

REVISED MINING PLAN

(FIRST REVISION)

INCORPORATING THE SUGGESTION OF STANDING COMMITTEE

GOURANGDIH ABC COAL BLOCK

(370.00 Ha)

(2.5 MTY)

RANIGANJ COALFIELD, DISTRICT BURDWAN, WEST BENGAL

TEXT ONLY

VOLUME – I



GOURANGDIH COAL LIMITED

TOWER-A, 3RD FLOOR, DLF IT PARK, 8, MAJOR ARTERIAL ROAD,
BLOCK-AF, NEW TOWN, KOLKATA-700 156.

Prepared By

SUBHASH CHANDRA CHATTERJEE

Recognised Qualified Person

Street No. 1, Hindustan Park, P.O. Asansol – 713304

Reference No. 38011/4/2002 CA dated 17-10-2002

and No. 13016/48/2004-CA dated 6.8.2004

from Ministry of Coal and Mines, Govt. of India.

(APRIL 2011)



Gourangdih Coal Limited

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Head Office : G.T. ROAD (EAST), MURGASOL, ASANSOL-713303, PH. : 0341-2275430-34, Fax : 2275436
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PH.: 033-40002020, Fax : 033-40002010

Ref.: GCL/MoC/MP/2011/04

02 May 2011

To

Shri Sandeep Gupta,
Under Secretary (CPAM),
Govt. of India,
Ministry of Coal,
Shastri Bhavan,
New Delhi



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4/5/11 *[Handwritten initials]*

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Sub: **Presentation of Mining Plan (November 2010) for Gourangdih ABC Coal Block of Raniganj Coalfield, District Burdwan, West Bengal, of M/s Gourangdih Coal Ltd. - Observations of Standing Committee.**

Ref.: Govt. of India, Ministry of Coal, Letter No. 34011/20/2011-CPAM dated 8th April, 2011

Dear Sir,

With reference to your letter quoted above, we append below our point-wise reply to the observations of the Technical Members of the Standing Committee made during the presentation of the Mining Plan (November 2010) for Gourangdih ABC Coal Block on 8th March 2011.

1. **The name of the Mining Plan should be same as per allotment letter i.e. Gourangdih ABC Coal Block.**

The name of the Mining Plan has been made the same as per allotment letter i.e. Gourangdih ABC Coal Block.

2. **In Para 1.4.1. details about the capacity of power plants, coal requirement calculations, source to meet balance requirement of coal etc. should be given in tabular form.**

Requirement of coal, as per the allotment letter, capacity of the power plants and source to meet the balance requirement have been shown in the following table.

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-:2:-

Name of the company	Geological Reserve/ Movable Reserve (MT)	Capacity/Location of the EUP	Requirement of coal for 30 years (MT)	Proportionate share from Gourangdih ABC block (MT)	Balance Requirement of coal (MT)	Source coal meet balance requirement
M/s Himachal EMTA Power Ltd. (IPP)	131.7 / 61.53	500 MW (2x250 MW) at Raniganj, West Bengal	$2.3 \times 30 = 69.00$	30.765 (Equal sharing basis)	38.235	From additional coal block long term linkage
M/s JSW Steel Ltd. (CPP)		900 MW (3 x 300 MW) At Pashchim Medinipur, West Bengal	$4.14 \times 30 = 124.20$	30.765 (Equal sharing basis)	93.435	Additional coal block long term linkage

3. Loss of reserves on account of Gourangdih B not being worked should be incorporated. Also, area of this block should be furnished.

Loss of reserve on account of Gourangdih B not being worked is 22.09 MT. Seamwise coal sterilised in this block is given in Table 4.5

Total area of the allotted Gourangdih ABC coal block: 370.00 Ha

Gourangdih-A, (Area 127.53 Ha)

Gourangdih-B, (Area 90.83 Ha)

Gourangdih-C, (Area 151.64 Ha)

4. Population of Gourangdih village and other small & medium villages over the block should be furnished.

The coal block falls in Panuria and Kanta Pahari mouzas under Barabani CD Block. As per 2001 Census Report, population of these mouzas has been shown as 1271 and 395 families or 6838 and 1691 persons respectively. Almost entire population, of Panuria Mouza covers the coal block. Only a small part of the population of Kanta Pahari is located near the south-east fringe of the coal block.

[Signature]
Sd/-
Joint Secretary
Coal Block
Gourangdih

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Details of Village-wise and Basti-wise population along with other socio-economic status of the people living in the area are being studied by the NGO, to whom the work has been assigned by Gourangdih Coal Limited.

5. **Co-ordinates of the block boundaries should also be given in para 4.2, over the block should be furnished.**

Gourangdih ABC coal block lies within the co-ordinates, 148140 E to 152313 E and 108602 N to 110535 N. Co-ordinates of different points of the block boundary have been shown in **Plate No. 04 A**.

6. **Loss of reserves in barrier against the boundary has not been mentioned.**

Coal sterilised in the quarry batter and the barriers is given in **Table 4.5**

Seam	Quarry - A		Quarry - C		Quarry A& C		Already Extracted (MT)	Net Geological Reserve under Built-up Area in Gourangdih-B (MT)	TOTAL
	Batter	Barrier	Batter	Barrier					
					Batter	Barrier			
B-II	3.005	1.6	6.24	4.67	9.245	6.27	6.75	12.76	35.02
B-III (Bottom)	0.75	0.54	1.17	1.03	1.92	1.57	0.63	2.07	6.19
B-III (Top)	0.535	0.4	0.83	0.45	1.365	0.85	0.08	1.76	4.055
B-IV	0.57	0.38	2.22	1.02	2.79	1.4	0.09	1.96	6.24
B-V	0.88	0.6	0.86	0.69	1.74	1.29	0	1.31	4.34
B-VI	0.46	0.25	0.98	0.65	1.44	0.9	0	2.16	4.5
B-VII	0.14	0.12	0.07	0.031	0.21	0.151	0	0.07	0.431
TOTAL	6.34	3.89	12.37	8.541	18.71	12.431	7.55	22.09	60.78

Coal loss due to barrier in Gourangdih A & C is 3.89 MT and 8.541 MT respectively i.e. 12.431 MT in all the barriers.

[Signature]

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अ. प्र. प्र. ३-३-२०१५
को. प्र. प्र. ३-३-२०१५
भा. प्र. प्र. ३-३-२०१५



Gourangdih Coal Limited

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7. **Possibility of dumping overburden of Gourangdih A in de-coaled void of Khairabad to the maximum extent feasible should be examined to avoid/reduce external dumping.**

In Gourangdih- A which will be started first, the initial OB will be dumped over the already de-coaled area of Khoirabad colliery. The height of the OB dump will be about 60m above the original ground level.

Gourangdih-C will start dumping over the vacant space in the north of the quarry.

(Ref. Para 6.7.2)

It is proposed to merge both the external dumps with the respective internal dumps to increase the capacity of the external dumps. At the mine closure stage, the dump will be reshaped and graded so as to make the top of the dumps nearly to the level with the adjacent ground topography.

8. **Distance of siding from the mine and from siding to end use plants should be mentioned. Has the feasibility of having a railway siding at Gourangdih been examined?**

Coal will be despatched by rail to the Thermal Power Station of M/s Himachal EMTA Power Ltd., situated at Raniganj, a distance of about 45 km and to power station of M/s JSW Steel Ltd situated at Salboni, Pashchim Midnapur, 350 km from the proposed railway siding.

(Ref. Para 9.1.1)

The sidings serving the old mines in Gourangdih area have been abandoned after the closure of the mines. The sidings have been dismantled and new structures like houses etc. have come up in the area, ruling out the possibility of their revival.

(Ref. Para 9.1.2)

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वी. एल. बरुवा V. L. BARUA
अध्यक्ष, गौरांगदिह कोयला लिमिटेड
कोयला मंत्रालय, नई दिल्ली
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There is only one available siding line functioning within 6 km west of the property- namely Bonjemehari siding. As this siding is being used by ECL for dispatching coal, this siding cannot be utilized for despatch of coal from Gourangdih ABC block.

It is proposed to construct the full rake capacity new siding near Bonjemehari for dispatching coal. Coal will be transported from the mine to the railway siding through a dedicated road (approximately 7 km). **(Ref. Para 9.1.3)**

9. Estimated power demand given in para 11.2 appears to be on higher side, it should be re-examined.

The installed capacity of transformers at the sub station has been reviewed and has been estimated as follows:

Main Sub-station 2x 2 MVA, 33/11KV
Quarry Sub-station 2x500KVA, 11KV/0.433KV

10. Chapters on coal beneficiation, borehole details, and explosives etc are not included

Gourangdih-A and Gourangdih-C will produce 1.00 MTY and 1.5 MTY coal respectively. At present there is no proposal to wash the coal. However, if in future the end use plants require better quality coal, installation of a beneficiating plant may be considered.

(Ref. Para 9.2.1.1)

In all 57 boreholes were drilled aggregating to 7023.90 meters.

(Ref. Para 3.1.4)

Contd. ...P/6

वी. एस.
शतरु रसिनी
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भारत



Gourangdih Coal Limited

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Details, like Bore Hole no., Depth of Bore Hole, surface R.L. and co-ordinates, of all the 57 boreholes are given in **Table 3.2.**

Lithologs / borehole sections are given in **Plate Nos. 5A – 5I**

Requirement of explosives and other details of blasting etc have been described in Para 7.4 under the heading "Drilling and Blasting"

(Ref. Para 7.4)

11. **A separate mine closure plan should be submitted as per the mine closure guidelines as several features of mine closure plan are not up to the mark.**


Mine Closure Plan for Gourangdih ABC Coal Block has been prepared as per the guidelines issued by the Ministry of Coal, Govt. of India. The Mine Closure Plan has been approved by the Board of M/s Gourangdih Coal Company. Copy of the Plan is enclosed.

(Annexure. VIII)

12. **As per annexure-II, actual area of the block is 3.7 sq. km against 5.5 sq. km mentioned in geological report. It should be reconciled with competent authority/MoC.**

Geological Report mentions that 5.5 Sq. Km area was triangulated and surveyed. This covered the area of the coal block and the surrounding area much beyond the boundary of the coal block as marked in the geological plan and the Topographical Plan enclosed with the Geological Report. The area of the coal block measures 3.70 Sq. Km.

The Mining Plan has therefore been prepared as per the block boundary shown in the Geological Plan.


श्री. एस. सार्ना
अवर सचिव, कोयला मंत्रालय
नवी दिल्ली
SE. S. SARNA
ASST. SECRETARY
MINISTRY OF COAL
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Contd. ...P/7



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13. Possibility of shifting built-up area of Gourangdih B should be examined from conservation angle.

The remaining thickly populated and heavily built up areas like Gourangdih and Panuria villages in the middle of the property is named as Gourangdih- B which has been kept out of the preview of any mining activity.

However, in future if the residents of that area agreed to shift to other place further expansion of mine may be considered.

We are submitting herewith the Mining Plan incorporating the above suggestions in quadruplicate duly signed by the RQP for necessary approval at the earliest.

Thanking You,

Yours faithfully,

(N.C. MUKHERJEE)
DIRECTOR CUM CEO

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डॉ. एम. रामचंद्र रेड्डि
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PH.: 033-40002020. Fax : 033-40002010

Ref.: GCL/MoC/MP/2011/

June 1, 2011

To

Shri Sandeep Gupta,
Under Secretary (CPAM),
Govt. of India,
Ministry of Coal,
Shastri Bhavan,
New Delhi

Sub: **Presentation of Mining Plan (November 2010) for Gourangdih ABC Coal Block of Raniganj Coalfield, District Burdwan, West Bengal, of M/s Gourangdih Coal Ltd. - Observations of Standing Committee.**

Ref.: Govt. of India, Ministry of Coal, Letter No. 34011/20/2011-CPAM dated 8th April, 2011

Dear Sir,

Please refer to the point-wise reply to the above referred letter of Govt. of India, Ministry of Coal, submitted by us vide our letter no. GCL/MoC/MP/2011/11 dated 02 May 2011.

We regret that some of the Annexure mentioned in the "List of Annexure" at Page 37 of the Mine Closure Plan were not enclosed through oversight. Also, they were not properly indexed. We have therefore made the following corrections to the List of Annexure.

- No. 1: **Allocation Letter for Gourangdih Coal Block.**
No change. Allocation letter enclosed as **Annexure- I.**
- No. 2: **Board Approval for Mine Closure Plan.**
Board Approval for Mine Closure Plan was not enclosed through oversight.
A Certified true copy of the Resolution passed by the Board of Directors of M/s. Gourangdih Coal Limited at their meeting held on 26th March 2011 at 12.00 noon at EMTA Globe, 5B, Nandalal Basu Sarani, Kolkata - 700 071, is enclosed as **Annexure- II**
- No. 3: **Approval Letter of Ministry of Coal for the RQP.**
No change. Approval Letter of Ministry of Coal for the RQP enclosed as **Annexure- III**

Contd. ...P/2

For the Managing Director
Gourangdih Coal Limited
Asst. Manager (Legal)
Gourangdih Coal Limited
Asst. Manager (Legal)
Gourangdih Coal Limited

A JOINT VENTURE OF HIMACHAL EMTA POWER LIMITED AND JSW STEEL LTD.



Gourangdih Coal Limited

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- No. 4: **RQP Compliance Report regarding ML Area.**
No change. RQP compliance report regarding ML Area is enclosed as **Annexure- IV.**
- No. 5 & 6: **Mining Plan Approval Letter from Ministry of Coal & Environment Clearance from Ministry of Environment & Forests.**
Mining Plan approval letter from Ministry of Coal and Environment clearance from Ministry of Environment and Forests have not been enclosed, as these approvals have not been received as yet.
- No. 7: **Pre-Mining Environmental Parameters.**
Pre- Mining environmental parameters have been included in the main Text of the Mine Closure Plan. Therefore these have not been separately annexed.
- No. 8: **Consent Letter for preparation of Mine Closure Plan.**
Authorisation Letter no. GCL/MCP/MC/2010/12B dated 12th August 2010 is enclosed as **Annexure- V**

Further, calculation of Cost of Mine Closure and the annual amount to be deposited in the Escrow Account has been revised.

Earlier, the cost was calculated on the basis of the 'Mining Lease', as per Para 4, Page 2 of Guidelines for Preparation of Mine Closure Plan, issued by Ministry of Coal vide No. 55011-01-2009-CPAM dated 27th August 2009.

The revised cost calculation is based on Total Leasehold Area (As per Para 6.3 Page 10 of the Guidelines)

There is no other change in the Mine Closure Plan submitted earlier.

Four copies of the Mine Closure Plan, incorporating the above corrections are being submitted for approval.

Thanking You,

Yours faithfully,


(N.C. MUKHERJEE)
DIRECTOR CUM CEO



वी. एस.
जन प्रतिनिधि
कोषा. विभाग, भारत सरकार
भारत शास्त्राचार्य, NEW DELHI
नई दिल्ली/NEW DELHI

REVISED MINING PLAN

FOR

GOURANGDIH ABC COAL BLOCK

Dist. Burdwan, West Bengal.



GOURANGDIH COAL LIMITED

A Joint Venture of

Himachal EMTA Power Limited And JSW Steel Limited

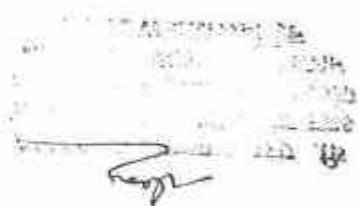
APRIL 2011

Plan prepared by me

(S. C. CHAKRABARTY)

Recognised by the Government of India (Ministry of Coal) vide No. 10-1/4-2002 dated 17.10.2002
Ministry of Coal, Government of India
No. 10-1/4-2002 dated 17.10.2002
The Govt. of India (Ministry of Coal) vide

VOLUME – II : Plates



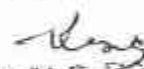
VOLUME – I	:	Executive Summary
	:	Text
	:	Appendices
	:	Annexure

Plan prepared by me


(S C CHAKRABORTY)

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Mineral Company Bill 2002 by Ministry
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Validity of recognition for 10 yrs.

VOLUME – I


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अवर सचिव/UNDER SECRETARY
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भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

Plan prepared by me


(S C CHATTERJEE)

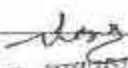
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MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

(S.C. CHATTERJEE)

Recognised Person as approved u/s 22(c) of
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 of Coal & Mines, Department of Coal vide
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MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

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MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

(S C CHATTERJEE)

Recognised by the Government of India under u/s 22 (C) of
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of Coal & Mines, Government of India vide
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MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

(S.C. CHARTERED)

Recognized by the Ministry of Coal, Government of India
under the provisions of the Coal Mines Act, 1902
(Section 22(c) of the Coal Mines Act, 1902)
and the Coal Mines (Consolidation) Act, 1952
(Section 22(c) of the Coal Mines Act, 1902)

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Plan prepared by me

Gourangdih Coal Limited

(S C CHATTERJEE)

Recognised & approved u/s 22 (C) of
Mineral Concessions Act, 1920 by Ministry
of Coal & Mines, Government of India vide
No. 280/14-2002 dated 17.10.2002

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

(S.C. CHATTERJEE)

Recognized under the provisions of the Coal Mines Act, 1902
Ministry of Coal & Mines
New Delhi
(Validity of Recognition till 31/03/2022)

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

(S. C. CHATTERJEE)


Recognised Person as approved u/s 22 (C) of
Mineral Concession Rules 1960 by Ministry
of Coal & Mines, Department of Coal vide
M.C. 1/4/2002-C.A. dated 17-10-2002
for 10 yrs.

**MINING PLAN FOR
GOURANGDIH ABC COAL BLOCK OCP**

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वी. एस. रामणा V. S. RAMANA
अध्यक्ष, गौरांगदीह
खाना बिल्ला
बल्लार

Plan Prepared by me


(S.C. CHATTERJEE)

Recognised Person as approved u/s 22(c) of
Mineral Concessions Act, 1920 by Ministry
of Coal & Mines, Government of India vide
No. 22414/2002 dated 17.03.2002
(Validity of Licence till 1.1.2016)

Gourangdih Coal Limited

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Gourangdih Coal Limited

**MINING PLAN FOR
GOURANGDIH ABC COAL BLOCK OCP**

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Plan Prepared by me

(S.C. CHATTERJEE)

Recognized Person as approved u/s 22(c) of Mineral Concession Rules, 1950 by Ministry of Coal, Govt. of India, New Delhi
Date: 17.10.2002
(Validity of recognition for 10 yrs.)

श्री. एस. रामसिंह. ड. राना
अवर जेनरल सेक्रेटरी
कोयला विभाग
भारत सरकार
नई दिल्ली

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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2	Annexure – II	MOC,s letter granting recognition to RQP vide letter no. 38011/4/2002-CA dated 17.10.2002 for preparing Mining Plan.
3	Annexure – III	Letter of Authorization by the Block Alottee/Applicant to the RQP for preparing Mining Plan.
4.	Annexure – IV	A Certificate by the RQP that he has been duly authorized by the mining company to prepare mining plan on their behalf and that he has a valid recognition from MOC under MCR, 1960 to prepare the mining plan and that provisions of all relevant rules and regulations have been considered while preparing the mining plan.
5.	Annexure – V	Certificate from empowered representative of/ or Block Alottee/Applicant that the mine will be developed as per the approval of the Mining Plan from Ministry of Coal and all other approvals, as required will be obtained from relevant authorities. Plan prepared by me

Gourangdih Coal Limited

(S. C. CHAT) :

Recognised Person as approved u/s 22 (C) of Mineral Concession Rules 1960 by Ministry

of Coal vide Department of Coal vide

dated 17-10-2002

valid for 10 yrs.

6	Annexure – VI	Confirmation from RQP that he has verified the Block area with the relevant plans supplied by CMPDI/SCCL/NLC and area covered by the Mining Plan does not encroach on any other Coal/Lignite Block.
7	Annexure – VII	Document to establish that the Geological Report Has been duly purchased from CMPDI, GSI/MECL as the case may be.
8	Annexure-VIII	Mine Closure Plan

Plan prepared by me

(S C CHA

Recognised Person approved u/s 22 (C) of
Mineral Concession Rules 1960 by Ministry
of Mines, Department of Coal vide
order dated 17-10-2002
valid for 10 yrs.

दी. एल. राणा

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Plan prepared by me

Gourangdih Coal Limited

(S C CHATTERJEE)

Recognised by the Government of India u/s 22 (C) of Mineral Concession Act, 1920 by Ministry of Coal & Mines, Government of India vide No. 300-1/4-2002 dated 17.10.2002
Validity of recognition for 10 yrs.

MINING PLAN FOR GOURANGDIH ABC COAL BLOCK OCP

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Plan Prepared by me

(S.C. CHATTERJEE)

Recognized Person as provided u/s 22(c) of
General Consol. Act, 1902 by Ministry
of Coal, Govt. of India
Gourangdih Coal Limited 17.10.2002
(Validity of Recognition for 10 yrs.)

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POINT-WISE REPLY TO THE OBSERVATIONS OF THE TECHNICAL MEMBERS OF THE STANDING COMMITTEE DURING THE PRESENTATION OF MINING PLAN (NOVEMBER 2010) FOR GOURANGDIH ABC COAL BLOCK ON 08.03.2011.

OBS.NO.	OBSERVATIONS MADE	REFERENCE IN MINING PLAN	
		PAGE NO.	PARA & TABLE NO.
1.	The name of the mining plan should be same as per allotment letter i.e. Gourangdih Abc coal block.	Revised	
2.	In Para 1.4.1. details about the capacity of power plants, coal requirement calculations, source to meet balance requirement of coal etc. should be given in tabular form.	I-4	Table 1.2
3.	Loss of reserves on account of Gourangdih B not being worked should be incorporated. Also, area of this block should be furnished.	IV-6 IV-2	Table 4.5 Para 4.3.1
4.	Population of Gourangdih village and other small & medium villages over the block should be furnished.	I-6	वी. एच. सहाय, प्रमुख, प्रशासनिक विभाग, कोयला विभाग, राँची, जमशेदपुर, जिला, झारखण्ड Para 1.7.1
5.	Co-ordinates of the block boundaries should also be given in para 4.2, over the block should be furnished.	IV-1	Para 4.2 & plate 04A
6.	Loss of reserves in barrier against the boundary has not been mentioned.	IV-6	Table 4.5
7.	Possibility of dumping overburden of Gourangdih A in de-coaled void of Khairabad to the maximum extent feasible should be examined to avoid/reduce external dumping.	VI-8	Para 6.7.2

Plan prepared by me

Gourangdih Coal Limited

8.	Distance of siding from the mine and from siding to end use plants should be mentioned. Has the feasibility of having a railway siding at Gourangdih been examined?	IX-1	Para 9.1.2
9.	Estimated power demand given in para 11.2 appears to be on higher side, it should be re-examined.	Revised in Para 11.2.1	
10.	Chapters on coal beneficiation, borehole details, and explosives etc are not included.	IX-1 III-4 VII-8	Para 9.2.1.1 Table 3.2 Para 7.4
11.	A separate mine closure plan should be submitted as per the mine closure guidelines as several features of mine closure plan are not up to the mark.	Prepared	
12.	As per annexure-II, actual area of the block is 3.7 sq. km against 5.5 sq. km mentioned in geological report. it should be reconciled with competent authority/moc.	Annexrue-VIII	
13.	Possibility of shifting built-up area of Gourangdih b should be examined from conservation angle.	IV-3	Para 4.4.3

Plan Prepared by me

(S.C. CHATOPADHYAY)

Recognised Person approved u/s 22 of the Coal Mines Act, 1902 by the Director, Coal Mines, Ministry of Coal & Mines, Government of India. No. 385114/2002 dated 17.10.2002. Validity of recognition (for 10 yrs.)

श्री. राजीव. B. RANA
UNDER SECRETARY
MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

SUMMARISED DATA

GOURANGDIH ABC COAL BLOCK OCP

A GENERAL	
a) Name and address of the Applicant Company	Gourangdih Coal Ltd. (A Joint venture of HEPL & JSW Steel Ltd.) Tower-A, 3 rd Floor, DLF IT Park 8, Major Arterial Road, Block – AF, New Town, Kolkata – 700156.
b) Name and address of the Block Allottee	Himachal EMTA Power Ltd., New Himras Building, Circular Road, Simla and JSW Steel Limited., 5A, Dr. G. Desmukh Marg, Mumbai
c) Relationship between the applicant and allottee company	Joint Venture Partner
d) Status of the Applicant Company: Central / Public Sector Undertaking/State Government Undertaking/JV Company/ Pvt Company/Public Co/Others (Specify)	Public Ltd. Co. registered under Companies Act.
e) Name of the Coal Block together with name of Coalfield & State where located	Gourangdih ABC Coal Block , Raniganj Coalfields Dist. Burdwan, West Bengal.
f) Date of allotment	10/07/2009
g) End Use of Coal/Lignite as per Approval by the Competent Authority	Exclusively to M/s Himachal EMTA Power Limited and M/s JSW Steel Ltd. In order to meet the requirement of coal for their power plant.
h) ROM Quantity proposed to be produced as per Mining Plan	2.5 MT/ Year
i) Norms adopted for calculating ROM quantity requirement if in case it differs from the quantity indicated in the Allotment Order.	Not applicable
j) Beneficiation required - Yes/No	No
k) Requirement of Beneficiated Coal & expected availability thereof	Not Applicable Plan prepared by me.

Gourangdih Coal Limited

(S C CHATTERJEE)

Recognised for approval u/s 22 (C) of
Mineral Concession Act, 1920 by Ministry
of Coal & Mines, Government of India vide
No. 280/1-4 2009 dated 17.10.2002

* Validated recordation for 10 yrs.

l)	Period for which Mining Lease has been granted / is to be renewed / is to be applied for.	27 Years, to be applied for.
m)	Date of Expiry of earlier Mining Lease, if any	Not applicable
n)	RQP who has prepared the Mining Plan Name Address Phone No / Fax No / Email ID Registration No & date till valid Date of grant/Renewal of RQP Status Validity	S.C.Chatterjee Street No. 1, Hindustan Park, P.O. Asansol – 713304 Dist. Burdwan, West Bengal Phone 0341 - 2250986 (R) / 2275431-35 (O) Fax 0341-2275436 scc3842@gmail.com 38011/4/2002 CA dated 17-10-2002 and No. 13016/48/2004-CA dated 6.8.2004 Valid for a period of 10 years from 17.10.2002.
B.	Information regarding earlier approved Mining Plans, if any	Not applicable
a)	Approval Letter no. and Date	
b)	Lease Area	
c)	Date of grant of Lease	
d)	Date of Expiry of Lease	
e)	Targetted Production	
f)	Proposed year of start of Production	
g)	Proposed year of achieving the targeted production level	
h)	Envisaged life of the mine (in years)	
i)	Date of actual commencement of Mining Operations, if operations already started	
j)	Likely date of Mining Operations, if operations not yet started & reasons for non-commencement of operations	
k)	Planned production and actual levels achieved in last 3 years	

Gourangdih Coal Limited

(S.C. CHATTERJEE)

Recognised Person as per xviii of 22(c) of
 Mineral Concessions Act, 1957 by Ministry
 of Coal & Mines, Govt. of India
 No. 14003300-1/2002 dated 21.10.2002
 (Valid for a period of 10 yrs.)

l)	Coal :- U/G O/Cast OB	
m)	Reasons for difference between the planned and actual production levels	
n)	Reason for revision of the Mining Plan	
o)	Details of changes in the new mining plan compared to earlier approval	
	Lease Area	
	Block Boundary	
	Production level	
	Mineable Coal Reserves	
	Mining Technology (Additional sheets to be used, if required)	
	Land use pattern	
	Forest land	
	Non-forest land	
C. LOCATION		
a)	Location of the Block Taluka/ Village/ Khasra/ Plot / Block Range / etc. District / State	Gourangdih Block ABC Sector covering an area of 5.5 Sq.Km. lies in the north central part of Raniganj Coalfields, Burdwan District, West Bengal.
b)	Name of the Coalfield/ Coal belt	Raniganj Coalfields
c)	Particulars of adjacent blocks: North, South, East, West	East: - Abandoned Gourangdih D Block in the East.
d)	Area of the Allotted Block (hectares) Geological block area Mining Block Area	370.00 Ha 370.00 Ha
e)	Reference no. of plan of block boundary issued by CMPDI/ SCCL/ NLC (A copy of the Plan is annexed)	M.E.C., D.O. No. 63/81, Plate No. III of Geological Report.
f)	Whether the lease boundary/ required boundary is same as demarcated by CMPDI/ SCCL / NLC for delineating block/sub-block	Same
g)	Existing mining Lease Area in case of existing mines, (hectares)	Not Applicable.
h)	Applied/ required Lease Area as per the Mining Plan under consideration (hectares)	Required Lease Area 214 Ha For Gourangdih A&C sector
i)	Whether the applied lease area falls within the allotted block	Yes

Plan prepared by me.

