D-7 MONTHLY LIST OF MASS CURVE

 $(Unit : m^3/s-d)$

< DEC >	-3680.0	-693.6	1811.5	5006.1	.6264.2	8319.1	6544.1	6688.3	6792.8	4583.4	16197.3	17241.7	23008.2	24880.4	25593.7	24181.2	23144.8	22061.9	19032.9	15059.9	9766.4	8821.3	7403.5	13212.1	5875.7	4943.0	5845.5	0.0
× 000 ×	-2744.1	-403.5	2250.4	5538.2	8766.8	8905.0	7255.5	7531.7	7378.8	5358.8	16446.3	17856.7	23688.1	25271.3	26077.2	24967.8	23879.6	22774.5	19847.5	16014.0	10703.0	9386.7	8046.4	13956.5	6658.7	5795.5	5506.2	1001.2
× 001 ×	-2067.3	-703.1	2572.5	5671.6	6230.6	9227.8	6747.9	8107.9	7688.1	5934.9	16112.5	18122.2	23902.5	25234.1	26057.9	25227.7	24102.7	22903.2	20237.3	16684.2	11304.0	9416.4	8234.8	14200.2	6885.5	6309.5	6692.8	1803.2
SEP V	-2100.9	-3184.3	1756.3	2328.7	3993.4	7207.3	5763.7	8407.8	6481.3	5641.6	14547.9	17480.9	23185.8	24545.3	24771.0	24813,8	23132.7	22022.7	20189.7	16374.5	11011.5	7836.0	7862.6	13074.3	6352.6	6037.3	6298.4	2356.9
A AUG >	-4513.0	-5486.1	-2474.7	2.567	2350.1	4459.0	4551.3	6537.4	3636.3	4528.7	9855.4	15059.6	20510.9	22730.5	22456.2	23659.2	21366.2	20631.6	17526.1	15355.1	10552.0	4506.2	6981.5	10319.8	5842.1	4.651.4	4418.0	2155.8
× 300 ×	-6695.5	6.6906-	4.4774.4	~1343.7	982.0	3074.3	2573.0	2560.8	472.8	2257.8	624.7	12806.6	16043.4	19158.9	20469.2	21282.1	20047.3	18251.9	16205.5	13219.9	7716.2	3741.6	4117.9	4566.0	5698.8	1783.4	1842.5	1209.5
A JUN >	-6483.2	-9295.5	-5670.7	-2514.7	-60.7	457.7	2667.3	1545.5	311.1	1981.3	1405.4	11757.8	12110.7	17029.2	19898.7	20440.3	19054.6	17599.7	16456.2	12744.7	8189.9	3680.5	3119.7	2781.1	4.5999	866.2	160.3	439.5
< MAY >	-5873.8	-8907.1	-5463.3	-2283.2	-136.3	1404.7	3133.3	1633.9	1357.5	1748.7	-567.3	12118.9	12187.8	17832.0	20199.6	20591.9	19251.1	18082.9	17366.7	13754.8	9289.7	4372.0	3499.9	2279.1	7617.9	332.4	-414.6	6.906
APR V	-4606.9	-8350.3	-4343.8	-1999.6	1077.9	2396.7	4331.7	2661.7	2463.3	2750.4	372.7	12868.2	13200.3	18969.9	21120.2	21527.5	20262.4	19052.3	18462.4	14798.8	10494.4	5268.3	4.653.0	3238.1	8851.2	1505.9	671.2	1993.5
A RAR	-3391.4	-7124.3	-3260.6	-915.8	2187.2	3494.9	5435.5	3786.7	3607.2	3885.5	1515.4	13841.7	14347.9	20042.9	22217.7	22639.2	21373.7	20202.8	19556.8	15958.4	11688.6	6433.9	5807.9	4381.5	10048.7	2665.0	1813.9	3093.2
^ 83 ^	-2186.5	-5911.2	-2188.5	152.2	3263.3	4582.9	6521.9	4.890.9	4727.5	4981.7	2684.6	14832.4	15453.8	21146.3	23252.4	23785.5	22425.1	21321.8	20646.9	17100.8	12897.2	7609.8	6974.8	5534.3	11240.2	3837.6	2964.2	4170.2
A NAC	-1128.0	-4817.0	-1362.5	1047.9	4180.6	5516.5	7457.1	5821.6	5692.0	5938.5	3646.0	15583.2	16375.5	22112.B	24128.6	24716.6	23335.7	22267.7	21541.6	18051.7	13940.2	8686.6	7958.9	6.7679	12247.2	4.881.6	3944.8	5054.4
	1959	1960	1961	1962	1963	1964	1965	1966	1961	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
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< DEC >	-9075.8	-3823.4	1055.2	6573.0	9568.5	15823.0	13204.8	15469.3	14987.9	10057.1	29805.2	32917.3	43902.6	45499.7	49466.5	45669.1	47252.2	43956.3	39207.5	35538.7	24145.7	22578.5	17978.3	26973.3	10944.9	8529.4	11638.5	0.0	
× >0N >	-7093.8	-3224.7	1997.8	7706:1	10505.4	1694611	14345.7	17116.0	16322.7	11681.4	30419.3	34025.5	45262.5	46461.2	50587.4	47241.0	48537.7	45281.4	4.0667.4	37327.1	26128.6	23774.7	19375.2	28469.2	12570.3	10224.6	12228.3	1818.7	
< 00T ≯	-5661.7	-3823.0	2554.4	7942.7	9301.7	17343.9	13040.9	18198.4	16996.1	12763.9	29828.0	34452.9	45726.2	46318.2	50666.9	47482.5	4.8690.6	45513.5	41194.0	38261.3	27454.5	23975.6	19833.8	28929.3	13104.1	11055.3	11350:1	3084.4	
A SEP Y	-5843.3	-8919.5	735.2	1305.2	4477.5	13020.6	10363.7	18484.4	14661.0	11683.9	27024.0	32699.2	44093.1	45120.8	47799.1	7.26997	45735.0	43463.9	40359.4	35601.7	26916.7	20867.7	19227.0	26226.0	12172.5	9545.6	7814.8	3879.4	
< AUG >	-10883.2	-13748.8	-8592.3	-2554.6	626.1	5887.6	7754.8	14041.4	9138.9	9351.0	17896.2	27330.5	38551.9	41868.3	41598.5	44076.0	39983.8	40414.2	34076.0	32784.4	25888.2	13421.4	17332.9	20497.2	11296.9	5947.8	2857.8	3127.7	
× 10L ×	-14977.2	-21539.7	-13182.2	-6381.9	-2391.0	2823.0	3577.7	4975.0	2296.8	4860.4	611.5	22294.9	29870.1	34778.2	35999.6	39675.4	36310.0	36222.0	31461.9	27771.5	20957.5	11655.9	11783.2	10472.7	11234.5	987.2	-936.6	1104.2	
v von	-14166.2	-21661.9	-14839.2	-8512.6	-4475.0	-2643.0	3980.4	2644.3	2241.8	4370.1	-948.5	20562.7	22357.6	31359.2	34651.2	38508.9	34721.2	35451.7	32058.5	26347.2	21928.4	11500.8	10256.4	7749.5	13258.2	-61.0	-2889.5	143.5	
^	-12628.1	-20481.1	-14092.9	-7753.1	-4305.2	-563.1	5187.4	2915.8	4271.4	4261.5	-901.8	21234.7	22567.2	33062.4	35484.3	39087.8	35326.4	36698.6	33958.7	28435.1	240042	12725.3	11276.6	7048-6	15287.4	-830.1	-2926.5	1519.7	
APR >	-9933.2	-19096.0	-11679.3	-7028.2	-1757.3	1516.4	7666.9	4967.2	6512.7	4.6629	1109.2	22554.2	24516.4	35419,9	37374.8	6.76607	37432.3	38748.6	36211.5	30612.1	26310.9	14540.4	13692.5	5.0606	17863.0	1660.1	-749.1	3681.6	
^ MAR ∨	-7316.5	-16455.1	-9324.8	-4690.7	617.0	3853.7	6.4866	7334.0	8943.2	8682.5	3526.1	24637.6	26911.3	37674.2	39727.7	43343.6	39811.4	41167.5	38500.1	33036.6	28787.3	17028.3	16147.7	11489.8	20384.4	4103.5	1749.0	5915.8	
A FEB >	-4703.6	-13626.9	-7042.2	-2421.6	2915.5	6123.4	12231.6	9632.5	11341.5	11042.1	5992.3	26775.0	29216.9	40007.7	41971.3	45741.8	42075.3	43517.3	40834.9	35414.9	31310.4	19552.6	18627.6	13955.7	22889.6	6625.4	4263.5	8182.4	
۷ کمی ۱	-2421.2	-11475.5	-5289.9	-560.7	4834.5	8023.7	14107.4	11524.3	13387.0	13112.8	8040.8	28422.4	31131.6	42035.0	43856.0	47668.2	43986.8	45478.0	42743.0	37348.2	33411.8	21847.7	20708.7	16015.8	24978.7	8835.2	6394.7	100001	
	1959	1960	1961	1962	1963	1961	1965	1966	1967	1968	1969	1970	1971	1972	1973	7.61	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	

(3) Monthly List of Mass Curve (Mae Lama Luang Project : Integrated Development)

(Unit : $m^3/s-d$)

	A NAC A	< FEB >	< MAR >	A APR V	A MAY V	< NOC >	< .JUL. >	< AUG >	v din	A 001 >	< NON >	< 050 ×
0	0	0	70,1	4100	20 24	0 0 1 1	6 5 7 7 K I	- X 2 X X	0840	0 10801	0 0 0 1	9 9872
r (0 10 1	7,6111	200	2 4 4		, H , C ,			000			
1960	14155.8	14740.7	2.48441	10412	0.0001	0.64201	-0017	14044	4.07471	1.0071	4.0011	1.0/011
1961	11589.5	-1781.9	-1995.0	-2201.2	-2414.2	-2620.4	-1724.1	-341.6	6.966	1812.5	1654.2	1490.6
1962	1327.1	1179.3	1015.7	857.4	693.8	535.5	1638.5	2741.4	3808.7	4911.7	4778.2	4460.7
1963	4143.1	3856.3	3538.8	3231.5	2913.9	2989.6	3614.9	4240.2	4845.4	5470.7	6.9009	5643.2
1964	5279.5	4939.3	4575.6	4223.6	3859.9	3507.9	4758.0	6008.1	7217.8	8467.9	8145.1	7790.1
1965	7435.2	7114.5	6759.6	6416.0	6061.1	5717.6	5623.2	5844.9	7.6509	6281.1	6495.6	6187.1
1966	5878.5	5599.8	5291.3	4992.7	7.4897	4595.8	5611.1	6646.1	7647.8	7348.0	6853.8	6343.1
1961	5832.4	5371.1	4860.4	4366.2	3855.6	3361.3	3523.0	4,070,4	5780.8.	6928.2	6628.3	6318.4
1968	6008.5	5718.6	5408.8	5108.9	4799.0	4872.7	4948.9	5025.1	5098.8	5175.0	0.7627	4.0074
1969	4006.8	3651.2	3257.6	2876.6	2483.0	5647.9	3675.0	9095.5	13788.0	15352.6	15686.4	15557.9
1970	15429.5	15313,5	15185.1	15060.8	14932.3	14808.0	15452.6	16097.2	16721.0	17362.3	17096.7	16780.2
1971	16463.6	16177.6	15861.0	15554.7	15238.1	15160.9	17608.9	20056.9	22425.8	23142.5	22928.2	22513.6
1972	22099.0	21711.1	21296.5	20895.3	20480.7	20079.5	21328.2	22576.9	23785.4	24474.2	24511.4	24283.0
1973	24054.5	23848.1	23619.7	23398.6	23170.1	22949.0	23519.5	24118.8	24698.7	25298.0	25317,2	25031.9
1974	24746.6	24488.9	24203.6	23927.5	23642.2	23490.6	23736.9	23983.2	24221.5	24467.8	24207.9	23883.2
1975	23558.4	23265.1	22940.4	22626.1	22301.4	22104.9	22416.9	22728.9	23030.8	23342.8	23119.7	22760.3
1976	22400.8	22064.6	21705.1	21357.3	20997.9	20650.0	21026.4	21402.7	21766.9	22143.2	22014.6	21647.8
1977	21281.1	20949.8	20583.1	20228.2	19861.4	19506.5	19255.8	19344.2	19429.7	19477.3	19087.6	18606.1
1978	18124.7	17689.8	17208.3	16742.4	16260.9	15795.0	15827.6	15860.2	15891.7	15924.3	15343.6	14743.6
1979	14143.6	13601.6	13001.6	12420.9	11820.9	11240.2	10766.5	10691.5	10619.0	10544.0	10073.3	9586.8
1980	9100.3	8645.3	8158.8	7688.0	7201.6	6730.8	6791.9	7420.2	8028.2	8656.5	8626.8	8267.5
1981	7908.3	7583.8	7224.5	6876.9	6517.6	6169.9	6498.8	6827.7	7146.0	7474.9	7286.5	6953.1
1982	6619.8	6318.7	5985.3	5662.7	5329.4	5831,4	7616.3	10003.9	12314.4	13440.3	13196.5	12629.2
1983	12061.8	11549.3	10982.0	10432.9	9865.5	9316.5	8749.1	8203.7	7675.8	7130.4	5602.5	1.7509
1984	5511.6	5001.4	4455.9	3928.1	3382.6	3848.6	4330.0	4811.4	5277.3	5549.6	5137.2	4711.1
1985	4285.0	3900.2	3474.1	3061.8	2635.7	3210.5	3995.0	7.6227	5538.5	5932.9	5746.2	5416.3
1986	5086.3	4788.3	4458.4	4139.1	3805.1	3489.8	2901.8	2313.9	1744.9	1156.9	588.0	0.0

D-8 MONTHLY LIST OF POWER AND ENERGY AT GENERATING END

(1) Monthly List of Power at Generating End
(Nam Ngao Project: Integrated Developme)

(Nam Ngao Project: Integrated Development)
(Unit: MW)

