Regd. Office :
SEEPAT ROAD,
P.O. : SECL
BILASPUR (C. G.)
PIN : 495 006

Under Jurisidiction of Bilaspur Court Only

साउथ ईस्टर्न कोलफील्ड्स् लिमिटेड
South Eastern Coalfields Limited.
(कोल इण्डिया का एक अंश/ A subsidiary of Coal India Ltd.)

GRAM : GEVRA COAL
S.T.D. : 07815
TELE : 275430 (O)
: 275030 (O)
: 275432 (R)
: 275032 (R)
FAX : 07815 275434

पो० आ० : गेवरा प्रोजेक्ट
जिला : कोरबा (छत्तीसगढ़)
पिन : 495 452

कार्यालय : मुख्य महाप्रबन्धक, गेवरा क्षेत्र
OFFICE OF THE
CHIEF GENERAL MANAGER
GEVRA AREA.

P. O. : GEVRA PROJECT
Distt. : Korba (C. G.) 495 452.

Ref. No. : SECL/CGM/GA/07/06/ 63

Date : 31/7/10

The General Manager
SECL, GEVRA AREA.

The Sr. Manager (P&P)
SECL, GEVRA AREA.

Dear Sir,

Sub : Project Report for 35 MTY – Gevra Expn.

...

Enclosed, please find herewith a copy of Project Report of Gevra Expansion (25 – 35 MTY), duly approved on 01-06-2010 and communicated under cover of letter No: 1405 dated 9/10-7-2010 by Regional Director, CMPDI Limited, RI-V, Bilaspur together with geological plans containing 22 (twenty two) plates for taking needful action at your end.

Yours faithfully

CHIEF GENERAL MANAGER
GEVRA AREA

E/aa

Cc to: 1. The GM (Optn), Gevra Area together with copy of said report
Cc to: 2. The GM(Exc), Gevra Area -do-
Cc to: 3. The GM(E&M), Gevra Area -do-
Cc to: 4. The GM(Civil), Gevra Area -do-
Cc to: 5. The Dy.GM(Finance), Gevra -do-

सेंट्रल माइन प्लानिंग & डिजाइन इंस्टिट्यूट लिमिटेड
क्षेत्रिय संस्थान – 5, सीपत रोड, बिलासपुर (छत्तीसगढ) – 495 006

पत्र सँख्या – सी.एम.पी.डी.आई./आर.आई.-5/ओसी/गेवरा/2010/1405 दिनाँक:09/07/2010

परिपत्र

गेवरा ओपनकास्ट (25-35 मि.ट.), गेवरा क्षेत्र की अनुमोदित परियोजना प्रतिवेदन की प्रतियाँ आपके उचित कार्यवाही हेतु संलग्न कर प्रेषित की जा रही हैं ।

भवदीय

(आर.एन. बिस्वास)
क्षेत्रीय निदेशक

संलग्न : उपरोक्तानुसार

प्रतिलिपि :

अ. एस.ई.सी.एल., बिलासपुर

1 मुख्य महाप्रबन्धक (उत्पादन)
2. मुख्य महाप्रबन्धक (उत्खनन)
3. मुख्य महाप्रबन्धक (वि. एवं यां)
4. मुख्य महाप्रबन्धक (सिविल)
5. मुख्य महाप्रबन्धक (योजना एवं परियोजना) – प्रतिवेदन की दो प्रतियाँ दो सेट प्लान के साथ
6. महाप्रबन्धक (पर्यावरण)
7. महाप्रबन्धक (वित)

ब. गेवरा क्षेत्र, एस.ई.सी.एल.

1. मुख्य महाप्रबन्धक - प्रतिवेदन की दो प्रतियाँ दो सेट प्लान के साथ

स. सी.एम.पी.डी.आई., मुख्यालय, राँची

1. मुख्य महाप्रबन्धक (ओपेनकास्ट) – प्रतिवेदन की एक प्रति एक सेट प्लान के साथ
2. मुख्य महाप्रबन्धक (पीएडी) - प्रतिवेदन की एक प्रति एक सेट प्लान के साथ

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KIND ATTN: SRI R.C. GUPTA, CP DEPTT, SECL

संख्या Ref. No. CIL : PMD : 21 /296

तिथि Date 21-06-2010

To
The Chairman cum Managing Director
South Eastern Coalfields Limited
Bilaspur

Sub:- Approval of PR for Gevra Expansion OCP (25 to 35 Mty), SECL.

Dear Sir,

The resolution of the 257th meeting of the Board of Directors of Coal India Limited held on 31st May and 1st June, 2010 at CIL, HQ, Kolkata on the above subject is enclosed for kind information and necessary action.

Yours faithfully,

21/6/2010
(T K Sinha)
General Manager (PMD)

Encl: As above.

सीएमपीडीआई
CMPDI

Approved on
01.06.2010

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For Company use only

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

PROJECT REPORT
FOR

GEVRA OC EXPANSION (25-35 MTY)

OF

SOUTH EASTERN COALFIELDS LIMITED
(A Mini Ratna Company)
GEVRA AREA

OCTOBER 2006
COST UPDATED SEPTEMBER 2009

REGIONAL INSTITUTE - V
CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED
(An ISO 9001 & A Mini Ratna Company)
(A Subsidiary of Coal India Limited)
SECL COMPLEX, SEEPAT ROAD
BILASPUR - (C.G.) 495006

PROJECT REPORT FOR GEVRA OC EXPANSION (25-35 MTY)

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PROJECT REPORT FOR GEVRA OC EXPANSION (25-35 MTY)

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PROJECT REPORT FOR GEVRA OC EXPANSION (25-35 MTY)

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Summarised Data

UPDATED COST ESTIMATES FOR GEVRA OC EXPANSION (25-35 Mty)

SUMMARISED DATA

Sl. No.	Particulars	Unit	Sanctioned PR (25 Mty)	Expansion PR, 25-35 Mty (Surface Miner)*
1	Thickness of coal seam (ex-band)			
	i) Composite D	m	8.57-14.87	6.13-12.26
	ii) E & F	m	15.96-30.20	8.57-14.87
	iii) Upper Kusmunda	m	27.11-42.65	15.96-30.20
	iv) Lower Kusmunda (top split)	m	0.60-7.09	27.11-42.65
	v) Coal in parting	m	3.14-8.67	0.60-7.09
	vi) Lower Kusmunda (bot. split)	m		3.14-8.67
	vii) Lower Kusmunda (Composite)	m		55.05-57.86
2	Overburden/parting thickness			
	a) Top OB	m	5.00-98.00	4.40-126.00
	b) Between D and E&F	m		64.92-89.45
	c) Between E&F and UK	m	18.40-61.35	10.35-73.24
	d) Between UK & LKT	m	36.60-83.89	36.60-83.89
	e) Between LKT & LKB	m	2.69-22.22	2.69-23.91
3	Gradient (dip)	degree	4.80-9.50	4.80-9.50
4	Average Grade		F	F
5	Mineable Reserves			13.85
	a) Composite Seam D	Mt.	14.90	54.97
	b) E & F Seam	Mt.	177.00	255.95
	c) Upper Kusmunda	Mt.	473.92	499.17
	d) LK seam (top split)	Mt.	27.00	33.25
	e) Parting Coal	Mt.	85.30	117.82
	f) LK seam (bottom split)	Mt.	778.12	975.00
	Total Mineable Reserves		(as on 1.4.01)	
6	Volume of OB	M.Cum	987.98 (as on 1.4.01)	1266.98 (as on 1.4.06)
7	Stripping Ratio (Av.)	Cum/t	1.27	1.30
8	Target Output	Mt/Yr.	25	35
9	Peak OBR	Cum/Yr	36.67	55.53
10	Method of Mining		Shovel-Dumper	For OB, Shovel-Dumper, For Coal, Surface Miner.
11	Project life	Year	28	29
12	Main Customers		TPH	

* Information of Sl No 1-12 is for total capacity 35 Mty.

