CASE B-3

(ITC 60%)

一大學 人名西西斯 医二种

PRODUCTION AND SALES	+	•	***************************************		**************************************	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- CCCCCCC	0000	-0000	100000
	• 0		5 6	724400	100000	1080000	1000001	1080000	1080000	000000
SECTION AND ASSET		ó	•	1200	45000	45000	45000	45000	45000	4500C+
NET KEVENOLS		•	٥	138486	. 64266	202262	206025	206340	206650	-026902
	11.74			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	# 11 PER 14 OF 1 1 1 PE	The second second second		:	:	
FACTORY VARIABLE COST			•	***************************************		A			į	
RAN RATEXIALV	ó	5 6	• 4 • 6	9400	2422	7.50	25221	25221	25221	25221
とはのひと コンロール		ļ		7537	25055	25056	ĥ	25056	ı	25056
PAPER BAC		d	ċ	6577	9396	\$ 296°	9396	0300		9050
	0			40871	71244	77244	71244-	71244	71244	171244
TACACA TACACA			9	4.056.	40.0	0507	4050	4059	4059	4055-
PACAMETER CONTRACTOR	•		•	400	4871	4077	4871.	4873	4871-	4872
2	0	9	0	4116	4116	£116.	41.16	•9114	*9177	4110
OVERHEAD	0	0	0	1441	1441-	1441	1441	1441	1447	444
	•	•	•	40.	- (0	404		ģ	
DEPRECIATION (PLANT)		ċ	٥	13957	٦	13757	13457	2007	C (2)	ACA.
DEPRECIATION CRAILWAYS	o d	• 6	o d	4 4 6 4 6 4		A 700	# () () () () () () () () () (107.6	6 1 C C	2 4 60 2 60 3 60
こうとはに ラン・こう・ しょうひとんじつ	,	S		28.0	ı	١.	28/97	28/32	28772	28778
FACTORY COST TOTAL		•	o	79652-	101026-	1026	101026.	101026	101026-	101020-
INCREASE IN PROC INVNT	-0	0	0	3326.	•906	-14-	***	Q.	Q.	8
NET OPERATING INCOME	0	0	0	62153.	94146.	102222.	104999	105314	105624	105944
SALES & ADMINISTRATION	٠,									
TRANSPORTATION COST	ŏ	0	.	17624	24909	27679	27849	26659	25486	
ACENT FEE	0 0	• •	0 0	4.00	70001	00001	0000	1740	2000	1740
TOTAL	• •	ò	ó	26600	36717	40049	40389.	39199	38026	
NET INCOME	•0	0	o	35544.	57430.	62173.	64610.	66115	67598.	445.80
FINANCIAL EXPENSES								-		
TO THE PROBLEM OF THE	000	o c	•	16166	1123	11994	8000	.7622	\$7.50	2650
וסואר	0	6	0	18415	20251	11004	2008	1822	5736	2650-
INCOME INCOME TAX	•0		•	TASE.	42226	50178	24701	\$8293	61862	64914.
PROVISION FOR INCOME TAX			•	.0.	0	0	6353-	25017	76801-	283274
PROFIL AFTER INCOME TAX	•	Ö	•	171310	492224	20178	48548	23276	33061	* 20000

PROJECT NAME COAMSANGTOBO		TH COME STATEMENT	RENT			DATE.	112581	•	
	9551	1007	8001	1000	2000	2361	2002	2003	;
PACOUCTS AND SALES PACOUCTS VOLUME SALES	1090000	1080000	1080000	1080000	1080000-	1080000	1080000	1060000	to the Company of the
INVENTORY VOLUME	207280-	207360	207360-	45000-	45000	45000-	45000-	45000-	
OPERATING COSTS			:						
AAK HATERIAUS	11571.	11571.	11571.	11571	11571.	11571.	11571.	11571.	
FUEL COALY	2522	25221.	252214	25221.	2522	25221.	25221	25221.	
PLECTRIC PONER:	25050 V3V6:	23030-	23030s	4306	43050	9306	43030	43050	
Very TOTAL V	71244-	71244	71244-	71244.	71244	71244	71244	71244	
CONTRACTORY IN THE CONTRACTORY	4050-	40.69	4050	4050	4050	4050*	4054	4059	
TAINTENANCE COST	487	: 🗠	762	-1487I	4871	687I	4871	187	
LABOR	4116	4116	4116-	4116.	4116+	4 1/16.	4116	4116	
OVERHEAD		1441	Teel.	1441	777	1991	1441	**************************************	
		0.00			1.000		7.305.7	7.505.1	
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DEPRECIATION (OTHERS)	871.	871	17.2	872	8.1	6.71	871.	871.	
	29782		29782	29732	29782	29782	29782	29782	
FACTORY COST TOTAL	101050	10104	*670701	0000000	40707	10101	***	****	
NET OPERATING INCORE	106254.	106334.	100334-	106334.	106334.	106334	106334.	106334.	
SALINS ADSTRUCTOR		; ; -3			1.13				
TRANSPORTATION COST	74840	24840	Dx 8.2.2	24640	0181	-0787Z	24840	24840	-
ACCAL **********************************	10500	10000	10800	10800	10200	10800	1740	2740	er e
TOTAL STATEMENT OF THE	37360	57580	37386	37380	37380	37380.	37580	87560	
NET INCOME	65874.	68954.	68954-	68954.	68954.	68954.	68954.	68954.	
FINANCIAL EXPENSES TINTEREST ON CONG LOANS	1564.	00	00	00	00	00	00	ÓÓ	
INCOME BEFORE INCOME TAX	67310.	68954.	68954	68954	68954-	68954.	68954	68954.	
PROVISION FOR INCOME TAX	29525	42501-	42501-	42501-	42501.	4250I.	42501.	42501	
PROFIT AFTER INCOME TAX	37785.	26454.	26454	26454	26454	26454.	26454.	26454.	
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	9867	1861	1,583	1084	1,000	1991	1,592	C05T-	7 553	5532
ASSETS								A STATE OF THE PROPERTY OF T		
CURRENT ASSETS	4			:-						
ENDING CASH BALANCE ACCOUNTS RECIEVABLE	00	00	20	2710.	50087	33225	88801	34390	3442	188301- 34495-
INVENTORIES :	•0	•	o	3319.	4224	4210	4209	4200	4200	4200.
TOTAL CURRENT ASSETS	00	00	00	31192	42161-	83260	1533	171741	199506	1533- 228539-
FIXED INVESTHENTS										0000
PCAN COST	4040	•020022	0000	6396	6396-	. 6396	6000	6396	- 444 V CO + 44	****
PREOPERATING EXPENSE	2588	5176	12492	12492	12492	12492	12492	13071	12492	12492-
ъ-	D	0	81.18	. 8110	8118	87.18	8118	8118	01.13	5118
AXORITZARION	2416	10690	26100	26100.3	26100	26100	26100	26100	26100	26100-
LESST DEPRECIATION	0	0	0	16995	33990	50985	47980	84975	101970-	118965
TOTAL SECTION SECTIONS OF SECTIONS OF SECTION SECTIONS OF SECTION SECTIONS OF SECTION SECTIONS OF SECT	00440	Z45 178	STORY	4 4 00 4 A	*1 00117	740007	£4204 (*	*****	******	* 7 * 7 * 7
TOTAL ASSETS	20009	248378	511077	32.52/4:	510248	343352	571078	39.7843	408613	*15902*
TITIETABICITY ESTANOTISTOCKHOLDERSTEOUTHY	S-EDUTHY	1 4 1 1 1						*		
CORRENTOLIABILITIES CORRESPONDE CORRESPONDE TRANSPORTED AND CORRESPONDE TRANSPORTED AND CORRESPONDED TO THE CORRESPONDED TO TH	•	•	ė	22467.	0	0	.0	0	.0	•0
PROCESS PATAGES	0	50	0 0	8/3 0	0.0	* 60 * 0	6353	25017	26801	28337.
TOTAL CORRENT LIABLES	0	ò	•	23142	*996	7.96	7317	25961.	27765-	20201
CONG. TEXN. COMNS	20202	276644	208200-	182524	1.56449	130374	104300	78225	52150	26075
STOCKNOCDEKS, EQUILY SHARE: CAPLTAL	30743	71734	102478	102478	102478	102478	102478.	102478	102478	102478
TOTAL STOCKHED COULTY	30743	71754	102478	17.51	161835	212013	260361	293637	226220± 328698=	262807- 365285-
TOTAL LULT AVSTKS EQUITY	60946	248378	311677.	325274.	319248.	343352	371978	39.7843	408613-	420652-
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1										
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			Part Comment		100 Mag.		*	:- ::- ::: :::		

218153. 274563 218153. 274563 4209 1533. 1535 1533. 1533 1533. 1533 1533. 1533 1533. 1533 1539. 1539 204977. 284977 204977. 284977 20100. 20100 155059 433559. 472088 HOLDERS EQUITY	316012. 3 34500. 2 1535. 1535. 3 1535. 3 1535. 3 15400. 2 6396. 2 6396. 2 12492. 3 126949. 3 169949. 3	361461. 361461. 37560-	2000 404000 34560	1007	2002	2002	1	
15. 15. 15. 15. 15. 15. 15. 15. 15. 15.	1	14560- 14560- 1200-	404909-					
### STASS		161461 34566 4209	40400					
SECTEVABLE 34547. 345 51 14215. 14209. 1533. 153	1 1 1 1 1 1 1 1 1 1	34560- 4200-	34560	448358	491807	535255	***************************************	
141.5 14		4200		n	3456C.	24560		
RAW MATERIALS TOTAL CORRENT ASSETS 258442 13. TOTAL CORRENT ASSETS 258442 13. PLANT COST 60700 2449 RAILWAY 605T 605T 12492 12. AND PREDPERTURE 12492 1250 STOKE AND SPARES 8118 81. TOTAL STREO INVESTMENT 175117 1581 OTAL ASSETS 100KHOLDENS GOUTTY RRECHT LIABLITICS 45559 4729 ACCOUNTS PAYABLE		-	4200	2002	4200	4200		
PLANT COST RAILWAY COST RAILWAY COST RAILWAY COST RAILWAY COST RAILWAY COST STORE AND SPARES STORE AND SPARES TOTAL RINGO STOCKHOLDENS COULTY RRENT LIES AND STOCKHOLDENS COULTY RRENT LIABILITIES ACCOUNTS PAYABLE		297.101	445212	488660	552100	578857		
XED LWVESINGNIS PLANT COST RAILWAT COST RAILWAT COST RAILWATCH COST RAID SAME STOKE AND SPARES STOKE AND SPARES AMORTICAL ZOST TOTAL FIXED INVESTHENT 175117 1581 OTAL ASSETS ABILITIES AND STOCKHOLDENS COULTY RECEDENT LIABLITIES								
RAILWAY LAND PREMIUM 12402 124 124 12606EANTING_EXPENSE 130 5104E 1014L		44900	244900	244900	244900	244900.		
LAND PREMIUM 12492. 124 PREOPERATING EXPENSE 13071. 130 STORE AND SPARES 204977. 2849 AMORTI ZATION 2640. 2640 TOTAL 2640. 1529 OTAL ASSETS. 200CKHOLDENS EQUITY ARCHITLES AND STOCKHOLDENS EQUITY RECEDENT LIABLLITIES		6.96	6396-	6396	6396	6396.		
PREOPERATING EXPENSE 12071. 120 STORE AND SPARES 204971. 2849 AMORTITAL 2849 TOTAL FIXED INVESTMENT 175117. 1581, OTAL ASSETS. 4729 ABILITIES AND STOCKHOLDENS EQUITY RRENT LIABLLITIES		12492-	12492.	12492	12492.	12492		
STOKE AND SPARES 2049772 2849 AMORTIZAL AMORTIZATION 2640 Z610 TOTAL FIXED INVESTMENT 175117- 1581 OTAL ASSETS 4729 ABILITIES AND STOCKHOLDENS COULTY RRENT LIABLITIES		15051	13071	12071	1207	13071		
AHORITZALION SEASON ZOANO ZANO Z		8118	5118	8118	8118	8118		
AMCKTIZATION SOLUTION SOLUTION SOLUTION SOLUTION SOLUTION SOCKHOLDENS COULTY SOCKHOLDENS COULTY SECONT STACKHOLDENS COULTY SOCKHOLDENS COULTY SOCKHOLDENS COULTY SOCKHOLDENS SOLUTY SOCKHOLDENS SOCKH		28 4U 77 E	20 40 77	11500	20 47 67	1044		
LESS: DEPRETATION 122929 1529 1529 1529 1529 1529 1529 15		20100	70 100 100 100 100 100 100 100 100 100 10	20100	20107	00707		
433559. 4729. EQUITY 964. 9		124133	107158	90143	75146	56153		
EQUITY:		525896.	552349.	\$78803.	605257.	631710.		
964- 964					8		Þ	i.
250				1	-		: 	
4 4 4 4 4 4	464	964	9.64.	064	964	296		
29525*	42501-	42501-	42501	42501.	42501.	42501.		
STOTAL CORRENT CLABES SOABY 43465-	43465.	43465.	+3465-	43405	43405	424034	***************************************	
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SHARE CAPITAL TOXAGE TOXAGE TOXAGE	102478	102478	102478	437860	102076	485768	•	
2562v 27620v 1700	ł	37457	508884.	535338	561792	588245		
				4				
TOTAL CSCT C STXS EDUITY 455559 472988	Z 7 7 6 6 7 6 6 7 6 7 6 7 6 7 6 7 6 7 6	525876	552344	> 78803-	603237	4077.150		
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CASH PROVIDED BY CASH BALLANGE Co.	YEAR	1086	1987	1588	1,680	1600	1001	7,693	1963	7557	1,555
DECINITION CASA SALANCE 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	THE MALE AND PROPERTY AND PROPERTY AS A ST.			The state of the s	1 TO	The second secon	4		3	96.4.4	ď
### ### ##############################	BALANCE		•	•	0	3719	ار اور	v	* D D	200101	4
PAGE AT 100 ST 1	T.										
NET IZCONE MENTIZATION MENTIZ	OPERATIONS:			# # * * * * * * * * * * * * * * * * * *			- 5		7 (7 7	A7508.	68564
	NAT HEADORN	o c		• •	00044	15255	4 V 5 V 5 V) W	15255	15255	~
STATE OF PAY					1740	1740	1740-	4.0	1740-	1740-	1740
THE PARTY THE	INCREASE IN ACAT	ő	ô	o	675-	289-	ċ	o	o .	ò	3
UNGERIASE IN AFTER TOWN	ASE IN ACNT	o	ė	0	23001-	7006	- 2	1112-	\$2.	25	3
MAGENTAL PROPERTION	THEREASE TW PROC				010	400	4 0	* d		6	
CCATINE PROVIDED COASTAL DAMS COASTAL LOANS COAS	TOTAL FRO				25.741	66545	<u> </u>	80493	83058	242	85506
LONG TERM LOANS 32033 146441 31655 0	CAPITAL PROVIDED	50743	£000.	30744	0	6	0			0.	ķ.
## APOLICO TO ## O	LONG TERM LOANS	50203	187432	31,655	o.4.	065.65	76044	040	- 8.505.8	84542	550
######################################	CASH APPOLIED TO	. .	c		0	ó	0	0	6353.		26801-
CONG. FERRITCH CONG. Co. C	PRINCIPAL PAYMENTS:	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	٥		-22467	22467.		ö	ė	ó	ò
NTEREST ON JUNE 1	CONCITERMITTO AND			0	26075	26075	26075	26075	26075.	26075	26075
INFERENCE ON LONG LOANS TATAL TATAL FIXED INVESTMENTS FIXED INVESTM	7.			0	2247	1123	0 9	0000	7822	\$736.	3650
#IXED JANVESTHENTS 58550- 179156- 47289- 505745- 38069- 38983- 40251- 56888- 5 TOTAL CASH APPLIED 60746- 187452- 62699- 22021- 5597- 37075- 44810- 42807- 27714- 2 **NET CASH THOREASE 0- 0- 0- 3719- 2597- 37075- 44810- 151089- 157089- 15	INTEREST ON LONG LOAN.		36	15.610	18413.	15264	11994	80.00	1822	5756	3650
NET CASH TRINCREASE - NOTICE ASSTRANCE - NOT	FIXED LINVESTRENTS	56550	2.5	47289	22021	 53.75.9 	38.069	35983	40251.	56828	56526-
NET. CASH TRACREASC COUNTY CASH BALANCE O									1 4 4 6 5 4 1	*** **********************************	28070
CHOING CASH BALANCE SALANCE STRANCE SALANCE STRANCE SALANCE STRANCE STRANCE SALAN	NET CASH INCREASE	0	•	Ó	9.7.7.5 9.7.7.5	-/662	*(/#/>))) ()	• 000	# * V. J. J. J	
SALANIANUM CASICRECOTREMENT OF THE STATE S	ENDING CASH SALANCE	0	6	0	377.5		20.202	98801	151608.	*225651	188201
	THE MENT CASH TREGOTREMENT	0	8		3719	2031.	51.70	₹ :	5135	5686-	\$08 0.
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)			• •			#		** 5.4%		
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	2003	491807		68954.	15255		0	65940	85040	42501.	6	o	42501.	43449.	535255	5059.		-		ACCOMPANY MANAGEMENT OF THE PROPERTY OF THE PR		-				
_OATE_112581	2007 2002	404.909- 448358-	C. II	8054. 68954.	\$255. 1340.			*6765B *6765B	65949	42501."" 42501.	•0		42501- 42501-	43449. 43449.	448358. 491807.	5059. 5059.			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	A Section of the sect					A William Control	. •
	2000	361461. 40		A8054.	15255	2014		8 5949=	8 5940			o.	42501	A3440. 4	404900- 44	5059	* 1, * 1, * 1, * 1, * 1, * 1, * 1, * 1,	The state of the s	\$ 2000	He is produced to	A STATE OF STATE	12 27 2 30m		the second of th		
	1000	318012		48054	15255		0.0	85949*	85949	42501		•	42501.	45449.	361461-	5050.	,			1.10				*		
ATEMENTS	1008	274565-		8064	15255	- C-	•0	8 59.49	8.20.40	42501-	ė		42501.	43449.	318012.	5050.									1.00	
CASH FLOW STATEHENY	7001.			48044	15255	047.	13.	85936-	85936	29525.		0	20525	-56411-	274563-	5059	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1						·		N. 12	
	2661	188361- 218153-		7400	15255	1760.	\$2.	85010	8581.8	28327.	26075.	1564.			218155-	- \$050	1.41.1				A to the second of	· · · · · · · · · · · · · · · · · · ·				:
PROJECT NAME GUANSANGIOGO	YEAR.	1 4	CASH PROVIDED BY		DEPKECTATION	AMORTIZATION	INCREASE IN ACNT ROV	ERATION	TOTAL CASH PROVIDED	CASH APPCIES TO INCOME TAX PAYMENT	PRINCIPAL PAYMENTS.	INTEREST PAYMENTS:	TOTAL CASH APPLIED	METACASH INCREASE	ENDING CASH BALANCE	MINIMUM CASH REQUIREMENT										

