

Emission reduction calculation

Year	Emission Reduction	
2001-02	7874	
2002-03	12411	
2003-04	13840	
2004-05	12918	
2005-06	12918	
2006-07	12918	
2007-08	12918	
2008-09	12918	
2009-10	12918	
2010-11	12918	
	124551	

Binani Cement Limited

Clinker cooler modification Project data for July 2000 to Jun 2001

			For July-2000		
	Parameter		03-Jul-00	11-Jul-00	18-Jul-00
1	Clinker production	tpd	5250	5250	5250
	Inlet temperature of the clinker in cooler	C	1420	1420	1420
	Specific heat of clinker	kcal/kg C	0.262	0.262	0.262
	Heat from clinker	kCal/hr	81249285	81249285	81249285
2	Clinker dust from kiln to cooler		105	105	105
	Temp. of Clinker dust from kiln to cooler		1420	1420	1420
	Sp. Heat of Clinker dust from kiln to cooler		0.262	0.262	0.262
	Heat from Clinker dust from kiln to cooler	kCal/hr	1624986	1624986	1624986
3	Inlet temperature of the cooling air in cooler	C	28.8	31.5	28.0
	Flow rate of cooling air in cooler	m3/min	8689	8352	8721
	Flow rate of cooling air in cooler	kg/hr	579854	552325	583411
	Specific heat of cooling air	kcal/kg C	0.239	0.239	0.239
	Heat from cooling air	kCal/hr	3988145	4162948	3907732
4	Power delivered by cooler fans	kWh/Day	32577	28896	32937
	Power delivered by cooler fans	kCal/hr	1167343	1035440	1180243
1a	Temperature of cooler exhaust flue gases	C	290	300	285
	Power Drawn by Cooler ESP Fan	kWh/Day	5223	5195	5186
		kWh/hr	217.6	216.5	216.1
	Flow rate of Cooler exhaust fan	m3/hr	607192	606106	605756
	Flow rate of Cooler exhaust fan	Kg/hr	361949	354996	364329
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.244	0.245	0.244
Heat from Cooler Exit Air	kcal/hr	25646433	26044728	25358532	
2a	Total Clinker from Cooler	tpd	5119	5119	5119
	Temp. of Clinker from Cooler	Deg.C	135.0	132.0	130.0
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.191	0.191	0.191
	Heat from Clinker Cooler	kcal/hr	5501737	5370443	5283029
3a	Total Clinker Dust from Cooler ESP	tpd	131	131	131
	Temp. of from Clinker dust to ESP	Deg.C	290.0	300.0	285.0
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.206	0.206	0.205
	Heat from Clinker dust to ESP	kcal/hr	325914	337841	318914
4a	Radiation Losses	kcal/hr	393456	381826	396626
	Heat Losses	kcal/hr	#####	32134839	31357101
	Cooler Efficiency	%	63.80	63.51	64.35
	Total heat input	kCal/hr	88029758	88072658	87962245
	Kiln running hours	hrs	24.00	24.00	24.00

		For Aug-2000					For Sep	
26-Jul-00	Monthly Average	02-Aug-00	10-Aug-00	16-Aug-00	25-Aug-00	Monthly Average	02-Sep-00	16-Sep-00
5250		5250	5250	5300	5300		5300	5330
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
81249285		81249285	81249285	82023087	82023087		82023087	82487369
105		105	105	106	106		106	107
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
1624986		1624986	1624986	1640462	1640462		1640462	1649747
30.8		28.5	29.8	25.5	31.5		27.0	30.0
8896		8787	8888	8895	8769		8722	8777
589725		586879	591187	600035	579911		585438	583299
0.239		0.239	0.239	0.239	0.239		0.239	0.239
4338787		4001294	4207807	3659612	4370871		3781004	4186618
34980		33703	34893	34969	33495		32951	33585
1253450		1207691	1250333	1253056	1200238		1180744	1203463
305		290	295	305	295		320	330
4643		4549	4587	4210	4706		4616	3821
193.5		189.5	191.1	175.4	196.1		192.3	159.2
583852		579889	581497	565125	586478		582719	549393
339004		345673	343581	328130	346524		329788	305770
0.245		0.244	0.244	0.245	0.244		0.245	0.245
25297439		24493205	24775880	24486038	24988093		25855416	24744323
5124		5125	5124	5178	5173		5174	5211
135.0		141.0	142.0	145.0	142.0		142.0	144.0
0.191		0.192	0.192	0.192	0.192		0.192	0.192
5507155		5772549	5816374	6011413	5871904		5872826	6005101
126		125	126	122	127		126	119
305.0		290.0	295.0	305.0	295.0		320.0	330.0
0.207		0.206	0.206	0.207	0.206		0.208	0.209
331483		311259	318116	320851	320841		349026	340557
384999		394513	389228	407189	381826		400852	388171
31521077		30971526	31299598	31225491	31562664		32478120	31478152
64.37	64.01	64.84	64.57	64.75	64.63	64.70	63.35	64.84
88466508	88132792.07	88083255	88332409	88576217	89234657	88556634.64	88625297	89527197
24.00		24.00	24.00	24.00	24.00		24.00	24.00

pt-2000			For Oct-2000					
22-Sep-00	28-Sep-00	Monthly Average	03-Oct-00	12-Oct-00	19-Oct-00	26-Oct-00	Monthly Average	06-Nov-00
5330	5330		5330	5330	5330	5330		5350
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
82487369	82487369		82487369	82487369	82487369	82487369		82796890
107	107		107	107	107	107		107
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
1649747	1649747		1649747	1649747	1649747	1649747		1655938
31.5	33.0		32.0	31.5	30.3	30.3		28.0
8966	8736		8932	8804	8741	8752		8701
592925	574883		589703	582182	580449	581152		582070
0.239	0.239		0.239	0.239	0.239	0.239		0.239
4468955	4539768		4515377	4387985	4200952	4206044		3898745
35825	33112		35414	33894	33173	33295		32708
1283729	1186513		1269002	1214535	1188699	1193071		1172037
335	338		325	315	310	308		305
3713	3514		3927	4511	4641	4449		4631
154.7	146.4		163.6	188.0	193.4	185.4		193.0
544687	541320		552180	578271	583768	575612		583349
300658	297333		309891	330053	336048	332494		338712
0.245	0.245		0.245	0.245	0.245	0.245		0.245
24710685	24663037		24686501	25460267	25499594	25062548		25275648
5212	5213		5211	5205	5204	5206		5224
146.0	145.0		148.0	145.0	142.0	140.0		135.0
0.192	0.192		0.192	0.192	0.192	0.192		0.191
6096503	6052212		6184972	6042946	5906620	5818825		5614752
118	117		119	125	126	124		126
335.0	338.0		325.0	315.0	310.0	308.0		305.0
0.209	0.209		0.208	0.208	0.207	0.207		0.207
343355	344645		336504	340333	337495	330389		331198
381826	375478		379711	381826	387114	387114		396626
31532370	31435372		31587688	32225372	32130824	31598876		31618224
64.92	65.02	64.53	64.87	64.09	64.11	64.71	64.45	64.68
89889801	89863398	89476422.99	89921495	89739636	89526767	89536231	89681032.30	89523610
24.00	24.00		24.00	24.00	24.00	24.00		24.00

For Nov-2000				For Dec-2000			
15-Nov-00	22-Nov-00	28-Nov-00	Monthly Average	05-Dec-00	15-Dec-00	23-Dec-00	28-Dec-00
5350	5350	5350		5400	5400	5450	5450
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
82796890	82796890	82796890		83570693	83570693	84344495	84344495
107	107	107		108	108	109	109
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
1655938	1655938	1655938		1671414	1671414	1686890	1686890
26.5	25.5	23.5		23.5	24.0	22.5	22.5
8747	8661	8683		8749	8741	8849	8760
588084	584261	589703		594182	592663	602981	596961
0.239	0.239	0.239		0.239	0.239	0.239	0.239
3727633	3563408	3314061		3339234	3401680	3244268	3211874
33236	32257	32507		33261	33173	34422	33391
1190957	1155876	1164834		1191853	1188699	1233455	1196511
305	290	295		295	298	297	300
4615	5178	5096		4779	4646	4716	5140
192.3	215.8	212.3		199.1	193.6	196.5	214.2
582677	605445	602235		589492	583978	586893	603962
338322	360908	355834		348305	343233	345552	353740
0.245	0.244	0.244		0.244	0.245	0.244	0.245
25246534	25572640	25659454		25116508	25009322	25091504	25952581
5224	5219	5220		5273	5274	5323	5320
134.0	130.0	129.0		138.0	136.0	140.0	132.0
0.191	0.191	0.190		0.191	0.191	0.192	0.191
5570118	5386299	5342470		5802934	5713604	5950236	5580750
126	131	130		127	126	127	130
305.0	290.0	295.0		295.0	298.0	297.0	300.0
0.207	0.206	0.206		0.206	0.206	0.206	0.206
330816	324976	329461		322490	323092	323492	336646
402964	407189	415634		415634	413523	419856	419856
31550433	31691104	31747019		31657565	31459541	31785087	32289833
64.70	64.46	64.30	64.54	64.74	64.98	64.88	64.30
89371417	89172111	88931723	89249715.46	89773193	89832486	90509108	90439770
24.00	24.00	24.00		24.00	24.00	24.00	24.00

Monthly Average	For Jan-2001				Monthly Average	For Feb-2001	
	03-Jan-01	10-Jan-01	17-Jan-01	25-Jan-00		09-Feb-01	15-Feb-01
	5450	5450	5450	5450		5500	5500
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	84344495	84344495	84344495	84344495		85118298	85118298
	109	109	109	109		110	110
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	1686890	1686890	1686890	1686890		1702366	1702366
	16.8	17.0	21.0	18.0		23.5	23.5
	8713	8645	8659	8692		8892	8782
	605498	600289	593046	601488		603872	596414
	0.239	0.239	0.239	0.239		0.239	0.239
	2424321	2439380	2977791	2588205		3393688	3351775
	32844	32079	32231	32612		34932	33641
	1176910	1149498	1154944	1168597		1251730	1205469
	305	309	311	308		315	321
	4609	4858	4642	4612		4783	4592
	192.0	202.4	193.4	192.2		199.3	191.3
	582425	592719	583810	582551		589656	581708
	338175	341787	335497	336502		336551	328661
	0.245	0.245	0.245	0.245		0.245	0.245
	25235599	25849057	25542210	25364656		25961532	25850014
	5324	5322	5324	5324		5373	5374
	135.0	132.0	135.0	138.0		138.0	139.0
	0.191	0.191	0.191	0.191		0.191	0.192
	5722447	5583297	5722125	5859612		5912952	5961088
	126	128	126	126		127	126
	305.0	309.0	311.0	308.0		315.0	321.0
	0.207	0.207	0.207	0.207		0.208	0.208
	330673	341439	338733	334371		347034	349635
	444120	443065	426187	438846		415634	415634
	31732839	32216859	32029255	31997486		32637152	32576372
	64.72	64.60	64.05	64.48	64.37	64.32	64.35
90138639.04	89632617	89620262	90164120	89788187	89801296.53	91466082	91377909
	24.00	24.00	24.00	24.00		24.00	24.00

		For Mar-2001						
21-Feb-01	Monthly Average	07-Mar-01	16-Mar-01	20-Mar-01	29-Mar-01	Monthly Average	07-Apr-01	
5600		5600	5600	5600	5600		5600	
1420		1420	1420	1420	1420		1420	
0.262		0.262	0.262	0.262	0.262		0.262	
86665903		86665903	86665903	86665903	86665903		86665903	
112		112	112	112	112		112	
1420		1420	1420	1420	1420		1420	
0.262		0.262	0.262	0.262	0.262		0.262	
1733318		1733318	1733318	1733318	1733318		1733318	
27.0		24.8	28.8	31.8	26.5		30.5	
8910		8771	8742	8796	8770		8825	
598070		593187	583398	581166	589628		585490	
0.239		0.239	0.239	0.239	0.239		0.239	
3862585		3511257	4012516	4415166	3737415		4272534	
35153		33517	33184	33799	33501		34139	
1259649		1201026	1189093	1211131	1200453		1223314	
320		322	325	330	331		325	
4719		4555	4374	4352	4772		4711	
196.6		189.8	182.3	181.3	198.8		196.3	
585308		580143	572363	571403	589204		586686	
331253		327226	321218	318020	327385		329256	
0.245		0.245	0.245	0.245	0.245		0.245	
25970301		25819686	25588798	25735636	26576219		26229132	
5474		5475	5476	5477	5473		5473	
142.0		139.0	140.0	140.0	139.0		140.0	
0.192		0.192	0.192	0.192	0.192		0.192	
6212702		6072380	6121412	6121644	6070210		6117954	
126		125	124	123	127		127	
320.0		322.0	325.0	330.0	331.0		325.0	
0.208		0.208	0.208	0.209	0.209		0.208	
350577		349907	348803	354201	366471		357532	
400852		410356	393456	380769	402964		386057	
32934432		32652329	32452470	32592249	33415863		33090675	
64.78	64.48	64.93	65.33	65.34	64.20	64.95	64.76	
93521456	92121815.56	93111505	93600831	94025518	93337089	93518735.64	93895069	
24.00		24.00	24.00	24.00	24.00		24.00	

For Apr-2001				For May-2001			
13-Apr-01	17-Apr-01	27-Apr-01	Monthly Average	03-May-01	10-May-01	17-May-01	25-May-01
5600	5600	5600		5600	5650	5650	5650
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
86665903	86665903	86665903		86665903	87439706	87439706	87439706
112	112	112		112	113	113	113
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
1733318	1733318	1733318		1733318	1748794	1748794	1748794
32.0	31.0	34.5		35.8	33.0	33.5	36.5
8882	8733	8776		8898	8874	8951	8955
586387	578463	574717		580350	583944	588088	582604
0.239	0.239	0.239		0.239	0.239	0.239	0.239
4489987	4290601	4745244		4965796	4611324	4714578	5089923
34814	33077	33577		35012	34719	35647	35687
1247502	1185259	1203176		1254597	1244098	1277351	1278784
326	328	331		331	328	330	331
5184	4932	4647		4680	4587	5043	5039
216.0	205.5	193.6		195.0	191.1	210.1	210.0
605679	595711	584019		585397	581497	600142	599984
339348	332652	324504		325269	324715	334015	333374
0.245	0.245	0.245		0.245	0.245	0.245	0.245
27118722	26751673	26342346		26404492	26113395	27030055	27062419
5469	5471	5474		5474	5524	5520	5520
142.0	142.0	142.0		141.0	142.0	142.0	145.0
0.192	0.192	0.192		0.192	0.192	0.192	0.192
6207708	6210152	6213018		6165451	6270388	6265817	6409010
131	129	126		126	126	130	130
326.0	328.0	331.0		331.0	328.0	330.0	331.0
0.208	0.209	0.209		0.209	0.209	0.209	0.209
370373	366772	363246		364103	358021	372016	373175
379711	383942	369127		363831	375478	373362	360652
34076514	33712539	33287736		33297877	33117283	34041249	34205257
63.80	64.09	64.72	64.34	64.81	65.16	64.24	64.20
94136711	93875082	94347642	94063625.87	94619614	95043922	95180429	95557208
24.00	24.00	24.00		24.00	24.00	24.00	24.00

