AA-2-2-1. Annual O	peration Plan (Sample case -300	00)

Appendix-2-2-1 Annual Operation Plan

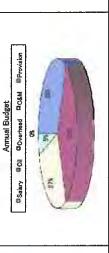
Tariff 1,508 Riel/kWh Profit 10,0%

Exchange Rate
Oil Price
Fuel Efficiency
Over head Expense

4,000 Riel/US\$ 3,000 Riel/Litter 0.31 Litter/KWh 100%

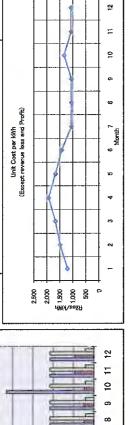
0,750

		100	16	\$ 1 m	-30g	-12%	华	29%	29%	29%	115	288	284	100	
Profit	- 0	73 306	Class	(000)	R DOOL	4300)	4,728	33.856	33,856	33.856	2.356	34,782	34,792	******	36.32
Why Cast	(e)	1 207		1,689	1,930	1,669	1,430	1,060	1,060	1,080	1,333	1,068	1,068	1,340 #	0.335
Cost K		99.585	123,254	137,692	159,192	137,692	112,578	83,450	83,450	83,450	104,950	88,100	88,100	1,301,493	325.37
	Total	30.080	27,894	26,290	26,290	26,290	28,564	31,800	31,800	31,800	31,800	31,800	31,800	356,206 1	89.05
Future)	O&M	22.500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	270,000	67.50
Deposit for	Hydro	7.580	5,394	3,790	3,790	3,790	6,064	9,300	9,300	9,300	9,300	9,300	9,300	86.206	21.55
Sub-total	N. Co. A.	69 505	95,380	111,403	132,903	111,403	84,014	51,650	51,650	51,650	73,150	56,300	58,300	945,287	236.32
O&M	20.0	0	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	44,000	11,00
Overhead	i i	21.500	21,500	21,500	21,500	21,500	21,500	21,500	21,500	21,500	21,500	21,500	21,500	258,000	64.50
ō	in the	26.505	48,360	64,403	64.403	64,403	37,014	4,650	4,650	4,650	4,650	9,300	9,300	342,287	85.57
Salary	Ö	21 500	21,500	21,500	43,000	21,500	21,500	21,500	21,500	21,500	43,000	21,500	21,500	#######	75.25
Revenue	A Dista	127.892	122.892	122 892	122 882	122,892	117,306	117,306	117,306	117,306	117,306	122,882	122,892	************	381.69
1	ä	າ ຊຶ່	Š.	56	å	å	ž	කී	Šć Č	2%	5%	Q.	SK SK	- 11	
Invoice	0 24	129.360	129,360	129,380	129,380	129,360	123,480	123,480	123,480	123,480	123,480	129,360	129,360	########	380,73
Tariff	Diel Gable	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568	1588		(\$5
tion	-	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	Total (1000 US\$
Consumption	E S	82.500	82,500	82,500	82,500	82,500	78,750	78,750	78,750	78,750	78,750	82,500	82,500	971,250	Total
	Oil Spend	8.835	16,120	21,488	21,468	21,468	12,338	1,550	1,550	1,550	1,550	3,100	3,100	114,096	
ation	Total	110,000	110,000	110,000	110,000	110,000	105,000	105,000	105,000	105,000	105,000	110,000	110,000	368,050 1,295,000	
Generation	Diesel	28,500	52,000	69,250	69,250	69,250	39,800	5,000	2,000	2,000	5,000	10,000	10,000	368,050	
	Hydro	81,500	58,000	40,750	40,750	40,750	65,200	100,000	100,000	100,000	100,000	100,000	100,000	926,950	
	Date	20-Jan	20-Feb	20-Mar	20-Apr	20-May	20-Jun	20-Jul	20-Aug	20-Sep	20-Oct	20-Nov	20-Dec		
L		г г	4	ſΩ	9	٦	80	ග	9	=	12	5	14		



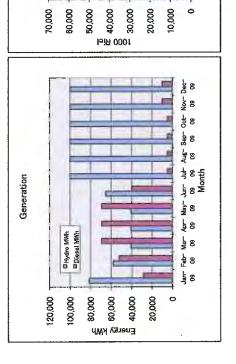
Desarry M Rels
DOI M Rels
ROverhead M Reis
DOSM M Reis

Monthly Expenditure



6 7 Month

4 က 8



AA-2-4-1. Sample of Billing Book



ព្រះរាជាណាចក្រកម្ពុជា ជាតិ សាសនា ព្រះមហាក្សត្រ



មន្ទីរឧស្សាហកម្មរ៉ៃ និងថាមពលខេត្តមណ្ឌលគីវិ

ផ្នែកគណៈ នេយ្យទូទាត់

្ន អង្គភាពអត្តិសនីខេត្តមណ្ឌលគិរិ

Bill Management Section

របាយការណ៍សេរុបក្នុងការចេញវិក័យបត្រជូនអតិថិជនតាមត្រង់ស្វូប្រចាំខែ (តុលា ២០០៩)

	to stading Number of Transformer	ជ្រុនអភិនិវេន Total of Customers	ร่อมกัญไก่ Total of Kwh	និកស្រាវិសរុប Total income	ប់អ៊ុនការ លូស៊ីលេសស្រ Total of	មីនមេញ ពីពីយប់ប្រ Total Invoice not issuse	ជាម្តនលេញ កែកា ប្រ Total Invoice Issuse
	P-01	29	6061	10,060,100 R	8	1	28
	P-02	27	5508	8,915,200 R	5	1	26
	P-03	26	820	1,243,800 R	1	1	25
	P-04	58	4451	7,099,500 R	7	2	56
	P-04 H	1	2089	3,133,500 R	0	0	1
.:	P-05	35	2056	3,084,000 R	0	О	35
	P-06	31	1729	2,593,500 R	0	О	31
	P-07	23	1739	2,776,900 R	2	1	22
	P-08	17	1123	1,781,500 R	1	О	17
31	P-09	25	1237	1,895,300 R	2	1	24
	P-10	10	1007	1,594,100 R	1	0	10
	P-11	41	4860	7,568,800 R	6	0	41
	P-12	16	1016	1,566,200 R	4	0	16
	P-13	6	601	981,900 R	2	0	6
	P-14	50	3880	6,122,200 R	5	1	49
	P-15	46	4585	7,254,500 R	4	0	46
	P-16 (01)	254	15860	24,472,800 R	8	7	247
	P-16 (02)	18	1844	2,857,400 R	2	0	18
	P-17	43	3887	6,116,900 R	3	1	42
	P-18	11	464	704,600 R	1	0	11
	P-19	75	3310	5,025,400 R	2	4	71
	P-20	49	2030	3,075,200 R	2	1	48

របាយការណ៍សេរុបក្នុងការចេញវិក័យបត្រជូនអតិថិជនតាមត្រង់ស្ងួប្រចាំខែ (តុលា ២០០៩)

		p-co-ccc	««««النظام»» «النظامة «النظامة «النظامة» «النظامة «النظامة» «النظامة «النظامة» «النظامة «النظامة» «			
P-21	32	1002	1,503,000 R	0	1	31
P-22	19	1238	1,868,200 R	1	О	19
P-23	17	800	1,200,000 R	0	0	17
P-24	5	202	303,000 R	0	О	5
P-25	12	996	1,626,600 R	1	1	11
P-26	14	525	789,700 R	0	1	13
P-27	13	345	517,500 R	0	О	13
P-28	6	128	192,000 R	0	0	6
P-29	32	2215	3,414,500 R	2	О	32
P-30	29	1286	1,929,000 R	0	2	27
P-31	21	1993	3,202,100 R	3	0	21
P-32	32	1187	1,780,500 R	0	0	32
P-33	20	926	1,389,000 R	0	1	19
P-34	17	2089	3,133,500 R	0	0	17
P-35	11	1064	1,596,000 R	0	1	10
Street-Light	1	972	1,458,000 R	0	0	1
P- 36 OR 066	2	88	132,000 R	0	0	2
Total	1174	87213	135,957,900 R	76	27	1146

ថ្ងៃទី ខែ ឆ្នាំ ២០..... បានឃើញ និង ឯកភាព ប្រធានគណ នេយ្យ ថ្ងៃទី ខែ ឆ្នាំ ២០.....

គណ នេយ្យទូទាត់

ថ្ងៃទី ខែ ឆ្នាំ ២០.....
បានឃើញ និង.....

ប្រធានអង្គភាពអគ្គិសនី

Appendix AA-4-1 Sample of Billing Book



ជាតិ ឆាសនា ព្រះមហាក្សត្រ ដេរូងការា ១០ លោកវាកុះក្ស

មទ្វីរពុស្សាហាឥម្មារីនិងថាមពេលខេត្តមណ្ឌលពីរី

អក្ខភាពអត្តិសនិទេក្តុមណ្ឌលទីរី

ម្នែកគណៈនេយ្យឲ្យទាត់

Bill Management Section

បញ្ជីសំរង់អគិចិជនប្រើប្រាស់ ថា មពល អគ្គីស នីនៅតាមក្រង់សួរចខះ

List of Customers used Energy Recoord For Transformer Number: 01

เบร์เล ตุเกา ๒๐๐៩

SYMBOL

B= Bill issued by Special Price C= 0 Kwh (Billnot issused)

D= Doubt Metter Broken or Stopped (Bill not issused)

E= Expire or Not Pay and stop suplied till pay

កំណ ត់បង្ហាញ

A= ចេញវិក័យបក្រជាយក់លៃចម្កកា

B= ចេញវិក័យៗព្រជាយក់លៃពិលេស C= ០គីឡូវ៉ាត់ ទិនចេញវិក័យបត្រ

D= សង្ស័យថាកុងច័រខូធវីគាំង ទិនចេញវិក័យបក្រ

E= ឃុំភកំណត់ វិមិនបានបង់ប្រាក់ និង ឆ្នាំកន្លាំកំផ្លង់ចរន្ត

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k	MON	ends cods	Cuntorien		Telephone Number	Symbol	Wetter tocation	Metter Serial	Type	Bresiler	Previous	current		Nate	Tetal	Mack
r=4		0	រាធ់ ស៊ុនអេង	យគិន៖ព្		A	P-01 117	38215	10(30)A	\$	117	128	Ħ	1,500 R	16,500 R	
2		Ð	្រសង ហាក់	យអ៊ីនះត្		¥	P-01 208	38702	10(30)A	뚕	407	442	35	1,500 R	52,500 R	
3		æ	អ៊ុក ស៊ន	យុទ្ធនះព័្		∢	P-01 116	38154	10(30)A	\$	648	999	12	1,500 R	18,000 R	
4		ъ	ឡេង សុវណ្ណា័ត្ន	ធំខេម្មព		⋖	P-01 114	39506	10(30)A	6A	279	280	1	1,500 R	1,500 R	
Z.		25	មាន់ ៥ន	ធមិនធំ		Æ	P-01 226	38766	10(30)A	6A	2285	2570	285	1,500 R	427,500 R	
9		а	ព្រីប ព្រែន	ធ្វេះមួញ		Ą	P-01 222	38722	10(30)A	6A	1152	1290	138	1,500 R	207,000 R	
7		E	ជីម ទូច	យគិនះជុំ		⋖	P-01 226	38186	10(30)A	P9	610	692	82	1,500 R	123,000 R	
90		ß	លាត សីមតុណ	ធ្វះសំណាក់បញ្ជីមាស		80	P-01 301	4182	3×20(60)A	63.A	12901	14007	1106	1,700 R	1,880,200 R	
6		16	ពេះម សុខពេរព	នុះសំណាក់មក្សា		89	P-01 303	4739	3x20(60)A	5.A	23297	25192	1895	1,700 R	3,221,500 R	
10		06	មែន ម៉ុយ	យុមិនធំព		C	P-01 308	39383	10(30)A	6A	20	20	0	1,500 R	OR	
11	ļ	66	គុជ វិណ្ណា	ផ្ទះសំណាក់		8	P-01 107	38419	10(30)A	SA	3408	3449	41	1,700 R	69,700 R	
12		e)	គុជ វិណ្ណា	ធ្វីនធម្មព		. Α	P-01 110	38346	1D(30)A	6A	630	732	102	1,500 R	153,000 R	
13		961	គុជ ម៉េងធូ	ម្ភុំ៖ធម្មភា		٧	P-01 110	38912	10(30)A	6A	415	459	44	1,500 R	66,000 R	
14		96	មួច ស្មើ	យង្គិនឡើ		A	P-01 222	38700	10(30)A	20A	793	884	91	1,500 R	136,500 R	
15		96	ស៊ីវ ឃ័ង	ផ្ទះធម្មកា		٨	P-01 224	38960	10(30)A	6A	589	753	89	1,500 R	102,000 R	
16		99	រង នៃ	ផ្ទះធម្មកា		A	P 01-222	038934	10(30)A	10A	433	460	27	1,500 R	40,500 R	

អ្នកធ្វើការាម

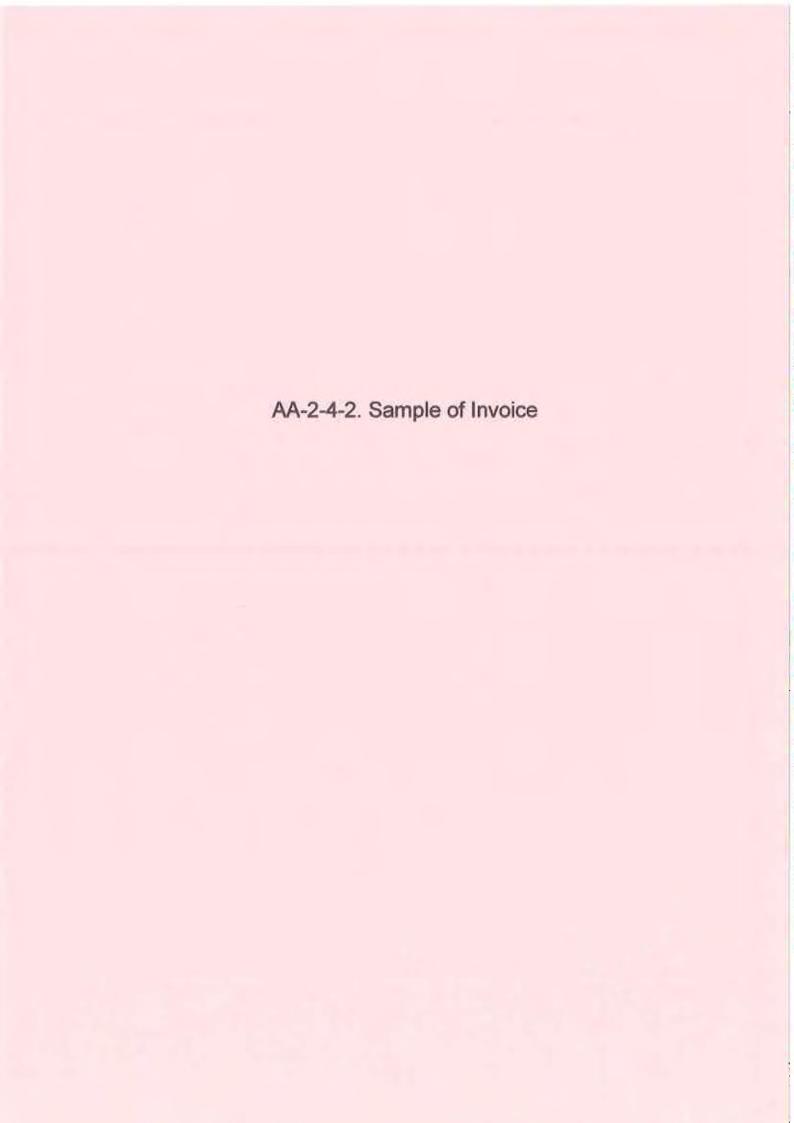
6061 Engaragu: 10,060,100 R

HEATHARDS:

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NUM	musica code	,		Telephone	Firmbel	Wetter (nostion.	Mether	Type	Breskar	Previous	current		Rate	Tetal	Mark
	þ6	តូវ សុធារីក	សុំដេមួញ		A	P 01-226	038673	10(30)A	6A	43.1	471	40	1,500 R	60,000 R	
	මයි	នធំ សុវណ្ណាំ	ផ្ទំដេម្មតា		٧	P 01-226	038394	10(30)A	Α9	455	480	25	1,500 R	37,500 R	
	196	សេង ខ្សែកាប	មូលមុំដំឡាកាប		B	P 01-117	038234	10(30)A	6.A	996	1080	114	1,700 R	193,800 R	
	PIO.	មាល អិន	22°		∢	P 01-112	696880	10(30)A	6A	367	404	37	1,500 R	55,500 R	
	6A .50	ផ្លិះសំណាក់បញ្ជីមាស	ផ្ទះសំណាក់		政	P 01-301	039414	10(30)A	6A	941	1165	224	1,700 R	380,800 R	
	1 99	ឡុងវិបុល	ធម្មកា		Ą	P 01-310	039231	10(30)A	20A	844	918	74	1,500 R	111,000 R	
	(Lice)	ជាង ខេម	មិម្ភិពា		Ą	P 01-212	039313	10(30)A	6A	397	412	15	1,500 R	22,500 R	
	সূত্র	រ៉េត សុខសាមឱ្	ធម្មតា		Ą	P 01-307	039082	10(30)A	5A	400	438	38	1,500 R	57,000 R	
	<u>면</u> 당	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	យុម្ព័ព		Ą	P 01-304	038885	10(30)A	Ą	241	275	34	1,500 R	51,000 R	
	â	ហាន តុម៉ា	ខារ៉ាងខេ		6 0	P 01-310	039241	10(30)A	20A	1632	1810	178	1,700 R	302,600 R]
	T G	កែប ស៊ីឈាង	ກູ້ເພັ		8	P-01 203	004184	10(30)A	20A	3588	4263	675	1,700 R	1,147,500 R	
	E E	ភាព ធន្នទាលី	Wā Ba		A	P-01 307	038951	10(30)A	6A	295	354	59	1,500 R	88,500 R	
	19	ញ្ច្រមហ៊ុន o៩ ៧	អជីវកម្ "០១៦"		60	P-01 266	038296	10(30)A	6A	841	1451	610	1,700 R	1,037,000 R	

ប្រធានគណ នេយ្យ



Appendix AA-2-4-2 Sample of Invoice

អង្គកាពអគ្គិសន៍ ខេត្តមណ្ឌលពីរ Electricity Unit of MondulKiri Province នៅ បុក្រារវានី (EUMP) DOEUM SROL, SENMONOROM.CITY	រចន្ទះ P-01 117 ព្រៃ្ធានអតិថិជន : ខាន សុនក្រ 1 (ប្រភព្វព្រៃស់: ផ្ទៃធម្មតា	របព្រះ 1 ព្រះភទ េហ្វីជ្រាស់: ផ្ទះធម្មតា	20/01/2009 ដល់ថ្ងៃទី: 20/02/2009 (គ្រាចាប់ពីថ្ងៃទី: 20/01/2009 ដល់ថ្ងៃទី: 20/02/2009	មេកុណ មានាល តំបំបងកមា តំបំបងកុខ នាឡិកាស្តង លេខនិយានចាស់ លេខនិយានថ្ងៃ មេតុណ នានាក តំបំបងកុនា MILITIDIER CONCINADITON RATE VALUE METER DEFLICUE CHOSENT MULTIDIES CONCINADITON PATE	11 1,500 R 38215 0001.17 0001.28 1 1.1	Please save Energy l ត្រុងជួយឥន្ទ្រំសំចេរាកាល !	Grighkajulgituk Total: 17,500 R	№ ปุกษณีผู้ที่เกล่าปรุกที่ รัสจารตก็มาสิทิธิเลยิลของปฏาที่ ў ผู้ผู้สำนับ คืบปฏาที่ РАУ ву: 209/2/3 🕴 Достіў простаў праталия п	អគ្គិសនិទ្ធមន្តមន្ត្របន្តិ៍ និងក្នុកផ្ទៅសំពេលជាបញ្ចេះអាសន្ន ។ ថ្ងៃបង់ប្រាក់ PAY DATE:	»ការក្នាច់ចង្ក្រាន់ខ្លួនក្រីញិញ ជួនក្រានតិចិន្នជានានបន់ចំណុលសរុបក្នុង ចិន្ទិនទីកប្រាក់បានបង់ AMOUNT:	វិក្សាយ។ក្រកនេះ និងកិច្ចិសេវក្សាយមន្ត្រាលក្រការ	் மாபமர் முர்காவதால் ஒவ்வாய் முரித்திர்வது வருக்கு வரித்திர்வத் வரித்திர்கள் வரித்திருந்திர்கள் வரித்திருந்திர்கள் வரித்திருந்
			600	TSECTION FER	ΨŪ			និជនមិនបានបង់ប្រាក់	F-	ម៉ូបំណុលសេវបញ្ជូន	ក្រាល់នៅបេឡាក	

AA-2-5	-1. Annual data sub	missions by sm	aller licensee

Appendix AA-2-5-1 (1) Annual data submissions by smaller Licensee

Sample table	Contents
AS 1	Data of generation
AS 2	Detail information on power purchase (buying power)
AS 3	Detail information on staff payment
AS 4	Payment for operation and maintenance
AS 5	Detail information on payment for administration and general management
AS 6	Detail information on soft loan
AS 7	Detail information on the total fixed assets
AS 8	Detail information on depreciation
AS 9	Calculation of reasonable profit
AS 10	Calculation correct payment
AS 11	Income from electricity tariff is carrying out
AS 12	Information on energy

Appendix AA-2-5-1 (2) Table AS 1
Data of Generation
really/certainly figure for last year

Ittem	L	Ifem	nmit	Tom I	Toh T	Mar	Amil	Mox	Trans	Tanl	Con	100	Nov	Doo	Total	
€		Technical dara			T		1	72047	\neg		 Т	T	Т	T	- Otal	
	ţ1	Installed capacity of Generator														
		(certify model)	kVA													
		(certify model)	kVA													
	7	Power generate	kWh													
	3		kWh													
	[Using power for generation	%													
	4		kWh													
	S	Power coefficient	%													
	9	Amount of operation hours	h													
8		Fuel-oil (D.O) data														
		Sources (certify the Name)														
	7	Amount of fuel-oil for buy-in	Liter (L)													
	∞	Amount of fuel-oil for using	Liter													
	9	Average price of fuel-oil	Reals/L													
}	10	Payment for fuel-oil	(000 Leals)													
		Sources (certify the Name)														
	Ξ	Amount of fuel-oil for buy-in	Liter													
	12	Amount of fuel-oil for using	Liter													
	13		Reals/L													
	14	Payment for fuel-oil	(000 Leals)				-									
	15	Using for fuel-oil rate	L/kWh													
	16	Amount of lubrication-oil for buy-in	Liter													
	17	Amount of lubrication-oil for using	Liter													
	18	Average price of lubrication-oil	Reals/L													
	19	Payment for lubrication-oil	(000 Reals)													
		Total payment for fuel-oil and lubrication-oil (10+14+19)	(000 Reals))	
	20	20 Using for lubrication-oil rate	L/kWh				9		7							
-																

Appendix AA-2-5-1 (3) Table AS 2 Detail information on power purchase (buying Electricity)

Really/certainly figure for last year

			Jan.	Feb.	Mar.	Jan. Feb. Mar. April May Jun. Jul.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Aug. Sep. Oct. Nov. Dec.	Total
A		Sources 1 (Name)													
	1	1 (Payment for capacity (000 Riel)													
	2	2 Payment on power purchase (000 Riel)													
	3	3 Total payment (000 Riel)													
	4	Total amount power purchase (000 kWh)													
	N)	5 Average payment (Riels/kWh)						-							
2		Sources 2 (Name)													
	-	Payment for capacity (000 Riel)													
	2	2 Payment on power purchase (000 Riel)													
	3	3 Total payment (000 Riel)													
	4	4 Total amount power purchase (000 kWh)													
	w	Average payment (Riels/kWh)													

Appendix AA-2-5-1 (4) Table AS 3 Detail information on staff payment

**************************************	ly figure for last year
	last
	for
	gure
	ly fi
	rtain
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	eally
	ž

		Number of		Supplementa	Extra	fortune and other	Benefit/		
		Staff at the end	Basic	ry money 1	money 2	benefit	Pomus	Others (
S _N	Category of Staff	of the year	Salary	(certify)	(certify)	(certify)	(certify)	certify)	Total
			(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels) (000 Riels)	(000 Riels)	(000 Riels)
	Administration Division							1	
1	1 Chief (Director)								
2	Vice-chief (Deputy Director)							THE PARTY AND TH	
3	Accounting or Cashier								WWW.
	Technical Division								
	Generation Section								
1	Operators								
2	Technician or Machinery								
3	Other (by category)								
	Distribution Section								
	Operators								
2	Electrician								
3	3 Other (by category)								
	Total								

Appendix AA-2-5-1 (5) Table AS 4

Payment for operation and maintenance

No	Item	Really/	certainly figure for last y	ear
		Generation Section	Distribution Section	Total
		(000 Riels)	(000 Riels)	(000 Riels)
1	Spare part			
2	Material (equipment)			
3	Repairing and maintenance			
4	Payment for hiring			
5	Water and Electricity			
6	Bad debt			
7	Other (please certify)			
8				
	Total			

Appendix AA-2-5-1 (6) Table AS 5

Detail information on payment for administration and general management

	Item	Really/certainly figure for last year
		(000 Riels)
1	Bank service	
2	License fee	
3	Payment for the regulation service	
4	Payment for transportation	
5	Payment for Mission and welcome guest	
6	Posts service and telecommunications	
7	Payment for office material (stationery)	
8	Payment for temporary staff	
9	Commission	
10	Tax on corporation/ tax on profit	
11	Other tax	
	Tax on transportation	
	Tax on exploitation	
	Tax on patent (business Licenses)	
	Other (please certify)	
12	Other payment (please certify)	
	Total	

Appendix AA-2-5-1 (7) Table AS 6

Detail information on soft loan

	Detail information on soft loan	Item	Really/certainly figure for last year
			(000 Riels)
1	Reference:	Debt of beginning of the year	
	Creditor (lender)	Soft loan received in the year	
	Soft loan	Payback in the year	
	Date of payback	Debt at the end of the year	
	Condition of interest	Payment for interest in the year	
2	Reference:	Debt of beginning of the year	
	Creditor (lender)	Soft loan received in the year	
	Soft loan	Payback in the year	
	Date of payback	Debt at the end of the year	
	Condition of interest	Payment for interest in the year	
	Soft loan for distribution service		
3	Reference:	Debt of beginning of the year	
	Creditor (lender)	Soft loan received in the year	
	Soft loan	Payback in the year	
	Date of payback	Debt at the end of the year	
	Condition of interest	Payment for interest in year	
4	Reference:	Debt of beginning the year	
	Creditor (lender)	Soft loan received in the year	
	Soft loan	Payback in the year	
	Date of payback	Debt at the end of the year	
	Condition of interest	Payment for interest in the year	
		Total Debt at the end of the ye	ar
		Payment for total interest in t	he year
	<u> </u>	<u>. </u>	L

Appendix AA-2-5-1 (8) Table AS 7

Detail information on the total fixed assets

		Fixed Assets at	Addition fixed	Take off fixed	Balance fixed
		beginning of	Assets in last	Assets in last	Assets at the end of
	Fixed assets item	last year	year	year	last year
		(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels)
		(a)	(b)	©	(d)=(a)+(b)-©
	Fixed Assets for Generation				
	Section				
1	Land				
2	Building				
3	Generator, by each category				
4	Other material of generation				
5	Switch board current include links	ige/splice cable			
	Please certify other fixed				
6	Assets by each category				
	Total				
	Fixed Assets for				
	Distribution Section				
1	Land				
2	Building				
3	Switch board current include linka	ge/splice cable			
4	Transmission line				<u> </u>
5	Poles (Tower)				
	Please certify other fixed				
6	Assets by each category		A CONTRACTOR OF THE CONTRACTOR		1
	and by caou category				
	Total				

Note: At the time registration for fixed assets on table above Licensee need to take off consumer contribution and all other assistance. Because some fixed Assets have been received assistance from the Government and have been shown the price higher than market price, so the Licensee should certify of which Fixed Assets that received from the Government.

Appendix AA-2-5-1 (9) Table AS 8
Detail information on depreciation
Really/certainly figure for last year

depreciation depreciation in vear (000 Riels) © (d)=(a)x© (d)=(a)x©				domento tion holowood		Dormond Co.	400000000000000000000000000000000000000	
Fixed Assets Item fixed Assets Item fixed Assets Item rate year (000 Riels) (000 Riels) (000 Riels) (000 Riels) Fixed Assets for Generation. (a) (b) (d)=(a)x© Eixed Assets for Generation. (a) (b) (d)=(a)x© Land Building (d)=(a)x© Switch board current include linkage/splice cable (d)=(a)x© Please certify other fixed Assets by each category (d)=(a)x© Land Excellon (d)=(a)x© Building (d)=(a)x© Switch board current include linkage/splice cable (d)=(a)x© Land Section Switch board current include linkage/splice cable (a) Transmission line Transmission line Please certify other fixed Assets by each category Total Assets by each category			Total cost		depreciation	depreciation in	consolidate on total at	fixed Assets
(a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c		Fixed Assets Item	fixed Assets		rate	year	the end of the year	only
Fixed Assets for Generation (a) (b) (c) (d)=(a)x© Exact Section (a) (b) (c) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d			(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels)	(000 Riels)
			(a)	(p)	٥	(d)=(a)x©	(e)=(p)+(q)	(f)=(a)-©
		Fixed Assets for Generation						
		Section						
	1							
	2	Building						
	3	Generator, by each category						
	4	Switch board current include linkag	e/splice cable					
		Please certify other fixed						
	Ś	Assets by each category						
		Total	:					
		Fixed Assets for Distribution						
		Section						
	1	Land						
	2	Building						
	က	Switch board current include linkag	e/splice cable					
	4	Transmission line						
		Please certify other fixed						
Total	2	Assets by each category						
		Total						

Note: In the table above Licensee shall register of the fixed assets make the same on the structure of distribution for fixed assets

Appendix AA-2-5-1 (10) Table AS 9

Calculation of reasonable profit

*4		Really/certainly figure for last
Item	Sample Table	year
		(000 Riels)
Generation Section		
Total original cost of fixed assets (minus contribution		
from consumer and assistant)		
Provision/arrangement stock for mobile capital		
Total cost of fixed assets		
Take off, depreciation consolidate	AS8	
Fixed assets cost only	1	
Soft loan for fixed assets is using	AS6	
Really personal capital (5-6)		
Profit rate of really personal capital		
Profit of really personal capital by the rate above		
Reasonable profit		****
Distribution Section		
Total original cost of fixed assets (minus contribution from consumer and assistant)		
Provision/arrangement stock for mobile capital		
Total cost of fixed assets		
Withdrawal depreciation plus reference	AS8	
Fixed assets cost only		
Soft loan for fixed assets is using	AS6	
Really personal capital (5-6)		
Profit rate of really personal capital		
Profit of really personal capital by the rate above		
Reasonable profit		
	Total original cost of fixed assets (minus contribution from consumer and assistant) Provision/arrangement stock for mobile capital Total cost of fixed assets Take off, depreciation consolidate Fixed assets cost only Soft loan for fixed assets is using Really personal capital (5-6) Profit rate of really personal capital Profit of really personal capital by the rate above Reasonable profit Distribution Section Total original cost of fixed assets (minus contribution from consumer and assistant) Provision/arrangement stock for mobile capital Total cost of fixed assets Withdrawal depreciation plus reference Fixed assets cost only Soft loan for fixed assets is using Really personal capital (5-6) Profit rate of really personal capital Profit of really personal capital by the rate above	Total original cost of fixed assets (minus contribution from consumer and assistant) Provision/arrangement stock for mobile capital Total cost of fixed assets Take off, depreciation consolidate AS8 Fixed assets cost only Soft loan for fixed assets is using AS6 Really personal capital (5-6) Profit rate of really personal capital Profit of really personal capital by the rate above Reasonable profit Distribution Section Total original cost of fixed assets (minus contribution from consumer and assistant) Provision/arrangement stock for mobile capital Total cost of fixed assets Withdrawal depreciation plus reference AS8 Fixed assets cost only Soft loan for fixed assets is using AS6 Really personal capital (5-6) Profit rate of really personal capital Profit of really personal capital by the rate above