> <total></total>	1630.4	1644.	.0 1653.9	.0 1658.0	.0 1660.6	F-1		4-1						н	**		•		7	н		•	0 1659.1	0	0	0	.0 1658.	1649.2	0 46127.8	1.0 1647.4	0 1665.5	
< DEC	140.0	140.0	140.0	140.0	140.0	140.0			140.0	140.0	140.0	140.0	140.0	140.0	•	•	0.071	140.0	140.0		140.0	140	140	140	140	140		140	3920.0	140.0	140.0	
< >00 ×	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	
< 0CT >	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	
A SEP >	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.5	140.0	1.0.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	
< AUG >	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140,0	140.0	140.0	126.7	140.0	140.0	140.0	3906.7	139.5	140.0	
< 70L >	124.8	128.2	140.0	140.0	140.0	140.0	125.5	140.0	126.8	140.0	140.0	140.0	140.0	140.0	137.3	140.0	140.0	136.2	124.6	128.4	123.5	126.2	140.0	140.0	64.3	140.0	140.0	136.8	3722.5	132.9	140.0	
A NUC A	122.7	125.9	126.9	129.6	127.5	125.4	125.1	127.5	134.9	129.2	128.8	126.1	127.6	125.4	126.4	127.2	126.9	125.5	125.4	125.4	99.8	125.4	125.7	130.6	129.2	129.4	131.0	125.5	3533.1	126.2	131.9	
A MAY Y	122.9	130.2	130.7	132.1	136.9	130.7	137.0	130.7	130.7	130.7	130.7	130.7	130.7	137.2	130.7	130.7	130.7	130.7	130.7	130.7	136.6	130.8	137.1	130.7	136.8	136.1	130.8	130.7	3695.9	132.0	137.2	
× 898 ×	140.0	140.0	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	136.2	140.0	136.5	136.2	136.2	136.2	140.0	136.3	136.2	3829.7	136.8	140.0	
A MAR >	14.0.0		140.0	140 0	140.0			140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	
∧ 7EB ∨	140.0	140.0	140.0	140.0	140.0	0.041	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	
V NAU	1.40	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	1,000	140.0	140.0	140.0	140.0	140.0	140.0	3920.0	140.0	140.0	

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(2) Monthly List of Energy at Generating End

(Nam Ngao Project: Integrated Development)

(Unit: MWh)

<total></total>	241835.	383319.	362409.	391955.	352525.	370566.	287658.	324573.	327247.	278600.	455063.	348061.	426598.	366711.	338904.	294107	302653.	301560,	258088.	242726.	213774.	302556.	294766.	412486.	177008.	299737.	346528.	207029.	8909028.	318180.	455063.	177008.
A DEC Y	16022.	27803.	26702.	24765.	25377.	23644.	23113.	17971.	23642.	19398.	27827.	23038.	21687.	27701.	25775.	19466.	20544.	21005.	18883.	15870.	16059.	24069.	22456	20344.	15625.	18095.	23128.	15741.	605749.	21634.	27827.	15625.
< 000 >	15650.	33833.	20674.	24665.	38840.	20657.	38235.	15679.	20941.	15682.	34555.	21869.	22952.	28278.	27897.	21989.	22767.	24766.	19240.	15650.	15674.	26861.	23503.	22330.	15230.	16609.	23539.	15527.	644090.	23003.	38840.	15230.
< 001 >	29361.	81603.	46065.	.96666	76397.	71772.	49652.	22243.	54403	34903.	62040.	42332.	43941.	43346.	56113.	37479.	49348.	47437.	29660.	35254.	34886.	62378.	36587.	52675.	15624.	34454.	37062.	16247.	1303255.	46545.	96666	15624.
< SEP >	63573.	76851.	100800.	66854.	62794.	86382.	36535.	67643.	88446.	51475.	1008001	79402.	84813.	65456.	77129.	52363.	64219.	57412.	49295.	48435.	31049.	. 57898.	46527.	86514.	15120.	57300.	67856.	15565.	1759597.	62843.	100800.	15120.
< AUG >	15624.	40921.	32721.	34428	20689.	06777	15624.	72573.	28970	28313	104160.	31732.	104160.	80124	17467.	34346,	15821.	23395.	15624.	15624.	15624.	15624.	42259.	104149.	14207.	57199,	72997.	15624.	1114484.	39803.	104160.	14207.
< 30L >	14065.	14319.	15624.	15624.	15624.	15624.	14112.	15624.	14216.	15624.	15624.	15624.	37094.	15624.	15320.	15624.	15624.	15205.	14047.	14336.	13960.	14171.	15624.	15624.	7172.	15624.	15624.	15263.	437638.	15630.	37094.	7172.
۸ ۷۵۶ ۷	13249.	23838.	23965.	24308.	24033.	15325.	22814.	24040.	14245	24252.	24207.	23859.	24048.	17765.	23902.	23998.	23967.	23776.	15997.	14162.	10774.	20034.	23810.	24439.	13950.	24285.	24487.	23786.	591316.	21118.	24487.	10774.
A MAY >	13711.	22976.	14641.	25454.	15277.	17057.	15286.	16379.	14902.	16875.	18043.	21659.	16670.	15310.	18410.	18126.	16692.	17485.	15094.	16071.	15245.	18881.	15301.	17682.	15268.	15188.	15284.	15263.	474229.	16937.	25454.	13711.
APR >	15120.	15120.	17260.	17250.	16751.	16969.	16860.	16445.	16077.	16247.	16101.	19400.	16005.	17458.	16983.	16705.	16714.	15949.	17042.	15773.	15120.	15675.	15865.	16088.	15035.	15120.	16104.	16940.	458175.	16363.	19400.	15035.
A MAR Y	15624.	15624.	18067.	18148.	17986.	17750.	17782.	17430.	17109	17588.	16138.	19682.	17395.	17445.	18808.	16594.	18476.	17135.	17709.	16670.	15624.	15969.	16184.	15463.		15624.	16513.	17968.	479202.	17114.	19682.	15624.
А В V	14112.	14616.	18920.	17511.	17076.	17619.	16714.	16803.	16120.	17152.	16184.	21987.	16986.	16955.	17905.	16794.	17209.	17370.	18125.	16394.	14112.	14864.	15725.	16200.	15262.	14616.	15794.	17744.	456868.	16674.	21987.	14112.
A JAN >	15624.	15814.	26970.	22952.	21681.	23279.	20931.	21742.	18178.	21091.	19384.	27479.	20847.	20248.	23195.	20625.	21272.	20624.	27373.	18488.	15647.	16132.	20924.	19976.	18822.	15624.	18139.	21361.	574422.	20515.	27479.	15624.
	1959	1960	1961	1962	1963	1964	1965	1966	1961	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	0.TAL	¥ >	¥ ¥	Σ Н Σ

(3) Monthly List of Power at Generating End
(Mae Lama Lwang Project: Integrated Development)
(Unit: MW)

(Mae Lama Luang Project: Integrated Development)
(Unit: MW)

2.00.00 0.00																														
0.040	0.040	·	240.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 3 2 3 3 3 3 3 3 3 3 3 3 3	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	44444444444444444444444444444444444444	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	44444444444444444444444444444444444444	44444444444444444444444444444444444444	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	44444444444444444444444444444444444444	44444444444444444444444444444444444444	44444444444444444444444444444444444444	7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	44444444444444444444444444444444444444			
0.040	2.044	240.0	240.0	240.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0								99999999999999999999999999999999999999	99999999999999999999999999999999999999	99999999999999999999999999999999999999				4444444444444444444		99999999999999999999999999999999999999	99999999999999999999999999999999999999						4444444444444 9000000000000000000000000	44444444444444444444444444444444444444	
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0.00	2.014	240.0			4 d																									
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(4) Monthly List of Energy at Generating End

(Mae Lama Luang Project: Integrated Development)

(Unit: MWh)

462505.	708425.	665035,	729433.	689243.	743800.	581489.	671557.	615387.	533961.	814131.	687951.	801661.	663932.	704315.	553601.	559698.	562187.	541717.	564612.	422190.	584337.	539625.	772437.	333215.	571540.	686484.	414092.	17284576.	617306.		814131	333215.	
29427.	54027.	49224.	45496.	49337.	45691.	45343.	31043.	41547.	31476.	52917.	45982.	41055.	48857.	45734.	36905	42511.	41738.	39097	32625.	59762	44259.	40330.	38393	32466.	34490.	56133.	30034.	1155597.	41271		56133.	29427.	
28643.	57456.	35005.	41224.	69224.	38090.	71189.	28837.	32732.	28837.	57319.	37515.	36810.	48603.	44278.	41129	42852.	41311.	35587.	29853.	28662.	41919.	36910.	36879.	29014.	29676.	62896.	28864	1141312.	40761.		71189.	28643.	
59116.	153517.	90568.	178560.	148286.	138665.	107048.	50133.	100477.	76371.	109484.	89311	86995	78625.	110709.	70788.	112395.	. 76676	71658.	87502.	67875.	115321.	67282.	107550.	38975	84624	123530.	39924	2660276.	95010.		178560.	38975.	
137435.	146588.	172800.	127967.	127808.	172899.	89086.	139170.	172800.	98640.	172800.	156950.	160262	116303.	172800.	104099	163266.	112409.	137091	126248.	. 76659	147922	90211.	163867	26139.	122934.	149042	43015	3616441.	129159		172800	26139.	
32340.	94485.	63297.	63177.	46754.	102638.	37372.	164551.	57473.	49612.	178560.	69654.	178560.	138329	74272	50565.	46356.	37263.	26782.	62484.	35552	26529.	73821.	178560.	25029.	70762.	66870.	26592	2078231.	74223		178560.	25029.	
25352.	39729.	47428.	47947.	48142.	54134.	36453.	49130.	39678.	46741.	47158.	47225.	90513.	48702.	47477.	46165.	46985	43268.	35852	47786.	30449.	42885.	46791.	49768.	14953.	46524:	45707.	44431.	1257366.	70677		90513.	14953.	
20820.	33298.	39314.	41903.	43256.	24606.	35304.	46317.	25162.	46465	46247.	45489.	46438.	29268.	41830.	43564	43872.	38005	27301.	24597.	24380.	34012.	38120.	47170.	23752.	45582	41739	35609.	1033420.	3,400°		47170.	20820.	٠
21147.	24536.	26102.	48113.	26048.	29742.	26103.	30219.	26987.	30451.	30909.	42678.	31961.	26171.	32961,	32678.	29292.	30244.	25789.	28082.	26126.	25008.	26126.	30385	25875.	25719.	27067.	28338.	615858.	29338		48113.	21147.	
25223.	23792	28369.	28657.	28021.	28670.	29008.	28153.	27037.	27867.	27274.	33121.	27660.	30124.	28396.	28470.	27938.	27240	29525	27141.	26059	24777.	26526.	27580.	26103.	25922	26109.	30476	775248.	27687		33121	23792.	
27405.	26346.	31905.	32154.	31614.	32144.	32566.	31614.	29775.	30488.	28526.	34579	31482	30970	32623	29778	32249	30668	30944	30143	28285.	26674.	28361.	28532	28324	28180	28310.	32201	846839.	30244	!	34579	26346.	
26508.	25831.	34571.	32511.	31409.	33536	32229.	31926.	29013.	30306.	28957.	37975.	51493.	31127.	32061.	31271.	31552.	32391	32162.	31139.	27431.	26107.	28337.	28735	28186.	27310.	27387.	33319.	854282.	30510	•	37975.	25831.	
29590.	28821.	46501.	41713.	39344.	43084.	39788.	40464.	32706.	36707.	33980.	47472.	38434.	36852.	41174.	38190.	40429	38656.	48929.	37012.	31911.	28924.	36810.	35019.	34399	29818.	31694.	41289.	1049710.	37490		48929.	28821.	•
1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	0861	1981	1982	1983	1984	1985	1985	TOTAL	>		Σ 4 ×	Z H E	
	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28621. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 3	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28621. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 7 46501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28821. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 7 46501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224. 6 41713. 32511. 32154. 28667. 48113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 7	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28821. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 7 46501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90548. 35005. 49224. 41713. 32511. 32154. 28657. 46113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 7 39344. 31409. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 148286. 69224. 49337.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28821. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 7 46501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224. 4 41713. 32511. 32154. 28657. 48113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 59344. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 148286. 69224. 49337. 4 43084. 33536. 32144. 28670. 29742. 24606. 54134. 102638. 172800. 138665. 38090. 45691. 7	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 4 28821. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 7 28821. 25831. 26329. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224. 41713. 32511. 32154. 28657. 48113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 59344. 31409. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 148286. 69224. 49337. 45084. 33536. 32144. 28670. 29742. 24606. 54134. 102638. 172800. 138655. 38090. 45591. 739788. 32229. 32566. 29008. 26103. 35304. 36453. 37372. 89086. 107048. 71189. 45343.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 42821. 25831. 26346. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 146501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224. 47713. 32511. 32154. 28657. 48113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 59344. 31409. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 148286. 69224. 49337. 45084. 33536. 32144. 28670. 29742. 24606. 54134. 102638. 172800. 138655. 38090. 45591. 39788. 32229. 32556. 29008. 26103. 35304. 36453. 49130. 164551. 139170. 50133. 28837. 31043. 60644. 31926. 31614. 28153. 30219. 46317. 49130. 164551. 139170. 50133. 28837. 31043.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 42821. 25831. 26346. 23792. 24536. 35298. 39729. 94485. 146588. 153517. 57456. 54027. 52861. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90568. 35005. 49224. 45501. 34571. 32154. 28657. 46113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 59344. 31644. 28670. 29742. 24606. 54134. 102638. 172800. 138655. 38090. 45591. 39788. 32529. 32566. 29008. 26103. 36453. 36742. 49130. 164551. 139170. 50133. 28837. 31043. 45316. 26987. 25162. 39678. 57475. 172800. 100477. 32732. 41547. 410644. 31926. 29775. 27037. 25987. 25162. 39678. 57473. 172800. 100477. 32732. 41547. 41547.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 28821. 25831. 26346. 23792. 24536. 35298. 39729. 94485. 146588. 153517. 57456. 54027. 28821. 25831. 26346. 28102. 34514. 47428. 63297. 172800. 90548. 35005. 49224. 41713. 32511. 32154. 28657. 46113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 39344. 31649. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 146286. 69224. 49337. 45084. 33536. 32144. 28070. 29742. 24606. 54134. 102638. 172800. 138665. 38090. 45591. 39788. 32229. 32556. 29008. 26103. 35304. 36453. 172800. 100449. 71189. 45343. 46317. 26987. 27752. 46754. 172800. 100477. 32732. 41547. 32706. 29013. 29775. 27877. 25987. 25162. 39778. 46455. 172800. 100477. 22837. 41547. 35770. 30306. 30488. 27867. 30451. 46465. 46741. 49612. 98640. 76371. 28837. 31476.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 28821. 25831. 26346. 23792. 24536. 35298. 39729. 94485. 146588. 153517. 57456. 54027. 28821. 25831. 26346. 28162. 26102. 39314. 47428. 63297. 172800. 90548. 35005. 49224. 41713. 32511. 32154. 28657. 46113. 41903. 47947. 63177. 127967. 178560. 41224. 45496. 39344. 31644. 28021. 26048. 43256. 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63177. 127967. 178560. 41224. 49337. 439344. 31609. 31614. 28021. 26048. 43256. 48142. 46754. 127808. 148286. 69224. 49337. 40644. 31926. 35244. 28670. 29742. 24606. 54134. 102438. 172800. 138665. 38090. 45991. 39788. 32229. 32566. 29008. 26103. 35304. 36453. 37372. 89086. 107048. 71189. 45343. 40644. 31926. 30013. 29775. 26103. 35304. 46317. 49130. 164551. 139170. 30133. 228337. 31043. 32706. 29013. 29775. 26987. 26162. 46764. 47251. 172800. 100477. 32732. 41547. 36707. 30306. 30488. 27874. 30099. 46247. 47158. 178800. 172800. 109484. 37319. 52917. 35980. 45678. 47225. 69654. 156950. 36910. 37515. 45982. 47472. 37975. 34579. 36810. 46458. 46489. 47225. 89654. 156950. 36910. 42678. 45489. 47225. 89654. 156950. 36910. 41055. 36810. 41055.	29590. 26008. 27405. 25223. 21147. 20820. 25352. 32340. 137435. 59116. 28643. 29427. 28821. 26546. 23792. 24536. 33298. 39729. 94485. 146588. 153517. 57456. 54027. 46501. 34571. 31905. 28369. 26102. 39314. 47428. 63297. 172800. 90548. 35005. 49224. 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APPENDIX—E PRELIMINARY DESIGN