Sl. No.	Particulars	Unit	Expansion PR (25 Mty)	Expansion PR 25-35 Mty (10 Mty Incremental) Surface Miner
13	a) Total capital investment b) Capital outlay per te of annual output	Rs. crores Rs./t	1667.55 702.98	1008.12 1008.12
14	a) Capital requirement of P&M b) Per tonne of annual output	Rs. crores Rs./t	1543.17 617.27	705.69 705.69
15	Selling price (95% of notified selling price) of processed ROM Coal.	Rs./ t	497.50	567.00
16	Estimated cost of production a) at 100% level of production. b) at 85% level of production	 Rs./t Rs./t	 278.71 311.21	 323.41 356.31
17	Profit per tonne a) at 100% level b) at 85% level	 Rs./t Rs./t	 218.79 186.29	 243.59 210.69
18	Foreign Exchange (Exchange Rate 1 US$=Rs.44.50)	Million US $	126.51 (Rs.550.30 cr.)	46.48 (Rs.225.44 cr.)
19	Break-even-point (%) (Mty)		45.70 11.43	43.35 4.33
20	No. of personnel		2725	551
21	OMS	t	34.75	68.75
22	EMS	Rs.	762.92	1587.40
23	Anticipated year of achieving target	Year	5th	5th
24	IRR at 100% level of production	%	368.68	More than 100
25	IRR at 85% level of production	%	225.79	More than 100
26	Completion capital of the project	Rs. crores	1897.80	1303.32
27	NPV @ 16 % at 100% level of production	Rs lakhs	284687	98595
28	NPV @ 16 % at 85% level of production	Rs lakhs	191757	66157

Particulars	Unit	Expansion PR (25 Mty)	Expansion PR, 25-35 Mty (10 Mty Incremental)
Number of villages within mine boundary	Nos.	14	
Involvement of forest land	Ha	101.01	1038.63
Number of families to be rehabilitated	Nos.	1468	1920
Total land required			
Existing	Ha	2945.66	3584.67 (for Sanc. PR (25 Mty)
Additional	Ha	639.01	599.815
No. of land oustees	No.	3530	6158
Amount to be spent on R&R	Rs. crores		93.33
Afforestation NPV	Rs. Lakhs	780.08	7035.15
EMP Capital	Rs. crores	46.94	115.87
Land required within minetake area	Ha	1550	
Land required outside minetake area	Ha	2034.67	

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EXECUTIVE SUMMARY
FOR
PR FOR GEVRA OC EXPANSION (25-35 MTY)

1.0 PREAMBLE

Project Report for Gevra Opencast Project for an annual capacity of 6.0 Mt of coal was prepared by CMPDI in March 1979. This was to meet the coal requirement of Korba Super Thermal Power Stations (KSTPS) of NTPC (first stage) for 1100 MW, amounting to about 4.25 Mty. The excess capacity was envisaged to meet a part of the demand for expansion of KSTPS by 1000 MW. However, the Government approved the Project Report in December 1979 for an annual capacity of 5 Mt at an estimated capital of Rs.50.08 crores. The approved schedule of working was 18 shifts / week.

Later, after the approval of Gevra Opencast Project, coal clearance was given to NTPC for expansion of the MSTPS by 2 x 500 = 1000 MW. Thus, the total capacity of the power house became 2100 MW and the ultimate annual coal requirement was estimated at about 8 Mt. To meet the above requirement of coal, a PR for Gevra Opencast Project (Expansion) was prepared in March 1982 for an annual production of 10.0 Mt, to meet the ultimate requirement of coal of KSTPS and to bridge the general shortfall of coal supply in Western India. The report was approved by Government of India on 18.9.85 for a capital investment of Rs.224.39 crores.

In the year 1992-93, a scheme for (Gevra OC), augmentation of production by 2.0 Mty was prepared for a capital investment of Rs.39.62 crores and sanctioned on 19.9.92 by CIL Board. The balance reserves as per the scheme (as on 1.4.92) were estimated as 496.31 Mt. The corresponding OBR was estimated as 533.79 Mcum at an average **stripping ratio of 1.08 cum/t**. (The scheme incorporated the additional provision of HEMM for removing the additional volume of overburden. The balance life of the project was estimated as 42 years at the enhanced capacity of 12 Mty). The scheme was declared completed on 31.3.95.

A capacity augmentation scheme for Gevra CHP (from 10 Mty to 12 Mty) was also prepared and sanctioned on 31.7.92 for a capital investment of Rs.13.63 crores.

Thus, the total sanctioned capital for Gevra OC (12 Mty) is Rs.277.64 crores (Rs.224.39 cr. + Rs.39.62 cr. + Rs.13.63 cr.).

The Project report for Gevra O/C Expansion (25 Mty) was prepared by CMPDI and approved by GOI on 12.07.05. The salient features of this sanctioned Project Report (25 Mty) project is as follows:-

Date of sanction	-	12.7.2005
Mineable reserves(As on 1.04.01)	-	778.12 Mt
Total OBR(As on 1.04.01)	-	987.98 Mcum
Av. Stripping Ratio	-	1.27 cum/t
Target production	-	25.00 Mty
Life	-	28 years
Seams to be worked		Thickness range
a) E&F		8.57 m – 14.87 m
b) Upper Kusmunda (UK)	-	15.96 m – 30.20 m
c) Lower Kusmunda (LK)	-	27.11 m - 42.65 m
d) Lower Kusmunda Bottom (LKB)	-	3.14 m – 8.67 m
Gradient	-	1 in 6 - 1 in 12

Quality (I-100 samples)

Seam	Quality Parameters			
	M%	Ash %	UHV K.cal./kg	Grade (Av.)
E&F	6.6-8.6	22.6-37.4	2803-4677	F to D
Lower Kusmunda (B)	5.7-7.8	24.6-35.4	3145-4428	E
Upper Kusmunda	6.1-7.6	27.6-39.1	2607-4042	E/F
Lower Kusmunda (T)	4.9-7.4	28.3-42.2	2400-3973	E/F

Maximum quarry depth	-	220 m
Capital outlay	-	Rs.1667.55 crores
Manpower	-	2725 nos.
OMS	-	34.75 t
Linkage	-	Korba STPS, Bhilai TPS, CSEB.

1.1 PERFORMANCE OF GEVRA OC

The performance of Gevra Opencast Project for the last 6 years is summarised in the following table:-

Sl. No.	Particulars	Unit	03-04	04-05	05-06	06-07	07-08	08-09
1	Coal production	Mt	21.89	26.16	26.46	27.22	29.06	32.10
2	OB removal	Mcum	11.69	12.50	12.13	12.39	11.51	17.59
3	Stripping ratio	Cum/t	0.53	0.48	0.46	0.46	0.40	0.55
4	OMS	t	21.69	23.31	22.85	21.92	22.93	28.29
5	Average Grade		F	F	F	F	F	F
6	Cost of production	Rs./t	213.83	232.76	281.45	274.03	303.44	314.05
7	Av. selling price	Rs./t	434.23	494.26	504.22	502.01	535.93	598.42
8	Profit/loss	Rs./t	220.40	261.50	222.77	227.98	232.49	284.37

1.2 NEED FOR GEVRA OC EXPANSION PROJECT REPORT (25 – 35 MTY)

Working group/X Plan document had indicated the demand of non-coking coal for XI Plan as 580 Mt and indigenous supply of non-coking coal from CIL as 445 Mt. The updated production of May 2005 have indicated the demand of non coking coal for the XI 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 562.32Mt leaves a gap of 59.68 Mt for which Emergency Coal Production Plan of CIL has been formulated. Gevra Opencast has been identified as one of the project in the Emergency Coal Production Plan of CIL.

