

ficer
Project
Area

**STRICTLY RESTRICTED
FOR COMPANY USE ONLY**

The information given in this report is not to be communicated either directly or indirectly to the press or any other person not holding Official position in the CIL/Government

Expansion Project Report

For

PIPARWAR OCP (10 MTY)

North Karanpura Coalfield
(Central Coalfields Limited)

(330 days working)

S.O. (P&P)

TEXT & APPENDICES

Piparwar Area

July '06

Regional Institute-III

Sunny Section P&P

[Signature]

Contents

Sl No.	Chapter	Particulars	Page No.	
			From	To
1		Summarized Data	i	i
2		List of Appendices	ii	ii-a
3		List of Drawings	iii	iii
4	I	Introduction	I-1	I-4
5	II	Location, Topography & Drainage, Communication & Climatic Conditions	II-1	II-2
6	III	Geology	III-1	III-14
7	IV	Marketing & Linkage	IV-1	IV-2
8	V	Main Technical decisions	V-1	V-30
9	VI	Pumping & Drainage	VI-1	VI-1
10	VII	Power Supply, Distribution, Illumination & Communication	VII-1	VII-19
11	VIII	Coal Handling Plant	VIII-1	VIII-3
12	IX	Railway Siding	IX-1	IX-1
13	X	Work Shop	X-1	X-1
14	XI	Manpower & Productivity	XI-1	XI-3
15	XII	Civil Construction	XII-1	XII-1
16	XIII	Water Supply & Sewerage	XIII-1	XIII-1
17	XIV	Land	XIV-1	XIV-1
18	XV	Safety & Conservation	XV-1	XV-6
19	XVI	Economics	XVI-1	XVI-9
20	XVII	Energy Conservation	XVII-1	XVII-3
21	XVIII	Environment	XVIII-1	XVIII-8
22	XIX	Mine Closure	XIX-1	XIX-6
23		Appendices (Option -I)	1X	44X
24		Appendices (Option -II)	1Y	27Y
25		Appendices (Option -III)	1Z	25Z
26		Annexure	AN-1	AN-2

EPR OF PIPARWAR OCP (10MTY)
SUMMARISED DATA

Approved

No.	Description	Unit	SANCTIONED	With CPP - Washed Coal			Without CPP - Raw Coal		
				OPTION-I	OPTION-II	OPTION-III	OPTION-I	OPTION-II	OPTION-III
1	Mineable Reserve	Mt	197.58	105.96	105.96	105.96	105.96	105.96	
2	Volume of OBR	Mcum		79.85	79.85	79.85	79.85	79.85	
3	Target Output								
4	Coal	Mt	6.50	10.00	10.00	10.00	10.00	10.00	
5	OBR (Peak)	Mcum		9.03	9.03	9.03	9.03	9.03	
6	Average Stripping Ratio	Cum/T	0.65	0.75	0.75	0.75	0.75	0.75	
7	Life of the Mine	Years	35	16	16	13	16	16	
8	Grade of Coal		G	E,F	E,F	E,F	E,F	E,F	
9	Initial Capital	Rs. Crore	838.27	1136.86	1093.65	1093.29	819.47	776.27	
10	Specific Investment (Raw Coal)	/Rate	1289.65	1136.86	1093.65	1093.29	819.47	776.27	
11	P & M Capital	Rs. Crore	519.55	408.34	365.48	365.13	408.34	365.48	
12	Specific Investment on P&M (Raw Coal)	/Rate	799.31	408.34	365.48	367.05	408.34	365.48	
13	HEM&M Capital	Rs. Crore	264.99	230.74	230.74	230.74	230.74	230.74	
14	Specific Investment on HEM&M (Raw Coal)	/Rate	407.68	230.74	230.74	230.74	230.74	230.74	
15	Total Average cost of Production Rs./t								
16	At 100%		212.82	606.70	598.41	513.04	390.42	385.87	
17	At 85%						436.89	427.84	
18	Wt. Average Selling Price of Coal Rs./t		268.07	919.96	901.21	901.21	602.91	593.03	
19	Profit Rs./t								
20	At 100%		55.25	313.26	302.80	388.17	209.49	207.16	
21	At 85%						165.02	165.19	
22	Financial IRR								
23	At 100%		10.40	28.39	29.02	31.21	34.83	36.01	
24	At 85%						25.56	26.67	
25	Economic IRR (Domestic Price)								
26	At 100%		18.00				38.48	39.42	
27	At 85%						29.28	30.16	
28	Completion Capital Rs. Crores	Rs. Crore		1141.52	1095.67	1095.29	824.13	776.29	
29	Internal Rate of return								
30	a) at 100% Capacity						34.71	35.96	
31	b) at 85% Capacity						25.44	26.62	
32	Economic Internal Rate of return								
33	a) at 100% Capacity						38.37	39.37	
34	b) at 85% Capacity						29.17	30.26	
35	CO ₂ (Target)	Tt					641.04	637.34	
36	OBR (Target)	Tt	31				45.53	46.31	
37	Wt. of Personnel (Target)	No.	775				632	618	
38							743		

OPTION-I Quarry-II as per sanctioned PR; Quarry-I concurrently started @1.5 mty; With shifting of conveyor-1092 & 1093; With add 3.5Mty CRP; in Quarry-I Coal & CRP outsourced for initial 5 years thereafter by departmental means.

OPTION-II Quarry-II as per sanctioned PR; Quarry-I concurrently started @1.5 mty; Without shifting of conveyor-1092 & 1093; Without add 3.5Mty CRP; in Quarry-I Coal & CRP outsourced for 5 years thereafter by departmental means.

OPTION-III Quarry-II as per sanctioned PR; Quarry-I concurrently started @1.5 mty; Without shifting of conveyor-1092 & 1093; Without add 3.5Mty CRP; Coal & CRP outsourced for whole life of quarry-I. Partial outsourcing of Coal & CRP also done in Quarry-II for 5 years.

LIST OF APPENDICES

Sl.No.	Particulars	No.	Page No.
Option - I			
Estimated Capital Investment On:			
1	Major Financial Heads With Yearwise Phasing	A	1X
2	Land Acquisition	A.1	2X
3	Building - Summary	A.2	3X
4	Residential Buildings	A.2.1	4X
5	Plant and Machinery	A.3	5X-6X
6	P&M-Electricals	A.3.1	7X-10Xa
7	P&M-Workshop	A.3.2	11X
8	Pumps,Pipes & fittings	A.3.3	12X
9	P&M - CHP	A.3.4	13X-18Xf
10	Spur Siding	A.5	18Xg
11	Capital Outlay in Mines	A.8.1	19X
12	Capital Investment on Road & Culverts	A.8.2	20X-22X
13	Water Supply & Sewerage Arrangement	A.8.3	23X
14	Statement of Manpower	B	24X-30X
15	Salary & Wages	B1	31X
16	Cost of Production & Profitability	C	32X-33X
17	Cash Flow Statement (financial analysis at 100%,85%)	D&D.1	34X-35X
18	Cash Flow Statement (Economic analysis at 100%,85%)	D.2&D.3	36X-37X
18	Cash Flow Statement (financial analysis on Completion Capitalat at 100%,85%)	D.4&D.5	38X-39X
19	Cash Flow Statement (Economic analysis on Completion Capitalat at 100%,85%)	D.6&D.7	40X-41X
20	Land Reclamation	E	42X
21	Estimated Capital Investment on EMP	F	43X-44X

LIST OF APPENDICES

Sl.No.	Particulars	No.	Page No.
Option - II			
Estimated Capital Investment On:			
1	Major Financial Heads With Yearwise Phasing	A	1Y
2	Plant and Machinery	A.3	2Y-3Y
3	P&M-Electricals	A.3.1	4Y-6Y
4	P&M - CHP	A.3.4	7-8Y
5	Statement of Manpower	B	9Y-15Y
6	Salary & Wages	B1	16Y
7	Cost of Production & Profitability	C	17Y-18Y
8	Cash Flow Statement (financial analysis at 100%,85%)	D&D.1	19Y-20Y
9	Cash Flow Statement (Economic analysis at 100%,85%)	D.2&D.3	21Y-22Y
10	Cash Flow Statement (financial analysis on Completion Capital at 100%,85%)	D.4&D.5	23Y-24Y
11	Cash Flow Statement (Economic analysis on Completion Capital at 100%,85%)	D.6&D.7	25Y-26Y
12	Estimated Capital Investment on EMP	F	27Y
Option - III			
Estimated Capital Investment On:			
1	Major Financial Heads With Yearwise Phasing	A	1Z
2	Plant and Machinery	A.3	2Z
3	P&M-Electricals	A.3.1	3Z-5Z
4	Statement of Manpower	B	6Z-13Z
5	Salary & Wages	B1	14Z
6	Cost of Production & Profitability	C	15Z-16Z
7	Cash Flow Statement (financial analysis at 100%,85%)	D&D.1	17Z-18Z
8	Cash Flow Statement (Economic analysis at 100%,85%)	D.2&D.3	19Z-20Z
9	Cash Flow Statement (financial analysis on Completion	D.4&D.5	21Z-22Z
10	Cash Flow Statement (Economic analysis on Completion	D.6&D.7	23Z-24Z
11	Estimated Capital Investment on EMP	F	25Z

LIST OF DRAWINGS

Sl. No.	Description	Scale	Drawing Nos.	Plate No.
A. GEOLOGY				
1	Topographical Map of Piparwar Block	1:5000	RI-3/G/1328	1
2	Geological Map of Piparwar Block	1:5000	RI-3/G/1438	2
B. MINING				
1	Plan showing the Final Stage Quarry Boundary (Opt-I)	1:5000	RI-3/OCM/462	3
2	Plan showing the Final Stage Quarry Boundary (Opt-II)	1:5001	RI-3/OCM/462A	3A
2	Plan showing the Quarry Cross-Section along AA', BB' & CC'	1:2000	RI-3/OCM/560	4
3	Plan showing the Quarry Cross-Section along DD', EE' & FF'	1:2001	RI-3/OCM/561	5
4	Plan showing the Quarry Cross-Section along GG', HH' & II'	1:2002	RI-3/OCM/562	6
5	Plan showing the Floor Contour and Isochore of Lower Dakra Seam within Quarry Boundary.	1:5000	RI-3/OCM/567	7
6	Plan showing the Floor Contour and Isochore of Upper Dakra Seam within Quarry Boundary	1:5000	RI-3/OCM/568	8
7	Plan showing the Floor Contour and Isochore of Bukbuka Seam within Quarry Boundary	1:5000	RI-3/OCM/569	9
8	Plan showing the Floor Contour and Isochore of Bukbuka Top Seam within Quarry Boundary	1:5000	RI-3/OCM/570	10
9	Plan showing the Floor Contour and Isochore of Bistrampur Seam within Quarry Boundary	1:5000	RI-3/OCM/571	11
10	Plan showing Isopachytes of total excavation within Quarry Boundary	1:5000	RI-3/OCM/579	12
11	Plan showing internal Dump extent line with quantity of dump and year of placement (Option I & II)	1:5000	RI-3/OCM/000299 & 300	13 & 14
12	Existing working plan	1:5000	SRV/PPR Plan/13A	15
C. E & M				
1	Modification of Piparwar CHP	1:5000	RI-3/E&M/002326	16
2	Single line electrical layout diagram	NTS	RI-3/E&M/002317	17
D. CIVIL				
1	Land Use Plan		RI-3/OCM/000301	18