APPENDIX-E PRELIMINARY DESIGN

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 MAE LAMA LUANG HYDROELECTRIC POWER PLANT
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TRIFURCATION DESIGN OF PENSTOCK FOR

MAE LAMA LUANG HYDROELECTRIC POWER PLANT

APPENDIX E-1 TRIFURCATION DESIGN OF PENSTOCK FOR MAE LAMA LUANG HYDROELECTRIC POWER PLANT

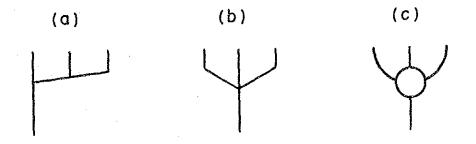
Ramification design of penstock (D = 7.4 m) into three manifolds (D = 4.5 m respectively) to connect three hydraulic turbines has three types as shown in the following figures, that is, (a) F Branch, (b) Three Pipe Branch and (c) Spherical Branch.

1) Head Loss

Results of hydraulic model tests gave us the head loss (h_B = f_B $\frac{v^2}{2g}$) of 0.25 m for Type (a) and 0.75 m - 1.00 m for Type (b) and (c), and the actual head loss of 0.75 m for Type (a) and 2.25 m - 3.00 m for Types (b) and (c) respectively. The results showed that the Type (a) was the most favorable.

2) Installation

While Type (b) and (c) require a large scale exterior stiffeners resulting in a heavy construction, Type (a) has only an interior stiffener and it is easy to transport and install.



E-2 STUDY ON ALTERNATIVE OF NAM NGAO SPILLWAY

APPENDIX E-2 STUDY ON ALTERNATIVE OF NAM NGAO SPILLWAY

For the original spillway plan, an alternative plan was studied which discharges flood flow through gully on the left bank of the dam. But comparing with the original spillway length of 300 m, the alternative needs about 800 m which results in the increase of construction cost. There is another alternative that the flood flow is to be discharged directly from the spillway which entrance is reinforced with concrete. But in this case there is a possibility of damaging natural ground due to the flood flow of 2,100 m³/sec. And also there is a possibility flooding the hydroelectric power plant located 250 m downstream from the spillway end, and the enormous volume of earth and rock scoured from ground may be deposited at the junction of the Ngao river and dam up the rivers. For the abovementioned reasons, the original plan was adopted.

APPENDIX—F

CONSTRUCTION PLANNING AND COST ESTIMATE

APPENDIX-F CONSTRUCTION PLANNING AND COST ESTIATE

CONTENTS

F-1 BILL OF QUANTITY

F-1-(1) BILL OF QUANTITY: NAM NGAO PROJECT

INDIVIDUAL AND INTEGRATED DEVELOPMENT

F-1-(2) BILL OF QUANTITY: MAE LAMA LUANG PROJECT

INTEGRATED DEVELOPMENT

F-1-(3) BILL OF QUANTITY: MAE LAMA LUANG PROJECT

INDIVIDUAL DEVELOPMENT

F-2 UNIT COST OF CIVIL WORKS

F-1 BILL OF QUANTITY

- F-1-(1) NAM NGAO PROJECT: INDIVIDUAL AND INTEGRATED PROJECTS
- F-1-(2) MAE LAMA LUANG PROJECT: INTEGRATED DEVELOPMENT
- F-1-(3) MAE LAMA LUANG PROJECT: INDIVIDUAL DEVELOPMENT

F-1-(1) BILL OF QUANTITY: NAM NGAO PROJECT
INDIVIDUAL AND INTEGRATED DEVELOPMENTS

Nam Ngao Individual and Integrated Development Construction Cost Unit: 1068

Unit: 106Baht

**	T.4.1	Curre	ency
Item	Total	Foreign	Local
Civil Works			
Diversion & Care of River	177.5	87.8	89.4
Dam	1,036.0	643.0	393.0
Spillway	269.8	114.6	155.2
Outlet Works	6.8	2.9	3.9
Intake	27.9	12.2	15.7
Headrace and Penstock	71.5	33.9	37.6
Powerhouse	102.8	49.2	53.6
Tail-race	67.1	30.0	37.1
Switchyard	1.7	0.7	1.0
Sub-total	1,761.1	974.3	786.8
Hydraulic Equipment		:	
Diversion Gate	6.4	5.1	1.3
Spillway Gate	21.4	17.1	4.3
Intake Gate	10.3	8.2	2.1
Screen	3.4	2.4	1.0
Tail-race	5.6	4.5	1.1
Outlet Valve	14.8	11.6	3.2
Penstock	97.6	68.3	29.3
Sub-totall	159.5	117.2	42.3

(1) Main Dam

Ngao Project

				Unit Price			Cost	
Uescr1pc1on	- Grit	Quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	391,000	09	42	18	23,460,000	16,422,000	7,038,000
Rock Excavation	e E	44,000	130	65	65	5,720,000	2,860,000	2,860,000
Embankment Rockfill	E E	5,026,000	110	72	38	552,860,000	361,872,000	190,988,000
Embankment Filter Material	B 3	348,000	150	98	52	52,200,000	34,104,000	18,096,000
Embankment Impervious Material	E E	324,000	150	98	52	48,500,000	31,752,000	16,848,000
Concrete Facing	£	43,000	2,500	704	1,796	107,500,000	30,272,000	77,228,000
Reinforcement	ىھ	3,300	15,600	13,185	2,415	51,480,000	43,510,500	7,969,500
Ancher Bar (ϕ 25m/m, ℓ =3.0")	ည	730	1,000	800	200	730,000	584,000	146,000
Curtain Grouting	E	36,000	2,500	1,615	885	90,000,000	58,140,000	31,860,000
Consolidation Grouting	ш	2,500	2,500	1,615	885	6,250,000	4,037,500	2,212,500
Water stop	E	5,000	009	400	. 200	3,000,000	2,000,000	1,000,000
Miscellaneous Works	L.S.	1				94,180,000	57,463,000	36,716,800
Sub Total				<u>.</u>	1 N	1,035,980,000	643,017,200	392,962,800
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						1 (19)		
								Acceptance of the second
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(2) Coffer Dam

Ngao Project

				Ibit Deice			2000	
Descripcion	Unit	Ouantity		ייין אין אין אין אין אין אין אין אין אין	1		100	
			Total	Foreign	Local	Total	Foreign	Local
Common Excavation	£ 23	70,300	90	42	18	4,218,000	2,952,600	1,265,400
Rock Excavation	£	4,300	130	65	65	559,000	279,500	279,500
Embankment Impervious Material	£	41,500	150	98	52	6,225,000	4,067,000	2,158,000
Embankment Rockfill	£	200,500	110	72	38	22,055,000	14,436,000	7,619,000
Miscellaneous Works	L.S.	F		·		3,305,700	2,173,510	1,132,190
Sub Total	·				:	36,362,700	23,908,610	12,454,090
			·					

(3) Spillway

Ngao Project

	4 7 5 1	0.00		Unit Price			Cost	
	3	למשוורו כא	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	⊞3	350,000	09	42	18	21,000,000	14,700,000	6,300,000
Rock Excavation	E _{III} 3	73,000	130	65	65	9,490,000	4,745,000	4,745,000
Backfill	£	30,000	8	99	30	2,700,000	1,800,000	900,000
Structual Concrete	m ³	13,000	2,400	704	1,696	31,200,000	9,152,000	22,048,000
Mass Concrete	E W	47,000	1,800	588	1,212	84,600,000	27,636,000	56,964,000
Backfilling Concrete	m ³	65,000	1,200	472	728	78,000,000	30,680,000	47,320,000
Reinforcenent	دي	1,170	15,600	13,185	2,415	18,252,000	15,426,000	2,825,550
Miscellaneous Works	L.S.					24,524,200	10,413,945	14,110,255
Sub Total						269,766,200	14,553,395	155,212,805
	·							
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(4) Diversion Work

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	45-41			Unit Price			Cost	
Descripcion	3	Chant Ly	Total	Foreign	Local	[ota]	Foreign	Local
Common Excavation	£	18,000	09	42	18	1,080,000	756,000	324,000
Rock Excavation	E	25,000	130	65	92	3,250,000	1,625,000	1,625,000
Tunnel Excavation	£	76,000	283	286	294	44,080,000	21,736,000	22,344,000
Structual Concrete	e (E	6,600	2,400	704	1,696	15,840,000	4,645,400	11,193,600
Concrete Lining	£	12,000	2,500	733	1,767	30,000,000	8,796,000	21,204,000
Plug Concrete	B33	3,800	2,200	645	1,555	8,360,000	2,451,000	5,909,000
Shotcrete	m ²	28,000	360	172	88	7,280,000	4,816,000	2,464,000
Rockbolt	PC	6,200	980	570	290	5,332,000	3,534,000	1,798,000
Reinforcement	4	470	15,600	13,185	2,415	7,332,000	6,196,950	1,135,050
Mortor Injection	33	200	3,000	1,580	1,420	1,500,000	790,000	710,000
Curtain Grouting	E	1,700	2,500	1,615	885	4,250,000	2,745,500	1,504,500
Miscellaneous Works	L.S.					12,830,400	2,745,500	1,504,500
Sub Total						141,134,400	63,902,135	77,232,265

(5) Bottom Outlet

Ngao Project

	+:3	4:4:4		Unit Price			Cost	
וויין ויינאל	5	לחמוורו הא	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	2,700	09	42	18	162,000	113,400	48,600
Rock Excavation	m3	4,100	130	65	65	533,000	266,500	266,500
Tunnel Excavation	E E	1,700	280	286	294	986,000	486,200	499,800
Structual Concrete	m ₃	900	2,400	704	1,696	1,440,000	422,400	1,017,600
Concrete Lining	m ₃	750	2,500	733	1,767	1,875,000	549,750	1,325,250
Plug Concrete	e E	200	2,200	645	1,555	440,000	129,000	311,000
Reinforcement	ديد	ଫ	15,600	13,185	2,415	780,000	659,250	120,750
Miscellaneous Works	L.S.	-4				621,600	262,650	358,950
Sub Total						6,837,600	2,889,150	3,948,450
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(6) Power Intake

Ngao Project

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Becrincian	+:4:	Ottont 1 tv		מוור זו וכם			300	
	,	المستدادة	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	e = = = = = = = = = = = = = = = = = = =	22,000	9	42	18	1,320,000	924,000	396,000
Rock Excavation	e E	7,100	130	65	65	923,000	461,500	461,500
Structual Concrete	E.	3,700	2,400	704	1,696	8,880,000	2,604,800	6,275,200
Mass Concrete	2€	4,700	1,800	588	1,212	8,460,000	2,763,600	5,696,400
Reinforcement	دي	230	15,600	13,185	2,415	3,588,000	3,032,550	555, 450
Connecting Bridge	L.S.					2,200,000	1,320,000	880,000
Miscellaneous Works	L.S.	~ 1				2,537,100	1,110,645	1,426,455
Sub Total						27,908,100	12,217,095	15,691,005
						-		
					1. H			
		, Alle Land State Control of the Con						

	12.7	,+;;+ac.		Unit Price			Cost	
	5	ליו ויוושאלי	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	24,000	09	42	18	1,440,000	1,008,000	432,000
Rock Excavation	£	8,900	130	65	65	1,157,000	578,500	578,500
Tunnel Excavation	£#3	30,000	280	286	294	17,400,000	8,580,000	8,820,000
Structual Concrete	33	5,700	2,400	704	1,696	13,680,000	4,012,800	9,667,200
Concrete Lining	S 883	3,100	2,500	733	1,767	7,750,000	2,272,300	5,477,700
Concrete Filling	が	4,800	1,200	472	728	5,760,000	2,265,600	3,494,400
Mortar Injection	£	909	3,000	1,580	1,420	1,800,000	948,000	852,000
Curtain Grouting	E	750	2,500	1,615	885	1,875,000	1,211,250	663,750
Consolidation Grouting	Æ	2,000	2,500	1,615	885	5,000,000	3,230,000	1,770,000
Shotcrete ($t = 10^{cm}$)	m²	12,200	260	172	88	3,172,000	2,098,400	1,073,600
Rockbolt (ϕ 25m/m, ℓ = 2.0")	၁႕	2,800	098	570	230	2,408,000	1,596,000	812,000
Reinforcement	+	230	15,600	13,185	2,415	3,588,000	3,032,550	555,450
Miscellaneous Works	L.S.					6,503,000	3,083,340	3,419,660
Sub Total						71,523,000	33,916,740	37,616,260
								The second second

				Unit Price			Cost	
Descripcion	Unit	Quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E ===	37,000	09	42	18	2,220,000	1,554,000	666,000
Rock Excavation	E 23	43,000	130	65	65	5,590,000	2,795,000	2,795,000
Backfill	£	16,000	8	09	30	1,440,000	000,096	480,000
Structual Concrete	m ₃	6,800	2,400	704	1,696	16,320,000	4,787,200	11,532,800
Mass Concrete	33	14,500	1,800	588	1,212	26,100,000	8,526,000	17,574,000
Reinforcement	L.	730	15,600	13,185	2,415	11,388,000	9,625,050	1,762,950
Pavement Works	■ 3	9,600	009	180	420	5,760,000	1,728,000	4,032,000
Architectural Works	L.S.					24,600,000	14,760,000	9,840,000
Miscellaneous Works	L.S.	-				9,341,800	4,473,525	4,868,275
Sub Total						102,759,800	49, 208, 775	53,551,025
							19. 00	
			- - - - - - -	·				