	PROFIT			INCREASE				
YEAR INVESTMENT	BEFORE TAX	DEPRECIATN	INTEREST	CAPITAL	TAX	- DISCOUNT FACTOR	りかにいまずずく	•
1986 58550.	0	•	o	Ö	-58530-	1-00000	-58530-	
1987 .179158.	0	0	Ü	0	-179158.	837673	-150070-	
1988 47289.	0	0	0	Ö	-47289.	70107	-35185.	
1989 0.	17131.	16995.	18413.	26798.	25741-	-587792	15130-	
1000 00	42226.	16995.	15204.	8082.	66545.	.492378	32066.	
1001	50178	16995.	11994.	3124.	76044	.412452	31365.	
1992 0.	54701.	16995.	99.08	1112.	80493.	*3*5500	27810-	
1993	58293.	16995.	7822.	\$\$.	83058	-280416	24038.	
1004	61862	16995-	5736	52.	84542	.242436	20496.	1
12995a 1275a 2000	64914.	16995-	3650.	53.	85506.	.203082	17365	
*O. J. J. J. A.	67310	16995	1564.	.55.	65818.	170117	14599.	
1997	68954	16995.	0	'n	85936.	-142502	12246.	
1998	68954.	16995-	,	9•	65949.	.119370	10260-	
10000 TO 10000	68954	16995=	0.	•0	85040-	.00003	B 594.	
2000 147 1 4 4 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1	48954	16995	•0	•0	85949.	-085762	7100.	
2001	68954	16995.	- 0	•0	85949.	•070165	-1404	
2002 0.	68954	16995.	0	• 0	85949.	-058775	\$052.	
2002	68954.	16995	. •0	•	65940.	.049235	4232.	
TERMINAL WALUE		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	* 13 to 2 to 2		.05491.	- 4.049235	4701-	
	e e e e e e e e e e e e e e e e e e e	A STATE OF THE STA	40,24.5		ď	1 4010°.	* 1	
•	INTERNAL RATE	TE OF RETURN 19	× 65.	CBEFORE TAX)				
THE RESERVE THE RE				ALANDON LINE TO A COMMENT OF THE PERSON IN CO.			* (14 16 16 16 16 16 16 16 16 16 16 16 16 16	

	PROFIT			INCREASE				
YEAR INVESTMENT TAX	AFTER TAX	DEPRECIATN	INTEREST	IN LUGRKING CAPITAL	G AFTER TAX	PACTOR	VALUE	
1986 58530-	• • • • • • • • • • • • • • • • • • • •	• 0 .	•0	0	-58530.	1.000000	-58550-	
1987 179158	0	0	0	0	-179158.	*870046	-155676.	
	o	• Communication of the	4 O	0	-47289	.756980	-45787-	
0861	17131-	16005.	18413.	26798	25741.	.658.608	16953-	
7000	.42220-	16995	15204	8082	66343	-573019	38016.	
7.667	50178	16995.	11004.	3124.	76044	.498553	37912.	
	-	16995	9006	1112.	74140.	.433764	32159.	
1993	53276-	16995	7822.	\$2.	58041.	377395	21904.	
	•	16995-	\$736.	\$2.	57741.	.328351	18956	
1995 0.	36587.	16995	3650.	53.	57179.	-285680	16335	
1996-	37785	16995	1564.	52.	56293.	.248555	13992.	
	26454.	16995	•0	15.	43435.	.216254	9393.	
1998	26454.	16995.	. • 0	•0	43449.	.188151	8175-	
1994	26454.	16995	*0.1	0	43449	.163700	7113-	
2000	26454.	16995	•0.	0.	43449.	.142427	6168-	
2001	-	16995	0	0	43449.	.123918	5384	
2002	26454	16995	•0	0	43449.	-107814	4684	
2003	26454.	16995	•0	0	43449.	.092803	4076	
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(TAX HOLIDAY 7 YEARS)

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STSEE COSTS										
FACTORY VARIABLE COST					-			1.671	11571	11571
RAW MATERIACS	•	0	ó	8100	113/1	95991	25221	25221	25221-	25.221-
FUEL (COAL)	٥	٥		, (85.5) (85.5)		25056	25056	23036	25056	25056
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FACTORY FIXED COST	•							7886	40.50	4089
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21			:						
OPERATING COSTS									
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TXXXXXQXTX1XQX COST	10800	10800	10800	10800	10800-	10800	10000	10800	
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TOTAL	37380-	37380	37380	00000					
NET' INCOME	68874.	68954	68954.	68954	68954	68954	08424e	426,000	
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		311077- 311077-	294082	277087	26009Z=	24.2047	201077		
	748374	577077	325274	\$19248		37.1078		!	
TOTAL ASSETS		,					4641964	439583	478824
TELAGICITIES AND STOCKHOLDERS EQUITY			-	Đ					
CURRENT CIABICITIES	V	-0	22467.	•	Ô	ô	0	o	o
			6/3	726	726	1984	* 99A	400	3 .
31.5-	•	0	23142.	204	964	964.		**************************************	
-LONG TERM LOANS 30203.	176644.	208599-	.182524.	1.56449-	130374.	104300-	.78225	\$2150	26075-
ATOCKADO BOUTTY							: 0269	*R/ Y/O	87.470
307	F	107.478	102478	102678	97470	164736	222520	2043914	
RETAINED EARNINGS TOTAL SO743	XI734-	102478	11000	161835	212013	266714	325007	386869	
TOTAL LELY & STKS EQUITY 609465	248378-	5170775	325274	310248	343352	37,1978	464196	439983	478822
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PROJECT NAME GUANSA	GUAMSANG1080 B	BACANCE SHEET	نار			DATE	112581	1	And the state of t
YEAR	9661	1001	1008	9667	2000	1002	2002	2003	
A\$\$675 Francisco Control (1975)									
CURRENT ASSETS ENDING CASH BALANCE	304650.	387738-	443340	408042	554544	610146-	665748-	721350-	rational for the control of the same of th
ACCOUNTS RECIEVABLE INVENTORIES:	54547	34560	24.560	34560	>	24560	54560	34560	
PRODUCTS	5.027	420.6	7.700	4205	4200	4.209	4205-	4200	
TOTAL CURKENT ASSETS	344939	478040	483642	536244	594846	650448	706050	761652	
PLYED INVESTMENTS	244000	244000	244000	244000	244900	244000		244900	
	004 W Y	2000	2000	Y 02.Y	7017	200.9	2007	**************************************	
CANO PRESIDENCE	12492	12492	12492	12492-	12492	12492	12402	.12492.	
PREGOCALTING EXPENSE	13071	13071	13071	13031	13071	12021	12071	12027	
STORE AND SPARES	8118	9118	9118.	6118	8118	8 V.18.	8.1.6	8118.	÷.
70 FF47 FF00x4	******	26100		444444 44100	100440X	100196	24100	-00146	
CESST OFFECTATION	135.65.	152954	160040	186944	203030	220034	23792	254924	
	175117	158122	14.1128	124133	107138	9.0143-	75348	56153-	
TOTAL ASSETS	520057-	586163-	624770.	663377.	701984.	74059Y-	770198.	017805.	
LIABILITIES AND STOCKHOLDERS COUITY	RS EQUITY				-	: 1	-		
PROUPLING TAX	764°	20347	30347	30347	30347	30347	30347	30347	ا المحتمد المح
TOTAL CORRENT LIMBLS.	3813	51311	Sisti	51371	51311	Sisir.	Sisil.	51311.	
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SEARCH CADALLAS	The state of the s	167,6782	102/1/8	.X0Z478	102678	107.78	102478	1.02478	
RETAINED EARNINGS	415766	452373	49 0980	529587	568194	60680I.	645408.	684015.	
TOTAL STOCKALD EDULLY	2.024	224821	202458	632065	6 706 7.4	4025601	74/836	66475	
" דסדאנ' נפנד' א "ארא "במעדרי"	520057	586163	624776	-663377	701984	740507	779198	817805-	
Annual Control of the									-
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YEAK	1986	1987	1988	1989	1000	1001	2661	٤٥٥٢:	7007	5667
BEGINNING CASH BALANCE	0	o	o	0	3719.	6317.	44292	88801-	137962.	190692
CASH PROVIDED BY					-					
OPERATIONS:										
NET INCOME DEPRECIATION	00	0	00	35584	57450	15255	64610	66115	15255	68564
INCREASE IN ACN'T DAY	00	00		1740	289	1740	1740	-	1740	1740
INCREASE IN ACNT RCV	ė	ö	:	23081.	7006.	3138-	1112.	53	5	3.5
TACKEASE IN PROCING		0	0	3310	• 906	14.	1	0	0-	ó
INCREASE IN MATE INVIT	• •	00	•	1073 25761	460	76044	80408	83058	84542	85506-
	10000	140441	440000		000	60	.	66		် ဝ
TOTAL CASH PROVIDED	60046	187452	62699	_2574 Y.	6654.3	76042	80403	82028	84542	9055e
CASH APPETED TO PRINCIPAL PAYMENTS:									***************************************	***************************************
SHOKT TERM COANS	o o	00	00	26075	26075	26075-	26075.	26075	26075	20075
		•0	•0	224.7	1123.	0	0	•	6	ó
TOTAL	2416	8274	15410	16166	15204	11094	9008	7822	5736	7650-
ΕŦ	58550	187432	47289-	22021	62745	38069	35084.	33897	32811	20725
WET CASH INCREASE	6	•	0	3719.	2597.	37975.	44510	49160	\$2730-	55781.
ENDING CASH BALANCE	o.	•	•6	3719.	631.7.	44292*	SBBOL.	137962+	190692	246472
	*0	•0	ő	3719	\$03T	.\$-170	5184.	5135.	5086.	5056.
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PROJECT NAME COAMSANCIONO	1	CASH FEGUTST	STATEMENTS	-		CAS	ווווווווווווווו		
YEAK	9661	100L	naa"	٨٥٥٤	2000	7007	2002	2002	
BEGINNING CASH BATANCE	246472	304650=	307738-	443340	498942	554544	620246	665748	
CASH PROVIDED UV									
OPEXALIONS: NET INCOME	68874.	68954.	68954.	66954.	68954-	68954	68954	68954.	
DEPRECIATION ABORTIZATION	1740-	15255	15255	15255-	1740-	1740	15255-	1740.	
200 120	S	-11	9	ő	• 0	0	3	ó	
KERSE IN SEKATION	ĸ	82028	82440	85949	62949	85949	85040	85949-	
TOTAL CASH PROVIDED	85819-	85936-	25940	3204V	N5949=	85949	85040	85949	
CASH APPEIXED TO TAKENT	•	26.46.	30347	30347.	30347	30347-	30347-	30347	
PRINCIPAL PRYNCHES.	26075	ė	ó	٥	ô	0	•	0	
	773			ó	ó	8	8	Ö	
TOTAL CASH APPLIED	27630	26.46	30347	30347	30347	30347-	30347	30347	
NET CASH INCREASE	58178.	63086-	55602.	55602.	55602-	55602*	\$5602.	\$5002-	
ENDING CASH BALANCE	304650.	387738.	443340.	498942.	554544.	610146	665748.	721350.	
HINIMUM CASH REQUIRENENT	5050.	\$050.	5059*	5050.	5059-	5059.	5059.	5050.	
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TERMINAL VALUE		95491	-049235 470X-

a fire a capital of the or commenced affected supply the fire time contract payments of the order of the

; ;		PROFIT			INCREASE	- 1	1	
YEAR INVESTMENT	F.Z	AFTER TAX	OEPRECTATN	INTEREST	CAPITAL	TAX	FACTOR	VALUE
1986 58530-	6	Se Section		•	0	-58530-	1-000000	-58550-
1987 179158		0	0	0	0.	-179 158	-848211	-151964-
	•	ó	0	0	0	-47289-	719463	-24023-
:		17131-	16995.	18413.	26798.	25741.	.610257	15708.
1990		42226	16995.	15204.	8082.	66343.	.517627	34341.
	ė	50178-	16995.	11994.	3124-	76044	439057	0.000
	•	54701-	16995.	0000	1112.	80493.	.372413	20977.
1993 0		58293.	16995.	7822.	52.	83058.	315885	26237.
		61862.	16995.	5736*	52.	84542-	.267937	22652.
	٥	64914.	16995-	3650	53.	\$5506.	.227267	19433.
	ું	04461.	16905-	1564	52.	82969.	.192771	15994.
	٠	36 607	16995-	• 5	13.	5558%.	.163510	0085
	٥	38 607.	16995.	•0	. .	55602	138691	7712.
	٠	38607.	16005-	. 0	O	55602	117640	654X •
	ė	56607	16995.	0	0	55602.	.099783	5548-
		38607	16095	0	•0.	55602.	08.4637	4706.
	؞	58607.	16995	0	0	55602*	.071790	2005.
		38607	16005.	•0	0	55602-	.060895	3386.
MAI "VA! 11F					-	95491.	.060803	5815.
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		TNYERNAL RATE	OF RETURN	17.90 X CAPTER	ER TAX)			
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AX DEPRECIATN RELAYMENT 0. 0. 0. 0. 0. 0. 131. 16995. 3608. 125. 16995. 26075. 101. 16995. 26075. 101. 16995. 26075. 101. 16995. 26075. 101. 16995. 26075. 101. 16995. 26075. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0. 101. 16995. 0.	17131.		-	INCREASE			
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CASE B-5

(ALL PRODUCTS CAN BE SOLD AT M\$192/ton IN KELANTAN AND TRENGGANU)

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いないのできません。	-	40.59	4050	4050	4059	4050	4050	4059		
TALITURANCE COST		4872	4871.	4871	4871	4.871	4873	4871		
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して ひんりならい かんけいしん いっぱん かんりん	14.13	871	871.	87.1	871	671	877	871	Participal of received in a september	
TOTAL	29782	24782	29762	20782	29782	29782	29782-	25782		
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ING INCOME	106534.	106334.	106334.	106334	106334	106334.	106334	106334.		
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PROJECT NAMET COMMSANGIONO TINCOME STATEMENT

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ATTACHMENT II

CONSTRUCTION COST LIST

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Construction Cost List

1. Materials

	· · · · · · · · · · · · · · · · · · ·				
No.	ltem	Description	Unit	Unit Rate (Malaysian \$)	Remarks
1.	Cement	Туре-1	Bag (Ton)	9.60 (192.0)	Bagged Cement
2.	Reinforce steel bar	Mild steel SR24 ø 16	Ton	1,000	
3.	Reinforce steel bar	High yield steel SD40 ø 16	Ton	1,000	·
4.	Crushed stone	25mm under	Cu.yd	25	•
5.	Crushed stone	40mm under	Cu.yd	25	୧୯୯୫ ବିଜ
6.	Fine aggregate	Screened sand	Cu.yd	8.50	
7.	Aggregate	25mm under	Cu.yd	- 25	e de la companya de
8.	Aggregate	40mm under	Cu.yd	25	
9.	Ply wood	12mm thickness 4' x 8'	PC	31	-
10.	Timber	Typical section 4" x 4" x 10"			-
		Söft wood	Ton	350	
		Hard wood	Ton	600	
11.	Galvanized iron sheet	1/16" × 3' × 8'	PC	10	
12.	Absestos cement sheet	1/4" × 4' × 8'	PC	10	
13.	Structural steel plate	Typical thickness 9mm SS41	ЯЪ	60	
14.	Structural steel angle	Typical section L-65 x 65 x 6	fр	70	
15.	Fuel	for Car	Liter	1.12	
16.	Roof tiles	1'-3"x9"			
İ		Butterfly tiles	PC	1.50	
		Redland tiles	PC	1.50	
17.	Vinyle pipe	Typical section 100¢ x 3000	PC	30	

No.	Item	Description	Unit	Unit Rate (Malaysian \$)	Remarks
18.	Reinforce concrete hume pipe	No pressure Class 'Y'	S ft	73.80	
-		\$24" \$30" \$36"		105.60 138.00 202.20	a i
		\$42" \$48" \$60"		255.00 312.20	
19.	Brick	4%" x 9" x 3%"	PC	.15	
	, 3	9" × 9" × 3%" 13%" × 9" × 3%"	sq.yd sq.yd	28 50	

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2. Works

No.	Item	Description	Unit	Unit Rate (Malaysian \$)	Remarks
1.	Excavation	Up to 2m	Cu.yd	1.20	
Ì	Excavation	Up to 3m	Cu.yd	1.80	
	Excavation	Up to 5m	Cu.yd	2.50	
2.	Land levelling	Cutting, Moving, Filling	Cu.yd	1.00	
3.	Concrete	1:3:6 mix.	Cu.ft	7	
	(inc. form works)	1:2:4 mix.	Cu.ft	9	a ;
4.	Concrete (inc. form works)	1:1%:3 mix.	Cu.ft	10	
5.	Reinforcing steel	Supply & erection			* · · · · · · · · · · · · · · · · · · ·
		5/8"¢ above	ŔР	80	
		1/2"¢ below	ЯЪ	85	···
6.	Asbestos cement sheeting	Supply & erection	Sq.yd	2.52	
7.	Galvanized iron sheet	Supply & erection	Sq.yd	2.52	e d e la est
8.	Brick wall	Supply & erection	140 J. Y		
		9"	Thick	28	turk eta
Ì	;	1315"	Thick	50	

3. Labour Fee

No.	Item	Description	Unit	Unit Rate (Malaysian \$)	ne i Remarks e pi
1.	Technical manager		Month	4.000	
		1,4		5.000	
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2.	Technical assist. manager		Month	2.000	
				3.000	
3.	Surveyor	2 11 to 14 21	Month	800	in the second second $ar{k}_{ij}$.
4.	Surveyor helper		Day	\$	
5.	Člask	-	Month	450	
6.	Typist	-	Month	400	
7.	Cook		Month	300	
8.	Nurse		Month	550	_
9.	Office boy		Month	180	
10.	Driver	Car, land-rover	Month	220	
Hİ.	Staff	10 years or more	Month	3,500	<i>:</i> :
12.	Foreman		Month	1,500	
13.	Earth worker		Day	12	
14.	Concrete worker		Day	20	
15.	Carpenter				
		Local	Ďay	25	j
		Outside	Day	30	
16.	Steel fixer		Day	20	
17.	Structural worker		Day	40	
18.	Roofing worker		Day	40	
19.	Plaster		Day	25	
20.	Water proofing worker		Day	25	
21.	Tile worker		Day	25	

- 1 - 1

No.	Item	Description	Unit	Unit Rate (Malaysian \$)	Remarks
22.	Brick mason		Day	30	
23.	Painter		Day	35	
24.	Electrician		Month	600	
25.	Mechanician		Month	700	
26.	Plumber		Day	30	
27.	Welder		Day	30	
28.	Equipment operator		Day	40	
29.	Car driver	Truck	Day	20	
30.	Machine operator		Day	25 } 30	
31.	Common labourer		Day	16	
32.	Duct worker		Day	16	
33.	State worker		Day	20	
34.	Watchman		Day	10	

Notes: 1. Unit costs mentioned above have been collected in Kota Bharu.