CHAPTER-1

1.0 INTRODUCTION

1.1 Piparwar Opencast Block is located in the North Karanpura Area of Central Coalfields Limited in the State of Jharkhand. Piparwar coal was to meet the requirement of 4x210 MW Dadri Thermal Power Station of Capital Region. The Central Electricity Authority had recommended that the 2 x 210 MW Bhatinda Power Station will receive coal from the Piparwar Project. A part of the requirement of Yamuna Nagar 3 x 210 MW Power Station was also to be met from this Project. The combined requirement of these three powerhouses was estimate as 5.5MTY from 1994-95 onwards. The Project Report for Piparwar Opencast Project was prepared by CMPDI in April:86 for a rated capacity of 5.0 Mte of ROM Coal per annum at an average stripping ratio of 0.73 Cum/Te. The CCL and CIL Board approved this report on 30.7.86 and 17.9.86 respectively. The IMG had considered the report on 17.11.86

Collaboration with Australia was considered for the purpose of constructing a highly productive coalmine and also to obtain the technology of crusher-conveyor system for coal, which is expected to be used in other mines also.

Discussion were held with the Australians to develop the Piparwar OC Project including the following assistance from them:

- a) Financing of the Piparwar Project (Mine Development, Coal preparation and Coal Handling System)
- b) Turn key project development:
 - i) Feasibility Report,
 - ii) Mine Plan, Design and Development.
 - iii) Equipment Design, Selection, procurement and installation.
 - iv) Infrastructure design, manufacture and installation,
 - v) Technology transfer and training.
- c) Achieve designed output; and
- d) Achieve high output per man shift (of the order of 29 tonne).

The Govt. of Australia had entrusted white Industries Limited (WIL) to undertake the above job. The Technical F.R. by WIL was based upon the (a) Project Report for Piparwar Opencast Project and (b) 'Project Report for the Piparwar Coal Preparation by CMPDI in 1986.

The Technical Feasibility Report was submitted in Sept.: '87 by white Industries Limited. The WIL team visited CMPDI/ CCL in Dec.'87 and Jan.'88 for detailed discussion and preparation of 'Financial Report. Thereafter, a final ' Technical Feasibility Report' has been submitted by WIL in 4 volumes including Financial Report in Jan. 88

Subsequently, a Revised ' Project Report (Vol IV Financial part and Addendum to Technical Part) was submitted by white Industries Limited in April '88.

The Approved UCE for Piparwar OCP was prepared by CMPDI in May 1993, which envisaged total capital investment as Rs. 838.27 Crores to produce 6.5 MTY 'G' grade ROM coal. The total reserve was estimated as 197.58 Mte corresponding to total OBR of 128.93 M.Cum. With a stripping ratio of 0.65M.Cum / Te. Since its working Quarry N o. II has produced 91.62 Mte of coal after removing 49.08 Mcum of OB. The balance coal reserve in Piparwar OCP is now 105.96 Mte & balance OB is 79.85 MCum

The life of the OCP was estimated as 35 years & total manpower was estimated as 775. The Piparwar OCP is now linked to Dadri, Bhatinda, Badarpur and Unchahar Thermal Power Stations.

1.1.1 The list of equipment for the sanctioned project report is given in Table No 1.1 below.

Table no.1.1

Sl. No.	Equipment	Size/Capacity	Total Quantity
A.	H.E.M.M.		
	Overburden		
1.	Electric Shovel	10 Cu.M	1
2.	Track Dozer	600 HP	1
3.	Diesel Drill	250-160 mm	1
	Coal :		
1	Conveyor (Coal)	2800 tph	1
2	Conveyor (Coal)	2800 tph	1
3	Conveyor (Coal)	2800 tph	1
4	Conveyor (Coal)	2800 tph	1
5	Electric Shovel	23/25 Cu.M	1
6	Electric Drill	250 mm	1
7	Mobile Crusher	2800 tph	1
8	Belt Wagon	2800 tph	1
9	Track Dozer	600 HP	2
10	Drive Head Transporter		1
	Common :		
1	Electric Shovel	10 Cu.M	1
2	Electric Drill	250 mm	1
3	Electric Drill	250 mm	2
4	Track Dozer	400 HP	5
5	Rear Dump Truck	120/85T	13/19
6	FE Loader	500 KW	2
7	FE Loader	120 KW	1
8	Hydraulic Excavator	12/10 Cu.M	1
9	Hydraulic Backhoe	1.5 Cu.M	1
10	Hydraulic Face Shovel	5.5 Cu.M	1
11	Dozer (Rubber Type)	230 KW	1
12	Rear Dump Truck	50/85T	6/4
13	Grader	200 KW	2
14	Compactor	230 KW	1
15	Mobile Hydraulic Crane	80 T	1
16	Rough Terrain Crain	35/40T	1
17	Rough Terrain Cranc	10 T	1
18	Cable Reeler	280 KW	1
19	Fork Lift	4 T	1
20	Fork Lift	1.5 T	1
21	Form Lift (Tyre Handler)	15 T	1

NOTE : 2 Nos. 10 Cu.M Shovel and 14 Nos. 85T Dumpers which would be deployed in 14/15th year are not included in the above estimate and are assumed to be financed through retained earnings.

1.2 Need for EPR for Piparwar Opencast Project (10 MTY)

As the demand of coal has increased the EPR for Piparwar OCP is required to be prepared under Emergency Coal Production programme enhancing the capacity of Piparwar OCP from existing 6.5MTY to 10.0 MTY of Coal Production as per letter No. CGM/PP/o6/758-59 dated 20.3.2006 issued by the Chief General Manager (P&P), CCL, Darbhanga House Ranchi.

1.3 PRESENT STATUS OF THE MINE -

The mine has produced 91.62 Mte of Coal and has removed 49.08M Cum of OB till 2004-2005. At present Piparwar OCP is working in Quarry No. II only. To enhance the production from 2007-2008 onward to the tune of 10MTY of Coal, it is proposed to open quarry no.I also simultaneously. The Piparwar OCP will produce 6.5 MTY of coal from Quarry No.II as per sanctioned PR.

Quarry No-II will work departmentally as usual and Quarry No-I is proposed to be outsourced both (coal & OB) for initial 8(eight) years. After Quarry no-II is exhausted completely the desired manpower and machine will be put in Quarry no-I, for its remaining life.

The coal production & OB removal with stripping ratio from Piparwar OCP for last five years have been given below in Table No.1.2

Table No.1.2

Year	Coal production in MTe	OBR in MCum	SR in Cu.m/Te.
2000-2001	8.001	4.536	0.567
2001-2002	7.601	4.276	0.563
2002-2003	8.432	3.543	0.420
2003-2004	8.384	2.850	0.340
2004-2005	6.778	4.125	0.609

Three options have been worked in this EPR. The total capital requirement for option I, II & III have been given in respective appendices.

CHAPTER -- II

2.0 LOCATION, COMMUNICATION, TOPOGRAPHY & CLIMATE

2.1 Location

Piparwar block is situated in the Chatra District of Jharkhand between latitude $23^{\circ} 42' 38''$ to $23^{\circ} 44' 45''$ N and longitudes $85^{\circ} 01' 34''$ to $85^{\circ} 03' 15''$ E. The area is covered by the Survey of India toposheet nos. 73E/1 and 73E/2. Damodar River flows through the South Eastern Boundary of this block (see plate no.1).

2.2 Communication

Piparwar block is approachable by a PWD road connecting Khalari with Hazaribagh via Dakra, Tandwa and Barkagaon. The road between Piparwar and Tandwa is still only a fair weather road. The existing bridge on Damodar River, which connects Bachra OCP to Piparwar block, is unfit for the movement of heavy vehicles. Khalari and Ray Railway stations, on Gomoh-Dehri-on-sone loop line of the Eastern Railway, are about 10 Kms and 5 Kms respectively from this bridge. Khalari Railway Station is connected to Ranchi by a metalled road via Bijupara village situated on Ranchi-Daltonganj high way.

2.3 Topography

The topography of the Piparwar block is mainly controlled by the wide gently dipping coal seam outcrops, which is represented by paddy lands. Dips being gentle, the outcrops follow the surface contour. The highest and lowest elevations of the block are 464m. and 409m. respectively. More than 50% of the land is cultivable land. There is a major village Mangardaha with about 80 houses and a small village Malmahura with few houses, situated within the block. The drainage is controlled by Damodar River and its tributaries. There

are two nallahs viz Benti and Mangardaha flowing through the block and draining in to Damodar River.

2.4 Climate

The climate is tropical. Maximum precipitation takes place during monsoon. The average monthly rainfall during the monsoon period (June to October) is 198.87 mm and during the non-monsoon period (November to May) is 17.83mm. During summer (March to May) the days are hot with dusty winds but nights are generally pleasant. The maximum summer temperature and minimum winter temperature generally varies between 40^o C and 1^oC.

CHAPTER - III

3.0 GEOLOGY

3.1 General

Piparwar Block located in the south-central part of North Karanpura Coalfield has been explored in detail covering an area of 6.38 sq.km. Out of this 4.8 sq.km has been identified for mine planning. Geological information provided herewith pertains mainly to this part of the block.

In all, 8 coal seams occur within the project area. Out of this, upper 6 coal seams, which belong to Barakar Formation, are considered suitable for opencast mining. The bottom-most two coal seams i.e. Lower Bachra and Upper Bachra seams, which belong to Karharbari Formation, are comparatively thin (<1m to 8m) and are overlain by thick parting (89 to 106m). The Karharbari seams neither outcrop/incrop in the area, nor are considered as suitable for opencast mining. These coal seams have, therefore, not been dealt with in detail. Only passing reference has been made, wherever felt necessary.

3.2 Status of Exploration

A total of 52 boreholes involving 5711m have been drilled in the project area. The density of boreholes is 11 bh/sq.km. Boreholes have by and large, been drilled upto the bottommost Lower Bachra seam and the area is considered as proved.

3.3 Geological Set-up

Stratigraphic succession of the area has been established. Pre-cambrian metamorphics form the base overlain unconformably by the non-coal bearing Talchir Formation. Talchirs are, in turn, overlain conformably by the coal-bearing Karharbari and Barakar Formations in ascending order. The area is entirely covered by Barakar Formation or alluvium. Talchir and Karharbari Formations do not outcrop in the area. Maximum thickness of Barakar Formation encountered in boreholes drilled within the block is 275m.