Gourangdih Coal Limited

(S C CHATTERJEE)

Recognised & approved u/s 22 (C) of
Mineral Concession Rules 1960 by Ministry
of Coal & Mineral Development of Govt of India
No. 28011/4-20(2) dated 17.10.2002
Validity of recognition for 10 years

j)	Area (hectares) of lease which falls outside the block/sub-block delineated by CMPDI/SCCL / NLC.	Nil
k)	<p>Details of outside area:</p> <p>Whether forms part of any other coal block</p> <p>Whether it contains any coal/lignite reserve</p> <p>Purpose for which it is required, e.g. roads/ OB dumps/service buildings/ colony/ safety zone/ others (specify)</p>	<p>The additional area required outside the leasehold area 142.67 Ha</p> <p>No</p> <p>Not Applicable</p> <p>external OB dump: 62.97 Ha, infrastructure: 9.50 Ha, Roads : 8.0 Ha, safety zone etc: 45.20 ha, rehabilitation colony: 12.00 Ha & township. 5.00 Ha</p>
l)	<p>Whether some part(s) of the allotted block has not been applied for mining lease</p> <p>Total area in Ha of such part(s).</p> <p>Total reserves in such part(s).</p> <p>Brief reasoning for leaving such part(s).</p>	<p>Yes.</p> <p>78.52 Ha</p> <p>Reserve: 60.78 Mt.</p> <p>Built up area in sector B.</p>
m)	<p>Type of Land involved in Hectares</p> <p>- Forest Land</p> <p>- Non Forest Land</p> <p>o Tenancy Land</p> <p>o Govt. Land</p> <p>o Fallow Land</p>	<p>92.53 Ha</p> <p><u>277.47 Ha</u></p> <p>370.00 Ha</p> <p>48.13 Ha. (Agri.)</p> <p>78.52 Ha (Built up)</p> <p>73.19 Ha.</p> <p>15.44 Ha (Water Body)</p> <p><u>62.19 Ha</u></p> <p>277.47 Ha</p>
n)	<p>Broad Land Use Pattern (Forest, Township, Industrial, Agricultural, Grazing, Barren etc.)</p> <p>o Agricultural (Tenancy Land)</p> <p>o Govt. land including road, nullah, pond, open space, etc.</p> <p>o Fallow land</p> <p>o Forest Land (Zudpi Jungle)</p> <p>o Plan Prepared by me</p>	<p>Same as in (m) above</p> <p><i>(Signature)</i></p> <p><i>(Stamp)</i></p>

Gourangdih Coal Limited

Recognized Person as per rule 23(a) of
Mineral Concession Rules, 1961 (by Ministry
of Coal & Mines, Government of India)
No. 1011/4/2002-Genl. (Mines) (23.2a/2)
(Validity of recognition for 10 yrs.)


o)	Proximity of public road / railway line/major water body if any and approximate distance	Power transmission lines and Asansol-Domahini road passing over the coal block will be diverted.
p)	Topo sheet No. with latitude and longitude	Survey of India Topo Sheet No.73 1/13. Latitudes 23°48'30"N & 23°49'45"N Longitudes 86°57'45"E & 87°00'15"E
D. GEOLOGY AND EXPLORATION		
a)	Name of the Geological Block and area in hectares	Gourangdih Block: ABC Sector 3.7 Sq. Km
b)	Name of the Geological Report (GR) with year of preparation	Geological Report on Exploration for Coal Gourangdih Block: ABC Sector, Raniganj Coal Field, District Burdwan, West Bengal.
c)	Name of the agency which conducted exploration and prepared GR	Detailed exploration by Mineral Exploration Corporation Limited and CMPDI.
d)	Period of conducting exploration	May 1978 to October 1980.
e)	Details of drilling (by all agencies)	57 boreholes were drilled by MECL aggregating to 7023.90 metres.
f)	No. of boreholes drilled within the block	57
g)	Overall borehole density within the block (no./sq. km)	15
h)	Area covered by 'detailed' exploration within the block (hectares)	3.7 sq.km. <i>[Signature]</i>
i)	Area covered by 'detailed' exploration outside the block (hectares) No. of boreholes drilled outside the block Bore hole density for outside area (no./sq. km)	Nil 4 borehole for proving boundary fault.
j)	Whether entire lease area has been covered by 'detailed' exploration.	Built up area of densely populated villages in Sector B has not been explored. As such this area has not been considered for mining or for lease in the present Mining Plan

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Gourangdih Coal Limited

(S.C. CHARTER 1931)

Recognised by the Government of India u/s 22 (C) of the Mineral Concessions Act, 1930 by Ministry of Coal & Mines, Government of India vide No. 28011/4-2002 dated 17.10.2002
 Validity of recognition for 10 yrs

k)	Whether any further exploration is required or suggested and timeframe in which it is to be completed	Further exploration will be required in Sector B, when the villages are vacated and the area is free for mining.		
l)	Number of coal/lignite seams/horizons thickness range of coal seams (in meters) mean thickness of total coal horizon (in meters) Standard Deviation of thickness Minimum & maximum depth of coal seams 	Seam	Thickness range in m	Quality UHV/Grade
		B-I	0.24-2.52	5491-3183 C-F
		B-II	5.68-25.07	1972-3242 F-G
		B-III bottom	0.67-7.33	2759-5022 D-E
		B-III Top	0.97-4.92	1958-3890 F-G
		B-IV	1.57-7.92	2759-4415 D-F
		B-V	3.52-9.89	3545-5684 B-F
		B-VI	5.02-8.85	3863-4153 D-E
		B-VII	0.27-1.46	3670 E
		Maximum depth of quarry: Gourangdih A: 120m Gourangdih B: 210m		
m)	Gross Calorific Value (GCV in K Cal/kg) and useful Heat Value (UHV in K.Cal/Kg) of coal as per GR: <div>Range</div> <div>Mean</div>	UHV 1958 to 5684 Kcal/kg		
o)	Total geological reserves in the block	129.15 MT		
p)	Depletion of reserves (in case of running mine)	Not Applicable		
q)	Geological reserves considered for mining : <div>by Opencast</div> <div>by Underground</div>	129.15 MT NIL		
r)	Corresponding Extractable reserves: <div>by Opencast</div> <div>by Underground</div>	68.37 MT for Gourangdih A&C NIL		
t)	Percentage of recovery w.r.t. geological reserves: <div>by Opencast</div>	90%		

Plan Prepared by me

Gourangdih Coal Limited

(S.C. CHATTERJEE)

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Recognised Person as per sub-section 22(c) of
Coal Mines Act, 1902 as amended by Ministry
of Coal, Government of India, New Delhi
Date: 10.10.2022
Place: Ranchi


	by Underground			
	* Seam wise details of items (f) to (t) included in Chapter 4			
E.	MINING			
a)	Existing and proposed method of mining (Opencast for OB & coal separately with dragline/ shovel / surface miners/ manual/ etc.) (Underground by longwall / bord & pillar / continuous miners/LHD/ SOU manual/ etc.)	OPENCAST OB – Shovel-dumper combination with 5m³ hydraulic shovel, 60 Te dumper trucks, Drilling & Blasting. Coal – Shovel dumper combination.		
b)	The Peak capacity as well in addition to targeted capacity in mtpa when the mine is fully developed and the year in which proposed to be achieved <div>by Opencast by Underground Total</div>	In the 3 rd year 2.50 MT NIL 2.5 MT		
c)	Life of the mine <div>by Opencast by Underground Overall</div>	27 Years Nil 27 Years सी. एस. बरना जिला प्रमुख, कोयला विभाग, राँची, झारखण्ड		
d)	Indicate quantum of production and expected grade as in table below :-			
	Year	Coal (MT)	OB (Mm³)	ROM Grade
	1.	0.50	2.50	F
	2.	1.50	5.20	F
	3.	2.50	7.25	F
	4.	2.50	7.25	F
	Total for full lease period of 27 years	61.54	179.37	
	Detailed calendar programme of coal production year wise and seam wise along with OB removal furnished in Chapter 7.			
e)	Whether the proposed external OB dump site is coal / lignite bearing: - If so, whether coal/lignite below waste disposal area is extractable	No		

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Gourangdih Coal Limited

(S C CHARTER 17)

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of Coal & Mines, Govt. of India vide
No. 280 (142)2-1 dated 13.10.2002
for recognition for 10 yrs.

f)	Whether negative proving for coal / lignite in the proposed site for OB dump/ Infrastructure has been done	Yes.
g)	Proposed configuration of HEMM for OC (Coal & OB) & Major Equipment for UG.	OB: 1. 5 m ³ Diesel Hydraulic (a). Shovel: 3 (b). Backhoe: 3 2. 60 T Rear Dumper: 36 3. 160 mm RBH drill: 4 3. 410 HP dozer : 6 COAL: 1. 3.2 m ³ DH shovel: 2 2. 2.5 m ³ DH Backhoe: 2 3. 60 T Rear Dumper: 20 4. 160 mm RBH drill: 2 320 HP Dozer: 4
	Mode of entry for underground mines (shaft, incline, adit)	Not applicable
i)	Operations that are proposed to be outsourced	Coal transport to railway siding
j)	Proposed coal evacuation facilities Face to Surface Mine to railway siding Surface to end use plants	Rear Dumpers Tipping trucks Railways
F. END USE OF COAL / LIGNITE		
a)	Capacity of the approved end use plants	i) <u>Power plant of Himachal EMTA Power Limited.</u> Proposed Capacity: 2x250 MW 1x250 MW (First Phase) Location: Ballavpur/Raniganj ii) <u>Captive Power Station of JSW Steel Limited.</u> Installed Capacity 900 MW in phases, 1 st Phase 300 MW. Location: Salboni, Paschim Midnapur, West Bengal.
<p style="text-align: center;">  श्री. एस. राना S. RANA ज्येष्ठ अभियन्ता (मिनिंग) कोयला विभाग, भारत सरकार नई दिल्ली-110002 </p> <p>Plan Prepared by me</p>		

Gourangdih Coal Limited

(S.C. CHATTERJEE)

Recognised Person as provided xxxiv(c) of
Mineral Conservation & Development Act, 1988 by Ministry
of Coal & Mines, Govt. of India vide
F.No. 12011/M/2002 dated 11.10.2002
(Validity of recognition for 10 yrs.)

b)	Coal/ lignite requirement for end use plant with grade/quality	1. M/s. Himachal EMTA Power Ltd (IPP): 69 MT 2. M/s. JSW Steel Ltd. (CPP): 124.20 MT
c)	%age of end use requirement to be met from this mine	1. M/s. Himachal EMTA Power Ltd (IPP): 95.43 % 2. M/s. JSW Steel Ltd. (CPP): 53.02 %
d)	If washing / beneficiation of the coal/ lignite is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the beneficiation and recovery rate with consumption of water etc.	Not proposed.
e)	Proposed Use of Rejects / Middlings	Not Applicable.
G. ENVIRONMENTAL MANAGEMENT		
a)	Existing land use pattern	Tenancy (Agricultural) Land – 48.43ha. Govt. Land – 73.19 Ha. - 15.44 (water body) Forest Land – 92.53 Ha.
b)	Land area indicating the area likely to be degraded due to mining, dumping, roads, workshop, washery, township etc.	Due to Mining: 214 Ha Ext. OB Dump: 62.97 Ha Rehab. Colony: 12.00 Township: 5.00 Ha Roads: 8.00 Ha Infrastructure: 9.50 Ha.
c)	Surface features over the block area	Power transmission lines and Asansol-Domahini road passing over the block area. Further some villages e.g Shibdhawara, Banddhawra, Lalbandh, Panuria, Gourangdhi, Kantapahari & Bhuiapara. In addition some illegal construction like Refractories, Crusher etc. exist.
d)	No. of villages/Houses to be shifted	GourangdihA: Shivdhawra Banddhawra Lalband

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Gourangdih Coal Limited

XXV

(S C CHATTERJEE)

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Valid for 10 yrs

		Gourangdih C: Panuria Gourangdih Katapahari Bhuiapara
e)	Population to be affected by	Gourangdih A: 950 Gourangdih C: 1090
f)	Year wise proposal for reclamation of land affected by mining activities	Progressive reclamation by topsoil proposed of external & internal dumps
g)	Monitoring schedules for different environmental components after the commencement of mining and other related activities.	Detailed under Environmental Management (Chapter 17)
H. PROGRESSIVE AND FINAL MINE CLOSURE PLAN (A separate chapter is incorporated)		
a)	Estimated total capital expenditure for mine closure activities	@ Rs. 6 lakh per Ha. of land used plus other closure costs to be estimated later.
b)	Major closure Activities with proposed Capital expenditure i) ii) iii) iv) Other activities	Capital expenditure towards closure activity to be detailed under a separate Mine Closure Plan to be submitted prior to start of mining operations.
I. OTHERS		
a)	Base date of Mining Plan	November 2010
b)	Calendar year from which the production will start	2013
c)	Results of a n y investigation carried out for scientific mining conservation of minerals and protection of environment; future proposals.	Nil
d)	Signature of RQP Date : Place :	

Plan Prepared by me

(S.C. CHATTERJEE)

Gourangdih Coal Limited

Recognised under the provisions of u/s 22(c) of
Mines Act, 1923 by Ministry
of Coal vide
17.10.2002
(10 yrs.)

EXECUTIVE SUMMARY

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(S.C. CHATTERJEE)

Recognised Person under rule 23(c) of
Mineral Concessions (Regulation) Act, 1923
of Coal & Mines, Ministry
No. 38011/4/2002 - C.A. dated 17/12/2002
(Validity of recognition for 10 yrs.)

EXECUTIVE SUMMARY

1.0 INTRODUCTION

1.1 GENERAL

- 1.1.1 The Gourangdih ABC Coal Block in Raniganj Coalfield in the State of West Bengal was allotted for captive mining of coal jointly by M/s Himachal EMTA Power Limited and M/s JSW Steel Limited in order to meet the requirement of coal for their Power Plants vide ref. No. 13016/79/2008-CA-I dated 10th July 2008 (Annexure - I).
- 1.1.2 Accordingly Gourangdih Coal Limited a joint venture company was formed between Himachal EMTA Power Limited and JSW Steel Limited for undertaking captive mining of coal from the allotted block.
- 1.1.3 The Geological Report on the Gourangdih ABC Block was purchased from CMPDI. The Geological Report was prepared by MECL in March 1981 at the instance of Central Mine Planning and Design Institute, Ranchi.
- 1.1.4 The Mining Plan has been prepared on the basis of the above Geological report.
- 1.1.5 Mining activities by both Open Cast and Underground methods have been continuing in this area since before nationalization of coal. The Central Mine Planning & Design Institute (CMPDI) proposed to the Mineral Exploration Corporation Limited vide their letter no. RI-1/Geology/77/707 dated 29.1.77 to undertake detailed exploration for coal in the Gourangdih Block for estimating the Net Reserves available in the block.

Gourangdih Coal Limited

E-1

(S C O-179-100)

Recognised & approved u/s 22 (C) of Mineral Concessions Act, 1930 by Ministry of Coal & Mines, Govt. of India vide No. 10014-2/2002 dated 17.10.2002
valid for 10 yrs.

- 1.1.6 Accordingly, initial proposal for drilling of 30 boreholes aggregating 3500 meters in 8 sq. km area was drawn up. The original proposal was revised after review of the available data and with the inclusion of open cast proposition up to 1:5 cut-off ratio covering seam B- II and above.
- 1.1.7 MECL commenced drilling in the ABC sector in May, 1978 and completed by October 1980 with a total of 57 grid, structural and incrop boreholes aggregating to 7023.90 meters.
- 1.1.8 As per the allotment letter, the coal produced from this captive mine will be supplied to M/s Himachal EMTA Power Limited for its power plant at Ranigunj, West Bengal and to M/s JSW Steel Ltd. for its power plant at Paschim Medinipur, West Bengal on the basis of equal sharing of the reserves.
- 1.1.9 The salient features of the proposed Gourangdih ABC Block opencast mine are as follows :

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(S.C. CHATTERJEE)

Recognized Director
Mineral Commission
New Delhi
No. 10-42802
(Validity of registration 10 yrs.)

वी. एस. राणा/V. S. RANA
अवर सचिव/UNDER SECRETARY
केन्द्रीय मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

Table no. 1.1
Table showing salient features of Proposed Gourangdih ABC Opencast Project

Sl. No.	Particulars	Unit	Value
1	Geological reserves	Mt.	129.15 MT
2	Mineable reserves	Mt.	61.54 MT
3	Target capacity	Mt./y	2.5
4	Excavation category - OB		50% Cat III + 50% Cat IV
5	Excavation category - Coal		100% Cat III
6	No. of Coal Seams		7 (B-II to B-VII)
7	Av. stripping ratio	cum/t	2.91
8	Annual max. OBR at rated capacity	MCum.	7.25
9	Life	Years	27
10	Grade of ROM coal		F
11	Main mining equipment		OB – Shovel (5-6 cum Diesel Hy. Shovel)+ Rear dumper (60T) Coal – 3.2 Cum Diesel Hy. Shovel & 2.5 Cum Diesel Hy. Backhoe, 60T Rear Dumpers
12	OMS	T	19.68
13	Initial capital Investment	Rs. in crores	621.71
14	Specific investment	Rs./t	2486.83
15	Investment on P&M	Rs. in crores	378.41
16	Year of achieving the target coal Production (2.5 Mty.)	Year	Year 3
17	Box cut - OBR - Coal	Mcum Mt.	5.00 1.00

(S.C. CHATOPADHYAY)

Manager

Gourangdih Coal Limited

No. 100/2002

(Validity of record)

Gourangdih Coal Limited

Approved u/s 22(c) of
 M.C.A. Act, 1956 by Ministry
 of Coal, Govt. of India

Gourangdih Coal Limited

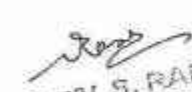
1.2 CONSTRAINTS

- 1.2.1 The area is thickly populated and a number of developed villages are situated within the proposed mining area. Apart from the villages, different types of industries are also present. A number of power lines, important roads connecting Jharkhand and from Chittaranjan to Asansol also pass over the property.

1.3 NEED FOR THE COAL PROJECT

- 1.3.1 As is evident from the letter of allotment of block (Annexure – I) the coal produced from this block will cater to the requirement of the power plants of M/s Himachal EMTA Power Limited and M/s JSW Steel Limited on the basis of equal sharing of the coal reserves.

Table 1.2 Details about the capacity of power plants, coal requirement calculations

Name of the company	Geological Reserve/ Minable Reserve (MT)	Capacity/Location of the EUP	Requirement of coal for 30 years (MT)	Proportionate share from Gourangdih ABC coal block (MT)	Balance Requirement of coal (MT)	Source of coal to meet balance requirement
M/s Himachal EMTA Power Ltd. (IPP)	131.7 / 61.53	 V. S. RANA Joint Secretary Ministry of Coal Government of India New Delhi (2x30 MW) at Raniganj, West Bengal	2.3 x 30 = 69.00	30.765 (Equal sharing basis)	38.235	From additional coal block or long term linkage
M/s JSW Steel Ltd. (CPP)		900 MW (3 x 300 MW) At Pashchim Medinipur, West Bengal	4.14 x 30 = 124.20	30.765 (Equal sharing basis)	93.435	Additional coal block or long term linkage

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Gourangdih Coal Limited

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(S C CHATTERJEE)


Recognised & approved u/s 22 (C) of Mineral Concession Rules, 1950 by Ministry of Coal & Mines, Government of India vide No. 22011/4200 dated 17.10.2002
Validity of recognition for 10 yrs

1.4 In view of the surface constraints of built up areas, Gourangdih ABC block has been considered in three sub blocks namely, Gourangdih – A, Gourangdih – B and Gourangdih – C for mine planning. Opencast mining will be done for the seams from B-II – B-VII in Gourangdih – A and Gourangdih – C quarries. It will not be feasible to work Gourangdih – B as this area is heavily built up and densely populated.

1.4.1 The Mining Plan envisages mining of 61.54 MT of coal between Gourangdih A and Gourangdih C quarries for an annual production target of 2.5 MTY at an overall stripping ratio of 2.91 m³/te. The proposed life of the project is 27 years. Out of the total extractable reserve of 61.54 MT, the extractable reserve in Gourangdih A is 24.46 MT and that in Gourangdih C is 37.08 MT. The reserves in Gourangdih B will not be worked as this area is heavily built up and excavation is not considered feasible.

1.5 CURRENT LAND USE PATTERN


1.5.1 The block has an undulating topography and the area is industrially developed. A large part of the area is also covered with forest. The break-up of Land requirement and pre-mining land use pattern of the proposed project are as follows:


श्री. एस. काना S. KANA
अवर सचिव/अवर कोऑर्डिनेटर
कोयला मंत्रालय/मिनिस्ट्री ऑफ कोयला
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

Gourangdih Coal Limited

E-5

Plan prepared by me


(S C CHATTERJEE)

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Mineral Concession Rules 1960 by Ministry
of Coal & Mines, Government of India vide
No. 2001/4-20 dated 17.10.2003
valid for 10 yrs

Table-1.3
Land Requirement

Sl. No.	Particulars of utilization	Total land Required (Ha)	Type of land. (Ha)	
			Non-Forest	Forest
1	Quarry area	214.00	121.47	92.53
2	External dump	62.97	62.97	0.00
3	Infrastructure	9.5	9.5	0.00
4	Rehabilitation colony	12.00	12.00	0.00
5	Workers Colony	5.00	5.00	0.00
6	Road	8.00	8.00	0.00
7	Others including safety zone	45.2	45.2	0.00
Total		356.67	264.14	92.53

Table- 1.4
Pre – Mining land Use Pattern

Sr. No.	Existing Land Use	Area (in Hectares)
1	Agricultural Land	48.43
2	Fallow (Danga) Land	62.19
3	Degraded Land (Old Quarry Area)	60.22
4	Built up Area	60.86
5	Water Body	15.44
6	Forest Land (Protected and Reserved)	92.53
7	Non Agricultural Land for Colony (outside core area)	5.00
8	Non Agricultural Land for Rehabilitation (outside core)	12.00
	Total	356.67

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Person as approved vide 22(c) of Mineral Concession Rules, 2002 by Ministry of Coal & Mines, Government of India vide No. 5811/42202-0 Dated 17.10.2002 (Validity of recognition for 10 yrs.)

डी. एन. एन. १०/१०/१०
अथवा एमिनेन्स डी. एन. एन. १०/१०/१०
कॉन्सल्टेंट्स/CONSULTANTS OF COAL
भारत सरकार/GOV'T. OF INDIA
नई दिल्ली/NEW DELHI

1.6 VILLAGE REHABILITATION

- 1.6.1 The coal block falls in Panuria and Kanta Pahari mouzas under Barabani CD Block. As per 2001 Census Report, population of these mouzas has been shown as 1271 and 395 families or 6838 and 1691 persons respectively. Almost 2/3 area, and entire population, of Panuria Mouza covers the coal block. Only a small part of the population of Kanta Pahari is located near the south-east fringe of the coal block.

Gourangdih/Panuria village, which falls in Panuria Mouza is situated in the middle of the property. The area is densely populated and there are various industries in the area since long. A number of small sized bastis / villages other than Gourangdih village are located in the block.

Shibdhaora, Bandhdhaora, Lalband falling in Gourangdih-A will need to be relocated as they fall in the excavation area.

Part of Panuria and Kanta Pahari villages, Bhuia Nanupara and Upperpara falling in Gourangdih-C will also be shifted

2.0 LOCATION, PHYSIOGRAPHY & CLIMATE

2.1 LOCATION & COMMUNICATION

- 2.1.1 The Gourangdih Block-ABC Sector covering an area of 5.5 sq. km., lies in the north central part of the Ranigarh Coalfield, Burdwan District, West Bengal. It falls between Latitudes 23°48'30" & 23°49'45" and Longitudes 86°57'45" & 87°00'15" and is included in the Survey of India Topo Sheet No. 73 I/13.

- 2.1.2 The area is well connected by rail and road. Gourangdih was the terminal railway station of Andal Gourangdih section of the Eastern Railway and is located about 38 km from Andal, on the Howrah- Delhi line of the Eastern Railway. The railway line

Gourangdih Coal Limited

E-7

(S.C.C.)
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No. 280/14-2002 dated 17-10-2002
Valid for 10 years

connecting Gourangdih Station and Andal has however been truncated.

- 2.1.3 A part of Asansol- Domohani road passes through the southern part of the area. Asansol town is located about 20 km from this project.

2.2 PHYSIOGRAPHY

- 2.2.1 The area presents topography with gentle undulations and gentle northerly slope. In the north-western part, coarse grained sandstones have given rise to small mounds. The maximum ground elevation is 174 mt above MSL in the north-west while the lowest level found in the south-central zone is 135 mt above MSL.

2.3 CLIMATE

- 2.3.1 The area is situated close to the Tropic of Cancer and thus enjoys tropical climate. The temperature varies from 25° to 28° during winter and 34° to 37° during summer. During December and January, which are the coldest months, temperature varies from 10° C to 14° C during day and night.

- 2.3.2 The average rainfall in the area is about 1180 mm. Major part of this precipitates during June to October.

3.0 GEOLOGY AND DEPOSIT APPRAISAL

3.1 GENERAL

- 3.1.1 Detailed exploration in an area of 5.5 Sq. Km. was done by Mineral Exploration Corporation Limited (MECL) at the instance of CMPDI during the period between May 1978 and October 1980. A total of 57 boreholes were drilled aggregating to 7023.90

Plan Prepared by me

Gourangdih Coal Limited

(S.P. CHATTERJEE)

Recognised Person, empowered u/s 22(c) of
Mines Act, 1923 by Ministry
& Director, Coal vide
No. 10/2002
(Validity of Recognition 10 yrs.)

meters. The exploration work done by MECL in Gourangdih ABC block are shown below:

1)	Topographical surveying & physical features	-	5.5 Sq. Km.*
2)	Geological Mapping	-	5.5 Sq. Km.
3)	Drilling		
	i) No. of boreholes drilled	-	57 Nos.
	ii) Total meterage drilled	-	7023.90m
4)	Sampling		
	i) No. of boreholes sampled	-	41
	ii) Total Coal core length	-	1279.22m

Geological Report mentions that 5.5 Sq. Km area was triangulated and surveyed. This covered the area of the coal block and the surrounding area much beyond the boundary of the coal block as marked in the geological plan and the Topographical Plan enclosed with the Geological Report. The area of the coal block measures 3.70 Sq. Km.

The Mining Plan has therefore been prepared as per the block boundary shown in the Geological Plan.

- 3.1.2 The area is devoid of good rock outcrops. The general stratigraphic sequence of the rocks in the explored 'ABC' Block as establish from MECL borehole data is given below:

Table 3.1

Location of Boreholes with RL

S. NO.	BORE HOLE NO.	TOTAL DEPTH (M)	REDUCED LEVEL (M)	CO-ORDINATE	
				LATITUDE (M)	DEPARTURE (M)
1	GRD-1	293.05	156.160	52026.751	44592.404
2	GRD-2	260.30	139.490	51233.182	45579.276
3	GRD-3	199.70	149.625	51518.772	44721.631

Gourangdih Coal Limited

E-9

(C.C. INTERVIEW)

Plan approved as approved u/s 22(c) of Mines Act, 1950 by Ministry of Coal, Government of India vide No. 261/2002 dated 17.10.2002 (Validity of recognition for 10 yrs.)

Mining Plan for Gourangdih ABC Coal Block O C P

S. NO.	BORE HOLE NO.	TOTAL DEPTH (M)	REDUCED LEVEL (M)	CO-ORDINATE	
				LATITUDE (M)	DEPARTURE (M)
4	GRD-4	141.65	147.335	51829.360	45212.857
5	GRD-6	195.85	153.275	51747.950	44198.144
6	GRD-7	150.10	155.695	51991.267	44775.912
7	GRD-8	175.00	142.555	51458.884	46027.513
8	GRD-9	235.25	146.095	51114.354	46261.374
9	GRD-10	237.20	156.480	51976.647	43778.796
10	GRD-11	203.25	143.525	51131.052	46732.761
11	GRD-12	100.20	145.565	51425.963	46888.045
12	GRD-13	80.00	151.865	52191.563	45448.685
13	GRD-14	111.60	144.405	51750.783	46151.935
14	GRD-15	53.65	144.530	51974.613	45816.095
15	GRD-17	86.60	156.740	52335.874	44996.765
16	GRD-18	98.30	166.535	52396.331	44592.461
17	GRD-22	105.40	155.970	52376.237	43792.885
18	GRD-23	94.00	172.455	52441.154	44217.839
19	GRD-24	165.05	144.490	51698.173	45504.335
20	GRD-25	291.60	135.405	51021.290	45822.200
21	GRD-27	164.05	139.480	51615.813	45810.915
22	GRD-28	41.20	152.875	52259.293	45330.315
23	GRD-29	52.80	147.910	52014.563	45610.695
24	GRD-30	223.75	147.745	51409.524	45218.804
25	GRD-31	69.10	140.990	51979.463	46084.845
26	GRD-32	131.60	149.355	51430.073	46402.835
27	GRD-33	50.30	148.075	51739.474	46405.393
28	GRD-34	200.15	149.920	51751.120	44491.376
29	GRD-35	165.90	145.920	51240.205	46607.244
30	GRD-36	62.70	148.530	51609.783	46622.295
31	GRD-37	61.65	142.525	51428.023	47306.155
32	GRD-38	71.25	141.295	51450.030	47070.570
33	GRD-39	55.60	148.195	52631.559	44794.916
34	GRD-40	35.55	151.325	52690.104	44521.515
35	GRD-41	113.55	164.145	52037.667	44012.016
36	GRD-42	149.70	154.705	52623.557	43997.056
37	GRD-43	123.40	162.550	52218.781	44708.069
38	GRD-44	129.25	167.600	52222.274	44207.184
39	GRD-45	111.10	155.260	52088.672	45004.299
40	GRD-46	90.00	164.670	52352.397	44017.876

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S. NO.	BORE HOLE NO.	TOTAL DEPTH (M)	REDUCED LEVEL (M)	CO-ORDINATE	
				LATITUDE (M)	DEPARTURE (M)
41	GRD-47	117.60	142.870	51755.613	45789.065
42	GRD-48	212.00	150.145	51633.548	44522.976
43	GRD-49	228.35	151.010	51369.274	44966.666
44	GRD-50	168.05	155.125	51845.940	44804.509
46	GRD-56	70.00	157.155	51929.40	44356.02
47	GRD-57	29.00	159.950	52201.03	44836.36
48	GRD-58	38.70	141.785	51789.36	45887.26
49	GRD-59	35.80	146.270	51848.56	45653.86
50	GRD-60	41.50	144.590	51537.36	45458.40
51	GRD-61	38.25	138.100	51496.89	45744.97
52	GRD-62	35.90	149.495	51656.64	45176.67
53	GRD-63	26.20	146.035	51161.32	46506.58
54	GRD-64	27.30	148.995	51903.33	45408.27
55	GRD-66	150.40	145.170	51246.110	46955.130
56	GRD-68	109.35	158.005	52208.98	43795.55
57	GRD-69	201.40	154.380	51826.01	43953.08
45	GRD-51	211.10	153.440	51707.250	44937.456

3.1.3 On the basis of drilling, eight distinctly correlatable and persistent coal horizons have been identified in the Barakars of the area. However, exposures of coal are rare and are mainly confined to the quarries. While the B-II seams are exposed in a number of quarries to the north-west and north-east, the seams B-IV, B-V & B-VI are locally exposed in small quarries in the eastern part of the area. In the central part near GRD-17 the B-IV seam (exposed in an abandoned quarry) is in juxtaposition with B-V seam (represented by para lava) due to faulting.

