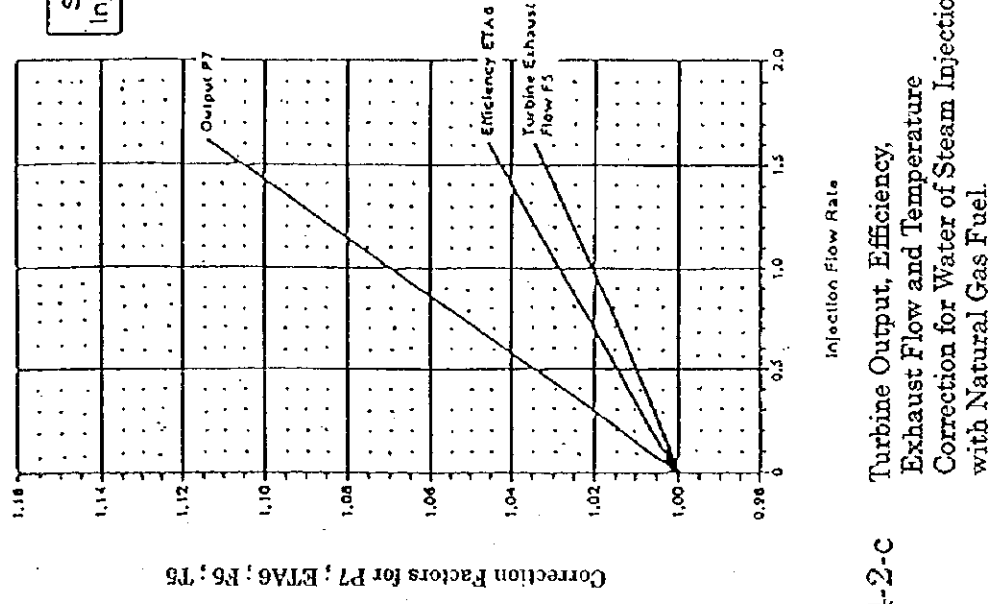
The Study on Demand Supply Management for Power Sector
In the Sultanate of Oman

JICA Final Report

Water Injection



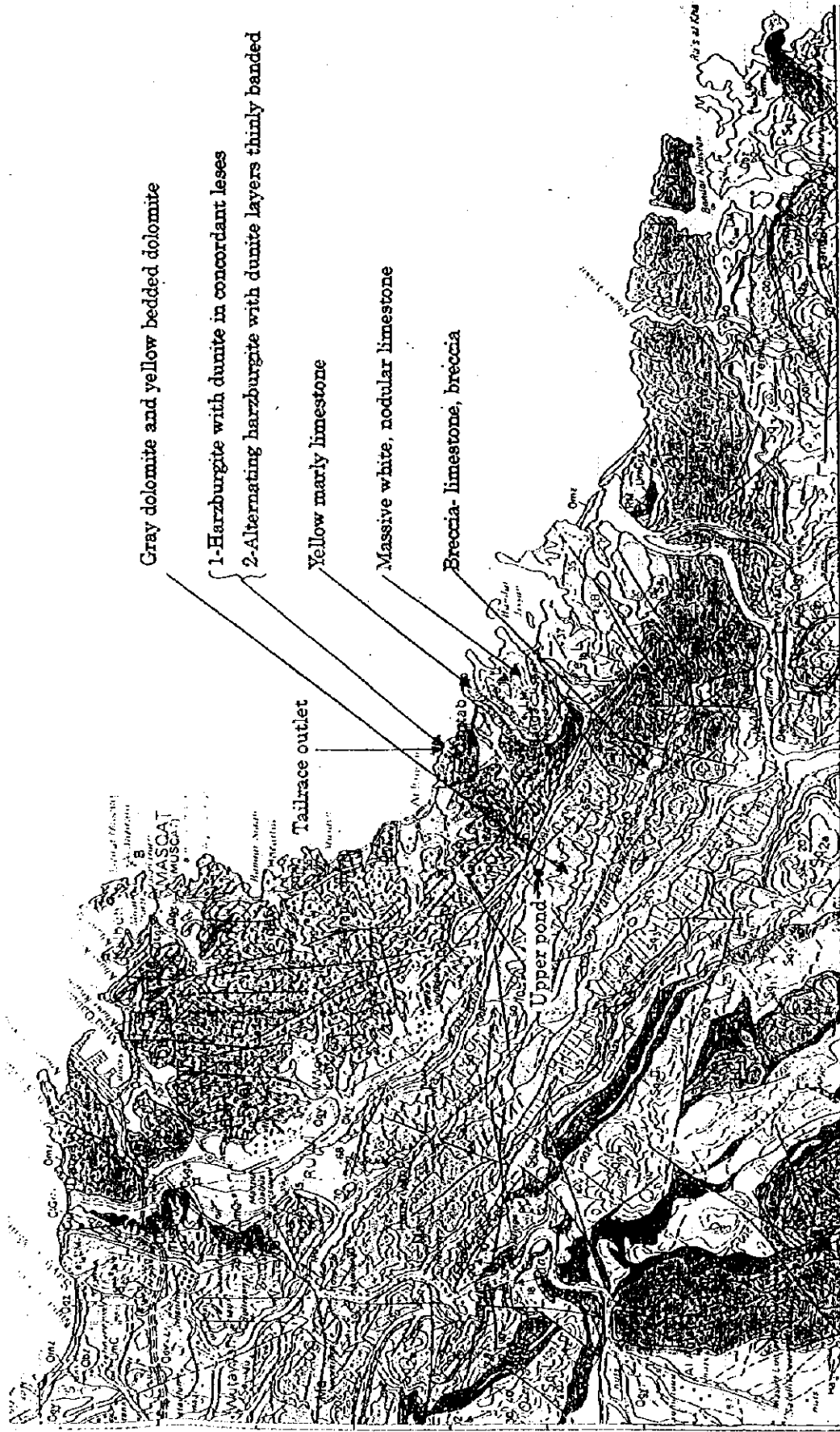
Steam Injection



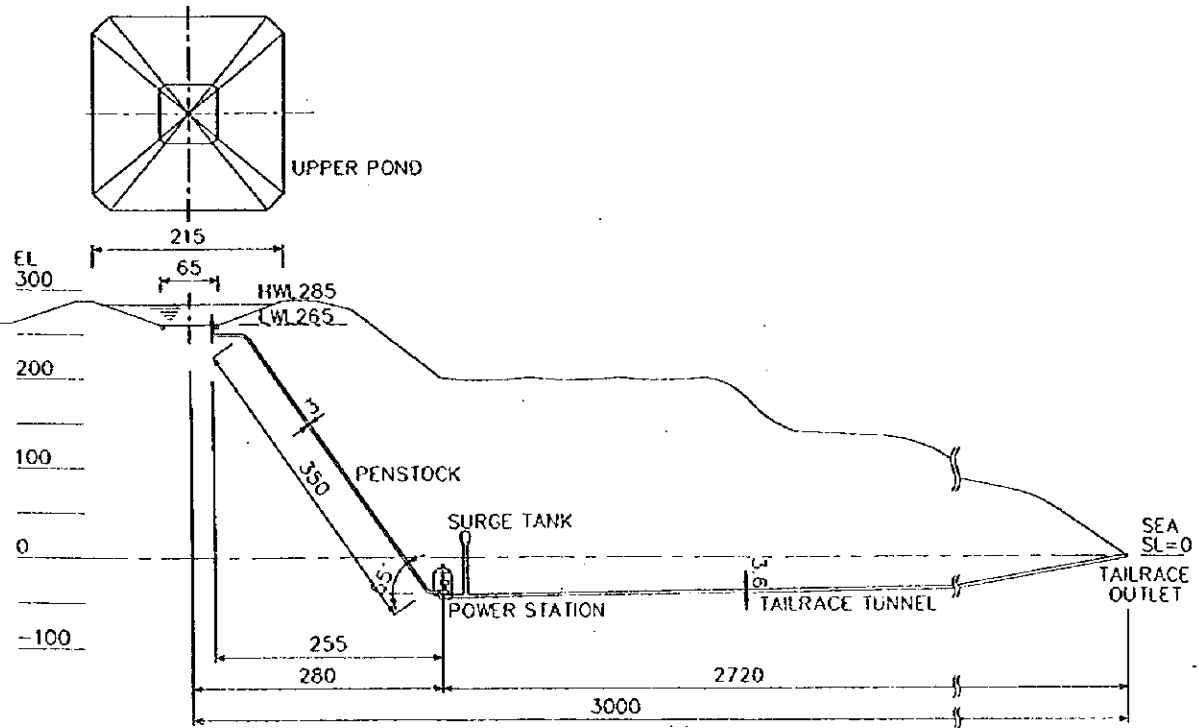
4-2-C Turbine Output, Efficiency, Exhaust Flow and Temperature Correction for Water of Steam Injection with Natural Gas Fuel.