3.4 Geological Structure

Within the Piparwar Project, the strike of the strata in the southern part is NW-SE to NNW-SSE and dip is low being 2 to 3 degree towards southwest. In the northern part the strike varies from NNW-SSE to NS with a dip of 3 to 4 degree.

Twelve faults have been encountered, which range in throw from 5 to 30m excluding the faults that limit the boundary of the project. The boundary faults have maximum throw of 76m. The faults are strike faults or slightly oblique to it, extending roughly in NW-SE direction

F36 (Northerly throw 38 m)/forms the northern boundary of the block. The elongated strip of Barakar formation between fault F36 and F40 has been referred as "Piparwar North Extension " has not been proved. The coal seams are likely to occur at depth (starting depth of coal seam in B.H NNKP-45 is 113 m) hence this part is " not of interest as far as mining is concerned" as per G.R.

3.5 Thickness and Parting of Coal Seams

The six coal seams considered for opencast mining are Lower Dakra, Upper Dakra, Bukbuka, Bukbuka Top, Bisrampur and Karkata seams in ascending order. The topmost Karkata and Bisrampur coal seams have been encountered in 2 and 6 boreholes respectively and cover small area. Thickness of the coal seams varies from <1m to 29.2 m. The most covetous coal seam is Lower Dakra seam ranging in thickness from 18.7m to 29.2m. Lower Dakra seam is overlain by Upper Dakra seam, the parting between two being 1.1m to 13.5m. The maximum parting between any two coal seams is not more than 23m and the minimum parting is less than 1m as between Upper Dakra and Bukbuka seams. Details of coal seams and associated parting are given in Table - 3.1.

Table - 3.1

Succession of Coal Seams in Piparwar Block

Sl. No.	Coal Seam	Thickness of coal seam (m)		Thickness of parting (m)		Remarks
		Min.	Max.	Min.	Max.	
BARAKAR FORMATION						
1	Karkata	4.90 (NNKP-45)	5.42 (NNK P-78)			Encountered in only two Bhs.
	Parting			7.92 (NNKP-45)	14.07 (NNKP-78)	
2	Bisrampur	2.40 (NNKP-73)	5.27 (NNK P-45)			Encountered in 6 bhs. only.
	Parting			7.80 (KP-3)	13.21 (NNKP-42)	
3	Bukbuka Top	2.25 (NNKP-45)	4.32 (NNK P-73)			Also encountered in two splits.
	Parting			6.16 (NNKP-71)	23.05 (NNKP-74)	
4	Bukbuka	9.24 (NNKP-74)	14.41 (NNK P-7)			
	Parting			0.75 (NNKP-42)	23.21 (NNKP-108)	
5	Upper Dakra	3.10 (NNKP-47)	8.82 (NNK P-39)			
	Parting			1.11 (NNKP-79)	13.48 (NNKP-38)	
6	Lower Dakra	18.65 (KP-3)	29.16 (NNK P-43)			
	Parting			89.12 (NNKP-67)	106 (NNKP-60)	

KARHARBARI FORMATION						
7.	Upper Bachra	Nil	2.37 (KP-2)			Thickness of coal seam is more than 0.90m. only in 3 Bhs.
	Parting			1.53 (NNKP-10)	12.61 (NNKP-31)	
8.	Lower Bachra	0.74 (NNKP-46)	8.42 (NNKP-16)			Also considered in splits in Bh NNP-14, 41 & 30
	Parting			90.35 (KP-2)		
	Talchir			More than 37m. Full thickness not drilled		

- Note: 1. Figures within parenthesis indicate borehole numbers.
2. Strata above Karkata Seam (Approx. 110m. thick) contain thin coaly horizons.

3.6 Dirt Bands

Coal seams contain both combustible and non-combustible dirt bands. If the ash and moisture content added together range from 55% to 75%, the dirt band is taken as combustible. Anything with higher ash and moisture content is considered as non-combustible dirt band. Number of dirt bands varies from nil to 23 (Lower Dakra seam). Summarized statement of dirt bands is given in Table - 3.2.

Table - 3.2

Summarized Statement of Dirt Bands

Coal Seam	Range of Combustible Dirt Bands		Range of Non-combustible dirt bands	
	Nos.	Thickness (Cumulative)	Nos.	Thickness (Cumulative)
Karkata	NIL	NIL	NIL	NIL
Bisrampur	NIL	NIL	NIL	NIL
Bukbuka Top	NIL	NIL	1	0.50
Bukbuka Seam	1 - 10	0.54-2.63	NIL - 4	0.25-1.97
Upper Dakra	1 - 7	0.10-2.46	NIL - 2	0.05-0.31
Lower Dakra	5 - 23	1.91-7.36	NIL - 3	0.05-1.26

3.7 Quality of Coal Seams

Coal seams are high moisture, low to high ash, high volatile and non-coking in nature.

On In-band basis, moisture content of coal seams varies from 5.6 to 8.7% and ash content from 17.4 to 42.2%. Useful heat value (UHV) ranges from 2260 to 5380 Kcal./kg placing coal in C to G grade. Even though grade of coal on the basis of extreme values varies from C to G; for all practical purposes, the grade of coal is E & F. Other grades of coal (C, D & G) have been encountered in scanty boreholes and are of not much significance (Table - 3.3).

Table - 3.3
Proximate Analysis as 60% RH and 40°C

Coal Seam	M%	A%	VM%	UHV	Grade
Karkata	7.6-8.0	22.2-29.8	26.4-27.9	-	D-E
Bisrampur	7.4-8.6	17.4-30.1	25.3-27.8	3560-5380	C-E
Bukbuka Top	7.4-8.0	21.1-31.3	26.6	3560-4925	D-E
Bukbuka	6.7-8.7	29.0-38.2	23.5-25.7	2620-3805	E-F
Upper Dakra	5.6-8.6	27.9-42.2	23.9-27.6	2260-3930	E-G
Lower Dakra	6.0-8.5	30.2-40.8	24.6-26.0	2415-3780	E-F

Note: -All the data are on In-band basis.

M - Moisture
A - Ash
VM - Volatile Matter

Hardgrove Grindability Index (HGI) of coal seams varies from 52 to 61. Initial Deformation Temperature (IDT) varies from 1180 - 1320°C. Hemispherical Temperature (HT) and Fusion Temperature (FT) are more than 1400°C as given in Table - 3.4.

Table – 3.4

IDT and Ash Fusion Range

Coal Seam	HGI	IDT (°C)	HT (°C)	FT (°C)
Karkata Seam	52	1280	>1400	>1400
Bisrampur Seam	56	1250	>1400	>1400
Bukbuka Top	54	1240	>1400	>1400
Bukbuka Seam	54-61	1180-1270	>1400	>1400
Upper Dakra	56	1255-1300	>1400	>1400
Lower Dakra	53-55	1300-1320	>1400	>1400

Results of ultimate analysis and ash analysis have been given for Lower Dakra seam only for getting an overall view (Table – 3.5 and 3.6).

Table – 3.5

Ultimate Analysis, Lower Dakra Seam

Sl. No	Analytical parameters on 60% RH & 40°C	NNKP-14	NNKP-28 & 30		Range on unit coal basis
		Exband	Exband	Inband	
1	Carbon %	49.0 (78.6)	49.8-50.2 (79.1-79.2)	-	78.6-79.2
2	Hydrogen%	3.1 (5.0)	3.0-3.1 (4.8-4.9)	-	4.8-5.0
3	Nitrogen %	1.6 (1.7)	1.1 (1.7-1.8)	-	1.7-1.8
4	Sulphur %	0.52 (0.60)	0.5-0.6 (0.60)	0.4-0.5	0.60
5	Oxygen (by diff.)%	(14.1)	(13.6-13.7)	-	13.6-14.1
6	Carbonate CO ₂ %	-	0.41-0.43	-	-
7	Phosphorous	-	-	0.079-0.86	-

Note : Figures within parenthesis are on unit coal basis.

Table - 3.6

Ash Analysis of Composite Upper and Lower Dakra Seams

Composition	Percentage				Range
	NNKP-6	NNKP-7	NNKP-81	NNKP-89	
SiO ₂	57.6	59.1	57.2	56.8	56.8-59.1
Al ₂ O ₃	31.7	29.3	29.8	29.4	29.3-31.7
Fe ₂ O ₃	5.5	5.6	4.8	4.5	4.5-5.6
TiO ₂	1.8	2.4	2.8	2.8	1.8-2.8
P ₂ O ₅	0.7	0.6	0.5	0.6	0.5-0.7
CaO	1.4	1.4	1.6	2.2	1.4-2.2
MgO	1.1	1.3	1.4	1.8	1.1-1.8
SO ₃	Traces	Traces	0.4	0.6	Traces to 0.6
Alkalies	0.2	0.3	1.5	1.3	0.2-1.5

3.8 Washability Studies

Washability studies on borehole core samples have been carried out for Lower Dakra, Upper Dakra, Bukbuka, Bukbuka Top and Bisrampur seams. The results of screening tests, cleaning possibilities and quality of washed coal of all the seams are given in Tables to

Table - 3.7

**Statement showing Screen Analysis & Cleaning Possibility
of Lower Dakra Seam (BH No. NNKP-76)**

<u>Particulars</u>	
Seam Depth	64.86-85.26m
Thickness	20.40m
Raw Coal Ash	38.3%

Screen Analysis of Coal crushed to 13mm top size

Size	Wt %	Ash %
13-04mm	97.7	36.4
-0.4	2.3	32.0

Cleaning possibility at Sp.Gr. Gravity out of 1.50

Cleans at 1.50		Middlings at 1.50-1.80		Sink at 1.80	
Wt. %	A%	Wt. %	Ash%	Wt. %	Ash%
35.0	17.6	45.0	37.3	20.0	61.5

Table - 3.8

Statement showing Quality of Cleans & Middlings from Lower Dakra Seam

Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
M% (on equilibrated basis)	9.6	6.5
A% - do -	17.6	37.3
VM % - do -	32.3	23.3
C % - do -	-	41.72
H % - do -	-	2.55
Gross CV (K.Cal/Kg.)	5310	3870
Carbonate %	0.55	0.78
Coke Type	A	-
Ash fusion range (at M.R.A)		
(a) IDT	1240°C	1230°C
(b) HT	1370°C	1350°C
(c) FT	Over-1400°C	Over-1400°C

Table - 3.9

**Statement showing Screen Analysis & Cleaning Possibility
of Upper Dakra Seam (BH No.NNKP-76)**

Particulars

Seam Depth	58.95-63.55 m.
Thickness	4.60 m.
Raw Coal Ash	38.1 %

Screen Analysis of Coal crushed to 13mm top size

Size	Wt %	Ash %
13-04mm	97.3	39.4
-0.4	2.7	34.2

Cleaning possibility at 1.50 Sp. Gr. (Cut off)