The incremental capital estimated for Project Report (25 to 35 Mty) dated October 2006 was Rs.618.16 crores. The project will produce coal of Power Grade. The updated capital estmate for the project dated July'07 was Rs.780.12 crores

The updated capital estimated for the project is **Rs.1008.12 crores** in the month of September 2009.

1.3 JUSTIFICATION OF THE PLANNED CAPACITY

There are mainly four coal seams on the dip side of Gevra opencast project. As we advance towards dip, the seams are splitting, viz., UK Seam in Gevra Block is composite of average thickness 25 m but on dip side in Ponri Block, it is splitted in four sections and thins further. In some boreholes, combined thickness of all four sections of UK seam is only 15-18 m. LK (Top) Seam also splits into two to three sections and combined thickness reduces from 40m (in rise side) to 30 m. Other younger seams like Seam D and E&F also splits.

On the dip side, dip of seams becomes steeper i.e. 1 in 9.0 to 1 in 7.0 whereas on the rise side, the dip of seam is around 1 in 10 in most of the area. As altogether 11 splits of different seam will have to be worked at a time due to splitting of all seams.

The property is fraught with many geological disturbances like presence of many faults, swinging and steeping of floor contours. One of the faults encountered is having thrown more than 100m.

Considering all the above points and geo-mining parameters of the quarry planned production of 35 Million Tonne per annum is the optimum and sustainable production from this property.

However, some times with favourable geological conditions i.e. increase of seam thickness etc. and improved productivity of the HEMM with better mining conditions project may produce upto 1.15 times of the planned capacity.

1.4 OTHER INFORMATION OF THE PROJECT

i) The thick seam power grade coal zone of Korba Coalfield has been divided into four major blocks, namely, Kusmunda, Naraibodh, Gevra and Dipka. Of these, Naraibodh block has deep seated reserves (minimum depth 180 m) at a higher average stripping ratio of 1.89 cum/t and the block will be worked from Gevra Opencast Expansion at a later date. The expansion of this project to a higher targeted capacity will not take longer time as it is already producing coal above its targeted capacity (i.e. 32.10 Mty coal in the year 2008-09) and also necessary surface infrastructure in existing and additional infrastructure are under implementation. Sufficient strike length and additional proved reserves are also available at favourable stripping ratio for planning an expansion from 25 Mty to 35 Mty capacity.

ii) As the project is an expansion of the existing sanctioned Project Report (25Mty), the infrastructure is available and additional production can be obtained with less gestation period.

iii) The PR has been updated to Cost Base September 2009.

1.5 VARIANT FOR FORMULATION OF PROJECT

As per Emergency Coal Production Program of CIL approved by GOI, the report envisages additional OB Removal by outsourcing upto the initial five years. However from the sixth year onwards, all the activities of OB removal (except inseam bands) are proposed departmentally. All most entire coal production is envisaged to be done by outsourcing as per prevailing practice.

In draft PR, mine economics had been worked out for two variant of coal winning.

Variant I – Coal winning by surface miner.

Variant II – Coal winning by conventional (drilling blasting) method.

In Planning Committee meeting of CMPDI & SECL both the variants were discussed and Variant-I has been recommended on the basis of techno-economic comparison. Accordingly this report is prepared for Coal winning by surface miner.

1.6 FLEXIBILITY

The flexibility in the implementation stage may be exercised within the approved cost estimates to respond to improvements in technology and equipment which would result in improved profitability and productivity measures. Following points may be considered under the flexibility: -

a) Re-alignment of project boundaries for better working layout / dump etc.
b) Change in the specification of HEMM to higher capacity at the time of procurement of new equipment or replacement of the equipment.
c) To procure state-of-the-art safety equipment, whenever they are introduced, even if the same is not provided in approved Project Report.
d) Relocation of site for infrastructure facilities depending upon techno-economic reasons and availability of land / forest area etc.
e) Hiring of equipment for drilling, blasting, loading, transportation etc., at a competitive price, so as to cater to the needs of increased demand of coal and subsequent removal of higher OB and for augmentation of coal production.
f) For upgradation of new technology in mining method for improving performance and reduction in manpower, at a subsequent date after project completion.

2.0 MARKETABILITY

The on-going Gevra Opencast Expansion was sanctioned for a targeted coal production of 25 Mty. Presently, Gevra Opencast Expansion is producing coal more than 25 Mty, which is being despatched to KSTPS, other TPS and industries. The expansion of this project has been planned to a targeted capacity of 35 Mty. As such, there will not be any problem to market the coal from this project.

3.0 PROJECT SITE INFORMATION

3.1 LOCATION

Gevra Opencast Block is located in the south-central part of Korba Coalfield in Korba District of Chhattisgarh. The Gevra Mining Block having an area of about 19.03 sq.km. is located in the Central part of Korba Coalfield. It is included in the Survey of India Topo-sheet No. 64 J/11 and is bounded by latitudes $22^0$18'00" and $22^0$21'42" and longitudes $82^0$32'0" to $82^0$39'30".

The block is well connected by rail and road. Gevra Road and Korba Railway Stations on Champa-Gevra Road branch line of S.E. Railway are at a distance of 10 km and 16 km respectively. Railway Siding has been extended upto and beyond Gevra OCP and coal is being transported from the pit head CHP through rail/MGR to the various consumers. SECL headquarters, Bilaspur, is at a distance of about 90 km by road.

3.2 CLIMATE

The climate of the area is dry to moist tropical with well defined summer from April to June, rainy season from July to September and winter from November to February. The temperature rises to a maximum of about 48^0C in May and drops to a minimum of about 7^0C in December.

3.3 PHYSIOGRAPHY

The general topography is gently undulating with elevations ranging from 288 m to 328 m above Mean Sea Level. The general slope is towards east.

The area is traversed by a seasonal nala, namely, Laxman Nala. This drains into Ahiran River located towards north-east. In addition, there are quite a few ponds. Ahiran and Hasdeo rivers control the drainage of this area and are situated towards North-East and East respectively of the area under consideration.

4.0 GEOLOGY

NCDC had carried out scout drilling in and around Gevra Block in 1963-65 and 1972-74. CMPDIL took up detailed drilling in this block in 1977-78, 98-99 & 2000-2004. A total of 172 boreholes were drilled in the minetake area of 19.03sq.km. The borehole density in the block is 9.04 per sq.km.

4.1 STRATIGRAPHIC SUCCESSION

The entire block is covered with soil. The thickness of the soil cover generally varies between 3m to 6m. The stratigraphic succession of the block upto the depth of ocurrence of the lower most quarriable seam.

Stratigraphic Succession of Gevra

Age	Formation	Thickness	Lithology
Recent	Soil/Weathered Zone	4 to 20 m	Soil/sub-soil and laterite soil.
Lower Permian	Upper Barakar	0 to + 34 m	Fine to coarse grained sandstone, sandy shale, grey shale, carb, shale and coal seam E&F.
	Middle Barakar	<15 m to + 300 m	Medium to coarse grained feldspathic sandstone, occasional shales, carbonaceous shale and thick coal seams, D, E&F, Upper and Lower Kusmunda.