The Study on Demand Supply Management for Power Sector
In the Sultanate of Oman

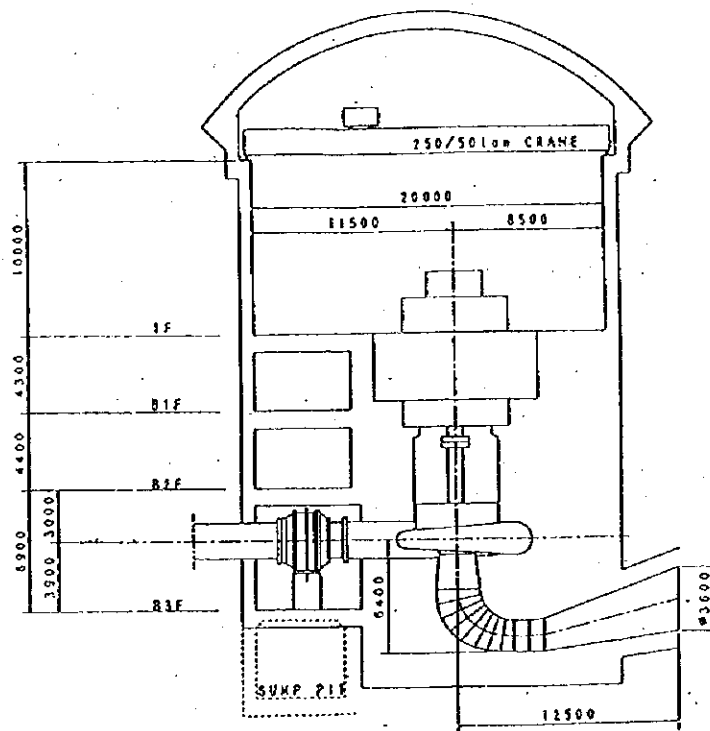
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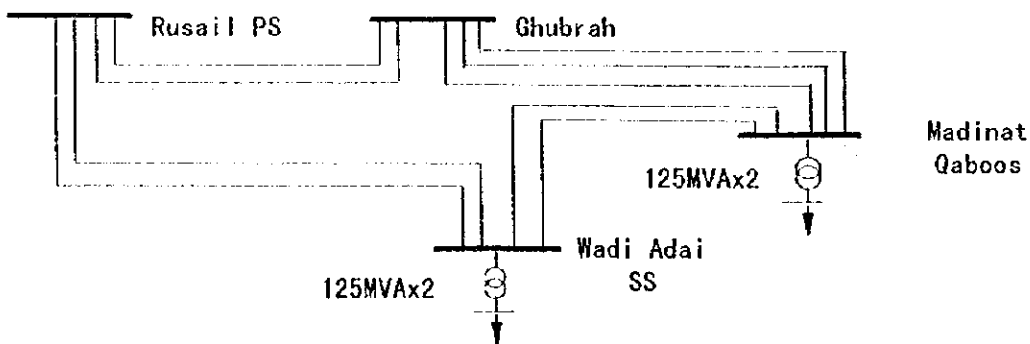
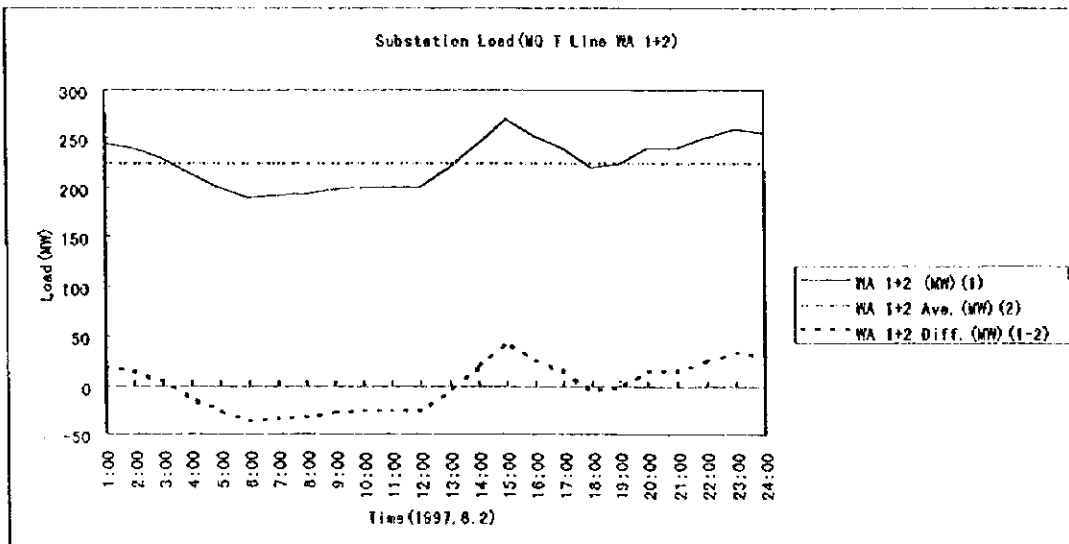
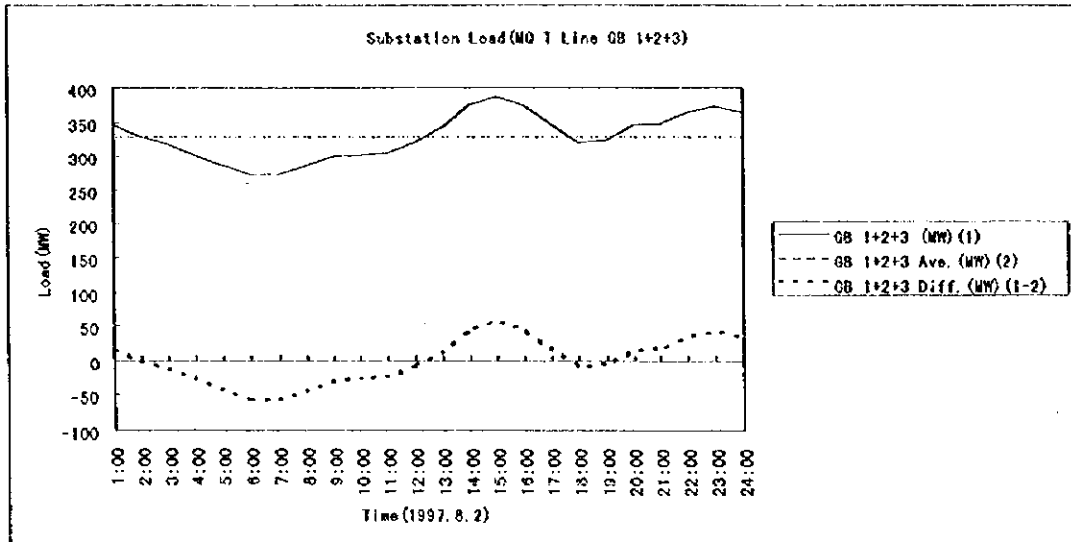
4-3-a GEOLOGICAL MAP OF MUSCAT AREA



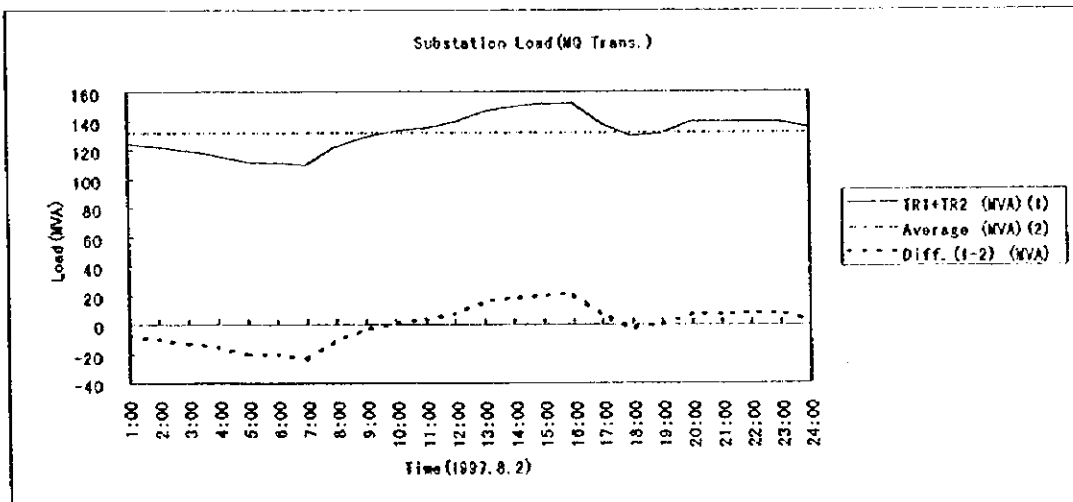
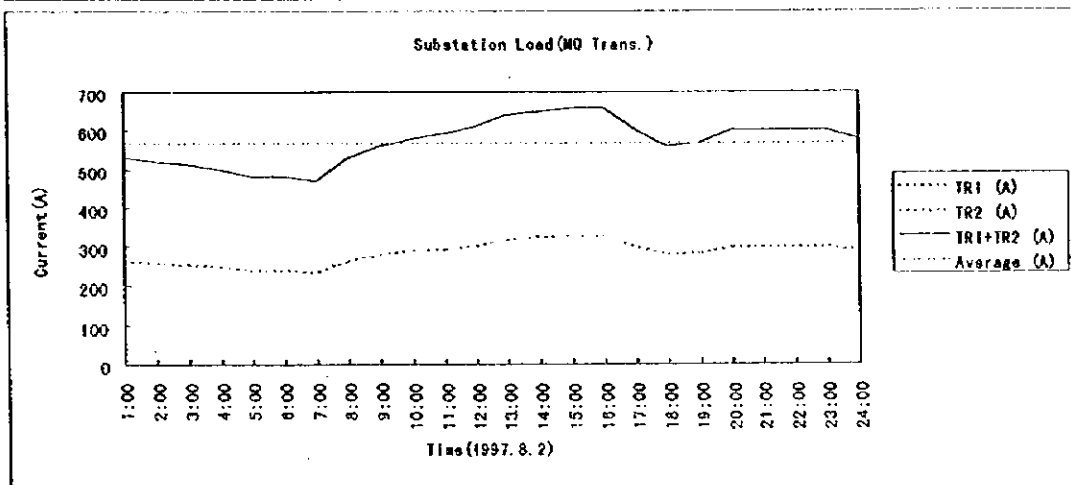
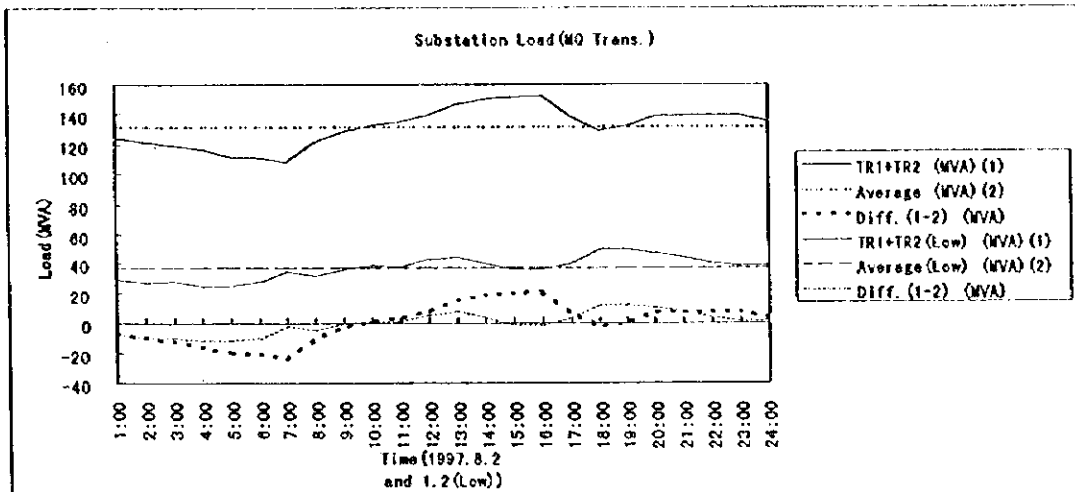
4-3-b HYDRAULIC PROFILE