Cleans at 1.50		Middlings at 1.50-1.80		Sink at 1.80	
Wt %	A%	Wt %	Ash%	Wt. %	Ash%
36.6	17.8	36.1	37.4	27.3	63.0

Table - 3.10

**Statement showing Quality of Cleans & Middlings from
Upper Dakra Dakra Seam**

Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sp.gr.)
M% (on equilibrated basis)	9.6	6.1
A% - do -	17.8	37.4
VM % - do -	30.2	23.5
C % - do -	-	41.94
H % - do -	-	2.58
Gross CV (K.Cal/Kg.)	5260	3915
Carbonate %	Trace	0.45

Coke Type	A	-
Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
Ash fusion range (at M.R.A)		
(a) IDT	1260 ^o C	1250 ^o C
(b) HT	1390 ^o C	1380 ^o C
(c) FT	Over-1400 ^o C	Over- 1400 ^o C

Table - 3.11

**Statement showing Screen Analysis & Cleaning Possibility
of Bukbuka Seam (BH No.NNKP-76)**

Particulars

Seam Depth	38.74- 51.92 m.
Thickness	13.18 m.
Raw Coal Ash	30.8 %

Screen Analysis of Coal crushed to 13mm top size

Size	Wt %	Ash %
13-04mm	96.7	31.1
-0.4	3.3	27.8

Cleaning possibility at Sp.Gr. Gravity out of 1.50

Cleans at 1.50		Middlings at 1.50-1.80		Sink at 1.80	
Wt %	A%	Wt %	Ash%	Wt %	Ash%
38.2	15.4	42.8	35.6	19.0	56.0

Table - 3.12

**Statement showing Quality of Cleans & Middlings from
Bukbuka Seam**

Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
M% (on equilibrated basis)	10.7	7.3
A% - do -	14.6	34.5
VM % - do -	29.2	24.3
Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
C % - do -	-	43.47
H % - do -	-	2.73
Gross CV (K.Cal/Kg.)	5450	4070
Carbonate %	0.40	4.1
Coke Type	A	-
Ash fusion range (at M.R.A)		
(a) IDT	1240 ^o C	1230 ^o C
(b) HT	1380 ^o C	1360 ^o C
(c) FT	Over-1400 ^o C	Over-1400 ^o C

Table - 3.13

**Statement showing Screen Analysis & Cleaning Possibility
of Bukbuka Top Seam (Top Split) (BH No.NNKP-76)**

Particulars

Seam Depth	20.17-22.50 m.
Thickness	2.33 m.
Raw Coal Ash	25.8 %

Screen Analysis of Coal crushed to 13mm top size

Size	Wt %	Ash %
13-04mm	97.5	28.2
-0.4	2.5	25.1

Cleaning possibility at Sp.Gr. Gravity out of 1.50

Cleans at 1.50		Middlings at 1.50-1.80		Sink at 1.80	
Wt.%	A%	Wt.%	Ash%	Wt.%	Ash%
47.5	15.4	39.1	34.8	13.4	50.4

Table - 3.14

Statement showing Quality of Cleans & Middlings from Bukbuka Top Seam (Top Split)

Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
M% (on equilibrated basis)	10.8	7.8
A% - do -	15.4	34.8
VM % - do -	29.2	23.5
C % - do -	-	42.86
H % - do -	-	2.75
Gross CV (K.Cal/Kg.)	5380	4030
Carbonate %	0.45	0.70
Coke Type	A	-
Ash fusion range (at M.R.A)		
(a) IDT	1250°C	1240°C
(b) HT	1400°C	1380°C
(c) FT	Over-1400°C	Over- 1400°C

Table - 3.15

Statement showing Screen Analysis & Cleaning Possibility of Bismour Seam (BH No.NNKP-76)

Particulars

Seam Depth	8.70 - 12.20 m.
Thickness	3.50 m.
Raw Coal Ash	30.1 %

Screen Analysis of Coal crushed to 13mm top size

Size	Wt %	Ash %
13-04mm	97.3	31.0
-0.4	2.7	27.4

Cleaning possibility at Sp.Gr. Gravity out of 1.50

Cleans at 1.50		Middlings at 1.50-1.80		Sink at 1.80	
Wt.%	A%	Wt %	Ash%	Wt %	Ash%
41.3	15.0	41.2	34.1	17.5	52.3

Table - 3.16

**Statement showing Quality of Cleans & Middlings from
Bisrampur Seam**

Item of Analysis	Cleans (1.50 sp.gr.)	Middlings (1.50-1.80 sq.gr.)
M% (on equilibrated basis)	10.6	7.9
A% - do -	15.0	34.1
VM % - do -	30.3	25.2
C % - do -	-	43.45
H % - do -	-	2.80
Gross CV (K.Cal/Kg.)	5400	4060
Carbonate %	0.35	0.55
Goke Type	A	-
Ash fusion range (at M.R.A)		
(a) IDT	1210 ^o C	1260 ^o C
(b) HT	1360 ^o C	1390 ^o C
(c) FT	Over-1400 ^o C	Over- 1400 ^o C

3.9 Reserve

Total net geological reserve of quarriable coal seams in the entire Piparwar Block as given in the concerned Geological Report, is 216 MT. Out of this, Grade F coal contributes the maximum quantity (180 MT) followed by Grade E coal (35 MT). All other grades of coal C, D & G taken together yield hardly 1 MT (1.04 MT to be precise).

Gradewise net geological reserve of coal seams of Piparwar Block is given in Table - 3.9.

Table - 3.17
Gradewise reserves of Coal Seams, Piparwar Block
(in Million Tonnes)

Seam	G R A D E					Total
	C	D	E	F	G	
Karkata	-	0.39	-	-	-	0.39
Bisrampur	0.19	0.15	2.34	-	-	2.68
Bukbuka Top	-	0.16	3.70	-	-	3.86
Bukbuka	-	-	5.01	33.85	-	38.86
Upper Dakra	-	-	3.19	28.64	0.15	31.98
Lower Dakra	-	-	20.84	117.40	-	138.24
Total	0.19	0.70	35.08	179.89	0.15	216.01

CHAPTER IV

4.0 MARKETABILITY AND LINKAGE

4.1 Demand

Liberalisation of power sector by Govt. of India has generated wide spread interests for Private and Public sector investments in power generation. As such, there is an appreciable increase in the number of upcoming new thermal power stations in both Private and Public Sectors. This has resulted in a sharp increase in the demand of power grade coal in CCL.

4.2 COAL BALANCE ON CCL

The demand and availability of Coal from CCL is given in Table-4.1 below:

Table 4.1

Sl No	Coal Consuming sectors	Coal Demand on CCL in Million te					
		06-07	07-08	08-09	09-10	10-11	11-12
1	Existing TPS	31.43	31.43	31.43	31.43	31.43	31.43
2	X Plan TPS	7.11	13.07	14.53	14.53	14.53	14.53
3	XI Plan TPS	0.00	1.45	4.47	12.81	19.48	22.49
	TOTAL (Power Utility)	38.54	45.95	50.43	58.77	65.44	68.45
4	Captive Power	2.77	2.77	1.35	1.35	1.35	1.35
5	Steel	6.00	6.10	6.20	6.30	6.40	6.50
6	Cement	0.18	0.18	0.18	0.18	0.18	0.18
7	Sponge iron	0.92	0.92	0.92	0.92	0.92	0.92
8	Other sectors	6.78	6.73	6.68	6.63	6.58	6.53
	TOTAL DEMAND	55.19	62.65	65.76	74.15	80.87	83.93
	PRODUCTION (Million te)	42.00	47.50	52.50	57.80	61.70	67.00
	GAP	(-)13.19	(-)15.15	(-)13.26	(-)16.35	(-)19.17	(-)16.93

Working group Xth Plan document had indicated the demand of non-coking coal for the Xth Plan as 580 Mt and indigenous supply of non-coking coal from CIL as 445 Mt. The updated projection till May, 2005 has indicated the demand of non-coking coal for the Xth Plan as 622 Mt and indigenous supply of non-coking coal from CIL as 508 Mt. Projection of total indigenous supply of non-coking coal as 562.32 Mt. leaves a gap of 59.32 Mt. for which the Emergency Coal Production Plan of CIL has

been formulated. The enhanced production of coal from Piparwar OCP (from 6.5 mty to 10 MTY) will partially meet this projected shortfall in coal production.

Expansion of this Piparwar OCP from existing 6.5 to 10 MTY will increase 3.5MTY of Coal production. It will fulfil to some extent the indicated growth in demand. Availability of coal from CCL does not include incremental production of 3.5 MTY from this project.

4.3 Linkage

Piparwar OCP (6.5 MTY) was planned to supply coal to Dadri, Bhatinda, Badarpur & Unchahar Thermal Power Station and balance coal shall be given to other Power houses.

CHAPTER – V

MAIN TECHNICAL DECISION FOR THE QUARRY

(Rated Capacity Mineable Reserves, Design criteria and Life of the Projects)

5.1 Annual workload for coal winning and OB removal are determined by the number of working days spent on these work. Based on this, capacities of the mining and transport equipment, capacity of mine and other economic indices are determined.

Rated Capacity

5.1.1 The Project Report for Piparwar opencast mine has been planned for a rated capacity of 6.5 M.Te of coal per annum. The demand of power grade coal has since increased much and under Emergency Coal Production Programme it was decided to enhance capacity of Piparwar OCP from existing 6.5 MTY to 10 MTY.

The parameters of the opencast minefield and the technical conditions of its development, make it feasible to produce 10 M.T of ROM coal, per annum, with normal technical indices viz. length of excavated block, yearly advance of the faces, opencast mine life, location of equipment etc.

Mineable Reserves

5.1.2 In the sanctioned 6.5 MTY Project Report the total mineable reserves was estimated as 197.58 M.T and the total volume of OB as 128.93 M.cum with an average stripping ratio of 0.73 cu.m. per tonne. The mine is a working mine and till 2004-2005 the quarry has produced 91.62MTe of coal after removing 49.08 Mcum of OB. The break up of the balance mineable reserves from different seams and the break up to the balance volume of OB & parting between seams and Top OB for both quarry no.1 and quarry no.2 is given in table no.5.1.

Design Criteria

5.1.3 The following design criteria has been adopted for the mining operations:-

No. of working days/week	:	6
No. of shifts per day	:	3
Duration of each shift	:	8 hrs.

The opencast mine is to be worked on the above 3 shifts per day and 6 days per week schedule and number of working days per year are adopted as 330.