Monthly Average	For Jun-2001		For 2000-01
	06-Jun-01	Monthly Average	Annual Average
	5650		
	1420		
	0.262		
	87439706		
	113		
	1420		
	0.262		
	1748794		
	32.5		
	8885		
	585649		
	0.239		
	4554562		
	34854		
	1248935		
	335		
	4591		
	191.3		
	581666		
	321070		
	0.245		
	26388304		
	5524		
	145.0		
	0.192		
	6413604		
	126		
	335.0		
	0.209		
	366665		
	377595		
	33546168		
64.60	64.69	64.69	64.53
95100293.20	94991997	94991997.00	91236083
	24.00		

Heat Cap - Coe			
Gas/Mat	*T^0	*T^1	*T^2
O2	0.2130	7.796E-05	-7.563E-08
CO2	0.1906	1.771E-04	-1.733E-07
N2+Ar	0.2465	-3.284E-06	4.366E-08
H2O,steam	0.4445	2.910E-05	6.887E-08
H2O, liq.	1.0000		
Rawmeal	0.2060	1.014E-04	-3.673E-08
Clinker	0.1742	1.414E-04	-1.283E-07

O2	mass %	23.0
CO2	mass %	0.0
N2	mass %	77.0
H2O	mass %	0.0

CV Fan Flow	m3/min	9500
Fan Power Drawn		180

efficients		
*T^3	*T^4	
4.074E-11	-8.183E-15	
9.315E-11	-1.894E-14	
-2.750E-11	5.504E-15	
-3.726E-11	6.472E-15	
5.074E-11		

Binani Cement Limited

Clinker cooler modification Project data for Aug 2001- March 2002

			For Aug-2001	
	Parameter		14-Aug-00	18-Aug-00
1	Clinker production	tpd	5820	5820
	Inlet temperature of the clinker in cooler	C	1420	1420
	Specific heat of clinker	kcal/kg C	0.262	0.262
	Heat from clinker	kCal/hr	90070635	90070635
2	Clinker dust from kiln to cooler		116	116
	Temp. of Clinker dust from kiln to cooler		1420	1420
	Sp. Heat of Clinker dust from kiln to cooler		0.262	0.262
	Heat from Clinker dust from kiln to cooler	kCal/hr	1801413	1801413
3	Inlet temperature of the cooling air in cooler	C	28.8	27.5
	Flow rate of cooling air in cooler	m3/min	9146	9226
	Flow rate of cooling air in cooler	kg/hr	610361	618263
	Specific heat of cooling air	kcal/kg C	0.239	0.239
	Heat from cooling air	kCal/hr	4197963	4067082
4	Power delivered by cooler fans	kWh/Day	38053	39071
	Power delivered by cooler fans	kCal/hr	1363566	1400044
1a	Temperature of cooler exhaust flue gases	C	296	295
	Power Drawn by Cooler ESP Fan	kWh/Day	4503	4706
		kWh/hr	187.6	196.1
	Flow rate of Cooler exhaust fan	m3/hr	577930	586478
	Flow rate of Cooler exhaust fan	Kg/hr	340873	346524
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.244	0.244
	Heat from Cooler Exit Air	kcal/hr	24666144	24988093
2a	Total Clinker from Cooler	tpd	5695	5693
	Temp. of Clinker from Cooler	Deg.C	136.0	138.0
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.191	0.191
	Heat from Clinker Cooler	kcal/hr	6170040	6265889
2a	Total Clinker Dust from Cooler ESP	tpd	125	127
	Temp. of from Clinker dust to ESP	Deg.C	296.0	295.0
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.206	0.206
	Heat from Clinker dust to ESP	kcal/hr	317357	320841
3a	Radiation Losses	kcal/hr	393456	398739
	Heat Losses	kcal/hr	31546997	31973562
	Cooler Efficiency	%	67.62	67.15
	Total heat input	kCal/hr	97433577	97339174
	Kiln running hours	hrs	24.00	24.00
4	Baseline Efficiency	%		
5	Increase in Cooler Efficiency	%		
6	Saving in heat output due to increase in cooler efficiency	Kcal/hr		
7	Saving in heat input due to increase in cooler efficiency	Kcal/hr		
8	Total energy saved	Million Kcal		
9	Average calorific value of petcoke	Kcal/ kg		
10	Average calorific value of Coal	Kcal/ kg		
11	Average calorific value of Lignite	Kcal/ kg		

12	Average calorific value of agri fuel	Kcal/ kg		
13	tCO ₂ emission per ton of Petcoke	t CO2/TJ		
14	tCO ₂ emission per ton of Coal	t CO2/TJ		
15	tCO ₂ emission per ton of Lignite	t CO2/TJ		
16	tCO ₂ emission per ton of agri fuel	t CO2/TJ		
17	Quantity of petcoke consumed	tons/month		
18	Quantity of fine coal consumed	tons/month		
19	Quantity of lignite consumed	tons/month		
20	Quantity of agri fuel consumed	tons/month		
21	Total heat supplied by fuels	Million Kcal/month		
22	Average emission factor of fuel used	t CO2/TJ		
23	Average emission factor of fuel used	kgCO2/Million Kcal		
24	Emission Reduction	tons/month		

Monthly Average	For Sept-2001				Monthly Average	For Oc	
	03-Sep-01	12-Sep-01	19-Sep-01	28-Sep-01		04-Oct-01	11-Oct-01
	5820	5850	5850	5850		5850	5850
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	90070635	90534917	90534917	90534917		90534917	90534917
	116	117	117	117		117	117
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	1801413	1810698	1810698	1810698		1810698	1810698
	28.5	28.5	32.0	33.8		32.0	30.8
	9383	9348	9193	9379		9347	9150
	626694	624357	606925	615667		617092	606605
	0.239	0.239	0.239	0.239		0.239	0.239
	4272749	4256812	4647249	4972586		4725094	4462974
	41120	40657	38642	41059		40637	38103
	1473467	1456876	1384672	1471281		1456159	1365358
	298	300	308	298		295	293
	4421	4934	4153	5020		4987	5009
	184.2	205.6	173.0	209.2		207.8	208.7
	574404	593184	563298	591807		597915	598792
	337606	347428	325381	347835		353281	355050
	0.245	0.245	0.245	0.245		0.244	0.244
	24599308	25489455	24526377	25344611		25475372	25424711
	5696	5722	5728	5722		5721	5721
	138.0	134.0	139.0	139.0		135.0	136.0
	0.191	0.191	0.192	0.192		0.191	0.191
	6268759	6100812	6353710	6346879		6148771	6197659
	124	128	122	128		129	129
	298.0	300.0	308.0	298.0		295.0	293.0
	0.206	0.206	0.207	0.206		0.206	0.206
	317795	330638	323321	327423		327097	325106
	394513	394513	379711	372303		379711	384999
	31580374	32315418	31583118	32391217		32330950	32332476
67.39	67.65	67.05	67.90	67.21	67.45	67.19	67.07
97386375.65	97618264	98059303	98377536	98789483	98211146.51	98526869	98173947
	24.00	24.00	24.00	24.00		24.00	24.00
64.53					64.53		
2.86					2.92		
2782557.08					2868262.26		
4129205.04					4252395.47		
2675.72					2755.55		
0					0		
6484					6517		
4639					5128		

0					0		
100.8					100.8		
96.1					96.1		
101.2					101.2		
0					0		
0					0		
15711					20586.38		
273					167.62		
0					0		
103136.57					135020.99		
96.16					96.13		
401.96					401.83		
1075.53					1107.27		

t-2001			For Nov-2001				
19-Oct-01	23-Oct-01	Monthly Average	08-Nov-01	14-Nov-01	19-Nov-01	26-Nov-01	Monthly Average
5850	5850		5850	5850	5850	5850	
1420	1420		1420	1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	0.262	
90534917	90534917		90534917	90534917	90534917	90534917	
117	117		117	117	117	117	
1420	1420		1420	1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	0.262	
1810698	1810698		1810698	1810698	1810698	1810698	
29.5	29.5		26.0	24.5	26.5	25.0	
9161	9330		9315	9239	9167	9028	
609802	621068		627310	625324	616351	610064	
0.239	0.239		0.239	0.239	0.239	0.239	
4303749	4383264		3901115	3664040	3906803	3647698	
38234	40415		40215	39228	38317	36584	
1370052	1448204		1441038	1405670	1373026	1310927	
290	288		305	302	291	290	
5473	5632		4631	4615	5178	5096	
228.0	234.7		193.0	192.3	215.8	212.3	
616720	622629		583349	582677	605445	602235	
367628	372474		338712	340087	360268	358994	
0.244	0.244		0.245	0.245	0.244	0.244	
26048858	26205468		25275648	25121778	25617638	25437065	
5717	5716		5724	5724	5719	5720	
133.0	130.0		135.0	134.0	130.0	129.0	
0.191	0.191		0.191	0.191	0.191	0.190	
6046423	5898474		6152152	6103231	5902305	5854209	
133	134		126	126	131	130	
290.0	288.0		305.0	302.0	291.0	290.0	
0.206	0.205		0.207	0.207	0.206	0.206	
331028	331637		331198	327194	326223	323253	
390285	390285		405077	411412	402964	409300	
32816594	32825864		32164074	31963615	32249130	32023827	
66.52	66.56	66.83	67.07	67.19	66.97	67.09	67.08
98019416	98177083	98224328.75	97687768	97415325	97625444	97304240	97508194.24
24.00	24.00		24.00	24.00	24.00	24.00	
		64.53					64.53
		2.30					2.55
		2263269.10					2486060.30
		3386394.47					3706135.14
		2194.38					2401.58
		0					0
		6947					6832
		4961					5051

		0					0
		100.8					100.8
		96.1					96.1
		101.2					101.2
		0					0
		0					0
		20412					17529
		0					0
		0					0
		141802.16					119758.13
		96.10					96.10
		401.70					401.70
		881.48					964.71

For Dec-2001					For Jan-2002			
04-Dec-01	11-Dec-01	18-Dec-01	27-Dec-01	Monthly Average	05-Jan-02	10-Jan-02	18-Jan-02	25-Jan-01
5850	5850	5850	5850		5900	5900	5900	5900
1420	1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262	0.262		0.262	0.262	0.262	0.262
90534917	90534917	90534917	90534917		91308720	91308720	91308720	91308720
117	117	117	117		118	118	118	118
1420	1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262	0.262		0.262	0.262	0.262	0.262
1810698	1810698	1810698	1810698		1826174	1826174	1826174	1826174
23.5	26.0	25.0	20.5		16.8	17.0	21.0	18.0
9156	9208	9244	9254		9298	9275	9244	9195
621835	620134	624601	634874		646203	644039	633152	636233
0.239	0.239	0.239	0.239		0.239	0.239	0.239	0.239
3494643	3856486	3734615	3111811		2587299	2617164	3179167	2737713
38177	38837	39290	39421		40002	39701	39300	38662
1368009	1391659	1407892	1412586		1433405	1422619	1408250	1385388
288	285	282	286		294	301	293	298
5322	5849	5814	5571		4623	4185	4423	5399
221.8	243.7	242.3	232.1		192.6	174.4	184.3	225.0
611001	630517	629258	620375		583013	564006	574490	613930
365518	379221	380510	372454		345084	329762	340640	360838
0.244	0.244	0.244	0.244		0.244	0.245	0.244	0.245
25716045	26395085	26198916	26017364		24797675	24276263	24392857	26292077
5718	5714	5714	5716		5774	5778	5776	5767
131.0	129.0	132.0	130.0		131.0	138.0	134.0	132.0
0.191	0.190	0.191	0.191		0.191	0.191	0.191	0.191
5949908	5847956	5994659	5898977		6008226	6359277	6158428	6050587
132	136	136	134		126	122	124	133
288.0	285.0	282.0	286.0		294.0	301.0	293.0	298.0
0.205	0.205	0.205	0.205		0.206	0.207	0.206	0.206
325443	331950	327412	327885		317742	315542	311912	339663
415634	405077	409300	428297		444120	443065	426187	438846
32407031	32980068	32930288	32672523		31567763	31394146	31289384	33121173
66.66	66.21	66.22	66.27	66.34	67.51	67.69	67.98	65.95
97208267	97593760	97488122	96870012	97290040.44	97155598	97174678	97722312	97257995
24.00	24.00	24.00	24.00		24.00	24.00	24.00	24.00
				64.53				
				1.81				
				1761454.17				
				2655170.94				
				1720.55				
				0				
				6556				
				4899				

				0				
				100.8				
				96.1				
				101.2				
				0				
				0				
				20695				
				0				
				0				
				135676.42				
				96.10				
				401.70				
				691.14				