Note: Need to provide method calculation for mobile capital

Appendix AA-2-5-1 (11) Table AS 10

Calculation correct payment

	Item	Sample Table	Really/certainly figure for last year
			(000 Riels)
	Payment for Generation Section		
1		AS1	
2	Payment for lubrication-oil	AS1	
3	Payment for staff of Generation Section	AS3	
4	Payment for operation and maintenance	AS4	
	Payment for Administration and General		
5	Management	AS5	
6	Payment for depreciation	AS8	
7	Interest	AS6	
8	Reasonable profit	AS9	
	Total correct payment for Generation Section	l	
9	Transmission Power for kWh		
10	Generation cost per kWh		
		A (10)	
			<u> </u>
3		AS4	-
	1 ·	1 C C	
		 	
	L		
7			
	Total correct payment for Distribution Section	n	
	Total payment (Generation +Distribution)		
		ff source	
•	Total income yearly is existed (A+B+C)		· · · · · · · · · · · · · · · · · · ·
	Total income from electricity tariff at present		
	Profit/(loss) pre-revise electricity tariff (E-D)		
	Effect on revision for electricity tariff		
	Profit/(loss) after revise electricity tariff (E+G-D	<u>, , , , , , , , , , , , , , , , , , , </u>	<u> </u>
	2 3 4 5 6 7 8	Payment for Generation Section 1 Payment for fuel-oil (D.O) 2 Payment for lubrication-oil 3 Payment for staff of Generation Section 4 Payment for operation and maintenance Payment for Administration and General 5 Management 6 Payment for depreciation 7 Interest 8 Reasonable profit Total correct payment for Generation Section 9 Transmission Power for kWh 10 Generation cost per kWh Payment for Distribution Section 1 Payment for Power Purchase (buying E-ty) 2 Payment for operation and maintenance Payment for Administration and General 4 Management 5 Payment for depreciation 6 Interest 7 Reasonable profit Total correct payment for Distribution Section Total payment (Generation + Distribution) Minus other income behind from Electricity tariff Total income yearly is existed (A+B+C) Total income from electricity tariff at present Profit/(loss) pre-revise electricity tariff (E-D) Effect on revision for electricity tariff	Payment for Generation Section 1 Payment for fuel-oil (D.O) AS1 2 Payment for lubrication-oil AS1 3 Payment for staff of Generation Section AS3 4 Payment for operation and maintenance AS4 Payment for Administration and General Management AS5 6 Payment for depreciation AS8 7 Interest AS6 8 Reasonable profit AS9 Total correct payment for Generation Section 9 Transmission Power for kWh 10 Generation cost per kWh Payment for Distribution Section 1 Payment for Staff of Distribution Section AS3 3 Payment for operation and maintenance AS4 Payment for Administration and General 4 Management AS5 5 Payment for depreciation AS8 6 Interest AS6 7 Reasonable profit AS9 Total correct payment for Distribution Section 4 AS8 6 Interest AS6 7 Reasonable profit AS9 Total correct payment for Distribution Section Total payment (Generation +Distribution) Minus other income behind from Electricity tariff source Total income yearly is existed (A+B+C) Total income from electricity tariff at present Profit/(loss) pre-revise electricity tariff (E-D) Effect on revision for electricity tariff

Note: (G) and (H) need to fulfill while revision for electricity tariff have been done by Licensee

Appendix AA-2-5-1 (12) Table AS 11 Income from electricity tariff is carrying out Really/certainly figure for last year

					Relaved data income								
		1	List of tariff rate		from selling energy	H H	ncome by inv	Income by invoice a full year	H		Income is collected	collected	
	Amount											Income	
	of		Section 2	Section 3			Income	Income			Income	from	
	consumer		(please	(please		Income	from selling from selling	from selling		Income	from selling	selling	···
	at the end		certify	certify		from	through a	through a		from	through a	through a	the december
	of the		Name and	Name and		selling	price of	price of		selling	price of	price of	
Category of consumers	s year	tariff rate	factor)	factor)	Selling electricity	electricity	type 2	type 3	Total	electricity	type 2	type 3	Total
		Riels/kWh			kWh	000 Riels			000 Riels	000 Riels			000 Riels
								-					

Appendix AA-2-5-1 (13) Table AS 12

Information on energy Really/certainly figure

	Item	Chilit	Jan.	Feb.	Mar.	April	May	Jum.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
-	Selling Electricity	kWh								0					
	Electricity sold of low Voltage	kWh													
	Electricity sold of medium Voltage	kWh													
4		kWh													
		%													
												Ī			
က	Need power only	kWh													
	Power Generation only	kWh													
	Power purchase (Buying E-ty)	kWh									-				
4		kWh													
-												l			
8	Over/(less)	kWh													
															· · · · · · · · · · · · · · · · · · ·
								-							
												Γ			

AA-2-5-2. Request for tariff revision by smaller license	ее

Appendix AA-2-5-2 Request for tariff revision by smaller Licensee

Samble table	Contents
TS 1	Data of generation
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TS 3	Detail information on staff payment
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TS 5	Detail information on payment for administration and general management
TS 6	Detail information on soft loan
TS 7	Detail information on the total fixed assets
TS 8	Detail information on depreciation
TS 9	Calculation of reasonable profit
TS 10	Calculation correct payment
TS 11	Income from electricity tariff is carrying out - Estimated figure for next year
TS 12	Income from electricity tariff new request - Estimated figure for next year
TS 13	Informantion on energy