2. Prices for the cost estimation of this project has been set, as 10% greater than above unit costs.

3. Regarding labour fee, it has been set 20% greater in GuaMusang and Jeli to compare with Tanah Merah.

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ATTACHMENT III

SCOPE OF WORK

SIGNED ON MAY 13, 1981

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SCOPE OF NORK

FOR

THE FEASIBILITY STUDY

ON.

THE ESTABLISHMENT OF INTERPATED CINERT

INDUSTRI IN KELANTAN, KALAYSIA

AGREED BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

PINU PRIMALE DIAGNOSE

DATED : ON 16th HAY, 1981

(KR. HIECSHI SUCTURA)

leader of the Japanese Study,

JAPAN INTERNATIONAL

COOPERATION AGENCY.

(TAH SRI ISHAK BIN PATEH AKHIR) DIRECTOR GENERAL, ECONOMIC PLANNING UNIT, PRIME HIMISTER'S DEPARTMENT

The Japanese Study Team organized by the Japan International Cooperation Agency and headed by Fr. Hiroshi Sugiura exchanged views and has a series of discussions in Kuala Lumpur from May 12 to May 13, 1981 with representatives of the Economic Planning Unit and other Authorities concerned on the Scope of Works for the execution of the Study.

As a result of the discussions, the Japanese Study Year and the officials of the Government of Kalaysia hereto agreed upon the Scope of Works.

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Ç.	ুন্দুৰ্ব, আন জীয়েল (১ জাকলাই) সংগ্ৰিক নামৰী ইনি নামৰী ইনি নামৰী ইনি নামৰী ইনি নামৰী ইনি নামৰী হৈছিল। নিজৰী	* 3 1.7

I. BACKGROUND

- 1. The Federal Government of Malaysia, in pursuit of its intention to accelerate economic development is actively encouraging the establishment of resource-based industry and a scheme of incentives to locate industry in less developed states is in operation.
- 2. In Kelantan, cement required mostly for various types of works have to be supplied by the cement producers located at the western part of Peninsular Malaysia, resulting in higher cost of transportation.
- 3. On the other hand, demand is expected to outstrip production by the late eighties. This provides opportunity for the set-up of cement plant in Kelantan which would contribute to accelerating the economic development of the state as well as utilizing its abundant limestone resources.
- 4. Under this circumstance, the Government of Malaysia decided to study the possibility of establishing a cement factory and requested the Government of Japan to make a feasibility study of the cement factory in February, 1981.
- 5. In response to this request, the Government of Japan decided to undertake the study and has entrusted the Japan International Cooperation Agency (here inafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation of the Government of Japan, with the task of carrying it out.
- 6. Such being the case, JICA has decided to despatch to Halaysia a study team (here inafter referred to as "The Japanese Study Team") consisting of ten experts.

II. OBJECTIVES

7. This feasibility study, which will be based on the egreed scope of work is to study the possibility of establishing a viable cement industry in Kelantan from technical, economical and financial viewpoints including surveys on limestone deposits and the proposed factory sites, and surveys on market and distribution.

4. 李小元 经货厂

III. SCOPE OF STUDY

- 8. To achieve the above-mentioned objectives, the work of The Japanese Study Team will include undertaking of field surveys and discussion with Authorities/organisations and industries concerned in Malaysia.
- 9. The range of the study will be based on the following conditions:
 - (i) Market survey and estimates of demand will be studied within Kalaysia, however, Singapore and any other countries will be considered if they have export potential.
 - (ii) The limestone resources of Kelantan will be reviewed and the most promising deposits (including Gua Musang) will be examined for the suitability of limestone, the amount of usable reserves and the ease of quarrying.
 - (iii) Plant sites appropriate for these deposits will be determined.

 The team will survey Jeli, Tanah Merah, and Gua Husang
 industrial estates as possible locations but not necessarily
 be confined to them.
 - (iv) Detailed financial and economic analysis of the main alternatives in respect to plant size, location and degree of integration will be performed.

- 10. Field survey will be conducted in three sectors which will be carried out as follows:-
 - (1) Market survey.

The following items will be studied:

- (a) Collection and analysis of cement consumption data in the whole of Kaleysia, West Maleysia and east coast states of Kelantan, Trengganu and Pahang with details such as the grade, quality, package, transportation, price, payment and so forth.
- (b) Analysis of the production and sales activity of existing and intending manufacturers based on present capacity, quality, sales, process, likely age of production plant, ray material and utilities.
- (c) Review of qualitative factors, covering customer attitudes and preferences, import restrictions, governmental influences and methods of marketing.
- (d) Preparation of market demand and supply forecasts showing in total and by product grade, customer category, location for the period up to 1990 with sales performances up to 2000.
- (ii) Rew Haterial Survey

The following items will be studied:

- (i) Review of past works in this field within Kelantan
- (ii) On-site surveys for clay, siliceous materials and iron ore in accessible areas close to the proposed cement plant sites including sampling for analysis.

- (c) A review of the limestone resources of Kelantan and on-site surveys of the most promising deposits including but not necessarily confined to Jeli, Gua Husang and Dabong.
- (d) Analysis of samples of materials to prove the suitability of identified deposits for the intended purpose.
- (e) Study for limestone querry including transportation and crushing units.

(111) Cement Plant and Infrastructure Survey.

The following items will be studied:

- (a) Collection of published and/or unpublished documents concerned with natural conditions and, in particular, soil conditions at the proposed desent factory sites.
 - (b) Collection of papers and discussion on infrastructures in Kelentan connected with economic and industrial development program in the State.
 - (c) Collection and analysis of technical and cost data on gypsum, fuels, packing materials and maintenance materials including utilities, labour cost, pollution regulation and the past experience on construction. Particular attention should be paid to fuel alternatives especially coal and natural gas and the implications of conveying these fuels to the plant site.
 - (d) Field survey on the proposed factory sites and infrastructures such as ports, roads bridges and railways for the study of transportation and freight of plant equipment, fuels, products and necessary materials.

- (e) Estimation of site construction and plant costs, financial and other costs required for the financial and economic analysis.
- (f) Assessment of the environmental impact of the cement plant.
- (g) Katrix preliminary analysis including the degree of integration and effects from infrastructures on the combination of limestone quarries and denent plant sites versus its capacity in accordance with demand estimates to find two or three feasible cases.
- (h) Detailed study on the said cases such as layout, equipment list, rew materials consumption list, utilities, manpower, consumables and the entire project implementation schedule.

(iv) Financial and Econosic Analysis

After the completion of the three studies (above-mentioned (1), (2) and (3)) detailed financial and economic analysis will be conducted for the agreed alternatives :-

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- (a) Estimates of the pre-operating cost, including investment cost required for plant and equipment, land, building ocean and inland freight, site construction and other necessary items.
 - (b) Projection of all costs and expenses for 5 years from commencement of production and, if break-even being not attainable within that period, up to the time of break-even.
 - (c) Projected yearly profit and loss accounts, working capital requirements, cash flow and financial and economic rates of return including sensitivity analysis.

IV. SCHEDULE OF REPORT PRESENTATION

- (1) An inception report (25 copies) containing a detailed statement of proposed procedures and work schedule will be submitted for discussion to the Government of Nalaysia before The Japanese Study Team leaves Malaysia.
- (ii) An interim report (25 copies) shall also be submitted for discussion within 24 months after The Japanese Study Team leaves Halaysia. The report should include an outline of the work performed during the period and indicating the progress under each major category of the Scope of Work as agreed. It should also include preliminary results of the technical, financial and economic analysis of the main alternatives.
- (iii) The draft final report written in English will be prepared and submitted (50 copies) for discussion in Malaysia, 2% months after the discussion on the interim report. The report should contain a summary of all work performed during the study, the finding and recommendations of the consultants based an the discussion of the interim report. Maps, plans, tables and diagrams will also be included.
- (iv) The final report written in English will be prepared and submitted (50 copies) 2 months after the discussion of the draft final report, incorporating all changes required and agreed upon during the said discussion.
- (v) All reports when finalized and submitted to the Government of Halaysia shall remain the property of the Government of Halaysia.

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V. CONTRIBUTION OF THE GOVERNMENT OF HALAYSIA

- 11. Cooperation and services on the following items would be highly appreciated:
 - (1) Furnishing of necessary information and data
 - (ii) Attendance of proper personnel from the Kalaysian Government and Authorities/Organization as required for the field survey.
 - (iii) Arrangement and provisions of the following necessary facilities and conveniences for the field survey:
 - (a) Helpers for raw materials sampling
 - (b) Land rovers around raw materials deposit
 - (c) Conference room facilities when necessary
 - (d) Clerk and secretary services
 - (iv) To exempt the Japanese Study Team from taxes and duties normally accorded under the provision of General Circular No. 1 of 1979 for materials, equipment and personal effects brought into Kalaysia for the purpose of the Study.
 - (v) To indexnify any member of the team in respect of damages arising from any legal action against him in relation to any act performed or omission made in undertaking the survey except when the two Governments agree that such a mamber is guilty of gross negligence or wilful misconduct.
 - (vi) To inform the members of the team of any existing risk in the study area and take any measures deemed necessary to secure the safety of the members of the team.

VI. CONTRIBUTION OF THE GOVERNMENT OF JAPAN

- (i) To bear necessary expenses for the execution of the study excluding for the items mentioned in 5. (Undertaking of the Government of Kalaysia).
 - (ii) To provide Study Team to undertake the feasibility study of the above project.
 - (111) To transfer the knowledge to the Malaysian counterpart personnel during the study period.

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ATTACHMENT IV

MINUTES OF MEETING

ON DEC. 24, 1981

Telefon: 200133
Kawat: Economics

Telex: EPUPH MA 30098

Bilangan Surat Kita; (6) dlm. UPE 32/1/56

Bilangan Surat Tuan;

BY HAND

January 11, 1982.

Mr. N. Abe, Resident Representative, Japan International Cooperation Agency, 23, Jalan Ampang Hilir, Kuala Lumour.

Dear Sir,

Re: Kinutes of Steering Committee Meeting for The Peasibility Study on the Establishment of an Integrated Cement Industry in Kelantan

With reference to the above matter, enclosed herewith a copy of minutes of the meeting held on 24th December 1981 for your information and retention.

Yours Sircerely,

(Salam bin Shawal)
on behalf of
Director General
Economic Planning Unit.



UNIT PERANCANG EKONOMI JABATAN PERDANA MENTER KUALA LUMPUR 11-01 MALAYSIA



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Service de la composition della #### Hinutes of Steering Committee Meeting for the Feasibility Study on the Establishment of an Integrated Cement Industry in Kelantan

Date : 24th December 1981

Time 1 9.30 a.m.

Venue : Main Conference Room Economic Planning Unit

Prime Minister's Department

Present:

Mr. Rahim Din - EPU, Deputy Director General (Chairman)

Ms. Raja Zaharaton Raja Zainal Abidin - Hinistry of Trade and Industry

Hr. Johan Hurad - Ministry of Public Enterprise

Fr. Wan Yahya Wan Salleh - SEPU Kelantan

Kr. Ismail Bukhary - SEPU Kelantan

Fr. Kike Stevens - SEPU Kelantan

Mr. Chew Bang Chyuan - MIDA

Hs. Hindun Tahir - EPU

Kr. Ryutaro NODA - JICA

Fr. Tetsuya HIRONAKA - JICA

Nr. Keiichi NUKNNE - JICA

Fir. Kunihiko TADAKA - Erbassy of Japan

Kr. Salam Shawal - EPU (Secretary)

Absent

Hr. Azmi Ali - Treasury

Hr. Abbas Salleh - SEDC of Kelantan

I. Introduction

1. The Chairman velcomed all numbers present. The meeting was informed that the objective of the meeting was to discuss the Droft

Final Report (DFR) which was earlier presented by JICA.

II. Discussion

2,1. Energy Resources

- 2.1. During the discussion on the Interim Report, the Japanese Study
 Team (JST) was required to analyse world demand and supply of coal. JST was
 also asked to indicate the difference in cost per ton cement due to transporting
 coal from the port of entry to Kelantan compared to that of the West Coast
 Cement Plants. After much deliberations, the Committee was satisfied with
 the analysis undertaken in the DFR.
- 2.2. However the Committee requested JST to show operational procedures and methods of securing a steady supply of coal from international suppliers in the Final Report.

3. Comparison of Capital Cost

- 3.1. JST had been requested to carry out a comparative study on total capital cost for a cement plant vis-a-vis other producers local as well as abroad. Comparative studies on capital cost vis-a-vis local producers using average figures for all producers have been undertaken by JST in the DFR (Page 276). However, the Committee was informed that to undertake a comparative study vis-a-vis international producers was a difficult task and beyond the scope of work of JST.
- Report so as to maintain the fact that all costs quoted in the study were reasonable and competitive internationally.

4. Harket. Strategy

4.1. JST was requested to further exclaim on the marketing strategies adopted in the DFR. JST assumed that 100% of cerent demand for Transcerni

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and Kelenten could be supplied by the Kelantan Cement Plant. This assumption was questionable while Kelantan cement had to face competition from present producers in the market including that of Pahang Cement.

4.2. However, after lengthy discussion and explanation from JST, the Committee was satisfied and agreed to the recommendations as put forward in the DFR.

5. Herket Projections

page 176 in the Interim Report, the calculation on demand for cement in Kelantan and Trengganu was based on higher demand growth rates as compared to that in the Interim Report, but the rationale for such assumption was not available.

JST was requested to clarify on this point. The meeting was informed that an additional 250,000 tons of cement was added to the demand figures of 1979/1980. This represented the import volume by wholesalers/retailers of these two states which was not included in the ETI trade statistics which was the basis of calculations in the Interim Report.

Financial Analysis

6.1. The calculation of IRR in the DFR should use the price and cost in respect of a uniform base year i.e. 1981 constant prices. Although JST made minor changes in the estimated production cost using constant prices of 1981, closer examination showed that changes were mainly due to actual increase in cost of obtaining/transporting limestone from Gua Musang to Tanah Merch. JST explained that the figures used in the Interia Report were actually based on 1981 costs and prices. It was however wrongly printed as 1980 costs.

- 7. Modifications to be Included in the Final Report
- 7.1. Minor additions and modifications that have to be included in the Final Report and have been agreed upon are as follows:
 - i) The write-up by JICA Preface
 - ii) JST leader write-up Poreword
 - iii) Table on page 191 of DFR will include also cement consumption by brand for the states of Trenggaru and Pahang
 - iv) Production figures for CIMA to be corrected as on page 95 of DFR.
 - v) Map on location of Existing and Planned Cement Plant in Peninsular Malaysia as on page 95 of DFR to include Perak Halla.
 - vi) Operative procedures and methods of securing a steady supply of coal friminternational suppliers.
- 7.2. The Committee agreed to accept the report on the condition that JST includes the modifications and addition as stated above.
- 7.3. The meeting ended at 11.30 a.m. on a note of thanks and appreciation from the Committee on the codial relation and the good work done by JICA and the JST in particular.

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APPENDIX I

PŘELIMINARY CASE STUDY

PRELIMINARY CASE STUDY

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1. Marketing

When this feasibility study was started the cement supply situation in Malaysia was as follows:

- a) Besides the five existing cement manufacturers including CMS's grinding mill in East Malaysia, there were three projects which were approved but yet to be implemented. (Simen Perak, Pahang Cement and Perak Halla).
- b) In addition there were one new project (Kedah Cement), and two expansion projects (Tasek and CIMA) and the new project in Kelantan was to be studied for its feasibility. Upon request by Malaysian Government.
- c) Then MIDA made the three case studies as shown in Table III-2-5 to -11. In which the demand and supply of cement situation was studied in Case I and II based on the assumption that all three approved projects are to be implemented for Case I, and that two (Pahang Cement and Perak Halla) are to be implemented and the remaining one (Simen Perak) is to be replaced by the new project (Kedah Cement). In Case III the assumption was that beside the projects in Case II, two expansions by Tasek and CIMA, and new Kelantan Cement were added for the prospective suppliers.
- d) Therefore in the Interim Report it was recommended that there will be room for a new comer besides those mentioned either in Case I or Case II in 1987 at the earliest, and that the new comer should be chosen out of the Kelantan Cement and the other existing manufacturers, for expansion depending on the project's necessity or importance and economic viability.
- e) Based on the above recommendation nine case studies of Kelantan Cement were made, so as to find out the best plant size and location from several view points.

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2. Determination of Study Case

To execute the feasibility study on the establishment of cement factory, it is necessary to fix the plant capacity and its proposed site at first. The study cases set forth in this report involve three levels of the plant capacity connected with the marketing discussed at the beginning of this section, and three proposed plant sites based on raw materials supply, the developing program of industrial estates with infrastructures and utilities, and market for the product, thus coming up to nine cases in total to study.