	For Feb-2002					For Mar-2002		
Monthly Average	04-Feb-02	12-Feb-02	21-Feb-02	28-Feb-02	Monthly Average	05-Mar-02	11-Mar-02	19-Mar-02
	5900	5900	5900	5900		5900	5900	5900
	1420	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262	0.262
	91308720	91308720	91308720	91308720		91308720	91308720	91308720
	118	118	118	118		118	118	118
	1420	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262	0.262
	1826174	1826174	1826174	1826174		1826174	1826174	1826174
	23.5	24.5	20.5	20.0		20.0	21.0	16.0
	9224	9235	9301	9266		9259	9233	9276
	626445	625072	638115	636792		636309	632385	646300
	0.239	0.239	0.239	0.239		0.239	0.239	0.239
	3520547	3662560	3127697	3044983		3042671	3175319	2471695
	39041	39180	40034	39578		39487	39156	39707
	1398969	1403950	1434552	1418212		1414951	1403090	1422834
	288	285	287	295		285	295	288
	5009	5380	5075	4590		5086	4685	4850
	208.7	224.2	211.5	191.3		211.9	195.2	202.1
	598806	613218	598223	580462		601838	585622	592394
	358222	368816	358513	342969		361972	346018	354387
	0.244	0.244	0.244	0.244		0.244	0.244	0.244
	25202780	25670880	25133368	24731747		25194478	24951615	24932926
	5771	5768	5771	5775		5770	5774	5772
	132.0	130.0	131.0	136.0		137.0	134.0	135.0
	0.191	0.191	0.191	0.191		0.191	0.191	0.191
	6054015	5952173	6004808	6256118		6300677	6155864	6203792
	129	132	129	125		130	126	128
	288.0	285.0	287.0	295.0		285.0	295.0	288.0
	0.205	0.205	0.205	0.206		0.205	0.206	0.205
	318947	322842	317407	317549		316851	320372	315532
	415634	411412	428297	430407		430407	426187	447284
	31991376	32357307	31883879	31735821		32242413	31854039	31899535
67.28	67.37	67.05	67.36	67.48	67.32	66.96	67.40	67.12
97327645.75	98054410	98201404	97697142	97598089	97887761.30	97592516	97713303	97029424
	24.00	24.00	24.00	24.00		24.00	24.00	24.00
64.53					64.53			
2.75					2.79			
2678330.74					2729021.69			
3980761.42					4053931.16			
2579.53					2626.95			
0					0			
6556					6554			
4643					4604			

0					0			
100.8					100.8			
96.1					96.1			
101.2					101.2			
0					0			
0					0			
18788					18484			
0					0			
0					0			
123174.13					121144.14			
96.10					96.10			
401.70					401.70			
1036.19					1055.24			

		Aug01-Mar02
27-Mar-02	Monthly Average	Yearly Average
5900		
1420		
0.262		
91308720		
118		
1420		
0.262		
1826174		
18.5		
9245		
638630		
0.239		
2824455		
39309		
1408573		
299		
4111		
171.3		
560653		
328949		
0.245		
24051084		
5779		
140.0		
0.192		
6459575		
121		
299.0		
0.206		
311346		
436737		
31258743		
67.90	67.35	
97367921	97425790.84	
24.00		
	64.53	
	2.82	
	2743225.98	
	4073349.37	
	2639.53	19593.80
	0	
	6541	
	4839	

	0	
	100.8	
	96.1	
	101.2	
	0	
	0	
	20175	
	1079	
	0	
	137185.96	
	96.29	
	402.51	
	1062.44	7874.01

Heat Cap - Coefficients					
Gas/Mat	*T^0	*T^1	*T^2	*T^3	*T^4
O2	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15
CO2	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14
N2+Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15
H2O,steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15
H2O, liq.	1.0000				
Rawmeal	0.2060	1.014E-04	-3.673E-08		
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11	

O2	mass %	23.0
CO2	mass %	0.0
N2	mass %	77.0
H2O	mass %	0.0

CV Fan Flow	m3/min	9500
Fan Power Drawn		180

Binani Cement Limited

Clinker cooler modification Project data for April 2002-March 2003

		April'02				
Parameter			05-Apr-02	11-Apr-02	15-Apr-02	27-Apr-02
1	Clinker production	tpd	5900	5900	5900	5900
	Inlet temperature of the clinker in cooler	C	1420	1420	1420	1420
	Specific heat of clinker	kcal/kg C	0.262	0.262	0.262	0.262
	Heat from clinker	kCal/hr	91308720	91308720	91308720	91308720
2	Clinker dust from kiln to cooler		118	118	118	118
	Temp. of Clinker dust from kiln to cooler		1420	1420	1420	1420
	Sp. Heat of Clinker dust from kiln to cooler		0.262	0.262	0.262	0.262
	Heat from Clinker dust from kiln to cooler	kCal/hr	1826174	1826174	1826174	1826174
3	Inlet temperature of the cooling air in cooler	C	33.5	30.0	31.5	34.5
	Flow rate of cooling air in cooler	m3/min	9178	9196	9179	9110
	Flow rate of cooling air in cooler	kg/hr	602979	611140	606986	596559
	Specific heat of cooling air	kcal/kg C	0.239	0.239	0.239	0.239
	Heat from cooling air	kCal/hr	4833951	4386451	4574936	4925583
4	Power delivered by cooler fans	kWh/Day	38453	38682	38462	37595
	Power delivered by cooler fans	kCal/hr	1377899	1386105	1378222	1347154
1a	Temperature of cooler exhaust flue gases	C	321	315	320	325
	Power Drawn by Cooler ESP Fan	kWh/Day	3507	4102	4123	3627
		kWh/hr	146.1	170.9	171.8	151.1
	Flow rate of Cooler exhaust fan	m3/hr	531768	561214	562074	545621
	Flow rate of Cooler exhaust fan	Kg/hr	300445	320318	318104	306210
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.245	0.245	0.245	0.245
	Heat from Cooler Exit Air	kcal/hr	23630764	24709261	24939399	24393229
2a	Total Clinker from Cooler	tpd	5785	5779	5779	5782
	Temp. of Clinker from Cooler	Deg.C	145.0	143.0	141.0	142.0
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.192	0.192	0.192	0.192
	Heat from Clinker Cooler	kcal/hr	6716359	6609027	6509048	6562943
3a	Total Clinker Dust from Cooler ESP	tpd	115	121	121	118
	Temp. of from Clinker dust to ESP	Deg.C	321.0	315.0	320.0	325.0
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.208	0.208	0.208	0.208
	Heat from Clinker dust to ESP	kcal/hr	319619	330294	336661	332506
4a	Radoation Losses	kcal/hr	373362	388171	381826	369127
	Heat Losses	kcal/hr	31040103	32036754	32166935	31657805
	Cooler Efficiency	%	68.76	67.61	67.54	68.15
	Total heat input	kCal/hr	99346744	98907450	99088052	99407632
	Kiln running hours	hrs	24.00	24.00	24.00	24.00
4	Baseline Efficiency	%				
5	Increase in Cooler Efficiency	%				
6	Saving in heat output due to increase in cooler efficiency	Kcal/hr				
7	Saving in heat input due to increase	Kcal/hr				

8	Total energy saved	Million Kcal				
9	Average calorific value of petcoke	Kcal/ kg				
10	Average calorific value of Coal	Kcal/ kg				
11	Average calorific value of Lignite	Kcal/ kg				
12	Average calorific value of agri fuel	Kcal/ kg				
13	tCO ₂ emission per ton of Petcoke	t CO ₂ /TJ				
14	tCO ₂ emission per ton of Coal	t CO ₂ /TJ				
15	tCO ₂ emission per ton of Lignite	t CO ₂ /TJ				
16	tCO ₂ emission per ton of agri fuel	t CO ₂ /TJ				
17	Quantity of petcoke consumed	tons/annum				
18	Quantity of fine coal consumed	tons/annum				
19	Quantity of lignite consumed	tons/annum				
20	Quantity of agri fuel consumed	tons/annum				
21	Total heat supplied by fuels	Million Kcal/annum				
22	Average emission factor of fuel used	t CO ₂ /TJ				
23	Average emission factor of fuel used	kgCO ₂ /Million Kcal				
24	Emission Reduction	tons/month				

Monthly Average	May'02			Monthly Average	June'02		
	03-May-02	22-May-02	29-May-02		05-Jun-02	13-Jun-02	21-Jun-02
	5900	5900	5900		5900	5900	5950
	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262		0.262	0.262	0.262
	91308720	91308720	91308720		91308720	91308720	92082522
	118	118	118		118	118	119
	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262		0.262	0.262	0.262
	1826174	1826174	1826174		1826174	1826174	1841650
	34.5	33.0	31.5		33.5	35.5	33.0
	9099	9199	9095		9162	9089	9071
	595835	605355	601467		601947	593234	596936
	0.239	0.239	0.239		0.239	0.239	0.239
	4919610	4780404	4533339		4825681	5040449	4713919
	37457	38722	37412		38254	37329	37113
	1342209	1387538	1340597		1370768	1337623	1329883
	330	295	291		305	320	315
	3617	5267	5287		4555	4158	4257
	150.7	219.5	220.3		189.8	173.3	177.4
	537265	604921	605609		580143	563502	567493
	299021	357421	360365		336850	318911	323902
	0.245	0.244	0.244		0.245	0.245	0.245
	24198116	25773890	25624587		25136755	25002724	24985736
	5784	5769	5769		5775	5778	5827
	148.0	131.0	132.0		138.0	140.0	142.0
	0.192	0.191	0.191		0.191	0.192	0.192
	6865368	6003302	6052473		6355440	6458888	6614332
	116	131	131		125	122	123
	330.0	295.0	291.0		305.0	320.0	315.0
	0.209	0.206	0.206		0.207	0.208	0.208
	333040	330930	326311		329378	337516	333990
	369127	375478	381826		373362	364890	375478
	31765651	32483602	32385198		32194935	32164018	32309537
68.01	68.04	67.29	67.29	67.54	67.59	67.68	67.68
99187469.56	99396713	99302836	99008829	99236126.11	99331343	99512965	99967974
	24.00	24.00	24.00		24.00	24.00	24.00
64.53				64.53			
3.48				3.01			
3455622.26				2987169.06			
5080756.62				4422804.06			

2926.52				2865.98			
0				0			
6554				6551			
4422				4336			
0				0			
100.8				100.8			
96.1				96.1			
101.2				101.2			
0				0			
0				0			
17889.14				10180			
153.86				0			
0				0			
117925.79				66689.18			
96.13				96.10			
401.82				401.70			
1175.94				1151.26			

		July'02					Aug	
27-Jun-02	Monthly Average	04-Jul-02	12-Jul-02	18-Jul-02	22-Jul-02	Monthly Average	03-Aug-02	07-Aug-02
5950		5950	5950	5950	5950		5950	5950
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
92082522		92082522	92082522	92082522	92082522		92082522	92082522
119		119	119	119	119		119	119
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
1841650		1841650	1841650	1841650	1841650		1841650	1841650
32.0		29.0	29.5	31.0	28.0		30.5	26.5
9062		9113	8998	9078	9043		8977	9115
598301		607631	598954	601296	604979		595601	612822
0.239		0.239	0.239	0.239	0.239		0.239	0.239
4581215		4215603	4227192	4459956	4052194		4346316	3884432
37002		37634	36210	37194	36767		35957	37656
1325905		1348552	1297525	1332785	1317484		1288459	1349340
301		310	309	311	315		311	315
4681		4415	4129	4393	4380		4082	4053
195.0		184.0	172.0	183.0	182.5		170.1	168.9
581552		574144	562320	572873	571969		559345	559194
340021		330508	324257	329211	326456		321437	319165
0.245		0.245	0.245	0.245	0.245		0.245	0.245
25031510		25079192	24523293	25063689	25182786		24471826	24620340
5824		5826	5829	5826	5826		5829	5829
139.0		141.0	145.0	140.0	138.0		148.0	146.0
0.192		0.192	0.192	0.192	0.191		0.192	0.192
6460254		6562432	6766746	6512514	6412412		6919056	6818007
126		124	121	124	124		121	121
301.0		310.0	309.0	311.0	315.0		311.0	315.0
0.207		0.207	0.207	0.207	0.208		0.207	0.208
325358		331931	323927	332387	336624		324538	329106
379711		392399	390285	383942	396626		386057	402964
32196833		32365955	32004251	32292532	32328448		32101476	32170417
67.75	67.67	67.47	67.82	67.62	67.44	67.59	67.76	67.56
99831292	99660893.77	99488327	99448890	99716914	99293851	99486995.58	99558948	99157945
24.00		24.00	24.00	24.00	24.00		24.00	24.00
	64.53					64.53		
	3.14					3.06		
	3133282.69					3040176.48		
	4629969.08					4498243.85		

	3000.22					2914.86		
	0					0		
	6519					6380		
	4287					4455		
	0					0		
	100.8					100.8		
	96.1					96.1		
	101.2					101.2		
	0					0		
	0					0		
	19621					20356		
	930					1575		
	0					0		
	131896.21					136887.91		
	96.25					96.36		
	402.34					402.79		
	1207.12					1174.08		

Aug'02			Sept'02					Oct'02
14-Aug-02	24-Aug-02	Monthly Average	03-Sep-02	11-Sep-02	17-Sep-02	24-Sep-02	Monthly Average	03-Oct-02
5950	5950		5950	5950	5950	5950		5950
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
92082522	92082522		92082522	92082522	92082522	92082522		92082522
119	119		119	119	119	119		119
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
1841650	1841650		1841650	1841650	1841650	1841650		1841650
26.5	31.0		28.5	29.0	28.0	30.5		28.5
9098	9114		9111	9104	9106	9031		9097
611713	603703		608489	607045	609195	599208		607538
0.239	0.239		0.239	0.239	0.239	0.239		0.239
3877407	4477809		4148630	4211533	4080435	4372640		4142140
37450	37647		37606	37524	37549	36621		37428
1341958	1349018		1347548	1344610	1345506	1312253		1341170
309	305		305	315	311	314		315
4140	4997		4841	4373	4522	4355		4311
172.5	208.2		201.7	182.2	188.4	181.5		179.6
562769	591128		592028	572089	577868	571151		569604
324516	343228		343751	326525	332082	326545		325106
0.245	0.245		0.245	0.245	0.245	0.245		0.245
24542874	25612683		25651689	25188071	25282254	25107351		25078674
5828	5822		5822	5826	5825	5827		5827
148.0	139.0		138.0	142.0	139.0	139.0		138.0
0.192	0.192		0.191	0.192	0.192	0.192		0.191
6918178	6457960		6407644	6613205	6461136	6462746		6412974
122	128		128	124	125	123		123
309.0	305.0		305.0	315.0	311.0	314.0		315.0
0.207	0.207		0.207	0.208	0.207	0.208		0.208
324185	335614		336125	336695	335286	334953		335232
402964	383942		394513	392399	396626	386057		394513
32188202	32790199		32789971	32530370	32475302	32291106		32221394
67.53	67.13	67.49	67.02	67.30	67.31	67.58	67.30	67.59
99143538	99750999	99402857.57	99420351	99480315	99350114	99609065	99464961.43	99407482
24.00	24.00		24.00	24.00	24.00	24.00		24.00
		64.53					64.53	
		2.96					2.77	
		2945900.36					2758404.86	
		4364710.84					4098472.44	