Data of Generation

		Item	unit	Estmated figure for next year
A		Technical dara		
	1	Installed capacity of Generator		
~~~		(certify model)	kVA	
		(certify model)	kVA	
	2	Power generate	kWh	
	3	Using power for generation	kWh	
		Using power for generation	%	
	4	Power Transmission (2-3)	kWh	
	5	Power coefficient	%	
	6	Amount of operation hours	h	
B		Fuel-oil (D.O) data	· · · · · · · · · · · · · · · · · · ·	
		Sources (certify the Name)		
	7	Amount of fuel-oil for buy-in	Liter (L)	
	8	Amount of fuel-oil for using	Liter	
	9	Average price of fuel-oil	Reals/L	
	10	Payment for fuel-oil	(000 Leals)	
		Sources (certify the Name)		
	11	Amount of fuel-oil for buy-in	Liter	
	12	Amount of fuel-oil for using	Liter	
	13	Average price of fuel-oil	Reals/L	
	14	Payment for fuel-oil	(000 Leals)	
	15	Using for fuel-oil rate	L/kWh	1.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4
		Sources (certify the Name)		
	16	Amount of lubrication-oil for buy-i	Liter	
	17	Amount of lubrication-oil for using	Liter	
	18	Average price of lubrication-oil	Reals/L	
	19	Payment for lubrication-oil	(000 Reals)	
		Total payment for fuel-oil and	<u> </u>	
		lubrication-oil (10+14+19)	(000 Reals)	
	20	Using for lubrication-oil rate	L/kWh	

Appendix AA-2-5-2 Table TS 2 Detail information on power purchase (buying Electricity)

Estimated figure for next year

			Jan.	Feb.	Mar.	Mar. April May	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
A		Sources 1 (Name)										-			
	1	Payment for capacity (000 Real)													
	2	2 Payment on power purchase (000 Real)													
	3	3  Total payment (000 Real)													
	4	4 Total amount power purchase (000 kWh)													
	8	Average payment ( Reals/kWh													
B		Sources 2 (Name)													
	T	1 Payment for capacity (000 Real)													
	7	2 Payment on power purchase (000 Real)													
	3	3 Total payment (000 Real)													
	4	4   Total amount power purchase (000 kWh)													
	3	Average payment (Reals/kWh)													

Name of Licensee

Appendix AA-2-5-2 Table TS 3 Detail information on staff payment

Estimated figure for next year

		Number of		Supplementa-	Extra	fortune and	Benefit/		
No	Category of Staff	Stair at the end of year	Basic	ry money 1 (certify)	money 2 ( certify)	other benefit (certify)	bonus (certify)	Others (confirm)	Total
			(000 Reals)	`	(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)
	Administration Division								
	Chief (Director)								
2	Vice-chief (Deputy Director)								
3									
	Technical Division								
	Generation Section								
1	Operators								
2	Mechanician or Machinery								
ы	Other (by categiry)								
	Distribution Section								
	Operators								
2	Electrician								
ς'n	Other (by categiry)								
	Total								

Payment for operation and maintenance

No	Item	Est	imated figure for next yea	ır
		Generation Section	Distribution Section	Total
*****		(000 Reals)	(000 Reals)	(000 Reals)
1	Sparepart			
2	Material (equipment)			
3	Repairing and maintenance			
4	Payment for hiring			
5	Water and Electricity			
6	Bad Debt			
7	Other (please confirm)			
8				
	Total			

Detail information on payment for administration and general management

	Item	Estimated figure for next year
		(000 Reals)
1	Bank service	- Mariana
2	License fee	
3	Payment for the regulation service	
4	Payment for transportation	
5	Payment for Mission and welcome guest	
6	Posts service and telecommunications	
7	Payment for office material (stationery)	
8	Payment for temporary staff	
9	Commission	to the second se
10	Tax on corporation/ tax on profit	
11	Other tax	
	Tax on transportation	
	Tax on exploitation	
	Tax on patent (business Licenses)	
	Other (please certify)	
12	Other payment (please certify)	
	Total	

### Detail information on soft loan

Dtail information on soft le	oan Item	Estimated figure for next year
		(000 Reals)
1 Reference:	Debt of beginning of the year	
Creditor (lender)	Soft loan received in the year	
Soft Ioan	Payback in the year	
Date of payback	Debt at the end of the year	
Condition of interest	Payment for interest in the year	
2 Reference:	Debt of beginning of the year	
Creditor (lender)	Soft loan received in the year	
Soft loan	Payback in the year	
Date of payback	Debt at the end of the year	
Condition of interest	Payment for interest in the year	
Soft loan for distrubution service	ce	
3 Reference:	Debt of beginning of the year	
Creditor (lender)	Soft loan received in the year	
Soft Ioan	Payback in the year	
Date of payback	Debt at the end of the year	
Condition of interest	Payment for interest in the year	
4 Reference:	Debt of beginning of the year	
Creditor (lender)	Soft loan received in the year	
Soft Ioan	Payback in the year	
Date ofpayback	Debt at the end of the year	
Condition of interest	Payment for interest in the year	
	Total Debt at the end of the year	
	Payment for total interest in the y	ear

Name of Licensee Annex 4

### Appendix AA-2-5-2 Table TS 7

### Detail information on the total fixed assets

	Fixed assets item	Fixed Assets at beginning of last year	Addition fixed Assets in last year	Take off fixed Assets in last year	Balance fixed Assets at the end of last year
		(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)
-		(a)	(b)	©	(d)=(a)+(b)-©
	Fixed Assets for Generation Section				
1	Land				
2	Building				
3	Generator, by each category				
4	Other material of generation				
5	Switch board current include linka	ge/splice cable			
6	Please certify other fixed Assets by each category  Total Fixed Assets for Distribution				
	<u>Section</u>				
1	Land	<del></del>			
	Building				
3	Switch board current include linka	ge/splice cable			
4	Transmission line				
5	Poles (Tower)				
6	Please certify other fixed Assets by each category				
	Total				

Note: At the time redistration for fixed assets on table above Licensee need to take off consumer contribution and all other assistance. Because some fixed Assets have been received assistance from the Government and have been shown the price higher than market price, so the Licensee should certify of which Fixed Assets that received from the Government.

Appendix AA-2-5-2 Table TS 8

Detail information on Depreciation

Estimated figure for next year

depreciation depreciation in rate year (000 Reals) (000 Reals)  © (d)=(a)x©				depreciation balance		Payment for	depreciation balance	
Fixed Assets Item         fixed Assets Item         fixed Assets Item         fixed Assets Item         at the end of the year (000 Reals)			Total cost			depreciation in	consolidate on total	
COOO Reals   COO		Fixed Assets Item	fixed Assets	beginning of the year	rate	year	at the end of the year	
Fixed Assets for Generation   (a)			(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)	(000 Reals)
			(a)	(p)	0	(d)=(a)x©	(p)+(q)=(p)	(f)=(a)-©
		Fixed Assets for Generation						
		Section						
	-	Land						
	7							
	ന							
الأتلط نبزت والمساوري والمواسية نبيان والمساور والمساورة والمساورة والمساورة والمساورة والمساورة والمساورة	4	Switch board current include linkage/spli	lice cable					
الأنادا فتتت المساور والمراج المناز بيني نبي وين وينان وينا في في فيسود	П							
الأناء فننت صحيحا كالكاك يستني نبيان حب حب عب في في فيستن								
الألكا نبتت والمساور والمراجب والمراجب والمراجب والمراجب والمراجب	V							
التتاليا فتنته والمساوري والمراقب والتناقب والمراقب والمراقب والمراقب والمراقب	1	7						
التتلاط فننته محصوص مواهو تبرين نميني بمنيه مساور		Total						
التتليا فنقد كالمساوي كالمواسية بنيس نهنيه		Fixed Assets for Distribution						
التكليا فنبتت والمساور والمهاجية بينين بمناه		Section						
التتاليا فننته سيسيس مي مي سيد سيس بسيد		Land						
التائط فننته مسموس والمتراسون	7							
	ω		lice cable					
	4							
	П							
		Please certify other fixed Assets by						
Total	Ş							
		Total						

Note: In the table above Licensee shall register of the fixed assets make the same on the structure of distribution for fixed assets

Calculation of reasonable profit

	Item	Sample Table	Estimated figure for next year
			(000 Reals)
	Generation Section		
1	Total original cost of fixed assets ( minus constribution from consumer and assistant)		
2	Provision/arrangement stock for mobile capital		
3	Total cost of fixed assets		
4	Take off depreciation plus reference	AS8	
5	Fixed assets cost only		
6	Soft loan for fixed assets is using	AS6	
7	Really personal capital (5-6)		
8	Profit rate of realy personal capital		
9	Profit of realy personal capital by the rate above		
10	Reasonable profit		
	Distribution Section		
	Total original cost of fixed assets ( minus constribution		
1	from consumer and assistant)		
2	Provision/arrangement stock for mobile capital		
3	Total cost of fixed assets		
4	Take off depreciation plus reference	AS8	
5	Fixed assets cost only		
6	Soft loan for fixed assets is using	AS6	
7	Realy personal capital (5-6)		
8	Profit rate of realy personal capital		
9	Profit of realy personal capital by the rate above		
10	Reasonable profit		

Note: Need to provide methot for calculation mobile capital

Calculation correct payment

	Item	Sample Table	Estimated figure for next year
			(000 Reals)
	Payment for Generation Section		
1	Payment for fuel-oil (D.O)	AS1	
2	Payment for lubrication-oil	AS1	
3	Payment for staff of Generation Section	AS3	
4	Payment for operation and maintenance	AS4	
	Payment for Administration and General		
5	Management	AS5	
6	Payment for depreciation	AS8	
7	Interest	AS6	
8	Reasonable profit	AS9	
	Total correct payment forGeneration Section		
9	Transmission Power for kWh		
10	Generation cost per kWh		
-		4.00	
		<del></del>	
3		A54	
		405	
		<u> </u>	
/		AS9	
	Total correct payment for Distribution Section		44
	Total payment (Generation +Distribution)		
		source	
	Total income from electricity tariff at present		
	Profit/(loss) pre-revise electricity tariff (E-D)		
	Effect on revision for electricity tariff		
· · · · · · · · · · · · · · · · · · ·	Profit/(loss) after revise electricity tariff (E+G-D)		
	2 3 4 5 6 7 8 9 10 1 2 3 4 5 6	Payment for fuel-oil (D.O) Payment for lubrication-oil Payment for staff of Generation Section Payment for operation and maintenance Payment for Administration and General Management Payment for depreciation Interest Reasonable profit Total correct payment for Generation Section Transmission Power for kWh Generation cost per kWh Payment for Distribution Section Payment for Power Purchase Payment for operation and maintenance Payment for operation and maintenance Payment for Administration and General Management Payment for depreciation Interest Reasonable profit Total correct payment for Distribution Section Total payment (Generation +Distribution) Minus other income behind from Electricity tariff Total income yearly is existed (A+B+C)  Effect on revision for electricity tariff (E-D)  Effect on revision for electricity tariff	1 Payment for fuel-oil (D.O) 2 Payment for lubrication-oil 3 Payment for staff of Generation Section 4 Payment for operation and maintenance AS4 Payment for Administration and General 5 Management AS5 6 Payment for depreciation AS8 7 Interest AS6 8 Reasonable profit AS9 Total correct payment forGeneration Section 9 Transmission Power for kWh 10 Generation cost per kWh Payment for Distribution Section 1 Payment for Power Purchase AS2 2 Payment for operation and maintenance AS4 Payment for Administration and General 4 Management AS5 5 Payment for depreciation AS8 6 Interest AS6 7 Reasonable profit AS9 Total correct payment for Distribution Section AS8 6 Interest AS6 7 Total payment (Generation + Distribution) Minus other income behind from Electricity tariff source Total income yearly is existed (A+B+C) Effect on revision for electricity tariff (E-D) Effect on revision for electricity tariff

Note: (G) nad (H) need to fulfill while revision for electricity tariff have been done by Licensee

Appendix AA-2-5-2 Table TS 11

Income from electricity tariff is carrying out Estimated figure for next year

L						Relaved data income								
			L	List of tariff rate		from selling energy	Inc	Income by invoice a full year	sice a full y	ear		Income is collected	collected	
								Income	Income					
		Amount		Section 2	Section 3			from	from			Income	Income	
		y W		(please	(please		Income	selling	selling		Income	from selling	from selling	
		consumer		certify	certify			through a	through a			through a	through a	
		at the end	Electricity	Name and	Name and			price of price of	price of		selling	price of price of	price of	
	Category of consumers of the year	of the year		factor)	factor)	tricity		type 2	type 3	Total	electricity	type 2	type 2	Total
			Reals/kWh			kWh	000 Reals			000 Reals	000 Reals		-	000 Reals
П														
7														
3														
4														
Ш														
Щ														
<u> </u>	TOTAL													

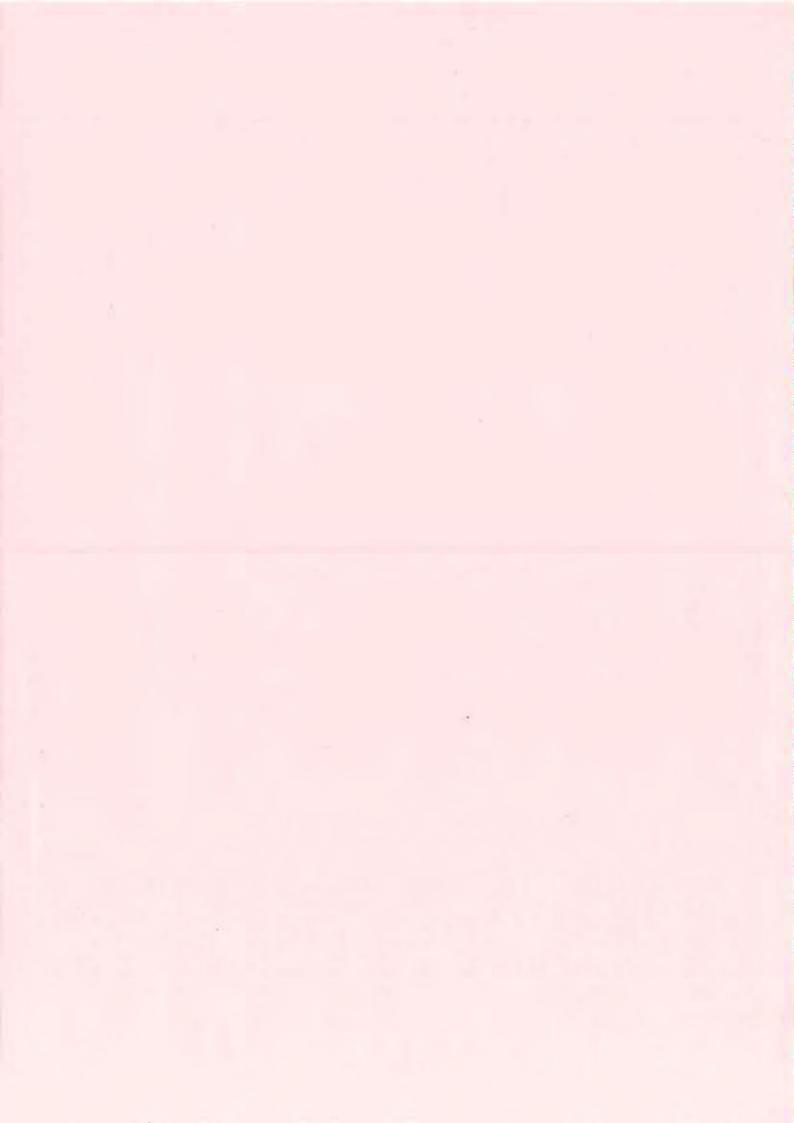
Appendix AA-2-5-2 Table TS 12
Income from electricity tariff new request
Estimated figure for next year

					Tot.	000											
Income is collected	0,000	from selling	through a	price of	type 3												
Income	Income	selling	through a	price of	type 2												
		Income	from	selling	Total electricity	OOO INCAIS											
rear					Total	OOO INCAID											
Income by invoice a full year	Income	selling		price of	type 3			***************************************									
come by inv	Income	selling	through a	price of	type 2												
juj		Income	from	selling	electricity	OOO INCOR											
Relaved data income from selling energy				j	Selling Electricity	AYYL											
ęs	Coortion 3	(please	certify	Name and	tactor)												
List of tariff rate	Cantion 2	(please	certify	Name and	tactor)												
7					Posts/LW/h	IVORTS/N W II											
		Amount of	consumer	at the end	of the year												
				,	Category of consumers of the year												TOTAL
							٦	" "	4						_		

Table TS 12

Informantion on energy

	Item	Unit	Estimated figure for next year
1	Selling Electricity	kWh	
	Electricity sold of low Voltage	kWh	
	Electricity sold of medium Voltage	kWh	
2	Loss on the distribution line	kWh	
		%	
3	Need power only	kWh	
	Power Generation only	kWh	
	Power purchase (Buying power)	kWh	
4	Total power for selling	kWh	
5	Over/(less)	kWh	







Ministry of Industry, Mines and Energy of Kingdom of Cambodia

The Project for Operation and Maintenance of Rural Electrification on Micro-hydropower in Mondul Kiri

Guidelines and Manuals for
Operation and Maintenance
of
the Electric Unit of Mondul Kiri Province

Volume II

(Technical)

February 2011

Japan International Cooperation Agency

Electric Power Development Co.,Ltd.

The Chugoku Electric Power Co., Inc.





### **Section I**

### Guideline for Operation and Maintenance

This Guidelines and Manuals for Operation and Maintenance is divided into followings:

### Volume I : Administration Items

Volume II : Technical Items

Section I : Guideline for Operation and Maintenance

Section II : Civil Structure

Section III: Electromechanical Equipments

Section IV: Transmission and distribution Facilities

Volume III: Reference Data

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### Volume II

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### Appendix

TG-1 Agent List

TG-2 Equipment List

Volume II: Technical

Section I Guideline for Operation and Maintenance

Chapter 1 General Provisions

1.1 Purpose

The purpose of this Standard is to stipulate basic rules and regulations for appropriate operation and maintenance of power facilities such as power station and transmission and distribution line, which will contribute to an efficient management of the equipment, a prevention of an accident and thereby securing a reliable and stable supply of electric power to consumers.

1.2 Scope of application

Operation and maintenance work for the power facilities shall be done in accordance with this Standard unless otherwise governed by government laws and regulations or higher company rules and regulations.

1.3 Definitions

(1) "Administration office" means whole management organization of power facilities with maintenance and administration works.

(2) "Load dispatch" means operation ordering to hydropower stations and diesel power station shall be done in accordance with "Plan of load dispatch control rules".

(3) "Power station" means a whole generating facilities including hydro turbine, generator, control equipment and transmission lines.

(4) "Operation" means operation of hydropower stations, diesel power station and transmission/distribution lines by the operators. The operators have to take responsibility for 24 hours monitoring and operation at sites.

(5) "Maintenance" means maintenance of hydropower stations, diesel power station and transmission/distribution lines by the maintenance staff. The maintenance staffs have to take responsibility for 24 hours monitoring and maintenance at sites.

(6) "Patrol and Inspection" means making plan and implementation of periodical inspections such as daily patrol, weekly, monthly and yearly inspections including recording, repairing and replacement work.

1.4 Tasks for head of an organization

Head shall command and supervise member personnel under his organization to achieve necessary job as a whole by promotion of maintenance job in a safety manner.

5

Head shall also train them not only for promotion of professional knowledge and technical skill but also for good local public relations. The tasks shall be referred to Chapter 1: Management, in Volume I: Administration.

### 1.5 Tasks of member personnel under an organization Head

- (1) Each personnel shall fully understand the Standard and always comply with the related rules and regulations under supervision of the Head so that reliable results may be secured in pursuing the operating and maintenance work in an efficient and orderly manner. He shall also do his best effort to secure and improve the power station functions, by trying equipment improvement, efficient job management and technical improvement.
- (2) He shall do his best effort to be familiar with the structure and performance of equipment and transmission system including civil constructions and communication systems so that he could adequately know measures to be taken in various types of possible accidents.
- (3) He shall always watch and know the condition of equipment. When he finds an abnormality, malfunction or accident, he shall immediately report them in accordance with a procedure stipulated in Clause 2.4 "Reporting". In an emergency where an urgent measure is required, he shall report it in an urgent manner to the operating chief and do his best effort to get a quickest restore from the accident by an appropriate remedial operation or a first aid measure.
- (4) He shall always obey relevant safety rules so that a human injury or accident may be prevented. He shall also make necessary improvement on the equipment for such purposes.

### 1.6 Deployment of operation and maintenance work

- (1) The Director shall assign responsible posts for a Deputy Director and Chief of administration division and leaders of administration staff for management of EUMP.
- (2) The Director shall also assign responsible posts for a Deputy Director, Chief of technical division and leaders of operation & maintenance staff and transmission line staff in charge of various site works.
- (3) Assignment of substitutes

The Director shall assign substitutes of absent operators in charge of shift operation work.