Ngao Project

(9) Tailrace

	a constant	1 12 1.4	4		Unit Price			Cost	on the second
	10.101	2 15	לחשוורו ול	Total	Foreign	Local	Total	Foreign	Local
	Common Excavation	£	102,000	09	42	18	6,120,000	4,284,000	1,836,000
	Rock Excavation	3	15,000	130	92	65	1,950,000	975,000	975,000
	Embankment	E III	55,000	3	86	52	8,250,000	5,390,000	2,860,000
	Structual Concrete	E 23	3,700	2,400	704	1,696	8,880,000	2,604,800	6,275,200
	Mass Concrete	£##	17,400	1,800	588	1,212	31,320,000	10,231,200	21,088,800
	Reinforcement	4	290	15,600	13,185	2,415	4,524,000	3,823,650	700,350
	Miscellaneous Works	L.S.					6,104,400	2,730,865	3,373,535
F -	Sub Total						67,148,400	30,039,515	37,108,885
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Ngao Project

(10) Switchyard

				Unit Price			Cost	
Descripcion	1 LUO	quanti ty	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	##3	350	09	42	18	21,000	14,700	6,300
Structual Concrete	完	200	2,400	704	1,696	1,200,000	352,000	848,000
Reinforcement	دډ	8	15,600	13,185	2,415	312,000	263,700	48,300
Miscellaneous Works	L.S.				:	153,300	63,040	90,260
Sub Total						1,686,300	693,440	992,860
						:		
		All my ball my party makes						
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F-1-(2) BILL OF QUANTITY: MAE LAMA LUANG PROJECT INTEGRATED DEVELOPMENT

Mae Lama Luang Integrated Development

Construction Cost

Unit: 106Baht

Item	Total	Curr	ency
1 tem	lotai	Foreign	Local
Civil Works			
Diversion & Care of River	227.1	114.0	113.1
Dam	533.3	348.3	185.0
Spillway	422.4	180.5	241.9
Outlet Works	7.4	3.1	4.3
Intake	35.6	15.2	20.4
Headrace and Penstock	55.6	28.0	27.6
Powerhouse	186.6	89.4	97.2
Tail-race	130.1	47.4	82.7
Switchyard	1.7	0.7	1.0
Sub-total	1,599.8	826.6	773.2
Hydraulic Equipment			
Diversion Gate	9.8	7.8	2.0
Spillway Gate	37.4	29.9	7.5
Intake Gate	15.9	12.7	3.2
Screen	5.2	3.6	1.6
Tail-race	6.5	5.2	1.3
Outlet Valve	15.0	11.7	3.3
Penstock	115.6	80.9	34.7
Sub-totall	205.4	151.8	53.6

(1) Main Dam

	4 : 1	4		Unit Price			Cost	
uescripcioii	3 2 5	quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E	494,000	9	42	82	29,640,000	20,748,000	8,892,000
Rock Excavation	£	72,000	130	65	65	9,360,000	4,680,000	4,680,000
Tunnel Excavation	E	800	580	586	464	464,000	228,800	235,200
Embankment Rockfill .	£	2,704,000	110	72	38	297,440,000	194,688,000	102,752,000
Embankment Filter Material	3	377,000	150	98	52	56,550,000	36,946,000	19,604,000
Embankment Impervious Material	E	446,000	150	98	52	66,900,000	43,708,000	23,192,000
Concrete Lining	E	200	2,500	733	1,767	500,000	146,600	353,400
Curtain Grouting	£	4,500	2,500	1,615	885	11,250,000	7,267,500	3,982,500
Blanket Grouting	E	5,100	2,500	1,615	885	12,750,000	8,236,500	4,513,500
Miscellaneous Works	L.S.	1				48,485,400	31,664,940	16,820,460
Sub Total						533,339,400	348,314,340	185,025,060
			14. 14			i se i		
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(2) Coffer Dam Mae Lama Luang Project

				Ilmit Daire			Cact	
Descrincion	unit	Ouantity	-[מוני בי יכם	1		300	
		<u></u>	Total	Foreign	Local	Total	Foreign	Locai
Common Excavation	Æ	78,000	9	42	18	4,680,000	3,276,000	1,404,000
Rock Excavation	. E	5,800	130	65	65	754,000	377,000	377,000
Embankment Rockfill	e E	243,000	110	72	38	26,730,000	17,496,000	9,234,000
Embankment Impervious Material	133	47,000	150	86	25	7,050,000	4,606,000	2,444,000
Miscellaneous Works	L.S.					3,921,400	2,575,500	1,345,900
Sub Total				-		43,135,400	28,330,500	14,804,900
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(3) Spillway

	4::11			Unit Price			Cost	
ווייין ואכשמ) 	Qualic Ly	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	e =	580,000	09	42	18	34,800,000	24,360,000	10,440,000
Rock Excavation	E	63,000	130	65	65	8,190,000	4,095,000	4,095,000
Backfill	EM3	38,000	06	09	30	3,420,000	2,280,000	1,140,000
Structual Concrete	e Æ	8,900	2,400	704	1,696	21,360,000	6,265,600	15,094,400
Mass Concrete	€	78,200	1,800	588	1,212	140,760,000	45,981,600	94,778,400
Backfilling Concrete	e E	124,000	1,200	472	728	148,800,000	58,528,000	90,272,000
Reinforcenent	4	1,710	15,600	13,185	2,415	26,676,000	22,546,350	4,129,650
Miscellaneous Works	L.S.					38,400,600	16,405,655	21,994,945
Sub Total						422,406,600	180,462,205	241,944,395
		-	-					
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(4) Diversion Work

Mae Lama Luang Project

	<u>.</u>	, + · + · · · ·		Unit Price			Cost	
Descripcion	UIBL	qualitity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	£	31,000	09	42	18	1,860,000	1,302,000	558,000
Rock Excavation	æ	15,000	130	65	65	1,950,000	975,000	975,000
Tunnel Excavation	B 3	130,000	580	286	294	75,400,000	37,180,000	38,220,000
Structual Concrete	E	3,400	2,400	704	1,696	8,160,000	2,393,600	5,766,400
Concrete Lining	E	14,100	2,500	733	1,767	35,250,000	10,335,300	24,914,700
Plug Concrete	E E	6,200	2,200	645	1,555	13,640,000	3,999,000	9,641,000
Shotcrete (t = 10 cm)	e ₽	38,000	260	172	88	9,880,000	6,536,000	3,344,000
Rockbolt (\$25m/m, &= 3.0")	PC	8,500	098	570	290	731,000	4,845,000	2,465,000
Reinforcement	ىپ	520	15,600	13,185	2,415	8,112,000	6,856,200	1,255,800
Mortor Injection	E E	510	3,000	1,580	1,420	1,530,000	805,800	724,200
Curtain Grouting	E	1,650	2,500	1,615	885	4,125,000	2,664,750	1,460,250
Miscellaneous Works	L.S.	red				16,721,700	7,789,265	8,932,435
Sub Total						183,938,700	85,581,915	98,256,785
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(5) Bottom Outlet

				Unit Price			Cost	
Describcion	Chit	Quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	m3	3,000	09	42	18	180,000	126,000	54,000
Rock Excavation	₩33	2,700	130	65	65	351,000	175,500	175,500
Tunnel Excavation	e E	1,200	280	286	294	696,000	343,200	352,800
Structual Concrete	Em3	800	2,400	704	1,696	1,920,000	563,200	1,356,800
Concrete Lining	m 3	750	2,500	733	1,767	1,875,000	549,750	1,325,250
Plug Concrete	E	350	2,200	645	1,555	770,000	225,750	544,250
Reinforcement	ديد	09	15,600	13,185	2,415	936,000	791,100	144,900
Miscellaneous Works	L.S.	₩.				672,800	277,450	395,350
Sub Total						7,400,800	3,051,950	4,348,850
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(6) Power Intake

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				Unit Price			Cost	
Descripcion	Unit	Quantity	Total	Foreign	Local	Total	Foreign	Locai
Common Excavation	e E	16,000	09	42	18	000,036	672,000	288,000
Rock Excavation	E E	15,000	130	65	65	1,950,000	975,000	975,000
Structual Concrete	£	4,900	2,400	704	1,696	11,760,000	3,449,600	8,310,400
Mass Concrete	£	6100	1800	588	1,212	10,980,000	3,586,800	7,393,200
Reinforcement	دي.	300	15,600	13,185	2,415	4,680,000	3,955,500	724,500
Connecting Bridge						2,000,000	1,200,000	800,000
Miscellaneous Works	L.S.	1				3,233,000	1,383,890	1,849,110
Sub Total						35,563,000	15,222,790	20,340,210
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(7) Penstock

Mae Lama Luang Project

		1 1	1		Unit Price			Cost	
	101201	3	quantity	Total	Foreign	Local	Total	Foreign	Local
	Tunnel Excavation	e E	35,000	580	286	294	20,300,000	10,010,000	10,290,000
	Concrete Lining	E E	3,000	2,500	733	1,767	7,500,000	2,199,000	5,301,000
	Concrete Filling	m ³	6,000	1,200	472	728	7,200,000	2,832,000	4,368,000
	Mortor Injection	. E	570	3,000	1,580	1,420	1,710,000	900,600	809,400
	Curtain Grouting	Æ	750	2,500	1,615	885	1,875,000	1,211,250	663,750
	Consolidation Grouting	Æ	1,400	2,500	1,615	885	3,500,000	2,261,000	1,239,000
	Shotcrete	. m²	13,000	260	172	88	3,380,000	2,236,000	1,144,000
F	Rockbolt	ည	2,900	098	929	062	2,494,000	1,653,000	841,000
- 20	Reinforcement	+	165	15,600	13,185	2,415	2,574,000	2,175,525	398,475
	Miscellaneous Works	L.S.					5,053,300	2,547,800	2,505,500
	Sub Total						55,586,300	28,026,175	27,560,125
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Osting and an article of the state of the st	- in:	Orantito	ì	Unit Price			1880	
15000 10000	5	fa la limb	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	£ #	44,000	09	42	18	2,640,000	1,848,000	792,000
Rock Excavation	E III	116,000	130	65	65	15,080,000	7,540,000	7,540,000
Backfi11	e E	18,000	96	90	30	1,620,000	1,080,000	540,000
Structual Concrete	E E	12,700	2,400	704	1,696	30,480,000	8,940,800	21,539,200
Mass Concrete	e E	28,700	1,800	588	1,212	51,660,000	16,875,600	34,784,400
Reinforcement	ىي	1,350	15,600	13,185	2,415	21,060,000	17,799,750	3,260,250
Pavement Works	m ²	5,700	009	180	420	3,420,000	1,026,000	2,394,000
Architectural Works	L.S.					43,665,000	26,199,000	17,466,000
Miscellaneous Works	L.S.					16,962,500	8,130,915	8,831,585
Sub Total						186,587,500	89,440,065	97,147,435
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(9) Tailra

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4				Unit Price			Cost	
חפאכן ואכן	2 1 1 10	quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	É	83,000	09	42	18	4,980,000	3,486,000	1,494,000
Rock Excavation	E E	23,000	130	65	65	2,990,000	1,495,000	1,495,000
Embankment	E .	29,000	150	886	25	8,850,000	5,782,000	3,068,000
Structual Concrete	E.M.	8,500	2,400	704	1,696	20,400,000	5,984,000	14,416,000
Mass Concrete	E E	39,400	1,800	450	1,350	70,920,000	17,730,000	53,190,000
Reinforcement	دي	650	15,600	13,185	2,415	10,140,000	8,570,250	1,569,750
Miscellaneous Works	L.S.	⊷1				11,828,000	4,304,725	7,523,275
Sub Total						130,108,000	47,351,975	82,756,025
		- 2.						
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(10) Switchyard

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	7:11			Unit Price			Cost	
Descripcion	ວເພດ	quanti ty	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	£	350	09	42	18	21,000	14,700	6,300
Structual Concrete	#3 ·	200	2,400	704	1,696	1,200,000	352,000	848,000
Reinforcement	ب.	20	15,600	13,185	2,415	312,000	263,700	48,300
Miscellaneous Works	L.S.	-				153,300	63,040	90,260
Sub Total						1,686,300	693,440	992,860
A RANGE TO THE TANK T								

F-1-(3) BILL OF QUANTITY: MAE LAMA LUANG PROJECT INDIVIDUAL DEVELOPMENT

Mae Lama Luang Individual Development

Construction Cost

Unit: 106Baht

	Item	Total -	Curre	ncy
	r.eu	lotal	Foreign	Local
Civil	Works			
	Diversion & Care of River	227.1	114.0	113.1
	Dam	533.3	348.3	185.0
•	Spillway	422.4	180.5	241.9
·: · · · · · · · · · · · · · · · · · ·	Outlet Works	7.4	3.1	4.3
. :	Intake	29.7	12.7	17.0
	Headrace and Penstock	46.0	23.3	22.7
•	Powerhouse	147.0	70.0	77.0
+ i	Tail-race	121.7	43.5	78.2
•	Switchyard	1.7	0.7	1.0
	Sub-total	1,536.3	796.1	740.2
Hydr	aulic Equipment			
	Diversion Gate	9.8	7.8	2.0
	Spillway Gate	37.4	29.9	7.5
٠,	Intake Gate	13.1	10.5	2.6
	Screen	4.3	3.0	1.3
	Tail-race	6.5	5.2	1.3
	Outlet Valve	15.0	11.7	3.3
	Penstock	82.4	57.7	24.7
	Sub-totall	168.5	125.8	42.7
			<u></u>	