2-1 Production capacity

Since the proposed plant will cover the local market such as Kelantan and Trengganu, in particular, the market size is one of the critical parameter to set the plant capacity. Around 500 thousand tons of annual production size is understood as an appropriate cement plant capacity in a smaller case. Suppose the other conditions are the same, and the all products can be sold, the larger plant will prove the more economical. Therefore, it is decided to set 500 thousand tons per annum as the smallest capacity, and 666 thousand tons per annum as the medium. The largest capacity is set at 833 thousand tons per annum, however, it has to be operated for a few years after start up at the lower capacity than the rated capacity because of its excess capacity versus local market.

Annual Production (ton/year)

Plant Capacity (t.cl/d)	1,500	2,000	2,500
Clinker	476,200	634,300	793,300
Cement (Net)	500,000	666,000	833,000

2-2 Proposed plant sites

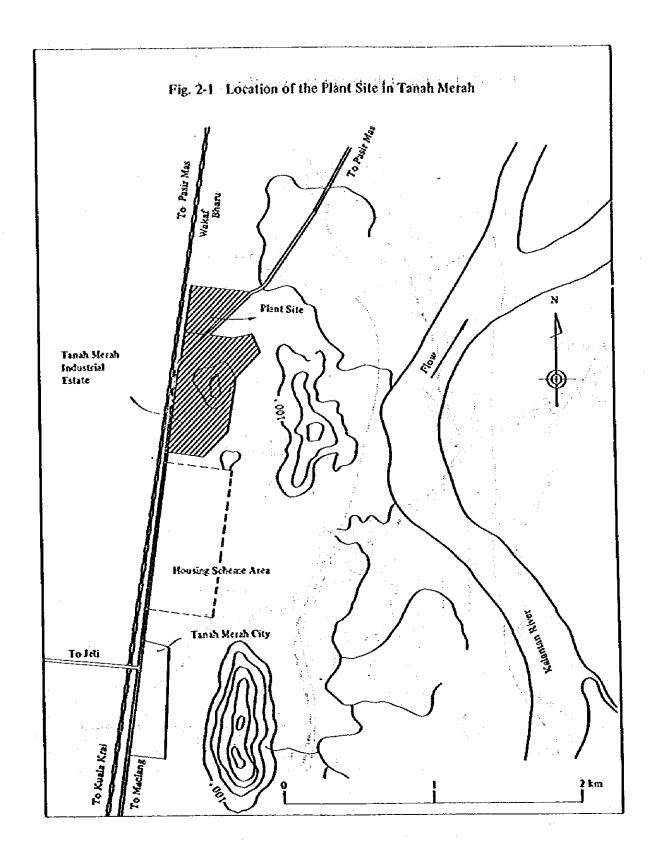
As aforementioned, three proposed plant sites are selected prior to the field survey. Advantages and disadvantages of each site are as follows.

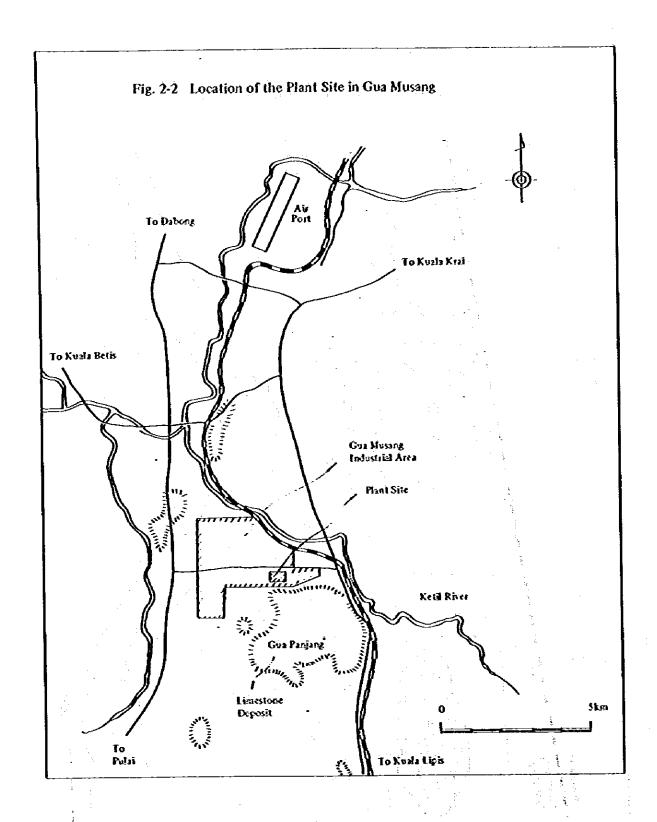
(1) Tanah Merah (Fig. 2-1)

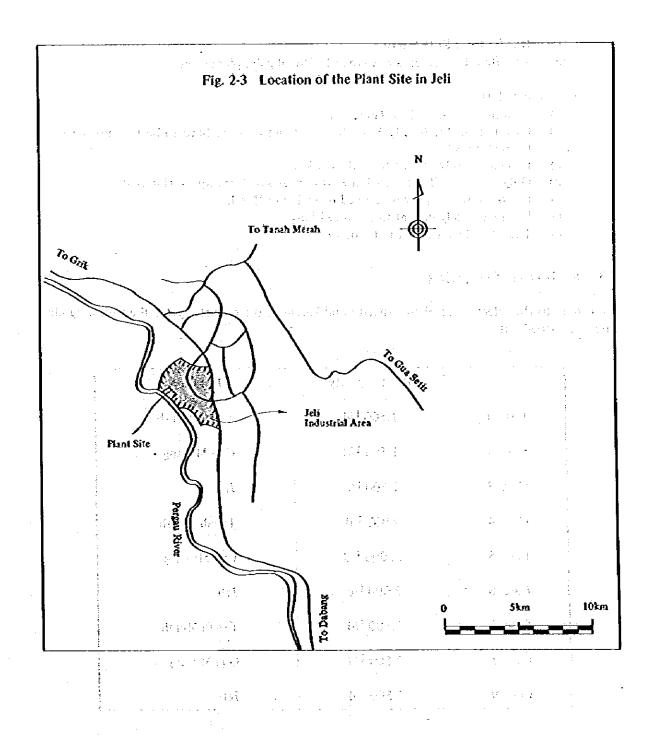
- a) Limestone has to be transported from Dabong by railway.
- b) Silica rich clay is available nearby.
- c) The site is situated nearest to the market.
- d) Railway and road facilities are available.
- e) The town has a main station of the national electric grid system.
- f) The site is nearest to Kota Bharu.
- g) The site is located on the flat but elevated ground.

(2) Gua Musang (Fig. 2-2)

- a) Limestone is available at Gua Panjang.
- b) Clay is available locally but silica sand and iron ore have to be transported from outside sources.
- c) It is far from the market.
- d) Railway is available and road is under construction.
- e) Electric power supply is planned from Tanah Merah.







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- f) It is far from Kota Bharu.
- g) The site is located on a flat ground with oil paim plantation.

(3) Jeli (Fig. 2-3)

- a) Limestone is available at Gua Setir.
- Clay is available locally but silica sand and from one have to be transported from outside sources.
- c) It is moderately distant from the market.
- d) Only road is available, which means to bear a high transportation cost.
- e) Electric power supply is planned from Tanah Merah.
- f) It is moderately distant from Kota Bharu.
- g) The site is located on a flat ground.

2-3 Study cases of the project

According to the selection of plant capacity and location, the case study for the following nine cases are carried out.

	Plant capacity	Location
Case 1	1,500 ^t /đ	Tanah Merah
Case 2	1,500 ¹ /đ	Gua Musang
Case 3	1,500 ¹ /a	Jeli
Case 4	2,000 t/d	Tanah Merah
Casé 5	2,000 ¹ /d	Guá Musang
Case 6	2,000 t/d	Jeli
Case 7	2,500 ¹ /d	Tanah Merah
Case 8	2,500 ^t /d	Gua Musang
Case 9	2,500 [‡] /d	Jeli

2-4 Raw materials supply

The combination of raw material deposits and plant sites are as follows.

(1) Limestone

Tanah Merah has a possibility to receive limestone from three deposits, however it is the most economical to get it from Dabong by railway.

Transporting facility and distance from each quarry to plant site are as follows:

Site	Case	Limestone quarry	Transporting facility	Distance (km)
Tanah Merah	1,4,7	Dabong	Railway 🗀 🗈	88
Gua Musang	2,5,8	Gua Panjang	Belt conveyor	\mathbf{I}^{i}
Jeli 💮	3, 6, 9	Gua Setir	Lorry	18

(2) Clay

At each site, clay is available at the nearest deposit to the plant site. Distance and transporting facility from quarry to the site are as follows:

Site	Case	Quarry	Transporting facility	Distance (km)
Tanah Merah	1,4,7	Tanah Merah (West)	Lony	9
Gua Musang	2,5,8	Gua Musang (South)	Lorry	3 3
Jeli	3, 6, 9	Jeli	Lorry	12

(3) Siliceous material

Tanah Merah has high silica clay near the site, therefore siliceous material is not required. Gua Musang and Jeli have to use silica sand from the Kelantan river near Kota Bharu. It may be possible to find siliceous materials near the site by the further investigation. Distance and transporting facility from quarry to the site are as follows:

Site	Case	Quarry	Transporting facility	Distance (km)
Tanah Merah	1,4,7	Tanah Merah (North) (clay)	Lorry	1
Gua Musang	2,5,8	Kelantan river	Lorry and railway	202
Jeli	3,6,9	Kelantan river	Lony	96

(4) Iron ore

Iron ore from Bukit Lata is used in all cases, because reliable iron deposit couldn't be confirmed in Temangan and Bukit Kuang.

Distance and transportation facility from quarry to the site are as follows:

Site :	Case	Quarry	Transporting facility	Distance (km)
Tanah Merah	1,4,7	Bukit Lata	Lorry	46
Gua Musang	2,5,8	Bukit Lata	Lorry and railway	208 - }
Jeli :	3,6,9	Bukit Lata	Lorry	69

(5) Gypsum

Gypsum imported from Thailand by rail are used in all cases.

Distance and transportation facility from Sungai Golok station, where the entrance point is located, to the site are as follows:

Site	Case	Supply source	Transporting facility	Distance (km)
Tanah Merah	1,4,7	Thailand	Railway	47
Gua Musang	2,5,8	Thailand	Railway	202
Jeli	3, 6, 9	Thailand	Lorry	59

 $\label{eq:continuous} \{x_1,\dots,x_n\} : x_1 = \{x_1,\dots,x_n\} \in \mathbb{R}^n : x_1 = \{$

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2-5 Utility and labour condition

2-5-1 Electric power

(1) Power demand Electric power requirement for cement pant is assumed as follows.

	<u> </u>	5 × 1			: 14
No.	Item	Unit	Case 1~3	Case 4~6	Case 7~9
1	Production capacity	t-cement/hour	65.6	87.5	109.4
2	Unit consumption	KWH/t-cement	120	118	116
3	Average power	KW (1x2)	7,900	10,300	12,700
4	Load factor Average power Max. demand power	%	75	75	75
14					
\$	Max. demand power	KW (3÷4)	10,600	13,800	17,000

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(2) Unit price

Based on the above conditions and the tariff of LLN, the unit price of power is calculated as follows.

No.	Item	Unit	Case 1~3	Case 4~6	Case 7~9
1	Max, power demand	KW	10,600	13,800	17,000
2	Unit power consumption	KW/t-cement	120	118	116
3	Annual cement production	10 ^{3 t} /y	500	666	833
4	Annual power consumption	10° KWH/y	60	79	97
5	Demand charge	103 M\$/y	1,500	2,000	2,400
6	Energy charge	103 M\$/y	10,200	13,400	16,500
7	Total charge	103 M\$/y	11,726	15,400	18,900
8	Unit price	MS/KWH	0.20	0.20	0.20
9	Unit power cost	MS/t-cement	24.0	23.6	23.2

2-5-2 Water

As each plant site is situated near the source of river water, i.e. Tanah Merah to Kelantan river, Jeli to Pergau river and Gua Musang to Ketil river, industrial water is available from river or ground water.

Drinking water is supplied by JKR to all sites.

The following are estimated requirements of water in the case of one-way use - not recirculating -.

Case	1~3	4~6	7~9
Industrial water t / h	200	260	330
Drinking water t / d	31	31	31

2-5-3 Labour

The population of the cities relating to the plant site at present are as follows:

Tanah Merah	about	70,000
Gua Musang	about	5,000
Jeli	about	3,000

If the project is established in Jeli or Gua Musang, it may encounter difficulties in securing locally adequate labor force. The project may require to recruit them from the other places including skilled workers and engineers.

3. Mixing Proportion of Raw Materials

3-1 Chemical composition of raw material

Average values of chemical composition of raw materials used in this calculation are shown in Table 3-1.

Table 3-1 Chemical Composition of Raw Materials

		5		Moixture				Chemi	Chemical Composition (wt. %)	soution (w1, %)				P20, •	Ü
Materials	1	THE STREET	Sumple	(1/2)	1.0.1	SiO2	د ۱۹۵۸	Fe20,	ChO	MKO	so,	Nu ₂ O	K20	Total	(ppm)	(mdd)
	£	# S	(2)	2.5	40,2H	6,71	1,11	92'0	50,43	0,56	0.04	0.07	21'0	60.00	280	80
stone	9	Puntung.	ô)	2,5	43.24	:00	0.25	0.0	\$4.65	94.0	0,07	10'0	0,03	28'66	200	. 40
	ව	Gus Setir		5;	43,93	0.24	0.17	0,05	53.51	1,92	20.0	0,0	0,02	78.49	110-	30
	3	Dabong		2.5	42.80	1,96	0,66	0,21	\$2,46	1.15	0.04	0,05	60'0	28'00	230	80
	€	Tenuh	West	14,6	\$,93	70.50	16,91	7,04	82,0	0.05	9,04	60'0	1,14	×6'66	320	35
	3	Meren	North	26.4	13.76	40,86	27,68	16.50	82.0	0.25	0,03	0.13	0.50	\$6.44	900	\$8
È	(3)	Joh		18.3	6,8X	60.51	21,93	6.78	0.21	0.20	0.02	0.28	3.18	66.66	360	30
	(4)	Gus Musang	South	17.5	7.06	62,04	20.57	6.22	0.35	0.40	0.03	0.20	3.10	86.66	340	.6E
Sitius Sand	pue	S, Keluntan	-	2,9	15.0	90,41	4,70	0.62	98.0	00'0	0.00	09'0	2.76	86'66	200	0\$
Iron Ore	ً و	Be, Lutu		•	11.43	11,40	12,99	61,20	0.63	0,76	6,12	0.12	1,21	98'66	6350	23
Coul Anh	چ ا	Australia	Hunter Valley Cost	ľ	ı	08.0	24.0	2.7	6.0	9.6	6.0	\$"0	1.1	-5'86	# -	8

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3-2 Combination of raw materials

Combination of raw materials and moduli of clinker selected in this calculation are shown in Table 3-2.

Table 3-2 Combination of Raw Materials

•					•						_				
	PE	ent Site			1	Jeli			Tar	ah Me	rah		— Ga	2 Musa	ng .
Combin	stion of	Raw Mater	1.1.	•	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Comons		Man States	1413		. 1	2	3	4	\$	6	7	8	ا و	10	11
Burning	Fed	i	Coal		Ö	0		0	0		0	0	0	0	ą.
Conditions			Oil				0			0		-	-		O
	Heat	ı	8001	Kealikg	0			O			0		0		
	Con	sumption	7601	Kcal/kg		О			0			Ò		0	
Lime-	(1)	Ğuı		(C)			, C ,						0	0	O
store	(2)	Panjang		(D)		-							0	0	О
	(3)	Gua Set	iŧ	:	0	Ō	0								
	(4)	Dabong Tanah West Merah North						0	0	0	O				
	(1)	Dabong Tanah West Merah North						Ò	0	0	O			74	
Chy	(2)	Tanah West Merah North						O	O	0	0		1.		
	(3)	Merah North			0	O	0								
	(4)	Gua Mu	sang										,O	О	0.
Siica Sand	S. X	Gua Musang			0	0	0	2.1			0		· O	0	0
Iron Ore	Bt.	S. Kelantan Bi. Lata			0	0	0	Ó	0	0	0	0.	0	0.	0.
Modeli of Cl	inker		İ	нм	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.06	2.10	2.10	2.10
(planned)				sм	2.60	2.60	2.60	2.60	2.60	2.60	2.40	2.60	2.60	2.60	2.60
				I.M	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80

3-3 Mixing proportion of raw materials

The mixing proportion of raw materials based on dry basis, the chemical composition of raw meal, chemical composition of clinker and mineral composition of clinker are shown in Table $3-3 \sim 3-6$, respectively.