### 1.7 Revision of Guideline, Operation and maintenance manual

The "Guideline, Operation and maintenance manual" for administration, electrical equipment & civil structures in Mondul kiri shall be revised about instructions and actual operation and maintenance work procedures, etc. The parts of revision in the manual shall be prepared by the staff and approved with Board (director and deputy directors) of EUMP.

The revised manual except Appendixes shall finally be published and approved by the JSC.

### 1.8 Mutual support in operation and maintenance

In an area where power stations and substations located adjacent to each other, they are often designed to rely upon their mutual help in operation and maintenance job. In such case, an organization can request a help in accordance with rules for such mutual support arrangement, and shall help other power station on his request.

### 1.9 Environment conservation

Power station shall prevent environmental contamination and degradation by waste water, solid wastes, noises, etc., and shall also execute measures necessary to preserve natural environmental conditions.

### 1.10 Dangerous materials

Explosives and inflammables such as oil, fuel, grease, chemicals shall be stored and treated in accordance with relevant government laws and regulations.

### 1.11 Equipment for accident prevention

Equipment for accident prevention and protection shall be well prepared in accordance with "Rules for measures for emergency and accidents". Daily patrols, inspections, tests shall be practiced so that appropriate maintenance would be secured.

### 1.12 Safety management

As the safety management of a power station operation work, measures shall be taken in various important aspects, such as safety precautions in equipment, safety education and training of personnel, establishing rules for safe operation deployment and safe work procedures.

### 1.13 Storage of parts and materials

Storage and handling of spare parts and other materials shall be made in accordance with "Rules for storage and handling of parts and materials", refer to Chapter 3 Maintenance.

### 1.14 Technical training

In order to maintain and promote technical and workmanship level of personnel, freshman education, job rotation education and OJT training shall be made in accordance with "Rules for technical training and education".

### 1.15 Measures to be taken in an emergency

Adequate and appropriate measures shall be taken in accordance with "Rules for measures in an emergency" when an emergency occurs or likely to occur in tornado, heavy rain, flood, heavy wind, earthquake and other natural disasters, big fire, explosion, or the like.

### Chapter 2 Operation

### 2.1 Operation work

Operation work here means jobs to operate the generating equipment or manage them in accordance with the load dispatch order, which basically includes the followings.

- (1) Load dispatch ordering and related work under "Load dispatch control rules".
- (2) Supervision of generating stations, civil facilities and substations, and watching weather condition.
- (3) Supervising and watching conditions of relating transmission lines.
- (4) Operation of the equipment and facilities.
- (5) Recorded data collection as necessary.
- (6) Normal communicating and reporting.
- (7) Grasping condition of an accident or a failure, identifying its cause, doing an emergent remedy, communicating and reporting.
- (8) Maintenance and cleaning of powerhouse and control equipment.
- (9) Design of the operating procedure table or chart.
- (10) Publishing and retrieving operating order sheets.
- (11) Collecting, communicating and reporting data in dam operation and management

### 2.2 Load dispatch ordering

Load dispatch ordering to hydropower stations and diesel power station shall be done in accordance with "Plan of load dispatch control rules" such as daily, weekly, monthly and yearly operation plan.

Load dispatch operation shall be made by an order of a load dispatch control group (hereinafter referred to "Dispatch order") in accordance with "Load dispatch operation rules". When an operation is made without load dispatch order, it shall be reported immediately to the corresponding load dispatch control organization.

### 2.3 Measures to be taken in an emergency or an accident

In an emergency or an accident, division chief, operators and maintenance staff shall do their best effort to know as exactly and quickly as possible the actual conditions and causes, operating properly the equipment in accordance with "Load dispatch operation rules". The situation shall be communicated with and reported to various corresponding responsible persons by procedures stipulated otherwise.

### 2.4 Recording

Load dispatch operations, important operations, orders, announcements, communications and reports shall be filed together with personnel names, time and date on "Work shift record file".

Operation diary shall be inspected to see the reports were properly made in stipulated items at proper timing. The records in operating diary shall be summed up and compiled for reporting to relating organizations.

The chief of technical division shall report Director or Deputy Director every morning about operation records and status of each power station and get approval with signatures.

### 2.5 Operating work shifts

The operation of power plants shall be executed by operators who are working in 3 shifts such as morning time, day time and night time work.

Each operator shall take over his job in detail to the subsequent shift operator in terms of the transmission condition, equipment operating condition, operating schedule, maintenance work progress, and other items deemed necessary to transfer. Important items shall be transferred by filing them in "Work shift record file"

The operator shall report a daily operation records by VHF communication and written data sheets to the chief of technical division at administration office every morning (excepting holiday), at least, total generation kWh/day, maximum output kW/day, total running ours/day, weather conditions, events, failures and/or operation conditions, etc.

### 2.6 Direct operation of power station

In the case of a direct operation of a power station at periodical inspection, the operator at the direct operation shall act on behalf of the division chief during inspection.

As for direct operations in the case of maintenance work, operation shall be done in accordance with "Rules for maintenance work management".

### Chapter 3 Maintenance

### 3.1. Maintenance work

Maintenance work here means the diagnostic inspection of equipment and facilities and the repair or replacement, etc. as the results of inspection, which shall be performed for the purpose of maintaining and improving the power station equipment and civil facilities performance and also preventing accidents and failures in equipment and facilities. The maintenance work

basically includes the following items.

### (1) Maintenance management

The work is necessary not only for smooth and efficient maintenance of equipment and facilities but also for efficient equipment management.

(a) Watching and evaluating equipment and facilities condition

Watch equipment and facilities condition through inspection and test, and evaluate degradation of the equipment and facilities.

### (b) Work planning

Make the following plans for maintenance work in order to manage and process them in orderly manner.

- Yearly work plan
- Monthly work plan
- Work execution plan
- (c) Planning items and procedures

Make the following planning in accordance with stipulated procedure.

- Budget request
- (Long run maintenance planning rules)
- ➢ Shutdown request
- Alteration on relay setting
- Equipment planning of transmission protection
- Operation of civil facilities data
- Operation of measuring system
- > Items stipulated time to time by minutes of meetings.
- (d) Preparation of documents and their reporting

Regular items and accident – emergency items shall be reported in accordance with "Rules for preparing documents and reporting for equipment"

(e) Management and utilization of records and files

Post inspection records and test records shall be filed orderly manner so that these records may be utilized for future operation references. Analyses of these records shall be made when necessary and the analyses shall also be recorded.

Specifications, drawings, control sequence diagrams and their setting values list shall be prepared for use in maintenance work.

### (2) Maintenance work

Protective maintenance, inferring maintenance and post maintenance of power stations, and

substations shall be executed as follows.

### (a) Protective maintenance

The following maintenance work shall be made for the purpose of maintaining functions and preventing failures of facilities, equipment and systems.

### Daily inspection

Daily patrol and inspection shall be made by means of maintenance personnel's knowledge, experiences and five senses for the purpose of early picking up and restoration of abnormal conditions of facilities, equipment and systems.

(Inspection Standard for facilities, equipment of hydro-electric power stations and substations)

### Periodical inspection

Internal condition shall be inspected periodically with equipment shutdown. Best function maintenance shall be made by making appropriate repair or replacement for the equipment having abnormal condition such as wear or degradation.

(Inspection Standard for facilities, equipment of hydro-electric power stations and substations)

### Special inspection

A special inspection shall be made when an abnormal condition is found on the equipment and the facilities in daily patrol or inspection. The purpose of the inspection is to prevent failure repetition in the subject equipment judged from past failure experiences, and prevent also similar failures in same type of the equipment and the facilities.

(Inspection Standard for facilities, equipment of hydro-electric power stations and substations)

### (b) Inferring maintenance

For the purpose of maintaining functions and preventing a failure of equipment and facilities, function degradation or failures shall be inferred being base upon various experience data and theories. Therefore, preventive maintenance work such as inspections, replacements, improvements shall be designed with appropriate interval, timing and items so that the equipment data, performance, failures may be obtained and archived in view of inferring technology including statistical concept, which will result in an efficient and cost effective maintenance outcome.

(Inspection Standard for facilities, equipment of hydro-electric power stations and substations)

### (c) Equipment and facilities improvement

Being judged from the records of equipment failures, malfunctions, inspections, repairs, inferring maintenance work and post inspection maintenance work, the equipment and the facilities shall be repaired, improved or renovated depending upon extent and nature of the equipment degradation, in order to restore or improve function of the equipment. For realizing the provisions, the equipment design shall initially be well incorporated with concepts for safety, easy maintenance, high reliability and cost effectiveness, which will result in comprehensive cost effective labor saving maintenance.

### (d) Post inspection maintenance

In a failure, accident or emergency, not only quick and appropriate measures but also preventive measures shall be done for consequential damages in the course of restoration work with extra caution to human safety.

### > First aid measures

Watch and confirm quickly the exact condition including causes of the failure or accident, and take fast appropriate remedial measures, followed by confirmation tests and a normal operation restoration.

### Permanent measures

Research thoroughly the causes of such failures, and repair, improve or renovate the equipment and the facilities in permanent sense for further long run operation, with concept based upon the research.

### Prevention of failure repetition

After the equipment and the facilities were recovered from a failure, case studies shall thoroughly be made for cause identification and condition analyses. Then extra effort shall be made to prevent repetition of similar failure in reference to the study, and information gained in the case shall also transferred to related departments for their preventive work references

### (3) Other work items

### (a) Local community relations

The Director shall be responsible for communicating and making agreement with local communities for items requested by local communities, in terms of "Causing limiting of electric power supply", such as water level limitations or generation limitations raised by local communities.

The Director shall be responsible also for other items which would time to time be raised by local communities to a necessary extent.

### (b) The Director shall be responsible for negotiating with other external relating

organizations and also for preparing documents to be used for applications and reports to public organizations.

### 3.2. Responsibility of management of maintenance work

Work to be done by own personnel

The Deputy Director shall determine the work procedure for maintenance and responsible for the management.

Subcontract and assigned work

Subcontractor or assignee shall be responsible for the management of maintenance work itself and in addition also for securing safety on lands, buildings and installations inside the power station premises. Final responsibility shall be assessed to the Director for the safety of the equipment.

Therefore, clear distinct scope shall be required in safety management. For this purpose the Director shall make clear sharing agreements on safety management with subcontractors and assignee, in terms of management organizations and scope of management work. These agreements shall be well informed to power station maintenance personnel and let them cooperate closely with the subcontractors and assignees.

### 3.3 Execution of maintenance work

All maintenance work shall be executed on prior approval of the Director in accordance with "Rules for the management of maintenance work". In the case of a work affecting power station operation, the work shall be processed on prior report to the division chief in accordance with "Rules for the work sheet procedure".

### (1) Shutdown procedure

In the case of shutting down the equipment (hereinafter referred to "work with shutdown" affecting supply and demand of the electricity, the shutdown procedure shall be made in accordance with "Rules for shutting down electrical equipment".

### (2) Grounding for maintenance work

Grounding for maintenance work is defined as a ground provided on transmission line or equipment for the purpose of execution of "work with shutdown". The ground of this type shall be provided in accordance with "Rules for the ground for maintenance work".

### (3) Procedure of altering set value of a protective relay

When an alteration is required in set value of a protective relay on processing the maintenance work, the alteration shall be made in accordance with "Rules for the protective relay operation".

### (4) Work sheet

On processing a work, necessary work sheets shall be published in accordance with "Rules for work sheet use", and the work shall be processed in accordance with the work sheets for the purpose of clarifying the responsibility on work and preventing an accident or failure.

### (5) Confirmation of safety precautions

The Director shall pay extra attention to good safety management through advice and reports by getting the safety manager confirm that the safety is secured at every work step, and also getting the chief safety personnel confirm the progress of work.

### (6) Organizing work deployment

On starting the maintenance work, the Director shall organize a work deployment by appointing persons out of power station personnel as required by "Rules for the management of maintenance work"

### 3.4 Spare parts management

EUMP provides spare parts list to manage the parts for take-out or in from the stockroom. The spare parts shall be controlled existing assets with quantity of parts by the authorized person of EUMP. The spare parts list shall be recorded when the parts has used or procured any time. The authorized person shall be appointed by Director of EUMP.

Example of Spare Parts List (for O'Moleng PS)

Name of parts (Parts No.)	Date of Out/In	Consuming Quantity	Existing Quantity	Remarks
Volt meter (OM-001)	2008/10/16		1	Original spare
User' Name				
Mr. Khim	2009/3/22	1	0	Meter broken
Mr. Vichet	2009/5/1		1	New buy
**************************************				

### Chapter 4 Construction

### 4.1 Construction work management

Construction management is performed by the contractor himself to comply with standards and specifications to complete the construction works economically and safely within the contracted period.

For assuring the quality and function and for controlling the progress of work, the contractor makes a construction plan, check in timely whether the work is being carried out as schedule, makes correction if the work delayed.

The construction management has 1) Progress control, 2) Quality control and 3) Payment control as follows.

### 4.2 Progress control

Management of progress control is the construction process for assuring the execution of work performance and safety control within the construction period.

In particular, the countries where dry and rainy seasons can be clearly recognized, the construction works are concentrated in dry season and this will impose extra restriction on time, and thus progress control must be made with extra care. Between civil and electrical works must be close coordination and adjustment for installation of equipment.

Various time schedules should be graphically prepared for progress control and then use as standards for implementation, review and handling.

### 4.3 Quality control

Quality control is used to maintain the standards of quality set forth in the design and specifications.

For performing quality control, standardization must first of all be made.

The standardization is established 1) Standards for materials, 2) Quality standards, 3) Work standards and 4) Test and inspection standards.

### 4.4 Payment control

Payment control is necessary to ensure that the civil work have been built in conformity with the contract requirements set forth and intended by the owner.

The installation of electrical equipment is also managed the work progress then each payment will be made by the "Certificate of Performance" against term of payment in the contract.

Photographic records are made as supplementary data for later confirmation of the progress of the works including conditions before and after the works.

### 4.5 Installation works

The installation works for turbine, generator and auxiliary equipment are required the following procedures at appropriated timing and places for safety work.

### 1) Heavy machine

Heavy machinery (loading, moving and lifting) of the required number for transporting materials, parts and equipment on the site should be secured for the required period.

### 2) Manpower

The numbers of direct laborers and technicians required varies depending on the types, capacities, sizes and installation method of turbine and generator, equipment etc.

### 3) Temporary facilities

- > Temporary power source and distribution panels
- Accommodation facility
- Warehouse
- Site construction office