(1) Main Dam

Becriving	12.2	4:4:		Unit Price			Cost	
	3 110	למשורוכא	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	494,000	09	42	18	29,640,000	20,748,000	8,892,000
Rock Excavation	B 3	72,000	130	65	65	9,360,000	4,680,000	4,680,000
Tunnel Excavation	E	800	580	286	464	464,000	228,800	235,200
Embankment Rockfill	E	2,704,000	110	72	38	297,440,000	194,688,000	102,752,000
Embankment Filter Material	B 3	377,000	150	98	52	56,550,000	36,946,000	19,604,000
Embankment Impervious Material	e E	446,000	150	86	52	66,900,000	43,708,000	23,192,000
Concrete Lining	E E	200	2,500	733	1,767	500,000	146,600	353,400
Curtain Grouting	E	4,500	2,500	1,615	885	11,250,000	7,267,500	3,982,500
Blanket Grouting	E	5,100	2,500	1,615	885	12,750,000	8,236,500	4,513,500
Miscellaneous Works	L.S.	₽				48,485,400	31,664,940	16,820,460
Sub Total						533,339,400	348,314,340	185,025,060
				e de la companya de l		12 .72		
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Mae Lama Luang Project Common Excavation Rock Excavation Embankment Rockfill Embankment Impervious Material Miscellaneous Works Sub Total	Unit m³ m³ ial m³ L.S.	(2) Quantity 78,000 5,800	Coffer Dam	r Dan				
		Quantity 78,000 5,800						
		(wantity 78,000 5,800		Unit Price			Cost	
		78,000	Total	Foreign	Local	Total	Foreign	Local
		5,800	09	42	18	4,680,000	3,275,000	1,404,000
			130	65	65	754,000	377,000	377,000
		243,000	110	72	38	26,730,000	17,496,000	9,234,000
Miscellaneou	۲.5.	47,000	150	86	52	7,050,000	4,606,000	2,444,000
						3,921,400	2,575,500	1,345,900
F - 27						43,135,400	28,330,500	14,804,900
F - 27								
27								
-								

(3) Spillway

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	4:41			Unit Price			Cost	
	د د	למשוורו בא	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	580,000	60	42	18	34,800,000	24,360,000	10,440,000
Rock Excavation	33	63,000	130	65	65	8,190,000	4,095,000	4,095,000
Backfill	B 3	38,000	06	9	30	3,420,000	2,280,000	1,140,000
Structual Concrete	SE	8,900	2,400	704	1,696	21,360,000	6,265,600	15,094,400
Mass Concrete	e €	78,200	1,800	588	1,212	140,760,000	45,981,600	94,778,400
Backfilling Concrete	£ #	124,000	1,200	472	728	148,800,000	58, 528, 000	90,272,000
Reinforcenent	L.	1,710	15,600	13,185	2,415	26,676,000	22,546,350	4,129,650
Miscellaneous Works	L.S.	-1				38,500,600	16,405,655	21,994,945
Sub Total						422,406,600	189,462,205	241,944,395
					:			
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(4) Diversion Work

Mae Lama Luang Project

**************************************				Unit Price			Cost	
Descr1pc1on	נשה	quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	e E	31,000	09	42	18	1,860,000	1,302,000	558,000
Rock Excavation	33	15,000	130	65	65	1,950,000	975,000	975,000
Tunnel Excavation	E E	130,000	580	286	294	75,400,000	37,180,000	38,220,000
Structual Concrete	E	3,400	2,400	704	1,696	8,160,000	2,393,600	5,766,400
Concrete Lining	£ E	14,100	2,500	733	1,767	35,250,000	10,335,300	24,914,700
Plug Concrete	£	6,200	2,200	645	1,555	13,640,000	3,999,000	9,641,000
Shotcrete (t = 10 cm)	E E	38,000	260	172	88	9,880,000	6,536,000	3,344,000
Rockbolt (ϕ 25m/m, ℓ = 3.0")	ည	8,500	860	570	290	731,000	4,845,000	2,465,000
Reinforcement	ىپ	520	15,600	13,185	2,415	8,112,000	6,856,200	1,255,800
Mortor Injection	#3	510	3,000	1,580	1,420	1,530,000	805,800	724,200
Curtain Grouting	E	1,650	2,500	1,615	885	4,125,000	2,664,750	1,460,255
Miscellaneous Works	L.S.					16,721,700	7,789,265	8,932,435
Sub Total						183,938,700	85,681,915	98, 256, 785
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(5) Bottom Outlet

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		4		Unit Price			Cost	
vescripcion	3 LUN	บุนสกราธุง	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E	3,000	09	42	18	180,000	126,000	54,000
Rock Excavation	E ##	2,700	130	65	65	351,000	175,500	175,500
Tunnel Excavation	E	1,200	580	286	294	969	343,200	352,800
Structual Concrete	. W.3	800	2,400	704	1,696	1,920	563,200	1,356,800
Concrete Lining	e E	750	2,500	733	1,767	1,875	549,750	1,325,250
Plug Concrete	e E	350	2,200	645	1,555	770,000	225,750	544,250
Reinforcement	ىد	09	15,600	13,185	2,415	936,000	791,100	144,900
Miscellaneous Works	L.S.					672,800	277,450	395,350
Sub Total						7,400,800	3,051,950	4,348,850
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(6) Power Intake

Mae Lama Luang Project (Turbine & Generator : 2 units)

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	+	+ + + + + + + + + + + + + + + + + + + +		Unit Price			1500	
nesci incinii	5	לים ויין ופחלי	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	14,000	09	42	18	840,000	588,000	252,000
Rock Excavation	Ę E	13,000	130	65	65	1,690,000	845,000	845,000
Structual Concrete	E	4,100	2,400	704	1,696	9,840,000	2,886,400	6,953,600
Mass Concrete	B 3	5,000	1800	588	1,212	9,000,000	2,940,000	6,060,000
Reinforcement	دب	230	15,600	13,185	2,415	3,588,000	3,032,550	555, 450
Connecting Bridge	L.S.					2,000,000	1,200,000	800,000
Miscellaneous Works	L.S.	ward				2,695,000	1,149,195	1,546,605
Sub Total						29,653,800	12,641,145	17,012,655
							7,1	
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(7) Penstock

Mae Lama Luang Project (Turbine & Generator : 2 units)

				Unit Price			Cost	
	7 110	לחשטר	Total	Foreign	Local	Total	Foreign	Local
Tunnel Excavation	£	27,000	580	286	294	15,660,000	7,722,000	7,938,000
Concrete Lining	E	2,700	2,500	733	1,767	6,750,000	1,979,100	4,770,900
Concrete Filling	m ³	4,500	1,200	472	728	5,400,000	2,124,000	3,276,000
Mortor Injection	E E	530	3,000	1,580	1,420	1,590,000	837,400	752,600
Curtain Grouting	Æ	750	2,500	1,615	885	1,875,000	1,211,250	663,750
Consolidation Grouting	6	1,400	2,500	1,615	885	3,500,000	2,261,000	1,239,000
Shotcrete	m ²	11,000	260	172	88	2,860,000	1,892,000	968,000
Rockbolt	J _d	2,400	860	570	290	2,064,000	1,368,000	000,969
Reinforcement	L.	135	15,600	13,185	2,415	2,106,000	1,779,975	326,025
Miscellaneous Works	L.S.			-		4,180,500	2,117,500	2,063,000
Sub Total						45,985,500	23, 292, 225	22,693,275

(8) Powerhouse

Mae Lama Luang Project (Turbine & Generator: 2 units)

				Unit Price			Cost	
Descripcion	5	Quantity	Total	Forejan	Local	Total	Foreign	Local
Common Excavation	£#3	34,000	09	42	18	2,040,000	1,428,000	612,000
Rock Excavation	£	83,000	130	65	65	10,790,000	5,395,000	5,395,000
Backfill	£	17,000	8	09	30	1,530,000	1,020,000	510,000
Structual Concrete	33	10,200	2,400	704	1,696	24,480,000	7,180,800	17,299,200
Mass Concrete	E III 3	22,900	1,800	588	1,212	41,220,000	13,465,200	27,754,800
Reinforcement	4	1,060	15,600	13,185	2,415	16,536,000	13,976,100	2,559,900
Pavement Works	Ш.	5,300	909	180	420	3,180,000	954,000	2,226,000
Architectural Works	L.S.	-				33,825,000	20, 295, 000	13,530,000
Miscellaneous Works	L.S.					13,360,100	6,371,410	6,988,690
Sub Total						146,961,100	70,085,510	76,875,590
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(9) Tailrace

	7:-1	4 7 4		Unit Price			Cost	
		קהוורוני	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	E E	63,000	09	42	18	3,780,000	2,646,000	1,134,000
Rock Excavation	£E	15,000	130	65	65	1,950,000	975,000	975,000
Embankment	1133	59,000	150	88	52	8,850,000	5,782,000	3,068,000
Structual Concrete	E 183	7,000	2,400	704	1,696	16,800,000	4,928,000	11,872,000
Mass Concrete	18 3	39,000	1,800	450	1,350	70,200,000	17,550,000	52,650,000
Reinforcement	دډ	580	15,600	13,185	2,415	9,048,000	7,647,300	1,400,700
Miscellaneous Works	L.S.	1				11,062,800	3,952,800	7,110,000
Sub Total						121,690,800	43,481,100	78, 209, 700
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Lama Luang Project

(10) Switchyard

				Unit Price			Cost	
Descripcion	r E	Quantity	Total	Foreign	Local	Total	Foreign	Local
Common Excavation	33	350	09	42	18	21,000		002*9
Structual Concrete	333	200	2,400	704	1,696	1,200,000	352,000	848,000
Reinforcement		20	15,600	13,185	12,415	312,000	263,700	48,300
Miscellaneous Works	L.S.	-1				153,300	63,040	90,260
Sub Total						1,686,300	693,440	992,860
				·				
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(11) Hydraulic Equipment

Mae Lama Luang Project

	7:-31	0		Unit Price			Cost	
והויסלו בספטת	3 !!!0	yualici uy	Total	Foreign	Local	Total	Foreign	Local
Diversion Gate (10m $ imes$ 10m)	4	184	53,000			9,752	7,802	1,950
Spillway Gate (12m $ imes$ 14.5m)	ىي	440	85,000			37,400	29,920	7,480
Intake Gate (Roller Gate)	t,	155	85,000			13,175	10,540	2,635
Screen	ų	86	50,000			4,300	3,010	1,290
Tailrace Gate	ני	9/	85,000			6,460	5,170	1,290
Outlet								
Conduit Pipe ($D = 1.5m$)	ىد	14	53,000			742	520	222
Screen	دد	95	20,000			2,300	1,610	069
Jet flow Gate	L.S.					6,300	5,040	1,260
High Presure Gate	L.S.					5,600	4,480	1,120
Penstock	L.	2,180	53,000	:		82,680	27,960	24,720
Sub Total						168,709	126,052	42,657
			· · · · · · · · · · · · · · · · · · ·					
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F-2 UNIT COST OF CIVIL WORKS

Appendix F-2 Unit Cost of Civil Works

Description	Total (B)	FC (B)	LC (\$)
Common Excavation		од се в вигодовения	
		·	
Excavating	15.3	13.2	2.1
Loading	9.2	8.2	1.0
Hauling	18.0	11.9	6.1
Disposal	8.6	80	1 °O
-			:
Sub-total	52.3	42.1	10.2
	1		1
Indirection Cost (Overhead, Profit, Tax)	1.1	0	/•/
Total Cost	0.09	42.1	17.9
	\$		

Description	Total (B)	FC (B)	LC (B)
Rock Excavation			
Blasting	53.9	37.4	16.5
Loading	22.0	11.3	10.7
Hauling	28.3	12.3	16.0
Disposal	8	0.4	4
Sub-total	113.0	65.0	48.0
Indirection Cost (Overhead, Profit, Tax)	17.0	0	17.0
Total Cost	130.0	65.0	65.0

Description	Total (B)	FC (\$)	LC (B)
Embankment Rockfill			
Blasting	24.6	20.7	9.0
Stockpile	7.2	8.0	<u>e</u>
Loading	10.3	0.8	2.3
Hauling	41.8	28.4	13.4
Spreading	10.1	8.1	2.0
Compacting	1.6	6.0	0.7
Sub-total	95.6	72.0	23.6
Indirection Cost (Overhead, Profit, Tax)	14.4	O	14.4
Total Cost	110.0	72.0	38.0

Description	Total (B)	FC (\$)	LC (B)
Embankment Filter Material			
Excavation	12.6	က္	7
Loading	12.6	φ 	7
Hauling	87.5	66.5	21.0
Spreading	12.6	10.3	2.3
Compacting	Ŋ	4.2	6
Sub-total	130.4	0.86	32.4
Indirection Cost (Overhead, Profit, Tax)	19.6	0	19.6
Total Cost	150.0	0.86	52.0

Description	Total (#)	FC (B)	rc (g)
Embankment Impervious Material			
Excavation	63.3	78*0	15.3
Loading	10.4	€ 6 6	H
Hauling	34.0	25.1	φ •
Spreading	15.1	11.4	3.7
Compacting	7.6	4.2	3.4
Sub-total	130.4	0.86	32.4
Indirection Cost (Overhead, Profit, Tax)	19.6	0	19.6
Total Cost	150.0	0*86	52.0

Description	Total (%)	FC (\$)	LC (\$)
		,	
Structural Concrete			
Mixing	206.9	159.1	47.8
Transporting	212.1	180.6	31.5
Placing	358.7	174.2	184.5
Formwork	411,4	0	411.4
Aggregate	236.4	190.1	46.3
Cement	661.5	0	661.5
Sub-total	2,087.0	704.0	1,383.0
Indirection Cost (Overhead, Profit, Tax)	313.0	0 0	313.0
Total Cost	2,400.0	704.0	1,696.0

Description	Total (B)	FC (#)	TC (#)
Mass Concrete			
Mixing	206.9	159.1	47.8
Transporting	212.1	180.6	31.5
Placing	152.4	58.2	94.2
Formwork	205.9	0	205.9
Aggregate	236.4	190.1	46.3
Cement	551.3	0	551.3
Sub-cotal	1,565.0	588.0	977.0
Indirection Cost (Overhead, Profit, Tax)	235.0	0	235.0
Total Cost	1,800.0	588.0	1,212.0

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		·	
Concrete Facing			
Mixing	206.9	159.1	8.74
Transporting	212.1	180.6	31.5
Placing	358.7	174.2	184.5
Formwork	7*867	0	498.4
Aggregate	236.4	1.061	46.3
Cement	661.5	0	661.5
			:
Sub-total	2,174.0	704.0	1,470.0
Indirection Cost (Overhead, Profit, Tax)	326.0	0	326.0
Total Cost	2,500.0	704.0	1,796.0