5.1.4 Breakup of Seamwise coal reserves & volume of OB between different seams.(Balance coal reserves &OB volume on 31-3-2005)

Table 5.1

Coal Seam	Unit	Quarry No.-I	Quarry No.-II	Total
LD	Mte	35.08	28.35	63.43
UD	Mte	9.17	6.64	15.81
BUK	Mte	5.10	15.32	20.42
BUKTOP	Mte	0.38	3.12	3.50
BISRAMPUR	Mte	0.13	2.30	2.43
KARKATTA	Mte	0.00	0.36	0.36
TOTAL COAL	Mte	49.87	56.09	105.96

OB	Unit	Quarry No.-I	Quarry No.-II	Total
Top OBR	mm ³	26.08	18.54	44.62
Part Bet LD & UD	mm ³	7.03	4.12	11.15
Part Bet UD & BUK	mm ³	1.70	7.22	8.92
Part Bet BUK & BUK Top	mm ³	3.20	9.54	12.75
Part Bet BUK Top & BISR	mm ³	0.15	2.09	2.24
Part Bet BISR & Kark	mm ³	0.00	0.16	0.16
TOTAL	mm³	38.16	41.69	79.85
Stripping Ratio	m ³ /Te	0.77	0.74	0.75

Boundaries of the Quarriable Block

5.2 This project report has been prepared for the exploitation of Lower Dakra, Upper Dakra, Bukbuka, Bukbuka Top Bistrampur and Karkata seams, by mechanized opencast method. The base of the quarry will be on the floor of Lower Dakra seams. The final stage quarry plan is given in drawing no. RI-3/OCM/462.

The boundaries of the quarriable block are as follows: -(No change has been envisaged in quarry boundary of Piparwar OCP (10MTY) and it is as per the sanctioned PR of Piparwar OCP (6.5MTY))

Northern Boundary

In the north east corner of the mine, the boundary is common with Mangardaha block along fault no. F28-F28 while in the north, fault no. F36-F36 forms the boundary.

Eastern Boundary

The eastern boundary has been fixed in the incrop zone of Lower Dakra seam. A protective embankment between the edge of the quarry and the bank of Damodar river, is proposed to be constructed in this part all along the boundary. The width of barrier will be 150m.

Southern Boundary

The fault no. F13-F13 forms of boundary of the quarriable block. The boundary is common with Ashok U/G block in the southeast part and Ashok Opencast block in the southwest.

Western Boundary

The western boundary has been fixed at a distance of 50m from Banti nalla.

Mining & Geological Characteristics of the Mining Block

5.3. The mining and the geological characteristics of the quarry nos. 1 & 2 are given in table no.5.2.

Reference of Plans

5.3.1 The plan showing the floor contours and isochors of different seams are given in the drawing nos. RI-3/OCM/567 to 571. Similarly the isopachytes of total excavation are given in drawing no. RI-3/OCM/579. The cross section plans are given in drawing no. RI-3/OCM/560 &562.

Table no.5.2

Mining and Geological Characteristics (Quarry I & Quarry II)

Sl. No.	Particulars	Units	Range
I.	COAL		
1.	Seam thickness		
1.1	Karkata	M	4.90 - 5.52
1.2	Bisrampur	M	2.40 - 5.27
1.3	Bukbuka	M	2.25 - 4.32
1.4	Bukbuka	M	9.24 -14.41
1.5	Upper Dakra	M	3.10 - 8.82
1.6	Lower Dakra	M	18.65 - 29.16
2.	Seam Gradient	M	2deg.-5deg
3.	Specific Gravity		
3.1	Bisrampur		1.50
3.2	Bukbuka Top		1.57
3.3	Bukbuka		1.60
3.4	Upper Dakra		1.64
3.5	Lower Dakra		1.62
4.	Drilling Category (Assumed)		VIII
5.	Excav. Category (Assumed)		III

II.	OVERBURDEN		
1.1	Above Karkata seam	M	20M (NNKP. 78)
1.2	Between Bisrampur seam	M	7.92 - 14.07
1.3	Between Bukbuka Top and Bisrampur seam	M	7.80 - 13.21
1.4	Between Bukbuka and Bukbuka Top seam	M	6.16 - 23.05
1.5	Between Upper Dakra and Bukbuka seam	M	0.75 - 23.21
1.6	Between Lower Dakra and Upper Dakra seam	M	1.11 - 13.40
2.	Drilling Category		II-X
3.	Excavation Category		50% Cat. III
4.	OB Volume weight	T/Cum	2.18
III	QUARRY PARAMETERS		
1.	Maximum strike length along the quarry floor	Km	1.1
2.	Maximum length of quarry along dip. At quarry floor	Km	2.85
3.	Maximum depth of quarry	M	110m
4.	Quarry area (at floor)	Sq.Km	4.8

Division of the mining blocks and sequence of opening the deposit.

5.4 In the approved Project Report of 6.5 MTY it was proposed to divide the mining block into two quarries viz quarry no.1 and quarry no.2. This was done due to the occurrence of fault F25-F25 with a throw of 10-70m towards north east. The same division is proposed to be continued in EPR for Piparwar OCP (10 MTY).

5.4.1 METHOD OF WORKING

OPTION - I

The quarry no.1 is proposed to be opened, first by an initial trench in the area of concealed out-crop of Lower Dakra seam. Such a scheme of stripping has the advantage of minimum scope of work for the initial box-cut. The Quarry no.11 is already operational. The location of the exit ramp/central haul road, is

shown in plate no. RI-3/OCM/462. The exit ramp and box cut will be constructed by the outsource Agency for quarry-I.

It is proposed that the quarry no.II which is operational at present will work departmentally and will produce coal @ 6.5 MTY whereas for the initial 8 years, quarry no.I will be outsourced to produce both (coal & OB) by shovel & dumper combination. The coal will be produced @ 3.5 MTY concurrently with quarry-II. After Quarry no. II is exhausted completely, the Quarry no.I will be worked departmentally for its remaining life by the balance equipment of quarry-II @ 3.5 MTY. The additional 2 nos of 10m³ Electric Rope Shovel and 14 nos of RD 85 T rear dumpers are also proposed to be procured as per sanctioned PR.

It is proposed to shift the existing 1002 conveyor by 100m away from quarry-I side, to avoid damage from blasting during quarry-I operation. The same conveyor is proposed to be extended towards incrop side and ultimately connecting to coal preparation plant. Conveyor 1003 is also proposed to be shifted.

For crushing of additional 3.5 MTY coal, a new CHP is being proposed. For transportation of additional 3.5 MTY coal, a warf wall loading facility has been proposed after Piparwar siding is completed. Till such time, present dispatch system is proposed to be continued. It is also proposed to realigned the existing dump hopper, which has been constructed over quarry-I coal bearing area.

The life of the quarry under this option is 16 years.

Layout of Haul Road – Option-I

The alignment of the haul road, within quarry no.I and quarry no.II, is shown in plan no. RI-3/OCM/462. The haul road is proposed to be constructed at a gradient of 6% to ensure efficient movement of dumpers. The width of the haul road would be 40m. The haul road will be constructed on the floor of Lower Dakra seam. In most of the portion, it will involve cutting of the floor,

except some portion, where it is on filled dump material. The RL of haul road at the exit level is 411.6m in quarry no.1.

OPTION -II

In this option, quarry-I is proposed to be opened leaving a safe distance of 100M on either side of the conveyor no. 1003 so that the existing coal transportation system from Quarry-II is not disturbed at all. The existing 1002 conveyor is not proposed to be shifted.

The Quarry no.1 is proposed to be opened in the area of concealed out crop of lower Dakra seam and it will work up to 100m safe barrier from existing 1003 conveyor on its right. This quarry will again be opened leaving a safe barrier of 100m from this conveyor on its dip side after total coal is won from the rise side. Thereafter coal from dipside of 1003 conveyor is proposed to be taken. On completion of the section coal, it is proposed to extract barrier coal sterilized under the 1003 conveyor again from the rise side.

It is proposed that the quarry no.II which is operational at present will work departmentally and will produce coal @ 6.5 MTY whereas for the initial 8 years, quarry no.I will be outsourced to produce both (coal & OB). The coal will be produced @ 3.5 MTY concurrently with quarry-II. After Quarry no. II is exhausted completely, the Quarry no.I will be worked departmentally for its remaining life by the balance equipment of quarry-II @ 3.5 MTY. The additional 2 nos of 10m³ Electric Rope Shovel and 14 nos of RD 85 T rear dumpers are also proposed to be procured as per sanctioned PR.

4/ Coal is proposed to be won by deploying such technology to produce -100mm coal or by surface miner or equivalent technology which will be cheaper techno-economically.

For crushing of additional 3.5 MTY coal, no new CHP is being proposed, as - 100 mm size coal is envisaged to be produced by suitable technology. For transportation of additional 3.5 MTY coal, present dispatch system is

proposed to be continued. It is also proposed to realigned the existing dump hopper, which has been constructed over quarry-I coal bearing area.

From 9th year onwards, it is proposed to work quarry-I departmentally. The life of the quarry under this option is 16 years.

Layout of Haul Road (Option-II)

The alignment of the haul road for Quarry-I will be the same as suggested in option-I except for a few ramps to be made as and when required to transport OB from this Quarry when it will work leaving a safe distance of 100m from existing conveyor No. 1003.

OPTION -III

In this option, quarry-I is proposed to be opened leaving a safe distance of 100M on the dip side of the conveyor no. 1003 so that the existing coal transportation system from Quarry-II is not disturbed at all. The existing 1002 conveyor is not proposed to be shifted. Coal from dip side of 1003 conveyor is proposed to be taken completely.

Thereafter coal it is proposed to open the quarry-I from the incrop side and work towards dip. After 9 years, the quarry-II will be exhausted and conveyor 1003 will not be required. So the sterilised coal below the conveyor-1003 is also proposed to be extracted in continuation with the workings..

It is proposed that the quarry no II which is operational at present will work mostly departmentally and partially outsourced (7.0mty of Coal & 7.99Mcum of OBR, instead of procuring 2nos of 10Cum E.R Shovel & 14nos of RD 85Te Dumpers as per sanctioned PR) and will produce coal @ 6.5 MTY, whereas quarry no.I will be outsourced to produce both (coal & OB) for its total life. The coal will be produced @ 3.5 MTY concurrently with quarry-II. After Quarry no. II is exhausted completely, the Quarry no.I will continue to work for its remaining life by outsourcing as proposed in the calendar plan.

Coal is proposed to be won by deploying such technology to produce -100mm. coal or by surface miner or equivalent technology which will be cheaper techno-economically.

For crushing of additional 3.5 MTY coal, no new CHP is being proposed, as - 100 mm size coal is envisaged to be produced by suitable technology. For transportation of additional 3.5 MTY coal, present dispatch system is proposed to be continued. It is also proposed to realigned the existing dump hopper, which has been constructed over quarry-I coal bearing area.

The life of the quarry under this option is 13 years. //

A suitable alignment of haul road is proposed to be made by outsourced agency along with a few ramps for transportation of coal and OB.

The surplus manpower and the HEMM etc. of Piparwar OCP are proposed to be utilised gainfully in the other mines of CCL.