		2828.33					2655.81	
		0					0	
		6547					6547	
		4523					4623	
		0					0	
		100.8					100.8	
		96.1					96.1	
		101.2					101.2	
		0					0	
		0					0	
		16865					19957	
		1336					5.62	
		0					0	
		116457.88					130684.46	
		96.36					96.10	
		402.80					401.70	
		1139.26					1066.84	

Oct'02			Nov'02		Dec'02		
11-Oct-02	17-Oct-02	Monthly Average	27-Nov-02	Monthly Average	04-Dec-02	21-Dec-02	26-Dec-02
5950	5950		5950		5950	5950	5950
1420	1420		1420		1420	1420	1420
0.262	0.262		0.262		0.262	0.262	0.262
92082522	92082522		92082522		92082522	92082522	92082522
119	119		119		119	119	119
1420	1420		1420		1420	1420	1420
0.262	0.262		0.262		0.262	0.262	0.262
1841650	1841650		1841650		1841650	1841650	1841650
29.0	28.0		24.5		22.0	23.5	18.5
9066	9188		9281		9311	9319	9390
604509	614655		628194		635534	632911	648630
0.239	0.239		0.239		0.239	0.239	0.239
4193939	4117003		3680853		3343315	3556886	2868681
37051	38578		39776		40161	40275	41204
1327661	1382378		1425307		1439103	1443188	1476477
320	311		310		300	302	291
4409	4140		4480		4657	4509	4749
183.7	172.5		186.7		194.0	187.9	197.9
573498	562769		576945		584438	578186	588257
324569	323405		332120		342305	337465	350040
0.245	0.245		0.245		0.245	0.245	0.244
25446263	24621626		25201547		25113614	24928142	24890386
5826	5828		5825		5824	5825	5823
141.0	142.0		138.0		141.0	141.0	135.0
0.192	0.192		0.191		0.192	0.192	0.191
6562589	6615491		6411229		6559927	6561449	6258493
124	122		125		126	125	127
320.0	311.0		310.0		300.0	302.0	291.0
0.208	0.207		0.207		0.206	0.207	0.206
343503	326525		333551		325763	324672	316962
392399	396626		411412		421966	415634	436737
32744755	31960267		32357738		32421271	32229897	31902577
67.07	67.85	67.50	67.33	67.33	67.15	67.42	67.54
99445773	99423554	99425603.06	99030332	99030332	98706590	98924246	98269331
24.00	24.00		24.00		24.00	24.00	24.00
		64.53		64.53			
		2.97		2.80			
		2957492.42		2772849.30			
		4381173.09		4118296.89			

		2839.00		2668.66			
		0		0			
		6497		6515			
		4772		4635			
		0		0			
		100.8		100.8			
		96.1		96.1			
		101.2		101.2			
		0		0			
		0		0			
		18590		13782.02			
		0		0			
		0		0			
		120779.23		89789.86			
		96.10		96.10			
		401.70		401.70			
		1140.42		1071.99			

Monthly Average	Jan'03				Monthly Average	Feb	
	06-Jan-03	13-Jan-03	21-Jan-03	31-Jan-03		04-Feb-03	11-Feb-03
	5950	5950	5950	5950		5950	5950
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	92082522	92082522	92082522	92082522		92082522	92082522
	119	119	119	119		119	119
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	1841650	1841650	1841650	1841650		1841650	1841650
	22.0	21.0	23.5	16.0		19.0	20.0
	9317	9106	9217	9331		9207	9262
	635967	623711	625984	650122		634892	636532
	0.239	0.239	0.239	0.239		0.239	0.239
	3345593	3131763	3517956	2486315		2883909	3043738
	40244	37551	38954	40423		38817	39529
	1442077	1345578	1395852	1448491		1390943	1416456
	291	302	301	295		298	296
	5031	4524	4591	4925		4726	4499
	209.6	188.5	191.3	205.2		196.9	187.5
	599666	578826	581666	595429		587307	577759
	356829	337839	340088	351813		345190	340772
	0.244	0.245	0.245	0.244		0.245	0.244
	25373128	24955727	25036428	25369464		25151909	24658846
	5820	5825	5824	5821		5823	5825
	135.0	132.0	135.0	130.0		135.0	138.0
	0.191	0.191	0.191	0.191		0.191	0.191
	6255844	6110997	6260023	6007739		6258713	6411036
	130	125	126	129		127	125
	291.0	302.0	301.0	295.0		298.0	296.0
	0.206	0.207	0.207	0.206		0.206	0.206
	323109	325031	325422	325738		324934	317263
	421966	426187	415634	447284		434627	430407
	32374047	31817942	32037507	32150225		32170183	31817552
67.37	67.20	67.67	67.59	67.15	67.40	67.24	67.66
98633388.93	98711843	98401514	98837980	97858979	98452578.98	98199025	98384367
	24.00	24.00	24.00	24.00		24.00	24.00
64.53					64.53		
2.84					2.87		
2800886.86					2825805.18		
4157487.85					4192575.63		

2694.05					2716.79		
0					0		
6543					6540		
4701					4694		
0					0		
100.8					100.8		
96.1					96.1		
101.2					101.2		
0					0		
0					0		
19090					20931.53		
1148					273.47		
0					0		
130302.62					138175.87		
96.31					96.15		
402.58					401.90		
1084.57					1091.87		

b'03			March'03				
18-Feb-03	26-Feb-03	Monthly Average	07-Mar-03	14-Mar-03	21-Mar-03	28-Mar-03	Monthly Average
5950	5950		5950	5950	5950	5950	
1420	1420		1420	1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	0.262	
92082522	92082522		92082522	92082522	92082522	92082522	
119	119		119	119	119	119	
1420	1420		1420	1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	0.262	
1841650	1841650		1841650	1841650	1841650	1841650	
19.0	28.0		23.0	27.5	30.0	30.0	
9099	9133		9140	8963	9063	8911	
627447	610999		621802	600624	602310	592204	
0.239	0.239		0.239	0.239	0.239	0.239	
2850091	4092520		3419988	3951048	4323070	4250536	
37454	37887		37976	35790	37013	35163	
1342102	1357618		1360807	1282475	1326299	1260008	
300	310		310	311	305	311	
4904	4417		4616	4470	4625	4523	
204.3	184.0		192.3	186.3	192.7	188.5	
592100	573810		582719	576516	583097	578783	
346793	330316		335444	331305	338566	332608	
0.245	0.245		0.245	0.245	0.245	0.245	
25442861	25064601		25453771	25223077	25264738	25322275	
5822	5826		5824	5825	5824	5825	
131.0	136.0		135.0	136.0	135.0	135.0	
0.191	0.191		0.191	0.191	0.191	0.191	
6058212	6311843		6259778	6311210	6259691	6260692	
128	124		126	125	126	125	
300.0	310.0		310.0	311.0	305.0	311.0	
0.206	0.207		0.207	0.207	0.207	0.207	
330034	331738		336889	334501	331055	335816	
434627	396626		417745	398739	388171	388171	
32265733	32104809		32468183	32267527	32243655	32306954	
67.11	67.69	67.43	67.11	67.46	67.62	67.51	67.42
98116366	99374310	98518517.10	98704967	99157696	99573542	99434717	99217730.46
24.00	24.00		24.00	24.00	24.00	24.00	
		64.53					64.53
		2.90					2.89
		2853994.29					2870327.26
		4232722.85					4257195.69

		2742.80					2758.66
		0					0
		6488					6466
		4410					4151
		0					0
		100.8					100.8
		96.1					96.1
		101.2					101.2
		0					0
		0					0
		18952.52					20882
		333.85					0
		0					0
		124436.23					135023.01
		96.16					96.10
		401.95					401.70
		1102.47					1108.15

30868.88
12411.50

Heat Cap - Coefficients						
Gas/Mat	*T^0	*T^1	*T^2	*T^3	*T^4	
O2	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15	
CO2	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14	
N2+Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15	
H2O,steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15	
H2O, liq.	1.0000					
Rawmeal	0.2060	1.014E-04	-3.673E-08			
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11		

O2	mass %	23.0
CO2	mass %	0.0
N2	mass %	77.0
H2O	mass %	0.0

CV Fan Fl	m3/min	9500
Fan Power Drawn		180

Binani Cement Limited

Clinker cooler modification Project data for April 2003-March 2004

			Apr	
	Parameter		02-Apr-03	08-Apr-03
1	Clinker production	tpd	5950	5950
	Inlet temperature of the clinker in cooler	C	1420	1420
	Specific heat of clinker	kcal/kg C	0.262	0.262
	Heat from clinker	kCal/hr	92082522	92082522
2	Clinker dust from kiln to cooler	tpd	119	119
	Temp. of Clinker dust from kiln to cooler	C	1420	1420
	Sp. Heat of Clinker dust from kiln to cooler	kcal/kg C	0.262	0.262
	Heat from Clinker dust from kiln to cooler	kCal/hr	1841650	1841650
3	Inlet temperature of the cooling air in cooler	C	32.0	32.5
	Flow rate of cooling air in cooler	m3/min	8931	8980
	Flow rate of cooling air in cooler	kg/hr	589626	591913
	Specific heat of cooling air	kcal/kg C	0.239	0.239
	Heat from cooling air	kCal/hr	4514788	4603277
4	Power delievered by cooler fans	kWh/Day	35400	35996
	Power delievered by cooler fans	kCal/hr	1268500	1289857
1a	Temperature of cooler exhaust flue gases	C	315	305
	Power Drawn by Cooler ESP Fan	kWh/Day	4497	4745
		kWh/hr	187.4	197.7
	Flow rate of Cooler exhaust fan	m3/hr	577673	588092
	Flow rate of Cooler exhaust fan	Kg/hr	329712	341466
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.245	0.245
Heat from Cooler Exit Air	kcal/hr	25433927	25481163	
2a	Total Clinker from Cooler	tpd	5825	5823
	Temp. of Clinker from Cooler	Deg.C	140.0	138.0
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.192	0.191
	Heat from Clinker Cooler	kcal/hr	6511355	6408579
3a	Total Clinker Dust from Cooler ESP	tpd	125	127
	Temp. of from Clinker dust to ESP	Deg.C	315.0	305.0
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.208	0.207
	Heat from Clinker dust to ESP	kcal/hr	339981	333891
4a	Radoation Losses	kcal/hr	379711	377595
	Heat Losses	kcal/hr	32664974	32601228
	Cooler Efficiency	%	67.24	67.34
	Total heat input	kCal/hr	99707461	99817307
	Kiln running hours	hrs	24.00	24.00
4	Baseline Efficiency	%		
5	Increase in Cooler Efficiency	%		
6	Saving in heat output due to increase in cooler efficiency	Kcal/hr		
7	Saving in heat input due to increase in	Kcal/hr		
8	Total energy saved	Million Kcal		

9	Average calorific value of petcoke	Kcal/ kg		
10	Average calorific value of Coal	Kcal/ kg		
11	Average calorific value of Lignite	Kcal/ kg		
12	Average calorific value of agri fuel	Kcal/ kg		
13	tCO ₂ emission per ton of Petcoke	t CO ₂ /TJ		
14	tCO ₂ emission per ton of Coal	t CO ₂ /TJ		
15	tCO ₂ emission per ton of Lignite	t CO ₂ /TJ		
16	tCO ₂ emission per ton of agri fuel	t CO ₂ /TJ		
17	Quantity of petcoke consumed	tons/month		
18	Quantity of fine coal consumed	tons/month		
19	Quantity of lignite consumed	tons/month		
20	Quantity of agri fuel consumed	tons/month		
21	Total heat supplied by fuels	Million Kcal/month		
22	Average emission factor of fuel used	t CO ₂ /TJ		
23	Average emission factor of fuel used	kgCO ₂ /Million Kcal		
24	Emission Reduction	tons/month		

il'03			May'03			
19-Apr-03	25-Apr-03	Monthly Average	05-May-03	12-May-03	17-May-03	Monthly Average
5950	5950		5950	5950	5950	
1420	1420		1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	
92082522	92082522		92082522	92082522	92082522	
119	119		119	119	119	
1420	1420		1420	1420	1420	
0.262	0.262		0.262	0.262	0.262	
1841650	1841650		1841650	1841650	1841650	
27.0	34.0		32.5	35.5	34.0	
8582	8481		8724	8720	8806	
576001	556258		574995	569175	577586	
0.239	0.239		0.239	0.239	0.239	
3720059	4526112		4471700	4836032	4699654	
27614	24889		29642	29606	30498	
989502	891856		1062172	1060882	1092845	
307	315		325	325	329	
4447	4514		3420	3355	3656	
185.3	188.1		142.5	139.8	152.3	
575526	578399		553705	550179	566147	
333017	330126		310747	308768	315618	
0.245	0.245		0.245	0.245	0.245	
25018221	25465904		24754676	24597001	25461539	
5826	5825		5830	5831	5828	
135.0	134.0		141.0	145.0	134.0	
0.191	0.191		0.192	0.192	0.191	
6261448	6210839		6567405	6769790	6213661	
124	125		120	119	122	
307.0	315.0		325.0	325.0	329.0	
0.207	0.208		0.208	0.208	0.209	
329144	340409		337433	335284	349756	
400852	371244		377595	364890	371244	
32009665	32388396		32037109	32066966	32396200	
67.55	67.40	67.38	67.79	67.88	67.51	67.73
98633733	99342141	99375160.50	99458045	99821087	99716672	99665267.72
24.00	24.00		24.00	24.00	24.00	
		64.53				64.53
		2.85				3.20
		2832776.50				3184514.12
		4204143.33				4702110.40
		2724.28				3046.97

		0				0
		6458				6492
		0				0
		0				0
		100.8				100.8
		96.1				96.1
		101.2				101.2
		0				0
		0				0
		20712				12275
		0				0
		0				0
		133758.10				79689.30
		96.10				96.10
		401.70				401.70
		1094.34				1223.96