The strike and dip of the coal seams in minetake area is given below:-

Part of the block	Strike	Dip
Western part	E-W with local swings	3^0-4^0 towards south
Eastern part	ENE - WSW to NW-SE	2^0-6^0 towards NE to SE
Central part	E-W to ENE-WSW	4^0-6^0 towards south to SE

4.2 SEQUENCE OF COAL SEAMS

The sequence of coal seams and partings in the minetake is summarised below :-

Sequence of Coal Seams

Seam	Thickness Range (m)		No.of BH inter-section	Area (sq km)	Seam-wise BH Density	No.of samples actually tested for proximate & ultimate analysis	Remarks
	Seam	Parting					
D Seam	01.10-25.32		17	1.17	14.53	05	Splits into 2 sections, towards southern part of the area.
		63.74-102.79					
E&F	9.25 – 16.70		56	3.70	15.13	55	Splits into 2 sections in the eastern part; 'E'=2.55m, Parting = 5.80m, 'F'=12.55m
		13.26-65.46					
Upper Kusmunda	21.00 – 36.50		74	9.03	8.19	72	
		36.60-83.89					

Lower Kusmunda (Top Section)	19.28 – 45.23		99	16.11	6.14	74	Top section of Lr. Kusmunda Splits in the south-western part of the block -
		2.69 - 23.91					
Lower Kusmunda (Bottom Section)	3.14 - 16.16		101	15.90	6.35	53	

4.3 DESCRIPTION OF COAL SEAMS

Occurrence of 4 nos. of coal seams has been proved in the block. These seams in descending orders are D, 'E&F', Upper Kusmunda and Lower Kusmunda. Lower Kusmunda seam occurs in two sections, namely, Lower Kusmunda (Top section) and Lower Kusmunda (Bottom Section) in major part of the block.

4.3.1 D SEAM

Seam D is a composite seam composed of two sections D Top and D Bottom, which are combined in some part of the block but separated by a carb.shale/grey shale band of 2-3m thickness. In the area, where this band increase in thickness beyond 3m. The D Top and D Bottom are considered as separate seams.

4.3.2 PROXIMATE ANALYSIS

Range of proximate analysis and grade of DCOM, DTOP, & DBOT Seam, in the Block

Parameters	Range		
	Bcs	I_{100}	I_p
(i)Full seam: DCOM			
Boreholes considered.	03	03	03
Thickness (m) range	7.18-8.20	8.58-10.32	10.10-13.68
Proximate analysis on 60% RH and 40°C Determined and calculated			
M%	6.1-12.6	5.3-11.70	4.6-10.60
Ash%	25.10-37.30	29.50-44.50	35.60-50.30
UHV(K.cal./kg)	2907-3703	2032-3212	1317-2530
Grade	F-E	G-F	G-F
(ii) Section DTOP			
Boreholes considered	01	01	01
Thickness(m)range	3.61	3.81	3.81
M%	6.90	6.50	6.50
Ash%	47.00	49.60	49.60
UHV(K.cal./kg)	1464	1153	1153
Grade	G	UG	UG

Parameters	Range		
	Bcs	I_{100}	I_p
(iii)Section DBOT			
Boreholes considered	03	03	03
Thickness(m)range	4.91-10.19	5.22-11.36	8.54-14.36
M%	5.90-6.00	5.30-5.60	4.30-5.30
Ash%	31.30-39.20	41.70-44.30	44.30-53.00
UHV(K.cal./kg)	2675-3644	2056-2378	988-2056
Grade	E-F	G	G

4.4 SEAM 'E&F'

E&F is the second seam in the block and occur in a small patch in the southern part of the block. Out of 56 boreholes in which seam E&F is intersected, the seam is splitted into two sections towards southern part of the block. .

4.4.1 QUALITY PARAMETER OF SEAM 'E&F'

The band-by-band analysis of the seam on air dried basis were carried out for all the boreholes having full thickness. The proximate analysis on 60% RH and 40^{0}C temperature has also been carried out, and also the quality parameters have been calculated for few boreholes in this seam on equilibrated basis. The quality parameter of the seam based on the available date are given in the following table:-

Quality Parameter of Seam 'E&F'

(a) Proximate analysis (I_{100} samples)					
Proximate analysis on equilibrated basis at 60% RH and 40^{0}C temperature			GCV (K.cal./kg)	UHV (K.cal./kg)	Grade
M%	Ash%	VM%			
5.7 to 8.6	22.6 to 39.9	26.2 to 27.7	3698 to 5264	2358 to 4677	G to D
(b) Proximate analysis (I_p samples)					
6.2 to 8.6	23.5 to 40.9	22.5 to 25.8	3585 to 5091	2193 to 4467	G to D

4.5 UPPER KUSMUNDA SEAM

The Upper Kusmunda Seam is the next seam in descending order after 'E&F' and underlies the seam 'E&F' after a parting range of 13.26m to 70.13 m. The seam has been intersected in 74 boreholes.

4.5.1 QUALITY PARAMETER OF UPPER KUSMUNDA SEAM

The band-by-band analysis of the seam on air dried basis were carried out for all the boreholes having full thickness. The proximate analysis on 60% RH and 40°C temperature has been carried out, and also the quality parameters have been calculated for few boreholes in this seam on equilibrated basis. The quality parameters of the seam based on the available data are given in the following table:-

Quality parameters of Upper Kusmunda Seam

a. Proximate analysis

Proximate analysis on equilibrated basis at 60% RH and 40°C temp.			Gross Calorific Value (K.Cal/kg)	Useful Heat Value (K.cal/kg)	Grade
M%	ASH%	V.M.%			
A. I_{100} Sample					
4.4 to 7.90	25.1 to 43.2	23.1 to 27.0	3680 to 5041	2345 to 4346	"D" to "G" (F)
B. Ip Sample					
5.6 to 7.2	35.8 to 44.10	22.2 to 24.9	3517 to 4085	1972 to 2966	"G" to "F" (G)

4.6 UPPER KUSMUNDA SEAM (BOTTOM SECTION)

The bottom portion of Upper Kusmunda Seam varying in thickness from 3.14 m to 16.16 m (general thickness 8-9 m) is better in quality, generally of grade D-E. Quality parameters of this section are given below:-

Quality parameters of Upper Kusmunda Seam (Bottom Section)

Proximate analysis on equilibrated basis at 60% RH and 40°C temp. (analysed and calculated)			Gross calorific value (K.cal/kg)	Useful heat value (K.cal/kg)	Grade
M%	Ash%	VM%			
5.8 to 7.8	19.7 to 41.8	26.2 to 26.8	3776-5380	2332 to 5105	E to G (E)

4.6.1 LOWER KUSMUNDA SEAM

Lower Kusmunda seam is the thickest and most important coal seam of this block. This seam has been intersected in 101 boreholes. On the basis of its structural make-up the Lower Kusmunda Seam is divisible into two prominent sections, viz., Top Section and Bottom Section. These two sections are separated by a 2.69 m to 23.90 m thick parting consisting of highly banded coal/carb.shale/shale and occasionally with alternate shale and sandstone particularly in the south-western part of the block.

4.6.2 LOWER KUSMUNDA (TOP SECTION)

The top section of Lower Kusmunda Seam has been intersected in 97 boreholes within the block in the depth range of 4.40 m (CMKK-75) to 280.80m (CKPR-25). This section has been treated as a separate seam, viz., Lower Kusmunda Top Seam.

4.6.3 QUALITY PARAMETERS

Band-by-band analysis of Top Section on air dried basis was carried out for all boreholes except incrop/fault thickness. Proximate analysis on 60% RH and 40^{0}C temperature has been carried out for 46 boreholes and also the quality parameters have been calculated for few boreholes in this seam on equilibrated basis. In major part of the block, the grade of Top Section (excluding 1m and above dirt band) is "E".