- 4) General tools and consumable materials
  - As required
- 5) Classified assembly and installation works
- Inspection of dimensions and level of concrete foundation
- > Transport of materials, parts and equipment
- Unpacking
- Preparing scaffolds
- Assembly and installation
- Welding and gas cutting
- Piping work and flushing
- > Hydraulic pressure test
- Non-destructive test
- > Centering, leveling and Shaft alignment
- Wiring
- Painting
- 6) Site tests and trail operation
- Preparation of instrument, materials and tools

Prior to commencement of the tests, test load should be provided as a dummy load, if an actual load is not available at site.

- Preparation of test procedures
- Preliminary test items (Dry test)
  - a) Appearance test for all components

### Appendix

TG-1 Agent List

TG-2 Equipment List

TG-1 Agent List

	Equipment No. in table TG-2			න න		2 & 4	284	ro	വ	ıcı	Q
	Staff	Mr.Hideki Watanabe	Mr.Hideki Watanabe		Mr. Khou Soklay	Mr. Yukio Motohashi	Mr. Natsumi Shida	Mr. Naohiko Matsumura	Mr.Osamu Sasaki	Mr. Shinya Maegasako	Mr.EAV MENG
	e-mail				khou soklav@pisanok Mr. Khou a.com Soklay	vır. motohashi@mx7,tton .ne.ip	shida@vawata.co.ip	naohiro.matsumura@ dhtd.co.ib	o-sasaki@taivo- electric.co.ip		E.M@online.com.kh
	Telephone	+81-3-5847- 1036 Fax. +81-3-5847- 1038	+81-3-5847- 1036 Fax, +81-3-5847- 1038	+855-23- 217802, Fax. +855-12- 8055457	+855-23-720958 Fax, :855-23- 211176	+81-3-3466-0451 Fax, +81-3-3466- 0701	+81-93-691-2331 Fax. +81-93-603- 2556	+81-3-3279-0868 Fax. +81-3-3245- 0395	+81-3-3293-0918 Fax. +81-3-3292- 7003	+81-3-3293-8453 Fax. +81-3-3293- 1990	Tel:+855-23-885-341 Fax:+855-23-885-341
	Adress	KS Bld.1-12-6, Nihonbashi, Kaigarachou, Chuo-ku, TOKYO, 103-0014, JAPAN	KS Bld.1-12-6, Nihorbashi, Kaigarachou, Chuo-ku, TOKYO, 103-0014, JAPAN	No.63 St.240 Sangkat Chaktomuk, Khan Daun, P.P	No. 51 St. 322 beng Keng kang 1, Chamcar Mon, P.P	1-9-10 Sasazuka, Shibuya-ku, Tokyou, Japan	2805 Honjyou, Yawatanishi, Kitakyushu-city, Japan	2-2-10 Nihorbashi- Honchou, Chuo- ku, Tokyo, Japan	1—16—8Uchikan da, Chuo-ku, Tokyo Japan		No. 85 St.344 Sangkat Boeung Salang, Khan Tuol Kok, P.P
Agent List	Supplier	Futurebud International Co., Ltd.	Futurebud International Co., Ltd.	Konoike Phom Penh Office	Pisnoka	Tanaka Suiryoku	Yawata Electric	Daihatsu	Taiyo Electríc		EM Construction
Age	Staff			Mr. Takashi Yamashita		Mr. Yoshinori Terashima					Mr. Masafumi Noda
	d-mail			vamashit <u>a tk@konoik</u> <u>e.co.ip</u>		Yoshinori terashima@ notes.takaoka.co.ip					masafumi <u>-</u> noda@eng.toenec.co <u>i.</u> D
t, cambodia	Telephone			+81-3-5617- 7861 Fax. +81-3- 5617-7864		+81-3-3556- 7511 Fax.+81-3- 3556-7510					+81-52-659- 1122 Fax.+81- 52-659-1170
ification project	Adress			2-7-5, Minamisuna, Koto-ku, Tokyo, Japan		2–5–2 Nishikannda. Chuo–ku, Tokyo, Japan					3–1–32 Chitose, Minato–ku, nagoya–city, Japan
Appendix TG-1 Mondul Kiri Electrification project, cambodia	Name of Agent	Mitsubishi Morters (www.mitsubishi- motors.com)	Mitsubishi Fuso T ruck & Bus Corporation	Konoike Construction		Takaoka Engineering					Toenec Corporation
	No.	÷ ;	2	ନ		<del>_</del> <del>_</del> <del>_</del> <del>_</del> <del>_</del> <del>_</del>					5)

TG-2 Equipment List

Equipment List

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project,
Electrification project
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Appendix TG-2

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2	tuemoiro	0,40	E	Cumilian	Time/Mo	On Original	Dalbara Di	Income Amount	America Trail	X X	T
	1	613	-	Cupping	Out-door 100	100	Delivery F.L.	Ogballese Agell	Agent rei.	Agent e-mail	_
<del>-</del>	Load breaker switch	2	set	Toenec	use 3S	Viet nam	DIME				
2	Arrester	48	set	Toenec	Outdoor Vari STAR UHS	Viet nam	DIME				
3	Cut out switch	33	set	Toenec		Viet nam	DIME				
4	22kV Conductors		1 lot	Toenec	Σ,	Viet nam	DIME				1
വ	Pin insulator	-	ᅜ	Toenec	Class 56.2	Viet nam	DIME				1
6	Tension insulator	-	<u> </u>	Toenec	24kV, 70kN	Viet nam	DIME				
5	Suspension insulator	-	lot	Toenec	24kV, 70kN	Viet nam	DIME				-
8	Concrete pole		lot	Toenec	Type-S, A, T	Viet nam	DIME				
6	End terminal materials	-	lot	Toenec	Quick Term II		DIME				
10)	Cramp	_	oţ	Toenec	AL16-150	Viet nam	DIME				
11)	Gye wire	-	1 lot	Toenec	Guy wire set		DIME				Γ.
12)	Step up transformer	ფ	set	Toenec	01T/N-005	Viet nam	O'R, O'M, DG				
13)	Stepdown transformer	<del>,</del>	1 lot	Toenec	22Kv/400v	Viet nam	DIME				
6.2	Pole mounted transformer	•	ot	Toenec	01T/001-004	Viet nam	DIME				Ι
6.3	Outdoor substation	-	1 lot	Toenec	kiosk outdoor	Viet nam	DIME				I
₽	Outer Cubicle	2	2 set	Toenec	Type SM-6	Viet nam	DIME				
ন	LBS cubicle	9	set	Toenec	IM500	Viet nam	DIME				1
3)	Transformer cubicle	4	set	Toenec	QM500	Viet nam	DIME				
6.4	22kV/400V underground cable	<b>~</b>	<u>ل</u>	Toenec	XLPE		DIME				
6.5	400V conductors		<u>o</u> t	Toenec			DIME		The same when the same same same same same same same sam		
=	Distribution lines	_	1 ot	Toenec	XLPE, ABC, IV, CU/PVC	Viet nam	DIME				1
2)	Distribution panels	37	set	Toenec	TypeA-1, A-2, A-3, B-1, B-2, B-3	Viet nam	DIME				<u> </u>
3	Cross arm materials	_	<u>5</u>	Toenec	Crossarm V75, U120, U140	Viet nam	DIME				
4)	Concrete poles	-	lot	Toenec	-	Viet nam	DIME				
6.6	Watt hour meters (WhM)	1	1 lot	Toenec		Viet nam	DIME				
6.7	WhM box	-	1 lot	Toenec		Viet nam	DIME				<u> </u>
6.8	VHF system	-	1 lot	Toenec	VHF radio	65	DIME				
6.9	Tools	-	1 lot	Toenec	1	Japan	DIME				- 1
6.10	Spare parts		1 ot	Toenec	1	Viet nam	DIME				
											$\neg$

Appendix TG-2

Equipment List

Mondul Kiri Electrification project, cambodia

Name of Equipment         Q'ty         Unit         Supplier         Type/No.           Turbine         Turbine         1 set         Tanaka Suiryoku         20110-1 Gross           Inlet valve         1 set         Tanaka Suiryoku         073-64 Batterfly           Dummy load unit         1 set         Tanaka Suiryoku         2018-0102           G.V servo. Motor         1 set         Tanaka Suiryoku         2008-0102           G.V servo. Motor         1 set         Tanaka Suiryoku         20110-1           Generator         1 set         Tanaka Suiryoku         20110-1           Generator         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Daihatsu         DL-16-021①           Spare parts         1 lot         Tanaka Suiryoku         20110-1           Diesel engine         1 set         Daihatsu         DL-16-021①           Air supply system         1 set         Daihatsu         DL-16-021②           Air supply system         1 set         Daihatsu         DL-16-021②           Evoling system         1 set         Daihatsu         DL-16-021③           Governor	ø	q	O	Ъ	ə	4-	500	ч		,	4
Turbine         1 set         Tanaka Suiryoku         20110–1 Gross           Inlet valve         1 set         Tanaka Suiryoku         073–64 Batterfly           Dummy load unit         1 set         Tanaka Suiryoku         20110–1 Dummy           Speed incleaser         1 set         Tanaka Suiryoku         2008–0102           GV servo. Motor         1 set         Tanaka Suiryoku         2008–0102           Generator         1 set         Tanaka Suiryoku         20110–1           Dummy load panel         1 set         Tanaka Suiryoku         20110–1           Dummy load panel         1 set         Tanaka Suiryoku         20110–1           Dummy load panel         1 set         Daihatsu         DL-16-021©           Spare parts         1 lot         Tanaka Suiryoku         20110–1           Diesel engine         1 set         Daihatsu         DL-16-021©           Evel supply system         1 set         Daihatsu         DL-16-021©           Lub. Oil supply system         1 set         Daihatsu         DL-16-021©           Erwist system         1 set         Daihatsu         DL-16-021©           Governor unit         1 set         Daihatsu         DL-16-021©           Goving system         1 set	No.	Name of Equipment	Q'ty	-		Type/No.	Origin	Delivery Pl.	Japanese Agent	Agent Tel.	Agent e-mail
Seed incleaser	4.1	Turbine	_	set	Tanaka Suiryoku	20110–1 Cross flow turbine	Japan	M,O			
Dummy load unit         1 set         Tanaka Suiryoku         20110-1 Dummy           Speed incleaser         1 set         Tanaka Suiryoku         20110-1           G.V servo. Motor         1 set         Tanaka Suiryoku         2018-0102           Gen Control panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Daihatsu         1017/N-005           Diesel engine         1 set         Daihatsu         DL-16-021@           Turbo charger         1 set         Daihatsu         DL-16-021@           Lub. Oil supply system         1 set         Daihatsu         DL-16-021@           Air supply system         1 set         Daihatsu         DL-16-021@           Exhust system         1 set         Daihatsu         DL-16-021@           Evoling system         1 set         Daihatsu         Dut door           Governor unit         1 set         Daihatsu         Dut door           Govoling system         1 set         Daihatsu         Dut door           Generator         1 set         Daihatsu <td>4.2</td> <td>Inlet valve</td> <td>_</td> <td></td> <td></td> <td>073-64 Batterfly</td> <td>Japan</td> <td>M.O</td> <td></td> <td></td> <td></td>	4.2	Inlet valve	_			073-64 Batterfly	Japan	M.O			
Speed incleaser         1 set         Tanaka Suiryoku         2008–0102           G.V servo. Motor         1 set         Tanaka Suiryoku         K9521501           Generator         1 set         Tanaka Suiryoku         Q81043101           Gen. Control panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         01T/N-005           Diesel parts         1 lot         Tanaka Suiryoku         01T/N-005           Diesel engine         1 set         Daihatsu         DL-16-021(7)           Diesel engine         1 set         Daihatsu         DL-16-021(7)           Lub. Oil supply system         1 set         Daihatsu         DL-16-021(7)           Air supply system         1 set         Daihatsu         DL-16-021(7)           Exhust system         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Exhust system         1 set         Daihatsu         Out door           Gooling system         1 set         Daihatsu         Out door           Generator         1 set         Dai	4.3	Dummy load unit		set		20110-1 Dummy load	Japan	M.O			and the state of t
G.V servo. Motor         1 set         Tanaka Suiryoku         K9521501           Generator         1 set         Tanaka Suiryoku         Q81043101           Gen. Control panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         20110-1           Diesel p.s         1 set         Daihatsu         DL-16-021(7)           Fuel supply system         1 set         Daihatsu         DL-16-021(7)           Air supply system         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Generator         1 set         Daihatsu         DL-16-021(7)           Gen Control panel         1 set <t< td=""><td>4.4</td><td>Speed incleaser</td><td></td><td>set</td><td></td><td>2008-0102</td><td>Japan</td><td>O'M</td><td></td><td>:</td><td></td></t<>	4.4	Speed incleaser		set		2008-0102	Japan	O'M		:	
Generator         1 set         Tanaka Suiryoku         Q81043101           Gen. Control panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         01T/N-005           Diesel p.s         1 set         Daihatsu         01T/N-005           Diesel engine         1 set         Daihatsu         DL-16-021©           Fuel supply system         1 set         Daihatsu         DL-16-021©           Air supply system         1 set         Daihatsu         DL-16-021©           Governor unit         1 set         Daihatsu         DL-16-021©           Governor unit         1 set         Daihatsu         DL-16-021©           Governor unit         1 set         Daihatsu         DL-16-021©           Generator         1 set         Daihatsu         DL-16-021©           Generator         1 set         Daihatsu         DL-16-0	4.5	G.V servo. Motor	-	set			Japan	O'M			
Gen. Control panel         1 set         Tanaka Suiryoku         20110-1           Dummy load panel         1 lot         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         20110-1           Diesel p.s         1 set         Daihatsu         1-16-021⑦           Diesel engine         1 set         Daihatsu         DL-16-021⑥           Turbo charger         1 set         Daihatsu         DL-16-021⑥           Fuel supply system         1 set         Daihatsu         DL-16-021⑥           Air supply system         1 set         Daihatsu         DL-16-021⑥           Governor unit         1 set         Daihatsu         DL-16-021⑥           Governor unit         1 set         Daihatsu         DL-16-021⑥           Cooling system         1 set         Daihatsu         Out door           Generator         1 set         Daihatsu         Out door           Auxiliary control panel         1 set         Daihatsu <td< td=""><td>4,6</td><td></td><td>•</td><td>set</td><td></td><td>01</td><td>Japan</td><td>O'M</td><td></td><td>The state of the s</td><td></td></td<>	4,6		•	set		01	Japan	O'M		The state of the s	
Dummy load panel         1 set         Tanaka Suiryoku         20110-1           Spare parts         1 lot         Tanaka Suiryoku         01T/N-005           Diesel p.s         1 set         Daihatsu         −           Diesel engine         1 set         Daihatsu         DL-16-021⑦           Turbo charger         1 set         Daihatsu         DL-16-021⑦           Fuel supply system         1 set         Daihatsu         DL-16-021⑦           Air supply system         1 set         Daihatsu         DL-16-021⑦           Air supply system         1 set         Daihatsu         DL-16-021⑦           Air supply system         1 set         Daihatsu         DL-16-021⑦           Governor unit         2 set         Daihatsu         DL-16-021⑦     <	4.7	Gen. Control panel		set		20110-1	Japan	O'M			
Spare parts         1 lot         Tanaka Suiryoku         011/N-005           Diesel p.s         1 set         Daihatsu         —           Diesel engine         1 set         Daihatsu         DL-16-021©           Turbo charger         1 set         Daihatsu         DL-16-021©           Fuel supply system         1 set         Daihatsu         DL-16-021©           Air supply system         1 set         Daihatsu         DL-16-021©           Air supply system         1 set         Daihatsu         DL-16-021©           Exhust system         1 set         Daihatsu         DL-16-021©           Governor unit         1 set         Daihatsu         DT-3266-01           Generator         1 set         Daihatsu         DT-3266-01           Gen Control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         O1T/N-006           Auxiliary control panel         1 set         Daihatsu         O1T/N-006  <	4.8	Dummy load panel		set			Japan	O'M			
Diesel p.s         1 set         Daihatsu         −           Diesel engine         1 set         Daihatsu         DL-16-021⑦           Turbo charger         1 set         Daihatsu         DL-16-021⑦           Fuel supply system         1 set         Daihatsu         DL-16-021⑦           Lub. Oil supply system         1 set         Daihatsu         DL-16-021⑦           Air supply system         1 set         Daihatsu         DL-16-021⑦           Exhust system         1 set         Daihatsu         Nood ward Gov.           Cooling system         1 set         Daihatsu         DL-16-021⑦           Fuel storage tank         1 set         Daihatsu         DL-16-021⑦           Generator         1 set         Daihatsu         Ovt door           Generator         1 set         Daihatsu         Ont door           Gen. Control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         Oll T/N-006           Transmission Line (T/L & D/L)         1 lot         Daihatsu         Oll T/N-006	4.9	Spare parts	_	호		01T/N-005	Japan	O'M			
Diesel p.s         1 set         Daihatsu         −           Diesel engine         1 set         Daihatsu         DL−16-021⑦           Turbo charger         1 set         Daihatsu         DL−16-021⑦           Fuel supply system         1 set         Daihatsu         DL−16-021⑦           Air supply system         1 set         Daihatsu         DL−16-021⑦           Air supply system         1 set         Daihatsu         DL−16-021⑦           Exhust system         1 set         Daihatsu         DL−16-021⑦           Governor unit         1 set         Daihatsu         DL−16-021⑦           Generator         1 set         Daihatsu         DT-3266-01           Gen. Control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         Out door           Transmission Line (T/L & D/L)         Transmission Line (T/L & D/L)         Transmission Line (T/L & D/L)											
Diesel engine         1 set         Daihatsu         DL-16-021(7)           Turbo charger         1 set         Daihatsu         DL-16-021(7)           Fuel supply system         1 set         Daihatsu         DL-16-021(7)           Air supply system         1 set         Daihatsu         DL-16-021(7)           Air supply system         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Cooling system         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Governor unit         1 set         Daihatsu         DL-16-021(7)           Generator         1 set         Daihatsu         DL-16-021(7)           Gen Control panel         1 set         Daihatsu         DT-16-021(7)           Auxiliary control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         Out door           Transmission Line (T/L & D/L)         1 lot         Daihatsu         Out door	2	Diesel p.s	-	set	Daihatsu	l		DIME	Daihatsu Diezel	+81-3-3279-0868	nachiro.matsumura@dhtd.co.ip.
Turbo charger         1 set         Daihatsu         DL-16-021①           Fuel supply system         1 set         Daihatsu         DL-16-021①           Lub. Oil supply ststem         1 set         Daihatsu         DL-16-021①           Air supply system         1 set         Daihatsu         DL-16-021①           Exhust system         1 set         Daihatsu         DL-16-021①           Governor unit         1 set         Daihatsu         DL-16-021①           Generator         1 set         Daihatsu         DL-16-021①           Gen. Control panel         1 set         Daihatsu         DL-16-021①           Spare parts         1 lot         Daihatsu         Out door           Spare parts         1 lot         Daihatsu         Out door           Transmission Line (T/L & D/L)         Transmission Line (T/L & D/L)         Transmission	5.1	Diesel engine	-	set	Daihatsu	DL-16-021(7)	Japan	DG			
Fuel supply system         1 set         Daihatsu         DL-16-021①           Lub. Oil supply ststem         1 set         Daihatsu         DL-16-021①           Air supply system         1 set         Daihatsu         DL-16-021①           Exhust system         1 set         Daihatsu         DL-16-021①           Governor unit         1 set         Daihatsu         DL-16-021①           Generator         1 set         Daihatsu         Dut door           Generator         1 set         Daihatsu         Metal crad           Auxiliary control panel         1 set         Daihatsu         OIT/N-006           Spare parts         1 lot         Daihatsu         OIT/N-006           Transmission Line (T/L & D/L)         Transmission Line (T/L & D/L)         Transmission Line (T/L & D/L)	5.2	Turbo charger	-	set	Daihatsu		Japan	DG			