June'03					July'03			
03-Jun-03	11-Jun-03	18-Jun-03	26-Jun-03	Monthly Average	01-Jul-03	08-Jul-03	19-Jul-03	25-Jul-03
5950	5950	5950	5950		5950	5950	5950	5950
1420	1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262	0.262		0.262	0.262	0.262	0.262
92082522	92082522	92082522	92082522		92082522	92082522	92082522	92082522
119	119	119	119		119	119	119	119
1420	1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262	0.262		0.262	0.262	0.262	0.262
1841650	1841650	1841650	1841650		1841650	1841650	1841650	1841650
34.0	33.0	26.5	31.5		33.0	28.5	31.0	28.0
8387	8553	8553	8564		8586	8628	8469	8399
550095	562819	575059	566348		565000	576268	561001	561856
0.239	0.239	0.239	0.239		0.239	0.239	0.239	0.239
4475967	4444505	3645068	4268643		4461725	3928944	4161080	3763357
29260	31051	31055	31177		31417	31890	30143	29386
1048483	1112661	1112804	1117176		1125776	1142725	1080124	1052998
318	319	311	321		320	311	308	321
3673	3500	3835	3499		3431	3907	4133	3302
153.0	145.8	159.8	145.8		143.0	162.8	172.2	137.6
567022	557985	575231	557932		554298	578805	578512	547269
321990	316323	330566	315228		313703	332620	334169	309203
0.245	0.245	0.245	0.245		0.245	0.245	0.245	0.245
25081704	24720022	25166848	24793440		24594354	25323213	25188799	24319588
5828	5829	5826	5829		5830	5825	5825	5832
139.0	145.0	138.0	141.0		142.0	135.0	139.0	141.0
0.192	0.192	0.191	0.192		0.192	0.191	0.192	0.192
6463735	6767833	6411637	6566376		6617567	6260687	6460982	6568971
122	121	124	121		120	125	125	118
318.0	319.0	311.0	321.0		320.0	311.0	308.0	321.0
0.208	0.208	0.207	0.208		0.208	0.207	0.207	0.208
337258	333047	333755	335345		332003	335829	332053	328936
371244	375478	402964	381826		375478	394513	383942	396626
32253942	32196381	32315204	32076988		31919403	32314242	32365775	31614121
67.57	67.64	67.25	67.70	67.54	67.92	67.36	67.36	67.98
99448623	99481339	98682045	99309992	99230500.05	99511674	98995842	99165377	98740528
24.00	24.00	24.00	24.00		24.00	24.00	24.00	24.00
				64.53				
				3.01				
				2985929.84				
				4421039.83				
				2864.83				

				0				
				6508				
				0				
				0				
				100.8				
				96.1				
				101.2				
				0				
				0				
				20117				
				0				
				0				
				130921.44				
				96.10				
				401.70				
				1150.80				

Monthly Average	Aug'03				Monthly Average	Sept'03		
	04-Aug-03	13-Aug-03	19-Aug-03	26-Aug-03		02-Sep-03	08-Sep-03	17-Sep-03
	5950	5950	5950	5950		5950	5950	5950
	1420	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262	0.262
	92082522	92082522	92082522	92082522		92082522	92082522	92082522
	119	119	119	119		119	119	119
	1420	1420	1420	1420		1420	1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262	0.262
	1841650	1841650	1841650	1841650		1841650	1841650	1841650
	25.5	28.5	28.0	26.0		27.5	27.5	29.5
	8368	8402	8590	8577		8515	8535	8507
	564519	561164	574651	577656		570600	571918	566253
	0.239	0.239	0.239	0.239		0.239	0.239	0.239
	3442998	3825969	3849054	3592324		3753544	3762216	3996399
	29066	29424	31461	31323		30639	30854	30545
	1041532	1054360	1127353	1122408		1097898	1105602	1094529
	318	316	318	311		310	309	311
	3372	3480	3380	3787		3771	3710	3748
	140.5	145.0	140.8	157.8		157.1	154.6	156.2
	551105	556921	551540	572823		572016	568918	570852
	312951	317328	313198	329183		329283	328062	328050
	0.245	0.245	0.245	0.245		0.245	0.245	0.245
	24377638	24558598	24396882	25061514		24986242	24811051	24975272
	5831	5830	5831	5826		5826	5827	5827
	142.0	145.0	144.0	141.0		140.0	142.0	140.0
	0.192	0.192	0.192	0.192		0.192	0.192	0.192
	6618350	6768099	6719002	6562753		6512721	6613983	6513002
	119	120	119	124		124	123	123
	318.0	316.0	318.0	311.0		310.0	309.0	311.0
	0.208	0.208	0.208	0.207		0.207	0.207	0.207
	327791	328928	328050	332358		330701	327728	331215
	407189	394513	396626	405077		398739	398739	390285
	31730968	32050139	31840561	32361702		32228404	32151501	32209774
67.66	67.76	67.56	67.81	67.19	67.58	67.37	67.46	67.47
99103355.31	98408702	98804502	98900579	98638905	98688171.98	98775615	98791991	99015101
	24.00	24.00	24.00	24.00		24.00	24.00	24.00
64.53					64.53			
3.13					3.05			
3098563.02					3008812.73			
4579838.67					4452302.17			
2967.74					2885.09			

0					0			
6593					6449			
0					4026			
0					0			
100.8					100.8			
96.1					96.1			
101.2					101.2			
0					0			
0					0			
21257					21299			
0					366			
0					0			
140147.40					138830.77			
96.10					96.15			
401.70					401.92			
1192.13					1159.59			

		Oct'03					Nov	
23-Sep-03	Monthly Average	06-Oct-03	14-Oct-03	22-Oct-03	28-Oct-03	Monthly Average	04-Nov-03	14-Nov-03
5950		5950	5950	5950	5950		5950	5950
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
92082522		92082522	92082522	92082522	92082522		92082522	92082522
119		119	119	119	119		119	119
1420		1420	1420	1420	1420		1420	1420
0.262		0.262	0.262	0.262	0.262		0.262	0.262
1841650		1841650	1841650	1841650	1841650		1841650	1841650
27.5		26.5	24.0	25.0	25.5		27.0	24.5
8575		8542	8601	8618	8570		8526	8539
574627		574300	583141	582311	578123		572295	577945
0.239		0.239	0.239	0.239	0.239		0.239	0.239
3780037		3640259	3347023	3481757	3525972		3696119	3386423
31299		30931	31584	31770	31241		30760	30896
1121548		1108361	1131760	1138425	1119469		1102233	1107107
314		309	305	301	305		305	302
3783		3888	4112	4123	3913		3808	4010
157.6		162.0	171.3	171.8	163.0		158.7	167.1
572621		577866	588746	589270	579100		568413	578281
327385		333222	341845	344534	336245		330040	337521
0.245		0.245	0.245	0.245	0.245		0.245	0.245
25171987		25201274	25509478	25363699	25091560		24628503	24932258
5826		5825	5823	5823	5825		5827	5825
138.0		138.0	134.0	135.0	139.0		139.0	134.0
0.191		0.191	0.191	0.191	0.192		0.192	0.191
6412257		6411010	6208456	6258258	6460841		6463401	6210866
124		125	127	127	125		123	125
314.0		309.0	305.0	301.0	305.0		305.0	302.0
0.208		0.207	0.207	0.207	0.207		0.207	0.207
335816		332882	334262	329676	328786		322718	324726
398739		402964	413523	409300	407189		400852	411412
32318799		32348131	32465719	32360932	32288376		31815474	31879262
67.30	67.40	67.22	67.01	67.16	67.24	67.16	67.77	67.61
98825757	98852115.76	98672793	98402955	98544355	98569614	98547429.28	98722525	98417703
24.00		24.00	24.00	24.00	24.00		24.00	24.00
	64.53					64.53		
	2.87					2.71		
	2835693.70					2674266.48		
	4207346.69					3977014.03		
	2726.36					2577.11		

	8429					8413		
	6362					6374		
	3852					0		
	0					0		
	100.8					100.8		
	96.1					96.1		
	101.2					101.2		
	0					0		
	40					1926		
	18477					18809		
	833.58					0		
	0					0		
	121098.78					136092.00		
	96.25					96.66		
	402.32					404.04		
	1096.86					1041.25		

'03			Dec'03					
19-Nov-03	24-Nov-03	Monthly Average	04-Dec-03	10-Dec-03	15-Dec-03	23-Dec-03	Monthly Average	08-Jan-04
5950	5950		5950	5950	5950	5950		5950
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
92082522	92082522		92082522	92082522	92082522	92082522		92082522
119	119		119	119	119	119		119
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
1841650	1841650		1841650	1841650	1841650	1841650		1841650
21.0	21.0		22.0	21.0	19.0	19.0		18.5
8483	8540		8462	8500	8533	8488		8558
581021	584937		577578	582189	588434	585363		591148
0.239	0.239		0.239	0.239	0.239	0.239		0.239
2917409	2937075		3038425	2923277	2672881	2658932		2614458
30291	30914		30058	30476	30833	30348		31104
1085428	1107752		1077078	1092057	1104849	1087470		1114560
300	301		298	302	301	300		301
4061	4151		4201	4304	4533	4083		4359
169.2	173.0		175.0	179.3	188.9	170.1		181.6
580720	584975		587312	580682	579209	570578		571708
340128	342023		345193	338922	338651	334187		334266
0.245	0.245		0.245	0.245	0.245	0.245		0.245
24953873	25178824		25152105	25035763	24930655	24518062		24607816
5825	5824		5823	5825	5825	5827		5827
132.0	132.0		131.0	133.0	135.0	134.0		135.0
0.191	0.191		0.191	0.191	0.191	0.191		0.191
6110568	6109604		6059288	6160422	6260593	6212640		6262335
125	126		127	125	125	123		123
300.0	301.0		298.0	302.0	301.0	300.0		301.0
0.206	0.207		0.206	0.207	0.207	0.206		0.207
323691	327273		324936	326074	324047	318038		319851
426187	426187		421966	426187	434627	434627		436737
31814319	32041888		31958295	31948445	31949922	31483367		31626738
67.51	67.29	67.55	67.40	67.38	67.30	67.77	67.46	67.61
97927010	97969000	98259059.38	98039677	97939507	97701903	97670575	97837915.37	97653191
24.00	24.00		24.00	24.00	24.00	24.00		24.00
		64.53					64.53	
		3.24					3.02	
		3201405.58					2964254.22	
		4723729.98					4388446.74	
		3060.98					2843.71	

		8450					8478	
		6463					6555	
		0					0	
		0					0	
		100.8					100.8	
		96.1					96.1	
		101.2					101.2	
		0					0	
		3030					3479	
		16254					12958	
		0					0	
		0					0	
		130653.10					114434.65	
		97.02					97.31	
		405.55					406.76	
		1241.37					1156.71	

Jan'04				Feb'04			
14-Jan-04	21-Jan-04	30-Jan-04	Monthly Average	03-Feb-04	11-Feb-04	17-Feb-04	23-Feb-04
5950	5950	5950		5950	5950	5950	5950
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
92082522	92082522	92082522		92082522	92082522	92082522	92082522
119	119	119		119	119	119	119
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
1841650	1841650	1841650		1841650	1841650	1841650	1841650
21.0	18.5	20.5		17.5	19.5	24.0	24.0
8582	8462	8562		8518	8366	8425	8555
587796	584532	587388		590407	575928	571234	579992
0.239	0.239	0.239		0.239	0.239	0.239	0.239
2951426	2585196	2879058		2469870	2685009	3278682	3328949
31374	30061	31147		30665	29040	29670	31070
1124235	1077186	1116101		1098829	1040600	1063175	1113342
303	304	303		304	301	310	312
4346	4480	4341		4273	4506	4371	4272
181.1	186.7	180.9		178.0	187.8	182.1	178.0
571140	576945	570921		567927	578058	572010	568093
332774	335574	332647		330329	337978	329280	325906
0.245	0.245	0.245		0.245	0.245	0.245	0.245
24665254	24957117	24655801		24567043	24881108	24986005	24894124
5827	5825	5827		5827	5825	5826	5827
132.0	135.0	133.0		131.0	130.0	132.0	135.0
0.191	0.191	0.191		0.191	0.191	0.191	0.191
6112739	6261119	6162652		6063645	6011611	6112542	6263174
123	125	123		123	125	124	123
303.0	304.0	303.0		304.0	301.0	310.0	312.0
0.207	0.207	0.207		0.207	0.207	0.207	0.207
321899	326366	321775		321265	323403	330698	330795
426187	436737	428297		440956	432517	413523	413523
31526079	31981338	31568525		31392909	31648639	31842768	31901616
67.83	67.23	67.76	67.61	67.80	67.59	67.60	67.57
97999834	97586554	97919332	97789727.65	97492872	97649782	98266030	98366463
24.00	24.00	24.00		24.00	24.00	24.00	24.00
			64.53				
			2.93				
			2868223.42				
			4251638.13				
			2755.06				

			8428				
			6530				
			0				
			0				
			100.8				
			96.1				
			101.2				
			0				
			2827				
			12097				
			0				
			0				
			102819.37				
			97.19				
			406.25				
			1119.25				

	March'04				2003-04	
Monthly Average	02-Mar-04	08-Mar-04	16-Mar-04	24-Mar-04	Monthly Average	Yearly Average
	5950	5950	5950	5950		
	1420	1420	1420	1420		
	0.262	0.262	0.262	0.262		
	92082522	92082522	92082522	92082522		
	119	119	119	119		
	1420	1420	1420	1420		
	0.262	0.262	0.262	0.262		
	1841650	1841650	1841650	1841650		
	23.5	27.5	30.5	28.0		
	8589	8548	8476	8573		
	583336	572816	562386	573509		
	0.239	0.239	0.239	0.239		
	3278278	3768122	4103934	3841408		
	31455	31001	30218	31272		
	1127138	1110869	1082812	1120580		
	313	317	318	320		
	4128	4037	3688	3814		
	172.0	168.2	153.7	158.9		
	561436	568429	562385	557775		
	321538	323336	319356	315670		
	0.245	0.245	0.245	0.245		
	24641406	25105065	24876569	24748619		
	5829	5827	5829	5830		
	135.0	138.0	141.0	139.0		
	0.191	0.191	0.192	0.192		
	6264719	6413253	6565293	6465950		
	121	123	121	120		
	313.0	317.0	318.0	320.0		
	0.207	0.208	0.208	0.208		
	328087	336910	334500	334085		
	415634	398739	386057	396626		
	31649847	32253967	32162419	31945281		
67.64	67.81	67.36	67.55	67.69	67.60	
97943786.88	98329588	98803164	99110919	98886161	98782457.96	
	24.00	24.00	24.00	24.00		
64.53					64.53	
3.08					3.11	
3009988.59					3044432.86	
4452117.57					4501045.62	
2884.97					2916.68	34253.78