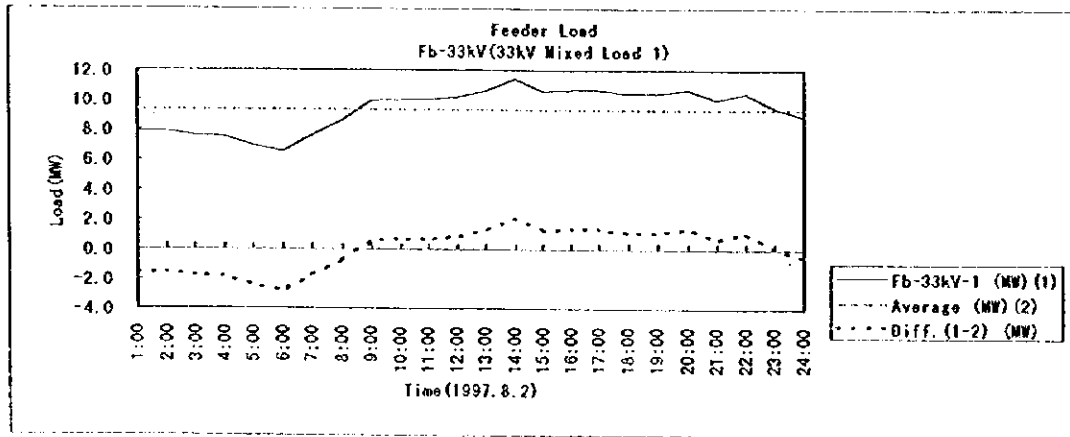
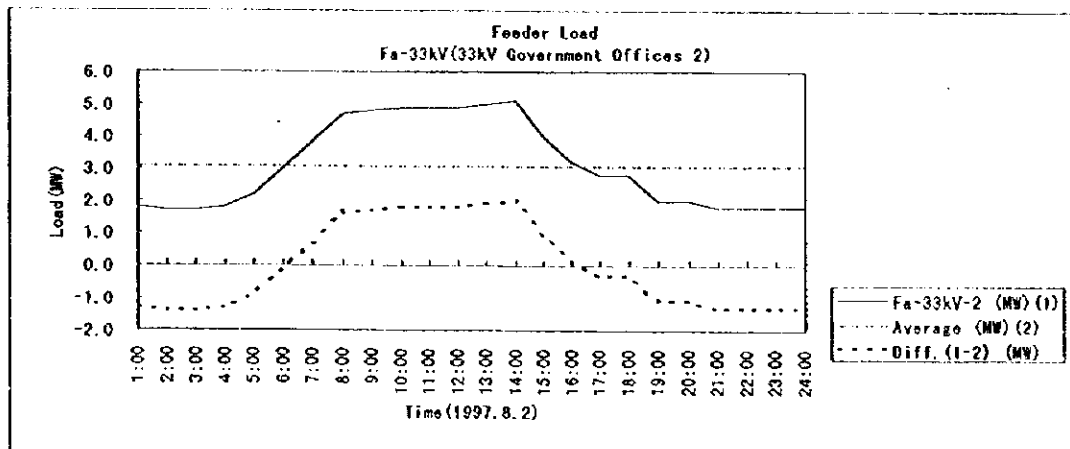
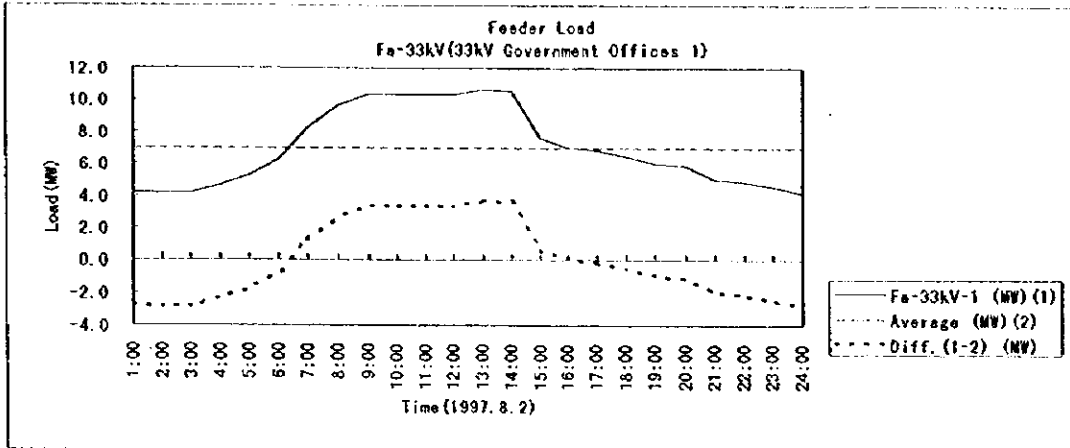
4-3-c CROSS SECTION OF POWER HOUSE



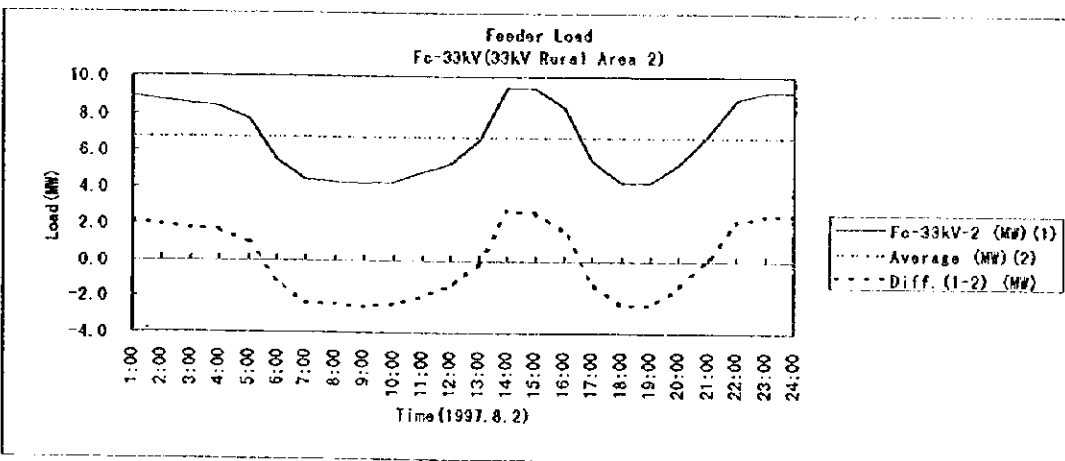
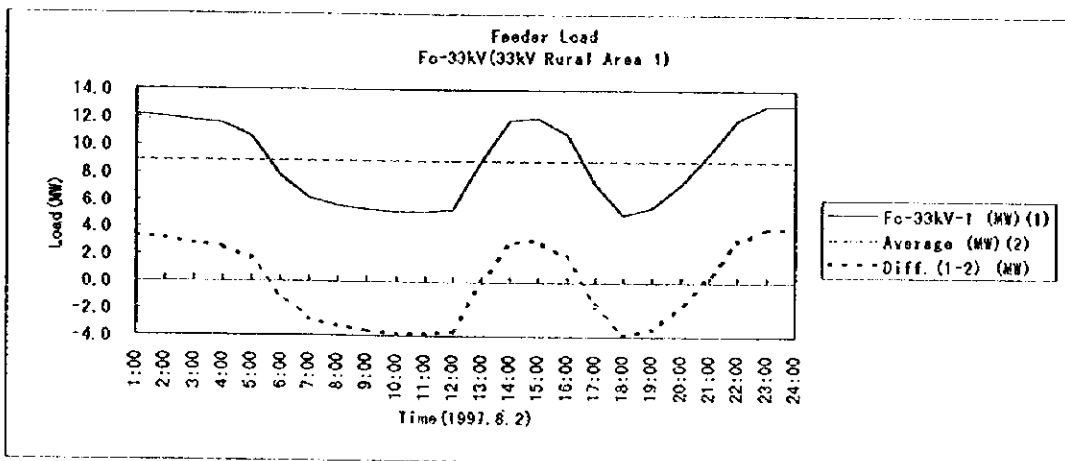
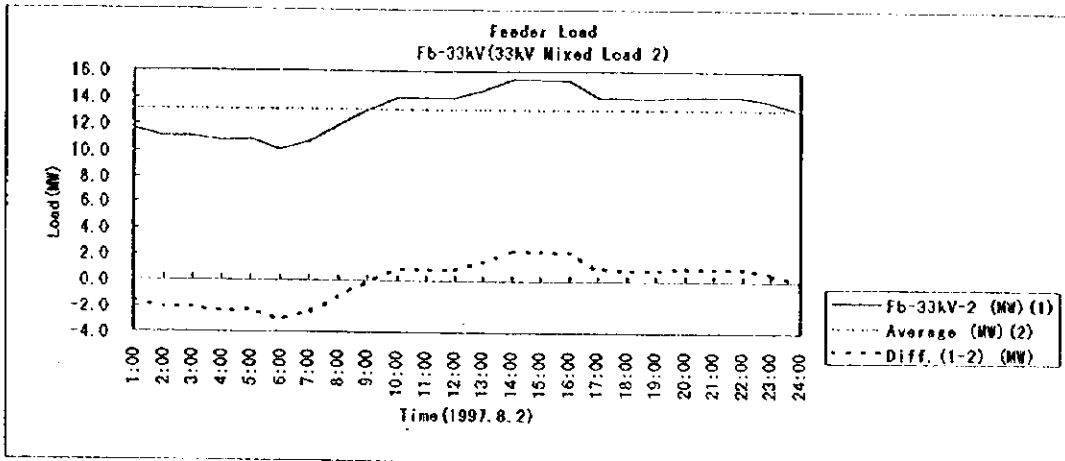
5-1-a Load Curve of Transmission Lines