Mining System

5.5 Option-I

5.5.1 Considering the mining conditions of (a) multiple seams viz. Lower Dakra, Upper Dakra, Bukbuka, Bukbuka Top Bisrampur and Karkata (b) gradient of the seams being 1.5-5deg, shovel dumper combination has been considered for the mining of seams.

In quarry-II, in view of the multiple seams and the intervening partings, it is proposed that coal seams i.e. Lower Dakra to Karkata would be worked by both Elect. Rope Shovel and Hyd. Shovel. The Lower Dakra seam is being worked by 25 Cu.m Elect. Rope Shovel along with inpit crusher and conveyor transport system, which will continue till the total life of Quarry-II. For working Upper seams, parting and Top OB, 10 Cu.m Elect. Rope Shovel and 6.75 Cu.m Hyd. Shovel will be put in conjunction with RD 85T Rear Dumpers Dozer of 600 HP, 400HP and 320 HP are working in coal bench, OB bench and on dump site as per their requirement which will continue.

The Quarry No.I is proposed to be outsourced for initial 8years working with shovel-Dumper combination. After Quarry-II is exhausted, the equipment will be shifted to Quarry No.I so that it will work departmentally for its remaining life.

5.5.2 Option-II & III

Considering the mining conditions of (a) multiple seams viz. Lower Dakra, Upper Dakra, Bukbuka, Bukbuka Top Bistrampur and Karkata (b) gradient of the seams being 1.5-5deg, quarry-II is proposed to continue as per sanctioned Project report.

In quarry-I, coal seams are proposed to be worked by Surface Miner or by deploying such equipment with technology to produce (-) 100mm coal size so that crushers are not required and the system is techno-economically better than shovel dumper combination. The working OB benches are proposed to be 40m wide and non-working benches are proposed to be 25m wide. Bench height is proposed to be 10m. Working coal benches are proposed to be 40m wide and 10m height and Non-Working coal benches are proposed to be 25m wide and 10m height.

In Option-II, after 9th year of quarry operation, the quarry is proposed to be worked departmentally for its remaining life using shovel-dumper combination. It is proposed that benches will be made suitable for 10 cum shovel and RD 85 Te. Rear Dumpers.

In Option-III, quarry I is proposed to be outsourced for its total life. OB is envisaged to be removed using shovel-dumper combination. The working OB benches are proposed to be 40m wide and non-working benches are proposed to be 25m wide. Bench height is proposed to be 10m. Working coal benches are proposed to be 40m wide and 10m height and Non-Working coal benches are proposed to be 25m wide and 10m height.

Drilling & Blasting Operations

5.5.3 Option-I

Physico-mechanical properties of coal & OB rocks indicate that the Drilling and blasting operations are considered necessary before any excavation is done. The drilling and blasting operations will be carried on as per prevailing practice in the Piparwar OCP.

Option-II

5.5.3.1 In quarry I, It is proposed that drilling and blasting upto 8 years is to be outsourced. After that, drilling & blasting will be done departmentally for its remaining life as per prevailing practice in the Piparwar OCP.

Option-III

5.5.3.2 In Quarry I, It is proposed that drilling and blasting, for its total life, will be outsourced.

Type of Drilling Equipment

5.6 For the conditions at Piparwar Opencast Mine, it was proposed to deploy RBH Elect. Drills of 250mm dia and 160mm dia for drilling in OB and coal benches respectively. Wagon drills of 100mm dia will be put in thin coal and OB Benches.

Elements of drilling and Blasting in Coal & OB

5.6.1 The pattern of drilling and blasting in coal and OB bench would be done as per prevailing practice in the Piparwar OCP.

For drilling OB, 4 nos. of RBH elect. Drills of 250mm dia have been engaged.

For drilling in coal, 2 nos. of RBH elect. Drills of 160mm dia have been put.

Calendar Programme of Excavation

5.5.3 Calendar plan of mining operations have been drawn up separately for the two quarries namely Quarry Nos I and II and for different options.

The quantity of coal & OB has been determined by cross-section method as well as by isochore and isopachytes method of calculation.

OPTION - 1

SUMMRISED CALENDAR PROGRAMME
QUARRY NO. 1

COAL	OUTSOURCED																		DEPARTMENTAL												GRAND TOTAL	
	2007-08		2008-09		2009-10		2010-11		2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		2020-21		2021-22			DEPARTM ENTAL TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
LD	0.00	3.41	3.16	2.96	2.73	2.64	2.61	2.60	2.45	2.38	1.99	2.00	2.00	1.91	1.78	0.44	32.99														12.50	
UD	0.00	0.00	0.34	0.54	0.77	0.88	0.89	0.90	0.85	0.81	0.80	0.61	0.62	0.60	0.58	0.14	5.21													3.96		
BUK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.31	0.90	0.85	0.82	0.85	0.69	0.22	0.21													4.69		
BUKTOP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.10	0.16	0.04	0.00													0.38		
BISRAMPUR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00													0.13		
KARAKATTA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00													0.00		
TOTAL	0.00	3.58	3.50	3.50	3.50	3.50	3.50	3.50	3.51	3.50	3.50	3.50	3.50	3.50	3.50	0.85	28.01													49.27		
OBR																																
Top OBR	mm ³	0.00	3.42	2.94	2.90	2.90	2.90	2.90	1.72	1.72	1.52	1.48	1.39	1.26	1.15	0.28	17.29													8.79		
Int Bet LD & UD	mm ³	0.00	0.16	0.37	0.53	0.41	0.38	0.41	0.74	0.74	0.64	0.57	0.40	0.35	0.29	0.07	0.00													0.00		
Int Bet UD & BUK	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.43	0.36	0.19	0.15	0.11	0.03	0.20													3.04		
Part Bet BUK & BUK Top	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.09	0.09	0.15	0.26	0.00													1.48		
Part Bet BUK Top & Blurr	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.02	0.00													0.15		
Part Bet Blurr & Mark	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00													0.00		
TOTAL	mm ³	0.00	3.58	3.01	2.97	2.92	2.90	2.90	2.44	2.44	2.64	2.61	2.68	2.71	2.78	0.68	21.48													46.87		
Shipping Ratio	mm ³		1.02	0.86	0.74	0.89	0.67	0.70	0.70	0.70	0.74	0.75	0.76	0.77	0.79	0.79	0.77													0.76		

OPTION - I

QUARRY No. - II

DEPARTMENTAL

COAL		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
		1	2	3	4	5	6	7	8	9	
LD	Mte	3.52	3.49	3.49	3.45	3.32	3.01	3.07	2.98	1.92	28.35
UD	Mte	0.90	0.98	0.86	0.82	0.80	0.64	0.49	0.69	0.46	6.64
BUK	Mte	1.98	1.92	1.91	1.90	1.87	1.48	1.65	1.61	1.00	15.32
BUKTOP	Mte	0.00	0.11	0.24	0.29	0.35	0.52	0.57	0.67	0.37	3.12
BISRAMPUR	Mte	0.00	0.00	0.00	0.04	0.16	0.85	0.72	0.38	0.15	2.30
KARKATTA	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.36
TOTAL	Mte	6.50	4.09	56.09							
OBR											
Top OBR	mm3	1.74	2.20	1.96	1.91	1.94	2.42	2.38	2.36	1.63	18.54
Part Bet LD & UD	mm3	0.48	0.46	0.44	0.44	0.48	0.49	0.46	0.53	0.32	4.12
Part Bet UD & BUK	mm3	1.22	1.18	1.15	1.01	0.57	0.81	0.79	0.31	0.18	7.22
Part Bet BUK & BUK Top	mm3	0.00	0.11	0.56	0.75	0.94	1.18	1.50	2.83	1.67	9.54
Part Bet BUK Top & Biser	mm3	0.00	0.00	0.00	0.05	0.22	0.29	0.62	0.47	0.45	2.09
Part Bet Biser & Kark	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.09	0.16
TOTAL	mm3	3.44	3.97	4.12	4.16	4.15	5.19	5.75	6.58	4.33	41.69
Stripping Ratio	mm3/t	0.53	0.61	0.63	0.64	0.64	0.80	0.88	1.01	1.06	0.74

OPTION - I
SUMMRISED CALENDAR PROGRAMME
 QUARRY - I & II

	2005-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	TOTAL
CRP (Quarry-I)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
mm3	0.00	3.56	3.01	2.57	2.42	2.36	2.44	2.45	2.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CRP (Departmental)		3.44	4.12	4.16	4.15	5.19	5.75	6.58	4.33	2.84	2.89	2.81	2.69	2.71	2.78	0.68	21.48
mm3	3.44	7.56	7.12	6.73	6.57	7.55	8.18	9.03	6.89	2.64	2.59	2.61	2.65	2.71	2.78	0.68	58.36
TOTAL																	79.85

COAL (Quarry-II)		0.00	3.50	3.50	3.50	3.50	3.50	3.50	3.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.01
mt		6.50	6.50	6.50	6.50	6.50	6.50	6.50	4.09	3.50	3.50	3.50	3.50	3.50	3.50	0.86	77.95
COAL (Departmental)		6.50	10.00	10.00	10.00	10.00	10.00	10.00	7.60	3.50	3.00	3.50	3.50	3.50	3.50	0.86	105.96
mt																	

OPTION - II

QUARRY No. - II

		DEPARTMENTAL										TOTAL
COAL		2005-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	9	
		1	2	3	4	5	6	7	8			
LD	Mte	3.62	3.49	3.49	3.45	3.32	3.01	3.07	2.98	1.92		28.35
UD	Mte	0.80	0.98	0.86	0.82	0.80	0.64	0.49	0.69	0.46		6.64
BUK	Mte	1.98	1.92	1.91	1.90	1.87	1.48	1.65	1.61	1.00		15.32
BUKTOP	Mte	0.00	0.11	0.24	0.29	0.35	0.52	0.57	0.67	0.37		3.12
BISRAMPUR	Mte	0.00	0.00	0.00	0.04	0.16	0.85	0.72	0.38	0.15		2.30
KARKATTA	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18		0.36
TOTAL	Mte	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	4.09		56.09
OBR												
Top OBR	mm3	1.74	2.20	1.96	1.91	1.94	2.42	2.38	2.36	1.63		18.54
Part Bet LD & UD	mm3	0.48	0.48	0.44	0.44	0.48	0.49	0.46	0.53	0.32		4.12
Part Bet UD & BUK	mm3	1.22	1.18	1.15	1.01	0.57	0.81	0.79	0.31	0.18		7.22
Part Bet BUK & BUK Top	mm3	0.00	0.11	0.56	0.75	0.94	1.18	1.50	2.83	1.67		9.54
Part Bet BUK Top & BISR	mm3	0.00	0.00	0.00	0.05	0.22	0.29	0.62	0.47	0.45		2.09
Part Bet BISR & Kark	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.09		0.16
TOTAL	mm3	3.44	3.97	4.12	4.16	4.15	5.19	5.75	6.58	4.33		41.69
Stripping Ratio	mm3/t	0.53	0.61	0.63	0.64	0.64	0.80	0.88	1.01	1.06		0.74