3.1.4 The most characteristic and unusual feature of the area is the 'para lava' which is exposed in the western part in a long narrow trench, following the outcrop position of the B-V seam. The clay

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bed as well as the silicified ferruginous sandstone are termed as Para lava and is possibly the result of sub-aerial burning of the coal seam (under oxidising conditions) and effect of the heat on the overlying sandstone.

3.2 STRUCTURE

3.2.1 STRIKE & DIP:

The strike of the strata shows a gradual swing from N 65- 70° W-S 65- 70° E in the east to nearly east-west in the west, with around 8° to 13° southerly dips. The increase in the dip is generally gradual from west to east. The local variations in the strike and dips are caused by incidence of faulting.

3.2.2 FAULTS:

It has been possible to demarcate 17 faults (F1 to F17) based on sub-surface data. All of these are normal gravity faults and die out towards up dip side. The F9, F10 and F12 are a combination of strike and oblique faults. Excluding the three faults in the extreme east which are dipping towards south, south east, all the oblique and dip faults with the exception of F9 dip either towards north or west. Fault F9 is the only south dipping fault in the western part of the area.

3.3 STRATUM CONTOUR

3.3.1 Stratum contours of the seams have been shown at 10 m interval.

3.4 COAL SEAMS:

3.4.1 The parameters of eight correlated and laterally persistent coal seams and their intervening partings are shown in the following table.

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(Sd/-) Joint Secretary, Ministry of Coal

with 400m grid interval and involved a total of 7023.90 meters of drilling. The borehole GRD - 1 is the deepest borehole (293.05m) whereas GRD - 63 is the shallowest borehole (26.20m) drilled in the block.

Overall borehole density in Gourangdih ABC block measuring 5.5 Sq. Km is 10.36 per Sq. Km which is considered adequate for deposit appraisal with high level of confidence.

3.6 MINE FLOOR:

Since B-I seam is not workable due to patchy deposit and thickness being inconsistent with a thick parting below B-II seam, therefore the floor of the coal seam B II has been planned as the open pit floor. The strike of the quarry floor shows a gradual swing from N65° - 70°W to S65° - 70°E in the east to nearly east west in the west with southerly dip of 8° to 13°. The increase in the dip is generally gradual from west to east. The local variations in the strike and dips are caused by incidence of faulting.

4.0 MINE BOUNDARY, RESERVES AND MINE LIFE

4.1 GENERAL

The mine boundaries of Gourangdih OCP have been fixed considering the block boundary, various surface constraints, geological information and topography.

4.2 BLOCK BOUNDARY

Gourangdih ABC coal block within the co-ordinates, 148140 E to 152313 E and 108602 N to 110535 N. Co-ordinates of different points of the block boundary have been shown **Plate No. 04 A.**

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Table- 3.2
Description and Quality of Coal Seams

Sl. No.	Particulars of deposit	Thickness range (m)	Quality (UHV/Grade)	Remarks
1	Seam B- I	0.24 – 2.52	(5491-3183)/ (C-F)	inconsistent deposit*
2	Parting	5.65-37.75		
3	Seam B- II	5.68-25.07	(1972-3242)/ (F-G)	Consistent with varying thickness
4	Parting	7.36-23.33		
5	Seam B- III (Bottom)	0.67-7.33	(2759-5022)/ (D-E)	Consistent
6	Parting	1.45-13.58		
7	Seam B- III (Top)	0.97-4.92	(1958-3890)/ (F-G)	Consistent
8	Parting	0.41-10.38		
9	Seam B- IV	1.57-7.92	(2759-4415)/ (D-F)	Extensively worked out by U/G
10	Parting	3.65-18.55		
11	Seam B- V	3.52-9.89	(3545-5684)/ (B-F)	'PARA LA VA' found within F2, F4 & F6. U/G development in eastern and western part.
12	Parting	54.50-69.81		
13	Seam B- VI	5.02-8.85	(3863-4153)/ (D-E)	Burnt in patches. Worked in the east by O/C & U/G.
14	Parting	9.74-25.70		
15	Seam B- VII	0.27-1.46	3670/E	

* The seam exhibits wide range of thickness varying from 0.24m to 2.52m the thickness of 1.2m and above occurs only in two patches away from each other in the central and Western part of the block. The parting of the seam with overlying B-II seam also shows marked variation. The parting shows marked increase on the west and northeast of GRD 9 also increases towards north west till it rocks a maximum of 37.15m in GRD17. In view of its uneconomical thickness on the updip side and along its incrop position as also marked increase in the parting, the seam has not been considered viable as for multi-seam opencast proposition along with seam B-II to B-VII as per the GR.

3.5 GEOLOGICAL MODELLING:

MECL has drilled 57 boreholes within the block during the course of detailed exploration. The boreholes were generally spaced

The boundary of Gourangdih ABC block has been delineated along the following limits as per the Geological Report. (Ref. Geological Plan Plate No. III of Geological Report).

- A) North: The in-crop position of B – II seam forms the northern limit.
- B) South: The southern boundary is defined by the Fault F13 and F12.
- C) East: The eastern boundary of the block is determined by Fault F17.
- D) West: Fault F1 determines the western boundary of the block.

4.3 MINE BOUNDARIES DELINEATION

4.3.1 For preparation of the mining plan the Gourangdih block is considered in three sub blocks namely

Gourangdih-A, (Area 127.53 Ha)

Gourangdih-B, (Area 90.83 Ha)

and Gourangdih-C, (Area 151.64 Ha)

Total area of the coal block: 370.00 Ha

Among the three sub blocks Gourangdih-A and Gourangdih-C have been worked partially both by underground and open cast method in the past. Gourangdih-B being the most thickly populated and built up area, the underlying seams were not worked and are mostly virgin. Mining activity may not be possible in this area due to presence of two densely populated villages namely Gourangdih and Panuria. Surface boundaries of Gourangdih-A and Gourangdih-C have therefore been delineated keeping safe distance 60 m from those villages. However, a part of Panuria

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village is to be relocated as that part has fallen within the boundary of Gourangdih-C quarry.

4.4 NOMENCLATURE CONSIDERED IN MINE PLAN

4.4.1 The Gourangdih 'ABC' coal block has been demarcated in this Mining Plan based on the geographic location and surface constraint. Gourangdih-A is the west side of the property starting from Khoirabad in the north, end of Shibdhaora and upto Gourangdih village in the east, west block boundary in the west and north block boundary in the north.

4.4.2 Gourangdih-C is the eastern property of the block leaving out the major part of Panuria village. A small part of Panuria village in its east side has been considered in the area of Gourangdih-C.

4.4.3 The remaining thickly populated and heavily built up areas like Gourangdih and Panuria villages in the middle of the property is named as Gourangdih- B which has been kept out of the preview of any mining activity. However, in future if the residents of that area agreed to shift to other place further expansion of mine may be considered.

4.5 PIT FORMULATION STRATEGY AND PIT DELINEATION:

The following table outlines the boundary delineation of the blocks considered for mining.

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Table- 4.1
Delineation of Boundary

Quarry	East	West	North	South
Gourangdih- A	Surface limit kept 100 m from Gourangdih village	Surface limit has been kept 7.5 m from Block Boundary	Existing face of Khoirabad is the limit in the north-western part and the remaining part Block Boundary is the surface limit.	Fault F13 is the southern limit.
Gourangdih- C	Surface limit has been kept at 100 m from Kanta Pahari village. (A part of Kanta Pahari village within 100m from surface limit may need rehabilitation).	Surface limit kept 100 m from Gourangdih and Panuria villages.	Faces of old abandoned quarries in B-II Seam are the limit.	Surface limit has been kept upto the fault F13.

4.6 COAL RESERVES

The following table shows the seam wise net and total net geological reserves in Gourangdih ABC block as per the GR.

Table 4.2
Seam-wise Net Geological Reserves within the Block

SL. No.	Seam	Net Geological Reserves (MT)
1.	B-II	71.06
2.	B-III (Bottom)	14.84
3.	B-III (Top)	8.99
4.	B-IV	13.77
5.	B-V	12.54
6.	B-VI	7.49
7.	B-VII	0.46
	TOTAL	129.15

4.7 COAL STERILISED & MINING LOSS

Inspite of considerations for maximizing exploitation of coal reserves within the block a substantial quantity of coal reserves will be sterilised or reduced due to the following considerations.

- (1) Reserves locked up below densely populated and heavily built up areas namely Gourangdih, Panur and Kantapahari villages.
- (2) Reserve blocked in Batters of Quarry A & Quarry C.
- (3) Reserves already extracted by ECL.

A mining loss of 10% on Net available reserves has been considered to arrive at the net mineable reserves.

The following table shows the Net Geological reserves in the block and the net available reserve for mining.

Table 4.3
Net Geological and Available reserve in the block

Seam	Net Geological Reserve in ABC Sector (MT)	Net Available Reserve for Mining (MT)		
		Quarry – A	Quarry – C	Quarry – A & C
B-II	71.06	12.07	21.67	33.74
B-III (Bottom)	14.84	3.85	4.94	8.79
B-III (Top)	8.99	2.91	2.52	5.43
B-IV	13.77	3.23	5.21	8.44
B-V	12.54	4.39	3.52	7.91
B-VI	7.49	0.57	3.21	3.77
B-VII	0.46	0.15	0.13	0.29
TOTAL	129.15	27.18	41.2	68.37

The table below shows the net geological reserves sterilised due to batter, below built up areas and also the reserves already

extracted till date

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Table 4.4

**Net Geological Reserves in Batter, Barrier, Already Extracted and
Net Geological Reserve under Built-up area.**

SEAM	Net Geological Reserve in Batter and Barrier (MT)						Already Extracted	Net Geological Reserve under Built-up Area (MT)	TOTAL
	Quarry – A			Quarry – C					
	Batter	Barrier	Total	Batter	Barrier	Total			
B-II	3.005	1.6	4.605	6.24	4.67	10.91	6.75	12.76	19.67
B-III (Bottom)	0.75	0.54	1.29	1.17	1.03	2.2	0.63	2.07	2.92
B-III (Top)	0.535	0.4	0.935	0.33	0.45	1.28	0.08	1.76	2.20
B-IV	0.57	0.38	0.95	2.22	1.02	3.24	0.09	1.96	5.29
B-V	0.88	0.6	1.48	0.86	0.69	1.55	0	1.31	2.79
B-VI	0.46	0.25	0.71	0.98	0.65	1.63	0	2.16	2.87
B-VII	0.14	0.12	0.26	0.07	0.031	0.101	0	0.07	0.34
TOTAL	6.34	3.89	10.23	12.37	8.541	20.911	7.55	22.09	42.90

A consolidated table showing the NET Geological Reserves within the block as per GR, Net Reserves sterilised or not available, Net Available Geological Reserve and Net Mineable Reserve is given in 4.5.

Along
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Table 4.5

SL No.	Particulars	Reserves (MT)
1.	Net Geological Reserve within the block as per GR	129.15
2.	Reserves Sterilised / Not Available	60.78
3.	Net Available Geological Reserve	68.37
4.	Less 10% Mining Loss	6.837
5.	Net Mineable Reserve	61.53

4.8 MINE LIFE

The total life of the project works out to 27 yrs at a peak target annual capacity of 2.50 MTY of coal. The project will achieve the target capacity in 3rd year. After exhaustion of coal Mine Closure activities will be continued for another two years.

4.9

QUARRY PARAMETERS

The parameters of the quarry for Gourangdih 'A' and Gourangdih 'C' has been summarized in Table 4.6:

Table 4.6
Quarry Parameters

Sl. No.	Parameters	Unit	Gourangdih-A	Gourangdih-C
1. Seam thickness				
i	Seam V	m.	6-9	1.2-7
ii	Seam IV	m.	2-4	3-7
iii	Seam III Combined	m.	NA	NA
iv	Seam III Top	m.	2-3	1.2-3
v	Seam III Bottom	m.	3-4	3-6
vi	Seam II	m.	6-11	13-24
vii	Seam I	m.	1-2	0-1
2. OB/ Parting thickness				
i	Above Seam V	m.	54-60	54-70
ii	Seam V – Seam IV	m.	3-15	5-18

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Sl. No.	Parameters	Unit	Gourangdih-A	Gourangdih-C
iii	Seam IV – Seam III Top	m.	0.4-9	2-10
iv	Seam III Top – Seam III Bottom	m.	1.4-10	2-14
v	Seam III Bottom – Seam II	m.	7-20	10-24
vi	Seam II – Seam I	m.	6-25	10-38
3.	Dip of the seams	Degree	8°-13°	
4.	Maximum depth	m	120	210
5.	Max. length along strike			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
6.	Max. width of quarry			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
7.	Area of Excavation			
	a. At surface	Ha	96	117
	b. At floor	Ha	65	70

4.10 GEO MINING CHARACTERISTICS

- 4.10.1 The geo-mining parameters of Gourangdih- A and Gourangdih- B are given below.

Table- 4.7
Geo Mining Parameters

Sl. No.	Parameters	Unit	Gourangdih-A	Gourangdih-B
1	a Quarry Area	at Surface	95.6	117.52
	b	at Floor	64.88	70.75
2	a Gradient of	Maximum	18	26.6
	b Seam	Minimum	6	13
3	a Strike Length	Maximum	1513	1254
	b	Minimum	443	389
4	a Width of Quarry	Surface	1565	1760
	b at	Floor	1453	1576
5	a Av. Effective	Rise	13	17
	b Seam thickness	Dip	35	45
6	Total OB	Mm ³	66.64	112.73
7	Total Coal	Mte	24.46	37.08
8	Stripping Ratio	m ³ /te	2.72	3.04
9	GRAND TOTAL			
	i) Coal	Mte	61.54	
	ii) OB	Mm ³	179.37	
	iii) Stripping Ratio	m ³ /te	2.91	

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5.0 METHOD OF MINING

5.1 SELECTION OF MINING METHOD

5.1.1 Gradient of seam in general is 8° to 13° . It is proposed to work the mine by horizontal slicing method with sump at floor of the quarry. Strike lengths of both the quarries reduces towards dip due to surface constraints.

5.2 TECHNOLOGY OPTIONS

5.2.1 Technology Option for Non-restricted Area

5.2.1.1 Due to occurrence of multiple coal seams, parting of varying thicknesses, multiplicity of faults (17 numbers) and steep gradient (8° to 13°), blasting restrictions in the proximity of built up areas, application of Dragline is not considered attractive.

5.2.1.2 Shovel and dumper combination is considered to be the most suitable technology under prevailing geo-mining conditions.

5.2.1.3 For opencast operation the top soil will have to be removed first with the help of 5 m^3 backhoe in conjunction with 60 T rear dumpers. This top soil shall be dumped separately and to be used at a later date for capping of backfilled area for land reclamation. After stripping of top soil hard overburden will be worked in benches of 12m height.

5.2.1.4 The overburden benches will be worked with 5 m^3 hydraulic shovels and 60T dumpers. 160 mm dia RBH drills will be used for drilling and blasting will be done with SMS explosives.

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5.2.1.5 All the partings less than or equal to 12 m will also be drilled by 160 mm blast hole drills. Backhoe shovels of capacity 5 m³ in conjunction with 60 T rear dumpers will be deployed there.

5.2.1.6 The dumpers will haul the O.B. material initially to the de-coaled zone of Khoirabad mine in case of Gourangdih-A quarry and external waste dump in the rise side in case of Gourangdih-C quarry.

5.2.2 Technological Option for Coal Mining

5.2.2.1 Under the prevailing conditions, conventional shovel dumper system has been selected for reasons of limited strike length and presence of a number of faults.

6.0 MINE DEVELOPMENT & DUMPING STRATEGY

6.1 CONSTRAINTS ON MINE DEVELOPMENT

6.1.1 The mining area consists of three sub blocks namely Gourangdih-A, Gourangdih-B and Gourangdih-C. Among the three sub blocks Gourangdih-A and Gourangdih-C have been worked partially both by underground and open cast methods in the past. Gourangdih-B is the most populated and developed area, and mining activity may not be possible in this area due to presence of two densely populated villages namely Gourangdih and Panuria. Surface boundaries of Gourangdih-A and Gourangdih-C have been delineated keeping safe distance (100 m from surface boundaries) from those villages. However, a part of Panuria village is to be evicted and rehabilitated for working Gourangdih-C quarry.

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6.1.2 Quite a number of illegal quarrying has spread especially near Shibdhaora village and old abandoned quarries. Special care has to be taken before excavation of the overlying OB against subsidence and outbreak up fire due to spontaneous combustion in subsided areas.

6.1.3 Due to the presence of a number of villages in the vicinity of the mine controlled blasting technique has to be adopted within the 500m zone of villages as well as steps are to be taken to control the dust and noise problems.

6.2 INITIAL MINE ENTRY

6.2.1 The mining operation will be started first in the Gourangdih-A quarry from the north – west. The mining operation will start from the existing Khoirabad face. B-II seam being the thickest among all will contribute the major share of production. Some quantity of devolatilized coal (jhamra) may also be produced during extraction of coal. The other overlying seams will be worked within five years.

6.2.2 Gourangdih-C will start operation from the 2nd year of mining activity from south west side of the quarry. Gourangdih-C will yield more coal than Gourangdih-A due to its having more reserves.

6.3 SEQUENCE OF MINING

6.3.1 After the development of box-cut, mining operation will be continued in Gourangdih- A quarry. The quarry will be advancing along the strike as well as towards the dip. As the

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Date

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quarry advances towards dip the upper seams will gradually be met with. The overlying seams R-III(B), R- III(T) and part of R- IV will be available in the first year of working.

6.3.2 The quarry will reach its full strike length in the third year and it will subsequently narrow down as it advances towards the dip side. The quarry will reach its target (1.00 MTY) in the third year and will continue till 25th year.

6.3.3 The existing road connecting Asansol to Runakuraghat passes over the eastern flank of Gourangdih – C quarry. This road is proposed to be diverted towards further east of the quarry.

6.3.4 The main access trench in Gourangdih – C will be made from the north western part of the quarry. Initially a narrow strip on the floor of B-II along the strike direction will make a link between the entry point and quarry end this will be continued till the 5th year of operation. During this period the evacuation and rehabilitation of part of the Panuria village envisaged in the mining plan is required to be completed. The quarry will continue till the end of the mine life. The target of 1.5 MTY from Gourangdih – C will be achieved in 3rd year of its operation.

6.4 MINING SYSTEM AND SYSTEM PARAMETERS

6.4.1 The following Table shows the geological and Mining Characteristics of this open cast project take.

Table 6.1
Quarry Parameters

Sl. No.	Parameters	Unit	Gourangdih-A	Gourangdih-C
1. Seam thickness				
i	Seam V	m.	6-9	1.2-7
ii	Seam IV	m.	2-4	3-7
iii	Seam III Combined	m.	NA	NA
iv	Seam III Top	m.	2-3	1.2-3
v	Seam III Bottom	m.	3-4	3-6
vi	Seam II	m.	6-11	13-24
vii	Seam I	m.	1-2	0-1
2. OB/ Parting thickness				
i	Above Seam V	m.	54-60	54-70
ii	Seam V – Seam IV	m.	3-15	5-18
iii	Seam IV – Seam III Top	m.	0.4-9	2-10
iv	Seam III Top – Seam III Bottom	m.	1.4-10	2-14
v	Seam III Bottom – Seam II	m.	7-20	10-24
vi	Seam II – Seam I	m.	6-25	10-38
3.	Dip of the seams	Degree	8°-13°	
4.	Maximum depth	m	120	210
5.	Max. length along strike			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
6.	Max. width of quarry			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
7.	Area of Excavation			
	a. At surface	Ha	96	117
	b. At floor	Ha	65	70

6.5 MINING OPERATION

6.5.1 Method of mining has been indicated in the sections 6.2, 6.3 and 6.4.

6.5.2 Controlled blasting technique will have to be adopted to minimise vibration within 500 m of villages. To restrict to 2000 kg of

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E-26

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explosive per round in that zone 3-4 rounds of blasting are required to meet the target production. By having two independently operated quarries the requirement of blasting in each quarry will be to 2-3 rounds leading to reduction in loss of production time on account of blasting operation.

6.6 DUMPING STRATEGY

6.6.1 In steeply inclined quarries, stability of dump in the de-coaled zone is to be maintained carefully and progress of backfilling becomes slow in view of larger gaps required to be left between the benches and dump toe.

6.6.2 In Gourangdih OCP land will be required outside the quarry area for initial OB dumping.

6.7 SOLID WASTE MANAGEMENT

6.7.1 Geological formation met in this block consists of soil and Barakar formation. The soil consists of clayey soil and sandy lateritic soil. The Barakar formation consists of shale, sandstone, mica-peridotite etc. Thickness of soil varies from 0 to 9.6 m.

6.7.2 In Gourangdih- A which will be started first, the initial OB will be dumped over the already de-coaled area of Kharabad colliery. The height of the OB dump will be about 60m above the original ground level.

Gourangdih-C will start dumping over the vacant space in the north of the quarry.

6.7.3 The total quantity of OB including access trenches has been estimated as 179.37 Mm³, which includes about 9.6 Mm³ of soft OB.

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E-27

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Validity of recognition for 10 yrs.

- 6.7.4 The OB/waste stripping operations will start firstly with top soil removal which will be stacked separately for reclamation purpose and transported to top soil dump on temporary basis. Around 7 ha land will be required for stacking separately. This soil shall have to be spread over the top of reclaimed dump at a later date as a measure of land reclamation.
- 6.7.5 The OB to be dumped externally and internally amounts to 37.15 Mm³ and 142.22 Mm³ respectively.
- 6.7.6 It is proposed to merge both the external dumps with the respective internal dumps to increase the capacity of the external dumps. At the end of mining operation the height of external dumps and internal dumps would be about 60 m above adjacent surface level. The maximum RL of internal dump at the end of mining operation would be 220 m above MSL. However at the mine closure stage, the dump will be regarded so as to make the top of the dumps nearly to the level with the adjacent ground topography. The excavated areas of both the quarries will be fully reclaimed. The RL of the top of dump at this stage will be 150-160m above MSL for both the quarries.
- 6.7.7 The angle of individual dump will follow its natural angle of repose. The angle of slope of dumps should not be steeper than 28° to the horizontal.
- 6.7.8 A clear space of 30 m width along the toe of external dumps is to be maintained for safety.

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(S.C. CHATTERJEE)
E-28
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No. 35011-KP/2002 dated 17.10.2002
(Validity of re-approval 12 yrs.)

- 6.7.9 Track dozers to be deployed for shaping the dumps.
- 6.7.10 Width of 80m to be maintained in the active dumping side between each deck of shovel dumper dump for safe dumping.
- 6.7.11 A wedge of sufficient height to be formed, 10 to 15m away from the dump edges. Dumpers should dump before this wedge, which will eventually be dozed by the dozers. This wedge is to be maintained in every active dump edge during dumping operations. Sufficient lights are to be maintained, especially at night operations on active dump edges.
- 6.7.12 Final reclamation will be done during closure period using the equipment provided for the purpose.
- 6.7.13 Toe of dumps are to be reinforced by construction of retaining walls or leaving adequate wedge at the mine floor (for internal dump).
- 6.7.14 Quantity of external dump, internal dump and reclaimed area at the end of different years of mining operation is shown in the Table 6.2 below

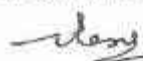

 श्री. एच. एस. चटर्जी, माना
 अध्यक्ष, भारतीय कोयला
 संघ, कोयला, भारत
 भारत

Table 6.2
Dump Quantities and Reclaimed Area

Year of Mining Operation	External Hard OB Dump Quantity		Internal Hard OB Dump Quantity		Soft Dump				Soft OB Reclaimed			
					External		Internal		Over External OB dumps		Over Internal OB dumps	
	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area
	In Mcum	In Ha	In Mcum	In Ha.	In Mcum	In Ha.	In Mcum.	In Ha.	In Mcum.	In Ha.	In Mcum.	In Ha.
Initial Mine Cut												
1 st year	2.35	13.75	0.00	0.00	0.15	1.25	0.00	0.00	0.00	0.00	0.00	0.00
2 nd year	7.30	18.21	0.00	0.00	0.40	2.79	0.00	0.00	0.00	0.00	0.00	0.00
3 rd year	14.24	42.59	0.00	0.00	0.71	5.41	0.00	0.00	0.00	0.00	0.00	0.00
4 th year	21.16	52.57	0.00	0.00	1.04	8.03	0.00	0.00	0.00	0.00	0.00	0.00
5 th year	23.61	60.50	4.52	16.80	1.32	11.00	0.00	0.00	0.02	1.25	0.00	0.00
10 th year	39.64	62.57	24.00	60.50	2.06	13.73	0.00	0.00	0.04	2.79	0.00	0.00
15 th year	47.10	62.97	52.17	85.45	2.68	13.73	0.00	0.00	0.08	5.41	0.00	0.00
20 th year	47.10	62.97	88.01	104.00	3.09	13.73	0.01	2.00	0.12	8.03	0.00	0.00
Final stage	47.10	62.97	129.08	112.50	3.09	13.73	0.10	20.00	0.17	11.00	0.25	16.00

6.7.15 Position of mining faces, haul roads and internal dumps at different stages of mining operations are shown in the following drawings –

- All stage plans with plate nos. 7A, 7B, 7C, 7D.
- Final dump and end of mining operations (Plate Nos. 9).
- Closure plan (Plate No. 12).
- Section along dumps (Plate No. 11).

7.1 MINING SCHEDULE AND EQUIPMENT PHASING

7.1.1 Annual production programme on target year is indicated below.

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(S.G. CHATTERJEE)

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of Coal vide
No. 10/2002
Dated 10/10/2002
E-30

Table-7.1
Annual Production Programme

Particulars	Total Production	Quarry	Production
Coal	2.50 Mte	Gourangdih- A	1.00 Mte
		Gourangdih-B	1.50 Mte
O.B.	7.25 Mm ³	Gourangdih- A	2.70 Mm ³
		Gourangdih-B	4.55 Mm ³

7.2 CALENDAR PROGRAM OF EXCAVATION

- 7.2.1 The calendar programme of excavation has been drawn up to end of quarry life starting from first year of excavation. The contribution of production from Gourangdih-C quarry will be substantially more than that from Gourangdih - A.

[Handwritten signature]
 Mr. S. C. Chatterjee
 Director, Coal India Ltd.
 New Delhi

Plan prepared by me

[Handwritten signature]
 (S. C. CHATTERJEE)

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 Mineral Concessions Act, 1950 by Ministry
 of Coal & Mines, Government of India vide
 No. 1/4 2002 dated 17.10.2002
 Validity of recognition for 10 yrs.