5-1-b Load Curve of Transformer



5-1-c Load Curve of 33kV Feeder



5-1-d Load Curve of 33kV Feeder

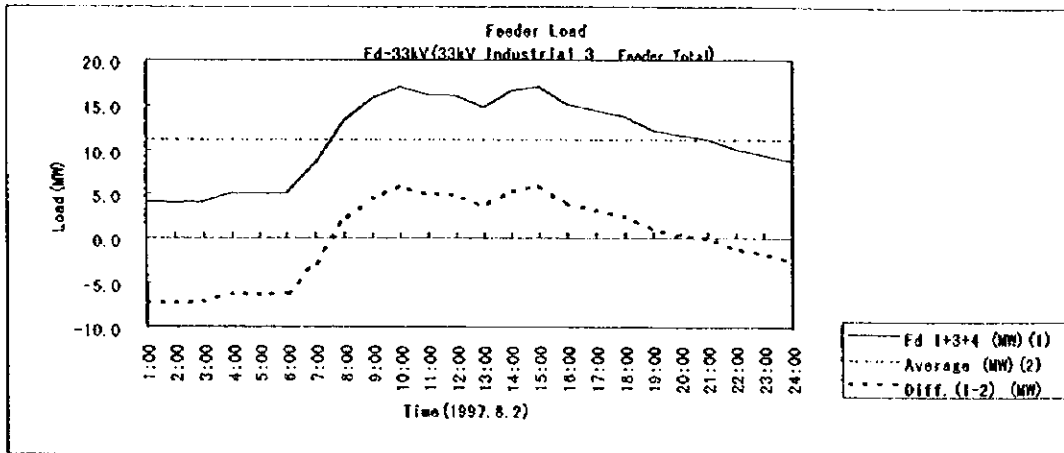
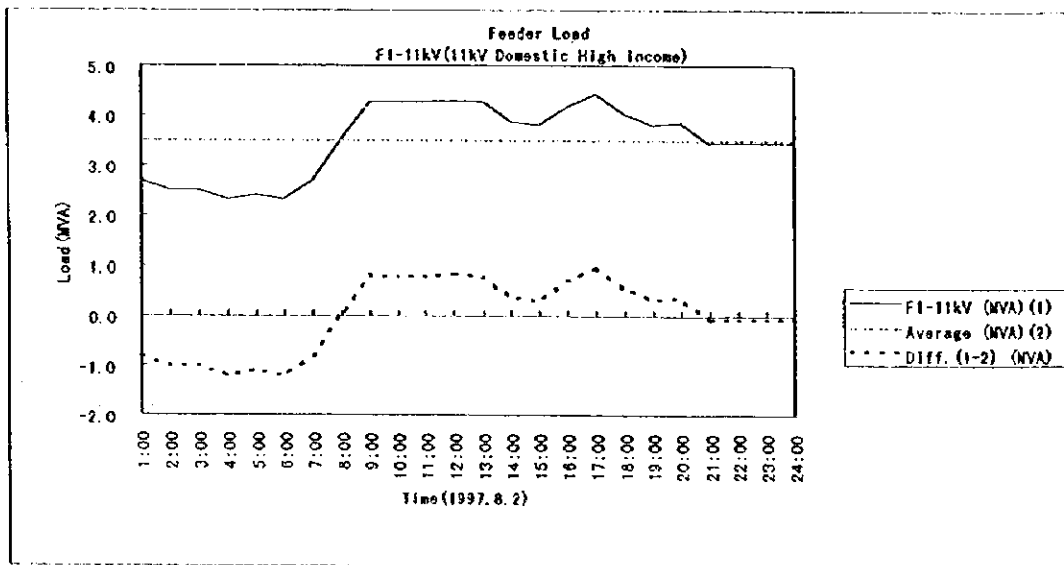
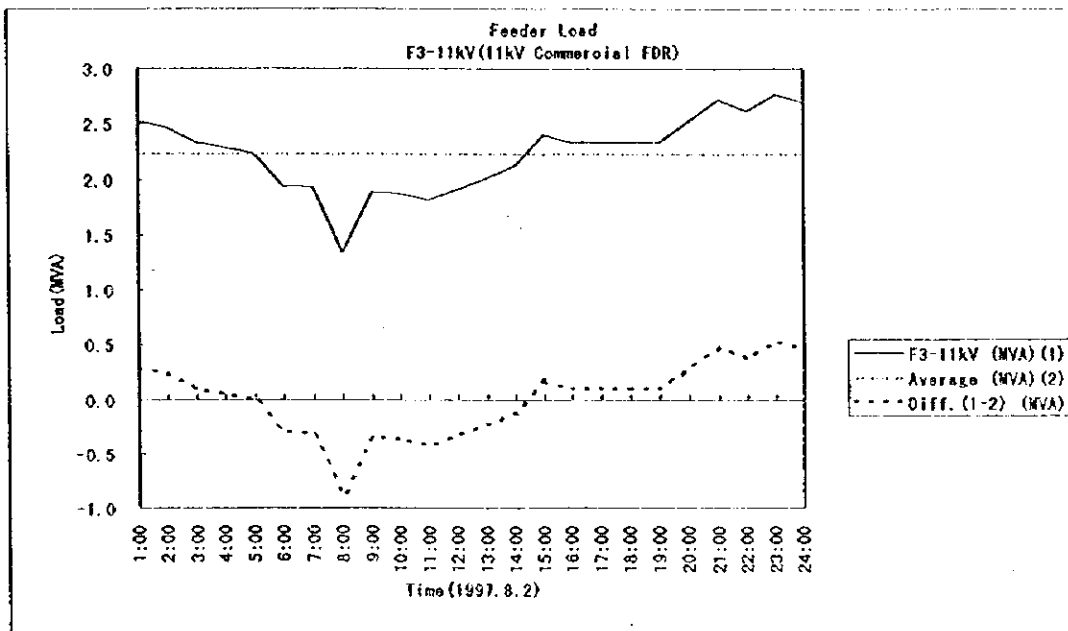
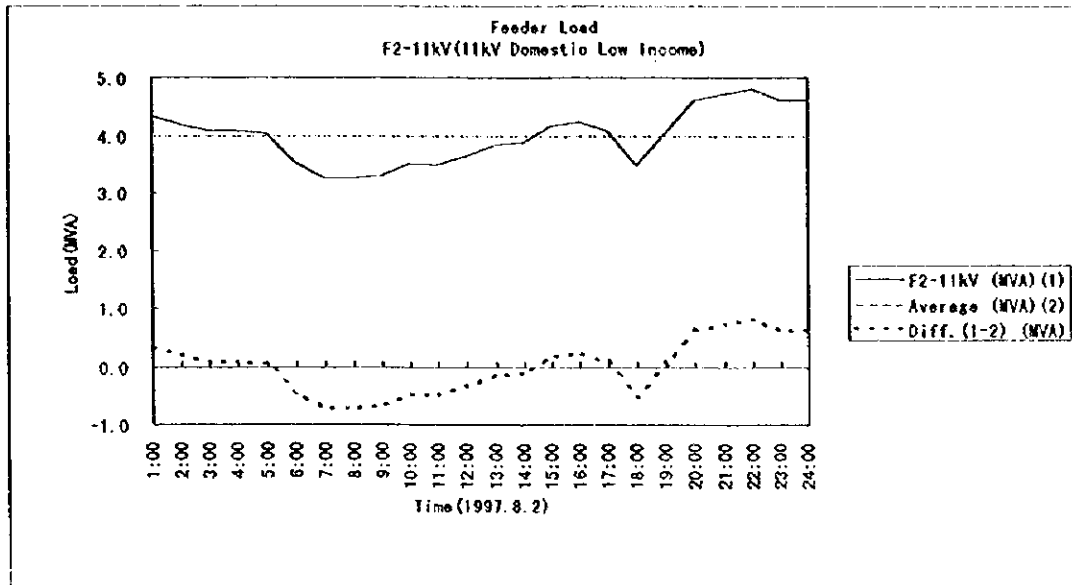


Fig.5-1-6-3 Load Curve of 33kV Feeder



5-1-c Load Curve of 11kV Feeder



5-1-f Load Curve of 11kV Feeder

"General Weather Conditions at Muscat in Oman"

1996

1) Monthly Average Temperature & Humidity (in Muscat)

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Temperature	20.4	21.7	24.4	28.8	34.1	34.4	34.6	31.2	29.7	27.5	23.6	20.6	27.6
(Tokyo)	5.2	5.5	8.5	14.1	18.6	21.7	25.2	27.1	21.2	17.6	12.6	7.9	15.4
Humidity	64	69	69	50	41	54	54	74	70	52	57	61	59.6
(%) (Tokyo)	50	52	56	63	66	73	76	73	73	67	61	54	63.7

1996

2) Monthly Maximum/Minimum Temperature & Humidity (in Muscat)

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Temperature [MAX]	28.5	29.1	36.5	41.5	45.2	47.8	44.1	42.1	39.8	37.5	31.5	28.4	37.7
(MIN)	12.8	14.1	15.4	19.2	22.4	27.1	27.3	25.3	22.2	16.6	12.8	10.9	18.8
Humidity [MAX]	96	99	97	94	89	91	100	95	94	89	89	90	93.6
(MIN)	28	34	24	11	8	8	11	24	25	4	24	22	18.6

3) Hourly Fluctuation of Temperature & Humidity in a day

Date= Maximum 05.06.1996													
Time (clock)	1	2	3	4	5	6	7	8	9	10	11	12	Average
Temperature	37.8	37.6	38	36.9	36.6	35.9	36.4	37.5	39.3	41.2	43.8	46.9	
Humidity (%)	18	21	31	35	35	37	38	35	31	25	17	7	
Date= Minimum 09.12.1996													
Time (clock)	1	2	3	4	5	6	7	8	9	10	11	12	Average
Temperature	16.1	13.9	11.7	12.7	13.1	13.1	13.2	16.6	20.5	22.6	22.7	23.3	
Humidity (%)	42	48	54	54	52	53	52	41	34	32	40	41	
Temperature	23.4	23.1	23.2	23	22.1	20.2	19.9	18.8	18.3	17.5	17.2	16.4	18.4
Humidity (%)	41	42	41	46	49	53	56	58	67	65	66	68	49.5

5-2-3

"General Weather Conditions at Muscat in Oman"

1996

1) Monthly Average Temperature & Humidity (in Muscat)

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Temperature	20.4	21.7	24.4	28.8	34.1	34.4	34.6	31.2	29.7	27.5	23.6	20.6	27.6
(Tokyo)	5.2	5.8	8.5	14.1	18.6	21.7	25.2	27.1	21.2	17.6	12.6	7.9	15.4
Humidity	64	69	69	50	41	54	54	74	70	52	57	61	59.6
(%) (Tokyo)	50	52	56	63	66	73	76	73	73	67	61	54	63.7