OPTION - II
SUMMRISED CALENDAR PROGRAMME
 QUARRY - I & II

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
DBR (Outsourced)	0.00	3.46	2.75	2.40	2.36	2.45	2.49	2.65	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.19
Cost (Departmental)	3.44	3.97	4.12	4.16	4.15	5.19	5.75	6.58	4.33	2.59	2.62	2.66	2.74	2.78	2.87	0.70	58.65
DBR (TOTAL)	3.44	7.43	6.86	6.56	6.51	7.64	8.24	9.23	6.97	2.59	2.62	2.66	2.74	2.78	2.87	0.70	79.85
COAL (Outsourced)	0.00	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.01
COAL (Departmental)	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	4.09	3.50	3.50	3.50	3.50	3.50	3.50	0.96	77.95
COAL (Total)	6.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	7.60	3.50	3.50	3.50	3.50	3.50	3.50	0.96	105.96

OPTION - III
CALENDAR PROGRAMME OF EXCAVATION

OUTSOURCED

QUARRY NO. - I

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	TOTAL
	2	3	4	5	6	7	8	9	10	11	12	13	
LD	Mte	2.96	2.71	2.73	2.63	2.60	2.45	2.41	2.86	2.55	3.46	4.36	35.08
UD	Mte	0.54	0.79	0.77	0.67	0.50	0.85	0.83	0.88	0.97	0.67	0.10	9.17
BUK	Mte	0.00	0.00	0.00	0.00	0.00	0.20	0.26	1.18	1.24	0.69	0.00	5.10
BUKTOP	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.16	0.12	0.00	0.38
BISRAMPUR	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.00	0.13
KARKATTA	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	Mte	3.50	3.50	3.50	3.50	3.50	3.50	5.91	5.00	5.00	5.00	4.46	49.87
Top OBR	mm3	3.15	2.17	1.33	1.53	1.70	1.71	1.70	2.56	2.17	1.63	3.49	26.08
Part Bet LD & UD	mm3	0.29	0.56	0.57	0.70	0.74	0.73	0.71	0.62	0.89	0.59	0.18	7.03
Part Bet UD & BUK	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.66	0.60	0.32	0.00	1.70
Part Bet BUK & BUK Top	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	0.00	3.20
Part Bet BUK Top & Blsr	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.07	0.00	0.15
Part Bet Blsr & Kark	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	mm3	3.43	2.73	1.90	2.33	2.45	2.45	2.44	3.85	3.66	4.56	3.67	38.16
Stripping Ratio	mm3/t	0.95	0.78	0.54	0.67	0.70	0.70	0.65	0.73	0.91	0.94	0.82	0.77

OPTION - III
CALENDAR PROGRAMME OF EXCAVATION
 DEPARTMENTAL

QUARRY NO. - II

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
	1	2	3	4	5	6	7	8	9	
LD	3.87	3.49	3.49	3.45	3.32	3.01	3.07	2.98	1.92	28.36
UD	0.25	0.96	0.86	0.22	0.50	0.64	0.49	0.65	0.46	6.54
BUK	1.48	0.90	1.54	1.88	1.87	1.48	1.55	1.61	1.00	13.39
BUKTOP	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.37	0.37
BISRAMPUR	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.15	0.15
KARKATTA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18
TOTAL COAL	6.01	6.37	6.89	6.12	5.98	5.13	5.21	5.27	4.09	46.09
Top OBR	1.74	2.20	1.96	1.91	1.94	2.42	2.36	2.35	1.53	18.54
Part Bet LD & UD	0.46	0.48	0.44	0.44	0.48	0.49	0.46	0.53	0.32	4.12
Part Bet UD & BUK	1.22	1.16	1.15	1.01	0.97	0.81	0.79	0.31	0.18	7.22
Part Bet BUK & BUK Top	0.00	0.00	0.00	0.00	0.32	0.05	0.43	0.50	1.67	3.28
Part Bet BUK Top & Blsr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45
Part Bet Blsr & Kark	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09
TOTAL OBR	3.44	3.85	3.56	3.36	3.31	3.78	4.06	4.01	4.33	31.76
Striping P-iso	0.67	0.72	0.60	0.55	0.50	0.74	0.76	0.76	1.06	6.69

OPTION - III
CALENDAR PROGRAMME OF EXCAVATION
 OUTSOURCED

	2006-07	2007-08	2008-09	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
LD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BUK	0.48	1.02	0.05	0.00	0.00	0.00	0.00	0.00	1.83
BUKTOP	0.00	0.11	0.24	0.35	0.52	0.57	0.67	0.00	2.78
BISKAMPUR	0.00	0.00	0.04	0.18	0.65	0.72	0.36	0.00	2.15
KARKATTA	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.18
TOTAL	0.48	1.13	0.38	0.51	1.37	1.29	1.23	0.00	7.00
Top OBR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part Bat LD & UD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part Bat UD & BUK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part Bat BUK & BUK Top	0.00	0.11	0.75	0.62	1.12	1.07	2.03	0.00	6.26
Part Bat BUK Top & BUK	0.00	0.00	0.05	0.22	0.29	0.62	0.47	0.00	1.65
Part Bat Bar & Hook	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.08
TOTAL	0.00	0.11	0.80	0.84	1.41	1.68	2.68	0.00	7.99
Striping Facia	0.00	0.10	2.13	1.63	1.03	1.32	2.10	0.00	1.14

OPTION - III
CALENDAR PROGRAMME OF EXCAVATION FOR Or. II
(DEPT & OUT-SOURCED)

		. QUARRY NO. - II									
		2005-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
ID		1	2	3	4	5	6	7	8	9	
	Mto	3.62	3.48	3.49	3.45	3.32	3.31	3.07	2.98	1.92	28.36
	Mto	0.50	0.56	0.86	0.82	0.80	0.64	0.49	0.69	0.46	6.54
	Mto	1.96	1.92	1.81	1.99	1.87	1.88	1.65	1.61	1.00	15.32
	Mto	0.00	0.11	0.24	0.29	0.35	0.52	0.57	0.67	0.37	3.12
	Mto	0.00	0.00	0.00	0.04	0.16	0.25	0.72	0.38	0.15	2.30
	Mto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.36
	Mto	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	4.08	56.00
	mm3	1.74	2.20	1.96	1.91	1.94	2.42	2.38	2.36	1.63	18.54
	mm3	0.48	0.48	0.44	0.44	0.48	0.49	0.46	0.53	0.32	4.12
	mm3	1.22	1.18	1.15	1.01	0.57	0.81	0.79	0.31	0.18	7.22
	mm3	0.00	0.11	0.56	0.75	0.84	1.18	1.50	2.83	1.87	9.64
	mm3	0.00	0.00	0.00	0.05	0.22	0.29	0.62	0.47	0.45	2.09
	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.16
	mm3	3.44	3.97	4.12	4.18	4.15	5.19	5.75	6.58	4.33	41.65
	mm3/T	0.53	0.51	0.63	0.64	0.64	0.80	0.88	1.01	1.06	0.74
	Slipping Ratio										

OPTION - III
 SUMMRISED CALENDAR PROGRAMME
 DEPARTMENTAL
 QUARRY NO. - I & II

LD	2008-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Mts	3.62	3.48	3.49	3.45	3.32	3.07	3.07	2.98	1.92	0.00	0.00	0.00	0.00	0.00
Mts	0.50	0.58	0.66	0.62	0.90	0.64	0.49	0.69	0.45	0.00	0.00	0.00	0.00	28.32
BUK	1.49	0.90	1.34	1.85	1.87	1.48	1.65	1.61	1.00	0.00	0.00	0.00	0.00	6.64
BUKTOP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	13.39
BISRAMPUR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.37
KARKATTA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.15
TOTAL COAL	6.01	5.37	5.89	6.12	5.99	5.13	5.21	5.27	4.09	0.00	0.00	0.00	0.00	0.18
Top Ovr	1.74	2.20	1.96	1.91	1.94	2.42	2.38	2.36	1.63	0.00	0.00	0.00	0.00	49.69
Part Bel LD & UD	0.48	0.48	0.44	0.44	0.48	0.49	0.46	0.53	0.32	0.00	0.00	0.00	0.00	18.54
Part Bel UD & BUK	1.22	1.16	1.15	1.01	0.57	0.81	0.79	0.31	0.18	0.00	0.00	0.00	0.00	4.12
Part Bel BUK & BUK Top	0.00	0.00	0.00	0.00	0.32	0.06	0.43	0.80	1.67	0.00	0.00	0.00	0.00	7.22
Part Bel BUK Top & Bel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	3.28
Part Bel Ellar & Kark	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.45
TOTAL OVR	3.44	3.86	3.56	3.35	3.31	3.78	4.05	4.01	4.33	0.00	0.00	0.00	0.00	0.09
Shipping Ratio	0.57	0.72	0.60	0.55	0.55	0.74	0.78	0.76	1.06	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	33.70
														0.69

OPTION - III
SUMMIRISED CALENDAR PROGRAMME
OUTSOURCED
QUARRY NO. - I & II

	2005-07	2007-05	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	
LD	Mt/c	2.95	2.73	2.63	2.63	2.63	2.45	2.41	3.36	2.85	2.55	3.45	4.36	
UD	Mt/c	0.54	0.77	0.87	0.90	0.90	0.85	0.83	1.02	0.88	0.97	0.67	0.10	35.08
BUK	Mt/c	0.49	0.37	0.05	0.00	0.00	0.20	0.26	1.53	1.18	1.24	0.65	0.00	9.17
BUKTOP	Mt/c	0.00	0.11	0.24	0.35	0.52	0.57	0.67	0.00	0.06	0.18	0.12	0.00	7.03
BIRAMPUR	Mt/c	0.00	0.00	0.04	0.16	0.85	0.72	0.38	0.00	0.00	0.07	0.06	0.00	3.13
KARAKATTA	Mt/c	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	2.28
TOTAL	Mt/c	0.49	4.63	4.11	3.88	4.01	4.87	4.73	5.91	5.00	5.00	5.00	6.00	56.87
Top COR	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part Bot LD & UD	mm ³	0.00	3.15	2.17	1.33	1.63	1.70	1.70	2.56	2.17	1.83	2.63	3.49	26.08
Part Bot UD & BUK	mm ³	0.00	0.29	0.56	0.57	0.70	0.74	0.71	0.62	0.89	0.59	0.44	0.18	7.03
Part Bot BUK & BUK Top	mm ³	0.00	0.11	0.56	0.75	0.62	1.12	2.06	0.66	0.60	0.32	0.08	0.00	7.96
Part Bot BUK Top & BUK	mm ³	0.00	0.00	0.02	0.05	0.22	0.29	0.62	0.47	0.00	1.73	1.47	0.00	4.85
Part Bot BUK Top & BUK	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.08	0.07	0.00	0.23
TOTAL	mm ³	0.00	3.55	3.29	2.70	3.17	3.85	4.14	3.85	3.88	4.56	4.69	3.67	46.15
Shipping Ratio	mm ³ /t	0.00	0.77	0.80	0.70	0.79	0.79	1.06	0.65	0.73	0.91	0.94	0.82	0.81