8366					8378	
6569					6611	
0					0	
0					0	
100.8					100.8	
96.1					96.1	
101.2					101.2	
0					0	
3985					4908	
13216					14723	
0					0	
0					0	
120154.41					138452.98	
97.40					97.50	
407.15					407.53	
1174.61					1188.64	13839.52

Gas/Mat
O2
CO2
N2+Ar
H2O, steam
H2O, liq.
Rawmeal
Clinker

O2
CO2
N2
H2O

CV Fan Fl
Fan Power

Heat Cap - Coefficients					
*T^0	*T^1	*T^2	*T^3	*T^4	
0.2130	#####	#####	#####	#####	
0.1906	#####	#####	#####	#####	
0.2465	#####	#####	#####	#####	
0.4445	#####	#####	#####	#####	
1.0000					
0.2060	#####	#####			
0.1742	#####	#####	#####		

mass %	23.0
mass %	0.0
mass %	77.0
mass %	0.0

m3/min	9500
r Drawn	180

Binani Cement Limited

Clinker cooler modification Project data for April 2004-March 2005

		April'04			
Parameter			05-Apr-04	13-Apr-04	Monthly Average
1	Clinker production	tpd	5950	5950	
	Inlet temperature of the clinker in cooler	C	1420	1420	
	Specific heat of clinker	kcal/kg C	0.262	0.262	
	Heat from clinker	kCal/hr	92082522	92082522	
2	Clinker dust from kiln to cooler	tpd	119	119	
	Temp. of Clinker dust from kiln to cooler	C	1420	1420	
	Sp. Heat of Clinker dust from kiln to cooler	kcal/kg C	0.262	0.262	
	Heat from Clinker dust from kiln to cooler	kCal/hr	1841650	1841650	
3	Inlet temperature of the cooling air in cooler	C	33.0	33.0	
	Flow rate of cooling air in cooler	m3/min	8620	8585	
	Flow rate of cooling air in cooler	kg/hr	567223	564911	
	Specific heat of cooling air	kcal/kg C	0.239	0.239	
	Heat from cooling air	kCal/hr	4479277	4461022	
4	Power delivered by cooler fans	kWh/Day	31793	31402	
	Power delivered by cooler fans	kCal/hr	1139249	1125238	
1a	Temperature of cooler exhaust flue gases	C	325	329	
	Power Drawn by Cooler ESP Fan	kWh/Day	3887	3518	
		kWh/hr	162.0	146.6	
	Flow rate of Cooler exhaust fan	m3/hr	561307	557381	
	Flow rate of Cooler exhaust fan	Kg/hr	315013	310731	
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.245	0.245	
Heat from Cooler Exit Air	kcal/hr	25094530	25067287		
2a	Total Clinker from Cooler	tpd	5829	5830	
	Temp. of Clinker from Cooler	Deg.C	139.0	140.0	
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.192	0.192	
	Heat from Clinker Cooler	kcal/hr	6465104	6516255	
3a	Total Clinker Dust from Cooler ESP	tpd	121	120	
	Temp. of from Clinker dust to ESP	Deg.C	325.0	329.0	
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.208	0.209	
	Heat from Clinker dust to ESP	kcal/hr	342066	344341	
4a	Radoation Losses	kcal/hr	375478	375478	
	Heat Losses	kcal/hr	32277178	32303361	
	Cooler Efficiency	%	67.57	67.54	67.56
	Total heat input	kCal/hr	99542699	99510434	99526566.19
	Kiln running hours	hrs	24.00	24.00	
4	Baseline Efficiency	%			64.53
5	Increase in Cooler Efficiency	%			2.63
6	Saving in heat output due to increase in cooler efficiency	Kcal/hr			2613979.23
7	Saving in heat input due to increase in	Kcal/hr			3892067.00
8	Total energy saved	Million Kcal			2522.06

9	Average calorific value of petcoke	Kcal/ kg			8295
10	Average calorific value of Coal	Kcal/ kg			6520
11	Average calorific value of Lignite	Kcal/ kg			0
12	Average calorific value of agri fuel	Kcal/ kg			0
13	tCO ₂ emission per ton of Petcoke	t CO2/TJ			100.8
14	tCO ₂ emission per ton of Coal	t CO2/TJ			96.1
15	tCO ₂ emission per ton of Lignite	t CO2/TJ			101.2
16	tCO ₂ emission per ton of agri fuel	t CO2/TJ			0
17	Quantity of petcoke consumed	tons/month			1866
18	Quantity of fine coal consumed	tons/month			9565
19	Quantity of lignite consumed	tons/month			0
20	Quantity of agri fuel consumed	tons/month			0
21	Total heat supplied by fuels	ion Kcal/month			77842.27
22	Average emission factor of fuel used	t CO2/TJ			97.03
23	Average emission factor of fuel used	O2/Million Kcal			405.60
24	Emission Reduction	tons/month			1022.96

May'04			June'04					
17-May-04	24-May-04	Monthly Average	04-Jun-04	10-Jun-04	21-Jun-04	23-Jun-04	Monthly Average	06-Jul-04
5950	5950		5950	5950	5950	5950		5950
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
92082522	92082522		92082522	92082522	92082522	92082522		92082522
119	119		119	119	119	119		119
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
1841650	1841650		1841650	1841650	1841650	1841650		1841650
34.0	32.0		32.5	33.5	31.5	30.0		27.0
8559	8514		8568	8510	8502	8526		8450
561367	562115		564763	559074	562248	566616		567191
0.239	0.239		0.239	0.239	0.239	0.239		0.239
4567688	4304131		4392131	4481977	4237738	4066882		3663155
31115	30628		31222	30580	30498	30758		29047
1114954	1097503		1118788	1095783	1092845	1102162		1040851
325	323		321	320	318	320		318
3988	4057		4161	4089	4185	4064		4168
166.2	169.0		173.4	170.4	174.4	169.3		173.7
566122	563784		568556	565261	569646	564107		568874
317716	317465		321230	319907	323480	319254		323041
0.245	0.245		0.245	0.245	0.245	0.245		0.245
25309810	25129578		25265527	25080772	25197748	25029604		25163617
5828	5828		5827	5828	5827	5828		5827
141.0	145.0		138.0	140.0	140.0	139.0		138.0
0.192	0.192		0.191	0.192	0.192	0.192		0.191
6564384	6766379		6413223	6514352	6513294	6464433		6413148
122	122		123	122	123	122		123
325.0	323.0		321.0	320.0	318.0	320.0		318.0
0.208	0.208		0.208	0.208	0.208	0.208		0.208
345000	341217		341730	338569	338819	337879		338360
371244	379711		377595	373362	381826	388171		400852
32590439	32616885		32398076	32307055	32431687	32220087		32315977
67.28	67.16	67.22	67.42	67.53	67.32	67.49	67.44	67.23
99606815	99325807	99466310.96	99435092	99501933	99254756	99093216	99321249.24	98628179
24.00	24.00		24.00	24.00	24.00	24.00		24.00
		64.53					64.53	
		2.79					3.09	
		2773974.84					3070223.45	
		4120286.60					4540207.27	
		2669.95					2942.05	

		8308					8318	
		6601					6678	
		0					0	
		0					0	
		100.8					100.8	
		96.1					96.1	
		101.2					101.2	
		0					0	
		2207					2075	
		10369					17646	
		0					0	
		0					0	
		86781.53					135099.84	
		97.09					96.70	
		405.85					404.21	
		1083.59					1189.20	

July'04				Aug'04				
14-Jul-04	20-Jul-04	26-Jul-04	Monthly Average	06-Aug-04	13-Aug-04	20-Aug-04	25-Aug-04	Monthly Average
5950	5950	5950		5950	5950	5950	5950	
1420	1420	1420		1420	1420	1420	1420	
0.262	0.262	0.262		0.262	0.262	0.262	0.262	
92082522	92082522	92082522		92082522	92082522	92082522	92082522	
119	119	119		119	119	119	119	
1420	1420	1420		1420	1420	1420	1420	
0.262	0.262	0.262		0.262	0.262	0.262	0.262	
1841650	1841650	1841650		1841650	1841650	1841650	1841650	
29.5	31.0	29.0		30.0	27.0	26.5	26.5	
8453	8581	8582		8433	8524	8548	8560	
562708	568418	572249		560408	572166	574741	575498	
0.239	0.239	0.239		0.239	0.239	0.239	0.239	
3971377	4216097	3970128		4022318	3695286	3643053	3647855	
29079	31367	31378		29748	30739	31003	31127	
1041998	1123984	1124378		1065970	1101481	1110941	1115384	
315	316	319		315	311	316	312	
3933	3949	4089		3848	4272	4240	4023	
163.9	164.5	170.4		160.3	178.0	176.7	167.6	
565258	565947	566287		559425	568093	566813	567772	
322626	322471	321029		319297	326464	322964	325723	
0.245	0.245	0.245		0.245	0.245	0.245	0.245	
24887336	24956614	25087788		24630518	24854555	24994768	24880084	
5828	5828	5828		5829	5827	5828	5827	
140.0	139.0	139.0		141.0	138.0	137.0	138.0	
0.192	0.192	0.192		0.192	0.191	0.191	0.191	
6514353	6463992	6463911		6566013	6413334	6363536	6413410	
122	122	122		121	123	122	123	
315.0	316.0	319.0		315.0	311.0	316.0	312.0	
0.208	0.208	0.208		0.208	0.207	0.208	0.207	
332675	334259	338002		329242	329614	334770	330609	
390285	383942	392399		388171	400852	402964	402964	
32124649	32138808	32282100		31913944	31998355	32096039	32027067	
67.53	67.62	67.40	67.45	67.77	67.59	67.47	67.55	67.59
98937548	99264254	99018679	98962164.90	99012461	98720940	98678167	98687412	98774745.01
24.00	24.00	24.00		24.00	24.00	24.00	24.00	
			64.53					64.53
			2.94					3.09
			2905106.55					3054182.38
			4305518.60					4516724.05
			2789.98					2926.84

			0					8296
			6561					5917
			0					3568
			0					4525
			100.8					100.8
			96.1					96.1
			101.2					101.2
			0					0
			0					2406
			19197					19454
			490.88					0
			0					99.98
			125951.52					135521.90
			96.10					96.47
			401.70					403.25
			1120.73					1180.25

Sept'04				Oct'04				
03-Sep-04	10-Sep-04	15-Sep-04	Monthly Average	12-Oct-04	18-Oct-04	26-Oct-04	Monthly Average	05-Nov-04
5950	5950	5950		5950	5950	5950		5950
1420	1420	1420		1420	1420	1420		1420
0.262	0.262	0.262		0.262	0.262	0.262		0.262
92082522	92082522	92082522		92082522	92082522	92082522		92082522
119	119	119		119	119	119		119
1420	1420	1420		1420	1420	1420		1420
0.262	0.262	0.262		0.262	0.262	0.262		0.262
1841650	1841650	1841650		1841650	1841650	1841650		1841650
29.0	29.5	28.5		23.0	25.5	22.0		22.0
8469	8560	8544		8549	8611	8544		8499
564667	569829	570655		581600	580891	583187		580103
0.239	0.239	0.239		0.239	0.239	0.239		0.239
3917524	4021637	3890678		3198871	3542853	3067934		3051708
30135	29320	29155		30092	30755	30032		28684
1079838	1050633	1044721		1078297	1102054	1076147		1027843
317	315	308		305	303	304		301
3648	4063	4296		4421	4934	4153		3867
152.0	169.3	179.0		184.2	205.6	173.0		161.1
557652	565204	569048		574404	581320	563298		576824
317206	322595	328702		333518	338706	327636		337257
0.245	0.245	0.245		0.245	0.245	0.245		0.245
24629082	24884933	24776736		24888053	25104900	24366794		24828023
5830	5828	5827		5826	5824	5828		5825
141.0	137.0	140.0		137.0	135.0	140.0		135.0
0.192	0.191	0.192		0.191	0.191	0.192		0.191
6566444	6363916	6513438		6361746	6260103	6514826		6261147
120	122	123		124	126	122		125
317.0	315.0	308.0		305.0	303.0	304.0		301.0
0.208	0.208	0.207		0.207	0.207	0.207		0.207
330522	332643	326621		326119	327636	318646		322713
392399	390285	394513		417745	407189	421966		421966
31918448	31971777	32011308		31993663	32099828	31622232		31833850
67.73	67.70	67.62	67.69	67.42	67.43	67.75	67.54	67.52
98921534	98996443	98859572	98925849.67	98201340	98569080	98068253	98279557.99	98003725
24.00	24.00	24.00		24.00	24.00	24.00		24.00
			64.53				64.53	
			3.01				3.13	
			2954740.39				3084654.77	
			4375029.69				4558984.61	
			2835.02				2954.22	

			0				8357	
			6139				6327	
			0				0	
			4539				4697	
			100.8				100.8	
			96.1				96.1	
			101.2				101.2	
			0				0	
			133				2753	
			12022				13760	
			0				0	
			0				198.46	
			73803.06				110998.51	
			96.10				96.27	
			401.70				402.40	
			1138.82				1188.77	

Nov'04				Dec'04			
10-Nov-04	17-Nov-04	23-Nov-04	Monthly Average	04-Dec-04	08-Dec-04	15-Dec-04	23-Dec-04
5950	5950	5950		5950	5950	5950	5950
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
92082522	92082522	92082522		92082522	92082522	92082522	92082522
119	119	119		119	119	119	119
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
1841650	1841650	1841650		1841650	1841650	1841650	1841650
25.5	27.5	25.5		21.0	22.5	22.5	18.0
8516	8572	8589		8565	8582	8541	8538
574457	574395	579434		586603	584812	582007	590807
0.239	0.239	0.239		0.239	0.239	0.239	0.239
3503614	3778510	3533965		2945440	3146510	3131415	2542242
28019	29440	29624		28510	28686	28271	28242
1004014	1054933	1061527		1021608	1027915	1013044	1012005
302	304	298		301	305	304	302
3747	3643	3760		3963	4089	3784	3966
156.1	151.8	156.7		165.1	170.4	157.7	165.3
570801	565476	571460		564938	570857	567218	559541
333155	328903	335876		330308	331459	329916	326583
0.245	0.245	0.245		0.245	0.245	0.245	0.245
24609748	24460991	24473236		24316408	24734393	24536347	24124261
5827	5828	5827		5828	5827	5827	5829
138.0	141.0	143.0		141.0	136.0	140.0	141.0
0.191	0.192	0.192		0.192	0.191	0.192	0.192
6412690	6564541	6663679		6564672	6312534	6513880	6565985
123	122	123		122	123	123	121
302.0	304.0	298.0		301.0	305.0	304.0	302.0
0.207	0.207	0.206		0.207	0.207	0.207	0.207
320525	319878	316166		316063	324106	320863	314202
407189	398739	407189		426187	419856	419856	438846
31750151	31744149	31860270		31623331	31790889	31790946	31443294
67.74	67.86	67.66	67.69	67.70	67.59	67.58	67.74
98431801	98757616	98519664	98428201.51	97891221	98098598	98068632	97478419
24.00	24.00	24.00		24.00	24.00	24.00	24.00
			64.53				
			3.17				
			3098685.50				
			4577391.93				
			2966.15				