Quality parameters of Lower Kusmunda (Top Section)

a. Proximate Analysis

Proximate analysis on equilibrated basis at 60% RH and 40°C temp.			Gross Calorific Value (K.Cal/Kg)	Useful Heat Value (K.Cal/Kg)	Grade
M%	ASH%	VM.%			
(I_{100} Sample)					
3.9 to 7.4	28.3 to 42.2	23.3 to 25.4	3800 to 4720	2400 to 3973	"F" to "E" (E)
					(I_p Sample)
5.0 to 7.1	31.8 to 45.1	23.2	4,440	1972 to 3531	"G" to "E" (F)

4.6.4 PARTING BETWEEN LOWER KUSMUNDA (TOP SECTION) & LOWER KUSMUNDA (BOTTOM SECTION)

The parting between Lower Kusmunda (Top Section) and the Lower Kusmunda (Bottom Section) is 2.69 m (CMKK-171) to 23.91 m (CKPR-20) thick and mainly composed of coal / carb.shale / shale. The coal sections developed within the parting are highly inter-banded with composite thickness varying from 1.45 m (CMKDP-65) to 8.25 m (CMKK-51).

4.6.5 QUALITY PARAMETERS OF PARTING COAL

The quality parameters for coal in parting between Lower Kusmunda (Top) Seam and Lower Kusmunda (Bottom) Seam are as tabulated below :-

Quality parameters of Parting Coal

Proximate analysis on equilibrated basis at 60% RH and 40°C temp. (analysed and calculated)		Useful Heat Value K.Cal./Kg	Grade
M%	ASH%		
I_{100} Sample			
5.7 to 6.5	30.6 to 44.5	2110 to 3780	"G" to "E"
I_p Sample			
3.9 to 9.7	38.5 to 54.2	730 to 2800	U/G to "F"

4.7 LOWER KUSMUNDA (BOTTOM SECTION)

The Bottom Section of Lower Kusmunda Seam occurs 2.69m to 23.91m below top section. It has been intersected in 102 boreholes in the depth range of 6.00m (CMKK-76) to 217.80m (CMKDP-97). This section has been treated as a separate seam and referred to as Lower Kusmunda Bottom Seam.

4.7.1 QUALITY PARAMETERS

The band-by-band analysis of the seam on air dried basis was carried out for all the boreholes having full thickness. Proximate analysis on 60% RH and 40^0C temperature has been carried out, and also the quality parameters have been calculated for few boreholes in this seam on equilibrated basis.. The details are given below :-

Quality parameters of Lower Kusmunda (Bottom Section)

a. Proximate Analysis (I_{100} Sample)

Proximate analysis on equilibrated basis at 60% RH and 40°C temp. (analysed and calculated)			Gross Calorific Value (K.cal/kg)	Useful Heat Value (K.cal/kg)	Grade
M%	ASH%	V.M.%			
5.4 to 7.8	24.6 to 38.3	25.2 to 26.5	4154 to 5080	2748 to 4428	F to D (E)

4.7.2 QUALITY PARAMETERS OF LOWER KUSMUNDA (COMPOSITE) SEAM

a. Proximate analysis of representative boreholes (Ip-Samples)

Borehole Number	Coal Seam Depth			Proximate analysis on equilibriated basis at 60% RH and 40°C temp. (analysed and calculated)		Useful Heat Value (K.cal/kg)	Grade
	From	To	Thickness	M%	Ash%		
CMKK-10	90.45	159.18	68.73	4.20	47.10	1821	G
CMKK-51*	112.99	169.51	56.52	5.10	47.90	1586	G
CMKK-25	13.75	63.62	49.87	5.80	43.00	2166	G

* Excluding shale, sandy shale / sandstone from 133 to 136.07 m.

5.0 MAIN TECHNICAL DECISION FOR THE QUARRY

5.1 Mineable reserves, waste quantities and average stripping ratio for the proposed mine boundaries are summed below:-

1. Mineable Reserves - 975.00 Mt (As on 1/4/2006)
2. Overburden - 1266.99 Mcum
3. Av. Stripping Ratio - 1.30 cum/t.

Seam wise Mineable Reserves, Overburden and Stripping Ratio

Sl. No.	Particulars	Unit	Value
1	**MINEABLE RESERVES:**		
1.1	D Seam	Mt	13.85
1.2	E&F seam	Mt	54.97
1.3	Upper Kusmunda seam	Mt	255.95
1.4	Lower Kusmunda Top Seam	Mt	499.17
1.5	Parting coal	Mt	33.25
1.6	Lower Kusmunda Bottom Seam	Mt	117.82
	Total Coal	**Mt**	**975.00**
2	**OVERBURDEN:**		
2.1	Top OB including Weathered Mantle	Mcum	354.54
2.2	Parting above E&F Seam	Mcum	65.73
2.3	Parting above UK	Mcum	155.68
2.4	Bands in UK	Mcum	37.76
2.5	Parting above LKT	Mcum	500.42
2.6	Bands in LKT	Mcum	24.45
2.7	Parting above LKB	Mcum	128.41
	Total Overburden	**Mcum**	**1266.98**
3	**AVERAGE STRIPPING RATIO**	**Cum/t**	**1.30**

5.2 MINE BOUNDARIES

The open pit mine boundaries are as follows:-

North-West - Based on incrop of Lower Kusmunda seam.

West - Based on the existing boundaries between Gevra (Mine) and Dipka (expansion project).

North-East - Based on out-crop of LK Seam and boundary Fault F1-F1.

East - Based on rationalisation of the earlier boundary of Gevra OC (25Mty).

South-East - Based on rationalisation of extension of the quarry surface ,boundary from west which is fixed at 60 m barrier distance from State Highway and floor contour to be followed.

South - Based on 60 m barrier distance from the State Highway Road passing by the side of property only upto which reserves are proved.

Pit Floor - Floor of the bottom split of the Lower Kusmunda Seam.

5.3 METHOD OF MINING & EQUIPMENT CONCEPTS

The selection of mining method for Gevra Opencast Expansion Project (35 Mty) has been based on the following factors:-

(i) Gevra Opencast Project is being worked by opencast methods deploying shovel dumper combination and HEMM configuration proposed in the sanctioned Project Report (25 Mty).

(ii) Present depth of workings is about 100 m against an ultimate planned depth of 220 m (as per sanctioned PR). Gevra Expansion Opencast Project has been planned upto a maximum depth of 318 m.

The coal deposit mainly constitutes of four thick coal seams occurring at shallow to moderate depth at favourable stripping ratio.

Based on the above factors, shovel-dumper combination is proposed to be continued. Deployment of draglines is not suggested as the combined thickness of the lower most seams i.e. LK seam (>48 m) will restrict the efficient deployment of dragline mining; and the inter-parting between LK (Top) and LK (Bottom) does not offer adequate load to justify the deployment. Moreover, coal in inter-parting will be lost.

The present extent of workings indicates that most of the balance OB will be accommodated in the internal dumps. This will help to restore a part of the land during the course of mining operations.