Table- 7.2
Calendar Programme of Excavation

Year	Gourangdih-A			Gourangdih-C			Gourangdih-A & C		
	Coal (Mte)	OB (Mm3)	SR (m3/te)	Coal (Mte)	OB (Mm3)	SR (m3/te)	Coal (Mte)	OB (Mm3)	SR (m3/te)
1	0.50	2.50	5.00				0.50	2.50	5.00
2	1.00	2.70	2.70	0.50	2.50	5.00	1.50	5.20	3.47
3	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
4	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
5	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
6	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
7	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
8	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
9	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
10	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
11	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
12	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
13	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
14	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
15	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
16	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
17	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
18	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
19	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
20	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
21	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
22	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
23	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
24	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
25	0.96	2.04	2.12	1.50	4.55	3.03	2.46	6.59	2.68
26				1.50	4.55	3.03	1.50	4.55	3.03
27				0.58	1.03	1.79	0.58	1.03	1.79
Total	24.46	66.64	2.72	37.08	112.73	3.04	61.54	179.37	2.91

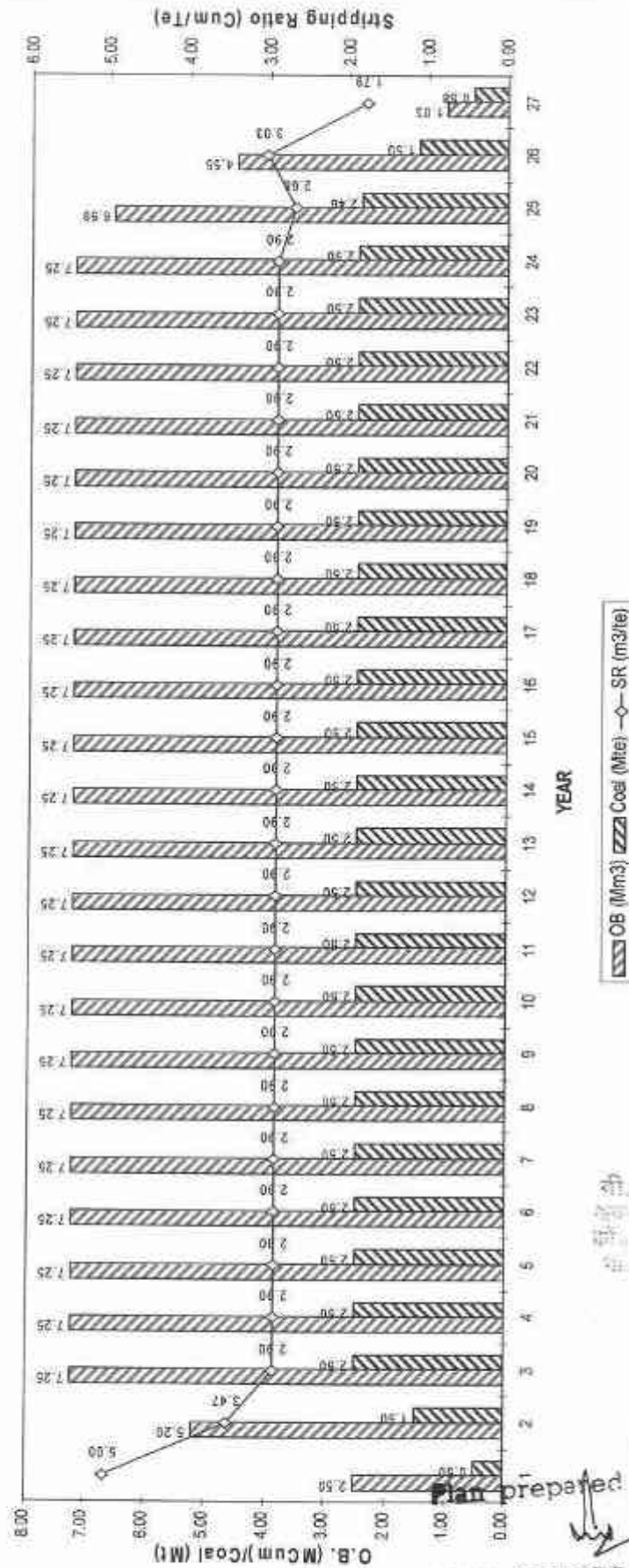
Plan Prepared by me

(S.C. CHATTERJEE)

Gourangdih Coal Limited

I, authorised Person, have approved u/s 22(c) of
E-32 - JG (Consolidation) Act, 1950 by Ministry
of Coal, Government of India vide
order dated 17.12.2002
(10 years.)

Opencast Coal Production, OB Removal & Stripping Ratio



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(S C CHATTERJEE)

Recognized Plan as approved u/s 22 (C) of Mineral Concessions Rules-2002 by Ministry of Coal & Mines, Government of India dated 17.10.2002. Validity of recognition for 10 yrs.

Gourangdih Coal Limited

7.3 EQUIPMENT SCHEDULE

7.3.1 Types and strength of mining equipment worked out for the target production and suited to the geo mining condition of coal and overlying strata is shown in the table- 7.3.

Table-7.3
Type & Size of Major HEMM

Sl. No.	Particulars	Quantity
A	OB	
1	5 m ³ Diesel Hydraulic Shovel	3
2	5 m ³ Diesel Hydraulic Backhoe	3
3	60 T Rear Dumper	36
4	160 mm RBH Drill	4
5	410 hp Dozer with ripper attachment	6
B	COAL	
1	3.2 m ³ Diesel Hydraulic Shovel	2
2	2.5 m ³ Diesel Hydraulic Backhoe	2
3	60 T Rear Dumper	20
4	160 mm RBH Drill	2
5	320 hp Dozer	4
C	RECLAMATION	
1	0.9 m ³ Diesel Hydraulic Backhoe	1
2	410 hp Dozer	1
3	28 kl Water Sprinkler	2
4	280 hp Motor Grader	1
D	COMMON	
1	2.5 m ³ Pay Loader	1
2	100-115 mm CA Drill	1
3	28 KL Water Sprinkler	4
4	280 hp Motor Grader	4
5	Diesel Bowser	2
6	Diesel Tanker	2
7	5T Fork Lift	1
8	Boom Truck	2
9	6-8T Tyre Handler	2
10	55T Crane	1
11	30T Crane	1
12	Vibratory compactor	1

Plan Prepared by me

(S.C. CHATTERJEE)

Gourangdih Coal Limited

Organised & approved by Ministry of Coal, Govt. of India
New Delhi
1.10.2002
(Secretary of Coal)

7.4 DRILLING & BLASTING

Due to the location of the project to close proximity to thick populated villages i.e., Gourangdih and Panuria, restrictions are anticipated in regard to blasting in this project.

- 7.4.1 For drilling in top OB and partings 160 mm dia drills have been provided. For soft and medium hard sand stone and bench height of 12 m the burden and spacing have been assumed 5m and 6m respectively. Consumption of explosive would be about 7 te/day assuming specific consumption of 0.32 kg/m³ in OB. The specific consumption of explosives in coal is adopted as 0.2 kg/m³. The detail patterns of drilling in OB and Coal would be finalized during the actual course of mining operation. The requirement of drill has been assessed considering the following –

- Workload as per calendar plan.
- Annual productivity of drills.
- Yield per running meter of hole drilled.

— [Signature]
श्री. एस. रामानंद स. पाहा
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नई दिल्ली

- 7.4.2 It is recommended to use bulk explosive for OB.
- 7.4.3 It will be necessary to obtain permission from DGMS for sleeping of holes, so that advance charging can be done and all required blasting rounds can be completed in the desired time.
- 7.4.4 For uninterrupted supply of blasted OB material to the shovels, it is proposed that advance drilling and blasting for seven days may be maintained.

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of Coal & Mines, Government of India vide
Order No. 1430 dated 17.10.2002
validity of recognition for 10 yrs.

- 7.4.5 Proper free face should always be maintained and no blasting should be undertaken without proper free face.
- 7.4.6 Monitoring of peak particle velocity on regular basis has to be conducted by a competent organisation for safety and to avoid administrative problem that may arise while working near villages.

8.0 PUMPING AND DRAINAGE

8.1 INTRODUCTION

- 8.1.1 The area of the block exhibits gently undulating topography with general northerly slope. The highest elevated ground is located in the north-western part (RL 174 mt above MSL) while the lowest level is in the south-central part (RL 135 mt above MSL).

8.2 PROVISION OF PUMPS, PIPES & PIPE FITTINGS

- 8.2.1 In Gourangdih-A & Gourangdih-C, 4 pumps of 300 cum/hr x 150 m head and 6 pumps of 300 cum/hr x 250 m head respectively have been envisaged. In Gourangdih-A out of 4 pumps 2 are standby. Normally one pump will operate to handle water seepage. In rainy season more pumps will work as per requirement. However in case of Gourangdih-C two pumps will operate in normal condition and up to five pumps may operate in peak rainy season.

9.0 MODE OF DESPATCH & QUALITY

9.1 DESPATCH

- 9.1.1 Coal will be despatched by rail from the railway siding to the Thermal Power Station of M/s Himachal EMTA Power Ltd., situated at Raniganj, a distance of about 45 km and to power

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Gourangdih Coal Limited

station of M/s JSW Steel Ltd situated at Salboni, Pashchim Denajpur, 350 km from the proposed railway siding. Loading of coal into wagons will be done with Pay Loaders. The railway siding is proposed to have empty receiving line, after load line and engine escape line, so that free movement of rakes is ensured.

- 9.1.2 The sidings serving the old mines in Gourangdih area have been abandoned after the closure of the mines. The sidings have been dismantled and new structures like houses etc. have come up in the area, ruling out the possibility of their revival.

There is only one available siding line functioning within 6 km west of the property- namely Bonjemehari siding. As this siding is being used by ECL for dispatching coal, this siding cannot be utilized for despatch of coal from Gourangdih ABC block.

- 9.1.3 Trucks will unload sized coal from the CHP at the siding. The trucks carrying coal from the mine to the siding will be covered. Arrangements for dust suppression are to be made during loading and unloading of the trucks.

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कोलकाता

9.2 COAL HANDLING ARRANGEMENT

9.2.1 Introduction

- 9.2.1.1 Gourangdih-A and Gourangdih-C will produce 1.00 MTY and 1.5 MTY of coal respectively to meet the production target of 2.50 MTY. At present there is no proposal to wash the coal. However, if in future the end use plants require better quality coal, installation of a beneficiating plant may be considered.

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(S C CHATTERJEE)
E-37 Recognised Person approved u/s 22 (C) of
Mineral Concession Rules 1960 by Ministry
of Coal & Mines, Government of India vide
No. 20011-4-2002 dated 17.10.2002
Validity of certificate for 10 yrs.

10.0 MINE FACILITIES

10.1 INTRODUCTION

The maintenance of all major HEMM is proposed to be done by the OEM (Original Equipment Manufacturer). They will be provided space & facilities for maintenance in the HEMM (Excavation) workshop.

Regular maintenance and repair of other plant & machinery can be carried out at E&M workshop. The Project store shall be attached to the E&M workshop. The proposed E&M workshop and project store will facilitate the maintenance and repair requirement of mining, mechanical, electrical, transport and other auxiliary equipment and storage of spare-parts, sub-assemblies and consumables.

10.2 SCOPE OF WORK

10.2.1 Excavation Workshop

- Preventive maintenance.
- Scheduled maintenance.
- Medium repair and replacement of assemblies and sub-assemblies.
- Mobile repair team with crew and facilities to cater to the maintenance and minor repair needs of field equipment at site.

10.2.2 E&M Workshop

- Minor repair, medium repair and replacement of components, assemblies and sub-assemblies of pumps and electrical equipment.

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(S.C. CHATTERJEE)

Recognised Form as approved u/s 22(c) of
Mineral Conservation & Development Act, 1984
of Govt of India
No. 8221107 dated 17.10.2002

Gourangdih Coal Limited

वी. एस. शर्मा
अवर सचिव, कोयला
कोयला मंत्रालय, भारत सरकार
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- Bi-weekly washing of LMVs and washing of equipment assemblies and sub-assemblies as and when required.
- Periodical lubrication.
- Repairs and replacement of components / assemblies for LMV.
- Minor and medium repair of switchgears, motors, self-starters and other electrical equipment.
- Battery charging facilities and re-conditioning of batteries.

Project Store


The project store is proposed to be integrated with the workshop facilities. An area of 30m x 120m has been kept for the Stores in the E&M workshop.

- The Mining Plan envisages a project store for reception, storage and issue of all kinds of materials, equipment and consumables required for mine operation and maintenance of mining, mechanical and electrical equipment. The storage capacity is planned for 30 to 45 days consumption of materials.


11.0 POWER SUPPLY AND DISTRIBUTION

11.1 SOURCE OF POWER

- 11.1.1 The mine will receive power at 33 kv from WBSEB. The main sub-station will be located at the dip side of the quarry so that two independent 11 kv feeders, one for Gourangdih-A and other for Gourangdih-C can be arranged for the quarry substations.


वी. एस. राणा V. S. RANA
अवर सचिव UNDER SECRETARY
कोयला मंत्रालय MINISTRY OF COAL
भारत सरकार GOVT OF INDIA

Plan prepared by me


(S C CHATTERJEE)

Recognised & approved u/s 22 (C) of
Mineral Concession (Regulation) by Ministry
of Mines, Government of India vide
order dated 17.10.2002
valid for 10 yrs

11.2 POWER DEMAND AND TRANSFORMER CAPACITY

11.2.1 The installed capacity of transformers at the sub station for proposed production level of 2.5 MTY has been estimated as follows:

Main Sub-station	2x 2 MVA, 33/11KV
Quarry Sub-station	2x500KVA, 11KV/0.433KV

11.3 POWER SUPPLY

All HEMM proposed for the project is diesel operated equipment. Electrical power requirement is only for quarry lighting, haul road lighting besides catering to the electrical load requirement for workshop, stores, pumping and colony and CHP.

11.3.1 Two substations shall have to be located at convenient places near the two access trenches of the quarries on the rise side. In these sub stations 11 kv shall be stepped down to 6.6 kv and fed to various power consumers viz. CHP, Workshop, main pumps etc.

11.4 DIVERSION OF EXISTING POWER LINES

11.4.1 The various existing power lines most of which are 11 kv single circuit feeders for factories, villages etc. passing over the area will have to be shifted. The tentative routes through a common corridor that appears to be available clear of hindrances, has been indicated in associated plates for laying of various lines requiring diversion. However, actual diverted routes and their lengths have to be finalized after

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No. 860/11/1-17.10.2002
(Validity of recognition for 10 yrs.)

Gourangdih Coal Limited

11.5 TELECOMMUNICATION

11.5.1 The proposed telecommunication system will cater to the need of voice communication among the mobile, fixed personnel related to mine operation, administration and equipment maintenance. The system also takes into account the data communication requirement for the mine operation and planning along with the latest office automation facilities. Suitable provision has also been kept for tracking the critical responsible persons.

12.0 CIVIL CONSTRUCTION

12.1 BUILDINGS

12.2.1 Non-Residential Buildings

12.2.1.1 These include community buildings, offices, workshop & stores, sub-stations, magazine & other statutory buildings. The comprehensive list of various service buildings with their estimated cost has been given in Appendices A.2.1.

12.2.2 Residential Buildings

12.2.2.1 270 nos. of residential units have been envisaged. The proposed site for the colony to accommodate these houses and other community/welfare facilities has been identified and is located in the north part of the block. Land required towards this works out to around 15 ha.

12.2.2.2 Hostel accommodation has been proposed as 20% of type-A quarters, and reduction in proposed type - A quarters has been made accordingly.

12.2.3 WATER SUPPLY & SEWERAGE

12.2.3.1 Ajoy river has been identified as the source of raw water required for the Project and residential colony. The

requirement has been estimated as 0.14 MGD of potable water and 0.12 MGD of industrial water. Raw water after treatment will be supplied to colonies and also for some industrial purposes.

12.2.3.2 Separate sewerage system for domestic & industrial sewage has been envisaged for the Project.

13.0 MANPOWER, PRODUCTIVITY & AUTOMATION

13.1 GENERAL

13.1.1 For the planned capacity of 2.5 Mtpa of coal, the total manpower requirement for Gourangdih Opencast project has been estimated as 494

13.2 OMS

13.2.1 At the targeted production capacity of 2.5 MTY of coal with total manpower of 494 the OMS of Gourangdih Opencast project works out to 19.68 t.

14.0 LAND REQUIREMENT

14.1.1 Total requirement of land for the Gourangdih ABC block OCP is 421.68 ha. The break up of the land requirement is shown in Table 14.1.

14.1.2 92.53 Ha of forest land is required for mining operation. Forest clearance is necessary for starting Gourangdih-A and C quarries.

14.1.3 The area for colony will be on the north of the block boundary and is to be finalized later after surface survey.

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- 14.1.4 A suitable area has to be found out for rehabilitation and resettlement on the north of block boundary of those persons who are directly affected and have to be evacuated.

Table-14.1
Break up of Land

Sl. No.	Particulars of utilization	Total land Required (Ha)	Type of land. (Ha)	
			Non-Forest	Forest
1	Quarry area	214.00	121.47	92.53
2	External dump	62.97	62.97	0.00
3	Infrastructure	9.5	9.5	0.00
4	Rehabilitation colony	12.00	12.00	0.00
5	Workers Colony	5.00	5.00	0.00
6	Road	8.00	8.00	0.00
7	Others including safety zone	45.2	45.2	0.00
Total		356.67	264.14	92.53

14.2 PRE MINING LAND USE PATTERN

- 14.2.1 Pre-mining land use pattern has been shown in the table-14.2.

Table- 14.2
Pre- Mining Land Use

Sr. No.	Existing Land Use	Area (in Hectares)
1	Agricultural Land	48.43
2	Fallow (Danga) Land	62.19
3	Degraded Land (Old Quarry Area)	60.22
4	Built up Area	60.86
5	Water Body	15.44
6	Forest Land (Protected and reserved)	92.53
7	Non Agricultural Land for Colony (outside core area)	5.00
8	Non Agricultural Land for Rehabilitation (outside core)	12.00
Total		356.67

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15.0 SAFETY & ENERGY CONSERVATION

15.1 SAFETY

15.1.1 Haul Road

15.1.1.1 Haul road for rear dumpers of 60 T is proposed with double lane and shoulders on both sides for movement of dumpers and ancillary equipment. The haul roads have been designed at a gradient of 1 in 16.

15.1.2 Stability of benches

15.1.2.1 OB benches are proposed to be at an angle of 70° from the horizontal & coal benches are proposed to be at an angle of 80° from the horizontal. The benches are proposed to be graded with a slope of 1 in 100 towards the sump to facilitate smooth flow of water towards the sump. The height and width of the main OB bench will be 12 m and 30 m respectively. For coal, the bench height will be usually 6 m.

15.1.3 OB dump

15.1.3.1 OB will be dumped in the external and internal dumping areas at the natural angle of repose to avoid sliding of OB. OB dump will be terraced at intervals of 30 m height with berm width of 30m. The barrier distance between internal dump and coal production bench will be maintained at a minimum of 100 m to have smooth functioning of the machineries. The surface of OB dump will be levelled and graded. Afforestation will be done on the slope of OB dumps to consolidate the spoil. The slope of OB dump will not exceed 37° from horizontal.

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15.1.4 Water management

15.1.4.1 Garland drains around the proposed quarry boundaries will be provided and periodically maintained for adequate safety.

15.1.4.2 Proper drainage system will be provided in haul roads and other roads to guard against damage of pavement and slippery condition during heavy shower.

15.1.5 Fire

15.1.5.1 To take care of fire, adequate provisions of fire fighting arrangements have to be provided.

15.1.6 Blasting

15.1.6.1 Controlled blasting techniques including muffled blasting will have to be adopted during blasting within 300 m zone but beyond 100 m from the village, dwellings, surface structure, road etc. Total quantity of explosive to be detonated at a time will be so regulated that ground vibration which may affect the nearby surface structures, are kept within the stipulated limit.

15.1.7 Safety Zone

15.1.7.1 Land requirement for safety zone has been assessed from quarry surface edge on the assumption that Controlled blasting techniques will be adopted during mining operation with prior permission from Directorate General of Mines Safety.

15.1.8 Dust suppression

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15.1.8.1 Water spraying has been envisaged on the haul roads starting from the quarry bench to external dump yard and around CHP to prevent rising of dust in the air..

15.1.9 Lighting & Signalling

15.1.9.1 Adequate lighting arrangement will be provided at all working places. In addition to this some mobile lighting arrangement should be made in the proximity of the equipment to prevent accident during power failure.

15.1.10 Power line

15.1.10.1 Where dumper/crane/other HEMM are to pass below power line, a corridor with appropriate ground clearance considering the maximum height of the equipment which are required to pass has to be maintained. Other places along the power lines, where appropriate ground clearance can not be kept should be effectively barricaded/ guarded.

16.0 PROJECT IMPLEMENTATION SCHEDULE

16.1 SCHEDULE

The proposed implementation schedule, vide Fig. 16.1, which has been developed considering third quarter of Year1 as the off-take date for start of mining activity.

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Project Schedule Indicating Major Activities upto Year 4

Sl.No	Year of mine operation	Advance action	Year 1	Year 2	Year 3	Year 4
A.	Approval of the Project					
B.	Major mine related activities					
1	Land					
1.1	Forest Land Clearance from MOEF & Physical Possession					
1.2	Non-Forest Land Acquisition, Compensation & Physical possession					
2	Rehabilitation & Resettlement					
3	Power Supply Arrangements					
3.1	Electrical system drawing/design					
3.2	Tender & award of work and					
3.3	Procurement & Erection of Power Supply Arrangements					
4	Workshop					
4.1	Civil & Structural drawing/design					
4.2	Tender & award of work					
4.3	Construction of Workshop					
4.4	Procurement & Commissioning of Workshop P&M					
5	Procurement of HEMM					
5.1	Preparation of tender document					
5.2	Tendering, Scrutiny & award of work					
5.3	Procurement of HEMM					
6	OB removal (Mcum)					
7	Coal Production (Mt.)					

2.5 Mcum. 5.20 Mcum. 7.25 Mcum. 7.25 Mcum.

0.56 Mt. 1.50 Mt. 2.50 Mt. 2.50 Mt.

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17.0 ENVIRONMENTAL MANAGEMENT

17.1 Study Area, Period, Components and Methodology

Gourangdih Coal Block comes under north west side of Raniganj coalfield where in a large number of coal mines, steel plant and other industrial activities are available.

To assess the impact of mining operation on different components of environment, one season environmental data on air, water, noise and soil environment are generated by CIMFR, Dhanbad. The environmental status of the area monitored is discussed briefly in following paragraphs based on the primary and secondary data.

17.2 Air Environment

Air pollution includes one or more contaminants (pollutants), in the outdoor atmosphere in such quantities and of such duration that may be injurious to human, plant or animal life. Dispersion of air pollutants from the source depends on micro-meteorological parameters of the area. Micro-meteorological parameter is essential to assess the pollution level in the area as well as helpful in taking precautionary measures to control, the levels.

17.2.1 Air Quality

Air pollution includes one or more contaminants (pollutants), in the outdoor atmosphere in such quantities and of such duration that may be injurious to human, plant or animal life. The topographical information of project site as well as of the study area, different activities related to the coal mining and associated activities were collected. Different air pollution parameters like, RSPM (PM10 & PM2.5), Pb, CO, SO₂, and NO_x

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were identified as related to the project activities for representing baseline status of ambient air quality with the study area. In addition fugitive emissions were also estimated with reference to mining operation. To assess the base line ambient air quality five air quality monitoring locations were selected in core and buffer zone area.

The results of air quality monitoring has been given below in Table 17.1. Air quality monitored data for the Gourangdih mine show that the average PM_{10} 60.1, $PM_{2.5}$ 18.8 and SPM ranges from 142.2 to 191.2 μg which is below the permissible limit. Similarly SO_2 values is ranging from 7.6 to 15.3 $\mu g/m^3$. The concentration of lead (Pb), CO and HC are found below the detectable limit.

17.3 Water Environment

Informations on water resources in the study area were collected. The water resource in the study area are mainly river, ponds and groundwater. Ajoy and Barakar flowing in the east and south of the Gourangdih Block. Ajoy and Barakar Rivers control the main drainage of the area. Though some ground water have been tapped by shallow wells for drinking and irrigation needs, the deep aquifers were neglected in most of the area. With proper technique, the ground water can be successfully tapped to meet the water demand both for domestic and agriculture. The common sources for domestic and irrigation in the core zone villages include shallow dug wells, river and ponds. The other system is tapping deep aquifers in some of the villages by deep tube wells i.e. hand pumps. These wells have been an average depth of 40-50 meters. In the

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reconnaissance survey, it is found that most of the villages have three to five tube wells and/or dug wells; either belongs to the private or public. The water table in the dug wells ranges in between 6-12 m in pre-monsoon and 2-8 meter in post-monsoon periods except in few cases when the water table is somewhat deeper.

To assess the impact of mining on water quality, five water samples have been collected from different locations. This comprises of tube well water and two river water (Ajoy) and one mine water. The water samples were collected and analysed as per IS:10500 standards. Results of ground water and surface water analysis shows that concentration of some ions like SO₄, Cl and Dissolved Solids (TDS) are relatively high in some ground water and mine water samples. However, in general all the measured values are found well within the maximum permissible limit as specified in the test parameters of drinking water as per

IS:10500

The possible sources of waste water due to the project activities are (i) mine water (ii) waste water from workshops and township/colony etc. The major pollutant expected to be coming with underground mine water will be suspended sediments and coal particles. Provision will be made for proper sewage disposal system for domestic and industrial effluents. As mentioned above most of the measured parameters in the surface and ground water of the study area is below the threshold values as per IS: 10500 and CPCB. The effluents and mine water will be collected in settling ponds for settlement of suspended sediments and no wastewater will be discharged directly in to the drainage system. The wastewater will be

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treated and clear water will be used in mining and reclamation process. Thus, there will be no possibility of the wastewater having any impact on the existing water regime; instead it will meet the demand of water for mining, washing & other operations.

Three area were selected for testing of drinking water as Tube well Gourangdih village (W1), Tube well of Lalgunj village (W2), and Tube well of Mohanpur village (W3). In addition to this, two samples W4 & W5 collected from U/S and D/S of Ajoy River The result of the water quality analysis shows that all the measured values are well within the threshold limit.

The proposed block falls within the catchment area of Ajoy River. Some tests of tubewells located in the vicinity of the block indicated that ground water is potable and safe. The water samples were collected and analysed as per IS:10500 standards. Results of ground water and surface water analysis have been given in the Table 17.2 – 17.3 respectively. All the measured values are found well within the threshold limit.

17.4 Noise Environment

Noise level was measured at several locations in the human settlements around the proposed mining site by using precision noise level meter. Detailed analysis of noise has revealed that there is no noticeable impact of noise in the surrounding environment. All the study sites in the residential areas exhibited a noise level well within the corresponding threshold limit value as prescribed by CPCB, both during the day and night time.

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17.5 Land Environment

Total requirement of land for the OCP project is 356.67 Ha. The land requirement for actual quarrying operation is 214 Ha. out of which 92.53 Ha is forest land. The break up of the land required for different purposes.

17.6 Soil Environment

To predict the future mining impact on soil quality in and around Gourangdih Block, the baseline soil quality of the area has been evaluated with respect to physical and chemical parameters. Analysis of soil samples reveals that there is no wide variation in the natural material.

17.7 Biological Environment

The area contains large part of agricultural, waste land, mining pit and dumping area. There is a large area for agricultural land across the site. The miscellaneous flora consists of the following species:- Khair, Asan, Karam, Guri, Sidha, Mahua, Gamhar, Bid, Semal, Piar, Bel, Dhaura, Salai, Kusum, Sisam etc. The area is not very rich in floral and faunal diversity. There is no endangered species of flora and fauna in the core & buffer zone of the mining site.

Among wildlife Snakes and lizards are quite common. Different varieties of birds are also observed in the winter season. The low vegetative cover, long mining history and disturbed surrounding area does not support growth of variety of faunal species.

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17.8 Socio-economic Environment

Gourangdih block area comes under three mouzas namely Panurid, Gourangdih and Katapahari covering seven villages.

These villages are Shivdhaura, Bandhura, Lalbandh, Panuria, Jamgram, Katapahari & Bhuiapara. The population of these villages will be affected by proposed coal mining.

The socio economic study in detail and Resettlement and Rehabilitation plan is been prepared by a reputed NGO. However the available census report shows that Katapahari, Panuria and Jamgram are the major villages under Barabani block, Asansol Sub-division of Burdwan District. Panuria is a big village with total population of 6838 (3501 Male & 3337 female). The Schedule Caste (SC) population is 1895 and Schedule Tribe (ST) 950 only. The literacy level is more than 50% of the total population. About 30% of the population are dominated by workers only. Agriculture activity is very less. Similarly Katapahari (153.86 Ha) has 395 no. of houses with around 1691 population (855 male & 806 female). In this village SC population is 238 and ST population 377 only.

Most of the houses in these villages are electrified with communication system and transport facilities available. A large no. of work force come from adjoining of Dumka district of Jharkhand. Education facilities comprises of lower, middle and higher secondary school at Panurai. Post office facilities exist in Panuria along with telephone and mobile tower.

17.9 Anticipated Environmental Impacts and Mitigation Measures

The section summarizes the pollution potential of the proposed mining project and its possible impact on the surrounding environment during pre-operational and operational phases and the necessary management actions proposed for control and abatement of pollution.

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17.9.1 Dust Control

Following are the precautionary measures to be adopted at Gourangdih to mitigate the generation of dust:

The measures will include:

- Optimum design of blasting operations to reduce fly rock and dust emission
- Use of water tankers and graders on haul roads.
- Better coal loading facilities from the stockyard.
- Provision of mechanical dust extraction systems at all major dust generating points including coal despatch.

17.9.1.1 Haul roads:

Haul roads are likely to be one of the major sources of fugitive dust. Automatic water sprinkling system will be provided on the main haulage road and other places where SPM are likely to be high.

17.9.1.2 Gaseous Pollutants

In mining dominated area, air is expected to contain gaseous pollutants, besides dusts. Gaseous pollutants like CO, CH₄ & CO₂ are emitted from the coal yard. Spontaneous heating may also lead to fire in the coal dump and release variety of other toxic gasses. To minimize such gaseous pollutants following steps should be taken:

- Production & delivery planning should be such that the minimum coal stock will present in the coal yard.
- While dumping the coal, it should be compacted by heavy earth moving machineries so that minimum air is

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allowed to stay in the coal dump.

- iii. It should always be watered regularly.

17.9.2 **Impact due to Water Pollution and its Management**

The mine discharge water may contain high-suspended solids and other pollutants. The treatment scheme thus needs to focus on the removal of suspended solids from the water. Pit water must be treated to meet the prescribed standards before being discharged into water bodies. When the water is used for agricultural or domestic work, it should undergo further treatment.