Table 3-3 Mixing Proportion of Raw Materials

	E.	Plant Site			Jeli			T	Tanah Merah	_		<i>O</i> .	Gua Musang	
	Zomb Raw	Combination of Raw Materials	.	No. 1	No. 2	S. o.	% o. 4	Z S S	No. 6	No. 7	% .o. %	No. 9	No. 10	No. 11
	3	Gua	õ									41.269	41,228	40.793
Lime (2)	8	Pan- jang	ê					Î.s.				41.269	41.228	40.793
4	6	Gua Setir	.ts	79.318	79.276	78,457						- ,		
	3	Dabong					81.335	81.282	80.449	81.192	80.938			
Ş	€	Tanah	West				17.099	17.127	17.578	13,358	17.422		. 7,	
	8	Merah	North				0.760	0.786	1.363	3.341	0.827			
		Jeli		12.213	12:265	13.244								te:
	3	Gua Musang	Suns			.5	-					11.949	12,008	13.083
Silica	S	S. Kelantan		6.731	6.728	6.664				1.382	7 () () () () () () () () () (3.724	3.715	3.605
o ii	ᄶ	Bt. Lata		1.738	1.731	1.635	0.806	0.805	0.610	0.726	0.813	1.789	1.821	1.726
		Total		100.000	100.000	100.000	100.000	100,000	100.000	1.00.000	1.00.000 1.00.000	100.000	100.000	100.000
		<u>ٽ</u>	(wt% in dry basis)	ry basis)	gada die Si Kalendie Geber Karen Geber				And the second of the second o		1.5			kg (m. 1900) Problems Karamanan (m. 1901) Garaman

(wt % in dry basis)

Table 3-4 Chemical Composition of Raw Meal

Plant Site	ite		Jeli			Ţ	Tanah Merah	뒥			Gua Musang	Su
Combination	thon	No.	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11
	LOI	35.91	35.90	35.60	36.02	36.00	35.73	36.09	35.88	35.52	35.51	35.21
	SiO ₂	13.87	13.89	14.41	14.05	14.08	14.60	13.71	14.30	14.18	14.20	14.73
Chemical	AI2O3	3.36	3.37	3.56	3.40	3.41	3.61	3.61	3.47	3.43	3,44	3,64
Composition	FegOs	1.97	1.97	1.98	1.99	2.00	2.00	2.11	2.03	2.02	2.03	2.05
(we want of the control of the contr	CaO	42.50	42.48	42.05	43.05	43.02	42.58	42.97	42.84	43,41	43,39	42.94
	MgO	1.56	1.56	1.55	0.95	0.95	0.94	0.95	0.95	0.49	0.49	0,49
	SOs	0.02	0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
1 14 1 1	Na ₂ O	0.08	0.08	0.09	90.0	0.06	90.0	0.07	90.0	0.08	0.08	0.08
	K ₂ O	0,61	0.61	0.64	0.28	0.28	0.29	0.29	0.28	0.58	0.58	0.61
f	Total	88.66	99.88	99.90	99.84	99.84	99.85	99.84	58.66	95.66	99.76	72.66
413 T	P ₂ O ₅ (ppm)	254	254	250	297	297	288	298	298	361	361	356
: · ·	CL (ppm)	33	31	31	47	47	47	\$	47	42	42	41
Moduli of raw meal	ЖЖ	2.21	2.21	2.10	2.21	2.21	2.10	2.21	2.16	2.21	2.21	2.10
(Calculated)	S.M.	2.60	2.60	2,59	2.60	2.60	2.60	2.40	2.60	2.60	2.60	2.60
on a material or control of the self-of-self-o	LM	1.71	1.71	1.80	1.71	1.71	1.80	1.71	1.71	1.71	1.71	1.80

Table 3-5 Chemical Composition of Clinker

Plant Site	ite		Jeli			H	Tanah Merah	rah		G	Gua Musang	S
Combination	tion	No. 1	No. 1 No. 2	No. 3	N 0 4	No. 5	No. 5 No. 6		No. 7 No. 8	1	No. 9 No. 10 No. 11	No. 11
	SiOs	22.39	22.39	22.39	22,71	22.71	22.71	22.20	23.01	22.78	22.78	22.78
(siseo	AI ₂ O ₃	5.54	5.54	5.54	5.62	5.62	5.62	5.95	-5.69	5.63	5.63	5.63
:	F. O.	3.08	3.08	3.08	3.12	3.12	3.12	3.30	3,16	3,13	3.13	3.13
	O	65.30	65.30	65.30	66.25	66.25	66.25	66.25	65.84	66.45	66.45	66.45
	OSM	2.41	2.41	2.40	1.47	1.47	1,47	1.48	1.46	0.77	0.77	0.76
	Total	98.72	98.72	98.71	99.17	99.17	99.17	99.18	99.16	98.76	98.76	98.75
(0:	H.M	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.06	2.10	2.10	2,10
elei Jelu	S.M.	2.60	2.60	2.60	2.60	2.60	2.60	2.40	2.60	2.60	2.60	2.60
onipe)	I.M	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80

Note: SO₃ content in clinker estimate 0.3%

Table 3-6 Mineral Composition of Clinker

Plant Sit	t Site		Jeli	:=	•	. &	Tanah Merah	पह	. :	<u> </u>	Gua Musang	
Combination	uoi	No. 1	X 9. 2	Z o S	No 4	No. 1 No. 2 No 3, No 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11
	C.S	53.2	53.2 53.2 53.2	53.2	53.2	53.2 53.2	53.2	55.4	49.6 53.2 53.2	53.2	53.2	53.2
(157)	200	24.1 24.1	24.1	24.1	24.1	24.1 24.1		21.8	21.8 28.6 24.1	24.1	24.1	24.1
Ap t	2 4	0		9.5	1	9.5 9.5 10.2	9.5	10.2	9.7	9.5	9.5	9.5
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	C. AF	4.6	4.6	9.4	1	9.4	9.4 9.4 10.0		9.6	9.4	9.4	9.4
		0.912	0.912	0.912	0.912	0.912 0.912 0.912 0.912 0.912 0.912 0.924 0.895 0.912 0.912 0.912	0.912	0.924	0.895	0,912	0.912	0.912

Mineral component of clinker are calculated according to ASTM C150. Note

The symbols of each mineral stands for as follows.

C₃S.(3C₂O. SiO₂); Tricalcium Silicate C₂S.(2C₂O. SiO₂); Dicalcium Silicate C₃A.(3C₂O. AI₂O₃); Tricalcium Aluminate C₄AF.(4C₂O·AI₂O₃·Fe₂O₃); Tetracalcium Aluminoferrite

: L.S.F. (Lime Saturation Factor)
L.S.F. are calculated according to the equation stipulated in BS12.

3-4 Theoretical unit consumption of raw materials

Theoretical unit consumption of raw materials is calculated using the mixing proportion of raw materials and is shown in Table 3-7.

Table 3-7 Unit Consumption of Raw Materials (Theoretical Value)

	P	ant Site		l	Jeti			T	anah Mer	ah .		Ġ	oa Musa	ng
	Con	ebiastion		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
		stansation		1	2	3	4	5	6	1	8	9	10	13.
	(1)	Gua	С			}					_	0.6314	0.6314	0.6314
Lime-	(2)	Panjang	D							-		0.6314	0.6314	0.6314
stone	(3)	Gua Seti	1	1.2184	1.2184	1.2185						į		
	(4)	Dabong	_				1.2515	1.2515	1.2517	1.2515	1.2437			
	(1)	Tanah	West				0.2631	0.2637	0.2735	0.2059	0.2677			
	(2)	Merah	North				0.0317	0.0121	0.0212	0.0515	0.0127			
	(2) Merah North			0.1876	0.1885	0.2057					. ,	1		
	(4)	Gu Musa	ru§	1								0.1829	0.1839	0.2025
Silica S	and	S. Kelan	(an	0.1034	0.1034	0.1035		<u> </u>		0.0213		0.0570	0.0569	0.0558
Iron Or	31	Bt. Lata		0.0267	0.0265	0.0254	0.0124	0.0124	0.0095	0.0112	0.0125	0.0280	0.0279	0.0267
		Total*		1.5351	1.5369	1.5532	1.5337	1.5397	1.5559	1.5414	1.5366	1.5307	1.5315	1.5478

t-raw materials in dry basis/t-clinker including coal ash.

3-5 Actual unit consumption of raw materials

In the above theoretical calculation, the loss in process was neglected. Actual unit consumption of raw materials is calculated by taking account of the possible loss in process and is shown in Table 3-8.

Table 3-8 Unit Consumption of Raw Materials (Actual Value)

	Pi	ant Site			leti,	4.	٠.	Ta	nah Mer	ah		G	01 Musa	Ng :
	Coa	ibination		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
				11	2	3	14	5	6	7	8	9	10	ú
	(1)	Gus	C									0.6140	0.6140	0.6440
Line	(2)	Penjang	D									0.6140	0.6140	0.6440
stone	(3)	Gva Seti	r	1.2428	1.2428	1.2430		1		i — —	- '			
	(4)	Dabong					1.2765	1.2765	1.2767	1.2765	1.2686			. ;
-	(1)	Tanah	Vest.				0.2684	0.2690	0.2790	0.2100	0.2731			
Clay	(2)	Merch	North				0.0119	0.0123	0.0216	0.0525	0.0130			
	(3)	les		0.1914	0.1923	0.2098							1	
	(4)	Gva Mus	માજ			! -		j	;			0.1866	0.1876	0.2066
Silica S	ะกง	S. Kelan	laa	0.1055	0.1055	0.1056			, ,	0.0317		0.0581	0.0580	0.0569
Irea Or	ė	BL Lata		0.0272	0.0271	0.0259	0.0126	0.0126	0.097	0.0114	0.0128	0.0286	0.0285	0.0272
	1	otal*		1.5669	15677	1.5843	1.5694	1.5694	1.5870	1.5721	1.5675	1.5613	1.5621	1.578

to taw materials in dry basis/to dinker including coal ash.

4. Outline of Plant

4-1 Main machinery and equipment

Main machinery and equipment which are adopted in the plant should be selected by taking into account the local condition.

The qualities and procurement condition of raw materials and fuel, the social and natural conditions at the plant sites are surveyed and studied.

As a result, the following main machinery and equipment are selected for the project.

1. Preblending bed system

As the raw materials to be used for cement manufacturing are natural, their chemical and mineral compositions fluctuate widely.

It is also a well-known fact that their fluctuations lead to the influence on plant operation, fuel consumption and quality of cement.

In order to avoid the above, the preblending bed system is used to homogenize and store raw materials before raw materials are blended into raw meal.

This preblending bed system has the following advantages:

- (1) Intermediate storage stockpile (buffer stock)
 - (a) The storage facilities at the quarry site and at the clinker manufacturing plant are not required to be geared each other.
 - (b) Rationalization can be made, because multiple shift work at the quarry site can be reduced and large-sized equipment is not required.
 - (c) Raw materials can be constantly and directly supplied to the kiln.
 - (d) Sticky materials are handled in preblending bed easier than in the silo.
 - (e) Automation of preparatory handling of raw materials is made easily.
- (2) Homogenization
 - (a) High blending efficiency can be obtained.
 - (b) Inhomogeneous raw materials, which could not be used as raw materials without a blending bed system, can be utilized.
 - (c) Pre-mixture of various kinds of raw materials can be achieved.
 - (d) Cement of high quality can be manufactured.

排除付付付付付款的基本的 1000.49 (Billion 1995) (1995) (Billion 1995)

2. Raw material and coal grinding mill

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Tube mill and vertical roller mill are adopted widely for grinding raw materials and coal. Since the raw materials and coal have a high moisture content as revealed by our survey and tests, they must be sufficiently dried to maintain a stable operation of the dry process. From this standpoint, the vertical roller mill is most preferred in that and it can be used not only for drying but grinding as well.

In the cement industry, among others, the vertical roller mill is used widely with the SP process ever since the suspension preheater is introduced to improve the heat transfer in the dry process. This is attributable mainly to the fact that the vertical roller mill can use exhaust gas from the SP kiln process at 350°C, which is discharged, after reuse, at

 $(\mathbf{x}_{i})_{i=1}^{n}(\mathbf{x}_{i}) = \mathbb{E}\left[\frac{1}{2} \left(\mathbf{x}_{i} \mathbf{x}_{i} \right)^{\frac{1}{2}} + \left(\mathbf{x}_{i} - \mathbf{x}_{i} \right)^{\frac{1}{2}} \right] + \mathbb{E}\left[\mathbf{x}_{i} - \mathbf{x}_{i} \right] +$

 $90 \sim 120^{\circ}$ C.

Thus, the vertical roller mill is adopted. Its advantages are described below.

- 15 20% lower power consumption, compared with the overall grinding system comprising a tube mill operating in a closed circuit with a bucket elevator.
- 2) Excellent drying capacity, even if only kiln exit gases of relatively low temperature (below 300°C) are used.
- Quick response to altered operating conditions; in particular, scope for rapid intervention in the raw mix composition, thanks to short average retention time of the materials in mill (approx. 2 minutes).
- Less noise emission in the significant frequency range as compared with steel-lined tube mills.
- The feed materials do not have to be available under a finely crushed condition: 5) this is especially advantageous when dealing with very moist abrasive materials.
- Lower running costs due to lower power consumption and maintenance costs.

Clinker Cooler

Clinker cooling is needed to manufacture cement for the following reasons.

- (1) Proper cooling improves quality of cement.
- (2) The recovered heat value of hot clinker is about 200 Kcal/kg clinker, which is one of the important factors to reduce the manufacturing costs.
- (3) It is difficult to convey hot clinker.
- (4) Hot clinker has a negative effect on the grinding process.

The cooling of the clinker influences its structure, the mineralogical composition, grindability and consequently, final quality of cement as a final product.

Therefore, we must adopt the most suitable cooling method in order to manufacture cement of high quality from the technical and economical points.

There are four types of clinker cooler:

- (1) The cooling drum located underneath the rotary kiln. (rotary cooler)
- (2) Cooling drums attached to the circumference of the discharge end of rotary kiln. (planetary cooler)
- (3) The grate cooler
- (4) The shaft cooler

The rotary cooler is of old type and its reclaimed secondary air temperature is so low that the fuel consumption and burning efficiency are bad.

As far as the planetary cooler is concerned, it is difficult to operate and maintain its cooler from the view of structual and mechanical points.

Grate type cooler is adopted as a clinker cooler on the following reasons.

- (1) Excellent air quenching effect.
 - In case of the rotary and planetary cooler, cooling is predominantly performed by transverse air current. In case of grate type cooler, however, cooling is performed by a combination of cross-current and counter-current air.
- (2) Improvement of the quality of cement

This type cooler enables rapid initial cooling of the clinker, a feature is of great importance for the formation of tricalcium silicate.

The application of excess cooling air results in cooling the clinker down to 60 -

- 100°C, and this temperature allows the clinker to be ground immediately into cement.
- (3) Good heat exchange between hot clinker and cooling air In this cooler, the clinker temperature can be about 1,350 1,450°C, resulting in increase of the thermal efficiency up to 60 70%.
- (4) Complete control of secondary air and the clinker temperature.
- (5) Low heat loss by radiation and convection.

4-2 Specification of main machinery, equipment and facilities

The following are the specifications of main machinery and equipment, electrical and instrumentation, and building and civil works of the plant for three production levels.

(1) Main Machinery and Equipment

		Case of Plant		
Specification of Main Machinery and Equipment	1,500 t.cl./d	2,000 t.cl./d	2,500 t.cl./d	
1. Limestone preblending storage	į			
Type of storage: Longitudinal stock				
pile with tripper conveyor sheltered			:	
type	حمم مم م	3 43 6667	á tcánna	
Capacity: Wet basis	2×10,000T	2×13,000T	2x16,000T	
Size of stock pile: (m ^W x m ^L x m ^H)	19×104×7.4	20x125x7.8		
Q'ty:	2 sets	2 sets	2 sets	
2. Tripper conveyor				
Service: For piting in the shed				
Type: Belt conveyor with tripper		* .		
Capacity: Wet basis	350 t/h	460 t/h	580 t/h	
Length: Center to center distance	240 m	280 m	280 m	
Q'ly:	i set	1 set	1 set	
			1	
3. Reclaimer				
Service: For teclaiming and transporting				
Type: Bridge scraper				
Capacity: Wet basis	140 t/h	190 t/h	230 t/h	
Length of scraper:	23 m	24 m	23 m	
Travelling length:	220 m	260 m	260 m	
Rail span:	22 m	23 m	25 m	
Q'ty:	l set	1 set	1 set	

		Case of Plant	
Specification of Main Machinery and Equipment	1,500 t.cl./d	2,000 t.cl./d	2,500 t.cl./d
4. Clay/silica source storage Type of storage: Longitudinal/conical stock pile with tripper conveyor			
Sheltered type Capacity: Wet basis Clay	5,000T 300T	6,500T 350T	8,500T 400T
Silica source Size of stock pile: (mw x m ¹ x m ¹) Clay (longitudinal) Silica source (conical)	15x83x5.9	18x88x7.0	19×102×7.4
Q'ty:	x2.8m ^H 1 set	×5.3m ^H 1 set	x5.5m ^H 1 set
5. Tripper conveyor Service: For piling clay/silica source to the shed		: , , , , ; ;	
Type: Belt conveyor with tripper Capacity: Wet basis	90 t/h	120 t/h	150 t/h
Length: Center to center distance Q'ty:	110 m 1 set	120 m 1 set	130 m 1 set
6. Wheel loader Service: For feeding clay/silica source to			
the hoppers (also iron source, coal and gypsum to be used.)			
Type: Tractor shovel type Bucket capacity: 1.5 m ³ Drive system: Four-wheel drive	1 set	1 set	2 sets
7. Iron source storage			
Type of storage: Sheltered type Capacity: Wet basis	400T	500T	700T
Size of stock pile: (mw x mL x mH) Q'ty:	9x 18x 2.8 1 set	10x18x2.8 1 set	1 set
8. Raw mill Service: For grinding raw materials			
Type: Vertical roller mill Capacity: Dry basis Fineness: Less than 14% residue on	120 t/h	160 t/h	200 t/h
200 mesh Roller diameter: Table diameter:	2,800 mm	1,500 mm 3,000 mm	1,700 mm 3,400 mm
Motor (main) Q'ty:	1,200 kW 1 set	1,400 kW 1 set	1,900 kW 1 set

		Case of Plant	
Specification of Main Machinery and Equipment	1,500 t.cl./d	2,000 t.cl./d	2,500 t.cl./d
9. Conditioning tower Service: In case of emergency for conditioning of exhaust gas from suspension preheater Type: Vertical cylindrical type Size: (mo x mH) Gas yolume:	\$.4×17.5 2,100	5.9×19.5 2,700	6.4×20.7 3,400
Gas temperature: Inlet Outlet (design basis) Spray water: Q'ty:	Nm³/min. 350°C 150°C 18 t/h 1 set	Nm³/min. 350°C 150°C 25 t/h 1 set	Nm³/min. 350°C 150°C 30 t/h 1 set
10. Raw meal blending silo Service: For blending of raw meal Type: Reinforced concrete construction Double deck type Effective capacity: Size: Inside diameter (mo)	1,100T 12.0 12.0	1,600T 13.5 13.5	1,900T 14.0 14.0
Effective height (m ^H) 11. Raw meal storage silo Service: For storage of raw meal Type: Reinforced concrete construction One is built under the raw meal	12.0		
blending silo, the other is a separate silo. Capacity: Total Size: Inside diameter (m ^b) x effective height (m ^H) Double deck Separate silo	6,600T 12×16 12×34 2	9,500T 13.5×18.5 13.5×38 2	11,000T 14.0×21.0 14.0×41.0 2
Q'ty: 12. Suspension preheater Service: For preheating raw meal Type: Four stages cyclone preheater Capacity:	1,500 t/d	2,000 t/d	2,500 t/a
13. Suspension preheater fan Service: For inducing exhaust gas from suspension preheater Type: Double suction type	4,000		6,700
Capacity:	m ³ /min.	m ³ /min.	m³/min.