5.4 PRODUCTIVITY OF EQUIPMENT

5.4.1 DESIGN CRITERIA

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

a. No. of annual working days - 330
b. No. of daily shifts - 3
c. Duration of each shift, hours - 8

5.4.2 ANNUAL PRODUCTIVITY OF EXCAVATORS

Standard annual productivity of excavator-truck systems, based on the report of the CIL committee on "Revision of norms of productivity of HEMM, April-03" for 330 days working is as follows:-

Annual productivity of shovels / excavators

Sl. No.	Particulars	Rock Type	No. of Shifts/day	Annual prod. (Mcum)
i.	42 cum Elect. Rope Shovel + 240 T RD	Overburden	3	8.06
ii.	9 cum Elect. Hyd. Backhoe +100 T RD		3	2.97

Productivity of Dumper for different Leads

	Lead in Km	2.5	3.0	3.5
I	**For OBR**			
1	240 T RD + 42 cum Elect. Rope Shovel	1.099	0.9929	0.9115
2	100 T RD + 9 cum Elect.Hyd.Backhoe			0.3100

5.5 PRODUCTION & PROJECT SCHEDULE

The production build-up programme is given below:-

Summarised Calendar Programme of Excavation showing Incremental Coal, OB and volume of OB to be outsourced for PR(25 to 35 Mty)

Year	PR(35Mty)				Capacity Built up of Coal & OB for PR (25 to 35 Mty)			
	Total Coal	Total Inseam Bands	Total OB excl. bands Adj.	Total OB	Coal	OB	OB (Leased Equipment)	OB (Departmental Equipment)
1	**27.00**	0.18	16.58	16.76	2.10	4.00	4.00	
2	**29.00**	0.57	23.43	24.00	4.00	4.00	4.00	
3	**31.00**	1.98	35.72	37.70	6.00	4.00	4.00	
4	**33.00**	2.11	39.59	41.70	8.00	4.00	4.00	
5	**35.00**	2.24	39.46	41.70	10.00	4.00	4.00	
6	**35.00**	2.41	46.35	48.76	10.00	11.06	2.41	8.65
7	**35.00**	2.55	46.35	48.90	10.00	11.20	2.55	8.65
8	**35.00**	2.55	46.35	48.90	10.00	11.20	2.55	8.65
9	**35.00**	2.55	46.35	48.90	10.00	11.20	2.55	8.65

Year	PR(35Mty)				Capacity Built up of Coal & OB for PR (25 to 35 Mty)			
	Total Coal	Total Inseam Bands	Total OB exl. bands Adj.	Total OB	Coal	OB	OB (Leased Equipment)	OB (Departmental Equipment)
10	**35.00**	2.55	46.35	48.90	10.00	11.20	2.55	8.65
11	**35.00**	2.82	46.35	49.17	10.00	12.50	2.82	9.68
12	**35.00**	3.58	46.35	49.93	10.00	13.26	3.58	9.68
13	**35.00**	3.58	46.35	49.93	10.00	13.26	3.58	9.68
14	**35.00**	3.58	46.35	49.93	10.00	13.26	3.58	9.68
15	**35.00**	3.58	46.35	49.93	10.00	13.26	3.58	9.68
16	**35.00**	3.58	46.35	49.93	10.00	13.26	3.58	9.68
17	**35.00**	3.55	46.35	49.90	10.00	13.26	3.55	9.71
18	**35.00**	2.59	46.35	48.94	10.00	13.26	2.59	10.67
19	**35.00**	2.59	46.35	48.94	10.00	13.26	2.59	10.67
20	**35.00**	2.59	46.35	48.94	10.00	13.26	2.59	10.67
21	**35.00**	2.59	46.35	48.94	10.00	13.26	2.59	10.67
22	**35.00**	1.90	46.35	48.25	10.00	13.26	1.90	11.36
23	**35.00**	1.89	46.35	48.24	10.00	13.26	1.89	11.37
24	**35.00**	1.89	46.35	48.24	10.00	13.26	1.89	11.37
25	**35.00**	1.44	46.35	47.79	10.00	13.26	1.44	11.82
26	**35.00**	0.38	36.00	36.38				
27	**35.00**	0.38	36.00	36.38				
28	**35.00**	0.38	36.00	36.38				
29	**15.00**	0.16	14.50	14.66				
	975.00	**62.72**	**1204.28**	**1267.00**				

The Calender Programme has been prepared based on mineable reserves & OB volume as on 1.04.06. The project has produced 27.22, 29.06 & 32.10 Mt of Coal during the year 2006-07, 2007-08 & 2008-09 respectively. The project has removed 12.39, 11.51 & 17.59 Mcum of OB during the year 2006-07, 2007-08 & 2008-09 respectively.

5.6 DRILLING & BLASTING

Drilling and blasting would be required only in OB bench before excavation by shovels. 381 mm RBH drills will be deployed for shovel benches of 42 cum rope shovel whereas 250 mm RBH drill will be deployed for benches of 12 cum shovels. Few 160 mm drills have been provided for coal also.

160 mm drills have been provided for drilling in benches of bands and partings.

The explosives consumption has been envisaged as 0.30 - 0.35 kg/Mcum of excavation.

The ground vibration due to blasting can be controlled by:-

i) reducing the amount of explosives charged per delay,
ii) reducing spacing and burden of blast holes,
iii) reducing the amount of explosives charged per blast,
iv) proper strata movement during blast by using suitable initiating sequence.

Since above parameters are site specific, the exact blasting pattern will be designed by conducting field trials.

5.7 SPOIL DISPOSAL PLANNING

Presently, internal backfilling is being done in the quarry and considerable volume of OB is also being dumped in the external dump. In coming years, major volume of OB will be internally backfilled and small volume of OB will continue to be dumped in the external dump. Volume of OB to be accommodated in external and internal dumps will be as given below:-

Dump	Total Volume of OB (Mcum) to be accommodated in different dumps
A. External	
NW (No. 1)	18.80
Dipka old Area	24.70
NE (No. 2)	104.10
Total	147.60
B. Internal	
SW	334.16
Central Dump	377.54
SE	407.69
Total	1119.38
Grand Total (A+B)	1266.98

5.8 HEMM PROVISION

The requirement of HEMM has been estimated on the basis of the adopted mining and dumping sequence, productivity of equipment and the mining schedule. The lead for coal and OB transport has been estimated as 2.0 Km and 3.5 Km respectively for the peak work load.

Requirement of HEMM

Sl. No.	Particulars	Unit	Size/ Capacity	Provision for sanct. PR (25 Mty)	Incremental provison for (25-35 Mty)
A.	**OVERBURDEN**				
1	Electric Rope Shovel	Cum	42	4	1
2	Electric Hydraulic Shovel	Cum	12	2	
3	Electric Hydraulic Backhoe	Cum	9	1	1
4	Electric Rope Shovel	Cum	10		
5	Electric Rope Shovel	Cum	4.6/5		
6	Elect./Diesel Hyd. Shovel	Cum	2 - 3		
7	Rear Dumpers	T	240	32	8
8	Rear Dumpers	T	120	21	
9	Rear Dumpers	T	100		8
10	Rear Dumpers	T	85		

Sl. No.	Particulars	Unit	Size/ Capacity	Provision for sanct. PR (25 Mty)	Incremental provison for (25-35 Mty)
11	RBH Drills	mm	381	4	1
12	RBH Drills	mm	250	6	1
13	RBH Drills	mm	160		
14	Dozers	HP	850	12	4
15	Dozers	HP	400-410	4	
16	Dozers	HP	320		
B.	**COAL**				
1	Electric Hydraulic Shovel	Cum	12		
2	Electric Rope Shovel	Cum	10		
3	Electric Rope Shovel	Cum	4.6/5		
4	Rear Dumpers (Coal Body)	T	85		
5	Rear Dumpers	T	50		
6	Rear Dumpers	T	35		
7	RBH Drills	mm	250		
8	RBH Drills	mm	160	16	
9	Dozers	HP	400-410	8	
10	Dozers	HP	320		
C.	**RECLAMATION**				
1	Dozers with Ripper	HP	850		1
2	Dozers	HP	400-410	5	
3	Dozers	HP	320		
4	Water Sprinkler	KL	60	6	3
5	Water Sprinkler	KL	28		
D.	**COMMON**				
1	Motor Grader	HP	500	4	2
2	Motor Grader	HP	280	5	
3	Motor Grader	HP	145		
4	Dozer	HP	400-410	2	
5	Ripper for 850 HP Dozer	HP	410	3	
6	Wheel Dozer	HP	410	3	
7	Scraper	Cum	11.5		
8	Front End Loader	Cum	10		1
9	Front End Loader	Cum	5.0-7.0	3	
10	Front End Loader	Cum	1.5-3.8	3	
11	Diesel Hydraulic Backhoe	Cum	2-4	2	
12	Hydraulic Backhoe	Cum	0.9-1.5	4	
13	Tyre Mounted Drill	mm	160		1
14	Tyre Mounted Backhoe	Cum	4-5		1
15	Vibratory Compactor	T	25	3	
16	Rough Terrain Crane	T	150		1
17	Rough Terrain Crane	T	75	2	
18	Crane	T	50/40/30/ 8/5	7	
19	Fork Lift	T	3.5	2	
20	Tyre Handler	T	3.5	2	