17.9.3 **Impact due to Noise Pollution and its Management**

In this coal mining project heavy earth moving machines will be deployed for mining, which is the major source of noise pollution. Blasting will also cause vibration and it has also the significant impact in the area. The following measures have been taken to minimise the possible adverse impact of noise in around the mining area:

- i. The DG sets shall be used and placed on vibration isolators.
- ii. Conventional drilling and blasting operation will be replaced with ripping and dozing by deploying state of art ripper dozer i.e. CTD, DIIN, DION & DIOR.
- iii. Noise protectors, sound insulation operator cabin and the reduction of noise from plant and other equipment are achieved by fitting of special silencer and proper lubrication and maintenance.
- iv. Increase in ambient noise level may be expected from exhaust ventilation fan for the underground mine. By

following the precautionary measures like fan balancing, bearing lubrication, fastener tightness, the undue noise and vibration may be controlled.

- v. Provision of earplug for heavy earth moving machinery operator.
- vi. Provision of green belt is made surrounding the lease boundary to arrest dispersion of noise in buffer zone area on surface.
- vii. Roads should be smooth, so that pollution will be less due to vehicular movement.

17.9.4 Management of Socio-economic impacts

The following measures will be taken to improve quality of life of the people:

- 
- i) Planting of economically important trees
 - ii) Use of clean and boiled water
 - iii) Providing drinking water
 - iv) Personal hygiene and small dispensary
 - v) Approach roads to surrounding villages
 - vi) Preference in skilled and non-skilled job
 - vii) Company will take all necessary steps to help and create self-employment opportunities for nearby villagers.

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Occupational safety and health is very closely related to productivity and good employee relationship. The main factors of occupational health on coalmine are fugitive dust and noise. To avoid any adverse effects on the health of workers due to dust, noise and other causes following measures have been taken by the company:

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- i. Provision of rest shelters for mine workers.
- ii. Provision of personal protection devices to the workers.
- iii. Training of employees for use of safety appliances and first aid.
- iv. Regular maintenance and testing of all equipments as per manufacturer guideline.
- v. Rotation of workers exposed to noise premises.
- vi. Effective dust suppression of haul roads.
- vii. First -aid facilities in mining area.
- viii. Provision of amenities like drinking water, toilets etc.
- ix. Periodical medical examination of all workers by medical specialist so that any adverse effects may be detected in its early stage.
- x. Close surveillance of the factors in working environment and work practices, which may affect environment and workers health. Monitoring of the values of various factors which may lead to occupational health hazards.
- xi. Working of the mines as per approved mining and environmental plans.

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17.10 Total Investment on Environmental Control Measures

The total capital investment on Environmental Control Measures in the project has been estimated at Rs. 3789.73 lakhs as per the report, the break-up of which is given in Table-17.1.

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Table-17.1
Estimated Capital Investment on Environmental Control Measures
 (Amount in Rs. Lakhs)

Sl. No.	Particulars	Total Capital
I	Rehabilitation of Villages	1013.13
II	Compensation to land losers	636.52
III	Community Development at Rehab. Colony	925.01
IV	Plant and Machinery	
a	HEMM & Water sprinklers	477.30
b	Dust suppression & extraction in CHP	75.00
c	Pollution control at proposed Rly. siding	19.20
V	Capital for Restoration	
a	Biological Reclamation of mined out land	167.18
b	Afforestation	167.18
VI	Other Provisions	
a	Colony potable water treatment plant	93.91
b	Storm water channel in residential areas	9.14
c	Domestic Effluent Treatment Plant (lump sum)	37.66
d	Open surface drains in industrial areas	19.13
e	Garland drains	5.00
f	Sewerage disposal system for service buildings including settling tanks, O&G trap	99.89
g	Consent to establish fee payment	7.50
h	Baseline data generation, EMP preparation cost and Hydrogeological investigation	22.00
i	Storm water pumping channel	5.00
j	Diversion of road	10.00
Total		3789.73

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18.0 PROGRESSIVE MINE CLOSURE

A separate Mine Closure Plan incorporating all the required details has been prepared as per the guidelines issued by the Ministry of Coal, Government of India. The Mine closure Plan is enclosed as **Annexure – VIII**.

19.0 ECONOMIC EVALUATION

19.1 TOTAL CAPITAL INVESTMENT

- 19.1.1 The initial capital investment required for Gourangdih opencast project has been estimated as Rs. 621.71 Crores up to the target achieving year. For the rated output of 2.5 Mty of coal. The head-wise break-up of the estimated capital investment with year-wise phasing is given in Table-19.1

Table- 19.1
Capital Investment

SL NO.	PARTICULARS	Total capital investment
1	Land	4608.10
2	Buildings	
	a) Non Residential	2377.31
	b) Residential	1305.04
	Sub-Total - (2)	3682.35
3	Plants & machineriēs	
	a)HEMM	22567.48
	b) Other than HEMM	15273.45
	Sub-Total - (3)	37840.93
4	Furniture & Fittings	23.00
5	Railway Siding	6000.00
6	Vehicles	106.20
7	Prospecting & Boring	150.00
8	Development	
8.1	Capital outlay in mines	8433.33
8.2	Roads & Culverts	600.00
8.3	Water Supply & sewerage	431.77

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कोयला विभाग, राँची, झारखण्ड
भारत (Rupee Lakh)

Gourangdih Coal Limited

E-59

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SL NO.	PARTICULARS	Total capital investment
8.4	EMP Preparation Cost	44.97
	Sub - Total (8)	9510.07
	SUB-TOTAL OF 1 TO 8	61920.65
9.0	Revenue Exp Capitalised during Development	250
	TOTAL INITIAL CAPITAL	62170.65

19.1.1 The specific investment works out to Rs.2486.83 per tonne of annual output based on the estimated capital investment.

Table- 19.2
Pre-Mining and Post-Mining Land Use

Sl. No.	Particulars	Land Use (ha)	
		Pre Mining	Post Mining
1	Forest Area	92.53	To be reclaimed after mining and restored for afforestation.
2	Non Forest Area	102.62	To be reclaimed and used for agro-forestry.
3	Rehabilitation Colony	12.00	Will remain as Rehab Colony.
4	Staff Colony	5.00	To be used for Afforestation.
5	Road	8.00	To be reclaimed for agro-forestry. The existing roads will be diverted before starting mining operations.
6	Water Body	15.44	This area falls within the quarry will be reclaimed and used for agro-forestry.
7	Built up	60.86	To be restored for agro-forestry.
8	Abandoned Quarry	60.22	To be reclaimed for agro-forestry
	TOTAL	356.67	Area to be reclaimed for Agro-forestry 344.67 Ha Rehabilitation Colony 12.00 Ha

Signature
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order dated 17.10.2002
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CHAPTER- I

INTRODUCTION

1.1 GENERAL

- 1.1.1 The Gourangdih ABC Coal Block in Raniganj Coalfield in the State of West Bengal was allotted for captive mining of coal jointly by M/s Himachal EMTA Power Limited and M/s JSW Steel Limited in order to meet the requirement of coal for their Power Plant vide ref. No. 13016/79/2008-CA-I dated 10th July 2009 (Annexure – I).
- 1.1.2 Accordingly Gourangdih Coal Limited a joint venture company was formed between Himachal EMTA Power Limited and JSW Steel Limited for undertaking captive mining of coal from the allotted block.
- 1.1.3 The Geological Report on the Gourangdih ABC Block was purchased from CMPDI. The Geological Report was prepared by MECL in March 1981 at the instance of Central Mine Planning and Design Institute, Ranchi.
- 1.1.4 The Mining Plan has been prepared on the basis of the above Geological report.
- 1.1.5 Mining activities by both Open Cast and Underground methods have been continuing in this area since before nationalization of coal. The Central Mine Planning & Design Institute (CMPDI) proposed to the Mineral Exploration Corporation Limited vide their letter no. RI-1/Geology/77/707 dated 29.1.77) to undertake detailed exploration for coal in the Gourangdih Block for preparing the Net Reserves available in the block.

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I-1

Gourangdih Coal Limited

(S C CHATTERJEE)

Approved by the Government of West Bengal vide G.O. No. 17/10/2002 dated 17.10.2002
Ministry of Coal
New Delhi

- 1.1.6 Accordingly, initial proposal for drilling of 30 boreholes aggregating 3500 meters in 8 sq. km area was drawn up. The original proposal was revised after review of the available data and with the inclusion of open cast proposition up to 1:5 cut-off ratio covering seam B- II and above.
- 1.1.7 MECL commenced drilling in the ABC sector in May, 1978 and completed by October 1980 with a total of 57 grid, structural and incrop boreholes aggregating to 7023.90 meters.
- 1.1.8 As per the allotment letter, the coal produced from this captive mine will be supplied to M/s Himachal EMTA Power Limited for its power plant at Ranigunj, West Bengal and to M/s JSW Steel Ltd. for its power plant at Paschim Medinipur, West Bengal on the basis of equal sharing of the reserves.

1.2 MINING STATUS OF THE BLOCK

- 1.2.1 The Gourangdih ABC Block has been exploited by both underground and opencast mining since long. This is one of the areas where Eastern Coalfield Limited was engaged in exploitation of coal till recently. Due to insufficient geological information mining activities in different time period were scattered. The few boreholes drilled by the erstwhile coal companies, as well as information from the abandoned underground mining activities were not adequate to provide enough data for long term mine planning of the block.

- 1.2.2 During pre nationalization period private coal companies like M/s Bird & Co, Burrakar Coal Company and others worked extensively the B-V seam by underground mining. B-VI seam were also developed in certain areas. B-II, B-IV and B-VI seams have also been exploited by open cast workings at places.

Plan Prepared by me


(S.C. CHATTERJEE)

Recognised & Approved by
Mineral Committee
of Coal & Mines
1. 26.04.2002
(Ministry of Coal)

Approved by Ministry
of Coal vide

Gourangdih Coal Limited

1.2.3 Apart from exploitation of coal some private lessees worked fire clay quarries along the outcrop of B-V seams in the western part of the area. The extent of these quarries is limited in the west and east by faults F2-F2 and F6-F6 respectively. They are now abandoned.

1.2.4 The salient features of the proposed Gourangdih ABC Block opencast mine are as follows :

Table no. 1.1
Table showing salient features of Proposed Gourangdih ABC Opencast Project

Sl. No.	Particulars	Unit	Value
1	Geological reserves	Mt.	129.15 MT
2	Mineable reserves	Mt.	61.54 MT
3	Target capacity	Mt./y	2.5
4	Excavation category - OB		50% Cat III + 50% Cat IV
5	Excavation category - Coal		100% Cat III
6	No. of Coal Seams		7 (B-II to B-VII)
7	Av. stripping ratio	cum/t	2.91
8	Annual max. OBR at rated capacity	MCum.	7.25
9	Life	Years	27
10	Grade of ROM coal		F
11	Main mining equipment		OB -Shovel (5-6 cum Diesel Hyd. Shovel)+ Rear dumper (60T) Coal - 3.2 Cum Diesel Hyd. Shovel & 2.5 Cum Diesel Hyd. Backhoe, 60T Rear Dumpers
12	OMS	T	19.68
13	Initial capital Investment	Rs. in crores	621.71
14	Specific Investment	Rs./t	2486.83
15	Investment on P&M	Rs. in crores	378.41
16	Year of achieving the target coal Production (2.5 Mty.)	Year	Year 3
17	Box cut - OBR - Coal	Mcum Mt.	5.00 1.00

1.3 CONSTRAINTS

1.3.1 The area is thickly populated and a number of developed villages are situated within the proposed mining area. Apart from the villages, different types of industries are also present. A number of power lines, important roads connecting Jharkhand and from Chittaranjan to Asansol also pass over the property.

1.4 NEED FOR THE PROJECT

1.4.1 The coal produced from this block will cater to the requirement of the following power plants of M/s Himachal EMTA Power Limited and M/s JSW Steel Limited on the basis of equal sharing of the coal reserves.

Table- 1.2
Details about the capacity of power plants, coal requirement calculations

Name of the company	Geological Reserve/ Minable Reserve (MT)	Capacity/Location of the EUP	Requirement of coal for 30 years (MT)	Proportionate share from Gourangdih ABC coal block (MT)	Balance Requirement of coal (MT)	Source of coal to meet balance requirement
M/s Himachal EMTA Power Ltd. (IPP)	131.7 / 61.53	500 MW (2x250 MW) at Raniganj, West Bengal	$2.3 \times 30 = 69.00$	30.765 (Equal sharing basis)	38.235	From additional coal block or long term linkage
M/s JSW Steel Ltd. (CPP)		900 MW (3 x 300 MW) At Pashchim Medinipur, West Bengal	$4.14 \times 30 = 124.20$	30.765 (Equal sharing basis)	93.435	Additional coal block or long term linkage

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Gourangdih Coal Limited

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1.5 In view of the surface constraints of built up areas, Gourangdih ABC block has been considered in three sub blocks namely, Gourangdih – A, Gourangdih – B and Gourangdih – C for mine planning. Opencast mining will be done for the seams from B-II – B-VII in Gourangdih – A and Gourangdih – C quarries. It will not be feasible to work Gourangdih – B as this area is heavily built up and densely populated.

1.5.1 The mining plan envisages mining of 61.54 MT of coal between Gourangdih A and Gourangdih C quarries for an annual production target of 2.5 MTY at an overall stripping ratio of 2.91 m³/te. The proposed life of the project is 27 years. Out of the total extractable reserve of 61.54 MT, the extractable reserve in Gourangdih A is 24.46 MT and that in Gourangdih C is 37.08 MT. The reserves in Gourangdih B will not be worked as this area is heavily built up and excavation is not considered feasible.

1.6 CURRENT LAND USE PATTERN

1.6.1 The block has an undulating topography and the area is industrially developed. A large part of the area is also covered with forest. The break-up of Land requirement and pre-mining land use pattern of the proposed project are as follows:

Table-1.3
Land Requirement

Sl. No.	Particulars of utilization	Total land Required (Ha)	Type of land. (Ha)	
			Non-Forest	Forest
1	Quarry area	214.00	121.47	92.53
2	External dump	62.97	62.97	0.00
3	Infrastructure	9.5	9.5	0.00
4	Rehabilitation colony	12.00	12.00	0.00
5	Workers Colony	5.00	5.00	0.00
6	Road	8.00	8.00	0.00

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Sl. No.	Particulars of utilization	Total land Required (Ha)	Type of land. (Ha)	
			Non-Forest	Forest
7	Others including safety zone	45.2	45.2	0.00
Total		356.67	264.14	92.53

Table- 1.4
Pre – Mining land Use Pattern

Sr. No.	Existing Land Use	Area (in Hectares)
1	Agricultural Land	48.43
2	Fallow (Danga) Land	62.19
3	Degraded Land (Old Quarry)	60.22
4	Built up Area	60.86
5	Water Body	15.44
6	Forest Land (Protected and	92.53
7	Non Agricultural Land for Colony (outside core area)	5.00
8	Non Agricultural Land for Rehabilitation (outside core	12.00
	Total	356.67

1.7 REHABILITATION / RELOCATION

- 1.7.1 The coal block falls in Panuria and Kanta Pahari mouzas under Barabani CD Block. As per 2001 Census Report, population of these mouzas has been shown as 1271 and 395 families or 6838 and 1691 persons respectively. Almost 2/3 area, and entire population, of Panuria Mouza covers the coal block. Only a small part of the population of Kanta Pahari is located near the south-east fringe of the coal block. Gourangdih/Panuria village, which falls in Panuria Mouza is situated in the middle of the property. The area is densely populated and there are various industries in the area since long. A number of small sized bastis / villages other than Gourangdih village are located in the block.

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Gourangdih Coal Limited

(S.C. QUARTERMASTER)

I-6

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Shibdhaora, Bandhdhaora, Lalband falling in Gourangdih-A will need to be relocated as they fall in the excavation area.

Part of Panuria and Kanta Pahari villages, Bhuia Namupara and Upperpara falling in Gourangdih-C will also be shifted.



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(S C CHATTERJEE)

Recognized as approved u/s 22 (C) of
Mines & Minerals (Conservation & Development) Act, 1980 by Ministry
& Mineral Development of Coal vide
G.O. No. 21/14-2/2002 dated 17.10.2002
and valid for 10 yrs.

CHAPTER- II

LOCATION, PHYSIOGRAPHY & CLIMATE

2.1 LOCATION & COMMUNICATION

- 2.1.1 The Gourangdih Block-ABC Sector covering an area of 5.5 sq. km., lies in the north central part of the Raniganj Coalfield, Burdwan District, West Bengal. It falls between Latitudes $23^{\circ}48'30''$ & $23^{\circ}49'45''$ and Longitudes $86^{\circ}57'45''$ & $87^{\circ}00'15''$ and is included in the Survey of India Topo Sheet No. 73 I/13.
- 2.1.2 The area is well connected by rail and road. Gourangdih was the terminal railway station of Andal Gourangdih section of the Eastern Railway and is located about 38 km from Andal, on the Howrah- Delhi line of the Eastern Railway. The railway line connecting Gourangdih Station and Andal has since been abandoned.
- 2.1.3 A part of Asansol- Domahani road passes through the southern part of the block. Asansol town is located about 20 km from this project.*

2.2 PHYSIOGRAPHY

- 2.2.1 The area presents topography with gentle undulations and northerly slope. In the north-western part, coarse grained sand stones have given rise to small mounds. The maximum ground elevation is 174 mt above MSL in the north-west while the lowest level found in the south-central zone is 135 mt above MSL.

Gourangdih Coal Limited

II-1

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Recognized Plan as approved u/s 22 (C) of

Coal Mines Regulation Act, 1902 by Ministry
& Mined. Dept. of Coal vide

D. 14 20/2 dated 17.10.2002

Valid for 10 yrs.

COAL MINES REGULATION ACT, 1902
MINISTRY OF COAL
GOVERNMENT OF INDIA
NEW DELHI

2.3 CLIMATE

- 2.3.1 The area is situated close to the Tropic of Cancer and thus enjoys tropical climate. The temperature varies from 25° to 28° during winter and 34° to 37° during summer. During December and January, which are the coldest months, temperature, varies from 10° C to 14° C during day and night.
- 2.3.2 The average rainfall in the area is about 1180 mm. Major part of this precipitates during June to October.

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Recognised Plan as approved u/s 22(c) of
Mines Act, 1902 by Ministry
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CHAPTER- III

GEOLOGY AND DEPOSIT APPRAISAL

3.1 GENERAL

- 3.1.1 The Raniganj Coalfield represents the easternmost area, amongst the several outliers of the Gondwana sediments grouped into Gondwana Super Group, within the Archaean gneisses in the Damodar Valley region. It is surrounded in the north, west and south by the Archaean metamorphics, while its extension to the east is not known due to cover of laterite and alluvium.
- 3.1.2 The general geological succession in the area is given in Table 3.1:

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(S.C. CH. 157)

Recognised Primary III-2 under/s 22(c) of
General Code of 1973 by Ministry
of Cost, 28/11/2002. Cost vide
M. 10/10/2002. M. 10/10/2002
(validity of recognition 10 yrs.)

3.1.3 Of all the various Gondwana formations, only the Barakars are exposed in Gourangdih ABC block area explored, while the Talchirs and Post Gondwana intrusives were intersected in few boreholes.

3.1.4 Detailed exploration in Gourangdih ABC block covering an area of 5.5 Sq. Km. was done by Mineral Exploration Corporation Limited (MECL) at the instance of CMPDI during the period between May 1978 and October 1980. A total of 57 boreholes were drilled aggregating to 7023.90 meters. The exploration work done by MECL in Gourangdih ABC block are shown below:

1)	Topographical surveying & physical features	-	5.5 Sq. Km.*
2)	Geological Mapping	-	5.5 Sq. Km.
3)	Drilling		
	i) No. of boreholes drilled	-	57 Nos.
	ii) Total meterage drilled	-	7023.90m
4)	Sampling		
	i) No. of boreholes sampled	-	41
	ii) Total Coal core length	-	1279.22m

*As per Geological Report it is mentioned that a total of 5.5 Sq. Km area was triangulated and surveyed. But the Block boundary shown in the Geological plan and the Topographical plan enclosed with the Geological Report, the area of the block measures as 3.70 Sq. Km. The mining plan has therefore been prepared as per the block boundary shown in the Geological Plan which measures to 3.70 Sq. Km. This subject was brought to the notice of the Coal Controller, Ministry of Coal vide letter dated 23rd June 2010 which is enclosed as Annexure – II. The co-ordinates and reduced levels of the Triangulation stations, Boreholes are given in the following table:

Table 3.2

Location of Boreholes with RL

S. NO.	BORE HOLE NO.	TOTAL DEPTH (M)	REDUCED LEVEL (M)	CO-ORDINATE	
				LATITUDE (M)	DEPARTURE (M)
1	GRD-1	293.05	156.160	52026.751	44592.404
2	GRD-2	260.30	139.490	51233.182	45579.276
3	GRD-3	199.70	149.625	51518.772	44721.631
4	GRD-4	141.65	147.335	51829.360	45212.857
5	GRD-6	195.85	153.275	51747.950	44198.144
6	GRD-7	150.10	155.695	51991.267	44775.912
7	GRD-8	175.00	142.555	51458.884	46027.513
8	GRD-9	235.25	146.095	51114.354	46261.374
9	GRD-10	237.20	156.480	51976.647	43778.796
10	GRD-11	203.25	143.525	51131.052	46732.761
11	GRD-12	100.20	145.565	51425.963	46888.045
12	GRD-13	80.00	151.865	52191.563	45448.685
13	GRD-14	111.60	144.405	51750.783	46151.935
14	GRD-15	53.65	144.530	51974.613	45816.095
15	GRD-17	86.60	156.740	52335.874	44996.765
16	GRD-18	98.30	166.535	52396.331	44592.461
17	GRD-22	105.40	155.970	52376.237	43792.885
18	GRD-23	94.00	172.455	52441.154	44217.839
19	GRD-24	165.05	144.490	51698.173	45504.335
20	GRD-25	291.60	135.405	51021.290	45822.200
21	GRD-27	164.05	139.480	51615.813	45810.915
22	GRD-28	41.20	152.875	52259.293	45330.315
23	GRD-29	52.80	147.910	52014.563	45610.695
24	GRD-30	223.75	147.745	51409.524	45218.804
25	GRD-31	69.10	140.990	51979.463	46084.845
26	GRD-32	131.60	149.355	51430.073	46402.835
27	GRD-33	50.30	148.075	51739.474	46405.393
28	GRD-34	200.15	149.920	51751.120	44491.376
29	GRD-35	165.90	145.920	51240.205	46607.244
30	GRD-36	82.70	148.530	51609.783	46622.295
31	GRD-37	64.55	148.525	51428.023	47306.155
32	GRD-38	71.25	141.295	51450.030	47070.570
33	GRD-39	55.60	148.195	52631.559	44794.916

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S. NO.	BORE HOLE NO.	TOTAL DEPTH (M)	REDUCED LEVEL (M)	CO-ORDINATE	
				LATITUDE (M)	DEPARTURE (M)
34	GRD-40	35.55	151.325	52690.104	44521.515
35	GRD-41	113.55	164.145	52037.667	44012.016
36	GRD-42	149.70	154.705	52623.557	43997.056
37	GRD-43	123.40	162.550	52218.781	44708.069
38	GRD-44	129.25	167.600	52222.274	44207.184
39	GRD-45	111.10	155.260	52088.672	45004.299
40	GRD-46	90.00	164.670	52352.397	44017.876
41	GRD-47	117.60	142.870	51755.613	45789.065
42	GRD-48	212.00	150.145	51633.548	44522.976
43	GRD-49	228.35	151.010	51369.274	44966.666
44	GRD-50	168.05	155.125	51845.940	44804.509
46	GRD-56	70.00	157.155	51929.40	44356.02
47	GRD-57	29.00	159.950	52201.03	44836.36
48	GRD-58	38.70	141.785	51789.36	45887.26
49	GRD-59	35.80	146.270	51848.56	45653.86
50	GRD-60	41.50	144.590	51537.36	45458.40
51	GRD-61	38.25	138.100	51496.89	45744.97
52	GRD-62	35.90	149.495	51656.64	45176.67
53	GRD-63	26.20	146.035	51161.32	46506.58
54	GRD-64	27.30	148.995	51903.33	45408.27
55	GRD-66	150.40	145.170	51246.110	46955.130
56	GRD-68	109.35	158.005	52208.98	43795.55
57	GRD-69	201.40	154.380	51826.01	43953.08
45	GRD-51*	211.10	153.440	51707.250	44937.456

3.1.5 The area is devoid of good rock outcrops. The general stratigraphic sequence of the rocks in the explored 'ABC' Block as establish from MEC borehole data is given below:

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नई दिल्ली/NEW DELHI

Gourangdih Coal Limited

III-5

Plan prepared by me

(S. C. CHATTERJEE)

9. Mining Plan was approved u/s 22 (C) of
Mines Act, 1923 by Ministry
of Mines, Government of India vide
order dated 17.10.2009
Copy of the order for 10 use.

Table- 3.3
Generalised Stratigraphic Sequence

Formation	Lithology	Thickness range (m)
Quaternary, Recent and sub-recent	Alluvium and sandy/ lateritic soil	0.0-9.60
Post Gondwana (Intrusives)	Mica Periodotite associated with few coal/ carbonaceous shale horizons	--
BARAKARS	SST (cgd, mgd), GSH, BSH	(+) 87
	Coal & SC (B VII seam)	0.65 – 1.95
	SST (cgd, mgd, argil), SH	9.74 – 25.70
	COAL, SC, CSH & JHAMA (B-VI seam)	5.02-8.66
	SST (Pebbly, cgd, mgd, fgd, argil) CSH, SH-SST ical	53.40 – 69.81
	COAL, SC, CSH, JHAMA, P.L. (B-V seam)	2.36 – 9.89
	SST (cgd, mgd, argil), SH-SST ical, GSH, CSH & minor coal bands	3.65 – 18.55
	COAL, SC & CSH (B-IV SEAM)	1.57 – 7.92
	SST (argil, fgd, cgd, mgd,), GSH, BSH, CSH, minor coal bands	0.41 – 10.38
	COAL, SC & CSH (B-III TOP seam)	1.02 – 4.92
	GSH, BSH, CSH, SSH (argil, mgd, cgd), SH-SST ical, minor coal bands	1.45 – 13.58
	COAL, SC & CSH (B-III BOT SEAM)	0.67 – 7.33
	SST (argil, mgd, cgd, fgd, carb), GSH, BSH, CSH, SH-SST ical, & minor coal bands	7.36 – 23.33
	COAL, SC, CSH, JHAMA (B-II seam)	5.69 – 25.07
	SST (argil, mgd, cgd, fgd, carb), GSH, CSH, SH-SST ical, & minor coal bands	5.65 – 37.75
	COAL, SC & CSH (B-I seam)	0.24 – 2.52
	SST (congl, argil, mgd, cgd, fgd), SH-SST ical, & minor coal bands	140
TALCHIRS	Greenish SH and SH-SST ical	-

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of Coal & Mines
New Delhi on 17.10.2002
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III-6

Abbreviation

SC	- Shaly Coal	Congl	- Conglomeratic
CSH	- Carbonaceous Shale	cgd	- course grained
BSH	- Black Shale	mgd	- medium grained
CSH/SH	- Gray Shale/Shale	fgd	- fine grained
SH aren	- Arenaceous Shale	argil	- argillaceous
SST	- Sandstone	carb	- carbonaceous
M.P.	- Mica – Peridotite	ical	- intercalations
P.L.	- Para- lava		

3.1.6 **ARCHAEANS:** The Archaean metamorphics are not exposed within the explored area. However, just about 180 meters beyond the western limit of the block, the northwest – southeast trending Panuria – Itapora fault has brought the Barakars in juxtaposition with the metamorphics comprising granite gneisses, mica schist, quartzite, etc. (Ref. Plate – III).

3.1.7 **TALCHIRS:** The Talchirs though not exposed anywhere in the area, have been intersected in one borehole GRD-1, where they are represented by greenish shale and intercalated shale and sandstone.

3.1.8 **BARAKARS:** The entire thickness of the sediments above the green Talchir shale/sandstone can be recognised as the Barakars. These essentially consist of pebbly to very coarse, and medium grained sandstones, shales, argillaceous sandstones, carbonaceous shale and coal seams.

3.1.9 Most of the Barakar outcrops are confined to the western part of the area exposing pebbly to coarse and medium grained sandstones with minor shale.

3.1.10 On the basis of drilling eight distinctly correlatable and persistent coal horizons have been identified in the Barakars of the area. However, exposures of coal are rare and are mainly confined to the quarries. While the B-II seams is exposed in a number of quarries to the north-west and north-east, the seams B-IV, B-V & B-VI are locally exposed in small quarries in the eastern part of the area. In the central part near GRD-17 the B-IV seam (exposed in an abandoned quarry) is in juxta position with B-V seam (represented by para lava) due to incidence of faulting.

3.1.11 The most characteristic and unusual feature of the area is the 'para lava' which is exposed in the western part in a long narrow trench, following the outcrop position of the B- V seam. In this part the seam is represented by a creamy to dirty white and locally slightly brownish granular to clayey material resembling fire clay. The area to the south of this horizon exposes what looks like devitrified or silicified ferruginous sandstone. The clay bed as well as the silicified ferruginous sandstone are termed as Para lava and is possibly the result of sub-aerial burning of the coal seam (under oxidising conditions) and effect of the heat on the overlying sandstone.