APPENDIX-G

ENVIRONMENTAL IMPACT

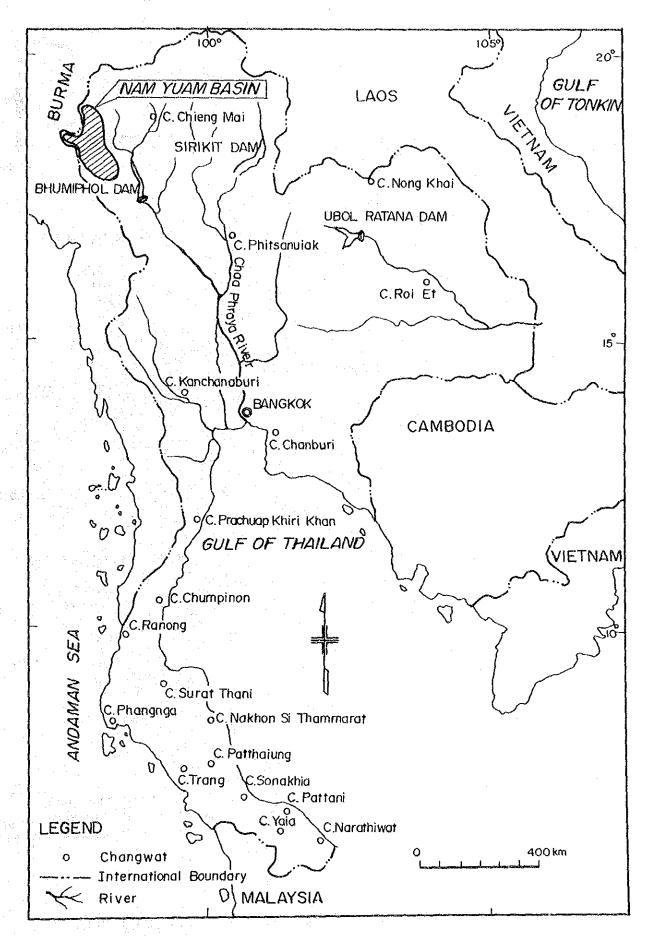


Fig. 1 LOCATION MAP

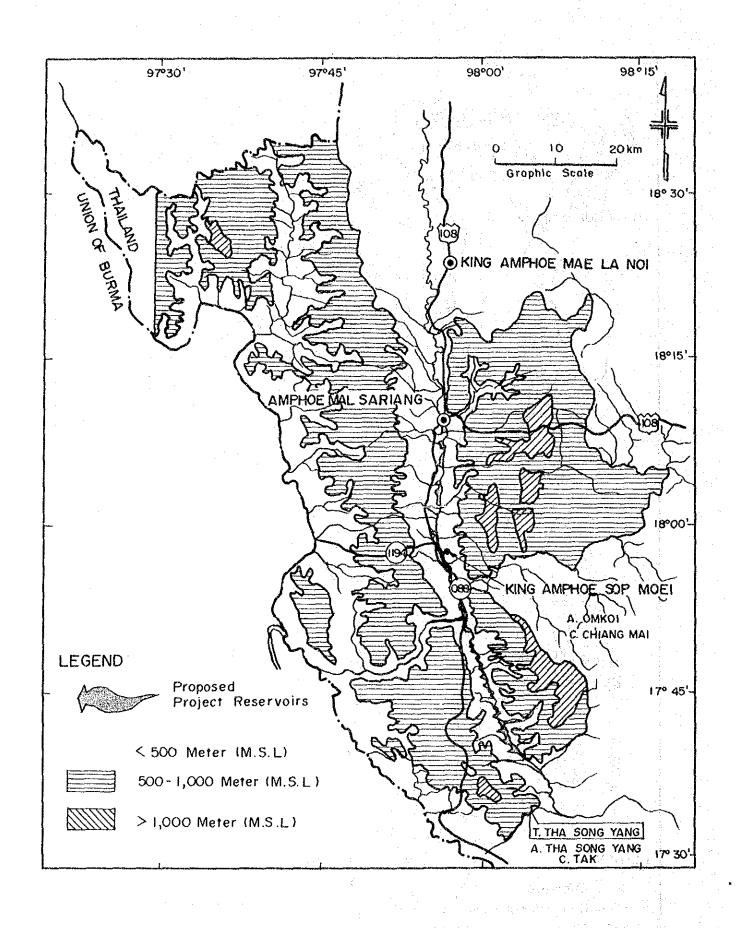


Fig. 2 GENERALIZE TOPOGRAPHY IN THE PROJECT VICINITY

Table 1 Climatological Statistics at Mae Sariang Meteorological Station (1951-1980)

Station	MAE SARIANG	Elevation of station above MSL.	212 meters
Index Station	48 325	Height of barometer above MSL.	215 meters
Latitude	18° 10' N	Height of thermometer above ground	1.20 meters
Longitude	97° 56' E	Height of wind vane above ground	11.66 meters
		Height of raingauge	0.52 meters

						raingang				necers			•
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
2													
Pressure (1,000 or 900)	13.81	12.18	9.50	7.60	6.08	5.20	5.34	5.58	7.02	10.19	12.51	13.75	0.09
Mean	4	23.92	19.88	18.20	15.16	14.24	14.19	14.19	16.54	19.48	23.98	24.99	24.93
Ext. Max	22.61		0.06	98.03	94.95	93.20	93.90	96.38	0.46	4.30	4.48	93.20	24.93
Ext. Min.	4.58	2.75				4.22	3.93	4.30	5.28	5.95	6.24	6.74	5.95
Mean daily range	7.17	7.49	7.46	7.05	5.49	4.22	3.93	4.30	J. 20	2.93	0.24	0.74	J. 35
Temperature (°C)										1	•		
Mean	21.7	23.6	27.6	30.7	29.3	27.2	26.6	26.3	26.0	26.8	25.2	22.4	26.2
	30.8	33.6	36.6	37.9	34.8	37.4	30.4	30.2	31.5	32.5	31.9	30.6	2.7
Mean Max.	13.1	12.9	16.9	22.1	24.0	23.5	23.1	23.0	23.1	22.1	19.2	15.3	19.9
Mean Min.	L .	38.8	41.5	44.1	42.7	38.6	35.7	36.4	37.4	36.3	36.4	36.0	44.1
Ext. Max.	36.4		8.7	13.8	19.2	20.5	20.8	20.6	19.7	13.4	6.5	5.0	3.3
Ext. Min.	3.3	6.2	0.7	13.0	13.2	20.5	20.0	20.0	13.7	. 13.4	0.5	3.0	3.3
Relative Humidity (%)								·					
Mean	73.0	65.0	55.0	55.0	71.0	81.0	83.0	85.0	83.0	80.0	77.0	76.0	74.0
Mean Max.	96.2	94.0	89.0	84.4	90.0	94.0	94.5	94.9	95.0	95.0	94.9	95.5	93.0
mean max. Mean Min.	43.7	34.2	29.3	33.7	53.2	68.4	71.5	73.3	68.7	62.6	55.5	49.8	53.7
	17.0	15.0	13.0	16.0	21.0	44.0	49.0	40.0	44.0	32.0	24.0	23.0	13.0
Ext. Min.	17.0	15.0	15.0	10.0	21.0	77.0	47.0	70.0	1.0	32.0			
Dew Point (°C)		1		ļ						ļ			
Mean	15.6	15.1	16.4	19.5	22.8	23.5	23.3	23.4	23.6	22.9	20.5	17.3	20.3
mean	13.0	1	101.4										
Evaporation (mm.)	1	1	I		e de la companya de					İ		1	
Mean - Pan						No Obs	ervation					[. [
									· .	ļ		.	
Cloudiness (0 - 8)	•	1		1]					, .		
Mean	2.9	1.7	1.5	2.7	5.7	6.9	7.2	7.2	6.4	5.3	4.1	3.6	. 4.6
Complian Duration (by)													
Sunshine Duration (hr.)					_ 1 _ 1 + 4 h	No Obs	ervation			·			
Mean		1.	<i>t</i>		1.	1 10 000) vue von		4				
Visibility (km.)	· ·						·						
0700 L.S.T.	1.4	1.7	1.5	3.6	7.9	6.8	6.3	6.1	5.6	4.3	2.4	1.6	4.1
Mean	8.4	6.1	3.3	5.2	10.4	9.2	8.4	8.4	9.5	10.3	10.7	10.0	2.3
пеан	0.7	"	3.3									}	
Wind (Knots)	[()				Ţ.				Į i	
Prevailing wind		s	S	s	S	s	S	S	S	Х	X	(X	
Mean wind speed	1.8	2.1	2.9	3.5	3.2	2.5	2.6	2.5	2.2	2.3	2.2	2.0	
Max. wind speed	33	39 E,Sx	52	50 SSr	60	45	35 S	35 S	30 X	40 x	30	34	60 V
Han with opeou			. 77.										
Rainfall (mm.)].							. n.t.				1 0/5 3
Mean	12.7	5.1	8.1	37.6	170.7	189.5	202.5	253.4	210.9	119.6	23.0	12.2	1,245.3
Mean rainy days	1.3	0.7	1.2	3.4	-16.3	24.1	25.9	26.0	20.9	12.5	3.5	2.0	137.5
Greatest in 24 hr.	49.4	38.9	61.3	62.8	131.0	95.1	57.2	92.8	113.8	96.3	76.7	58.9	131.0
Day/Year	10/75	2/53	13/71	19/77	23/80	6/55	4/64	29/71	3/69	14/60	1/56	23/61	26/80
	1	}			100		.	<u> </u>	. 1			}	
Number of days with	[].												
XXXX	20.6	24.6	29.5	22.4	2.7	0.2	0.0	0.2	0.4	3.7	7.3	12.4	124.4
Fog	22.0	12.6	5.6	1.4	0.2	0.0	0.4	0.3	0.9	6.3	16.5	22.6	89.3
Hail	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Thunderstorm	0.4	0.3	1.9	6.3	11.9	3.5	2.9	3.5	8.6	9.6	2.4	0.5	52.1
Snowfall	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5110 11 14 1 2]	
	1	1	<u> </u>	L		1		<u> </u>					

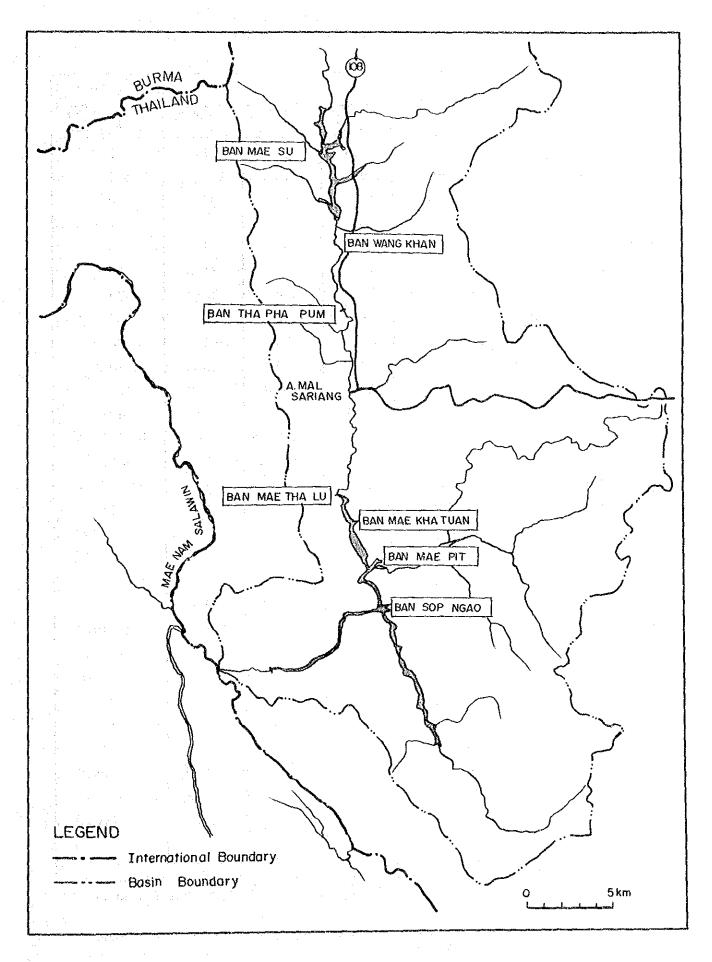


Fig. 3 WATER SAMPLING STATIONS

Table 2 Physico - Chemical Properties of Water Samplers at 7 Water Sampling Stations

Kind of Sample					
Source		Ban Mae Tha Lu	Ban Mae Rit	Ban Wang Khan	North of Ban Tha Pha Pum
рН	· · · · · · · · · · · · · · · · · · ·	7.5	7.6	7.7	7.0
Conductivity (micro	mhos/cm)	230	320	220	800*
Depth (cm)		30	50	80	50
Transparency (cm)					
Turbidity (NTU)		15	90	9.0	80
Temperature (°C) Wa	ter	33	31	31	32
Total Alkalinity	(as CaCO ₃)	98	142*	88	74
Total Hardness	(as CaCO3)	84	122	76	108
Calcium Hardness	(as CaCO3)	64	94	64	78
Magnesium Hardness	(as CaCO3)	20	28	12	30
Total Solids		128.0	1,701.0*	115.0	1,802*
Dissolved Solids	•	121.0	163.0	we un	440
Suspended Solids		7.0	1,535.0*	مسمير	1,362*
Bicarbonate	(as HCO3)	119.6	173.2	107.4	90.3
Carbonate	(as CO3)			espe durá	
Chloride	(as CL)	5.0	3.0	4.0	152*
Nitrate	(as N)				
Nitrite	(as N)				
Phosphate	(as PO4)				
Silica	(as SiO ₂)	15.9	16.8	20.2	16.0
Sulfate	(as SO ₄)	2.95	3.14	2.75	27.54*
Sulfide	(as S)				
Ammonia	(as N)				
Carbon Dioxide	(as CO ₂)				
Chromium (VI)	(as Cr)				
Copper	(as Cu)				
Iron	(as Fe)	0.43	2.3	0.51	3.32*
Manganese	(as Mr)]		i i	
Oxygen Dissolved	(as 0)	7.0	6.0 - 6.9	5.5	7.1
Solinity (PPT)			u,i		opulation of the ord

Remark: Water samplers at Ban Mae Rit, North of Ban Tha Pha Pum show brawn and high turbidity.

Depth, Water temperature and dissolved oxygen were collected during the field survey.