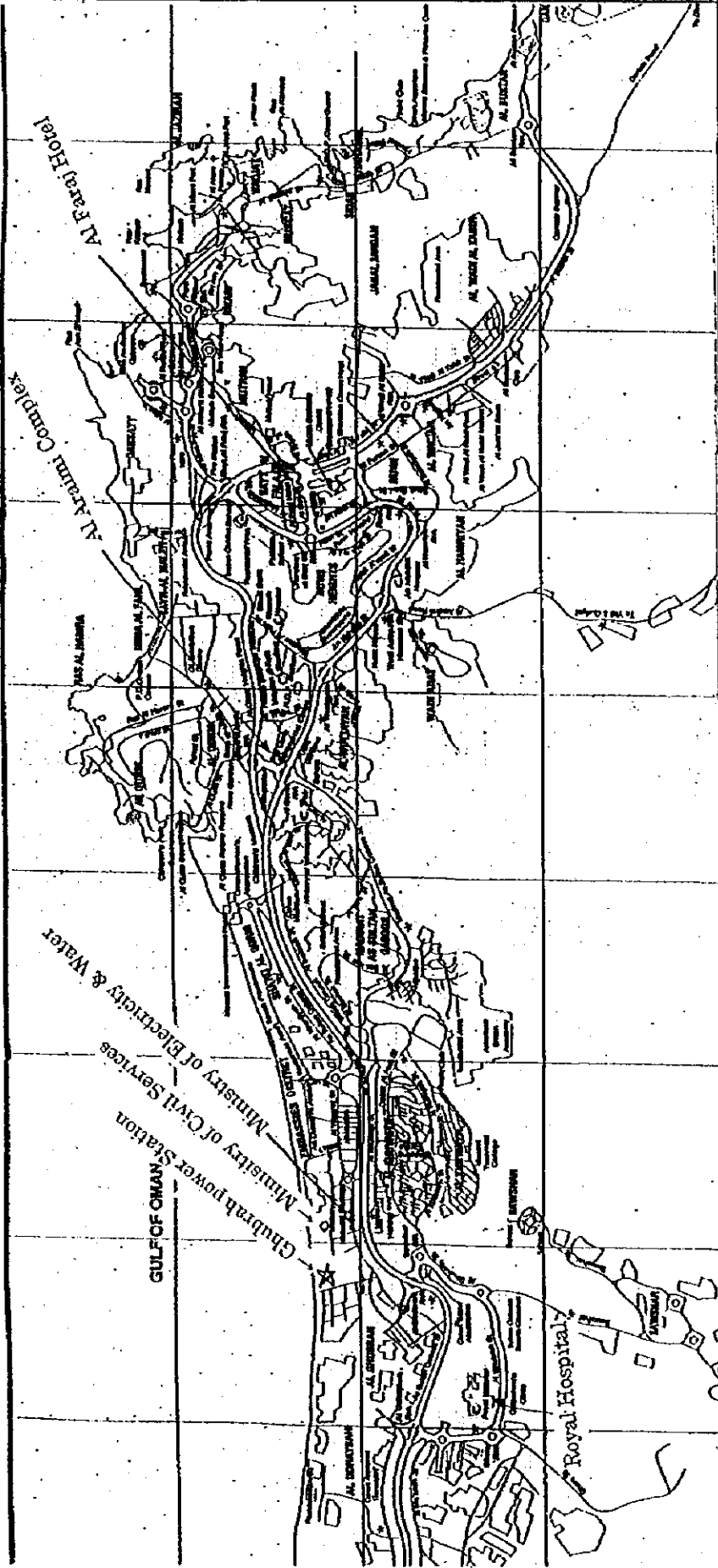
1996

2) Monthly Maximum/Minimum Temperature & Humidity (in Muscat)

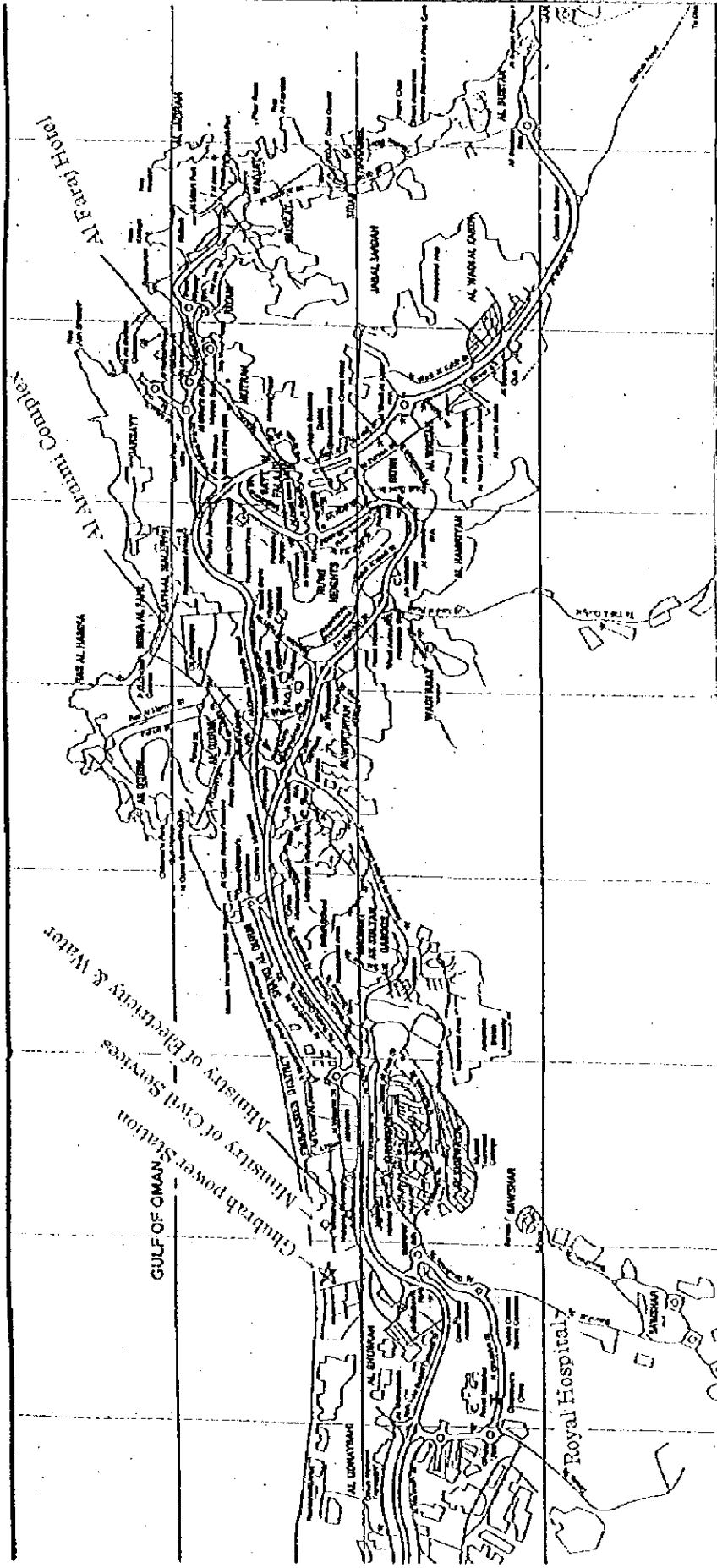
Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Temperature [MAX]	28.5	29.1	36.5	41.5	45.2	47.8	44.1	42.1	39.8	37.5	31.5	28.4	37.7
[MIN]	12.8	14.1	15.4	19.2	22.4	27.1	27.3	25.3	22.2	16.6	12.8	10.9	18.8
Humidity [MAX]	96	99	97	94	89	91	100	95	94	89	89	90	93.6
(%) [MIN]	28	34	24	11	8	8	11	24	25	4	24	22	18.6

3) Hourly Fluctuation of Temperature & Humidity in a day

Date= Maximum 05.06.1996													
Time (o'clock)	1	2	3	4	5	6	7	8	9	10	11	12	Average
Temperature	37.8	37.6	38	36.9	36.6	35.9	36.4	37.5	39.3	41.2	43.8	46.9	
Humidity (%)	18	21	31	35	35	37	38	35	37	25	17	7	
Date= Minimum 09.12.1996													
Time (o'clock)	1	2	3	4	5	6	7	8	9	10	11	12	Average
Temperature	16.1	13.9	11.7	12.7	13.1	13.1	13.2	16.6	20.5	22.6	22.7	23.3	
Humidity (%)	42	48	54	54	52	53	52	47	34	32	40	41	
Temperature	23.4	23.1	23.2	23	22.1	20.2	19.9	18.8	18.3	17.5	17.2	16.4	18.4
Humidity (%)	47	42	47	46	49	53	56	58	67	65	66	68	49.5



5-2-b Location of the Buildings/Facilities in Capital Area Muscat, Oman



5-2-b Location of the Buildings/Facilities in Capital Area Muscat, Oman

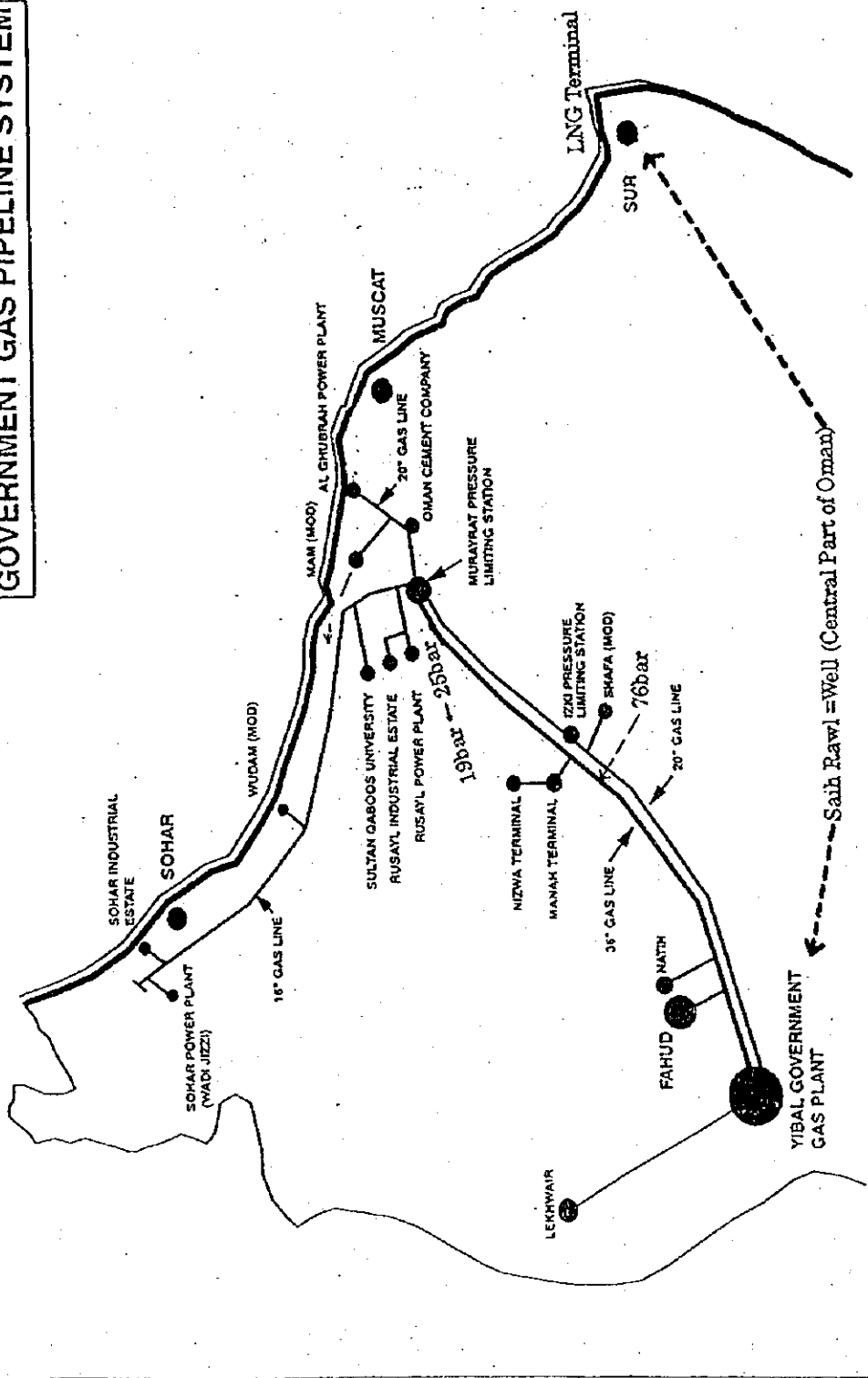
The Study on Demand Supply Management for Power Sector
In the Sultanate of Oman