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3.2 STRUCTURE

3.2.1 STRIKE & DIP:

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The strike of the strata shows a gradual swing from N 65- 70° W-S 65- 70° E in the east to nearly east-west in the west, with around 8° to 13° southerly dips. The increase in the dip is generally

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Recognized & approved u/s 22(c) of
Mineral Development & Regulation Act, 1947
of Coal & Mines Administration, 1960 by Ministry
of Coal & Mines, Government of India
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gradual from west to east. The local variations in the strike and dips are caused by incidence of faulting.

3.2.2 FAULTS:

It has been possible to demarcate 17 faults (F1 to F17) based on sub-surface data. All of these are normal gravity faults and die out towards up dip side. The F9, F10 and F12 are a combination of strike and oblique faults. Excluding the three faults in the extreme east which are dipping towards south, south east, all the oblique and dip faults with the exception of F9 dip either towards north or west. Fault F9 is the only south dipping fault in the western part of the area.

The detailed descriptions of the faults are given in the following table:

Table 3.4
Description of Faults

Sl. No.	Fault No.	Strike and Dip	Throw
1	F1 – F1	N25°W – S25°E Dip 75° due west	About 35m near GRD – 10, gradually reducing to the north – west.
2	F2 – F2	N15°E – S15°W Dip 75° due west	5m near GRD-22, reducing further to the north
3	F3 – F3	N60°E – S60°W Dip 75° due north	25m near GRD-22, gradually reducing eastward.
4	F4 – F4	Nearly N75°W – S75°E Dip 75° due north	15 meters near GRD-46, reducing towards east.
5	F5 – F5	Nearly N70°W – S70°E Dip 75° due north	10m near GRD-68 reducing eastward
6	F6 – F6	N10°E – S10°W Dip 75° due west	8m north east of GRD-18, reducing towards south and dies out before reaching fault F7.

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7	F7 – F7	N65°E – S65°W swerving to N80°E – S80°W in the west Dip 75° northerly	5 to 10m
8	F8 – F8	N85°W – S85°E to E – W. 50° Dip due north	20m near GRD-41, reducing towards east.
9	F9 – F9	Swing in the strike from E – W in the east to N70°E – S70°E further westwards, Dip 75° due south	Variable, 12m in the east near GRD-50, 55m near GRD-34, 75m near GRD-6 and 45m near GRD-69 to the west.
10	F10 – F10	Strike swerves from N65°E – S65°W in the east to N70°W – S70°E in the west. Dip 75° due north	15m near GRD-69 30m near GRD-6 10m near GRD-50 and reduces further north eastwards.
11	F11 – F11	N75°E – S75°W to nearly E – W Dip 75° due north	15m near GRD-48, gradually reducing to the north-east.
12	F12 – F12	Nearly N50°E – S50°W in the east with a sharp swing to nearly N80°E – S80°W west of GRD-47. Dip 75° due north.	35m near GRD-48 and 25m near GRD-25.
13	F13 – F13	Strike nearly N80°W – S80°E in the east swerving to N50°W – S50°E and then to near east-west to the west. Dip 75° due west	15m near GRD-25 and 20m near GRD-3.
14	F14 – F14	Strike N30°W – S30°E to N15°W – S15°E; 75° westerly dip	15m near GRD-27 reducing at both extensions.
15	F15 – F15	N55°E – S55°W Dip 75° easterly	4m near GRD-35 and in Gourangdih quarry.
16	F16 – F16	N55°E – S55°W Dip 75° easterly	3m near GRD-66.
17	F17 – F17	N70°E – S70°W Dip 75° due east	55m near GRD-11 reduces to the north.

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(S.O. 11/11/11)

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III-10

3.3 STRATUM CONTOUR

3.3.1 Floor contour plans of 6 persistent seams considered under the open cast mining propositions, viz, seam B-II, B-III (B), B- III(T), B- IV, B- V and B- VI have been prepared on the basis of the interpretation of the drilling data of the MECL boreholes, in addition to the available mine data are given in Plate Nos. 6A, 6B, 6C, 6D, 6E, 6F and 6G.

3.3.2 Stratum contours of the seams have been shown at 10 m interval. Pattern of contours has been drawn based on borehole data; geological cross sections and available mine data. Faults with throw of less than 5 meters have not been taken into account except in case where specific information was available/ interpreted. Heave zones of the faults have been shown taking into account the throw and dip.

3.4 COAL SEAMS:

3.4.1 Detailed exploration in Gourangdih ABC Block has proved 8 correlatable and laterally persistent coal seams in the Barakar Formation.

3.4.2 The Gourangdih coals are low in moisture and high in ash content, with caking index generally ranging between 4 & 6 and considered non-coking type.

3.4.3 While determining the quality of coal seams, bands containing below 35% ash content have been considered as coal, with ash content between 35% to 55% as 'shaly coal', while bands with

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III-11

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& Minister, Ministry of Coal vide
No. 1-22(1) dated 17-10-2002
& its continuation for 10 yrs

55% to 75% ash and 0.05 m or more in thickness are taken as 'Dirt Bands'. Bands having more than 75% ash content are non combustible and have been excluded irrespective of their thickness.

3.4.4 Minimum workable thickness of the individual seam has been considered as 1.20 m. While assessing the thickness of individual seams, 'split sections' with over 0.90 meter and with less than 3.0 m of intervening parting have been grouped together and considered as one seam.

3.4.5 Since all the major seams in the area (B- II to B- VI and locally B- VII) excepting seam B- I are considered to have quarriable potentiality, the seam thickness have been computed by inclusion of dirt bands having thickness up to 1.0 m but excluding the non-combustible bands irrespective of their thickness.

3.4.6 The seam thickness considered in the Geological Report includes disposition of the pyrolitised portion of the respective heat affected coal seams (viz. B- II, B- V, B- VI and B- VII). In the case of B- V seam, the zone of para lava has been shown to extend down dip up to the F4-F4 fault, where as the lateral extent of burning is presumably controlled by F2 and F6 faults.

3.4.7 The parameters of eight correlated and laterally persistent coal seams and their intervening partings are shown in the following table.

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Table- 3.5
Description and Quality of Coal Seams

Sl. No.	Particulars of deposit	Thickness range (m)	Quality (UHV/Grade)	Remarks
1	Seam B- I	0.24 – 2.52	(5491-3183)/ (C-F)	inconsistent deposit*
2	Parting	5.65-37.75		
3	Seam B- II	5.68-25.07	(1972-3242)/ (F-G)	Consistent with varying thickness
4	Parting	7.36-23.33		
5	Seam B- III (Bottom)	0.67-7.33	(2759-5022)/ (D-E)	Consistent
6	Parting	1.45-13.58		
7	Seam B- III (Top)	0.97-4.92	(1958-3890)/ (F-G)	Consistent
8	Parting	0.41-10.38		
9	Seam B- IV	1.57-7.92	(2759-4415)/ (D-F)	Extensively worked out by U/G
10	Parting	3.65-18.55		
11	Seam B- V	3.52-9.89	(3545-5684)/ (B-F)	'PARA LAVA' found within F2, F4 & F6. U/G development in eastern and western part.
12	Parting	54.50-69.81		
13	Seam B- VI	5.02-8.85	(3863-4153)/ (D-E)	Burnt patches. Worked in the east by O/C & U/G.
14	Parting	9.74-25.70		
15	Seam B- VII	0.27-1.46	3670/E	

* The seam exhibits wide range of thickness varying from 0.24m to 2.52m. the thickness of 1.2m and above occurs only in two patches away from each other in the central and Western part of the block. The parting of the seam with overlying B-II seam also shows marked variation. The parting shows marked increased to the west and northeast of GRD 9 also increases towards north west till it rocks a maximum of 37.15m in GRD17. In

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III-13

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view of its uneconomical thickness on the updip side and along its incrop position as also marked increase in the parting, the seam has not been considered viable as for multi-seam opencast proposition along with seam B-II to B-VII as per the GR.

3.5 GEOLOGICAL MODELLING:

MECL has drilled 57 boreholes within the block during the course of detailed exploration. The boreholes were generally spaced with 400m grid interval and involved a total of 7023.90 meters of drilling. The borehole GRD - 1 is the deepest borehole (293.05m) whereas GRD - 63 is the shallowest borehole (26.20m) drilled in the block.

Overall borehole density in Gourangdih ABC block measuring 5.5 Sq. Km is 10.36 per Sq. Km which is considered adequate for deposit appraisal with high level of confidence.

Reduced Levels, Surface and Sub-Surface borehole data have been used to generate geological plans, sections and floor contours. Surface topography and positions of seam incrops have been adopted as given in the Geological Report. The latitude, departure, collar reduced levels of the boreholes (Table 5.2) have been considered for geological modelling.

3.6 MINE FLOOR:

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Since B-I seam is not workable due to patchy deposit and thickness being inconsistent with a thick parting below B-II seam, therefore the floor of the coal seam B II has been planned as the open pit floor. The strike of the quarry floor shows a gradual swing

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Table- 3.5
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2	Parting	5.65-37.75		
3	Seam B- II	5.68-25.07	(1972-3242)/ (F-G)	Consistent with varying thickness
4	Parting	7.36-23.33		
5	Seam B- III (Bottom)	0.67-7.33	(2759-5022)/ (D-E)	Consistent
6	Parting	1.45-13.58		
7	Seam B- III (Top)	0.97-4.92	(1958-3890)/ (F-G)	Consistent
8	Parting	0.41-10.38		
9	Seam B- IV	1.57-7.92	(2759-4415)/ (D-F)	Extensively worked out by U/G
10	Parting	3.65-18.55		
11	Seam B- V	3.52-9.89	(3545-5684)/ (B-F)	'PARA LAVA' found within F2, F4 & F6. U/G development in eastern and western part.
12	Parting	54.50-69.81		
13	Seam B- VI	5.02-8.85	(3863-4153)/ (D-E)	Burnt in patches. Worked in the east by O/C & U/G.
14	Parting	9.74-25.70		
15	Seam B- VII	0.27-1.46	3670/E	

* The seam exhibits wide range of thickness varying from 0.24m to 2.52m. the thickness of 1.2m and above occurs only in two patches away from each other in the central and Western part of the block. The parting of the seam with overlying B-II seam also shows marked variation. The parting shows marked increased to the west and northeast of GRD 9 also increases towards north west till it rocks a maximum of 37.15m in GRD17. In

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from N65° - 70°W to S65° - 70°E in the east to nearly east west in the west with southerly dip of 8° to 13°. The increase in the dip is generally gradual from west to east. The local variations in the strike and dips are caused by incidence of faulting.

Gourangdih ABC block has a maximum strike length of 4348 m and the maximum length along dip rise is 1205 m.

3.7 DESCRIPTION OF COAL SEAMS:

3.7.1 **B - I Seam:** This is the oldest coal seam of the Barakar sequence of the area. The seam though intersected in 28 boreholes, shows irregular development from the point of mineability. This seam with thickness of over 1.2m is developed in two patches in the central and western part of the block. The parting of the seam with the overlying B-II seam ranges from 5.65m (GRD - 9) to 37.75m (GRD - 17). The parting shows marked increase to the west and north east of GRD - 9 and gradual increase towards north west.

In view of its uneconomical thickness on the up dip side and along its incrop position as also marked increase in the parting, the seam has not been considered viable for opencast proposition. Net indicated reserve in this seam is 2.55 MT.

3.7.2 **B - II Seam:** This seam locally known as Salanpur 'A' seam, occurs 5.65m to 37.75m above B - I seam. It was mined in the area by open cast method in the North West (Khoirabad quarry) and Gourangdih opencast in the east. The seam is affected by mica - peridotite intrusive in the north of the western part of the

block. The thickness of the seam varies from 5.68m (GRD – 68) to 28.07m (GRD – 9).

Quality:

Proximate Analysis:

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	1.7	38.7	19.6	32.1
Max	2.4	44.6	22.9	39.2

Ultimate Analysis:

Range	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
Min	86.80	4.88	1.62	0.53	0.032	0.44
Max	89.20	5.24	2.00	0.60	0.161	0.89

Hardgrove Grindability Index: 47 to 49

Ash Fusion Temp.

i) $\leq 1200 - 1300^{\circ}\text{C}$

ii) $= 1300 - 1400^{\circ}\text{C}$

iii) $\geq 1400^{\circ}\text{C}$

FT (°C)

3.7.3 **B – III (Bottom) Seam:** This seam which occurs 7.36m (GRD – 50) to 23.33m (GRD – 23) above the B – II seam, is entirely virgin in this area. Its incrop extends in a general ENE – WNW direction across the entire length of the area in the northern part. In the western part the incrop shows a near east – west trend. The seam generally comprises 2 to 3 sections, with intervening parting of

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less than 3 meters. The individual parting ranges from 0.57m (GRD – 27) to 2.29m (GRD – 50). The development of the sections is rather irregular with characteristics of splitting and coalescing. The total coal thickness of the seam varies from 0.67m (GRD – 66) to 7.33m (GRD – 25).

Quality:

Proximate Analysis:

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	1.7	25.7	21.4	33.6
Max	2.4	44.5	24.0	48.6

Ultimate Analysis:

Range	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
Min	86.25	4.90	1.80	0.52	0.063	0.36
Max	88.50	5.21	2.00	0.61	0.118	0.92

Hardgrove Grindability Index: 48 to 55

Ash Fusion Temp:

- i) IDT (°C) = 1160 – 1280°C
- ii) HT (°C) = 1340 – 1400°C
- iii) FT (°C) = > 1400°C

3.7.4 **B – III (Top) Seam:** This seam rests over B – III (Bottom) seam after a parting varying in thickness from 1.45m to 13.55m. The incrop of this virgin seam runs across the central part of the block in a

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III-17

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general WNW – ESE direction. To the west the incrop shows an east west trend. The B – III (Top) seam locally consists of the two sections with intervening parting of less than 3 meters, except in GRD – 9 in the east, where the parting is 3.11 meters thick. The development of two sections with over 0.90m parting is noticed locally in the region of GRD – 2, 32 and 9 in the east, GRD – 49, 51 and 34 in the centre and GRD – 46, 41, & 10 in the west. The cumulative seam thickness ranges from 1.02 m (GRD – 2) to 4.92m (GRD – 10).

Quality:

Proximate Analysis:

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	1.7	37.6	17.9	31.8
Max	2.5	47.9	24.4	41.5

Ultimate Analysis:

Range	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
Min	86.40	4.80	1.70	0.43	0.023	0.45
Max	88.75	5.10	2.10	0.72	0.163	1.39

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Hardgrove Grindability Index: 46 to 52

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Ash Fusion Temp:

- i) FDT (°C) = 1120 – 1280°C
- ii) HT (°C) = 1350 – 1400°C
- iii) FT (°C) = > 1400°C

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3.7.5 B – IV Seam: The seam, which is locally called as 'Gourangdih Seam', follows B – III (Top) seam after a 0.41m to 10.38m thick parting. The seam incrops from east to west throughout the central part of the block. It has been mined in the past by way of underground development in the eastern part and is virgin in the rest of the area. The seam thickness shows marked variation from 1.57m (GRD – 30) to 7.92m (GRD – 32). The development of the seam in two sections is observed in the region of GRD – 45, 1, 7, 34, 48, 6 and 41 in the west and isolated around GRD – 30 in the south – central and GRD – 8 & 14 in the east. The thickness of the intervening parting between the two sections, where developed, ranges from 0.51m (GRD – 42) to 2.82m (GRD – 14), except locally in GRD – 6 in the south western corner of the block where the parting is 3.95 meters.

Quality:

Proximate Analysis:

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	1.9	32.8	18.3	36.3
Max	2.6	42.6	22.3	45.5

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Ultimate Analysis:

Range	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
Min	86.75	4.80	1.80	0.51	0.072	0.29
Max	89.70	5.00	2.00	0.71	0.185	1.12

Hardgrove Grindability Index: 42 to 54

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III-19

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Order No. 1491 dated 17.10.2002

for a period of 10 yrs.

1

Ash Fusion Temp:

- i) I D T (°C) = 1190 – 1280°C
- ii) H T (°C) = 1350 – 1400°C
- iii) F T (°C) = > 1400°C

3.7.6 **B – V Seam:** The B – V seam is the most extensively worked out seam in the Gourangdih area. The mine workings are in the form of independent underground development in the eastern and western part of the block. The seam overlies seam B – IV after 3.65m to 18.55m thick parting. The thickness of the seam varies from 3.52m (GRD – 7) to 9.89m (GRD – 10).

The seam is also the most affected by the mica-peridotite intrusives in this area. The effect of pyrolitisation is confined to the central part of the block where in the region of GRD – 2, 4, 42, 47, 22, 51, the effect is partial, while around GRD – 24, 64 and 58 the entire seam has turned into Jhama. The degree of pyrolitisation varies from 17 to 100%.

The typical sub-aerial burning of this seam is noticed in the northwestern part where the entire seam is represented by granular to fine clayey material, locally quarried as fire clay. This is apparently the effect of seam burning under oxidising condition, as such, termed as para – lava. The extent of the para – lava is apparently limited within area bounded by faults F2, F4 and F6. Apart from this, a small patch of para – lava also occurs west of borehole GRD – 12 along the outcrop position of B – V seam.

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Quality:**Proximate Analysis:**

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	2.5	31.3	23.2	43.0
Max	2.8	36.3	24.3	-

Ultimate Analysis:

Range	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
Min	87.12	4.80	1.79	0.50	0.017	0.39
Max	88.20	5.00	2.00	0.70	0.116	1.04

Hardgrove Grindability Index: 44 to 50**Ash Fusion Temp:**

- i) I D T (°C) = 1210 – 1240°C
- ii) H T (°C) = 1360 – 1380°C
- iii) F T (°C) = > 1400°C

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 नई दिल्ली-110002

3.7.7 **B – VI Seam:** The B – VI seam occurs above B – V seam after 54.40m to 69.81m parting. The seam incrops in the central part of the area, extending from north of GRD – 63 in the east to north of GRD – 50 to the west, beyond which it is cut off by two near – strike faults (F9 and F10). The seam has been worked in the past in the east by opencast as well as through inclined in the region of boreholes GRD – 8, 9 and 63. The seam is found pyrolitised in two boreholes viz. GRD – 25 and 69. In GRD – 25 the entire seam

with the thickness of 7.10m is converted into Jhama, whereas in GRD - 69 only the bottom portion of the seam is burnt. The thickness of B - VI seam, including all sections, varies from 5.02m (GRD - 3) to 8.85m (GRD - 60).

Quality:

Proximate Analysis:

Range	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
Min	2.2	31.9	-	-
Max	2.5	34.1	24.0	39.5

Ultimate Analysis:

B.H. No.	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
GRD - 30	84.26	5.10	2.00	0.70	0.036	0.29

Hardgrove Grindability Index: 48 (GRD - 30)

Ash Fusion Temp:

- i) I D T (°C) = 1220 - 1260°C
- ii) H T (°C) = 1390 - 1400°C
- iii) F T (°C) = > 1400°C

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जांच के लिए भेजा जा रहा है।
नई दिल्ली, 15.08.2012

3.7.8 **B - VII Seam:** The seam follows B - VI seam in order to superposition and is the youngest coal horizon in the area, occurring 9.74m (GRD - 6) to 25.70m (GRD - 2) above the B - VI seam. It is developed in the south-central and south-western part of the block. Seam with mineable thickness (1.20m and above) is confined to the south western portion. The seam incrops with a

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strike varying from ESE – WNW to NE – SW. To the south of fault F13 – F13 and beyond the limit of the present exploration block, the seam has been worked through an underground development, in the vicinity of GRD – 25. Partial burning of the seam due to mica-peridotite intrusives is recorded in GRD – 11 just beyond the eastern end of the block, where 0.27m of the bottom portion of the 1.46m thick seam has been transformed into Jhama. The seam thickness shows marked variation from 0.65m (GRD – 25) to 1.95m (GRD – 34).

Quality:

Proximate Analysis:

B.H. No.	Analytical parameter (At 60% RH & 40°C)			
	Mois (%)	Ash (%)	V.M. (%)	F.C. (%)
GRD - 30	2.3	35.6	23.8	

Ultimate Analysis:

B.H. No.	Parameters					
	C %	H%	N%	S%	P%	CO ₂ %
GRD - 30	86.30	5.20	1.85	0.60	0.163	0.75

Hardgrove Grindability Index: 47 (GRD – 30)

Ash Fusion Temp:

- i) I D T (°C) = 1220°C
- ii) H T (°C) = 1360°C
- iii) F T (°C) = > 1400°C

[Signature]
 श्री. राज. बालाच. डी. शास्त्री
 ज्योतिषी, गौरांगदीह
 खण्ड, राँची जिला, झारखण्ड
 मुद्रांक सं. १०७७८८८८
 २००२

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 No. 14202-C dated 17.10.2002
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CHAPTER- IV

MINE BOUNDARY, RESERVES AND MINE LIFE

4.1 GENERAL

The mine boundaries of Gourangdih OCP have been fixed considering the block boundary, various surface constraints, geological informations and topography.

The geological structure and mine reserves of the block have been worked out based on the "Geological Report on Exploration For Coal, Gourangdih Block: ABC Sector by Mineral Exploration Corporation Limited, March 1981" at the instance and as per the exploration programme of Central Mine Planning and Design Institute (CMPDI).

4.2 BLOCK BOUNDARY

Gourangdih ABC coal block within the co-ordinates, 148140 E to 152313 E and 108602 N to 110535 N. Co-ordinates of different points of the block boundary have been shown **Plate No. 04 A**.

The boundary of Gourangdih ABC block has been delineated along the following limits as per the Geological Report. (Ref. *Handwritten signature* Geological Plan Plate No. III of Geological Report).

- A) North: The in-crop position of B – II seam forms the northern limit.
- B) South: The southern boundary is defined by the Fault F13 and F12.

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- C) East: The eastern boundary of the block is determined by Fault F17.
- D) West: Fault F1 determines the western boundary of the block.

4.3 MINE BOUNDARIES DELINEATION

- 4.3.1 For preparation of the mining plan the Gourangdih block is considered in three sub blocks namely

Gourangdih-A, (Area 127.53 Ha)

Gourangdih-B, (Area 90.83 Ha)

and Gourangdih-C, (Area 151.64 Ha)

Total area of the coal block: 370.00 Ha

Among the three sub blocks Gourangdih-A and Gourangdih-C have been worked partially both by underground and open cast method in the past. Gourangdih-B being the most thickly populated and built up area, the underlying seams were not worked and are mostly virgin. Mining activity may not be possible in this area due to presence of two densely populated villages namely Gourangdih and Panuria. Surface boundaries of Gourangdih-A and Gourangdih-C have therefore been delineated keeping safe distance 60 m from those villages. However, a part of Panuria village is to be relocated as the part has fallen within the boundary of Gourangdih-C quarry.

4.4 NOMENCLATURE CONSIDERED IN MINE PLAN

- 4.4.1 The Gourangdih ABC coal block has been demarcated in this Mining Plan based on the geographic location and surface constraint. Gourangdih-A is the west side of the property starting from Khoirabad in the north, end of Shibdhaora and upto

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Gourangdih village in the east, west block boundary in the west and north block boundary in the north.

4.4.2 Gourangdih-C is the eastern property of the block leaving out the major part of Panuria village. A small part of Panuria village in its east side has been considered in the area of Gourangdih-C.

4.4.3 The remaining thickly populated and heavily built up areas like Gourangdih and Panuria villages in the middle of the property is named as Gourangdih- B which has been kept out of the preview of any mining activity. However, in future if the residents of that area agreed to shift to other place further expansion of mine may be considered.

4.5 PIT FORMULATION STRATEGY AND PIT DELINEATION:

The following table outlines the boundary delineation of the blocks considered for mining.

Table- 4.1
Delineation of Boundary

Quarry	East	West	North	South
Gourangdih- A	Surface limit kept 60 m from Gourangdih village	Surface limit has been kept 7.5 m from Block Boundary	Existing face of Khoirabad is the limit in the north-western part and the remaining part Block Boundary is the surface limit.	Fault F13 is the southern limit.
Gourangdih- C	Surface limit has been kept at 60 m from Kanta Pahari village.	Surface limit kept 60 m from Gourangdih and Panuria	Faces of old abandoned quarries in B-II Seam are the	Surface limit has been kept upto the fault F13.

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Quarry	East	West	North	South
	(A part of Kanta Pahari village within 60m from surface limit may need rehabilitation).	villages.	limit.	

4.6 COAL RESERVES

The following table shows the seam wise and total net geological reserves in Gourangdih ABC block as per the GR. While estimating the net geological reserves the following deductions have been made from gross geological reserves.

A deduction of 30% of the estimated 'Gross Reserves' has been made on account of percentage of extraction in the developed area of the coal seams worked in past by underground mining. The area of opencast mines worked in the past has been excluded while estimating the reserves.

A deduction of 10% of the 'Gross Reserves' of coal has been made on account of normal geological variation like structural disturbances, pyrolitisation of seam etc. and unaccountable and unforeseen geological uncertainties, to arrive at the 'Net Reserves'.

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Table 4.3
Seam-wise Net Geological Reserves within the Block

SL. No.	Seam	Net Geological Reserves (MT)
1.	B-II	71.06
2.	B-III (Bottom)	14.84

CHAPTER- V

METHOD OF MINING

5.1 SELECTION OF MINING METHOD

5.1.1 Gradient of seam in general is 8° to 13° . It is proposed to work the mine by horizontal slicing method with sump at floor of the quarry. Strike lengths of both the quarries reduces towards dip due to surface constraints. Working with single flank is a better option for proper backfilling of worked out area.

5.1.2 While working on coal seams wedge shaped strip formed at end cut will have to be mined by backhoe and transporting equipment will ply along haul roads laid along apparent dip of 1 in 16.

5.2 TECHNOLOGY OPTIONS

5.2.1 Technology Option for Non-restricted Area

5.2.1.1 Due to occurrence of multiple coal seams, parting of varying thicknesses, multiplicity of faults (17 numbers) and steep gradient (8° to 13°), blasting restrictions in the proximity of built up areas, application of Dragline is not considered attractive.

5.2.1.2 Shovel and dumper combination is considered to be the most suitable technology under prevailing geo-mining conditions.

5.2.1.3 Hydraulic shovels are proposed in preference to Rope shovels due to:

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1. Better manoeuvrability.
2. Flexibility of operations.

5.2.1.4 For opencast operation the top soil will have to be removed first with the help of 5 m³ backhoe in conjunction with 60 T rear dumpers. This top soil shall be dumped separately and to be used at a later date for capping of backfilled area for land reclamation. After stripping of top soil hard overburden will be worked in benches of 12m height.

5.2.1.5 The overburden benches will be worked with 5m³ hydraulic shovels and 60T dumpers. 160 mm dia RBH drills will be used for drilling and blasting will be done with SMS explosives.

5.2.1.6 All the partings less than or equal to 12 m will also be drilled by 160 mm blast hole drills. Backhoe shovels of capacity 5 m³ in conjunction with 60 T rear dumpers will be deployed there.

5.2.1.7 The dumpers will haul the O.B. material initially to the de-coaled zone of Khoirabad mine in case of Gourangdih-A quarry and external waste dump in the rise side in case of Gourangdih-C quarry.

5.2.2 System Parameters

5.2.2.1 For 12m high overburden benches, the widths of working and non-working benches have been kept as 50 m and 30 m respectively. For coal, height of working benches would be 6 m or less depending on the thickness of coal seams. However, bench width for coal benches would be same as for OB.

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CHAPTER- V

METHOD OF MINING

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1. Better manoeuvrability.
2. Flexibility of operations.

5.2.1.4 For opencast operation the top soil will have to be removed first with the help of 5 m³ backhoe in conjunction with 60 T rear dumpers. This top soil shall be dumped separately and to be used at a later date for capping of backfilled area for land reclamation. After stripping of top soil hard overburden will be worked in benches of 12m height.

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5.2.2.2 Haul roads would be constructed on the floor of the quarry with the help of motor grader, compactor and dozer provided for the purpose, at a gradient of 1 in 16. Hard sandstones as well as rocks of the igneous intrusives occurring in the area may be used for construction of haul roads.

5.2.2.3 A 30 m wide haul road is considered to be sufficient for dumper movement, dozer path, drainage and electrification etc.

5.3 TECHNOLOGICAL OPTION FOR RESTRICTED AREAS

5.3.1 The area being thickly populated, restriction on limiting blast vibration is essential. It is pertinent to examine whether non-blasting opencast technologies can be considered feasible for mining this coal. Non blasting technology of breaking the hard overburden by high horse power Ripper Dozer may be tried at a later date.

5.3.2 Technological Option for Coal Mining

5.3.2.1 Two different options are available for mining coal, one is conventional application of shovel/dumper mining with drilling and blasting and the other is selective mining technology by application of surface miner.

5.3.2.2 In shovel/dumper system intermediate dirt bands can not be separated during mining as the entire bench shall have to blast at one time, which results decrease in quality.

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5.3.2.3 The requirement of Surface Miner Technology is a fairly uniform seam gradient and a fairly good strike length. The strike length in this case is restricted due to built up areas and villages and this will seriously affect the performance of Surface Miners.

5.3.2.4 Under the prevailing conditions, out of the above two technological options conventional shovel dumper system has been selected for reasons of limited strike length and presence of a number of faults.