		Case of Plant	
Specification of Main Machinery and Equipment	1,500 t.cl./d	2,000 t.cl./d	2,500 t.cl./d
Pressure:	450 mmAg	480 mmAq	510 mmAq
Motor: WIM, Direct drive for fan	500 kW	700 kW	950 kW
14. Rotary kitn	. "		
Service: For clinker burning		- 1 4	
Type: Dry short kiln with suspension	· ·	1 11	
preheater			e i de la companya de la companya de la companya de la companya de la companya de la companya de la companya d La companya de la co
Capacity:	1,500 t/d	2,000 t/d	2,500 t/d
Shell size: Inner diameter (m ^b)	4.3	4.7	5.1
Overall length (m ^L)	68	76	81
Number of supports:	3	3	3 .
	250 kW	300 kW	380 kW
Motor:	ZJUKII	300 KII	JOURN
15. Clinker cooler			in the state of ₹
Service: For cooling of clinker	1.	. '	
Type: Horizontal greate cooler			. ,
Capacity:	1,500 t/d	2,000 t/d	2,500 t/d
Clinker temperature:			
70°C plus ambient temperature			
Grate area:	48 m ²	64 m²	80 m²
No. of compartment:	5	6	7
No. of compartment.		Ů	
16. Electrostatic precipitator			
Service: For dedusting of exhaust gas of			
raw mill and SP exhaust gas	• •	4, 114	
Type: Horizontal gas flow	1		
Gas volume: Max.	4,300	5,500	7,000
	m³/min.	m³/min.: ::	m³/min:
Temperature: Nor. 100 ~ 150°C	7		San San San San San San San San San San
Dust content: Inlet 70 g/Nm ³			
Outlet 0.1 g/Nm ³	İ		
1. 美国主义的第三人称单数形式 (1) 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.			1
17. Electrostatic precipitator			
Service: For dedusting of exhaust gas from			
clinker cooler		¥ 14 - 5 ±	1.8
Type: Horizontal gas flow	1 .	1981 Brown 1982	i un setu≜
Gas volume: Max.	1,700	2,200	2,700
	m³/min.	m³/min.	min/em
Temperature:	250°C	250°C	250°C
Dust content: Inlet 20 g/Nm ³	1 3	12300	
Outlet 0.1 g/Nm ³			
Ounce on given			
10 Cluberalle	The second		1
18. Clinker silo		juje s užilo i ir sti	
Type: Concrete structure	100000	20.000-	313.600=
Capacity:	15,000T	20,000T	2x12,500T

	Case of Plant			
Specification of Main Machinery and Equipment	1,500 t.cl./d	2,000 t.cl./d	2,500 t.cl./d	
Size: (m ^o x m ^H)	22×40	25×39	20×38	
Q'ty:	1 set	1 set	2 sets	
		. * *		
9. Coal storage				
Type: Sheltered type			:	
Capacity:	3,000T	3,000T	3,000T	
Size of stock pile: (mw x m ^L x m ^H)	30×55×3.0	30×55×3.0	30×55×3.0	
Q'ty:	1 set	1 set	1 set	
O. Gypsum storage		-		
Type: Sheltered type				
Capacity:	3,000T	3,000T	3,000T	
Size of stock pile: (mw x mL x mH)	20x45x3.0	20x45x3.0	20x45x3.0	
Q'ty:	1 set	l set	l sét	
	·			
21. Coal milt				
Service: For grinding coal				
Type: Vertical roller mill				
Capacity: Dry basis	10 t/h	13 t/h	17 t/h	
Fineness: Less than 15% residue on			· ·	
75 micron sieve	1.0			
Roller diameter:	850 mm	950 mm	1,060 mm	
Table diameter:		1,300 mm	1,400 mm	
Motor (main):		120 kW	160 kW	
Q'ty: 3.76 % a de la la la la la la la la la la la la la	1 set	l set	1 set	
			1	
22. Cement mill		1.1	and the second	
Service: For grinding clinker and gypsum		1	İ	
Type: Closed circuit, 2-compartment com-				
pound mill with cyclone air separato				
Capacity: Dry basis	90 t/h	120 t/h	2×75 t/h	
Feed size: Under 30 mm			1	
Size: Inside diameter (m*)	4.1	4.5	3.9	
Overall length (m ^L)	12.2	13.0	11.5	
Fineness: Mean 2,800 Blaine				
	1 set	1 set	2 sets	
Motor: Rated power (kw)	2,700	3,600	2×2,250	
1937 Adres at the state of the se		1 3,000		
·			ļ	
Service: For storage of cement			1	
Type: Concrete structure	1. 11		11 644	
Canacity:	7 SOOT	11,000T		
Capacity: Size: (m ^o x m ^H)	17.30	19x39	20x41	
The O'ty: See bother disable his is it is	1 64	set	l set	
	1 300	1	4	

41	Case of Plant				
Specification of Main Machinery and Equipment	1,000,111,000				2,500 t.cl./d
24. Packer		. *.			
Service: For filling of cement to cement			,		
sack					
Type: Rotary packer			F 1		
Capacity: Max. 100 t/h each set		1			
(at 50 kg sack)			A STATE OF THE STA		
Accuracy: ±1/200					
No. of spout: 8 Spouts					
Q'ty:	2 sets	3 sets	4 sets		

`2.	Elec	trical and Instrumentation	
	(1)	Receiving switchgear	Outdoor, metal-enclosed self-standing type
			Voltage: 33KV, 50Hz, 3 phase
		•	Main equipment:
			(1) Circuit breaker
			(2) Lightning arrestor
			(3) Current transformer
	•	-	(4) Potential transformer
			(5) Protective relays and meters
			(6) Supply meter
	(2)	Receiving transformer	Outdoor, oil-immersed and self-cooled type
	: .		Rated voltage: 33,000/6,000V
			Tap voltage: No-load tap changer
			34,500, 31,500, 30,000V
	(3)	6KV switchgear	Indoor, metal-enclosed and self-standing type,
-			multiunit per cabinet
			Main equipment:
			(1) Circuit breaker and/or high tension air-break
			electromagnetic
			(2) Current transformer
			(3) Protective relays and meters
	(4)	Transformer	Indoor, oil-immersed and self-cooled type
			Rated voltage: 6,000/380V
		4	Tap voltage: No-load tap changer, 5 nos of 2.5% tap
			voltage groups and the market
	(5)	Power capacitor	Indoor, oil-immersed and self-cooled type
			Voltage: 6,000V
			Accessories: Discharge coil, series reactor
	(6)	Bus duct	Metal-clad type the set sets below of his type
	(7)	Battery and charger	Indoor, alkaline battery
			. Input: 380V (fig. * 500) incl.
		1	Charger: Metal-enclosed, self-cooled and self-standing
			type 3 phase bridge rectifier

Indoor, metal-enclosed and self-standing type (8) Supervisory panel The panel has mimic of power distribution, control switches, meters and annunciators Indoor, metal-clad, self-standing type (9) Motor control center Multi unit per cabinet Rated: 380V, 3 phase, 4 wires, 50Hz Outdoor, self-standing and/or wall-hanging type (10) Local control box Indoor, wall-hanging type (11) Maintenance box Indoor, wall-hanging type (12) Lighting switch box (13) Motor Totally enclosed fan-cooled type DC motor with SCR (1) Direct current motor controller. For kiln, clinker cooler (2) Variable speed motor

Totally enclosed fan-cooled type cage rotor induction motor with eddy-current coupling controlled by SCR controller.

For constant feed weigher and other feeders.

380V, 3 phase, 50Hz

(3) Induction motor

Totally enclosed fan-cooled type and/or drip-proof type induction motor

- (1) Wound rotor type with liquid speed controller 380V, 3 phase, 50Hz For separator, preheater fan
- (2) Wound rotor type with starting resistor 6,000V, 380V, 3 phase, 50Hz For raw mill, coal mill
- (3) Cage rotor type 6,000V, 380V, 3 phase, 50Hz For fan, pump, blower, etc.
- (4) Geared motor

Totally-enclosed fan-cooled, cage rotor type induction motor with gear 380V, 3 phase, 50liz

For conveyor, bucket elevator, flow conveyor, etc.

Outdoor and/or indoor (14) Lighting fixture Mercury vapor lamp - Fluorescent lamp Voltage: 220V, 50Hz

(15) Control panel and control

desk

For process control, including control switches, lamps, meters instruments, annunciators, etc.

(16) Instrument The following instruments are mounted and have the functions such as alarming, controlling, indicating, integrating and/or recording

Measurement item

- 1) Weight
- ty case to continue to per 2) of Differential pressure (1996) 447
- angen de van besk van beskele 3) % Watt.
 - 4) Ampere
 - 5) Flow

5...(6) Level

Temperature

8) Pressure

9) Revolution

10) Component

(17) Cable

6,600V, 600V cross-linked

polyethylene insulated, PVC seathed cable.

600Y PVC insulated, PVC seathed control cable.

Building and Civil Works

The building and civil works to be required for construction of this project are as follow: 等分类 人名雷拉内斯瓦拉 医黄斑 电电流转换

(1) Limestone Preblending Shed

Structure: 1-storied steel framed on reinforced concrete foundation

Appurtenant works: Overhead conveyor girder Reclaimer foundation

(2) Raw Materials Storage Shed

tall a second

Application:

Storaging for clay, silica source and iron source

Structure:

1-storied steel framed on reinforced concrete foundation

Appurtenant works:

Steel stairway and handrail Overhead conveyor girder

Extraction equipment foundation

(3) Raw mill house

Structure:

3-storied steel framed on reinforced concrete foundation

Appurtenant works:

Mill foundation Motor foundation Overhead crane girder

Fan foundation Cyclone foundation

Steel stairway and handrail

(4) Raw Meal Blending and Storage Silo

Structure:

Substructure

Reinforced concrete structure

Superstructure

Reinforced concrete and all welded steel plate structure

Appurtenant works:

Machine foundation

Stairway, handrail and walkway

(5) Coal Storage Shed

Structure:

1-storied steel framed on reinforced concrete foundation

Appurtenant works: Receiving hopper

See Harris Control of the Control

Extraction equipment foundation : (1)

(6) Coal Mill Building

2-storied steel framed on reinforced concrete foundation

Appurtenant: Mill foundation

Steel stairway and handrail

(7) Burner Platform (including clinker cooler room)

Structure:

2-storied steel framed on reinforced concrete

Appurtenant:

Cooler pit of reinforced concrete at the basement

Stairway and handrail 11.

(8) Clinker Silo

Structure:

Substructure

Reinforced concrete structure

Superstructure

All welded steel plate structure

Appurtenant works:

Staisway, handrail and walkway.

(9) Gypsum Storage

Structure:

1-storied steel framed on reinforced concrete foundation

Appurtenant works:

Receiving hopper

Extraction equipment foundation

(10) Cement Mill Building

Structure:

3-storied steel framed on reinforced concrete foundation

Appurtenant works:

Mill foundation
Motor foundation

Fan foundation
Cyclone foundation

Steel stairway and handrail

(11) Cement Packing House

Structure:

2-storied and partially 3-storied steel framed on reinforced

Compared to the second control of the control of th

· 经数据证据。

Carlos en la Harriago de la Carlos de Carlos de Carlos de Carlos de Carlos de Carlos de Carlos de Carlos de Car

concrete foundation

Appurtenant works:

Packer foundation

other machinery foundation and appear and

Steel stairway and handrail

(12) Other Building

- and a Office of the state of th
 - (b) Workshop
 - (c) Laboratory
 - (d) Warehouse
 - (e) Substation and a second se
 - (f) Truck weigh bridge house
 - (g) Gate house
- (h) Toilet blocks
 - (13) Pavement
 - (14) Drainage system
 - (15) Cable duct

the state of the

(16) Gate and Fence

4-3 Organization and personnel requirements

12.74

(1) Organization (1) (3)

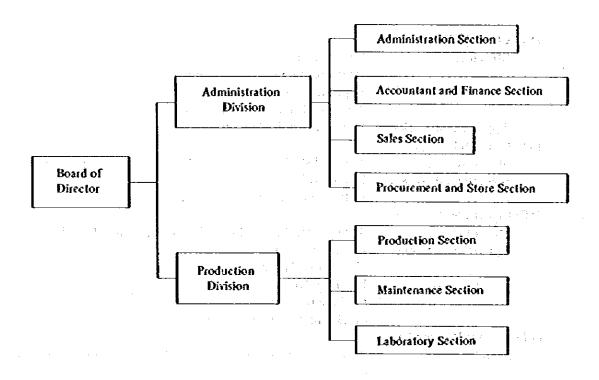
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The outline of organization is shown as follows:

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(2) Personnel Requirements

The personnel requirements for the plant is estimated 308 for all cases.

Break down of labour requirement and cost is shown in Table V-7-1.

The labour cost for Gua Musang and Jeli is set at 1.2 times that of Tanah Merah because of the social conditions at the plant site.

Table 4-1 Labour Cost Breakdown for Tanah Merah

Production		in the second se	\$ 163 .
ltem	No. of Person	Unit cost M\$/Man, Mon	Annual cost the MS/Year
Technical Manager	1		90,000
Assistant T.M.	2	6,000	
Electrical Engineer	3	3,500	126,000
Mechanical Engineer	3	3,500	126,000
Chemical Engineer	· 11 ·	3,500	42,000
Assistant Chemist	2	2,500	60,000
Master Burner	1	5,000	60,000
Supervisors	18	1,200	259,200
Skilled workers	60	800	576,000
Semi-skilled workers	75	600	540,000
Unskilled workers	90	400	432,000
Quarry Engineer	1	3,500	42,000
Assistant Q.E	2	2,500	60,000
Clerks	9	500	54,000
Sub-total	268		2,611,200

Administration

Total	308	-	3,148,800
Sub-total	40		537,600
Clerks	12	500	72,000
Sales & Purchase	5	800	48,000
Accountants	9	600	64,800
Administration	8	800	76,800
Office management/Personnel	2	2,500	60,000
Chief Accountant	1	3,500	42,000
Sales Manager	1	5,000	60,000
Company Secretary	1	3,500	42,000
General Manager	1	6,000	72,000

4-4 Flow diagram, layout and implementation schedule

1. General flow diagram

Refer to Fig. 4-1 General flow diagram which covers in all cases for main machinery and equipment.

2. Layout

Refer to Fig. 4-2, typical layout of coment plant is shown at 2,000 t-cl/d. The layout for the case of 2,000 t-cl/d can be applied to the case of 1,500 t-cl/d and

2,500 t-cl/d except the dimensions of the plant site.

Necessary size and area of the plant site are approximately estimated as follows:

Capacity	Size	Area
1,500 t-cl/d	320 m x 500 m	160,000 m ²
2,000 t-cl/d	360 m x 550 m	198,000 m ²
2,500 t-c1/d	400 m x 550 m	220,000 m ²

The plant layout varies from site to site depending on the method of raw material receiving, and cement shipping, and the local conditions.

Plant layout will be studied in detail for the selected case in the final report.

3. Implementation schedule

Refer to Fig. 4-3, schedule sheet for plant construction covers all cases.

The schedule is based on the assumption that the project will be implemented smoothly.

	en en en en en en en en en en en en en e		$(x_1, \dots, x_n) \in \mathcal{H}_{n+1}$
		<u> </u>	
	set .	:	and the state of t
: 7	$\{x_1,\dots,y_n\}$		
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Fig. 4-1 General Flow Diagram