Lub. Oil supply ststem         1 set         Daihatsu         DL-16-021①           Air supply system         1 set         Daihatsu         DL-16-021①           Exhust system         1 set         Daihatsu         DL-16-021①           Governor unit         1 set         Daihatsu         Wood ward Gov.           Cooling system         1 set         Daihatsu         DL-16-021①           Fuel storage tank         1 set         Daihatsu         Out door           Generator         1 set         Daihatsu         Metal crad           Auxiliary control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         01T/N-006           Transmission Line (T/L & D/L)         1 lot         Daihatsu         01T/N-006	5.3	Fuel supply system		set	Daihatsu		Japan	DG			
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Generator         1 set         Daihatsu         07–3266–01           Gen. Control panel         1 set         Daihatsu         Metal crad           Auxiliary control panel         1 lot         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         01T/N-006           Transmission Line (T/L & D/L)         1 lot         Transmission Line (T/L & D/L)	5.9		,	set	Konoike	Out door	Cambodia	DG			
Gen. Control panel         1 set         Daihatsu         Metal crad           Auxiliary control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         01T/N-006           Transmission Line (T/L & D/L)         -         -	5,10		<del></del>	set	Daihatsu	07-3266-01	Japan	DG			
Auxiliary control panel         1 set         Daihatsu         Metal crad           Spare parts         1 lot         Daihatsu         01T/N-006           Transmission Line (T/L & D/L)         -         -	5.11		_	set	Daihatsu		Japan	DG			
Spare parts         1 lot         Daihatsu         01T/N-006           Transmission Line (T/L & D/L)         -         -	5.12	Auxiliary control	-	set	Daihatsu	Metal crad	Japan	DG			
Transmission Line (T/L & D/L)	5.13	$\overline{}$	-	<u>8</u>	Daihatsu	01T/N-006	Japan	DG			
Transmission Line (T/L & D/L)											magnitude and the second and the sec
Transmission Line (T/L & D/L)											
1 T 1 T 1 T 1 T 1 T 1 T 1 T 1 T 1 T 1 T	ဖ	Transmission Line (T/L & D/L	~			1		DIME	Toenec Corporation	+81-52-659-1122	masafumi-noda@eng.toenec.co.ip
	6.1	22kV T/L		t 5	Toenec	Air insulated	Viet nam	DIME			

## Appendix TG-2

## Equipment List

# Mondul Kiri Electrification project, cambodia

w	q	Q	ъ	60	ų.	bū	h			¥
No	Name of Equipment	Q'ty	Chit	Supplier	Type/No.	Origin	Delivery PI.	Japanese Agent	Agent Tel.	Agent e-mail
<b></b>	O'Romis p.s Civil				ı		DIME			
1.1	Intake gate	_	set	Konoike		Viet nam	O'R	Konoike Construction	+81-3-5617-7861	Vamashita tk@konoike.co.ip
1.2	Sand flushing gate	-	set	Konoike		Viet nam	O'R			
<del>د</del>	Sedimentation gate	_	set	Konoike		Viet nam	O'R		Anna Alda Anna Anna Anna Anna Anna Anna Anna An	
1.4	Sedim. Gate at Head T.	_	set	Konoike		Viet nam	O'R	Add to the state of the state o		
1.5	Intake screen	-	set	Konoike		Viet nam	O'R			A CONTRACTOR OF THE PROPERTY O
1.6	Sedim. Screen	_	set	Konoike		Viet nam	O'R		The state of the s	A STATE OF THE STA
1.7	penstock (600A)	-	<u>o</u> t	Konoike		Viet nam	O'R			
1.8	penstock (800A)	1	1 lot	Konoike		Viet nam	O'R			
	O'Romis p.s Electric									
2.1	Turbine	<b>~~</b>	set	Tanaka Suiryoku	20110–2 Cross flow turbine	Japan	O'R	Tanaka Suiryoku	+81-3-3466-0451	Yu-motchashi@mx7.ttcn.ne.ip
2.2	Inlet valve	<b>,-</b>	set	Tanaka Suiryoku	073-64	Japan	O'R			
2.3	Dummy load unit	,	set	Tanaka Suiryoku	20110-2 Dumy load	Japan	O'R			
2.4	Speed incleaser		set	Tanaka Suiryoku	2008-0101	Japan	O'R			
2.5	G.V servo, Motor	<b>,-</b>	set	Tanaka Suiryoku	K9521401	Japan	O'R			
5.6	Generator	_	set	Tanaka Suiryoku	Q81043102	Japan	O'R			
2.7	Gen. Control panel	_	set		20110-2	Japan	O'R			
2.8	Dummy load panel	_	set	Tanaka Suiryoku	20110-2	Japan	O'R			
2.9	Spare parts		<u>।</u>	Tanaka Suiryoku		Japan	O'R			
භ	O'Moleng p.s Civil				1		DIME	Konoike Construction	+81-3-5617-7861	vamashita tk@konoike,co.ip
3.1	Intake gate	_	set	Konoike		Viet nam	O'M			
3.2	Sand flushing gate	_	set	Konoike		Viet nam	O'M			
3.3	Sedimentation gate	_	set	Konoike		Viet nam	O'M			
3.4	Intake screen		set	Konoike		Viet nam	O'M			
3.5	Sedím, Screen	_	set	Konoike		Viet nam	O'M			
3.6	penstock (600A)		ఠ	Konoike		Viet nam	O'M			
3.7	penstock (1,000A)		<u>ا</u>	Konoike		Viet nam	O'M			
4	O'Moleng p.s Electric							Tanaka Suiryoku	+81-3-3466-0451	vu-motohashi@mx7.ttcn.ne.ip

## Section II: Civil Structure

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Section II: Civil Structure

Chapter 1: The general

1.1 Aim

This manual stipulates the operation and maintenance work for civil structure of O'Moleng and O'Romis hydropower station and the objective is to ensure the function of civil structure, to promote the adequate and safe operation and to prevent the accident.

1.2 Application

This manual is applied to the operation and maintenance works for civil structure of O'Moleng and O'Romis hydropower station.

1.3 Definition of the word

1) "Civil structure" means reservoir, intake weir, intake, waterway, sedimentation basin, head tank, spillway, penstock, powerhouse, outlet, access path and the facilities of those.

2) "Patrol" means the work to check the existence or nonexistence of the abnormity by seeing the appearance, function and gauge with five senses of the patrolman.

"Patrol" includes garbage removing, sand removal, minor maintenance or adjustment of gate and facilities etc.

3) "Maintenance" means the work to keep the good condition of the facilities and equipment.

"Maintenance" includes the cutting bushes, removing mad from the ditch, cleaning around the civil structure, adjustment or replacement of the consumables for the equipment and filling oil to the moving part, etc.

4) "Operation" means the work to operate the electric power system to supply stable electricity to the customers.

"Operation" of the civil facilities includes the measuring the water level, open or close the gate and recording the data, etc.

5) "Head of hydropower station" is responsible for the safety and steady implementation of operation and maintenance work.

"Head of O'Moleng hydropower station" is the person who is in charge of "Section head of O'Moleng hydropower station".

"Head of O'Romis hydropower station" is the person who is in charge of "Section head of O'Romis hydropower station".

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### Chapter 2: Maintenance

### 2.1 Maintenance work

The contents of maintenance work are as follows;

- (1) Document control (Result of the patrol and maintenance record, etc)
- (2) Implementation of patrol and keeping the civil facilities good condition
- (3) Research and study for repair and improvement
- (4) Others necessary for maintenance of civil structure

### 2.2 Checking items of patrol

Patrol should be done periodically, that is daily, weekly and monthly.

Checking items of patrol are shown in appendix 1 (for O'Molemg hydropower station) and appendix 2 (for O'Romis hydropower station).

Principally daily patrol, weekly patrol and monthly patrol should be done every day, on Monday and first commercial day of the month respectively.

The results of the patrol should be recorded with the format of appendix 3-8 and be approved by the head of hydropower station.

### 2.3 Repair and improvement

If some troubles are found in the patrol, repair or improvement should be planned and done.

Priority of repair and improvement should be set according to the result of patrol, checking, and measurement etc. Matters of trouble in function for dairy operation or necessary for safety should have the first priority.

Records of repair and improvement should be kept and facilities book or drawings should be updated if the specification or appearance of civil structure is modified.

### 2.4 Contents of patrol and maintenance

### 1) Access path

Access path should be well maintained so that EUMP staff can reach every hydropower facility safely and smoothly.

For example,

Sand or mad accumulated in the side ditch should be cleared away;

Damaged surface of the path should be refilled with crushed stone;

Weeding should be done periodically; etc.

### 2) Intake weir

Intake weir should be well maintained so that water for power generation can be taken through intake surely all the time.

For example,

Intake weir body should be repaired when clacks or leaking water is detected;

Garbage and drifting tree on the screen should be cleared away in order to keep off the head loss; Sedimentation in front of the screen should be cleared away to prevent the sedimentation coming into waterway when the surface level of sedimentation reaches near to the intake level;

Intake gate and sand flushing gate should be well maintained in order to ensure the function; etc.

### 3) Sedimentation basin

Sedimentation basin should be well maintained so that the function is always kept.

For example,

Sedimentation basin body should be repaired when clacks or leaking water is detected;

Sedimentation accumulated on the bottom of basin should be cleared away;

Garbage and drifting tree on the screen should be cleared away in order to keep off the head loss; etc.

### 4) Water way (O'Romis hydropower station only)

Water way should be well maintained so that it can convey the water from sedimentation basin to head tank surely all the time.

For example,

Water way basin body should be repaired when clacks or leaking water is detected;

### 5) Head tank (O'Romis hydropower station only)

Head tank should be well maintained so that the function is always kept.

For example,

Head tank body should be repaired when clacks or leaking water is detected;

Sedimentation accumulated on the bottom of tank should be cleared away;

Garbage and drifting tree on the screen should be cleared away in order to keep off the head loss; etc.

### 6) Penstock

Penstock should be well maintained so that it can convey the water from sedimentation basin or head tank to powerhouse surely all the time.

For example,

Re-painting on the penstock should be done when rusting is detected on its surface;

Checking of the status of the penstock should be done, that is checking the abnormal vibration or looseness of the volt; etc.

### 7) Power house

Power house should be well maintained so that the operator can carry out their job surely and safely. For example,

Retaining wall should be repaired when clacks, deformation or depression is detected; etc.

### 8) Outlet

Outlet should be well maintained so that the function is always kept.

For example,

Sand, mad or another obstacles in front of the outlet should be cleared away so that smooth discharge should be kept; etc.

### Chapter 3: Operation

### 3.1 Operation work

The contents of operation work are as follows;

- (1) Gate operation
- (2) Record and report of operation
- (3) Measurement of discharge or water level
- (4) Emergency measures when accident happens

### 3.2 Operation of the gate

Principally, gate should be operated by the command of head of the hydropower station except for the cases bellows;

- A) Emergent case when accident happens etc
- B) Control of discharge for generation

### 3.3 Taking or stopping water discharge

- 1) The maximum discharge is as bellows;
  - O'Moleng hydropower station: 1.45 cms
  - O'Romis hydropower station: 1.05 cms
- 2) Abortion of taking water should be done at the cases bellows;
- A) When the taking water becomes difficult for example machine trouble or low river flow.
- B) When the risk that may give some damages to the civil structure is seen for example flood.

### 3.4 Measurement of water flow

1) Measurement of water level

Measurement of water level should be done at intake weir, sedimentation basin, waterway and head tank.

Principally, measurement should be done three times a day.

2) Actual measurement of discharge

Actual measurement should be done at the waterway of O'Romis hydropower station. Actual measurement should be done every 3 months.

-End-

Appendix:	
AP-S-II-01	Check items of civil facilities (O'Moleng hydropower station)
AP-S-II-02	Check items of civil facilities (O'Romis hydropower station)
AP-S-II-03	Check sheet of civil facilities for daily patrol (O'Moleng hydropower station)
AP-S-II-04	Check sheet of civil facilities for weekly patrol (O'Moleng hydropower station)
AP-S-II-05	Check sheet of civil facilities for monthly patrol (O'Moleng hydropower station)
AP-S-II-06	Check sheet of civil facilities for daily patrol (O'Romis hydropower station)
AP-S-II-07	Check sheet of civil facilities for weekly patrol (O'Romis hydropower station)
AP-S-II-08	Check sheet of civil facilities for monthly patrol (O'Romis hydropower station)
AP-S-II-09	How to measure the discharge of O'Romis waterway

### Volume III Reference Data

### Document for Civil Structure

- R-2-1 Basic knowledge about the civil structure of hydropower station
- R-2-2 Key points of patrol regarding the civil facilities

AP-S-II-01 Check items of civil facilities (O'Moleng hydropower station)

#### Check items of civil facilities (O'Moleng hydropower station)

Name of facility	ltem	Maintenance point	Daily	Weekly	Monthly	Remarks
	Side ditch	Clean the side ditch		0		if necessary
	Weeding	Weeding around the path			0	If necessary
Access path	Road surface	Check the condition of road surface		0		
	Slope protection	Check the condition of slope or guard fence		0		
	Appearance	Check the appearance, others	0			
	Intake screen	Remove the trash on the screen	0			If necessary
-7.2%	Sedimentation	Flush out the accumulated sand in front of the intake			0	Rainy season, if necessary
Intaka Waiv	Gate	Check the function of the gate If necessary, but the oil on the gear			0	
	Locking	Check the locking of gate handle and gurad fence	0			
	Structure	Water leakage, deformation and crack, etc		0		
	Appearance	Check the appearance, others	0			
	Screen	Remove the trash on the screen	0			
Section Caritation	Sedimentation	Flush out the accumulated sand in front of the intake			0	If necessary
פמווופן ושנטן ספון	Structure	Water leakage, deformation and crack, etc		0		
	Appearance	Check the appearance, others	0			
	Vibration	Check the abnormal vibration or noise from the structure			0	
Penstock	Bolt	Clench the bolt			0	lf necessary
	Appearance	Check the appearance, others	0			
Daniel	Retaining wall	Deformation or depression of the structure		0		
20001010101	Appearance	Check the appearance, others	0			
in the second	Sedimentaion	Remove the sand or mad in front of the outlet			0	If necoessary
	Appearance	Check the appearance of outlet	0			

AP-S-II-02 Check items of civil facilities (O'Romis hydropower station)

#### Check items of civil facilities (O'Romis hydropower station)

Side ditch         Clean the side ditch         O           Weeding         Weeding around the path         O           Road surface         Check the condition of road eurafece         O           Slope protection         Check the condition of slope or guard fence         O           Appearance         Check the trash on the screen         O           Sedimentation         Final working the read of on the gear         O           Locking         Check the function of the generators of there are guard fence         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Remove the trash on the screen         O           Screen         Appearance         Check the appearance, others           Screen         Remove the trash on the screen         O           Screen         Structure         Water leakage, deformation and crack, etc           Appearance         Check the app	Name of facility	Item	Maintenance point	Daily	Weekly	Monthly	Remarks
Weeding         Weeding around the path         O           Read surface         Check the condition of loade surface         O           Road surface         Check the condition of slope or guard fence         O           Nope protection Check the condition of slope around the grand fence         O           Intake screen         Remove the trash on the screen         O           Sedimentation         Check the function of the gard         O           Looking         Check the function of the grand fence         O           Structure         Water leakage, deformation and crack, etc         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Remove the trash on the screen         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Onesk the appearance, others         O           Screen         Onesk the appearance, others         O           Screen         Onesk the appearance, others         O           Screen         Water leakage, deformation and crack, etc         O           Scrincture         Water leakage, deformation and crack, etc         O           Scrincture         Water leakage, deformation and crack, etc         O           Scrincture		Side ditch			0		If necessary
Read surface         Oheek the condition of road surface         O           Stope protection         Stope protection         O           Intake sorem         Check the condition of slope or guard fence         O           Intake sorem         Check the transparance, others         O           Sedimentation         Thish out the accumulated sand in front of the intake         O           Clocking         Check the function of the gate         O           Locking         Check the Incition of the gate         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Screen         Remove the trash on the screen         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O <t< td=""><td></td><td>Weeding</td><td>Weeding around the path</td><td></td><td></td><td>0</td><td>If necessary</td></t<>		Weeding	Weeding around the path			0	If necessary
Slope protection (Check the condition of slope or guard fence  Appearance Check the appearance, others  Further screen Remove the trash on the screen  Gate Hoessary, put the oil on the gate  Greek the flooking of gate handle and gurad fence  Check the looking of gate handle and gurad fence  Check the looking of gate handle and gurad fence  Check the looking of gate handle and gurad fence  Check the appearance others  Structure Water leakage, deformation and crack, etc  Check the appearance others  Structure Water leakage deformation and crack, etc  Appearance Check the appearance others  Structure Water leakage deformation and crack, etc  Appearance Check the appearance cutters  Structure Water leakage deformation and crack, etc  Appearance Check the appearance cutters  Structure Water leakage deformation and crack, etc  Check the appearance cutters  Structure Water leakage deformation and crack, etc  Appearance Check the appearance cutters  Structure Water leakage deformation and crack, etc  Check the appearance cutters  Structure Water leakage deformation and crack, etc  Check the appearance cutters  Structure Check the appearance cutters  Check the appearan	Access path	Road surface	Check the condition of road surface		0		