			0				
			6530				
			0				
			4573				
			100.8				
			96.1				
			101.2				
			0				
			1337.29				
			18715				
			0				
			1692				
			129944.91				
			90.38				
			377.78				
			1120.56				

Monthly Average	Jan'05				Monthly Average	Feb	
	05-Jan-05	11-Jan-05	17-Jan-05	27-Jan-05		05-Feb-05	11-Feb-05
	5950	5950	5950	5950		5950	5950
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	92082522	92082522	92082522	92082522		92082522	92082522
	119	119	119	119		119	119
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	1841650	1841650	1841650	1841650		1841650	1841650
	17.5	17.5	15.0	16.0		22.5	23.5
	8562	8493	8535	8551		8547	8481
	593468	588675	596748	595795		582389	575992
	0.239	0.239	0.239	0.239		0.239	0.239
	2482673	2462624	2139412	2278546		3133473	3237008
	29335	28623	29058	27553		27510	26110
	1051171	1025658	1041245	987316		985775	935608
	305	309	311	308		304	306
	3978	4101	4026	4091		3780	3949
	165.8	170.9	167.8	170.5		157.5	164.5
	565649	565812	562345	565353		564292	569805
	328435	326271	323162	326567		328214	330276
	0.245	0.245	0.245	0.245		0.245	0.245
	24508748	24675617	24603110	24615827		24409785	24729221
	5828	5828	5829	5828		5828	5827
	138.0	136.0	135.0	135.0		138.0	139.0
	0.191	0.191	0.191	0.191		0.191	0.192
	6413914	6313715	6264508	6263810		6414237	6463068
	122	122	121	122		122	123
	305.0	309.0	311.0	308.0		304.0	306.0
	0.207	0.207	0.207	0.207		0.207	0.207
	321149	325939	326279	324500		319208	324690
	440956	440956	451503	447284		419856	415634
	31684767	31756227	31645400	31651422		31563086	31932613
67.65	67.49	67.40	67.41	67.43	67.43	67.81	67.45
97884217.46	97458017	97412455	97104830	97190035	97291334.10	98043421	98096789
	24.00	24.00	24.00	24.00		24.00	24.00
64.53					64.53		
3.12					2.90		
3057572.39					2824758.91		
4519448.45					4188960.98		
2928.60					2714.45		

0					0		
6182					5862		
0					0		
4579					4262		
100.8					100.8		
96.1					96.1		
101.2					101.2		
0					0		
0					0		
20010					18968		
0					0		
2981					5821		
137351.82					135999.52		
86.55					78.57		
361.78					328.42		
1059.50					891.48		

b'05			March'05				2004-05
17-Feb-05	23-Feb-05	Monthly Average	02-Mar-05	10-Mar-05	16-Mar-05	Monthly Average	Yearly Average
5950	5950		5950	5950	5950		
1420	1420		1420	1420	1420		
0.262	0.262		0.262	0.262	0.262		
92082522	92082522		92082522	92082522	92082522		
119	119		119	119	119		
1420	1420		1420	1420	1420		
0.262	0.262		0.262	0.262	0.262		
1841650	1841650		1841650	1841650	1841650		
18.0	20.0		27.0	22.0	29.5		
8533	8466		8524	8550	8558		
590436	581851		572127	583630	569679		
0.239	0.239		0.239	0.239	0.239		
2540646	2782268		3695038	3070267	4020580		
26980	26350		26130	26759	26833		
966783	944208		936325	958864	961516		
305	301		308	315	320		
4004	4353		4100	3915	3590		
166.8	181.4		170.8	163.1	149.6		
573872	577016		565766	557134	557364		
333209	337369		326806	317989	315438		
0.245	0.245		0.245	0.245	0.245		
24865031	24836259		24633847	24529638	24730381		
5826	5825		5828	5830	5830		
136.0	135.0		139.0	140.0	139.0		
0.191	0.191		0.192	0.192	0.192		
6311829	6261102		6464036	6516314	6466049		
124	125		122	120	120		
305.0	301.0		308.0	315.0	320.0		
0.207	0.207		0.207	0.208	0.208		
325817	322820		324737	327893	333839		
438846	430407		400852	421966	390285		
31941523	31850589		31823472	31795813	31920555		
67.22	67.38	67.46	67.71	67.54	67.73	67.66	
97431603	97650649	97805615.58	98555536	97953304	98906269	98471702.90	
24.00	24.00		24.00	24.00	24.00		
		64.53				64.53	
		2.93				3.13	
		2869244.10				3080981.87	
		4253024.29				4553704.63	
		2755.96				2950.80	33956.07

		0				0	
		6151				6156	
		0				0	
		4372				4313	
		100.8				100.8	
		96.1				96.1	
		101.2				101.2	
		0				0	
		426				0	
		16320				20772	
		0				0	
		5764				4239	
		125584.53				146155.24	
		76.82				84.08	
		321.09				351.45	
		884.92				1037.06	12917.84

Heat Cap - Coefficients

Gas/Mat	*T^0	*T^1	*T^2	*T^3	*T^4
O2	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15
CO2	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14
N2+Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15
H2O, steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15
H2O, liq.	1.0000				
Rawmeal	0.2060	1.014E-04	-3.673E-08		
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11	

O2	mass %	23.0
CO2	mass %	0.0
N2	mass %	77.0
H2O	mass %	0.0

CV Fan Flow	m3/min	9500
Fan Power Drawn		180

Binani Cement Limited

Clinker cooler modification Project data for April 2005-March 2006

		April'05		
Parameter		05-Apr-04	13-Apr-04	Monthly Average
1	Clinker production	tpd	5950	5950
	Inlet temperature of the clinker in cooler	C	1420	1420
	Specific heat of clinker	kcal/kg C	0.262	0.262
	Heat from clinker	kCal/hr	92082522	92082522
2	Clinker dust from kiln to cooler	tpd	119	119
	Temp. of Clinker dust from kiln to cooler	C	1420	1420
	Sp. Heat of Clinker dust from kiln to cooler	kcal/kg C	0.262	0.262
	Heat from Clinker dust from kiln to cooler	kCal/hr	1841650	1841650
3	Inlet temperature of the cooling air in cooler	C	33.0	33.0
	Flow rate of cooling air in cooler	m3/min	8620	8585
	Flow rate of cooling air in cooler	kg/hr	567223	564911
	Specific heat of cooling air	kcal/kg C	0.239	0.239
	Heat from cooling air	kCal/hr	4479277	4461022
4	Power delivered by cooler fans	kWh/Day	31793	31402
	Power delivered by cooler fans	kCal/hr	1139249	1125238
1a	Temperature of cooler exhaust flue gases	C	325	329
	Power Drawn by Cooler ESP Fan	kWh/Day	3887	3518
		kWh/hr	162.0	146.6
	Flow rate of Cooler exhaust fan	m3/hr	561307	557381
	Flow rate of Cooler exhaust fan	Kg/hr	315013	310731
	Cp of Cooler Exit Air	kcal/kg/deg.C	0.245	0.245
	Heat from Cooler Exit Air	kcal/hr	25094530	25067287
2a	Total Clinker from Cooler	tpd	5829	5830
	Temp. of Clinker from Cooler	Deg.C	139.0	140.0
	Cp of Clinker from Cooler	kcal/kg/deg.C	0.192	0.192
	Heat from Clinker Cooler	kcal/hr	6465104	6516255
3a	Total Clinker Dust from Cooler ESP	tpd	121	120
	Temp. of from Clinker dust to ESP	Deg.C	325.0	329.0
	Cp of from Clinker dust to ESP	kcal/kg/deg.C	0.208	0.209
	Heat from Clinker dust to ESP	kcal/hr	342066	344341
4a	Radoation Losses	kcal/hr	375478	375478
	Heat Losses	kcal/hr	32277178	32303361
	Cooler Efficiency	%	67.57	67.54
	Total heat input	kCal/hr	99542699	99510434
	Kiln running hours	hrs	24.00	24.00
4	Baseline Efficiency	%		64.53
5	Increase in Cooler Efficiency	%		2.63
6	Saving in heat output due to increase in cooler efficiency	Kcal/hr		2613979.23
7	Saving in heat input due to increase in	Kcal/hr		3892067.00
8	Total energy saved	Million Kcal		2522.06

9	Average calorific value of petcoke	Kcal/ kg			8295
10	Average calorific value of Coal	Kcal/ kg			6520
11	Average calorific value of Lignite	Kcal/ kg			
12	Average calorific value of agri fuel	Kcal/ kg			0
13	tCO ₂ emission per ton of Petcoke	t CO2/TJ			100.8
14	tCO ₂ emission per ton of Coal	t CO2/TJ			96.1
15	tCO ₂ emission per ton of Lignite	t CO2/TJ			101.2
16	tCO ₂ emission per ton of agri fuel	t CO2/TJ			0
17	Quantity of petcoke consumed	tons/month			1866
18	Quantity of fine coal consumed	tons/month			9565
19	Quantity of lignite consumed	tons/month			0
20	Quantity of agri fuel consumed	tons/month			0
21	Total heat supplied by fuels	ion Kcal/month			77842.27
22	Average emission factor of fuel used	t CO2/TJ			97.03
23	Average emission factor of fuel used	O2/Million Kcal			405.60
24	Emission Reduction	tons/month			1022.96

May'05			June'05					
17-May-04	24-May-04	Monthly Average	04-Jun-04	10-Jun-04	21-Jun-04	23-Jun-04	Monthly Average	06-Jul-04
5950	5950		5950	5950	5950	5950		5950
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
92082522	92082522		92082522	92082522	92082522	92082522		92082522
119	119		119	119	119	119		119
1420	1420		1420	1420	1420	1420		1420
0.262	0.262		0.262	0.262	0.262	0.262		0.262
1841650	1841650		1841650	1841650	1841650	1841650		1841650
34.0	32.0		32.5	33.5	31.5	30.0		27.0
8559	8514		8568	8510	8502	8526		8450
561367	562115		564763	559074	562248	566616		567191
0.239	0.239		0.239	0.239	0.239	0.239		0.239
4567688	4304131		4392131	4481977	4237738	4066882		3663155
31115	30628		31222	30580	30498	30758		29047
1114954	1097503		1118788	1095783	1092845	1102162		1040851
325	323		321	320	318	320		318
3988	4057		4161	4089	4185	4064		4168
166.2	169.0		173.4	170.4	174.4	169.3		173.7
566122	563784		568556	565261	569646	564107		568874
317716	317465		321230	319907	323480	319254		323041
0.245	0.245		0.245	0.245	0.245	0.245		0.245
25309810	25129578		25265527	25080772	25197748	25029604		25163617
5828	5828		5827	5828	5827	5828		5827
141.0	145.0		138.0	140.0	140.0	139.0		138.0
0.192	0.192		0.191	0.192	0.192	0.192		0.191
6564384	6766379		6413223	6514352	6513294	6464433		6413148
122	122		123	122	123	122		123
325.0	323.0		321.0	320.0	318.0	320.0		318.0
0.208	0.208		0.208	0.208	0.208	0.208		0.208
345000	341217		341730	338569	338819	337879		338360
371244	379711		377595	373362	381826	388171		400852
32590439	32616885		32398076	32307055	32431687	32220087		32315977
67.28	67.16	67.22	67.42	67.53	67.32	67.49	67.44	67.23
99606815	99325807	99466310.96	99435092	99501933	99254756	99093216	99321249.24	98628179
24.00	24.00		24.00	24.00	24.00	24.00		24.00
		64.53					64.53	
		2.79					3.09	
		2773974.84					3070223.45	
		4120286.60					4540207.27	
		2669.95					2942.05	

		8308					8318	
		6601					6678	
		0					0	
		100.8					100.8	
		96.1					96.1	
		101.2					101.2	
		0					0	
		2207					2075	
		10369					17646	
		0					0	
		0					0	
		86781.53					135099.84	
		97.09					96.70	
		405.85					404.21	
		1083.59					1189.20	

July'05				Aug'05				
14-Jul-04	20-Jul-04	26-Jul-04	Monthly Average	06-Aug-04	13-Aug-04	20-Aug-04	25-Aug-04	Monthly Average
5950	5950	5950		5950	5950	5950	5950	
1420	1420	1420		1420	1420	1420	1420	
0.262	0.262	0.262		0.262	0.262	0.262	0.262	
92082522	92082522	92082522		92082522	92082522	92082522	92082522	
119	119	119		119	119	119	119	
1420	1420	1420		1420	1420	1420	1420	
0.262	0.262	0.262		0.262	0.262	0.262	0.262	
1841650	1841650	1841650		1841650	1841650	1841650	1841650	
29.5	31.0	29.0		30.0	27.0	26.5	26.5	
8453	8581	8582		8433	8524	8548	8560	
562708	568418	572249		560408	572166	574741	575498	
0.239	0.239	0.239		0.239	0.239	0.239	0.239	
3971377	4216097	3970128		4022318	3695286	3643053	3647855	
29079	31367	31378		29748	30739	31003	31127	
1041998	1123984	1124378		1065970	1101481	1110941	1115384	
315	316	319		315	311	316	312	
3933	3949	4089		3848	4272	4240	4023	
163.9	164.5	170.4		160.3	178.0	176.7	167.6	
565258	565947	566287		559425	568093	566813	567772	
322626	322471	321029		319297	326464	322964	325723	
0.245	0.245	0.245		0.245	0.245	0.245	0.245	
24887336	24956614	25087788		24630518	24854555	24994768	24880084	
5828	5828	5828		5829	5827	5828	5827	
140.0	139.0	139.0		141.0	138.0	137.0	138.0	
0.192	0.192	0.192		0.192	0.191	0.191	0.191	
6514353	6463992	6463911		6566013	6413334	6363536	6413410	
122	122	122		121	123	122	123	
315.0	316.0	319.0		315.0	311.0	316.0	312.0	
0.208	0.208	0.208		0.208	0.207	0.208	0.207	
332675	334259	338002		329242	329614	334770	330609	
390285	383942	392399		388171	400852	402964	402964	
32124649	32138808	32282100		31913944	31998355	32096039	32027067	
67.53	67.62	67.40	67.45	67.77	67.59	67.47	67.55	67.59
98937548	99264254	99018679	98962164.90	99012461	98720940	98678167	98687412	98774745.01
24.00	24.00	24.00		24.00	24.00	24.00	24.00	
			64.53					64.53
			2.94					3.09
			2905106.55					3054182.38
			4305518.60					4516724.05
			2789.98					2926.84