Source: Chemical and Analysis Department

Table 2 (cont')

Kind of Sample	all markets in the first of the state of the		
Source	Ban Mae Ngao	Ban Mae Kha Tuan	Ban Mae Su
pH	8.2	7.5	7.3
Conductivity (micromhos/cm)	215	210	210
Depth (cm)	30	50	50
Transparency (cm)			
Turbidity (NTU)	8.0	38.0	120*
Temperature (°C) Water	31.9	28.5	28
Total Alkalinity (as CaCO3)	100	92	88
Total Hardness (as CaCO3)	94	84	80
Calcium Hardness (as CaCO3)	64	64	64
Magnesium Hardness (as CaCO3)	30	20	16
Total Solids	122	221.0	292.5
Dissolved Solids		110.0	126.0
Suspended Solids		111	166.5
Bicarbonate (as HCO3)	107.4	112.2	107.4
Carbonate (as CO ₃)	7.2		
Chloride (as CL)	5.0	5.0	4.0
Nitrate (as N)			
Nitrite (as N)			<u> </u>
Phosphate (as PO ₄)			
Silica (as SiO ₂)	10.2	23.4	18.3
Sulfate (as SO ₄)	1.77	1.37	4.72
Sulfide (as S)			
Ammonia (as N)			
Carbon Dioxide (as CO ₂)			
Chromium (VI) (as Cr)			•
Copper (as Cu)			
Iron (as Fe)	0.38	1.02	2.91
Manganese (as Mr)			
Oxygen Dissolved (as O)	8.2 - 8.9	5.8	5.6
Solinity (PPT)			-

Source: Chemical and Analysis Department

Table 3 Forest Area in Mae Hong Son Province (Classified by Type of Forest, 1975)

Types of Forest	Plant Names	Area (rai)
l. Diciduous Dipterocarp Forest	Lagerstcoemia siamica Gagnep	3,711,636
	Shorea obtusa Wall	
:	Shorea siamensia Miq.	
	Shidora	
	Siamensia Teijsm ex Miq.	
	Family Fagaceae	
2. Mixed Deciduous	Tectona grandis Linn. f.	3,541,942
Forest with Teak	Afzelia xylocarpa Roxb.	
	Chukrasia venlutina W. & A.	
	Diospyros mollis Griff	
	Pterocarpus macrocarpus Kurz.	i exe. Saskijas š
	Family Lythraceae Family Myristicaceae Family Gramineae	
3. Hill Evergreen Forest	Castanopsis acuminatisima Rehd.	69,126
·	Castanopsis argentea A. Dc.	
	Quercus poilanei Hick. & A. Camus	
	Eugenia cumini (L.) Druce	
	Family Pinaceae Family Fagaceae Grounding Plant: Fern, Moss, Bromheadia finlaysoniana Reichb. f.	
4. Pine Forest	Family Pinaceae	78,607

Table 3 (con't) Forest Area in Mae Hong Son Province (Classified by Type of Forest 1975)

	Types of Forest	Plant Names	Area (rai)
5.	Dry Evergreen Forest	Dipterocarpus alatus Roxb. Afella xylocarpa Roxb. Family Lythraccae	1,692
6.	Disturbed Deciduous Dipterocarp Forest		361,677
7.	Mixed Deciduous Forest with Disturbed Teak		138,099
8.	Mixed Deciduous Forest with Undisturbed Teak		24,831
9.	Disturbed Hill Evergreen Forest	ing we	1,538
	Total rai		7,929,130
-	Total sq. km.		12,686.60

Source: Social Research Institute, Chiang Mai University 1983

Freshwater Fauna Quality and Utilization at Amphoe Mae Sariang, Mae Hong Song Province (1980 - 1983) Table 4

 1983	th Sale or Consume (kg)	350 250	1 %	800	700	200 2,500 150	300	5,850
	Total Catch (kg)	350 250	900	800	200	200 2,500 150	300	5,850
 2	Sale or Consume (kg)	600 500	200	2,000	ļ	700 3,500 200	200	8,500
1982	Total Catch (kg)	909 200	200	2,000	1	3,500 200	200	8,500
1981	Sale or Consume (kg)	500 750	200	1	2,000	450 3,000 400	1,200	9,500
19	Total Catch (kg)	500 750	200	1	2,000	3,000 400 400	1,200	005,6
0	Sale or Consume (kg)	22,650 14,680	8,315	1,250	1,830	19,900	2,220	73,535
1980	Total Catch (kg)	24,500 15,200	8,315	1,250	1,830	25,400	2,370	82,105
di contraction contraction	Name	1. Striped Snake-Head 2. Clarias spp.	3. Climbing Perch 4. Puntius spp.	5. Tilapia spp.	6. Cyprinus spp.	7. Swamp eel 8. Other Fish 9. Shrimp	IO. Uther kreshwater Fauna	Total

Source: Mae Sriang, Amphoe Fisheries Office

Remark: Not classified by freshwater fauna's source

Table 5 List of Fish Names in the Salawin River

Scientific Name	Common Name	Year 1945	Year 1981
Family Notopteridae		5	
1) Notopterus notoptrus (Pallas)	Hang-Pan	-	.+
Family Mastacembelidae			
2) Mastacembelus armatus Gunther	Lard	<u>.</u>	+
3) Mastacembelus unicolor Cuvier and Valencennes	Lard	-	+
Family Anguillidae 4) Anguilla australis Richardson	Sa-Ngik	· _	+
Family Flutidae			·
5) Fluta albe (Zuiew)	Yian		+
Family Cyprinidae			
6) <u>Danio regina</u> Fowler	Siew	-	+
7) <u>Danio aeguipinnatus</u> (Mc Clelland)	Siew	~	+
8) <u>Rasbora myersi</u> Brittan	Siew	-	+
9) <u>Aspidoparia morar</u> (Hamilton)	***	-	+
10) Mystacoleucus argenteus (Day)	Hang-Luane	**** .	+
11) <u>Hampala macrolepidota</u> van <u>Hasselt</u>	Кавоор	-	+
12) Tor (Folifer) brevifilis brevifillis (Peters)	Kor-Moer-Nang	-	+
13) Tor tambroides (Bleeker)	-	-708	+
14) Tor stracheyi (Day)	Yard	+	~
15) <u>Tor soro</u> (Cuvier and Valenciennes)	Mung	+	+
16) Rohtee alfrediana (Cuvier and Valenciennes)	Kai-Ong	-	+
17) Barilius pulchellus Smith	Kaem		+

Table 5 (Cont') List of Fish Names in the Salawin River

Scientific Name	Common Name	Year 1945	Year 1981
18) Barilius guttatus (Day)	Ma-Hung	**************************************	
19) Puntius stoliczkae (Day)	Mung-Maie	e e gr	
20) Puntius daruphan! Smith	Sa-Pag	r j 🤻 jeze	12 1 † 12 1
21) <u>Puntius orphoides</u> (Cuvier and Valenciennes)			
22) Chagunius chagunio (Hamilton)	Hang-Daeng		
23) Acrossocheilus vittatus Smith	Jad	ng s + f da _n	
24) Acrossocheilus malcomi Smith	Jad		
25) Acrossocheilus deauratus (Cuvier and Valenciennes)	-		1 (4) (1) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
26) Acrossocheilus bantamensis (Rendahl)	-	**************************************	
27) <u>Scaphiodonichthys burmanicus</u> Vinciguerra	Mum, Kam	• • • • • • • • • • • • • • • • • • •	.
28) Labeo dyochellus (Mcclelland)	Va		**************************************
29) <u>Labao calbasu</u> (Hamilton)	· · · · · · · · · · · · · · · · · · ·	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
30) <u>Labeo behri</u> Fowler		7	30 at 1
31) <u>Garra fuliginosa</u> Fowler	Mud		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
32) <u>Garra</u> sp.		-	
33) Epalzeorhynchos siamensis Smith	Mon	+	_
34) Crossocheilus sp.	Mon		+
35) <u>Balitory brucei Gray</u>	-	+	\$ 19. * \$ 6 6 6
36) <u>Homaloptera sexmaculata Fowler</u>	i 🕳 i e e e e e e e e e e e e e e e e e e		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
37) <u>Lepidocephalus octocirrhus</u> (Van Hasselt)	Sai	o - o ga thag j	+
38) Noemacheilus multifasciatus Day	Bou	+	1
39) Noemacheilus waltoni Fowler	Bou	+	**************************************
40) Noemacheilus sexcauda Fowler	Bou		

Table 5 (Cont') List of Fish Names in the Salawin River

Scientific Name	Common Name	Year 1945	Year 1981
41) Noemacheilus reidi Smith	Bou	+ -	+ .
42) Silurichthys leucopodus Fowler	Varn	. ••••	+
43) Ompok bimculatus (Bloch)		-	+
Family Clariidae			
44) Clarias batrachus (Linnaeus)	Duk	ļ 	+
Family Schiibeidae			
45) Eutropiichthys vacha (Hamilton)		+	_
Family amblycipitidae			
46) Amblyceps mangols (Hamilton)	Dack	_	1-
Family Bagridae		ļ	
47) Mystus seenghala Day	Kod Hour Seab	_	+
48) Mystus bleekeri Day	-	_	+
49) Mystus microphthalmus Day	<u>-</u>		+
Family Sisoridae			·
50) Bagarius yarrellie (Sykes)	Kae	_	<u> </u>
51) Gagata cenia (Hamilton)	-	+	_
52) <u>Hara hara</u> (Hamilton)	•••	-	+
53) Exostoma vincigurrae Ragan	~	-	+
54) Pseudecheneis sulcatus (Mac Clelland)	-		+
55) Glyptothorax platypogonoides (Bleeker)	Kong-Kang, Tek-Hin	+	 +
56) Glytothorax trilineatus Blyth	Tek-Hin	-	+
57) <u>Glyptothorax dorsalis</u> <u>Vinciguerra</u>	_		+
58) Glyptothorax sp.	_	***	+

Table 5 (Cont') List of Fish Names in the Salawin River

Scientific Name	Common Name Year 1945 Year 1981
Family Belonidae	
59) Xenentodon cancila (Hamilton)	Som-Mok + +
Family Anabantidae	
60) Trichogaster trichopterus (Pallas)	Slak + -
Family Ophicephalidae	
61) Ophicephalus marulius Hamilton	Lim-Hang-Qua - +
62) Ophicephalus striatus Bloch	Lim, Kor - +
63) Ophicephalus gachua Hamilton	Kang + +
Family Centroponidae	
64) Chanda siamensis Fowler	- +
65) <u>Chanda ranga</u> Hamilton	Peir, Wee +
66) Unknown species	Hour-Luam - +

Source: Somposh Akatavewat, 1982

Remark: + Fish was found

- Fish wasn't found

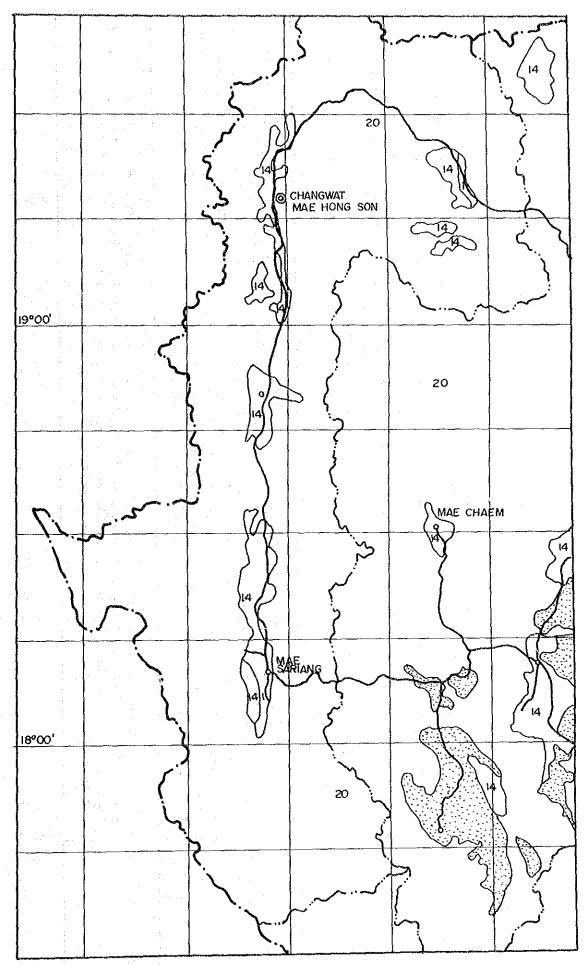


Fig.4 LAND CAPABILITY FOR AGRICULTURE IN MAE HONG SON PROVINCE

Soil Characteristics and Land Use in the Area of Mae Hong Son Province Table 6

Number Used as Symbols in Figure 4-2	General Soil Characterístics	Recommendations for Land use	Land Management
1.	Deep and well drained, Soil texture varying from silt to sandy loam, Moderate fertility. Normally found in the area of relatively flat or rolling close to the river.	Generally suitable for cultivation of cash crops such as corn, cotton, tobacco, peanut, sugar cane, sorghum and castor bean	Require moderate land management to maintain the land fertility and soil structure. Irrigation may be required for cultivation in the dry season.
***	Shallow and moderate to well drained. At the depth of 50 cm. from the surface, often found rocky lateritic soll. This type of soil are mainly in the area of moderate to steep slope.	Not suitable for cultivation. This type of land may be better for livestock raising and forest plantation. Specific land management is necessary if the land to be utilized for cultivation.	Advanced and technologies of agricultural practices are very much needed where fertilizer and soil improvement are necessary for cultivate this type of land.
. 20.	Shallow to deep soil with very well drained and can be found mainly on slope of high hills and mountain.	Not suitable for agricultural practice of any kind. The land should be reserved as forest of watershed area.	There should not be any investment on this type of land.

Table 7 Small Irrigation Project in Amphoe Mae Sariang, Mae La Noi and King Amphoe Sop Moei

Pro	ject Name	Tambon	Irrigation Area (Rai)	Year Completed
Amphoe Ma	e Sariang			_
1. Huai	Kud Weir	Ban Gart	600	1983
2. Maer	Ko Weir	Mae Kha Tuan	600	1983
3. Mae T	ob Tai Weir	Ban Gart	1,250	1978
4. Mae P	an Weir	Mae Kha Tuan	1,500	1978
5. Mae T	ob Klang Weir	Ban Gart	360	1984
6. Mae 1	a Weir	Mae Sariang	800	1989
7. Huai	Luang Reservoir	Ban Gart	~	1988
8. Huai	Luang Weir	Ban Gart		1988
1. Mae S 2. Mae I	oe Sop Moei uad Weir halu Weir a Rservoir		1,117 200 1,200	1984 1984 1984
Amphoe Ma	e La Noi		•	
1. Chang	Moh Weir	Mae La Noi	300	1982
2. Om Pa	i Weir	Mae La Noi	200	1982
3. Mae T	aie Weir	Tha Pa Pum	650	1982
4. Mae L	a Ngoe Weir	Mae La Noi	600	1982
5. Mae K	oh Weir	Tha Pa Pum	500	1983
6. Mae T	ho Weir	Mae Tho	185	1983
7. Mae P	rang Weir	Mae La Luang	100	1984

Table 8 Mae Sariang Waterwork Requirement and Its Consumers

	Year 1986 (Cu.M.)	Year 1987 (Cu.M.)	Year 1988 (Cu.M.)
Raw Water Demand	366,301	389,507	383,811
Water Production	363,761	386,633	380,361
Number of Household Served	947	1,008	1,104

Source: Data Received from Mae Sariang Waterwork Office during Field Investigation August 1989.