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CHAPTER- VI

MINE DEVELOPMENT & DUMPING STRATEGY

6.1 CONSTRAINTS ON MINE DEVELOPMENT

- 6.1.1 The mining area consists of three sub blocks namely Gourangdih-A, Gourangdih-B and Gourangdih-C. Among the three sub blocks Gourangdih-A and Gourangdih-C have been worked partially both by underground and open cast methods in the past. Gourangdih-B is the most populated and developed area, and mining activity may not be possible in this area due to presence of two densely populated villages namely Gourangdih and Panuria. Surface boundaries of Gourangdih-A and Gourangdih-C have been delineated keeping safe distance (100 m from surface boundaries) from those villages. However, a part of Panuria village is to be evacuated and rehabilitated for working Gourangdih-C quarry.
- 6.1.2 Quite a number of illegal quarrying has spread especially near Shibdhaora village and old abandoned quarries. Special care has to be taken before excavation of the overlying OB against subsidence and outbreak up fire due to spontaneous combustion in subsided areas.
- 6.1.3 Due to the presence of a number of villages in the vicinity of the mine controlled blasting technique has to be adopted within the 500m zone of villages as well as steps are to be taken to control the dust and noise problems.

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6.1.4 Adequate dust suppression measures with sprinkler, tankers, automatic water sprinklers and adoption of water sprinkling with polymer additives are to be adopted on a regular basis.

6.1.5 Additional space outside the quarry boundary for initial dumping is necessary. Movement of loaded dumper within the quarry is also to be planned along haul roads laid along apparent dip.

6.2 INITIAL MINE ENTRY

6.2.1 The mining operation will be started first in the Gourangdih-A quarry from the north – west. The mining operation will start from the existing Khoirabad face. B-II seam being the thickest among all will contribute the major share of production. Some quantity of devolatilized coal (jhamra) may also be produced during extraction of coal. The other overlying seams will be worked within five years.

6.2.2 Gourangdih-C will start operation from the 2nd year of mining activity from south west side of the quarry. Gourangdih-C will yield more coal than Gourangdih-A due to its having more reserves.

6.3 SEQUENCE OF MINING

6.3.1 After the development of box cut, mining operation will be continued in Gourangdih-A quarry. The quarry will be advancing along the strike as well as towards the dip. As the quarry advances towards dip the upper seams will gradually be met with. The overlying seams R-III(B), R- III(T) and part of R- IV will be available in the first year of working.

6.3.2 The mining activity will be shifted towards the Khoirabad quarry end for widening the strike. B-III(B) and part of B-III(T) will be

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intersected here. The quarry will reach its full strike length in the third year and it will subsequently narrow down as it advances towards the dip side. The quarry will reach its target (1.00 MTY) in the third year and will continue till 25th year.

6.3.3 The existing road connecting Asansol to Runakuraghat passes over the eastern flank of Gourangdih – C quarry. This road is proposed to be diverted towards further east of the quarry.

6.3.4 The main access trench in Gourangdih – C will be made from the north western part of the quarry. Initially a narrow strip on the floor of B-II along the strike direction will make a link between the entry point and quarry end this will be continued till the 5th year of operation. During this period the evacuation and rehabilitation of part of the Panuria village envisaged in the mining plan is required to be completed. The quarry will continue till the end of the mine life. The target of 1.5 MTY from Gourangdih – C will be achieved in 3rd year of its operation.

6.3.5 The overlying seams B-III(B), B-III(T) and B-IV will intersect in the first year and B-V will met in the third year of quarry operation. B-VI seam will met with the quarry after 11th year of operation.

6.3.6 In both the quarries seam B-VII will intersect at the end.

6.4 MINING SYSTEM AND SYSTEM PARAMETERS

6.4.1 Mining method and systems have been selected as required for each of the two open cast mines keeping in view the Geo-mining conditions of the blocks.

6.4.2 The following Table shows the geological and Mining Characteristics of this open cast project take.

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(S. C. CHATTERJEE)

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17/10/2000

Table 6.1
Quarry Parameters

Sl. No.	Parameters	Unit	Gourangdih-A	Gourangdih-C
1. Seam thickness				
i	Seam V	m.	6-9	1.2-7
ii	Seam IV	m.	2-4	3-7
iii	Seam III Combined	m.	NA	NA
iv	Seam III Top	m.	2-3	1.2-3
v	Seam III Bottom	m.	3-4	3-6
vi	Seam II	m.	6-11	13-24
vii	Seam I	m.	1-2	0-1
2. OB/ Parting thickness				
i	Above Seam V	m.	54-60	54-70
ii	Seam V – Seam IV	m.	3-15	5-18
iii	Seam IV – Seam III Top	m.	0.4-9	2-10
iv	Seam III Top – Seam III Bottom	m.	1.4-10	2-14
v	Seam III Bottom – Seam II	m.	7-20	10-24
vi	Seam II – Seam I	m.	6-25	10-38
3.	Dip of the seams	Degree	8°-13°	
4.	Maximum depth	m	120	210
5.	Max. length along strike			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
6.	Max. width of quarry			
	a. At surface	Km	1522	1678
	b. At floor	Km	1419	1566
7.	Area of Excavation			
	a. At surface	Ha	96	117
	b. At floor	Ha	65	70

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(S.C. CHATTERJEE)

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6.4.3 Geo-mining condition of this property shows

- a. Moderately steep seam inclinations.
- b. Multiple seam deposit with thin inter burden between the seams in some places.
- c. Abrupt variation of floor RL due to occurrence of several faults along strike.

6.4.4 Application of dragline is not found suitable. Hence, shovel dumper combination is envisaged in this project.

6.4.5 Elements of Mining System

6.4.5.1 Mining system with shovel dumper combination has been proposed in this project.

6.4.5.2 The nature of the deposit being moderately steep and to minimise the dilution during mining as far as possible, a combination of horizontal and inclined stripping has been proposed.

6.4.5.3 In overburden, depending upon the thickness of strata, number of benches will be formed. Development of all OB benches above coal seam other than thin partings will follow definite horizons.

6.4.5.4 Both in overburden and coal (thick seam) alternate benches will be working and transporting bench.

6.4.5.5 Main sump will be provided at the bottom most bench i.e, in B-II seam floor.

6.4.6 Bench Geometry

6.4.6.1 Working parameters of the excavators proposed to be deployed will decide the height as well as the width of the benches.

6.4.6.2 In top overburden and large parting between B- V and B-VI seams the bench width and height will be governed by the excavators deployed there (5 cum Diesel Hydraulic Shovel).

6.4.6.3 The average width of working and non working benches will be 50 m and 30 m respectively. The working bench widths as proposed will ensure free flow of dumper.

6.4.6.4 In case of thin partings and seams hydraulic shovels and backhoe are provided. Here, according to the working parameters of excavators (2.5 cum to 3.5 cum), the width of working and non working benches will be 40m and 25 m respectively.

6.4.6.5 The working bench will accommodate two lanes of road, blasted materials, clearance from toe and clearance between two lanes.

6.4.6.6 Width of cut is also to be considered for deciding the bench width which varies with the size of excavators.

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VI-6

(S.C. CHATTERJEE)

Recognized as
General Manager
of Coal &
Ministry of Coal
Government of India
New Delhi
10.2002
Validity upto 10.2002

- 6.4.6.7 The height of the OB benches is governed by the maximum digging height of the excavator. For overburden to be removed by using 5 cum hydraulic shovels, the height of the bench is proposed as 12 m (maximum).
- 6.4.6.8 While working over underground workings minimum 6m OB bench has to be maintained over the affected zone and backhoe will be deployed at the top of the bench.
- 6.4.6.9 For coal benches the width and height of bench is fixed as per the working parameters of hydraulic shovel. The width of the bench will be 40 m (maximum) for working bench. The height of the bench will depend upon the seam thickness available on the face. The maximum height of coal bench is proposed as 6 m.
- 6.4.6.10 The high wall angle of the bench is proposed as 70° to the horizontal with a view to having a stable bench slope. But at the time of actual operation slope stability study is to be made and the angle is to be decided on the basis of the study.

6.5 MINING OPERATION

6.5.1 Method of mining has been indicated in the sections 6.2, 6.3 and 6.4.

6.5.2 Controlled blasting technique will have to be adopted to minimise vibration within 500 m of villages. To restrict to 2000 kg of explosive per round in that zone 3-4 rounds of blasting are

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(S G CHATTERJEE)

Approved & signed as per u/s 22 (C) of Coal Mines Act, 1902 by Ministry of Coal, Government of India, New Delhi.

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Joint Secretary
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New Delhi

required to meet the target production. By having two independently operated quarries the requirement of blasting in each quarry will be to 2-3 rounds leading to reduction in loss of production time on account of blasting operation.

6.6 DUMPING STRATEGY

6.6.1 In steeply inclined quarries, stability of dump in the de-coaled zone is to be maintained carefully and progress of backfilling becomes slow in view of larger gaps required to be left between the benches and dump toe.

6.6.2 In Gourangdih OCP land will be required outside the quarry area for initial OB dumping.

6.7 SOLID WASTE MANAGEMENT

6.7.1 Geological formation met in this block consists of soil and Barakar formation. The soil consists of clayey soil and sandy lateritic soil. The Barakar formation consists of shale, sandstone, mica-peridotite etc. Thickness of soil varies from 0 to 9.6 m.

6.7.2 In Gourangdih- A which will be started first, the initial OB will be dumped over the already de-coaled area of Khoirabad colliery. The height of the OB dump will be about 60m above the original ground level.

Gourangdih-C will start dumping over the vacant space in the north of the quarry.

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17.10.2002
(Validity of recognition for 10 yrs.)

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आर. एन. मिनीस्ट्री ऑफ़ मिनरल
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ऑफ़िस रजिस्ट्रार, नई दिल्ली
17.10.2002

- 6.7.3 The total quantity of OB including access trenches has been estimated as 179.37 Mm³, which includes about 9.6 Mm³ of soft OB.
- 6.7.4 The OB/waste stripping operations will start firstly with top soil removal which will be stacked separately for reclamation purpose and transported to top soil dump on temporary basis. Around 7 ha land will be required for stacking separately. This soil shall have to be spread over the top of reclaimed dump at a later date as a measure of land reclamation.
- 6.7.5 The OB to be dumped externally and internally amounts to 37.15 Mm³ and 142.22 Mm³ respectively.
- 6.7.6 It is proposed to merge both the external dumps with the respective internal dumps to increase the capacity of the external dumps. At the end of mining operation the height of external dumps and internal dumps would be about 60 m above adjacent surface level. The maximum RL of internal dump at the end of mining operation would be 220 m above MSL. However at the mine closure stage, the dump will be regarded so as to make the top of the dumps nearly to the level with the adjacent ground topography. The excavated areas of both the quarries will be fully reclaimed. The RL of the top of dump at this stage will be 150-160m above MSL for both the quarries.
- 6.7.7 The angle of individual dump will follow its natural angle of repose. The angle of slope of dumps should not be steeper than 28° to the horizontal.

- 6.7.8 A clear space of 30 m width along the toe of external dumps is to be maintained for safety.
- 6.7.9 Track dozers to be deployed for shaping the dumps.
- 6.7.10 Width of 80m to be maintained in the active dumping side between each deck of shovel dumper dump for safe dumping.
- 6.7.11 A wedge of sufficient height to be formed, 10 to 15m away from the dump edges. Dumpers should dump before this wedge, which will eventually be dozed by the dozers. This wedge is to be maintained in every active dump edge during dumping operations. Sufficient lights are to be maintained, especially at night operations on active dump edges.
- 6.7.12 Final reclamation will be done during closure period using the equipment provided for the purpose.
- 6.7.13 Toe of dumps are to be reinforced by construction of retaining walls or leaving adequate wedge at the mine floor (for internal dump).
- 6.7.14 Quantity of external dump, internal dump and reclaimed area at the end of different years of mining operation is shown in the Table 6.2 below

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Plan approved u/s 22(c) of
Mineral Con. Act, 1950 by Ministry
of Coal & Mines, Govt. of India vide
No. 372144/2005 dated 17.10.10

Gourangdih Coal Limited (Valid for 10 yrs.)

Table 6.2
Dump Quantities and Reclaimed Area

Year of Mining Operation	External Hard OB Dump Quantity		Internal Hard OB Dump Quantity		Soft Dump				Soft OB Reclaimed			
					External		Internal		Over External OB dumps		Over Internal OB dumps	
	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area	Qty.	Area
	In Mcum	In Ha	In Mcum	In Ha.	In Mcum	In Ha.	In Mcum.	In Ha.	In Mcum.	In Ha.	In Mcum.	In Ha.
Initial Mine Cut												
1 st year	2.35	13.75	0.00	0.00	0.15	1.25	0.00	0.00	0.00	0.00	0.00	0.00
2 nd year	7.30	18.21	0.00	0.00	0.40	2.79	0.00	0.00	0.00	0.00	0.00	0.00
3 rd year	14.24	42.59	0.00	0.00	0.71	5.41	0.00	0.00	0.00	0.00	0.00	0.00
4 th year	21.16	52.57	0.00	0.00	1.04	8.03	0.00	0.00	0.00	0.00	0.00	0.00
5 th year	23.61	60.50	4.52	16.80	1.32	11.00	0.00	0.00	0.02	1.25	0.00	0.00
10 th year	39.64	62.57	24.00	60.50	2.06	13.73	0.00	0.00	0.04	2.79	0.00	0.00
15 th year	47.10	62.97	52.17	85.45	2.68	13.73	0.00	0.00	0.08	5.41	0.00	0.00
20 th year	47.10	62.97	88.01	104.00	3.09	13.73	0.01	2.00	0.12	8.03	0.00	0.00
Final stage	47.10	62.97	129.08	112.50	3.09	13.73	0.10	20.00	0.17	11.00	0.25	16.80

6.7.15 Position of mining faces, haul roads and internal dumps at different stages of mining operations are shown in the following drawings –

- All stage plans with plate nos. 7A, 7B, 7C, 7D.
- Final dump and end of mining operations (Plate Nos. 9).
- Closure plan (Plate No. 12).
- Section along dumps (Plate No. 11).

6.8 STABILITY OF OB DUMPS

The height of the dump and dump slope has been planned keeping in view the geo-technical characteristics of dump material and the dump floor inclination during different stages of mine operation. During the mining operations further study on slope stability is to be done.

Plan prepared by me

(S C CHATTERJEE)

Recognized Person as approved u/s 22 (c) of
Mineral Concession Rules 1960 by Ministry
of Coal & Mines Department of Coal vide
No. 2001-2012 dated 17-10-2002
(Validity for extension for 10 yrs.)

The following safety measures shall also be observed to improve the stability of OB dumps:

- a) Alluvium material shall be dumped separately to prevent mixing with hard rock waste material.
- b) After mining of coal, a layer of crushed rock, left out crushed coal and water lies on the de-coaled quarry floor. This heterogeneous mixture is termed here as interface material. This interface material covering the inclined quarry floor may be one of the major causes of any internal dump failure. Before backfilling, this interface material shall be cleaned with a dozer.
- c) Garland drains shall be provided around the pit and the external dumps to divert the flow of water.

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Person approved u/s 22(c) of
Mineral Concessions Act, 1920 by Ministry
of Coal & Petroleum, Government of India vide
No. 34314/2002 dated 17.10.2002
(Validity of recognition for 10 yrs.)

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CHAPTER - VII

MINING SCHEDULE AND EQUIPMENT PHASING

7.1 ANNUAL PRODUCTIVITY OF EXCAVATOR

7.1.1 The equipment provision has been made on the basis of Calendar Plan of excavation and productivity of equipment for 7 days per week schedule, 330 days working per annum.

7.1.2 Annual production programme on target year has been shown in the table-7.3.

Table-7.1
Annual Production Programme

Particulars	Total Production	Quarry	Production
Coal	2.50 Mte	Gourangdih- A	1.00 Mte
		Gourangdih-B	1.50 Mte
O.B.	7.25 Mm ³	Gourangdih- A	2.70 Mm ³
		Gourangdih-B	4.55 Mm ³

7.1.3 DESIGN CRITERIA AND PRODUCTIVITY OF HEMM

A. Working Regime

Round the year 3 shifts working is envisaged for coal extraction and overburden removal. However, for the purpose of assessing productivity of equipment, following schedule is considered.

B. Category of Excavation

Following categories of excavation has been assumed

- i) Top soil/Alluvium - Cat I
- ii) Rock overburden - 50% Cat III+50% Cat IV

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iii) Coal

- Cat III

C. Material Density & Swell Factor

Material density and swell factors for coal and overburden assumed is as follows :

i) Material density :-

Alluvium/Top Soil - 1.62 t/cum

Overburden - 2.4 t/cum

Coal - 1.50 to 1.60 t/cum

ii) Swell factor :-

Overburden- 1.2 times of its in-situ volume

Coal - 1.2 times of its in-situ volume

D. Productivity of HEMM

Following factors have been considered while assessing productivity of HEMM.

a) Overall standard availability

for shovels & dumpers 80%

b) Overall standard utilisation

for shovels & dumpers 83%

7.1.4 The standard annual productivity of the proposed HEMM are shown in the table-7.2.

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised & approved u/s 22(c) of
Mineral Coal Act, 1920 by Ministry
of Coal & Mines, Govt. of India vide
No. 91741/92/2002 dated 13.10.2002
(validity of recognition for 10 yrs.) VII-2

Gourangdih Coal Limited

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भारत सरकार, नई दिल्ली
नई दिल्ली NEW DELHI

Table-7.2
Annual Production Programme

Sl. No.	Type of HEMM	Rock Type	No. of Shift	Capacity in OB (Mm ³)	Capacity in Coal (Mm ³)
1	5 m ³ Diesel Hydraulic Shovel	OB	3	1.32	-
2	5 m ³ Diesel Hydraulic Backhoe	OB	3	1.17	-
3	3.8 m ³ Diesel Hydraulic Shovel	COAL	3	-	0.92
4	2.5 m ³ Diesel Hydraulic Backhoe	COAL	3	-	0.65
5	0.9 m ³ Diesel Hydraulic Backhoe	COAL	3	0.23	-
6	60 T Rear Dumper	OB	3	0.1636	0.1228

7.2 CALENDAR PROGRAM OF EXCAVATION

7.2.1 The calendar programme of excavation has been drawn up to end of quarry life starting from first year of excavation. The contribution of production from Gourangdih-C quarry will be substantially more than that from Gourangdih - A.

7.2.2 Gourangdih-A will start first with a coal production of 0.5 Mte at a stripping ratio 1:5.

7.2.3 In the next year Gourangdih- A will enhance its production to 1.0 Mte starting operation from existing Khoirabad face. Gourangdih- C will start production by opening a box-cut at the south-west part of the quarry. The production of coal and OB in the 1st year of operation of Gourangdih- C will be 0.5 Mte and 2.5 Mm³ respectively at a stripping ratio of 5m³/te.

Plan prepared by me

VII-3

Gourangdih Coal Limited

(S C CHATTERJEE)

Reconferred Plan approved u/s 22 (C) of Mineral Concessions Rules 1960 by Ministry of Coal vide No. 17/10/2002 dated 17.10.2002 for 10 yrs.

- 7.2.4 The project will reach its target production in the 3rd year. The production of coal and OB from Gourangdih- A will be 1.0 Mte and 2.70 Mm³ and Gourangdih- B will produce 1.50 Mte coal and 4.55 Mm³ OB.
- 7.2.5 The total production of coal and OB will be 2.5 Mte and 7.25 Mm³ per year respectively. The project will complete its life after 27 years of operation. Calendar plan of excavation is shown in the table- 7.3.

Plan Prepared by me

(S.C. VYATTERJEE)

Recognised & approved u/s 22(c) of
Mines Act, 1920 by Ministry
of Coal vide
No. 231, dated 17.10.2002
(Validity of recognition for 10 yrs.)

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NEW DELHI

Table- 7.3
Calendar Programme of Excavation

Year	Gourangdih-A			Gourangdih-C			Gourangdih-A & C		
	Coal (Mte)	OB (Mm3)	SR (m3/te)	Coal (Mte)	OB (Mm3)	SR (m3/te)	Coal (Mte)	OB (Mm3)	SR (m3/te)
1	0.50	2.50	5.00				0.50	2.50	5.00
2	1.00	2.70	2.70	0.50	2.50	5.00	1.50	5.20	3.47
3	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
4	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
5	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
6	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
7	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
8	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
9	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
10	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
11	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
12	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
13	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
14	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
15	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
16	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
17	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
18	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
19	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
20	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
21	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
22	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
23	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
24	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
25	0.96	2.04	2.12	1.50	4.55	3.03	2.46	6.59	2.68
26				1.50	4.55	3.03	1.50	4.55	3.03
27				0.58	1.03	1.79	0.58	1.03	1.79
Total	24.46	66.64	2.72	37.08	112.73	3.04	61.54	179.37	2.91

Handwritten signature
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 नई दिल्ली NEW DELHI
 VII-5

Gourangdih Coal Limited

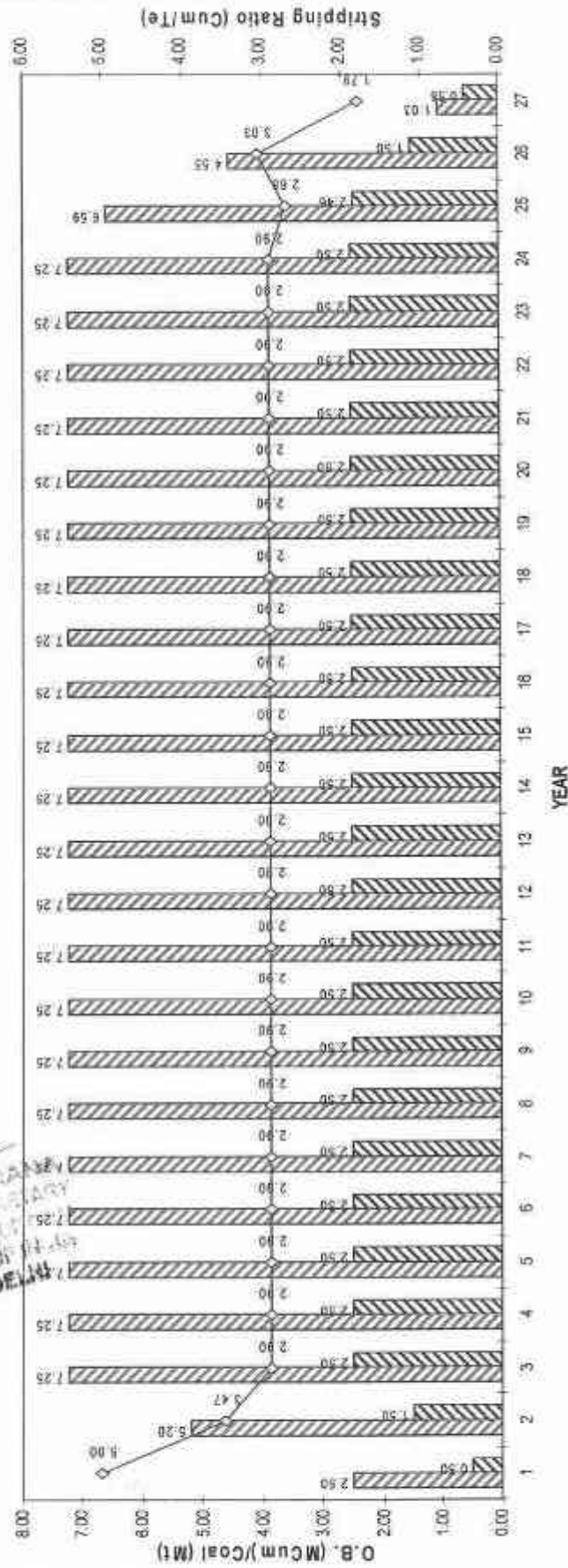
Plan prepared by me

(S. G. CHANDRA)

Approved by the Ministry of Coal vide
 General Order No. 17/10/2002
 dated 17/10/2002
 for the period of 10 yrs.

श्री. एस. शशीशंकर राय
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Opencast Coal Production, OB Removal & Stripping Ratio



Plan Prepared by me

(S.C. CHATTERJEE)

Approved vide 22(c) of
Mines Act, 1952 by Ministry
of Coal vide
17.10.2002
Gaurangdih Coal Limited (P.S.)

7.3 EQUIPMENT SCHEDULE

7.3.1 Types and strength of mining equipment worked out for the target production and suited to the geo mining condition of coal and overlying strata is shown in the table- 7.4.

Table-7.4
Type & Size of Major HEMM

Sl. No.	Particulars	Quantity
A	OB	
1	5 m ³ Diesel Hydraulic Shovel	3
2	5 m ³ Diesel Hydraulic Backhoe	3
3	60 T Rear Dumper	36
4	160 mm RBH Drill	4
5	410 hp Dozer with ripper attachment	6
B	COAL	
1	3.2 m ³ Diesel Hydraulic Shovel	2
2	2.5 m ³ Diesel Hydraulic Backhoe	2
3	60 T Rear Dumper	20
4	160 mm RBH Drill	2
5	320 hp Dozer	4
C	RECLAMATION	
1	0.9 m ³ Diesel Hydraulic Backhoe	1
2	410 hp Dozer	1
3	28 kl Water Sprinkler	2
4	280 hp Motor Grader	1
D	COMMON	
1	2.5 m ³ Pay Loader	1
2	100-115 mm CA Drill	1
3	28 KL Water Sprinkler	4
4	280 hp Motor Grader	4
5	Diesel Bowser	2
6	Diesel Tanker	2
7	5T Fork Lift	1
8	Boom Truck	2
9	6-8T Tyre Handler	2
10	55T Crane	1
11	30T Crane	1
12	Vibratory compactor	1

VII-7

Plan prepared by me

Gourangdih Coal Limited

(S C CHATTERJEE)

Mining Plan approved u/s 22 (C) of

the Coal Mines Act, 1902 by Ministry

of Mines, Government of India vide

No. 3033/2003 dated 17.10.2003

7.4 DRILLING & BLASTING

7.4.1 Due to the location of the project to close proximity to thickly populated villages i.e. Gourangdih and Panuria, restrictions are anticipated in regard to blasting in this project. The restrictions are anticipated on the basis of the studies conducted in Tara OCP situated about 5 km away from the proposed block. As per the above study, for a maximum peak particle velocity of 0.3 mm/sec, mining operation is planned upto a distance of 100 m from village boundary with a maximum charge per round 2 te, maximum charge per delay 200 kg and maximum depth of hole 12 m.

7.4.2 Keeping in view the above said restrictions for blasting and maximum quantity of explosive to be blasted at one time and the geo mining parameters, the maximum size of the blast would be around of 10 holes, with charge per hole ranging between 100 kg to 150 kg. i.e. each hole will be required to be blasted in different delay and maximum charge per round would be 200 kg. It may be necessary to blast 4 rounds per day to ensure uninterrupted availability of OB materials for the shovels.

7.4.3 The total daily requirement of explosives for blasting about 22000m³ of OB would be around 7.0 te (assuming explosive consumption of 0.32 kg/m³). To meet this requirement about 4 rounds of blasting will be required per day comprising 1-2 rounds in Gourangdih- A quarry and 2-3 rounds in Gourangdih- C quarry. The rock formation in this mine mostly consists of soft, medium and coarse grained sand stone. Based upon the

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Recognised & approved u/s 22(c) of
Mineral Concessions Act, 1926 by Ministry
of Coal & Mines, Government of India
No. 32011/42 Dated 17.10.2002
(Validity of recognition for 10 yrs.)

Gourangdih Coal Limited

loading equipments provided a bench height of maximum 12 m has been envisaged. For drilling in top OB and partings 160 mm dia drills have been provided. For soft and medium hard sand stone and bench height of 12 m the burden and spacing have been assumed 5m and 6m respectively. Consumption of explosive would be about 7 te/day assuming specific consumption of 0.32 kg/m³ in OB. The specific consumption of explosives in coal is adopted as 0.2 kg/m³. The detail patterns of drilling in OB and Coal would be finalized during the actual course of mining operation. The requirement of drill has been assessed considering the following –

- Workload as per calendar plan.
- Annual productivity of drills.
- Yield per running meter of hole drilled.

7.4.4 It is recommended to use bulk explosive for OB. For thin seams and seams having underground workings high explosive may be used. 2 nos of magazines of 3 te capacity each have been provided for storage of high explosives, cast booster and explosive accessories.

7.4.5 It will be necessary to obtain permission from DGMS for sleeping of holes, so that advance charging can be done and all required blasting rounds can be completed in the desired time.

7.4.6 For uninterrupted supply of blasted OB material to the shovels, it is proposed that advance drilling and blasting for seven days may be maintained.

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VII-9

Gourangdih Coal Limited

(S C CHATTERJEE)

Revised and approved u/s 22 (C) of
Mines Act, 1923 by Ministry
of Coal, Government of India vide
No. 1001/1-2/2002 dated 17.10.2002
Ministry of Coal, New Delhi.

7.4.7 Proper free face should always be maintained and no blasting should be undertaken without proper free face.

7.4.8 Monitoring of peak particle velocity on regular basis has to be conducted by a competent organisation for safety and to avoid administrative problem that may arise while working near villages.

Plan Prepared by me

(S.C. BHATTARAJ)

Recognised Person approved u/s 22(c) of
Mines Act, 1923 by Ministry
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Order dated 10.10.2002
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प्राप्त संख्या: 100/2002/अ.स.
दि: 10/10/2002

CHAPTER- VIII

PUMPING AND DRAINAGE

8.1 INTRODUCTION

8.1.1 The area of the block exhibits gently undulating topography with general northerly slope. The highest elevated ground is located in the north-western part (RL 174 mt above MSL) while the lowest level is in the south-central part (RL 135 mt above MSL).