								8296
			6561					5917
								3568
			0					4525
			100.8					100.8
			96.1					96.1
			101.2					101.2
			0					0
			0					2406
			19197					19454
			490.88					0
			0					99.98
			125951.52					135521.90
			96.10					96.47
			401.70					403.25
			1120.73					1180.25

Sept'05				Oct'05				
03-Sep-04	10-Sep-04	15-Sep-04	Monthly Average	12-Oct-04	18-Oct-04	26-Oct-04	Monthly Average	05-Nov-04
5950	5950	5950		5950	5950	5950		5950
1420	1420	1420		1420	1420	1420		1420
0.262	0.262	0.262		0.262	0.262	0.262		0.262
92082522	92082522	92082522		92082522	92082522	92082522		92082522
119	119	119		119	119	119		119
1420	1420	1420		1420	1420	1420		1420
0.262	0.262	0.262		0.262	0.262	0.262		0.262
1841650	1841650	1841650		1841650	1841650	1841650		1841650
29.0	29.5	28.5		23.0	25.5	22.0		22.0
8469	8560	8544		8549	8611	8544		8499
564667	569829	570655		581600	580891	583187		580103
0.239	0.239	0.239		0.239	0.239	0.239		0.239
3917524	4021637	3890678		3198871	3542853	3067934		3051708
30135	29320	29155		30092	30755	30032		28684
1079838	1050633	1044721		1078297	1102054	1076147		1027843
317	315	308		305	303	304		301
3648	4063	4296		4421	4934	4153		3867
152.0	169.3	179.0		184.2	205.6	173.0		161.1
557652	565204	569048		574404	581320	563298		576824
317206	322595	328702		333518	338706	327636		337257
0.245	0.245	0.245		0.245	0.245	0.245		0.245
24629082	24884933	24776736		24888053	25104900	24366794		24828023
5830	5828	5827		5826	5824	5828		5825
141.0	137.0	140.0		137.0	135.0	140.0		135.0
0.192	0.191	0.192		0.191	0.191	0.192		0.191
6566444	6363916	6513438		6361746	6260103	6514826		6261147
120	122	123		124	126	122		125
317.0	315.0	308.0		305.0	303.0	304.0		301.0
0.208	0.208	0.207		0.207	0.207	0.207		0.207
330522	332643	326621		326119	327636	318646		322713
392399	390285	394513		417745	407189	421966		421966
31918448	31971777	32011308		31993663	32099828	31622232		31833850
67.73	67.70	67.62	67.69	67.42	67.43	67.75	67.54	67.52
98921534	98996443	98859572	98925849.67	98201340	98569080	98068253	98279557.99	98003725
24.00	24.00	24.00		24.00	24.00	24.00		24.00
			64.53				64.53	
			3.01				3.13	
			2954740.39				3084654.77	
			4375029.69				4558984.61	
			2835.02				2954.22	

							8357	
			6139				6327	
			4539				4697	
			100.8				100.8	
			96.1				96.1	
			101.2				101.2	
			0				0	
			133				2753	
			12022				13760	
			0				0	
			0				198.46	
			73803.06				110998.51	
			96.10				96.27	
			401.70				402.40	
			1138.82				1188.77	

Nov'05				Dec'05			
10-Nov-04	17-Nov-04	23-Nov-04	Monthly Average	04-Dec-04	08-Dec-04	15-Dec-04	23-Dec-04
5950	5950	5950		5950	5950	5950	5950
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
92082522	92082522	92082522		92082522	92082522	92082522	92082522
119	119	119		119	119	119	119
1420	1420	1420		1420	1420	1420	1420
0.262	0.262	0.262		0.262	0.262	0.262	0.262
1841650	1841650	1841650		1841650	1841650	1841650	1841650
25.5	27.5	25.5		21.0	22.5	22.5	18.0
8516	8572	8589		8565	8582	8541	8538
574457	574395	579434		586603	584812	582007	590807
0.239	0.239	0.239		0.239	0.239	0.239	0.239
3503614	3778510	3533965		2945440	3146510	3131415	2542242
28019	29440	29624		28510	28686	28271	28242
1004014	1054933	1061527		1021608	1027915	1013044	1012005
302	304	298		301	305	304	302
3747	3643	3760		3963	4089	3784	3966
156.1	151.8	156.7		165.1	170.4	157.7	165.3
570801	565476	571460		564938	570857	567218	559541
333155	328903	335876		330308	331459	329916	326583
0.245	0.245	0.245		0.245	0.245	0.245	0.245
24609748	24460991	24473236		24316408	24734393	24536347	24124261
5827	5828	5827		5828	5827	5827	5829
138.0	141.0	143.0		141.0	136.0	140.0	141.0
0.191	0.192	0.192		0.192	0.191	0.192	0.192
6412690	6564541	6663679		6564672	6312534	6513880	6565985
123	122	123		122	123	123	121
302.0	304.0	298.0		301.0	305.0	304.0	302.0
0.207	0.207	0.206		0.207	0.207	0.207	0.207
320525	319878	316166		316063	324106	320863	314202
407189	398739	407189		426187	419856	419856	438846
31750151	31744149	31860270		31623331	31790889	31790946	31443294
67.74	67.86	67.66	67.69	67.70	67.59	67.58	67.74
98431801	98757616	98519664	98428201.51	97891221	98098598	98068632	97478419
24.00	24.00	24.00		24.00	24.00	24.00	24.00
			64.53				
			3.17				
			3098685.50				
			4577391.93				
			2966.15				

			6530				
			4573				
			100.8				
			96.1				
			101.2				
			0				
			1337.29				
			18715				
			0				
			1692				
			129944.91				
			90.38				
			377.78				
			1120.56				

Monthly Average	Jan'06				Monthly Average	Feb	
	05-Jan-05	11-Jan-05	17-Jan-05	27-Jan-05		05-Feb-05	11-Feb-05
	5950	5950	5950	5950		5950	5950
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	92082522	92082522	92082522	92082522		92082522	92082522
	119	119	119	119		119	119
	1420	1420	1420	1420		1420	1420
	0.262	0.262	0.262	0.262		0.262	0.262
	1841650	1841650	1841650	1841650		1841650	1841650
	17.5	17.5	15.0	16.0		22.5	23.5
	8562	8493	8535	8551		8547	8481
	593468	588675	596748	595795		582389	575992
	0.239	0.239	0.239	0.239		0.239	0.239
	2482673	2462624	2139412	2278546		3133473	3237008
	29335	28623	29058	27553		27510	26110
	1051171	1025658	1041245	987316		985775	935608
	305	309	311	308		304	306
	3978	4101	4026	4091		3780	3949
	165.8	170.9	167.8	170.5		157.5	164.5
	565649	565812	562345	565353		564292	569805
	328435	326271	323162	326567		328214	330276
	0.245	0.245	0.245	0.245		0.245	0.245
	24508748	24675617	24603110	24615827		24409785	24729221
	5828	5828	5829	5828		5828	5827
	138.0	136.0	135.0	135.0		138.0	139.0
	0.191	0.191	0.191	0.191		0.191	0.192
	6413914	6313715	6264508	6263810		6414237	6463068
	122	122	121	122		122	123
	305.0	309.0	311.0	308.0		304.0	306.0
	0.207	0.207	0.207	0.207		0.207	0.207
	321149	325939	326279	324500		319208	324690
	440956	440956	451503	447284		419856	415634
	31684767	31756227	31645400	31651422		31563086	31932613
67.65	67.49	67.40	67.41	67.43	67.43	67.81	67.45
97884217.46	97458017	97412455	97104830	97190035	97291334.10	98043421	98096789
	24.00	24.00	24.00	24.00		24.00	24.00
64.53					64.53		
3.12					2.90		
3057572.39					2824758.91		
4519448.45					4188960.98		
2928.60					2714.45		

6182					5862		
4579					4262		
100.8					100.8		
96.1					96.1		
101.2					101.2		
0					0		
0					0		
20010					18968		
0					0		
2981					5821		
137351.82					135999.52		
86.55					78.57		
361.78					328.42		
1059.50					891.48		

b'06			March'06				2006-07
17-Feb-05	23-Feb-05	Monthly Average	02-Mar-05	10-Mar-05	16-Mar-05	Monthly Average	Yearly Average
5950	5950		5950	5950	5950		
1420	1420		1420	1420	1420		
0.262	0.262		0.262	0.262	0.262		
92082522	92082522		92082522	92082522	92082522		
119	119		119	119	119		
1420	1420		1420	1420	1420		
0.262	0.262		0.262	0.262	0.262		
1841650	1841650		1841650	1841650	1841650		
18.0	20.0		27.0	22.0	29.5		
8533	8466		8524	8550	8558		
590436	581851		572127	583630	569679		
0.239	0.239		0.239	0.239	0.239		
2540646	2782268		3695038	3070267	4020580		
26980	26350		26130	26759	26833		
966783	944208		936325	958864	961516		
305	301		308	315	320		
4004	4353		4100	3915	3590		
166.8	181.4		170.8	163.1	149.6		
573872	577016		565766	557134	557364		
333209	337369		326806	317989	315438		
0.245	0.245		0.245	0.245	0.245		
24865031	24836259		24633847	24529638	24730381		
5826	5825		5828	5830	5830		
136.0	135.0		139.0	140.0	139.0		
0.191	0.191		0.192	0.192	0.192		
6311829	6261102		6464036	6516314	6466049		
124	125		122	120	120		
305.0	301.0		308.0	315.0	320.0		
0.207	0.207		0.207	0.208	0.208		
325817	322820		324737	327893	333839		
438846	430407		400852	421966	390285		
31941523	31850589		31823472	31795813	31920555		
67.22	67.38	67.46	67.71	67.54	67.73	67.66	
97431603	97650649	97805615.58	98555536	97953304	98906269	98471702.90	
24.00	24.00		24.00	24.00	24.00		
		64.53				64.53	
		2.93				3.13	
		2869244.10				3080981.87	
		4253024.29				4553704.63	
		2755.96				2950.80	33956.07

		6151				6156	
		4372				4313	
		100.8				100.8	
		96.1				96.1	
		101.2				101.2	
		0				0	
		426				0	
		16320				20772	
		0				0	
		5764				4239	
		125584.53				146155.24	
		76.82				84.08	
		321.09				351.45	
		884.92				1037.06	12917.84

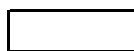
Heat Cap - Coefficients

Gas/Mat	*T^0	*T^1	*T^2	*T^3	*T^4	
O2	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15	
CO2	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14	
N2+Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15	
H2O, steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15	
H2O, liq.	1.0000					
Rawmeal	0.2060	1.014E-04	-3.673E-08			
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11		

O2	mass %	23.0
CO2	mass %	0.0
N2	mass %	77.0
H2O	mass %	0.0

CV Fan Flow	m3/min	9500
Fan Power Drawn		180

IRR calculations for Cooler Upgradation in Binani Cement Limited					
Project parameters					
Initial Investment of the proposed project (Rs in millions)		40.47			
Annual administrative cost (Rs in millions)		1.00			
Expected CER pricing (Rs/ ton of CO ₂)		280.00			
Year	Baseyear	2001-02	2002-03	2003-04	2004-05
Expenditure					
Initial investment	40.47				
Recurring cost					
Administrative cost (5% Annual Escalation)		1.00	1.05	1.10	1.16
Maintenance Cost @ 1% of cost of project with 5% escalation every year.		0.40	0.42	0.45	0.47
Production Loss due to plant shutdown during commissioning (20 days)		93.80			
Cost of insurance (1.5% of project cost) every year		0.61	0.61	0.61	0.61
Income Tax on Fuel Cost Saving		2.69	4.44	5.18	5.39
Total cashflow out (A)	40.47	98.50	6.53	7.33	7.62
Income					
Salvage Value of project (10%)		0	0	0	0
Saving in income tax due to depreciation (35% of depreciated amount)		0.84987	0.84987	0.84987	0.84987
Fuel Cost saving based on following Average cost Rs. 391.77/Million Kcal with 5% escalation per year	0	7.68	12.70	14.80	15.40
CER credits	0	2.20	3.48	3.88	3.62
Total project income without considering CER credits(B)	0	8.53	13.55	15.64	16.25
Total project income with considering CER credits(C)	0	10.73	17.02	19.52	19.87
Net cash flow without considering CER Credits (A-B)	-40.47	-89.97	7.02	8.31	8.63
Net cash flow with considering CER Credits (A-C)	-40.47	-87.77	10.50	12.19	12.24
IRR of the project without considering CER credits		2.1%			
IRR of the project with considering CER credits		6.1%			



2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71
0.49	0.52	0.54	0.57	0.60	0.63	0.66	0.69
0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
5.66	5.94	6.24	6.55	6.88	7.22	7.58	7.96
7.97	8.34	8.73	9.14	9.56	10.01	10.48	10.97
0	0	0	0	0	0	0	0
0.84987	0.84987	0.84987	0.84987	0.84987	0.84987	0.84987	0.84987
16.17	16.98	17.83	18.72	19.65	20.64	21.67	22.75
3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62
17.02	17.83	18.68	19.57	20.50	21.49	22.52	23.60
20.64	21.45	22.29	23.19	24.12	25.10	26.14	27.22
9.05	9.49	9.95	10.43	10.94	11.48	12.04	12.63
12.66	13.10	13.57	14.05	14.56	15.09	15.66	16.25

2013-14	2014-15	2015-16
1.80	1.89	1.98
0.73	0.76	0.80
0.61	0.61	0.61
8.36	8.78	9.22
11.49	12.04	12.61
0	0	4.047
0.84987	0.84987	0.84987
23.89	25.08	26.34
3.62	3.62	3.62
24.74	25.93	31.24
28.36	29.55	34.85
13.25	13.90	18.63
16.87	17.52	22.25