PIPARWAR OCP (10MTY)
QUARRY NO.1

PARTICULARS	Unit	SECTORS										TOTAL
		9	10	11	12	13	14	15	16			
LD	Mt	4.91	5.49	4.90	4.84	4.53	3.70	3.72	2.99	16	35.0	
UD	Mt	0.09	1.01	1.50	1.57	1.57	1.12	1.14	0.98	9.1		
BUK	Mt	0.00	0.00	0.00	0.00	0.39	1.56	1.53	1.50	5.1		
BUKTOP	Mt	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.27	0.3		
BISRAMPUR	Mt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.1		
KARKATTA	Mt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0		
TOTAL COAL	Mt	5.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50	49.87		
Top OBR	mm ³	4.89	3.80	3.72	3.17	3.18	2.62	2.58	1.92	26.0		
Part Bet LD & UD	mm ³	0.23	0.98	0.66	1.36	1.36	1.19	0.74	0.48	7.0		
Part Bet UD & BUK	mm ³	0.00	0.00	0.00	0.00	0.37	0.79	0.34	0.18	1.7		
Part Bet BUK & BUK Top	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	1.28	1.92	3.2		
Part Bet BUK Top & Bisr	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.1		
Part Bet Bisr & Kark	mm ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0		
TOTAL OBR	mm ³	5.12	4.78	4.38	4.55	4.92	4.81	4.94	4.66	38.16		
Shipping Ratio	mm ³ /t	1.02	0.74	0.67	0.70	0.76	0.74	0.76	0.79	0.7		

PIPARWAR OCP (10MTY)
QUARRY NO. II

PARTICULARS	UNIT	SECTORS								TOTAL
		1	2	3	4	5	6	7	8	
LD	Mte	3.62	4.29	5.37	5.11	2.54	2.52	2.39	2.51	28.35
UD	Mte	0.90	1.21	1.27	1.23	0.50	0.38	0.55	0.60	6.64
BUK	Mte	1.98	2.36	2.94	2.87	1.16	1.40	1.30	1.31	15.32
BUKTOP	Mte	0.00	0.14	0.42	0.54	0.53	0.45	0.56	0.48	3.12
BISRAMPUR	Mte	0.00	0.00	0.00	0.25	1.02	0.50	0.33	0.20	2.30
KARKATTA	Mte	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.24	0.36
TOTAL	Mte	6.50	8.00	10.00	10.00	5.75	5.26	5.25	5.34	56.09
Top OBR	mm3	1.74	2.70	2.92	2.98	2.33	1.87	1.86	2.13	18.54
Part Bet LD & UD	mm3	0.48	0.59	0.66	0.74	0.43	0.37	0.44	0.42	4.12
Part Bet UD & BUK	mm3	1.22	1.45	1.75	0.87	0.82	0.61	0.26	0.24	7.22
Part Bet BUK & BUK Top	mm3	0.00	0.14	1.07	1.45	1.13	1.26	2.32	2.18	9.54
Part Bet BUK Top & Blsr	mm3	0.00	0.00	0.00	0.33	0.28	0.56	0.34	0.58	2.09
Part Bet Blsr & Kark.	mm3	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.11	0.16
TOTAL	mm3	3.44	4.89	6.40	6.38	5.00	4.66	5.26	5.66	41.69
Stripping Ratio	mm3/t	0.53	0.61	0.64	0.64	0.87	0.89	1.00	1.06	0.74

Requirement of Main HEMM

Option-I & II :

5.6 The requirement of main HEMM is dependent upon its annual productivity, annual work load (determined as per calendar programme of excavation) and considering also the physical location of the equipment within the operating section and the planned cycle of repair and maintenance.

The number of existing main HEMM is given in the list of main HEMM given in Table No5.3 for the Quarry No. II. For Quarry No.I, No HEMM has been proposed for initial 8 years as it is proposed to be outsourced till then and after that, quarry no.I is proposed to be worked departmentally by using the equipments being used in quarry-II.

Option-III :

As quarry no.I is proposed to be outsourced for its total life. No HEMM will be required. Only Supervisory manpower and other essential manpower has been proposed for this quarry. The remaining manpower and balance life of HEMM will be utilized gainfully in other OCPs of CCL after 9th year of quarry operation.

Population of Existing Equipment

OPTION-I & II

Table - 5.3

Sl No	Particulars	Sanctioned		Existing as on 31.3.05
		Size /Cap	Total	
A Overburden				
1	Electric Rope Shovel	10 Cum	1+2*	1
2	Hydraulic shovel	6.75/10Cum	1	1
3	Rear Dumper	120 / 85 T	19+6*	19
4	RBH Drill	250/160mm	2	2
5	Dozer	600 HP	1	2
6	Dozer	410 HP		1
B Coal				
1	Electric Rope Shovel	10 Cum	1	1
2	Electric Rope Shovel *	23/25 Cum	1	1
3	Rear Dumper	50 / 85 T	5+7*	5
4	Dozer	600 HP	1	1
5	Dozer	400HP	1	1
6	RBH Drill	250mm	3	4
C Common				
1	Wheel Dozer	460		1
2	Water Sprinkler	28KL		2
3	EOT Crane	80 T	1	1
4	EOT Crane	35/40 T	1	1
5	EOT Crane	10 T	1	2
6	EOT Crane	5T		2
7	EOT Crane	<5 T		2
8	Hydraulic shovel	5.5Cum	1	
9	Hydraulic Backhoe	1.5Cum	1	
10	Fork lift			
11	Dozer	230 HP	1	
C 1 Haul Road maintenance				
1	Pay Loader	500KW	2	2
2	Motor Grader	200KW	2	1
3	Scraper Compactor	230KW	1	2
4	Pay Loader	120KW	1	
C 2 Reclamation				
1	Dozer	400HP	1	1
2	Dozer	320 HP	1	1

Note

- a) 2nos of 10Cum Elect Rope Shovel & 14nos of RD85Te Dumper were proposed to be deployed in 14/15th yr of Quarry operation & these were assumed to be financed through the retained earning
 b) 1no. Of 25Cum Elect Rope shovel will not be required after 9th yr of quarry operation .

OPTION-III

Scanned

Existing as on 31.3.05

Sl No	Particulars	Size / Cap	Total
A Overburden			
1	Electric Rope Shovel	10 Cum	1+2*
2	Hydraulic shovel	6.75/10Cum	1
3	Rear Dumper	120 / 85 T	19+6*
4	RBH Drill	250/150mm	2
5	Dozer	600 HP	1
6	Dozer	410 HP	2
B Coal			
1	Electric Rope Shovel	10 Cum	1
2	Electric Rope Shovel	23/25 Cum	1
3	Hydraulic shovel		
4	Rear Dumper	50 / 85 T	5+7*
5	Dozer	600 HP	1
6	Dozer	400HP	1
7	RBH Drill	250mm	1
C Common			
1	Wheel Dozer	460	1
2	Water Sprinkler	28KL	2
3	EOT Crane	80 T	1
4	EOT Crane	35/40 T	1
5	EOT Crane	10 T	1
6	EOT Crane	5T	2
7	EOT Crane	<5 T	2
8	Hydraulic shovel	5.5Cum	1
9	Hydraulic Backhoe	1.5Cum	1
10	Fork lift		
11	Dozer	230 HP	1
C 1 Haul Road maintenance			
1	Pav Loader	500KW	2
2	Motor Grader	200KW	2
3	Scraper Compactor	230KW	1
4	Pav Loader	120KW	1
C 2 Reclamation			
1	Dozer	400HP	1
2	Dozer	400 HP	1

ANNUAL PRODUCTIVITY

The main mining and transport equipment will be operating on 3 shifts/day and 6 days/week operating schedule. The number of operating days per year have been adopted as 330.

Based on the above operating condition, the estimated annual productivity of proposed excavators as per CMPDIL norms is given below in table no.5.8.

Table 5.8

Equipment Combination	For 330 Days Annual Productivity (Mcm)	
	Coal	OBR
10Cum Elect. Rope with 85Te Dumper	2.08	1.97
6.75 Hyd RS with 85Te Dumper	1.84	1.75

Annual Productivity of Rear Dumpers

The requirement of rear dumpers for the transport of OB and coal is based upon (i) annual work load, as determined by the calendar plan of excavation (ii) annual productivity of rear dumpers (iii) haul distance from faces to the receiving pit for coal and from the faces to the spoil dump for OB.

The productivity of rear dumper of 85T, working on 3 shifts per day, and on 6 days, per week, schedule in conjunction with 10 Cu.m Elect. Rope Shovel and 6.75 Cu.m Hyd. Shovel for both coal and OB is given below for the leads of 0.5 to 4 Km is given in Table no. 5.9.

Table - 5.9

Area Of Operation	Equipment Combination	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00
OB	10.0 Cum ERS+85T	0.41	0.32	0.27	0.24	0.22	0.20	0.18	0.17
	6.75 Cum HS+85T	0.42	0.34	0.29	0.25	0.23	0.21	0.20	0.18
Coal	10.0 Cum ERS+85T	0.43	0.34	0.28	0.25	0.23	0.21	0.19	0.18
	6.75 Cum HS+85T	0.44	0.35	0.30	0.26	0.24	0.22	0.20	0.19

6.1 O.B Dump- Option-I

Almost all OB from Piparwar was proposed to be dumped internally except for some volume, which was to be put externally as flood protecting embankment. The dumping is proposed to be done as per reclamation Plan of the approved Project Report. The maximum RL of reclaimed area was envisaged as +420m and minimum RL as +390m. The OB at present is being dumped internally in Quarry No.II accordingly and back filling of OB dump in Quarry No.II and Quarry No.I will continue as per that reclamation plan. When Quarry No.I will be opened for initial three years OB dump will be done in Quarry No.II and after that back filling of OB dump will be started in Quarry No.I it self, as shown in **year wise placement and extent of OB dump with In quarry** (Ref. Plan No. RI-3/ OCM/299)

6.1.1. OB Dump – Option-II

As the Quarry-1 is proposed to be opened leaving a safe barrier of 100 m on both left and right side of existing conveyor 1003, the dumping space will not be available for 3-4 years in Quarry No.1 so more OB will be dumped in the voids of Quarry-II and some space will be left without dumping in Quarry No.1 as shown in **year wise placement and extent of ob dump within quarry** (Ref. Plan No. RI-3/ OCM/300).

Option-III :

6.1.2 The dumping is proposed to be done in the available voids of quarry II and quarry- I suitably so that total dump is accommodated in quarry voids only.