Sl. No.	Particulars	Unit	Size/ Capacity	Provision for sanct. PR (25 Mty)	Incremental provison for (25-35 Mty)
21	Tyre Handler	T	6 - 8	2	
22	Tyre Handler	T	10-12		1
23	Mobile Workshop			3	
24	Mobile Maintenance Truck			3	
25	Cable realer				1

6.0 PUMPING & DRAINAGE

The pumping system of Gevra Opencast Expansion has been designed to dewater the inflow of water in 100 hrs. due to precipitation falling during maximum rainfall in a day to enable mining activity to continue round the year. The estimated capital investment has been provided in **Appendix - A.3.4.**

7.0 CRUSHING, INPIT COAL TRANSPORT AND COAL HANDLING PLANT

Necessary arrangements for coal receiving and inpit transport will be provided for coal produced through south-west inpit and central inpit of Lower Kusmunda Seam. For receiving coal 8 nos. of truck receiving stations have been provided. Inpit transport from these truck receiving stations will be through 1600 mm belt conveyors. The coal produced from Upper Kusmunda Seam will be transported by dump trucks to the truck receiving stations to be constructed on surface at south-west flank (2 nos.) and north-east flank (2 nos.) and truck loading hoppers will also be constructed. From these trucks, loading hoppers coal will be transported to the CHP/wharfwall siding or to miscellaneous consumers by tipping trucks.

The coal from both UK and LK seams will be received at the proposed coal handling plant. Approximately, 13 Mty coal will be despatched through existing CHP and silos to NTPC Korba. It is proposed to construct another coal handling plant with a handling capacity of 10 Mty for despatch of coal to miscellaneous customers / power houses. Proposed CHP consists of 10000 t surge bunker and belt conveyors system, 2 nos. of 4000 t silos for dispatch of coal. Provision has been also made to construct another transfer hopper TH2 and extension of existing conveyors C3/C4.

Estimated capital provisions for the system has been given in the **Appendix-A.3.5.1** and **A.3.5.2.**

8.0 RAILWAY SIDING

It is also proposed to modify the Junadih siding for construction of 2 nos. Silos and loading of trains while in motion. The suggested modifications include relaying and modification of railway tracks, modification in signaling, construction of block cabin etc.

The estimated capital investment for railway siding is given in **Appendix - A.5.**

9.0 POWER SUPPLY, ILLUMINATION AND TELECOMMUNICATION

Gevra opencast expansion project will receive power at 33kV from existing 132/33kV substation of SECL at Gevra. In the Dipka Opencast Expansion Project, a separate 2 x 32/36 MVA, 132/ 33kV substation at Dipka has been proposed. The capacity of existing 132/33kV substation at Gevra is 3 x 20/40 MVA

The estimated maximum demand of the project, including CHP, workshop, quarry, colony load etc. has been calculated and is 37.91 MVA with corrective power factor of 0.98 (approx.). To meet this demand and distribution of power, 3 nos. of project substations have been proposed. Details of which are as under: -

Substation No.	Voltage ratio	Transformer Capacity
1	33/3.4kV	2x5MVA
2	33/6.6kV	2x16 MVA
3	33/6.6kV	2x16MVA

Necessary provision has been made for field switches, circuit breakers, overhead lines/ cables for distribution of power in the quarry and other loads. Similarly, provision has been made for illumination of quarry and other centres of project at 230 V (L-L).

The specific energy consumption of the project has been estimated as 3.408 kwh/t for a targeted production of 35 Mt per year.

A 500 line IP enabled telephone exchange up-gradable to 2000 lines has been envisaged for effective communication (both voice and data) between various production units, quarry workings, workshops, main and site offices, stores and sub-stations etc. The facilities also include LAN/WAN post and external STD & ISD facility interfaced with BSNL exchange.

A separate TETRA – based system is proposed for mobile communication with GPS based Automatic Vehicle Location System (AVLS).

The proposed capital investment for electrical P&M is given in **Appendix - A.3.2.**

10.0 WORKSHOP AND STORES

Gevra OC (Expansion) will be provided with unit workshop for repair and maintenance of excavation and E&M equipment. Two tier facilities have been envisaged.

(i) Project workshop for daily maintenance, scheduled maintenance.

(ii) Central workshop for capital repair and major over hauling.

The estimated capital requirement on P&M for excavation and E&M workshop is provided in **Appendix-A.3.3.**

11.0 CIVIL CONSTRUCTION

The existing project of Gevra OCP has been proposed to expand to the capacity from 25 Mty to 35 Mty with deployment of surface miner. As per proposed expansion, the life of mine will be 29 years and hence for all infrastructural development permanent specifications have been envisaged. The new facilities like residential buildings, service buildings are required to be constructed on non-coal bearing area.

The cost estimates have been worked out in March 2009 with reference to 100 base at New Delhi in October 1976 and the value of the same is 1720.

In the proposed expansion report essential service building provision like dumper repair shed at two locations, dozer repair shop, washing ramp for dozer and dumper, dumper pavement have been provided.

The details of capital provision for service buildings, residential buildings, roads and culverts and water supply & sewerage have been given in Appendix-A.2.1, A.2.2, A.8.2 and A.8.3 respectively.

12.0 MANPOWER & PRODUCTIVITY

The requirement of manpower at the rated capacity of 35 Mt of coal and 48.76 Mcum of OB has been estimated as 3276 persons resulting in an overall OMS of 40.47 t. The PR for Gevra OC Expansion (25 to 35 Mty) envisages 551 manpower resulting in OMS of 68.75 for incremental capacity of 10 Mty.

13.0 LAND

The sanctioned Project Report (25 Mty) envisages requirement of 3584.67 Ha land, which is acquired but physical possession of the same is under process. Additional land requirement for Project Report (25 to 35 Mty) is assessed as 599.815 Ha. Break-up of type of land use as given by the mine authority is as follows:-

(Figures in Ha)

Sl. No.	Particulars	Type of land			
		Forest	Govt.	Tenancy	Total
A) Already Acquired Land					
1	Quarry	385.121	289.514	1113.144	1787.779
2	Safety Zone	3.472	4.643	75.385	83.5
3	Infrastructure & Rehabilitation	515.434	261.859	936.099	1713.392
	Sub-Total (A)	904.027	556.016	2124.628	3584.671
B) Land to be Acquired					
1	Quarry	78.507	10.682	160.282	249.471
2	Safety Zone	56.096	58.587	235.661	350.344
3	Infrastructure & Rehabilitation	0.000	0.000	0.000	0.000
	Sub-Total (B)*	134.603	69.269	395.943	599.815
	Total Land (A+B)				
1	Quarry	463.628	300.196	1273.426	2037.25
2	Safety Zone	59.568	63.23	311.046	433.844
3	Infrastructure & Rehabilitation	515.434	261.859	936.099	1713.392
	Grand Total (A+B)	1038.63	625.285	2520.571	4184.486

The estimated capital requirement for land acquisition of the quarry has been given in Appendix-A.1.