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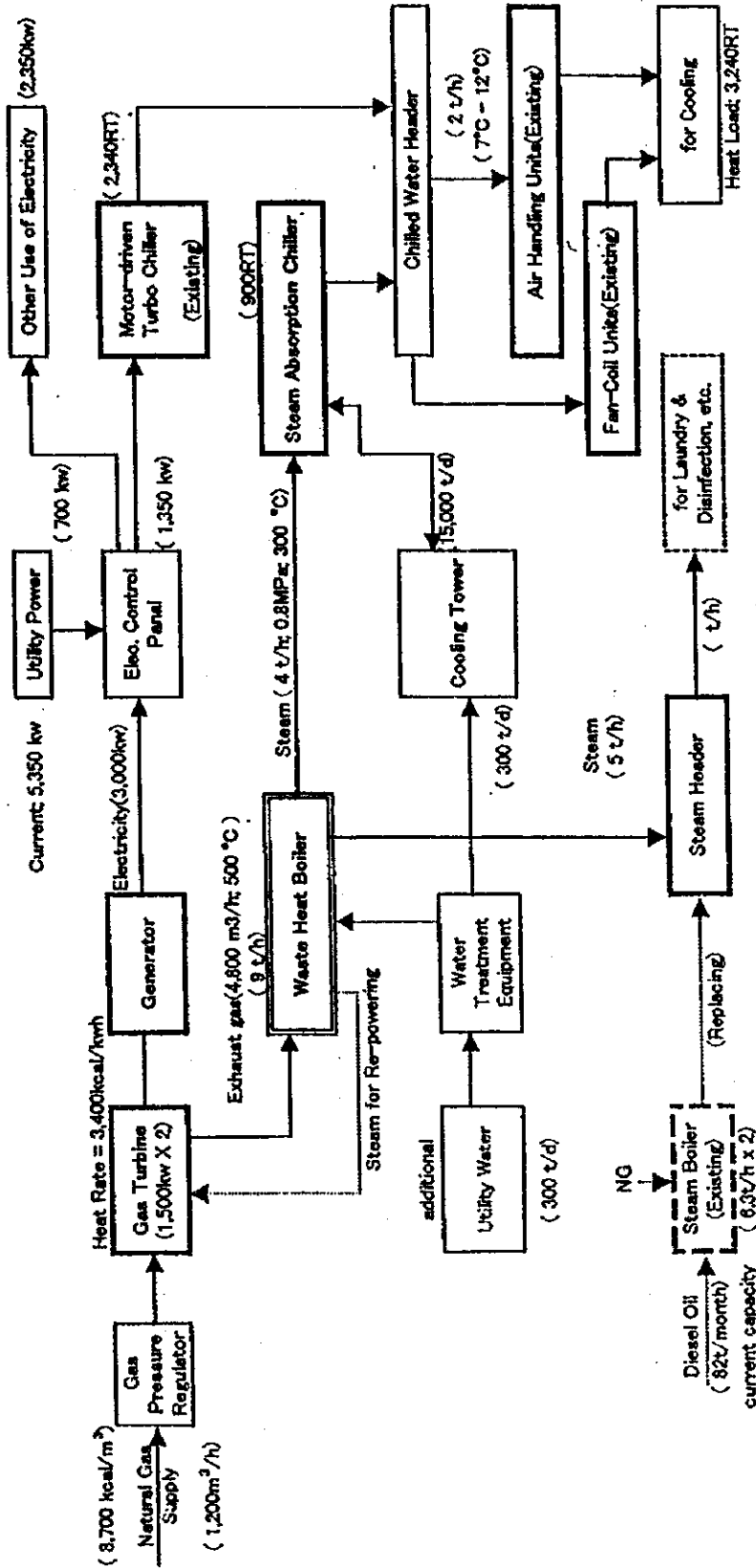
5-2-C High-Pressure Natural Gas Transmission Pipelines in Oman

(Source : Ministry of Oil & Gas, Oman)

GOVERNMENT GAS PIPELINE SYSTEM



5-2-d
Schematic Diagram of Proposed Cooling System using NG for Royal Hospital
(Case Study 1: Co-Generation System with Gas Turbines embodying Absorption Chillers)



Note:

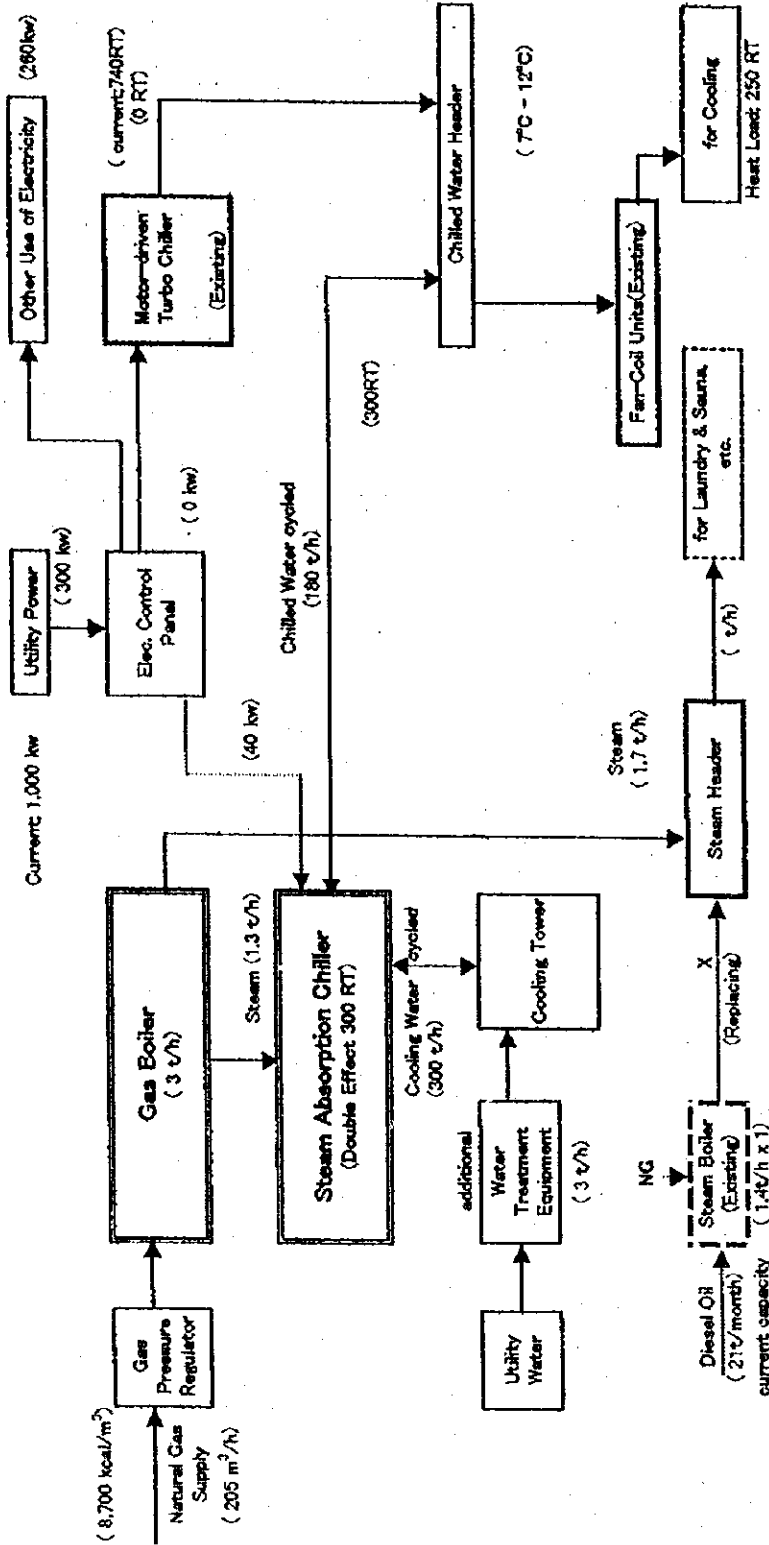
- (1) Overall Heat Load of Cooling System for the Building = 3,240 RT; and about 900RT of it can be complemented by the absorption chiller.
- (2) Necessary Capacity of the Motor-driven Turbo Chiller for all with it, = approximately 4,000 kw, supposing its COP = 3.0, and 0.7kw/RT.
- (3) Necessary Capacity of Waste Heat Boiler is about 3t/h for 1,000kw turbine
- (4) Necessary additional Water for Cooling tower of the Absorption Chiller will be about 10,000t/month.
- (5) Existing Steam Boiler can be replaced by the waste heat boiler.
- (6) Existing Emergency power supply generator can be replaced by this co-generation/utility power.

Recommended Co-Generation System for Royal Hospital

5-2-e

Schematic Diagram of Proposed Gas Cooling System using NG for Al Falaj Hotel

(Case Study_AE(1): Gas-fired Steam Absorption Chiller System for Whole Cooling)



Note:

- (1) Overall Heat Load of Cooling System for the Building = 300 RT; and all the cooling load (300RT) can be performed by the gas steam absorption chiller. Some units of electro turbo chillers shall be used in an emergency.
- (2) Necessary Capacity of the Motor-driven Turbo Chiller, if for all with it, is supposed to be approximately 375 kw, supposing its COP = 3.0, but currently equipped with 660 kw showing over-spec.
- (3) Necessary Capacity of Gas Boilers is about 3 t/h for generating Steam
- (4) Necessary additional Water for Cooling tower of the Absorption Chiller will be about 1,900t/month.
- (5) Existing Steam Boiler can be replaced by the Gas boiler (both for Absorption Chillers & for Laundry/Sauna).