Appearance Check the appearance, others  Intake screen Remove the trash on the screen  Sedimentation of Plush out the accumulated sand in front of the intake  Check the function of the gate  I checks the function of the gate  Check the locking of gate handle and gurad fence  Check the locking of gate handle and gurad fence  Structure  Water leakage, deformation and crack, etc  Check the appearance, others  Sedimentation  Sedimentation  Check the appearance, others  Scructure  Water leakage, deformation and crack, etc  Appearance  Check the appearance, others  Structure  Water leakage, deformation and crack, etc  Appearance  Check the appearance, others  Structure  Water leakage, deformation and crack, etc  Appearance  Check the appearance, others  Structure  Water leakage, deformation and crack, etc  Appearance  Check the appearance, others  Structure  Water leakage, deformation and crack, etc  Appearance  Check the appearance, others  Structure  Water leakage, deformation or noise from the structure  Structure  Water leakage, deformation or noise from the structure  Structure  Water leakage, deformation or noise from the structure  O Appearance  Check the appearance, others  Check the appearance, others  Structure  Water leakage, deformation or noise from the structure  O Appearance  Check the appearance of the structure  Water leakage, deformation or deach, etc  Appearance  Check the appearance, others  Check the appearance, others  O Check the appearance, others  Sedimentation  Retaining wall  Deformation or depression of the structure  Appearance  Check the appearance, others  O Check the appearance, others  O Check the appearance others  O C		Slope protection			0		
Intake screen         Remove the trash on the screen         O           Sedimentation         Flush out the accumulated sand in front of the intake         O           Gate         (Prock) the function of the gate         O           Looking         (Prock) the function of the gate         O           Structure         (Prock the looking of gate handle and garad fence         O           Structure         (Prock the looking of gate handle and garad fence         O           Sedimentation         (Prock the looking of gate handle and garad fence         O           Sedimentation         (Plush out the accumulated sand in front of the intake         O           Sedimentation         (Plush out the accumulated sand in front of the intake         O           Appearance         (Preck the appearance, others         O           Structure         (Mater leakage, deformation and crack, etc         O           Screen         (Plush out the appearance, others         O           Screen         (Plush out the appearance, others         O           Structure         (Mater leakage, deformation and crack, etc         O           Appearance         (Pluck the appearance, others         O           Structure         (Mater leakage, deformation and crack, etc         O           Appearance         (Pluck		Appearance	Check the appearance, others	0			
Sedimentation Flush out the accumulated sand in front of the intake  Gate Gheck the function of the gate Greek the function of the gate Structure Greek the locking of gate handle and gurad fence Oneck the locking of gate handle and gurad fence Screen Screen Screen Sedimentation Sedimentation Greek the appearance, others Screen Screen Screen Screen Screen Screen Greek the appearance, others Screen Screen Greek the appearance, others Screen Screen Greek the appearance, others Screen Screen Screen Screen Greek the appearance, others Screen Screen Screen Screen Greek the appearance, others Screen Screen Greek the appearance, others Screen Screen Greek the appearance, others Screen Greek the appearance, others Scructure Water leakage, deformation and crack, etc On Structure Water leakage, deformation or noise from the structure Screen Greek the appearance, others Scructure Oneck the appearance, others Scructure Oneck the appearance, others Scructure Greek the appearance, others Scructure Greek the appearance, others Scructure Oneck the appearance, others Scructure Scructure Oneck the appearance, others Scructure Oneck the appearance, others Scalimentation Sedimentation Sedimentation Sedimentation Scalimentation Scructure Oneck the appearance, others Scalimentation Scalimentation Scalimentation Scalimentation Scalimentation Scalimentation Oneck the appearance, others Scalimentation Scalimentation Scalimentation Oneck the appearance, others Scalimentation Oneck t		Intake screen	Remove the trash on the screen	0			If necessary
Gate         Check the function of the gate         O           Locking         Check the looking of gate handle and gurad fence         O           Locking         Check the looking of gate handle and gurad fence         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Remove the trash on the screen         O           Scrim Remove the trash on the screen         O           Scrim Hashage, deformation and crack, etc         O           Appearance         Check the appearance, others           Structure         Water leakage, deformation and crack, etc           Appearance         Check the appearance, others           Screen         Remove the trash on the screen           Screen         Screen           Screen         Remove the trash on the screen           Screen         Screen           Screen         Screen           Screen         Screen           Screen         Screen           Screen         Screen		Sedimentation	Flush out the accumulated sand in front of the intake			0	Rainy season, if necessary
Looking         Check the looking of gate handle and gurad fence         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Screen         Remove the trash on the screen         O           Screen         Remove the trash on the screen         O           Scrincture         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Screen         Remove the trash on the screen         O           Screen         Remove the trash on the screen         O           Screen         Remove the trash on the screen         O           Screen         Water leakage, deformation and crack, etc         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Bolt         Clench the bolt         O           Appearance         Check the appearance, others         O           Appearance         Check the appearance, others <td< td=""><td>Intake Weir</td><td>Gate</td><td>Check the function of the gate If necessary, put the oil on the gear</td><td></td><td></td><td>0</td><td></td></td<>	Intake Weir	Gate	Check the function of the gate If necessary, put the oil on the gear			0	
Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Screen         Remove the trash on the screen         O           Screen         Remove the trash on the screen         O           Sedimentation         Flush out the accumulated sand in front of the intake         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Oheck the appearance, others         O           Scrimentation         Flush out the appearance, others         O           Scrimentation         Flush out the appearance, others         O           Scrimentation         Flush out the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the abnormal vibration or noise from the structure         O           Retaining wall         Deformation or depression of the structure         O           Appearance         Oheck the appearance, others         O           Retaining wall         Deformation or depression of the structure		Locking	Check the locking of gate handle and gurad fence	0			
Appearance         Check the appearance, others         O           Screen         Remove the trash on the screen         O           Scrien         Sedimentation         Flush out the accumulated sand in front of the intake         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Wibration         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O <t< td=""><td></td><td>Structure</td><td>Water leakage, deformation and crack, etc</td><td></td><td>0</td><td></td><td></td></t<>		Structure	Water leakage, deformation and crack, etc		0		
Screen         Remove the trash on the screen         O           Sedimentation         Flush out the accumulated sand in front of the intake         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Remove the trash on the screen         O           Screen         Scrimentation         Flush out the accumulated sand in front of the intake         O           Scrimentation         Flush out the accumulated sand in front of the intake         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Oheck the appearance, others         O           Structure         Water leakage, deformation or noise from the structure         O           Vibration         Check the appearance, others         O           Retaining wall         Deformation or depression of the structure         O           Appearance         Check the appearance, others         O           Sedimentaion         Remove the sand or mad in front of the outlet         O           Sedimentaion         Remove the sappearance, others         O		Appearance	Check the appearance, others	0			
Sedimentation         Flush out the accumulated sand in front of the intake         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Screen         Remove the trash on the screen         O           Screen         Remove the trash on the screen         O           Scrincture         Water leakage, deformation and crack, etc         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Check the appearance, others         O           Structure         Water leakage, deformation and crack, etc         O           Appearance         Oheck the appearance, others         O           Structure         Oheck the appearance, others         O           Retaining wall         Deformation or depression of the structure         O           Appearance         Check the appearance, others         O           Sedimentaion         Remove the sand or mad in front of the outlet         O <td></td> <td>Screen</td> <td>Remove the trash on the screen</td> <td>0</td> <td></td> <td></td> <td></td>		Screen	Remove the trash on the screen	0			
Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Screen         Remove the trash on the screen         O         O           Screen         Remove the trash on the screen         O         O           Screen         Remove the trash on the screen         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Oheck the appearance, others         O         O           Structure         Water leakage, deformation or dozek, etc         O         O           Appearance         Water leakage, deformation or noise from the structure         O         O           Structure         Water leakage, deformation or noise from the structure         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet <td>Sedimentation Rasin</td> <td>Sedimentation</td> <td>Flush out the accumulated sand in front of the intake</td> <td></td> <td></td> <td>0</td> <td>If necessary</td>	Sedimentation Rasin	Sedimentation	Flush out the accumulated sand in front of the intake			0	If necessary
Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Screen         Remove the trash on the screen         O         O           Scrimentation         Flush out the accumulated sand in front of the intake         O         O           Sclimentation         Flush out the accumulated sand in front of the intake         O         O           Sclimentation         Mater leakage, deformation and crack, etc         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O		Structure	Water leakage, deformation and crack, etc		0		
Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         P           Screen         Remove the trash on the screen         O         P           Sedimentation         Flush out the accumulated sand in front of the intake         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O		Appearance	Check the appearance, others	0			
Appearance         Check the appearance, others         O         Percent           Screen         Remove the trash on the screen         O         O           Sedimentation         Flush out the accumulated sand in front of the intake         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O	Waterway	Structure	Water leakage, deformation and crack, etc		0		
Screen         Remove the trash on the screen         O         O           Sedimentation         Flush out the accumulated sand in front of the intake         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Glench the bolt         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O	ÁBH 1991	Appearance	Check the appearance, others	0			
SedimentationFlush out the accumulated sand in front of the intakeOStructureWater leakage, deformation and crack, etcOOAppearanceCheck the appearance, othersOOAppearanceWater leakage, deformation and crack, etcOOVibrationCheck the abnormal vibration or noise from the structureOOBoltClench the boltOOAppearanceCheck the appearance, othersOORetaining wallDeformation or depression of the structureOOAppearanceCheck the appearance, othersOOSedimentaionRemove the sand or mad in front of the outletOOAppearanceCheck the appearance, othersOO		Screen	Remove the trash on the screen	0			
Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O		Sedimentation	Flush out the accumulated sand in front of the intake			0	If necessary
Appearance         Check the appearance, others         O         O           Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation or noise from the structure         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O		Structure	Water leakage, deformation and crack, etc		0		
Structure         Water leakage, deformation and crack, etc         O         O           Appearance         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O		Appearance	Check the appearance, others	0			
Appearance         Water leakage, deformation and crack, etc         O         O           Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O	Spillaray	Structure	Water leakage, deformation and crack, etc		0		
Vibration         Check the abnormal vibration or noise from the structure         O         O           Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O           Sedimentaion         Remove the sand or mad in front of the outlet         O         O           Appearance         Check the appearance, others         O         O	ástildo	Appearance	Water leakage, deformation and crack, etc	0			
Bolt         Clench the bolt         O         O           Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O		Vibration				0	
Appearance         Check the appearance, others         O         O           Retaining wall         Deformation or depression of the structure         O         O           Appearance         Check the appearance, others         O         O           Appearance         Check the appearance, others         O         O	Penstock	Bolt	Clench the bolt			0	If necessary
Retaining wall       Deformation or depression of the structure       O       O         Appearance       Check the appearance, others       O       O         Appearance       Check the appearance, others       O       O		Appearance	Check the appearance, others	0			
Appearance Check the appearance, others  Sedimentaion Remove the sand or mad in front of the outlet  Appearance Check the appearance, others  O	Dowerhouse	Retaining wall	Deformation or depression of the structure		0		
Sedimentaion Remove the sand or mad in front of the outlet O Appearance Check the appearance, others O	999	Appearance	Check the appearance, others	0			
Appearance Check the appearance, others	†  -  -	Sedimentaion	Remove the sand or mad in front of the outlet			0	If neccessary
	) Ariot	Appearance	Check the appearance, others	0			

AP-S-II-03 Check sheet of civil facilities for daily patrol (O'Moleng hydropower station)

Check sheet of civil facilities for daily patrol

(O'Moleng hydropower station)

Name

Year

Month

Day

**Treatment** Status if "NG" DNG ___ BN □ □ NG \(\sigma\) D NG DNG □ ₽ □ S Condition ⊟ S ∆ S S <u>П</u> □ K □ 8 8 0 <u></u> □ 드 Item Intake screen Appearance Appearance Appearance Appearance Appearance Appearance Locking Screen Sedimentation Basin Name of facility Access path Powerhouse Intake Weir Penstock Outlet AP-S-II-04 Check sheet of civil facilities for weekly patrol (O'Moleng hydropower station)

## Check sheet of civil facilities for weekly patrol (O'Moleng hydropower station)

Day Month	Year			Name	
Name of facility	Item	Conc	Condition	Status if "NG"	Treatment
	Side dirch	п ок	DN □		
Access path	Road surface	ок	DN 🗆		
	Slope protection	п ок	DN 🗆		
Intake weir	Structure	п ок	DN □		
Sedimentation basin	Structure	ок	9N □		
Power house	Structure	п ок	□ NG		

AP-S-II-05 Check sheet of civil facilities for monthly patrol (O'Moleng hydropower station)

AP-S-II-05

# Check sheet of civil facilities for monthly patrol (O'Moleng hydropower station)

Day Month	Year			Name	
Name of facility	Item	Conc	Condition	Status if "NG"	Treatment
Access path	Weeding	ок	DN 🗆		
vious extern	Sedimentation	п ок	□ NG		
	Gate	ОК	DN 🗆		
Sedimentation basin	Sedimentation	жо 🗆	□ NG		
Donotood	Vibration	ОК	□ NG		
1000000	Bolt	ОК	□ NG		
Outlet	Structure	ОК	D NG		

AP-S-II-06 Check sheet of civil facilities for daily patrol (O'Romis hydropower station)

### Check sheet of civil facilities for daily patrol

(O'Romis hydropower station)

Name

Year

Month

Day

Remark Status if "NG" DNG □ © □ S 8 S S 8 S 8 S <u>S</u> Š S Condition ŏ ⊝ S C S S 엉 ð Š ò Š Š Š Š ş ð Item Intake screen Appearance Appearance Appearance Appearance Appearance Appearance Appearance Appearance Appearance Locking Screen Screen Sedimentation Basin Name of facility Access path Powerhouse Intake Weir Waterway Penstock Headtank Spillway Outlet

AP-S-II-07 Check sheet of civil facilities for weekly patrol (O'Romis hydropower station)

AP-S-[I-07

## Check sheet of civil facilities for weekly patrol (O'Romis hydropower station)

Day Month	Year		a total tiple on the second	Name	
Name of facility	Item	Conc	Condition	Status if "NG"	Remark
	Side ditch	п ок	□ NG		
Access path	Road surface	П ОК	DN □		
	Slope protection	П ок	D NG		
Intake Weir	Structure	П ОК	□ NG		
Sedimentation Basin	Structure	П ОК	9N □		
Waterway	Structure	П ОК	DN 🗆		
Headtank	Structure	п ок	DN 🗆		
Spillway	Structure	л ок	DN □		
Powerhouse	Retaining wall	ок	DN □		
Outlet	Appearance	п ок	□ NG		

AP-S-II-08 Check sheet of civil facilities for monthly patrol (O'Romis hydropower station)

AP-S-II-08

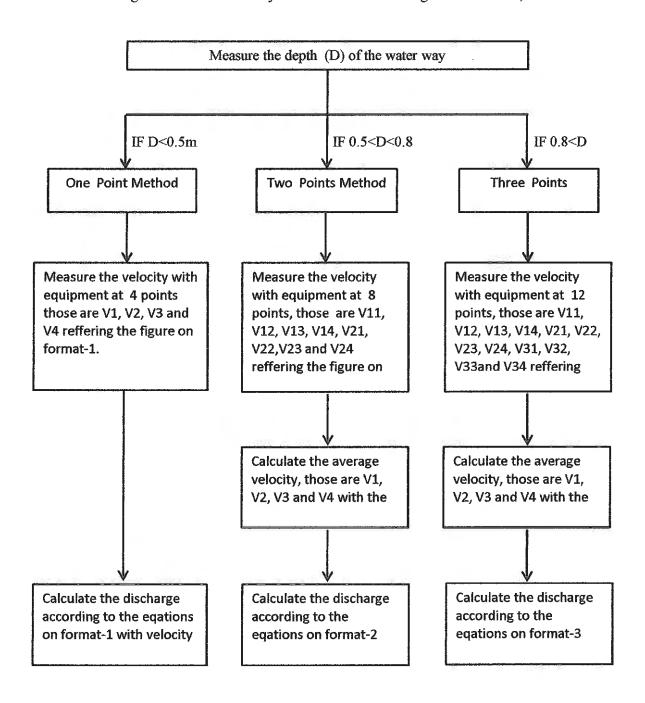
Check sheet of civil facilities for monthly patrol (O'Romis hydropower station)

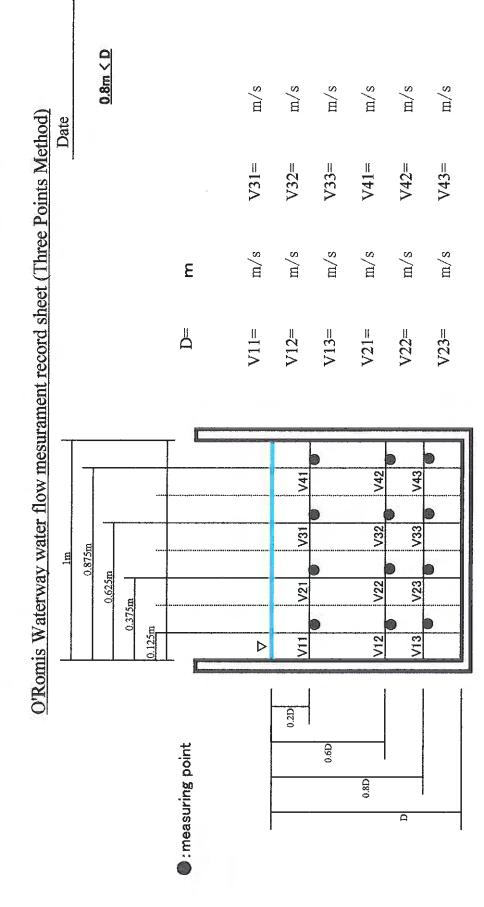
200000000000000000000000000000000000000	Remark									
Name	Status if "NG"									
	Condition	DN 🗆	DN 🗆	DN 🗆	DN □	□ NG	□ NG	□ NG	DN 🗆	ÐN □
	Conc	у П	п ок	уо 🗆	ОК	п ок	ОК	П ОК	П ОК	П ок
Year	Item	Weeding	Sedimentation	Gate	Sedimentation	Sedimentation	Appearance	Vibration	Bolt	Sedimentaion
Day Month	Name of facility	Access path	Intoke Weir		Sedimentation Basin	Headtank	Spillway	C Social Section 1		Outlet

AP-S-II-09 How to measure the discharge of O'Romis waterway

#### How to measure the discharge of O'Romis waterway

Measurament of discharge of O'Romis waterway should be done following the flow below;







m/s

V1 = (V11+2V12+V13)/4 =

(V21+2V22+V23)/4 =

V2=

(V31+2V32+V33)/4=

V3=

s/m

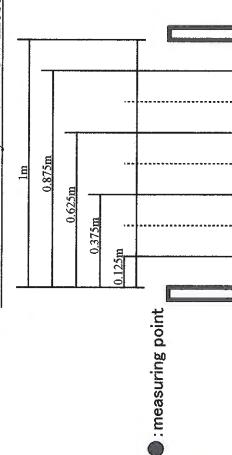
s/m

s/m

(V41+2V42+V43)/4=

V4=

O'Romis Waterway water flow mesurament record sheet (Two Points Method)



0.5m< D < 0.8m

Date

E

m/s

m/s

s/m

V12 =

m/s

m/s

m/s

V21 =

/41

**V31** 

V21

0.2L

0.8L

Þ

V42

V32

V22

V12

$$Q = 0.25 \times D \times (V1+V2+V3+V4)$$

$$= \boxed{ m3/s}$$

$$V1 = (V11+V12)/2 =$$

m/s

$$V2= (V21+V22)/2=$$

V3 = (V31+V32)/2 =

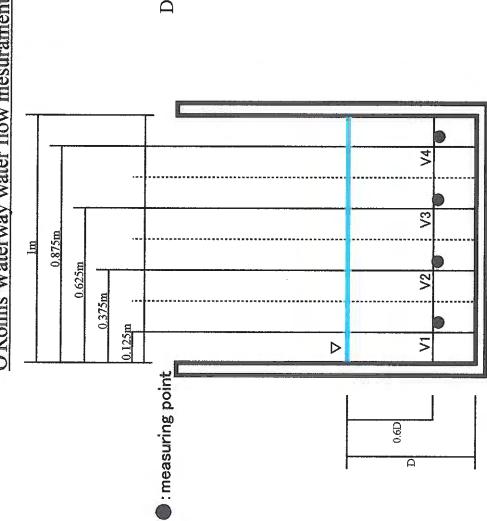
V4= (V41+V42)/2=

m/s

D < 0.5m

Date





D=

$$Q = 0.25 \times D \times (V1+V2+V3+V4)$$

$$= \boxed{ \qquad \qquad m3/s}$$

s/m

s/m

m/s

s/m

$$V2=$$