14.0 ENVIRONMENT MANAGEMENT

The additional minetake area involves 1920 families and 6158 land oustees. In the existing minetake area, 968 families and 2630 land oustees have been rehabilitated / resettled.

Estimated capital investment for the rehabilitation of affected families has been given in Appendix-A.8.1.

15.0 ECONOMIC EVALUATION

15.1 The initial capital investment for expansion of the project from 25 Mty to 35 Mty i.e. for incremental 10 Mty is estimated as Rs.1008.12 crores. The capital investment per tonne of annual output (incremental 10 Mty) works out to Rs.1008.12. The head-wise break-up of the estimated capital investment and the year-wise phasing of capital are shown in Appendix-A.

The mine economics has been worked out considering total capital as equity capital

15.2 PLANT AND MACHINERY

The capital investment of plant and machinery for incremental 10 Mty is estimated as Rs.705.69 crores as shown in Appendix-A.3. The detailed break-up of HEMM and other than HEMM is given in subsequent appendices.

The specific capital investment on P&M works out for incremental 10 Mty is estimated to Rs. 705.69 per tonne. The capital investment on HEMM alone for incremental 10 Mty is estimated as Rs.464.09 crores.

15.3 BASIS OF PRICE ESTIMATION OF P&M

The estimate for the HEMM's and other P&M are based mainly on the standard price list November 2008 of mining equipment published by CMPDIL, Ranchi. Considering the escalation rate per month, the price of HEMM has been updated upto September 2009. The basis for estimation of civil construction cost has been given in Appendix-A.2.3 i.e. Cost Index September 2009 at Gevra Area.

15.4 MANPOWER, EMS & OMS

The incremental requirement of manpower for expansion of the Project from 25 to 35 Mty is estimated as 551 which give an overall OMS of 68.75 t. The overall EMS works out to Rs.1587.40; the details of manpower are shown in Appendix-B and B.1.

15.5 COST OF PRODUCTION OF COAL

The salient points regarding estimation of the operating costs are as follows:-

15.5.1 INTEREST ON WORKING CAPITAL

The rate of interest on working capital is taken as 14.5% per annum and quantum of working capital has been assumed as equivalent of 4 months cash revenue costs.

15.5.1.1 REVENUE EXPENDITURE CAPITALISED

Since the mine is an expansion project no revenue expenditure during development would be capitalised.

15.5.2 INTEREST ON LOAN CAPITAL

It has been taken as 12% per annum in lines with the current instructions received from the Govt. for loan taken for a period of 10-15 years.

15.5.3 DEPRECIATION

For calculation of annual depreciation of the assets, the latest guideline issued from CMPDIL, Ranchi has been followed.

15.5.4 ADMINISTRATIVE CHARGES

This is estimated as Rs.40.23 per tonne of coal as per latest guidelines received from CIL, Kolkata.

15.5.5 STORE COST

This is calculated as per the existing norms for opencast projects. For the purpose of cost estimate, the type of explosives to be used for this mine is considered in 30:70 ratios as High Strength Explosive and Low Strength Explosive.

15.5.6 As per Sanction letter No. 43011-38(3)-2005-CPAM, GOI, MOC, New Delhi, Dated-04.05.2006 under Emergency Coal Production Program of CIL the report envisages additional OB Removal by outsourcing means upto the initial five years. However, from the sixth year onwards, all the activities of OB removal are proposed departmentally except in-seam bands. Entire coal production is envisaged to be done by outsourcing by Surface Miner.

19.5.7 RATE OF LEASING OF HEMM

On the basis of letter no. SECL/BSP/CMC/RFC/1906, Dated 24/4/09, following rates are to be considered for the economic evaluation: -

A. COAL (By Surface Miner)

	Cutting (Rs./cum)	Cutting (Rs./t)	Loading (Rs./t)	Transportation (Rs./t)	Total (Rs./t)
Gevra	21.82	13.64	10.50	19.96 (2 KM – AVERAGE)	44.10 say 48.00 (Considering 10% Escalation)

B. OVERBURDEN

	Average Lead (Km)	Rate (Rs./cum)
Gevra	3.5	62.75 say 63.00

19.5.5 COA L PRODUCTION & OB REMOVAL

For economic evaluation of the project report (25 to 35 Mty), incremental coal production and incremental OB removal has been considered as follows:-

Year	1	2	3	4	5	6	7th onwards
Coal (Mty)	2.10	4.00	6.00	8.00	10.00	10.00	10.00
OB (Mcum)	4.00	4.00	4.00	4.00	4.00	11.06	11.20
OB to be outsourced	4.00	4.00	4.00	4.00	4.00	2.41	2.55

Note: For the first five years all OB removal will be done through outsourcing, 6th year onward, only inseam band will be outsourced.

15.6 SELLING PRICE

The weighted average selling price of coal for this project has been taken as Rs.567.00 per tonne for ROM processed coal (- 100 mm). The weighted average grade of coal is 'F' grade.

CALCULATION OF SELLING PRICE

(a) Price of 'F' grade coal per tonne* -Rs.520.00

(b) Price taken in PR of 'F' grade coal per tonne** -Rs.494.00

(c) Sizing charges (- 100 mm) per tonne -Rs. 55.00

(d) Rapid loading chargers by silo -Rs. 18.00

(e) Selling price considered in PR per te -Rs.567.00
(b+c+d)

*As per price notification No. CIL: S&M: GM (F): Pricing:1124 dated 12.12.2007.
**95% of the grade based on borehole data as per norms.

15.7 ESTIMATED COST AND PROFITABILITY

The Appendix-C shows the unit cost estimated and profitability for a rated output of 10.00 Mt of coal.

The overall cost of production at 100% and 85% operating level has been worked out as Rs.323.41 and Rs.356.31 per tonne respectively which results into a profit of Rs.243.59 and Rs.210.69 per tonne respectively at the calculated average selling price of Rs.567.00 per tonne. The project however, fails to result any profit below 43.35% (4.33 Mty) of the rated output level, which is its break-even-point.

The estimated cost of production and profitability at 80%, 85% & 90% level of operation are shown in Appendix-C.1.

The above cost/t is inclusive of EMP cost, the impact of which is Rs.15.19 per tonne as shown in Appendix-C.2.

15.8 IRR OF THE PROJECT

The internal rate of return for incremental 10 Mty at 100% and 85% level of production come to more than 100%.

NPV @16% at 100% and 85% level of production comes to Rs.98595 lakhs and Rs.66157 lakhs respectively.

15.9 CONCLUSION

The project has been planned with a high degree of mechanisation, in line with the present and forthcoming changes in neighboring mines as well as in other parts of the country.

The techno-economics have been worked out based on the prevalent norms of productivity, operating cost, spare consumption etc.

For meeting increasing demand of power grade coal in X Five Year Plan for upcoming thermal power houses, it is essential to approve and implement this project.

15.10 FLEXIBILITY

The flexibility in the implementation stage may be exercised within the approved cost estimates to respond to improvements in technology and equipment which would result in improved profitability and productivity measures. Following points may be considered under the flexibility:-

g) Re-alignment of project boundaries for better working layout / dump etc.

h) Change in the specification of HEMM to higher capacity at the time of procurement of new equipment or replacement of the equipment.

i) To procure state-of-the-art safety equipment, whenever they are introduced, even if the same is not provided in approved Project Report.

j) Relocation of site for infrastructure facilities depending upon techno-economic reasons and availability of land / forest area etc.

k) Hiring of equipment for drilling, blasting, loading, transportation etc., at a competitive price, so as to cater to the needs of increased demand of coal and subsequent removal of higher OB and for augmentation of coal production.

l) For upgradation of new technology in mining method for improving performance and reduction in manpower, at a subsequent date after project completion.

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