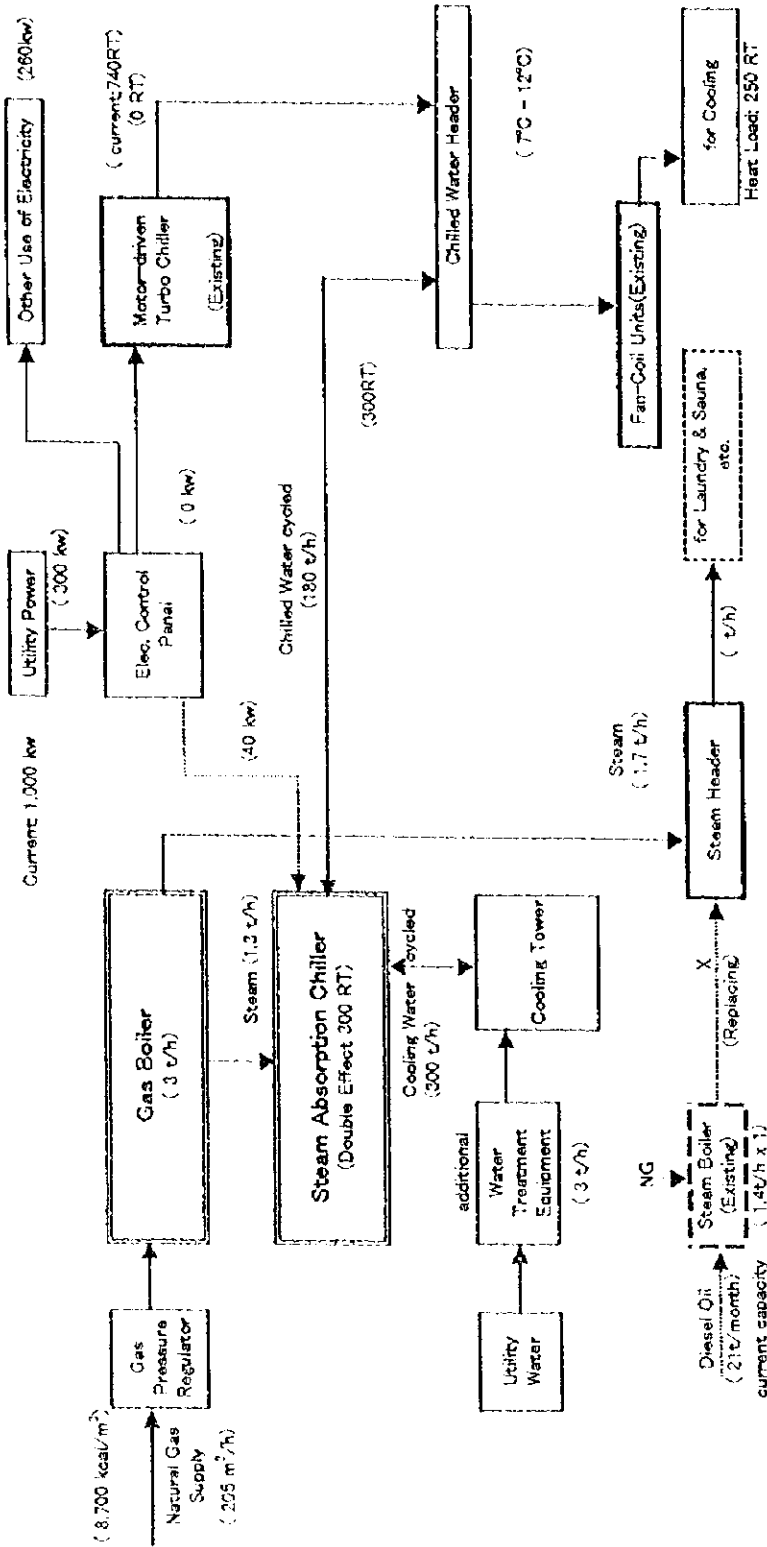
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Schematic Diagram of Proposed Gas Cooling System using NG for Al Falaj Hotel

(Case Study A/E/C) Gas-fired Steam Absorption Chiller System for Whole Cooling)

5-2-0



- Note:
- (1) Overall Heat Load of Cooling System for the Building = 300 RT; and all the cooling load (300RT) can be performed by the gas steam absorption chiller. Some units of electric turbo chillers shall be used in an emergency.
 - (2) Necessary Capacity of the Motor-driven Turbo Chiller, if for all with it, is supposed to be approximately 375 kw, supposing its COP = 3.0, but currently equipped with 950 kw showing over-spec.
 - (3) Necessary Capacity of Gas Boilers is about 3 t/h for generating Steam
 - (4) Necessary additional Water for Cooling tower of the Absorption Chiller will be about 1,950t/month.
 - (5) Existing Steam Boiler can be replaced by the Gas boiler (both for Absorption Chillers & for Laundry/Sauna).

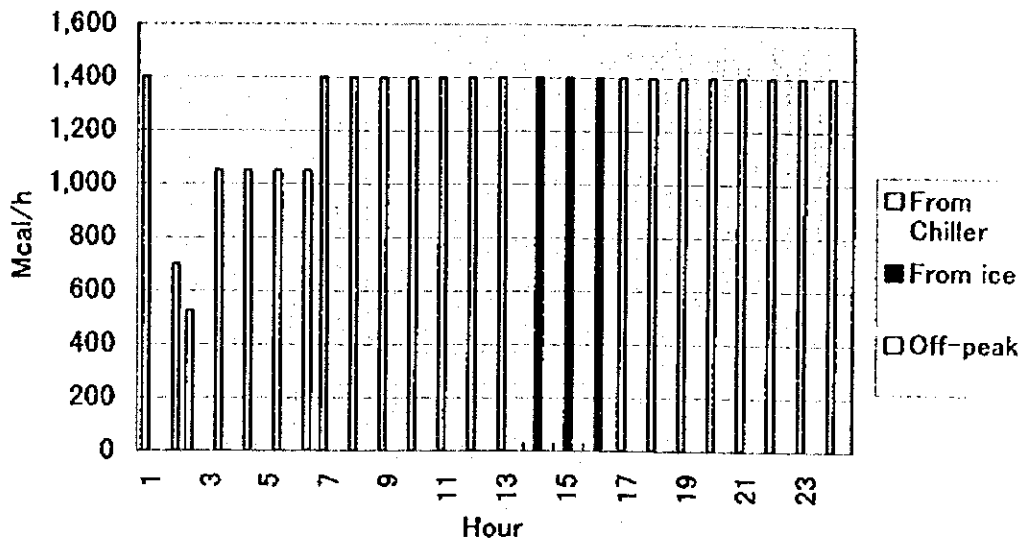
5-3-a Peak Cut Operation Mode -Royal Hospital
(Case 1)

2x 270RTx 3,024 Kcal/h = 1,633 Mcal/h
A/C presumed load factor=0.85

Unit: Mcal/h

Hour	A/C operation mode			Ice stored mode
	From Chiller	From ice	Total	Off-peak
1	1,400	0	1,400	0
2	700	0	700	525
3	0	0	0	1,050
4	0	0	0	1,050
5	0	0	0	1,050
6	0	0	0	1,050
7	1,400	0	1,400	0
8	1,400	0	1,400	0
9	1,400	0	1,400	0
10	1,400	0	1,400	0
11	1,400	0	1,400	0
12	1,400	0	1,400	0
13	1,400	0	1,400	0
14	0	1,400	1,400	0
15	0	1,400	1,400	0
16	0	1,400	1,400	0
17	1,400	0	1,400	0
18	1,400	0	1,400	0
19	1,400	0	1,400	0
20	1,400	0	1,400	0
21	1,400	0	1,400	0
22	1,400	0	1,400	0
23	1,400	0	1,400	0
24	1,400	0	1,400	0
Total	23,100	4,200	27,300	4,725

Operation Mode-Royal Hospital



5-3-b Power Consumption by Peak Cut Operation-Royal Hospital
(Case 1)

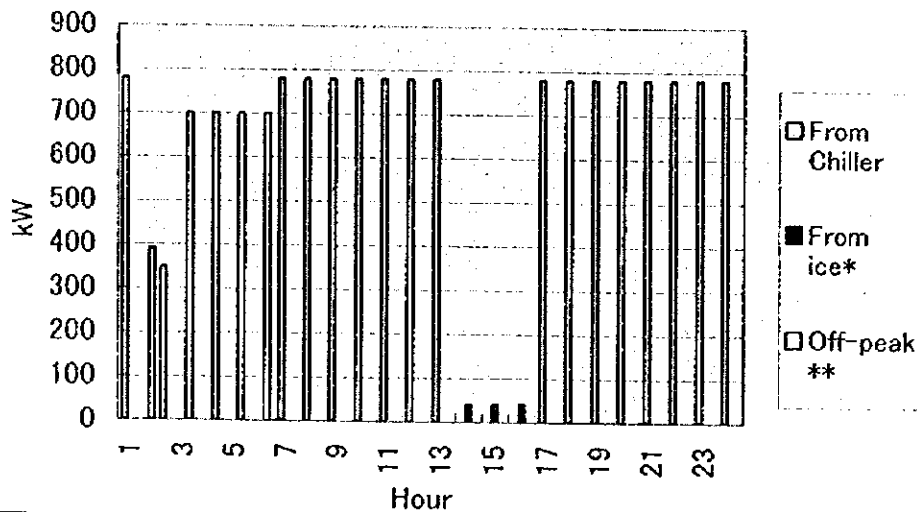
2x270RTx 3,024 Kcal/RT = 1,633 Mcal/h
A/C load factor = 0.85

Unit: kW

Hour	A/C operation mode			Ice stored mode	Power Consumption
	From Chiller	From ice*	Sub-Total	Off-peak **	Total
1	780	0	780	0	780
2	390	0	390	350	740
3	0	0	0	700	700
4	0	0	0	700	700
5	0	0	0	700	700
6	0	0	0	700	700
7	780	0	780	0	780
8	780	0	780	0	780
9	780	0	780	0	780
10	780	0	780	0	780
11	780	0	780	0	780
12	780	0	780	0	780
13	780	0	780	0	780
14	0	40	40	0	40
15	0	40	40	0	40
16	0	40	40	0	40
17	780	0	780	0	780
18	780	0	780	0	780
19	780	0	780	0	780
20	780	0	780	0	780
21	780	0	780	0	780
22	780	0	780	0	780
23	780	0	780	0	780
24	780	0	780	0	780
Total	12,870	120	12,990	3,150	16,140

*included brine circulating pump of 40k ** included brine pump of 53kW

Power Consumption-Royal Hospital



5-3-c Load Leveling Operation Mode(8Hour Ice Making)-Royal Hospital
(Case 2)