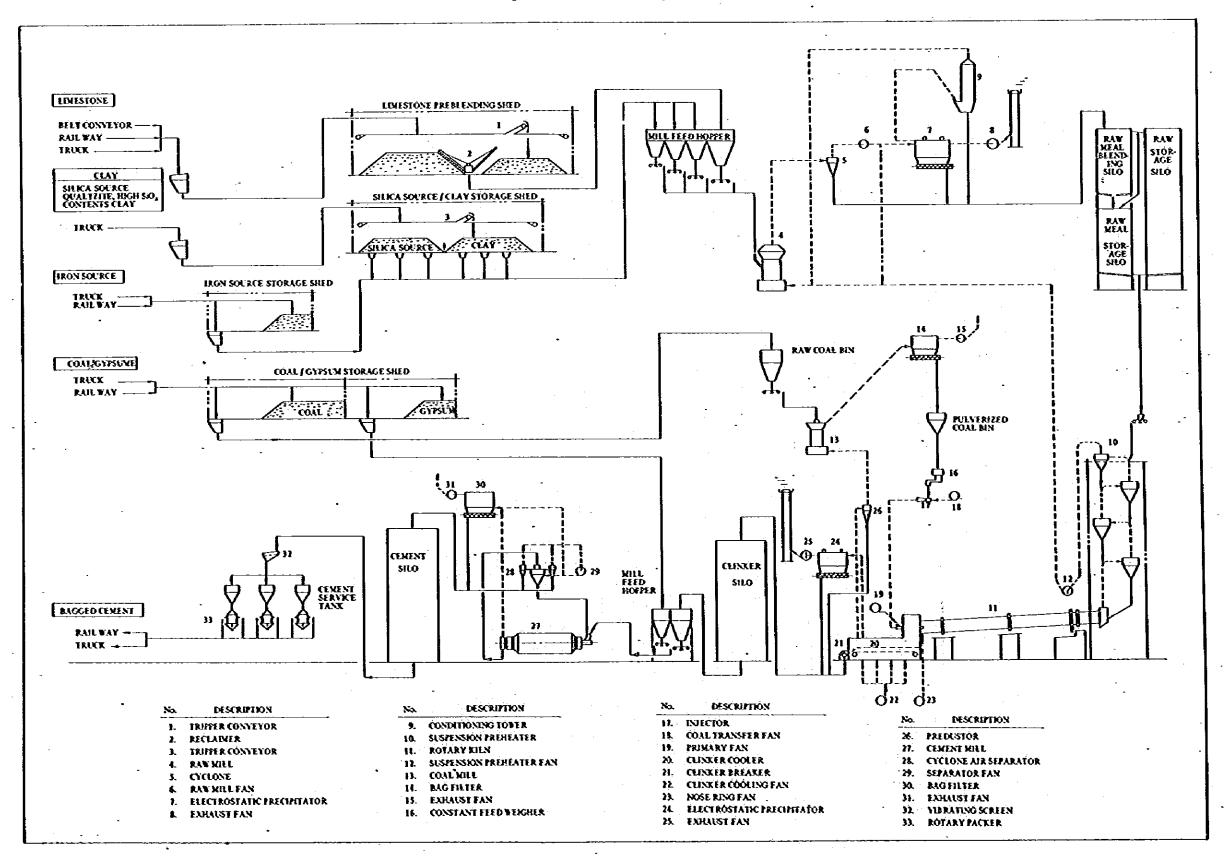


Fig. 4-2 Typical Layout of Cement Plant

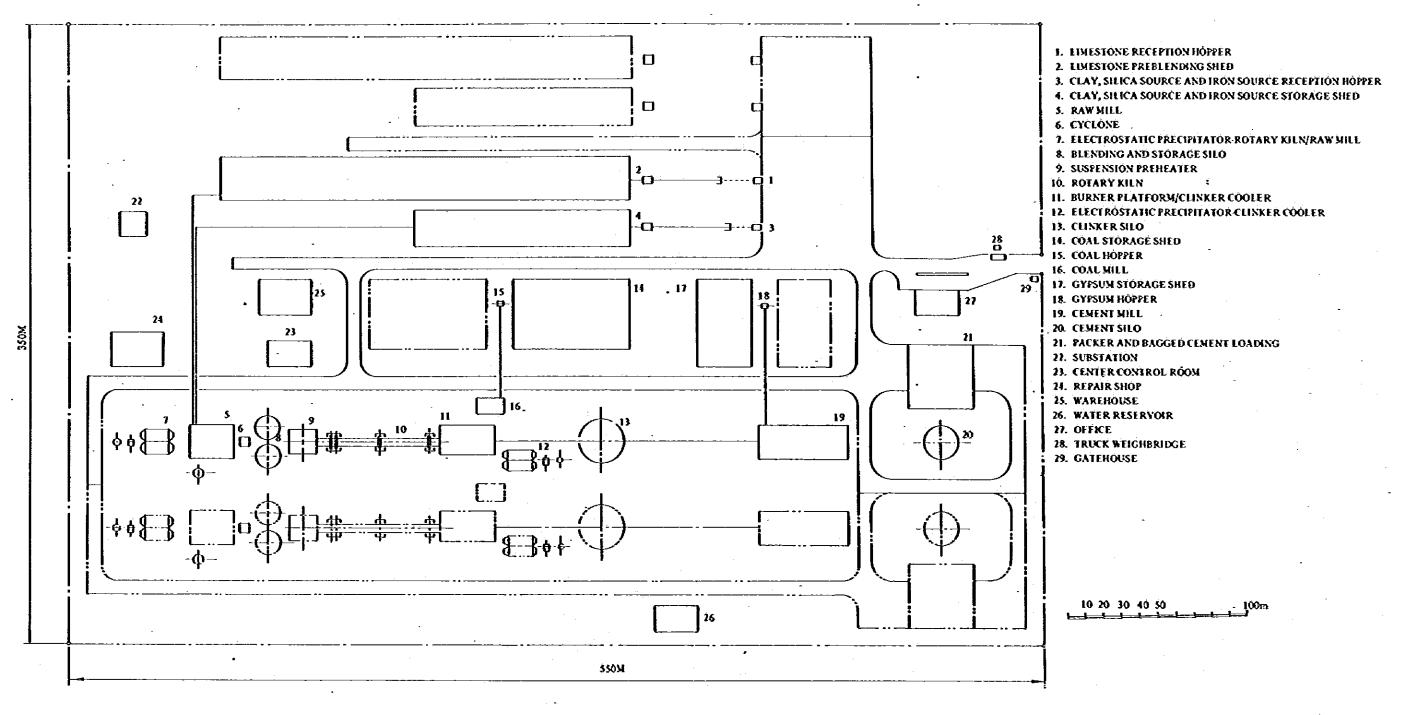


Fig. 4-3 Schedule Sheet for Plant Construction

			1981	1982 1983	1984	1985	1986 19	87	Year
No.	ITEM						·		Month
l.	Preparation of F/S								
2	Submission of F/S							NOTE:	
									Owner
3	Review and Approval of F/S			→					Consultant
4	Decision of the Project								Contractor
5	Arranging of Equity Capital								
6	Arranging of Finance, Forming of Company			↓					
1	Selection of Consultant								
3	Preparation of Tender Specification								
	(incl. evaluation/secommendation of								
	design base, plant and process)		·						
9	Tender Document Issuance	1 1 1 1 1 1 1 1 1 1							
10	Preparation of Proposal		.	4-19					
31	Evaluation and Selection of Successful								
	Bidder (incl. negotiation)								
12	Contract of Plant Construction				3				
13	Basic/Deta#d Engineering				<mark>┢╂╌</mark> ╂┩╏╏╏				
14	Ciril Works								
15	Manufacturing								
16	Shipping					6			
17	Erection								
18	Commissioning								
19	Commercial Operation								
	<u> </u>		 	 	┺╼┺╼┸				121 - 142 PAGE /

5. Capital Requirements and Financing Plan

5-1 Capital requirements

(1) General

Based on the plant layout and the process flowsheets as described in 4, the total capital requirements for the Project have been estimated. The following conditions have been assumed as the bases for the estimation:

a) Basis of prices:

1981 constant prices

b) Exchange rate:

Japanese yen - ¥1 = M\$0.01 U. S. dollars - US\$1 = M\$2.20

c) Import duty:

Assumed to be exempted

(2) Project Capital Requirements

As stated in 2-3 the Project has been studied in nine cases of different plant capacity and locations. The total capital requirements for each case, of which breakdown is shown in Table 5-1, are as follows:

Total Capital Requirements (M\$'000)

Plant Capacity	Tanah Merah	Gua Musang	Jeli
500,000 ton/year	(Case 1)	(Case 2)	(Case 3)
	202,662	209,958	209,440
666,000 ton/year	(Case 4)	(Case 5)	(Case 6)
	242,955	253,307	249,265
833,000 ton/year	(Case 7)	(Case 8)	(Case 9)
	275,380	286,855	280,647

(Interest rate: 8% p.a.)

In Gua Musang and Jeli, the capital expenditure will necessarily be greater than in Tanah Merah because of higher costs of civil engineering and construction due in part to limited availability of labor force which necessitates importation of workers from other states and in part to the less-developed infrastructure which means added costs for the development of infrastructure, and because of lack of supporting industries.

(3) Assumption for Capital Cost Estimation

Basic assumptions reflected in the estimation are as follows.

a) Machinery and Equipment

The cost of machinery and equipment covers main machinery, electric and instrumentation equipment and auxiliary equipment except mining equipment.

b) Erection, Building and Structures 🥳

The cost of civil and erection works has been estimated by taking account of the

Table 5-1 Estimated Capital Requirements (1981 Prices)

					1				(M) (M)
	Case 1	Case 2	Cave 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Plant Capacity	\$	\$00,000 ton/year		Ý	666,000 ton/year		x	833,000 ton/year	
Location	Tanah Morah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli
Plant Cost	,						ಾಕವಾ.		
Machinery and Equipment	81,400	81,400	81,400	96,800	008'96	96,800	111,100	111,100	111,100
Erection Cost	26,400	30,600	29,000	31,900	38,300	35,100	36,300	43,600	39,900
Building and Structure	35,200	42,200	38,700	41,800	50,200	46,000	47,300	\$6,800	\$2,000
Sub-total	143,000	154,200	149,100	170,500	185,300	177.900	194,700	211,500	203,000
		; -			:				
Railway Siding	8,364	3,936	ı	9,840	4,625	1	11,316	5.215	1
Road			7,000		i	7,000		1	7,000
Land Promium	7,586	6,327	8,205	9,168	7.754	9,415	10,265	8,677	10,080
Store and Spares	4,884	4.884	4.884	808'5	5,808	5,808	999'9	999'9	6,666
Sub-total	20,834	15,147	20,089	24,816	18,187	22,223	28,247	20,558	23,746
Total Construction Cost	163,834	169,347	169,189	195,316	203,487	200,123	222,947	232,058	226,746
Pre-Operating Expenses	8,130	8,684	8,562	9,331	9,949	9,771	10,438	11,053	10,851
Initial Working Capital	14,535	14,683	14,678	19,101	19,263	19,253	20,053	20,209	20,187
Total Project Cost	186,499	192,714	192,429	223,748	232,699	229.147	253,438	263,320	257,784
Interest During Construction (Interest Rate: 8% p.a.)	16,163	17,244	17,011	19,207	20,608	20,118	21,942	23,535	22,863
Total Capital Requirements	202,662	209,958	209,440	242,955	253,307	249,265	275,380	286,855	280,647

1 3

infrastructure and labor conditions in each of plant area.

c) Railway Siding, Road

The costs of railway siding and road have been estimated based on the information from Malayan Railway and J.K.R., respectively.

d) Land Premium

The cost of land premium has been set at M\$3.00/s.q. feet in Tanah Merah and Gua Musang and M\$2.50/s.q. feet in Jeli on the assumption that the land levelling including drainage system would be completed ready for plant construction and electricity, water and telephone line shall be delivered to the boundary of the plant site.

e) Store and Spares

It is assumed that an initial store and spares needed for operation for two years will be procured at the same time as the plant equipment. On the basis of this assumption, the cost to be procured initially is estimated at 6% of the cost of machinery and equipment.

f) Pre-Operating Expenses, Initial Working Capital
The break-down of pre-operating expenses and initial working capital are shown in
Table V-8-2.

5-2 Financing plan

30% of the capital requirements for the Project will be financed by the equity capital and the remaining 70% by loans.

The paid-up schedule of the equity capital has been assumed to be as follows:

1984 1985	30% 40%
1986	30%
Total	100%

Regarding the loans, working capital will be financed by short term loan and the remaining from long term loans.

Since the source of financing for the Project has not yet been determined, the terms of financing are not known. In this report the terms and conditions used as the basis of financial planing are the interest rate on loans of 8% p.a., and repayment in 11 years (including a three-years grace period). Further studies using different interest rates of 5% p.a. and 10% p.a. are shown in sensitibity analysis.

The interest rate of short term loan is assumed to be 10% p.a..

The results of financing planing are shown in Table 5-3.

Table 5-2 Pre-Operating Expenses & Initial Working Capital (1981 Prices)

Plant Capacity S Location Tanah Morah Pre-Operating Expenses 4,290 Consultant foe (3 years) Land ront fee (3 years) 66 Labor cost (6 months) 1,575	500,000 ton/year h Gua Musang							
	<u> </u>	*-	39	666,000 ton/year	I-g	90	833,000 ton/year	•
	-	Joli	Tanah Merah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli
						5		
	4,626	4,473	5,115	5,559	5,337	5.841	6,345	060'9
	65	79	79	7.	92	8	88	8
	1,890	1,890	1,575	1,890	1,890	1,575	1,890	1,890
Loses during test operation 1,199 (1/3 month of variable cost and consumables)	1,104	1,120	1,562	1,429	1,452	1,933	1,738	1,771
Miscellaneous 1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total 8:130	8.684	8,562	9,331	9,949	9,771	10,438	11,053	10,851
Initial Working Capital								
Accounts receivable 10,733 (2 months)	10,733	10,733	14,291	14,291	14,291	14,976	14,976	14,976
Inventory			<u>-</u> -					
Products (half month) 1,862	1,840	1,844	2,311	2,257	2,263	2,473	2,393	2,398
Raw Materials, Coal (talf month)	\$36	\$46	812	683	703	851	692	715
Accounts payable (Less) (one month of rew materials)	380	341	904	467	430	764	465	434
Minimum cash requirements 1,856 (half month of production cost except deprecation, interest)	1,954	1,895	2,393	2,499	2,427	2,51.8	2,613	2,532
Total	14,683	14.678	19,101	19,263	19,253	20,053	20,209	20,187

Table 5-3 Tentative Financing Plan (1981 Prices)

(M\$.000)

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Plant Capacity	5	\$00,000 ton/year	l.	٥	666,000 ton/year		∞	833,000 ton/year	H
Location	Tanah Merah	Gua Musang	Joh	Tanah Morah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli
Total Financing Required				1 1·		- · · · ·			
Equipy (30%)	60,799	62,987	62,832	72,887	75,992	74,780	82,614	86,057.	84,194
Dale (70%)	141.863	146,971	146,608	170,068	177,315	174,485	192,766	200,798	196,453
(Tomo form loan	(127.328	/132,288	/131,930	/150,967	/158,052	(155,232	/ 172,713	/ 180,589	/176,266
Short torm loan	14,535	14,683	14,678	19,101	19,263	19,253	\ 20'023	(20,209	781,02 /
ing section of the se	202,662	209,958	209,440	242,955	253,307	249,265	275,380	286,855	280,647
Colina O air Mico			į	:		* *			
1084	18.240	18,896	18,850	21,866	22,798	22,434	24,784	25,817	25,258
*086	24.319	25,195	25,132	29,154	30,396	29,912	33,046	34,423	33,678
9861	18,240	18,896	18,850	21,867	22,798	22,434	24,784	25,817	25,258
Equity	60,799	62.987	62,832	72,887	75,992	74,780	82,614	86,057	84,194
Loan Disbursement									,
Long term loan	• .			:					79
1984 (at Beginning)	20,830	23,145	23,111	24,786	27,655	27,153	28,096	31,383	30,415
1985 (at Middle)	86,298	91,540	88,900	102,635	109,441	105,980	117,675	125,437	121,620
1986 (at Middle)	20,200	17,603	19,919	23,546	20,956	22,099	26,942	23,769	24,231
Short term loan					- i - i - i - i - i - i - i - i - i - i		690	0000	60
1987 (at Boginning)	14,535	14,683	14,678	19,101	19,263	19,23.5	50,02	607,07	,01,137
Debt	141,863	146,971	146,608	170.068	177,315	174,485	192,766	200,798	196,453

6. Financial Analysis

6-1 Main assumptions for cost estimation and financial projections

(1) General

The production cost estimates and the financial projections in this report are based on the assumption that commercial operation of the Plant will be started in 1987, and that the Plant has an economic life-span of 15 years after the start up.

These estimates and projections are given at 1981 constant prices.

(2) Production and Sales

Regarding operation of the cement plant, it is reasonable to assume from technical point of view that the rate of net capacity utilization will be 70% for the first year, 90% for the second year and 100% for the subsequent years.

It is assumed that the sales volume of cement will be equivalent to the total demand of Kelantan and Trengganu.

According to the above assumptions, the projections of production and sales of products are given in Table 6-1.

It is assumed that the sales price of cement will be M\$192/ton.

(3) Taxation

The Project will be given maximum incentives which may be allowed under the tax law and regulations in Malaysia. The following taxation is assumed for the financial projections:

a) Coorporate tax

Coorporate tax will be imposed at a rate of 50% of taxable income, consisting of:

Total	50%
Excess profit tax	5%
Development tax	5%
Company tax	40%

However the Project will be given tax holidays for a period of 7 years after the commencement of commercial operation.

The 7 year tax holiday period is computed as follows:

Pioneer company	5 years
Development area	l year
Malaysian material content	1 year
Total	7 years

Internal rate of return (IRR) on investment computed without tax holiday is also described in this report.

b) Sales tax, Surtax

Salestax and Surtax are included in the cost of equipment to be imported.

c) Excise duty:

Excise duty is computed at M\$1.97 per ton of cement.

Table 6-1 Projected Production and Sales

			-					(ton)
	1987	1988	1989	1990	1991	1992	1993	1994 onwards
Demand of Kelantan & Trenggunn	468,000	528,000	297,000	674,000	739,000	804,000	869,000	934,000
Case 1, 2, 3 (Plant Capacity: 500,000 ton/year)								
Production (capacity utilization)	350,000	450,000	500,000	200,000	200,000	200,000	200,000	800,000
Sales	335,417	445,833	497,917	500,000	200,000	200,000	200,000	200,000
Inventory (half month of production)	14,583	18,750	20,833	20,833	20,833	20,833	20,833	20,833
Case 4, 5, 6 (Plant Capacity: 666,000 ton/year)					- - - -		:	
Production (capacity utilization)	466,000	530,695	599,883	(100%)	966,000	000,999	9999	966,000
Sales	446,583	528,000	000,768	663,245	966,000	000'999	99999	666,000
Inventory	19,417	22,112	24,995	27,750	27,750	27,750	27,750	27.750
Case 7, 8, 9 (Plant Capacity: 833,000 ton/year)	0000	200 774	\$ 00 00 x	677.221	741.686	806,709	833.000	833,000
rroduction (capacity utilization)	(58.6%)	(63.6%)	(72.0%)	(81.3%)	(89.0%)	(96.8%)	(100%)	
Sales	468,000	528,000	597,000	674,000	739,000	804,000	831,905	833,000
Inventory	20,348	22,072	24,997	28,218	30,904	33,613	34,708	34,708

Table 6-2 Projected Production Cost (1981 Prices)

	Case I	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Plant Capocity	S	500,000 ton/year		\$	666,000 ton/year		20	833,000 ton/year	
Locution	Tanah Merah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli	Tanah Merah	Gua Musang	Jeli
Variable Cost				-					
Limestone	14,81	7,64	5.70	14.54	6,74	5.12	15.20	6.14	4.83
Clay	96.0	0.65	96'0	66'0	09.0	0.95	96'0	0,63	0.87
Silica sand	0,05	1,44	1.98	0.05	1.44	1.98	0.05	1.44	1.98
Iron ore	0.29	0.84	0.50	42.0	0.70	0.45	0.21	92.0	0.42
Cypsum	2.36	2.46	2.57	2,36	2.46	2.57	2,36	2.46	2.57
Fuel (coal)	24.24	23.75	25.76	23.64	23.16	25.12	23.04	22.57	24,49
Electric power	24,00	24.00	24.00	23.60	23,60	23,60	23.20	23,20	23,20
Paper bag	8.30	8:30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
Sub-total	75.03	80.69	69.77	73.72	67.09	68.09	73.32	65.50	99.99
Pixed Cost									
Consumables	88.4	88.4	88.4	4.36	4.36	4.36	4,00	4,00	4,00
Maintenance cost	88.4	5.86	5.62	4.36	5.23	5.02	4.00	4.80	4.60
Labor	6.30	7.56	7.56	4.73	5.67	5.67	3.78	4.54	4.54
Overhead	2.20	2.65	2.65	1.65	1.99	1.99	1,32	1.59	1.59
Land cost	0.0	0.0	0.05	0.0	0.04	0.05	0.03	0.03	9.0
Depreciation	18,55	18.98	18.95	16.56	17.10	16.80	15.14	15,60	15,25
Subtotal	36.85	39.97	39.71	31.70	34.39	33.89	28.27	30.56	30,02
Sales Expenses, Others									ξ.
Transportation cost	15.30	24.50	20.00	17.20	26,60	22.00	17.30	27.10	22.10
Agent foe	10.00	10.00	10.00	10.00	10.00	10,00	10.00	10.00	10.00
Excise duty	1.97	1.97	1.97	1.97	1,97	1.97	1.97	1.97	1.97
Amortization	2:16	2:30	2.27	1.92	2.06	2.01	1.76	1.88	1.83
Subtotal		38.77	34.24	31.09	40.63	35.98	31.03	20.02	35.90
					1: 4				
Anterosci.			3. 00		(
Congruentoun (o/o p.a.)	17.74 10.0	00:02	20,45	17.57	78,35	18.00	10.07	16.80	16,40
Short term loan (10% p.a.)	2.91	2.94	2.94	2.87	2.89	2.89	4	 63.	ći Ci
Sub-total	22.65	23.44	23.39	20.44	21.28	20.95	18.48	19.23	18.82
Total Production Cost	163.96	171.26	147 11	30 YY I	162.30	16001	(i)	166.50	98.191

d) Import duties

Assumed to be exempted.

c) Capital allowance

For the computation of taxable income, neither depreciation nor amortization is deductable, but deduction is allowed for initial and annual capital allowance. After the expiration of tax holiday period, the following allowance will be applied.