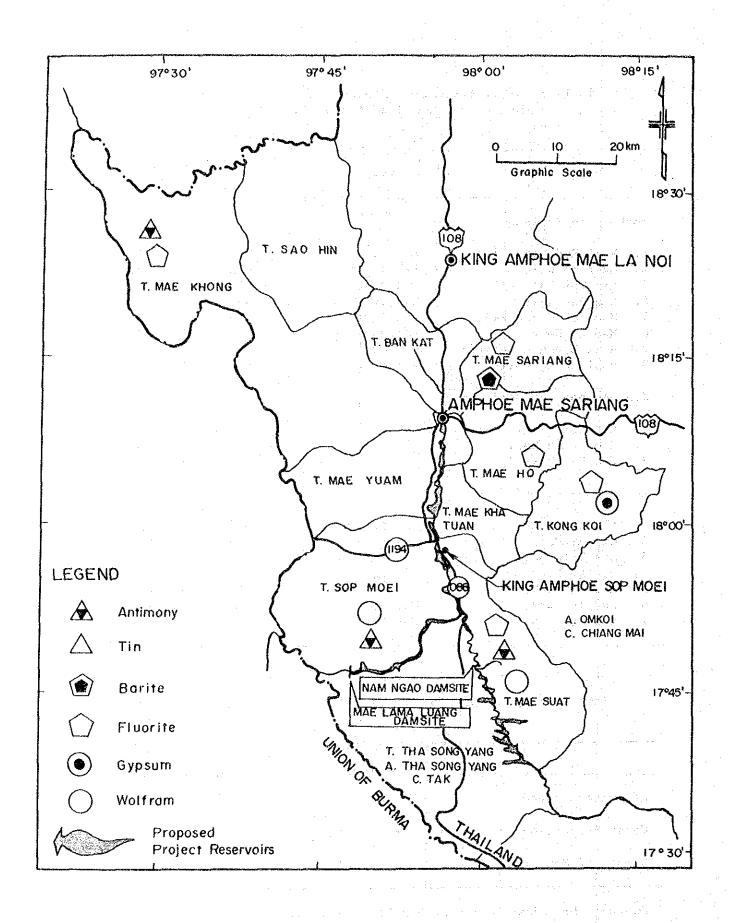


Fig. 5 MINERAL RESOURCES IN PROJECT VINICITY

Table 9 Population Distribution of Amphoe Mae Sariang

Tambon	Moo Ban	Population	Male	Female	House- holds
Mae Sariang	5	9,383	4,789	4,594	1,781
Ban Gart	11	10,868	5.854	5,014	2.011
Mae Kong	10	3,272	1.648	1,624	649
Mae Yuam	11	8,333	3,879	4,454	1,689
Mae Huaa	12	6,316	3,185	3,131	1.063
Soa Hin	6	1,434	723	711	266
Pa Pae	. · . 9	5,434	2,751	2,683	882
Total	55	39,606	20,078	19,528	7,459

Source: Brief Report of Mae Sariang 1989

Table 10 Population Distribution of King Amphoe Sop Moei

Tambon	Moo Ban	Population	Male	Female	House holds
Sop Moel	9	4,098	2,074	2,024	1,247
Mae Kha Tuan	7	4,327	2,134	2,193	1,608
Mae Suad	7	3,898	1,921	1,977	690
Kong Koi	6	3,757	1,911	1,846	1,289
Pa Pong	7	2,885	1,409	1,476	•
Mae Sam Lap	9	4,367	2,197	2,170	
Total	45	23,332	11,646	11,686	4,834

Source: Brief Report of King Amphoe Sop Moei 1989

Mae Sarlang

Mac Sariang Administrative Office

Mae Sariang Provincial Court

Mae Sariang Regional Forestry

Mae Sariang District Penitentiary

Mac Sariang District Treasury

District Attorney

Police Station

District Custom

Border Patrol Police Unit 337

Control Unit 35

Military Unit 4, 7

Mobile Unit for Development No. 27

Unit 36

Immigation Check Point

Nam Yuam Irrigation Project

EGAT Field Office

Community Hospital

Malaria Control Unit No. 11

Public Health Office

Co-operation Office

Mae Sariang Electric Work

Post Office

Meteorological Station

Animal Husbandary Office

Rural Development Office

Agricultural Office

Excise Office

Revenue Office

Forestry Office

Lands Office

Military Recruitment Office

Education Office

Primary School Administration Office

Provincial Lands Office

Mae Sariang Water Work

Center for Hill Tribe Development and Welfare

Krung Thai Bank Ltd.

The Government Saving Bank

Sop Moet

Sop Moei Administrative Office

Rural Development Office

Forestry Office

Animal Husbandary Office

Lands Office

Education Office

Taxation Office

Excise Office

Military Recruitment Office

Post Office

Primary School Administration Office

Agricultural Office

Police Station

Public Health Office

Co-operation Office

Community Hospital

Sop Moei Secondary School

Malaria Control Unit

Forest Protection Unit

Special Task Force Unit No. 32

Table 12 Number of Hospital and Public Health Offices (1988)

Health Relate Facilities	Amphoe Mae Sartang	King Amphoe Sop Moei
		<u> </u>
District Hospital	1	1
District Health Office	1	1.
Health Service Center	6	4
Midwifery	2	i
Maralia Control Unit	1	1

Source: Brief Report on Public Health of Sop Moei Sub-District 1988 Brief Report on Public Health of Amphoe Mae Sariang 1989

Table 13 Number of Health Personal

Amphoe Mae Sariang	King Amphoe Sop Moei
3	.1
13	4
21	8
9	3
4	4
8	5
13	13
	Amphoe Mae Sariang 3 13 21 9 4 8 13

Source: Brief Report on Public Health of King Amphoe Sop Moei 1988 Brief Report on Public Health of Amphoe Mae Sariang 1989

Table 14 Health Records of Local and Endemic Diseases of Amphoe Mae Sariang

		Nu	mber of Pat	lent
	Diseases	Year 1987	Year 1988	Oct. 88 - Jun. 89
1.	Infectiuas and Parasitic Diseases	6,935	6,316	2,863
2.	Neoplasm	194	290	468
3.	Endrocrine, Nutritional and Metabolic Diseases	1,348	1,155	1,412
4.	Diseases of the Blood and Blood-forming Organs	429	550	291
5.	Mental Disorders	1,051	1,329	1,465
6.	Diseases of the Nervous System and Sense Organs	2,121	2,681	1,172
7.	Diseases of Circulatory System	1,552	2,249	1,185
8.	Diseases of the Raspiratory System	13,819	11,906	9,684
9.	Diseases of the Digestive System	6,704	12,975	4,503
10.	Diseases of the Genitourinary System	1,826	1,744	1,281
11.	Complications of Pregnancy Childbirth and the Puerperium	461	733	58
12.	Diseases of the Skin and Subcutaneous Tissue	3,774	4,843	2,853
13.	Diseases of the Musculosketal System and Connective Tissue	2,292	2,766	1,382
14.	Congenital Anomalies	33	23	
15.	Certain Causes of Perinatal Morbidity and Mortaliry	37	49	23
16.	Symtoms and Illdefined Conditions	12,351	11,292	8,210
17.	Accidents, Poisonings and Violence	2,634	2,919	1,736
18.	Others	11,371	8,024	7,863

Source: Brief Report on Public Health of Amphoe Mae Sariang 1989

Table 15 Health Records of Local and Endemic Diseases of King Amphoe Sop Moei

	Diseases	Number of Patient			
	D1303363	Year 1986	Year 1987	Year 1988	
1.	Diarrhosa	10	101	95	
2.	Symthoms and Ill-defined Condition	63	114	28	
3.	Measles	# -	1	37	
4.	Conjunctivitis	7	5	17	
5.	Tneumonia	11	16	8	
6.	Influenza	3	1	5	
7.	Malaria	19	219	389	
8.	Tuberculosis	1	1	1	
9.	Hepatitis	1	1	1	
10.	Shigellosis	6	2	6	
11.	Chicken Pox			1	
12.	Nephritis	1			
13.	Encephalitis	1	and suff		
14.	Haemorrhagic Fever	1			

Source: Brief Report on Public Health of King Amphoe Sop Moei 1989

Table 16 Classification of Existing Local Tourism Resource in Mae Hong Son Province

	AND THE RESERVE OF THE PROPERTY OF THE PROPERT	Tourism Resource	
Amphoe	National Attraction	Architectural Attraction	Cultural Attraction
Amphoe Muang	Pha Sour Waterfall Pra Cave Park Pha Pong Hot Spring Pe Man cave Huai Kan Waterfall	Wat Phra Non Wat Hua Wlang Wat Jong Kum Wat Jong Krang Wihara Wat Pong Toa U	Miew Village Na Pa Pag Ruk Kiew Ordination
Amphoe Pai	Moa Peng Waterfall Mae Nam Pai, Floating Lum Nam Pai Sanctuary	Wat Krang Wat Nam Hu	
Amphoe Kun Yuam	Mae Surin Waterfall National Park	Wat toa prai Ban Muang Pon Ancient	
Amphoe Mae La Noi	Mae Hu Cave Dao Dung Waterfall	Wat Mae La Noi	Thai Yai Local Performance Art
Amphoe Mae Sariang	Huai Som Pu Plant Garden Salawin Sanctuary Mae Nam Salawin, Floating	Wat Kittiwong Wat Uttayalom	Mae Hong Son Hilltribe Development and Wellfare Center

Source: The Tourism Authority of Thailand, 1983

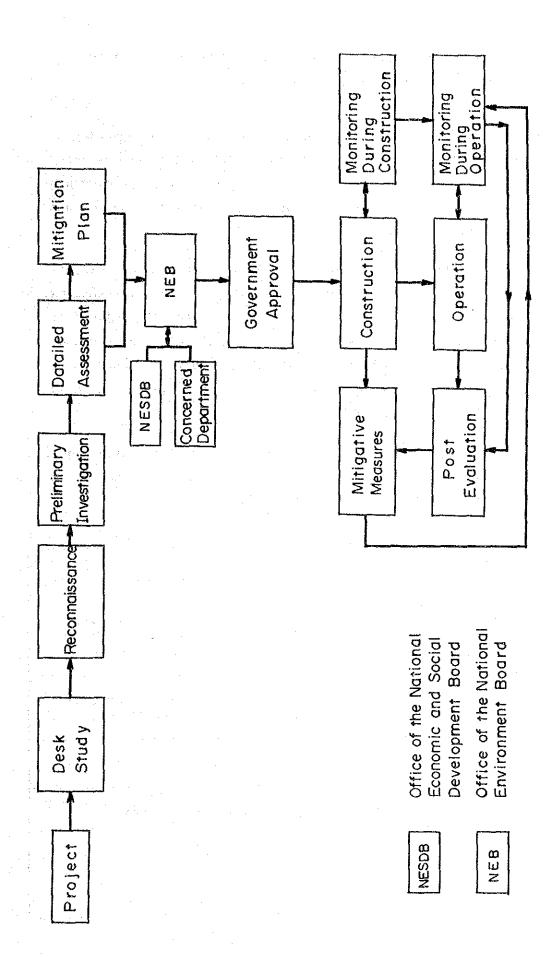


Fig. 6 ENVIRONMENTAL PROCEDURE

G-23 Proclamation for Types and Sizes of Project Required Environmental Impact Assessment

The National Environment Board (NEB) of Thailand is now implementing "selective projects" approach in identifying environmental impact along with mitigation measures and monitoring programs for certain projects or activities to ensure efficient utilization of natural and human resources in the economic development.

Section 17 of the National Environmental Quality Act (NEQA) of 1975, as amended in 1978, provides a power to the Ministry of Science, Technology and Energy to issue proclamation for the types and sizes of projects or activities requiring Environmental Impact Assessment (EIA) reports and measures for the prevention of and remedy for the adverse effects on environmental quality. The first proclamation has been issued on 14 July 1981 which stipulates in essence an in table below:

Table: Notification of Types and Sizes of Projects or Activities Requiring EIA Reports and Measures for the Prevention of and Remedy for the Adverse Effects on the Environmental Quality.

Items	Types of Projects or Activities	Sizes
1	Dam or Reservoir	storage volume greater than 100,000,000 cubic meters or storage surface area greater than 15 square kilometers
2	Irrigation	irrigated area greater than 80,000 rais (12,800. hectares).
3	Commercial Airport	all sizes
4	Hotel or Resort Facilities environmentally sensitive areas such as areas adjacent to rivers, coastal areas, lakes or beaches or in the vicinity of national parks	greater than 80 rooms

Items	Types of Projects or Activities	Sizes
5 · · · · · · · · · · · · · · · · · · ·	Mass Transit System and Expressway as defined by the Announcement of the Revolutionary Party No. 290, 24 November B. E. 2515	all sizes
6	Mining as defined by the Mineral Act No. 1 B.E. 2510, No. 2 B.E. 2516 and No. 3 B.E. 2522	all sizes
7	Industrial Estate as defined by the Industrial Estate Authority of Thailand Act, B.E. 2522	all sizes
8	Commercial Port and Harbour	with capacity for vessels of greater than 500 ton-gross.
9	Thermal Power Plant	capacity greater than 10 MW.
10	Industries (1) Petrochemical Industry	greater than 100 tons/day of raw materials required in production processes of oil refinery and/or natural gas separation.
·	(2) Oil Refinery	all sizes
	(3) Natural Gas Separation of processing	all sizes
	(4) Chlor-alkaline Industry requiring NaCl as raw material for production of NaOH, Na ₂ CO ₃ , HCl, CL ₂ , NaOCl and Bleaching Powder	production capacity of each or combined product greater than 100 tons/day

Items	Турев	of Projects or Activities	Sizes
10	(5)	Iron and/or Steel Industry	requiring from are and/or scrap iron as raw materials for production greater than 100 tons/day or using furnaces with combined capacity greater 5 tons/batch.
:	(6)	Cement Industry	all sizes
	(7)	Smelting Industry other than Iron and Steel	production capacity greater than 50 tons/day.
	(8)	Pulp Industry	production capacity greater than 50 tons/day.