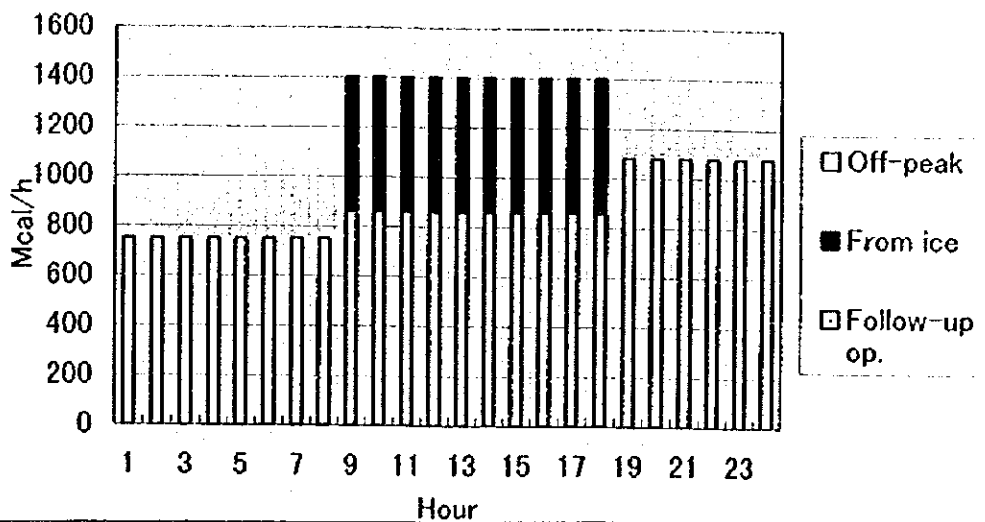
2x 270RTx 3,024 Kcal/h = 1,633 Mcal/h

A/C presumed load factor=0.85 Capacity of chiller: 70%(5x120HP)

Unit: Mcal/h

Hour	A/C operation mode			Ice stored mode
	Follow-up op.	From ice	Total	Off-peak
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	0	0	0	750
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
	540	0	1,400	0
18	800	540	1,400	0
19	1,080	0	1,080	0
20	1,080	0	1,080	0
21	1,080	0	1,080	0
22	1,080	0	1,080	0
23	1,080	0	1,080	0
24	1,080	0	1,080	0
Total	15,080	5,400	20,480	6,000

Operation Mode-Royal Hospital



5-3-C Load Leveling Operation Mode(8Hour Ice Making)-Royal Hospital
(Case 2)

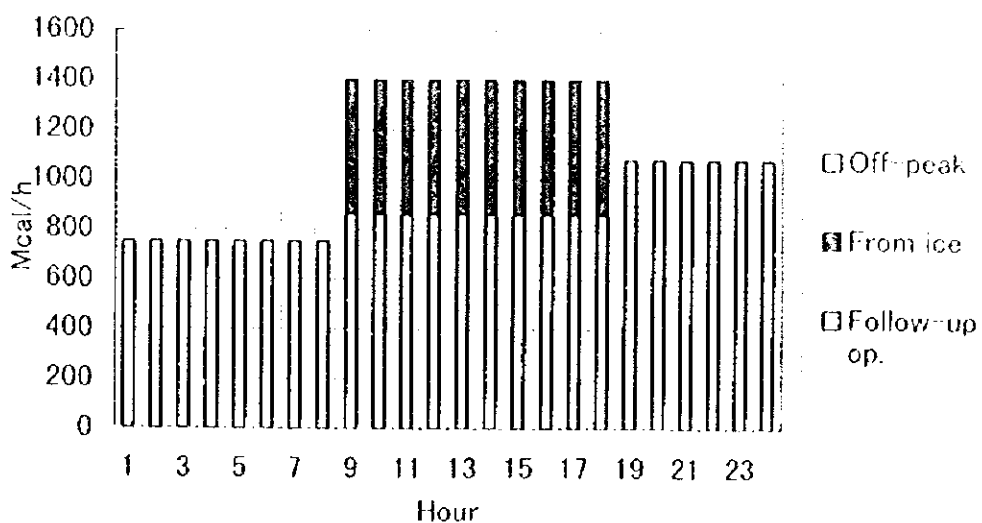
2x 270RTx 3,924 Kcal/h = 1,633 Mcal/h

A/C presumed load factor=0.85 Capacity of chiller: 70%(5x120HP)

Unit: Mcal/h

Hour	A/C operation mode			Ice stored mode
	Follow-up op.	From ice	Total	Off-peak
1	0	0	0	750
2	0	0	0	750
3	0	0	0	750
4	0	0	0	750
5	0	0	0	750
6	0	0	0	750
7	0	0	0	750
8	0	0	0	750
9	860	540	1,400	0
10	860	540	1,400	0
11	860	540	1,400	0
12	860	540	1,400	0
13	860	540	1,400	0
14	860	540	1,400	0
15	860	540	1,400	0
16	860	540	1,400	0
17	860	540	1,400	0
18	860	540	1,400	0
19	1,080	0	1,080	0
20	1,080	0	1,080	0
21	1,080	0	1,080	0
22	1,080	0	1,080	0
23	1,080	0	1,080	0
24	1,080	0	1,080	0
Total	15,080	5,400	20,480	6,000

Operation Mode--Royal Hospital



5-3-d Power Consumption by Load Leveling Operation -Royal Hospital
(Case 2) Chiller capacity of 70%(5x120HP)

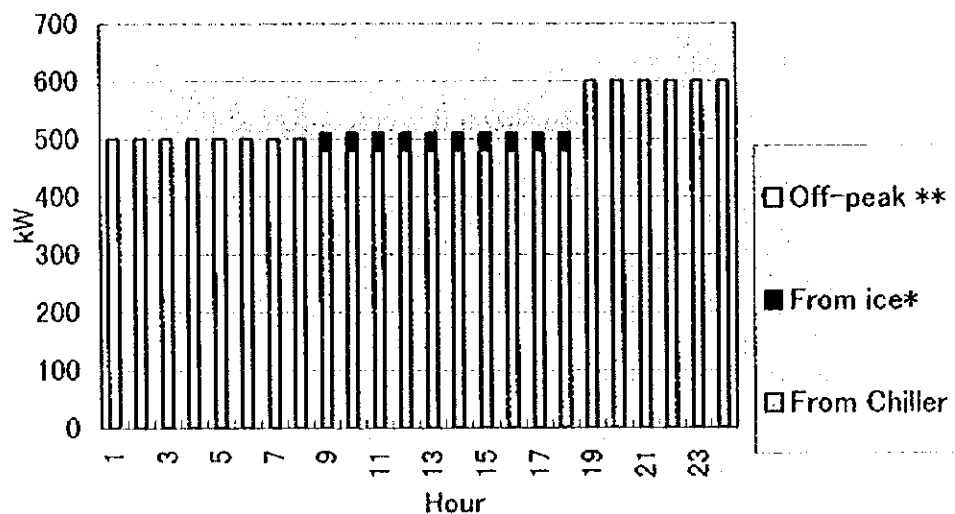
2x270RTx 3,024 Kcal/RT = 1,633 Mcal/h
A/C load factor = 0.85

Unit: kW

Hour	A/C operation mode			Ice stored mode	Power Consumption
	From Chiller	From ice*	Sub-Total	Off-peak **	Total
1	0	0	0	500	500
2	0	0	0	500	500
3	0	0	0	500	500
4	0	0	0	500	500
5	0	0	0	500	500
6	0	0	0	500	500
7	0	0	0	500	500
8	0	0	0	500	500
9	480	30	510	0	510
10	480	30	510	0	510
11	480	30	510	0	510
12	480	30	510	0	510
13	480	30	510	0	510
14	480	30	510	0	510
15	480	30	510	0	510
16	480	30	510	0	510
17	480	30	510	0	510
18	480	30	510	0	510
19	600	0	600	0	600
20	600	0	600	0	600
21	600	0	600	0	600
22	600	0	600	0	600
23	600	0	600	0	600
24	600	0	600	0	600
Total	8,400	300	8,700	4,000	12,700

*included brine circulating pump of 30 ** included brine pump of 38kW

Power Consumption-Royal Hospital



5-3-d Power Consumption by Load Leveling Operation --Royal Hospital
(Case 2) Chiller capacity of 70%(5x120HP)

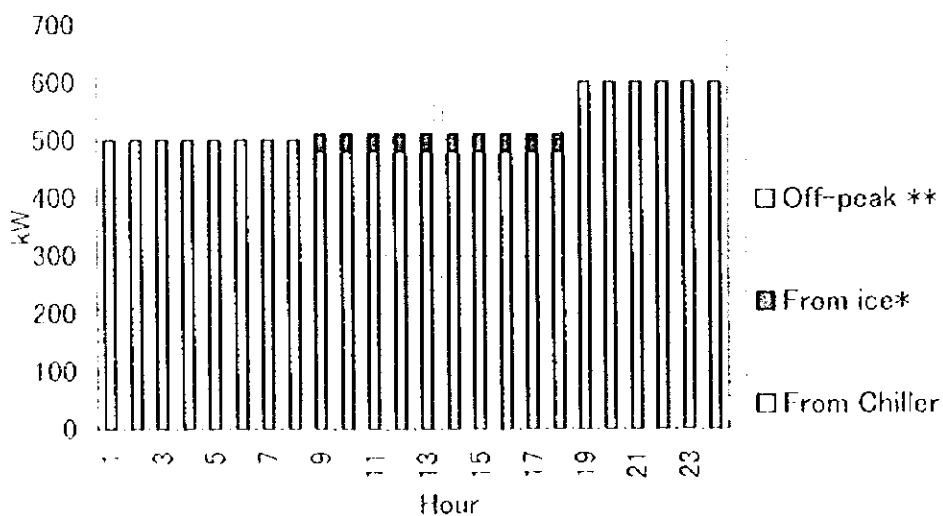
2x270RTx 3,024 Kcal/RT = 1,633 Mcal/h
A/C load factor = 0.85

Unit: kW

Hour	A/C operation mode			Ice stored mode	Power Consumption
	From Chiller	From ice*	Sub-Total	Off-peak **	Total
1	0	0	0	500	500
2	0	0	0	500	500
3	0	0	0	500	500
4	0	0	0	500	500
5	0	0	0	500	500
6	0	0	0	500	500
7	0	0	0	500	500
8	0	0	0	500	500
9	480	30	510	0	510
10	480	30	510	0	510
11	480	30	510	0	510
12	480	30	510	0	510
13	480	30	510	0	510
14	480	30	510	0	510
15	480	30	510	0	510
16	480	30	510	0	510
17	480	30	510	0	510
18	480	30	510	0	510
19	600	0	600	0	600
20	600	0	600	0	600
21	600	0	600	0	600
22	600	0	600	0	600
23	600	0	600	0	600
24	600	0	600	0	600
Total	8,400	300	8,700	4,000	12,700

*included brine circulating pump of 30 ** included brine pump of 38kW

Power Consumption--Royal Hospital



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