- Structures and buildings
 2% by straight line method. However, 12% of capital allowance can be made since 10% of special capital allowance can be additionally allowed for the initial year only.
- Machinery and equipment, erection cost, railway siding, pre-operating expenses 10% by straight line method. However, 30% of capital allowance can be made since 20% of special capital allowance can be additionally allowed for the initial year only.

6-2 Production cost

(1) General

The break-down of the production cost, based on the method of calculation given below, is shown in Table V-9-2.

The results of computation of production costs are as follows:

Total Production Cost (M\$/ton cement)

Plant Capacity	Tanah Merah	Gua Musang	Jeli
500,000 ton/year	(Case 1)	(Case 2)	(Case 3)
	163.96	171.26	167.11
666,000 ton/year	(Case 4)	(Case 5)	(Case 6)
	156.95	163.39	158.91
833,000 ton/year	(Case 7)	(Case 8)	(Case 9)
	151.10	156.24	151.40

(capacity utilization: 100%)

Assuming that the sales price would be at M\$192/ton cement, the profit per ton will be M\$20.74 to M\$40.9. As seen from the above figures, the project will be profitable in case of capacity with 666,000 ton/year and 833,000 ton/year, since the ratio of profit on sales will be higher than 15%. Further study of profitability will be given in V-9-3.

(2) Variable Cost

Regarding the cost of raw materials and fuel, the consumption and the price are calculated in wet base and the loss in process is estimated at 2% for the purpose of cost calculation. Those costs are different according to plant site and capacity as follows:

a) Limestone

Limestone			
	Tanah Merah	Gua Musang	Jeli
Consumption (ton/ton cement)	1.247	1.258	1.214
Unit Price (M\$/ton) i	ncluding quarry r	oyalty of M\$0.49	/ton (M\$1.
500,000 ton/year :	11.88	6.07	4.67
666,000 ton/year :	11.66	5.36	4.22
833,000 ton/year :	12.19	4.88	3.98
Clay			1.2
$(x,y) = \{x \in \mathbb{R}^n : x \in \mathbb{R}^n \mid x \in \mathbb{R}^n \}$			1.
	Tanah Merah	Gua Musang	Jeli
Consumption (ton/ton cement)	0.301	0.215	0.223
Unit Price (M\$/ton) i	ncluding quarry r	oyalty of MSO.62	/ton (M\$1.
500,000 ton/year :	3.25	3.02	4.32
666,000 ton/year :	3.28	2.80	4.24
	3.18	2.92	3.90
Silica Sand (in case of Ta	na Merah, high sil	lica clay is used)	
4	Tanah Merah	Gua Musang	Jeli
Consumption : (ton/ton cement)	0.016	0.057	0.103
•	0.016 3.25	0.057	0.103
(ton/ton cement)	3.25	25.24	19.20
(ton/ton cement) Unit Price (M\$/ton):	3.25	25.24	19.20

		Tanah Merah	Gua Musang	Jeli
Consumptio (ton/ton co	•	0.013	0.029	0.028
Unit Price (M\$/ton) i	ncluding quarry	royalty of MSO.56	5/ton (M\$1.50/cv. yd.)
500,000 to 666,000 to 833,000 to	on/year :	22.21 18.65 16.47	28.81 27.20 26.07	17.93 16.26 15.04
	· · · · · · · · · · · · · · · · · · ·	$\{x_{i,j}, x_{i,j}, x_{i,j}, \dots, x_{i,j}, x_{i,j}, x_{i,j}, \dots, x_{i,j}, x_{$	o tropologicky solic State of Eq. (1994) State of the original	

e) Gypsum

	•	Tanah Merah	Gua Musang	Jeli
Consumption (ton/ton cement)	:	0.05	0.05	0.05
Unit Price (M\$/ton)	:	47.20	49.20	51.34

f) Fuel (imported coal from Australia)

Coat consumption (Heat consumption)

500,000 ton/year 666,000 ton/year	•	0.121 ton/ton cement (800 Kcal/kg. clinker) 0.118 ton/ton cement (780 Kcal/kg. clinker)
833,000 ton/year	:	0.115 ton/ton cement (760 Kcal/kg. clinker)

Unit Price	Tanah Merah	Gua Musang	<u>Jeli</u>
C.I.F. price at Port Kelang	M\$165.00/ton		
Port charges	10.00		
Sub-total	M\$175.00/ton	M\$175.00/ton	M\$175.00/ton
Inland transportation	25.32	21.24	37.92
Price at plant site	M\$200.32/ton	M\$196.24/ton	M\$212.92/ton

Electric Power g)

in the said of the	500,000 ton/year	666,000 ton/year	833,000 ton/year
Consumption (KWH/ton cement)	120	118	116
	.*		

The price including demand charge is estimated at M\$0.20/KWH, based on the running charge of M\$0.17/KWH and the maximum demand charge of M\$12.00/KW month indicated by National Electricity Board.

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Paper Bag

The cost of paper bag is estimated at M\$8.30/ton cement based on the condition that 3 ply bags and 4 ply bags are mixedly used on the following manner:

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(30%)

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(3) Fixed Cost

a) Consumables

Annual cost of consumables such as fire brick, castables and steel balls are sssumed at 3% of capital cost for machinery and equipment.

b) Maintenance Cost

Annual maintenance costs for the plant are estimated as follows:

Tanah Merah : 3% of capital cost for machinery and equipment : 3.45% of capital cost for machinery and equipment : 3.6% of capital cost for machinery and equipment

c) Labor

In all cases, it is assumed that the number of employees will be 308. Annual labor cost for the plant at Tanah Merah is estimated at M\$3,148,800 and those at Gua Musang and Jeli will be 20% higher than that at Tanah Merah. The details of labor cost at Tanah Merah are shown in Table 4-1.

d) Overheads

The overhead costs are estimated at 35% of labor cost.

e) Land Cost

The cost of land rent is estimated as follows:

Plant Site, Railway, Road : M\$250/acre. Quarry : M\$100/acre.

Depreciation and Amortization

The following periods of depreciation and amortization will be applied:

Building and structures : 35 years
Machinery and equipment including erection cost
Railway siding, road : 15 years
Pre-operating expenses : 15 years
Interest during construction : 15 years

(4) Sales Expenses

a) Transportation Cost

The transportation cost should vary with the distance from the plant site to each market. The growth of demand in area near to the plant site will make the cost lower.

The results of computation are shown in Table 6-3.

b) Agent Fee

The sales commission paid to agent is estimated at M\$10. per ton of cement.

c) Excise Duty

Excise duty is estimated at M\$1.97 per ton of cement.

6-3 Profitability

(1) Financial Rate of Return

Summary of income statement for the period of 15 years after the start of commercial operation is shown in Table 6-4.

The financial rate of return on investment for the Project was assessed in terms of the internal rate of return (IRR).

The IRR computed for each of the nine cases is as shown below:

	•	JŔŖ afte	er tax
antico e de troma de	IRR before tax	With 7-year tax holiday	Without tax holiday
Capacity: 500,000 ton/year			
Case 1 (Tanah Merah)	13.9%	12.6%	9.4%
Case 2 (Gua Musang)	12.2%	11.0%	8.4%
Case 3 (Jeli)	12.9%	11.7%	8.7%
Capacity: 666,000 ton/year			
Case 4 (Tanah Merah)	15.8%	14.3%	10.7%
Case S (Gua Musang)	14.1%	12.7%	9.6%
Case 6 (Jeli)	15.1%	13.7%	10.2%
Capacity: 833,000 ton/year			
Case 7 (Tanah Merah)	15.7%	14.1%	10.8%
Case 8 (Gua Musang)	14.4%	12.7%	9.9%
Case 9 (Jeli)	15.4%	13.8%	10.6%

As seen from the above, IRR with fax holiday is higher than IRR without tax holiday by approx. 3%.

A cement plant in Tanah Merah would be the most profitable of three locations even if the plant capacity is changed.

(2) Pay-out Period and Break-even Point The pay-out period and break-even point computed for each of the nine cases with the 7-year tax holiday are shown below:

		Break	even Point
	Pay-out Period	First year	Average for 15 years
Capacity: \$00,000 ton/year		· · · · · · · · · · · · · · · · · · ·	
Case I (Tanah Merah)	6.7 years	10.1%	50.4%
Case 2 (Gua Musang)	7.6 years	78.3%	56.7%
Case 3 (Jeli)	7.2 years	74.2%	54.3%
Capacity: 666,000 ton/year		1. 1	;
Case 4 (Tanah Merah)	6.0 years	61.0%	43.3%
Case 5 (Gua Musang)	6.7 years	68.0%	48.4%
Case 6 (Jeli)	6.2 years	63.9%	45.9%
Capacity: 833,000 ton/year			
Case 7 (Tanah Merah)	6.4 years	55.0%	39.3%
Case 8 (Gua Musang)	7.0 years	60.5%	43.4%
Case 9 (Jeli)	6.5 years	56.4%	40.7%
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The above result indicates that the break-even point becomes more favourable as capacity becomes larger, and pay-out period becomes shortest in case of plant capacity of 666,000 ton/year.

(3) Sensitivity Analysis

Analysis of sensitivity to changes of interest rate and sales price etc. was made for case 4 (Plant Capacity: 666,000 ton/year, at Tanah Merah) which involves the highest IRR of

Interest rate on long term loan

As stated in V-8-2, interest rate is set at 8% p.a. as Base Case. And further, in this section, analysis of sensitivity to changes of interest rate is made as follows:

Interest Rate	5% p.a.	8% p.a.(Base Ca	se) 10% p.a.
Capital Requirements & Finan	ncing (M\$'000)	41	
Total Capital Requireme	nts 235,541	242,955	248.041
Equity (30%)	70,662	72,887	74,413
Debt (70%)	164,879	170,068	173,628
(Long Term Loan Short Term Loan	(145.778 19,101	(150.967 19,101	(154,527 19,101
Production Cost	M\$149.24/ton	M\$156.95/ton	M\$162.37/ton
Pay-back Period Break-even Point	5.5 years	6.0 years	6.3 years
/First year	51.4%	61.0%	67.8%
Average for 15 years	39.9%	43.3%	45.8%

Sales price, coal price and investment cost

The sensitivity of the IRR after tax to changes of sales price, coal price and investment cost is shown below:

	:		IRR after tax	No. 1 For a
Base Case				
/Sale price :	: M\$192/ton \		14.3%	
Coal price	M\$192/ton M\$200.32/ton	:		
- · ·			1000	Maria Maria
Sales Price		to the production		y the grade of the
	: MS211.2/ton		18.0%	
10% down :	: M\$211.2/ton : M\$172.8/ton		-	Andrew Francis
(10,0 10,000			18 1.74	
Coal Price			• 4	ta ing sa ika
/10% up	: M\$220.35/ton	<u> </u>	13.7%	11 11 1 1 1 1 1 1 1 1
10% down	: M\$220.35/ton - : M\$180.29/ton -		14.7%	
		(j+1) = (-1)(2)		
Investment Co	st		. 19 a - 1-1	er er er er er
	: 267 Million M\$			
(10% down	: 219 Million M\$		15.9%	

Table 6-3 Computed Transportation Cost (1981 Prices)

And the second s	Case 1	Case 2	Case 3-	Case 4	Case S	Case 6	Case 7	Case 8	Case 9
Plant Capacity	,	500,000 ton/year		9	666,000 ton/year		0 6	833,000 ton/year	
Location	Tanah Merah	Gua Musang	Joli	Tanah Merah Gua Musang	Gua Musang	Jeli	Tanah Merah Gua Musang	Gua Musang	Jeli
1987	15.3	24.5	20.0	17.2	26.6	22.0	17,3	27.1	22.1
1988	15.9	24.8	20,6	17,4	27.1	22.2	17.4	27.1	22.2
1989	15.8	24.7	4.02	17.4	27.2	22.2	17.4	27.2	22.2
1990	15.5	24.9	20.1	17.4	27.1	22.2	17.5	27.3	22.3
1991	15.1	24.1	19.9	16.9	25.9	21.6	17.4	27.2	22.2
1992	14,6	23.0	19.7	15.5	24.3	20.1	17.3	27.0	22.1
1993	14,0	22.0	19.5	15.4	24.5	20.0	17.1	26.5	21.9
· 1986	13.7	21.7	19.3	15.1	24.1	19.9	16.6	25.3	21.3
\$61	13.7	21.9	19,4	14.7	23.3	19.8	15.3	24.1	20.0
9661 (1997)	13.6	21.9	19.4	14.3	22.6	19.6	15.3	24,3	20.0
1997	13,5	21.7	19.4	13.9	21.8	19.4	13.1	24.2	19.9
1998	13.4	21.5	19.3	13.7	21.7	19.3	34.8	23.5	19.8
1999	13.3	4.15	19.3	13.8	21.8	19.5	14.5	22.9	19.7
2000	13.3	21,4	19.3	13.7	21.9	19.4	14.2	22.3	19.5
2001	13,3	21.4	19.3	13.7	21.9	19.4	14.2	22.3	19.5

Table 6-4 Summary of Income Statement (1981 Prices)

		1987	1988	1989	1990	1991	1992	1993	1994	199\$	1996	1997	1998	1999	2000	2001
Plant Capacity (500,000 ton/year)		. 7 4 7	•	730	, X	3		2	0	Q Y	0.46	o o	9	0.96	0.96	0 96
Profit		*	o o	ָ ר ר) }	?	<u>.</u>	2	2	2	}					•
Case 1	•	99	9 6	15.9	80 0 80 0	20.7	; ; ; ; ; ; ;	60 0 00 0	25.2	26.1	26.2	26.2	26.3	26.3	26.3	26.3
(Tanah Morah)	, atter tax	٥. ٢	o'.	Y.C.1	70.5	-	*:44	5	41.5	3101						
Case 2 (Gua Musang)	{ before tax after tax	44	5.7	11.5	13,4	16.0	18.8 18.8	00	22.5 22.5	23,4 13.9	23.4 13.9	23.5 13.9	23.6 14.0	23.6 14.0	33.6	23.6 6.61
Chase 3 (Joli)	{ before tax after tax	2.4	77	13.9 13.9	16.4	18.8	20.7	22.1	23.5 23.5	24.5 14.4	24.5 14.4	24.5 14.4	24.5 14.5	24.5 14.5	24.5	24.5 14.5
Plant Capacity (666,000 ton/year)																
Sales Revenue		85.7	101.4	114.6	127.3	127.9	127.9	127.9	127.9	127.9	127.9	127.9	127.9	127.9	127.9	127.9
Profit		i. '			•			;		•		9	4	•	ć	ć
Case 4 Control Defore to	Sefore tax	4 4 ผู้ ณ	4 4 6 6	2 2 3 3	0, 6, 0, 6, 0, 0,	31.6	33.0 0.00	35.5 5.55	37.5 37.5 17.5	5 5 5 5 6 7	20 K	12 CE) (1) (1	9 69 8 69 8 69	3 G 3 G	9 CI
Cuso S	f before tax	9.0	7.7	15.3	23.5	27.3	30.4	31.9	33.7	35.4	35.9	36,4	36.5	36.4	36.4	36.4
(Cus Musang)	after tax	4.0	7.7	15.3	23.5	27.3	30.4	31.9	33.7	20.3	20.6	\$0.8	20.9	20.8	30.8	် ဂ
Chase 6 (Joll)	bofore tax	& & €1 €1	10.7	18.9 18.9	27.6 27.6	30.4	33.0 33.0	34.6 34.6	36.2 36.2	37.5	37.6	37.7	37.8	37.7 21.4	37.7 21.5	37.7
Plant Capacity (833,000 ton/year)	-			-				•		•		; ;	:		:	1
Salos Revenue		89.9	89.9 101.4	114.6	129,4	141.9	154.4	159.7	159.7 159.9	159.9	159.9	159.9	159.9	159.9	159.9	159.9
Profit	20,000	-	, 0,	0 5	25.4	4.	42:1	46.5	24 20 20	51.1	51.1	51.3	51.6	51.8	52.1	52.1
(Tanah Morah)		, o, i	∞.	15.9	25.4	34.1	42.1	46.5	48,8	28.6	28.6	28.6	28.8	28.9	29.0	29,0
Case 8 (Gua Musang)	before tax	15.1 -5.1	3.6	11.1	20.0	28.8	37.9 37.9	43.1 43.1	46.0	27.2	48.1 27.1	48.2 27.1	4 8 8 4 7 2 4 4 4	49.3 27.7	27.9	27.9
Quee 9	before tax	6.0	8.9	14.9	24.5	33.6	42.0	46.5	2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	\$1.2 28.6	\$1.2 j	51.3	51.4	\$1.5 28.7	51.7	51.7
्री स्टि	After tax	V.0	× 0	,		10.00) i	0	•	0.04	200	2	0	Ś	5	