8.1.2 The drainage in the area is mainly provided by Ajoy River, located on the north around 3.5 km from the block. There is no major stream passing over the property. However, one seasonal water channel passes through the property of Gourangdih- C, which will merge with garland drain to be made along the periphery of the quarry. Cross section of the garland drain should be more than that of existing channel to be diverted.

8.2 GENERAL CONSIDERATIONS

8.2.1 Based on the existing mine operation the following assumptions have been made to arrive at the pumping requirement of the mine:

- I. Maximum rainfall assumed as 170mm in a single day of monsoon period as per meteorological report of Raniganj Coalfield.
- II. Seepage through backfilled area, strata and surface run-off assumed as 20% of water flowing in direct

rainfall on the day of maximum rainfall at the catchment area. Catchment Area (A) has been considered to comprise of the following areas :

- a) Surface area of mine or excavation
- b) Area beyond excavation (taken as 5% of (a))
- c) Internal dumped area

III. Accumulated mine water on the day of maximum rainfall is to be pumped out in 5 days with 20 hours effective pumping per day.

IV. Volume of rain water entering to the mine and accumulating in the quarry (make of water) has been assessed on the basis of the following formula:

Done

$$Q = A \times H \times \theta \text{ m}^3/\text{day}$$

Where,

A - Catchment area in m^2

H - Maximum daily precipitation in m

θ - Run-off co-efficient

The run off co-efficient (θ) has been considered as below :

For mined out area : 0.60

For area beyond excavation : 0.15

For internal dumped area : 0.10

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The external dump area has been considered as the area beyond excavation and the area of working benches has been included in the mined out area. Based on the above pumps, pipes and fittings are envisaged in Section 8.4.

(S.C. CHATTERJEE)

Recognised by
Mineral Council
of India & Ministry
of Coal & Mines
N. 20/1313
(Validity of recognition for 10 yrs.)

Approved u/s 22(c) of
Mines Act, 1923 by Ministry
of Coal & Mines

Ministry of Coal & Mines

17.10.2002

8.3 MINE DRAINAGE/WATER MANAGEMENT

8.3.1 Ground Water Inflow Prediction

8.3.1.1 SOURCES OF WATER

8.3.1.2 Different sources of water through which water is accumulate in the quarry are

1. Ground water inflow to the quarry
2. Rainwater falling directly within the excavated area
3. Seepage through backfilled area
4. Inrush of rainwater into quarry from the area beyond excavation.

8.3.1.3 Inflow of water into mines is unavoidable and appropriate control measures are required for tackling the inflow problem. For effective management of ground water seepage to the mine, it is essential to know the quantity of water to be handled and its allied problems. Therefore, prediction of ground water inflows by gravity drainage has been done at maximum quarry depths. The expected inflow in Gourangdih-A and Gourangdih-C are around 180 LPS and 380 LPS respectively.

8.3.2 Advance Dewatering Scheme

8.3.2.1 While working over old underground developed area a borehole is to be made at deepest point of the developed zone so that process of pumping out of water as per requirement can be maintained.

8.3.2.2 As mining progresses there is bound to be decline in water levels surrounding the mine due to dewatering of the aquifers and fall in hydraulic gradients.

8.3.2.3 Fresh garland drains shall be made before every monsoon at the periphery of active edge of quarry to prevent the surface rain water to enter the quarry. Settlement tanks of adequate capacity shall be made on the surface and mine water will be discharged into it. After settlement of suspended particles the fresh water will be discharged into nearest nallah after proper chemical treatment.

8.4 SUMP

8.4.1 The sump shall be made at one end of strike on the floor of the quarry. The working benches shall be graded suitably so that the entire water will flow down to the sump. The sumps shall have to be cleaned periodically.

8.5 PROVISION OF PUMPS, PIPES & PIPE FITTINGS

8.5.1 In Gourangdih-A & Gourangdih-C, 4 pumps of 300 cum/hr x 150 m head and 6 pumps of 300 cum/hr x 250 m head respectively have been envisaged. In Gourangdih-A out of 4 pumps 2 are standby. Normally one pump will operate to handle water seepage. In rainy season more pumps will work as per requirement. However in case of Gourangdih-C two pumps will operate in normal condition and up to five pumps may operate in peak rainy season.

Plan Prepared by me

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Gourangdih Coal Limited

Recognised/Permitted/Approved u/s 22(c) of
Mineral C. & M. Act, 1911 by Ministry
of Coal & Mines, Govt. of India vide
No. S. 111/11-1, dated 17.10.2002
(Validity of recognition for 10 yrs.)

- 8.5.2 Three face pumps out of which one face pump of 50 cum/hr x 50 m head in Gourangdih-A have been proposed and out of 3 pumps 1 is standby. Among 3 face pumps of same capacity 1 will have to work in Gourangdih-C. These have been provided to keep the coal/OB face dry.
- 8.5.3 Sufficient length of pipes of dia 200 mm and 150 mm have been provided for above pumps depending upon the capacity.
- 8.5.4 Besides main pumps and face pumps 3 numbers of slurry pumps has to be provided for cleaning sumps.

[Signature]
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CHAPTER- IX

MODE OF DESPATCH & QUALITY

9.1 DESPATCH

9.1.1 Coal will be despatched by rail from the railway siding to the Thermal Power Station of M/s Himachal EMTA Power Ltd., situated at Raniganj, a distance of about 45 km and to power station of M/s JSW Steel Ltd situated at Salboni, Pashchim Denajpur, 350 km from the proposed railway siding. Loading of coal into wagons will be done with Pay Loaders. The railway siding is proposed to have empty receiving line, after load line and engine escape line, so that free movement of rakes is ensured.

9.1.2 The sidings serving the old mines in Gourangdih area have been abandoned after the closure of the mines. The sidings have been dismantled and new structures like houses etc. have come up in this area, ruling out the possibility of their revival.

There is only one available siding line (about 4 km) west of the property- namely Bonjemehari siding. As this siding is being used by ECL for dispatching coal, this siding cannot be utilized for despatch of coal from Gourangdih ABC block.

9.1.3 It is proposed to construct the full rake capacity new siding near Bonjemehari for dispatching coal. Coal will be transported from the mine to the railway siding through a dedicated road (approximately 7 km) to be constructed over the metamorphic zone in the rise side of Dabor, Sangramgarh, Mohanpur and Itapara.

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(S. C. CHATTERJEE)

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- 9.1.4 Trucks will unload sized coal from the CHP at the siding. The trucks carrying coal from the mine to the siding will be covered. Arrangements for dust suppression are to be made during loading and unloading of the trucks.

9.2 COAL HANDLING ARRANGEMENT

9.2.1 Introduction

- 9.2.1.1 Gourangdih-A and Gourangdih-C will produce 1.00 MTY and 1.5 MTY of coal respectively to meet the production target of 2.50 MTY. At present there is no proposal to wash the coal. However, if in future the end use plants require better quality coal, installation of a beneficiating plant may be considered.

- 9.2.1.2 The size of some of the ROM coal may be upto 1000 mm which will need to be reduced to the size acceptable to the Power Plant authorities. Accordingly suitable crushing arrangement has to be installed near the mine so that dumpers can directly dump onto the receiving hopper of crusher. The crushed coal will be stored over the ground for transportation to the railway siding by dumpers.

- 9.2.1.3 Crushed coal of required size will be transported to the railway siding at a distance of 6 Km from the mine.

9.2.2 System Description

- 9.2.2.1 The coal handling plant can be divided into two different sections viz, (i) Receiving and Crushing Complex (ii) Transporting of sized coal from receiving complex up to ground stockpile.

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9.2.2.2 The receiving and crushing complex will consist of a ramp and dumper unloading platform of 12 m height. The ramp should facilitate for easy and safe movement of 60 te dumper. The ramp, platform & unloading station shall have to be so constructed so that 2 no. dumpers can unload coal simultaneously to achieve the through put capacity of the plant. The system capacity of the crushing complex is proposed as 1000 TPH & all other equipments have to be selected accordingly. Rear discharge dumpers will unload coal into an Apron Feeder through self flowing bunker. A twin shaft primary sizer is proposed to be installed at 3.00 m elevation from the ground to receive ROM Coal from the Apron feeder after shale picking & will crush coal up to the required size. Dust collecting hoppers will be fitted below the Apron Feeder. A belt conveyor will receive coal mainly from outlet end of primary sizer as well as dust collecting hoppers below Apron feeder & will deliver coal into a secondary sizer. The conveyor would be 50 m length, 1200 mm width & 1000 TPH capacity. The secondary sizer will be of twin shaft type. It will further crush coal from (-) 300 mm to (-) 50 mm sizes.

9.2.2.3 A reclaim conveyor will convey coal from secondary sizer outlet end to the ground stockpile. The output coal of size (-) 50 mm will be transported to the railway siding by truck for despatch to the Power Plants by the railways.

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CHAPTER- X

MINE FACILITIES

10.1 INTRODUCTION

The maintenance of all major HEMM is proposed to be done by the OEM (Original Equipment Manufacturer). They will be provided space & facilities for maintenance in the HEMM (Excavation) workshop.

Regular maintenance and repair of other plant & machinery can be carried out at E&M workshop. The Project store shall be attached to the E&M workshop. The proposed E&M workshop and project store will facilitate the maintenance and repair requirement of mining, mechanical, electrical, transport and other auxiliary equipment and storage of spare-parts, sub-assemblies and consumables.

10.2 EQUIPMENT MAINTENANCE PLANNING

Facility planning of workshop and project store has been done based on a comprehensive maintenance and repair programme to achieve high level of equipment availability, reliability and longer life.

Maintenance and repair load of unit workshop has been assessed on the basis of annual operating time, inter repair period, life of the equipment/ assemblies/ sub-assemblies, weight and size of the equipment/ assemblies/ sub-assemblies, man-hours required per repair etc. Space requirement for

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(Valid till 17-10-2007)

maintenance and repair activities, parking facilities of HEMM and other equipment, washing of equipment and assemblies, requirement of open and covered storage space etc. have also been considered. The size of Excavation workshop, E&M workshop cum Project Store has been given in Table-10.1 below:

Dimensions of Excavation workshop & E&M Workshop cum Store

Particular	Size (m x m)	Area (m ²)
A. Excavation Workshop	150 X 120	18000
B. E&M Workshop Cum Project Store	150 x 120	18000
C. Mine Office & Common Facilities	180 x 100	18000

10.3 SCOPE OF WORK

10.3.1 Excavation Workshop

- Preventive maintenance.
 - a) Daily maintenance, routine lubrication and bi-weekly washing of equipment.
 - b) Technical inspection and running repair of transport equipment and checking of tyres.
 - c) Daily and fast filling of diesel at fuel delivery station for transport equipment and at site for field equipment.
 - d) Dismantling, opening and refitting of tyres.
 - e) Incidental minor repairs of assemblies and sub-assemblies of mining and mechanical equipment i.e. dumper, dozer, shovel, drill etc.
- Scheduled maintenance.
- Medium repair and replacement of assemblies and sub-assemblies.

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- Mobile repair team with crew and facilities to cater to the maintenance and minor repair needs of field equipment at site.

10.3.2 E&M Workshop

- Minor repair, medium repair and replacement of components, assemblies and sub-assemblies of pumps and electrical equipment.
- Bi-weekly washing of LMVs and washing of equipment assemblies and sub-assemblies as and when required.
- Periodical lubrication.
- Repairs and replacement of components / assemblies for LMV.
- Minor and medium repair of switchgears, motors, self-starters and other electrical equipment.
- Battery charging facilities and re-conditioning of batteries.

10.4 FACILITIES

Following facilities have been provided in the Excavation workshop and E&M workshop for maintenance and repair of equipment as envisaged in the scope of work:

10.4.1 Excavation Workshop

- Mechanised washing on specially constructed platform for dumpers and dozers.
- Daily maintenance bays for dumpers and dozers.
- Schedule inspection and lubrication bays for dumpers and dozers.
- Scheduled maintenance, medium repair and minor repair facilities for dumpers and dozers.

- Minor repair and replacement of sub-assemblies and assemblies of shovels, drills and other field equipment including surface miner at site by mobile repair team.
- Medium repair and overhauling of sub-assemblies and assemblies of field equipment.
- Machining section.
- Electrical and auto repair section.
- Engine section.
- Repair of hydraulics.
- Radiator repair section.
- Welding and structural section.
- Tyre section.
- Condition monitoring room.
- Shovel repair section.
- Drill repair section
- Dozer repair shop.
- Pavements for dumper and dozer parking.
- Overhead and u/g water reservoirs.
- Supporting facilities like computer room, electronics room, changed off stores, tool room, offices, pump room, cycle stand, canteen, security post, fire fighting facilities, ventilation system etc.
- Material handling facilities.
- Machine tools, general and special purpose tools, diagnostic tools, master tool kits etc.
- Refuelling station with pump and other necessary accessories.
- Mobile repair and servicing unit.

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10.4.2 E&M Workshop

- E&M maintenance and repair unit for maintenance and minor repair of equipment, pumps, electrical equipment and other installations.
- Machining section, mechanical and structural section, electrical and auto section etc.
- Washing platform for LMVs.
- Maintenance and repair shop for LMVs.
- Machine tools, general and special purpose tools, diagnostic tools, master tool kits etc for electrical and mechanical equipment.
- Supporting facilities like charged off store, tool store, toilet, offices etc.

10.5 **WORKSHOP & PROJECT STORES LAYOUT**

The maintenance and repair bays and other facilities for dumpers and other HEMM have been designed based on the prevailing standard norms and OEM's/ Equipment Manufacturer's recommendations.

Excavation workshop unit has been planned for maintenance and repair work of all major HEMM.

Excavation Workshop

The area of excavation workshop unit will be 18000 m². This workshop has been designed to cater the needs of dumpers up to 100T capacity. Detail description of major functional shops are given in Table-10.2 below.



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Table No. -10.2

General Plan for HEMM Workshop

Major Shops	No. of bays	Bay size (m x m)	Shop size (m x m)	Bracket height (m)	EOT Crane Capacity (t)
Dumper repair complex	15	10 x 18	60 x 40	11.5 m	25/5 t - 1 nos. 10/2 t - 1 no.
Dozer & Face eqpt. repair complex	3	10 x 12	40 x 30	8.5 m	15/2 t - 1 no.

E&M Workshop

In the Mining Plan, it is proposed to deploy trucks buses, jeeps/ cars/ vans and a large nos. of pumps, transformers and other electrical equipment.

The maintenance and repair bays and other maintenance facilities required for LMVs, pumps and other electrical and mechanical equipment have been designed based on the prevailing standards and OEM's recommendations.

The overall area of E&M workshop will be 18000 m². Sizes of major functional shops of E&M workshop are given in Table-10.3 below:

Table No. -10.3

General Plan for layout for E&M Workshop

Major Shops	No. of bays	Bay size	Shop size	Bracket height	EOT Crane Capacity (t)
E&M repair Complex	-	-	40m x 60m	6 m	5 t - 1 no.
LMV repair Shop	1 (Truck)	6m x 8m	15m x 10m	6 m	
	2 (Jeep)	5m x 6m			

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X-6

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Project Store

The project store is proposed to be integrated with the workshop facilities. An area of 30m x 120m has been kept for the Stores in the E&M workshop.

The Mining Plan envisages a project store for reception, storage and issue of all kinds of materials, equipment and consumables required for mine operation and maintenance of mining, mechanical and electrical equipment. The storage capacity is planned for 30 to 45 days consumption of materials. Due consideration has also been given for proper working environment, cleanness and safety measures. Proper equipment and material handling facilities have also been provided.

- The entire operation of the project store will be controlled and coordinated by material management division. The project store has been located within the E&M workshop complex near the mine entry.
- The project store will meet the total store requirement of project and unit workshop. Overall size of the project store will be 30m x 120m. The size of main sheds/ buildings of the project store will be as given in Table-10.4 below:

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Table No. -10.4
General Plan for layout for Project Store

Major Sheds	Shop Size	Covered Area	Height	EOT Crane Capacity (t)
Store shed	50m x 30m	1500m ²	8 m	5 t - 1 no.
POL store	40m x 30m	1200m ²	4.5 m	-
Cement store	30m x 30m	900m ²	3.5 m	-

- Separate storage facilities have been envisaged for the following items:
 - Bulk consumables
 - Light consumables
 - Spares and assemblies of HEMM
 - Spares and assemblies of LMV
 - Electrical equipment like, motors, generators, switch gears etc.
 - Spares and assemblies of electrical equipment
 - Cables and beltings
 - Chemicals, paints etc.
 - Rubber materials
 - Stationery and office material
 - Float assemblies
 - POL etc.

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10.6 PLANT AND EQUIPMENT FOR WORKSHOP

The selection of plant and equipment (machine tools) for workshops have been done in accordance with the maintenance programme of various equipment, job-wise

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requirement in respect of dimensions, nature of operations to be performed, frequency of such requirements and degree of precision.

Provision of E.O.T. cranes, mobile cranes, tyre handler, fork-lift trucks, trolleys, electric hoist, chain pulley blocks, jacks etc. has been made for quick and effective handling of heavy materials and tyres within and outside the shops.

10.6.1 Sheds

10.6.1.1 Workshop sheds will generally have north light trusses and structural columns of steel, with RCC flooring. Maximum natural lighting will be used.

10.6.1.2 For ventilation roofs will have louvers and Air- circulators will be provided at shop floor. Generally all sides except entires will be cladded. Roofs and sides will be of GI sheets. North light windows will be of perspex sheets.

10.6.1.3 Flooring will be RCC with wear resistant lining of ironite. All cubicles, office, tool stores, toilets, etc. will be of masonry and annexed to sheds with 3.5 to 4 m height.

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10.6.1.4 Rain water drainage from roofs will have to be taken care of particularly since very big roof area will collect lot of rain water. The rain water down pipes are to be provided along which column with drains covered with chequered M.S. plates running along side the columns.

10.6.2 Water Supply to Workshop

10.6.2.1 An estimated quantity of 40,000 liters of industrial water will be required per shift for washing of Dumpers, Dozers, LMVs, etc. Since the washing system will work on pumps for generating pressure, only two ground reservoirs have been provided, which will greatly economize on cost. One shift requirement capacity each of 40,000 liters ground reservoir has been provided with facilities for refilling it by pump whenever required. The pumping to fill the tank will be required twice a day. One shift reserve should be always there. The ground reservoir will be of brick masonry with RCC top slab. This will supply to reservoir near dozer she-6 and LMV-shed also. Supply of water will be from sub-soil water. Potable water including radiator shop requirement is about 8,000 liters. This will be lifted on over head at different locations, like administrative building, HEMM shed, etc. The source of supply will be the sub-soil water.

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CHAPTER- XI

POWER SUPPLY AND DISTRIBUTION

11.1 SOURCE OF POWER

- 11.1.1 The mine will receive power at 33 kv from WBSEB. The main sub-station will be located at the dip side of the quarry so that two independent 11 kv feeders, one for Gourangdih-A and other for Gourangdih-C can be arranged for the quarry substations.

11.2 POWER DEMAND AND TRANSFORMER CAPACITY

- 11.2.1 The installed capacity of transformers at the sub station for proposed production level of 2.5 MTY has been estimated as follows:

Main Sub-station 2x 2 MVA, 33/11KV

2x500KVA, 11KV/0.433KV Located at Quarry Sub-station

11.3 POWER SUPPLY

All HEMM proposed for the project is diesel operated equipment. Electrical power requirement is only for quarry lighting, haul road lighting besides catering to the electrical load requirement for workshop, stores, pumping and colony and CHP.

- 11.3.1 Two surface substations shall have to be located at convenient places near the two access trenches of the quarries on the rise side. In these sub stations 11 KV shall be stepped down to 6.6 KV and fed to various power consumers viz. CHP, Workshop, main

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XI-I

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pumps etc. One 160 KVA 6600/433 volt transformer shall take care of the lighting loads etc.

11.4 EARTHING

11.4.1 Effective earthing system is envisaged for ensuring safety to working personnel and prevention of shock hazards. There should be an earthing grid surrounding the sub-station.

11.5 DIVERSION OF EXISTING POWER LINES

11.5.1 The various existing power lines most of which are 11 kv single circuit feeders for factories, villages etc. passing over the area will have to be shifted. The tentative routes through a common corridor that appears to be available clear of hindrances, has been indicated in associated plates for laying of various lines requiring diversion. However, actual diverted routes and their lengths have to be finalized after detailed survey.

11.6 TELECOMMUNICATION

11.6.1 The proposed telecommunication system will cater to the need of voice communication among the mobile, fixed personnel related to mine operation, administration and equipment maintenance. The system also takes into account the data communication requirement for the mine operation and planning along with the latest office automation facilities. Suitable provision has also been kept for tracking the critical responsible persons.

11.6.2 In order to cater to the need of surface communication an IP enabled Exchange of 100 lines is proposed for facilitating

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effective communication between various offices, residential buildings and other strategic points within the mines. Apart from the conventional telephone exchange adequate numbers of VHF wireless sets have also been proposed for effective communication, especially at the quarry.

11.6.3 It is proposed to provide 10 Nos. BSNL telephone extensions to the project in order to facilitate external communication and to link the project with the BSNL's national telephone network. The BSNL telephones shall be provided at the offices and residences of important officials.

11.6.4 In view of growing need of Information Technology and an efficient and reliable means to access data from anywhere, a Local Area Network (LAN) is required to share the existing resources.

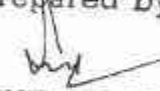
11.6.6 The objective of this proposal is to link all proposed 15 PCs of the Project with each other and with Area, in a single network facilitating sharing of information and computing resources amongst different departments/disciplines. The network shall be capable to add more nodes as and when the no. of users grows and it will be equipped with the latest state-of-art technology.


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XI-3

Gourangdih Coal Limited


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Geological Plan approved u/s 22 (C) of
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No. 17/10/2002
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CHAPTER- XII

CIVIL CONSTRUCTION

12.1 INTRODUCTION

- 12.1.1 Gourangdih OCP envisages a life of 27 years with a target annual production of 2.5 MTY. As such construction of all buildings will be of permanent type.
- 12.1.2 All the non residential buildings will have to be constructed in the vicinity of OCP. The suitable location will be in the north side of Gourangdih block as that part is non coal bearing area.
- 12.1.3 Within the lease hold area there is no suitable land available for locating a residential colony for the employees. As such it is proposed to locate the residential colony on the north side of the block on non agricultural land. 15 Ha of land will be required for this.
- 12.1.4 For the resettlement colony also a suitable site has to be selected measuring around 36 ha in consultation with district administration on the north of the block.

12.2 BUILDINGS

12.2.1 Non-Residential Buildings

- 12.2.1.1 These include community buildings, offices, workshop & stores, sub-stations, magazine & other statutory buildings. The comprehensive list of various service buildings with their estimated cost has been given in Appendices A.2.1. Following are the broad details of these buildings.

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12.2.1.2 Community Buildings

12.2.1.2.1 These include dispensary, primary school, officers' and staff rest houses, clubs, community centre etc. Cost towards these buildings has been indicated in Appendix A.2.1.

12.2.1.3 Offices

12.2.1.3.1 Provision has been made for Project office and mine site office. These buildings have been envisaged as RCC-cum-brick masonry structures.

12.2.1.4 Workshops and Stores

12.2.1.4.1 In this project report, provisions have been made for maintenance and repair of HEMM, LMV and other Plant & Machineries. Accordingly, workshop and stores to cater for the needs of their repairs and maintenance have been considered. The area of various shops and facilities are envisaged on the basis of technological & operational requirements.

12.2.1.5 Sub-Station

12.2.1.5.1 One Sub-station has been considered to cater for the requirements of the Project & township. This will be brick masonry, RCC beam and slab construction with RCC louvers for ventilation and ducts with proper size for electric cables.

12.2.1.6 Magazine

12.2.1.6.1 Required provision for magazine has been made in the report.

12.2.1.7 Statutory Buildings

12.2.1.7.1 There are provisions for canteen, first aid centre, rest shelter, training centre, pit head bath etc. The areas for various statutory buildings have been considered on the basis of BPE guidelines.

12.2.2 Residential Buildings

12.2.2.1 The manpower requirement for Gourangdih Opencast Mine has been estimated as 494. The project is located in the Salanpur area of ECL, District Burdwan. The nearest town of Asansol is about 20 kms from the proposed Project. With this background, around 55% housing satisfaction has been considered for the project. Thus, 270 nos. of residential units have been envisaged. The proposed site for the colony to accommodate these houses and other community/welfare facilities has been identified and is located in the north part of the block. Land required towards this works out to around 20 ha.

12.2.2.2 Hostel accommodation has been proposed as 20% of type-A quarters, and reduction in proposed type - A quarters has been made accordingly.

12.3 ROADS & CULVERTS

12.3.1 Colony Roads

12.3.1.1 The length of colony roads has been estimated and respective capital expenditure has been furnished in Appendix A.8.2.1.

12.3.2 Haul Road

12.3.2.1 The length of haul roads has been estimated as 3 Kms for plying of 60T dumpers.

12.3.3 Heavy Duty Road

12.3.3.1 The dumpers deployed in the benches will also go to the workshop for maintenance. Hence a provision for 2 Kms heavy duty road has been made in the present report.

12.3.4 Approach Road to Project & Township

12.3.4.1 Approach road of 2.5 Km length has been proposed in this Report.

12.3.5 Approach Road to Magazine

12.3.5.1 A 2.0 Km long approach road is proposed for magazine. The magazine will be located in the south side of the quarry..

12.3.6 WATER SUPPLY & SEWERAGE

12.3.6.1 Ajoy river has been identified as the source of raw water required for the Project and residential colony. The requirement has been estimated as 0.14 MGD of potable water and 0.12 MGD of industrial water. Water from Ajoy river is proposed to be stored in bulk reservoir at a point in the colony area through intake well & pump arrangement at Ajoy river. Water received in the bulk reservoir shall be treated first for both colony and industrial requirements. This treated water has been envisaged to be pumped in overhead tank in the colony. It is proposed to store required industrial water in a ground reservoir envisaged in the industrial area and from there to the overhead tank in the industrial area. From these overhead tanks, water would be distributed to the points of consumption through water supply networks in the colony and industrial area.

12.3.6.2 Separate sewerage system for domestic & industrial sewage has been envisaged for the Project.

12.3.7 Colony Water Supply

12.3.7.1 An overhead tank shall have to be constructed within the complex. In take water after proper treatment will be stored into the overhead tank for distribution.

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Gourangdih Coal Limited

(S.C. GUPTA)

Recognised Plan approved u/s 22(c) of
Mineral Concessions Act, 1957 by Ministry
of Coal & Mines, Government of India vide
No. 26011/4/2002-CC dated 17.10.2002
(validity of recognition for 10 yrs.)

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12.3.8 Industrial Water Supply

12.3.8.1 Water from the overhead tank for industrial purposes has been considered to be delivered to the various industrial buildings, administrative complex & quarry sites and is proposed to be distributed by gravity to the point of consumption through a distribution network.

12.3.8.2 For fire fighting purposes in the industrial areas like workshops, stores and quarry area, separate distribution networks have been proposed from the ground reservoir. Provision towards requirement of water for public utilities like park, garden, afforestation etc. has been made in this report. It has been envisaged that the distribution network for fire fighting purposes shall also be utilised for these purposes.

12.3.9 Colony Sewerage

12.3.9.1 Colony sewage has been proposed to be dealt through septic tanks and soak pits.

12.3.10 Industrial Sewerage

12.3.10.1 It is proposed that the industrial wastes from workshop and other industrial establishments would be led through oil & grease traps. Thereafter the effluent coming out of the industrial premises is proposed to be led to the settling tank and is proposed to be chemically treated and recycled for various industrial uses for this project. The domestic sewage generated in industrial premise has been considered to be dealt in septic tanks and soak pits.

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CHAPTER- XIII

MANPOWER, PRODUCTIVITY & AUTOMATION

13.1 GENERAL

- 13.1.1 For the planned capacity of 2.5 Mtpa of coal, the total manpower requirement for Gourangdih Opencast project has been estimated as 494, the break-up of which is given in the table-13.1.

Table- 13.1
Break-up of total manpower requirement

SL. No	Particulars	Strength (nos)
I	Operation	
I A	OB	180
I B	Coal	68
I C	Reclamation	12
I D	Common	23
	Sub. Total (I)	283
II	Maintenance	42
III	CHP & Despatch	23
IV	Common Manpower	
IV A	Excavation supervision	8
IV B	E & M supervision	3
IV C	E & M Maintenance, w/shop. colony.	16
IV D	Other operations	31
IV E	Planning office	2
IV F	Transport	
IV G	Mining safety, Despatches & quality control	13
IV H	Training centre	
IV I	Project office *	7
IV J	Finance & Accounts	7
IV K	Watch & Ward	8
IV L	Personnel welfare	1
IV M	Stores	8
IV N	Civil & Town Administration	3
IV O	Medical & Sanitation	5
IV P	Water supply	16
IV Q	Survey	

Plan prepared by me

Gourangdih Coal Limited

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(S C CHATTERJEE)

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No. 142/12 dated 17.10.2002
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Sl. No	Particulars	Strength (nos)
IV R	Communication	2
	Sub Total (IV)	142
V	Environment	4
	TOTAL (I+II+III+IV+V)	494

13.1.2 The manpower calculation has been made based on 330 days of annual working. Services for security, canteen, rest house, colony maintenance, biological reclamation and sanitation are proposed to be outsourced. Financial provisions for these have been made.

13.2 OMS

13.2.1 At the targeted production capacity of 2.5 MTY of coal with total manpower of 494 the OMS of Gaurangdih Opencast project works out to 19.68 t.

13.3 SERVICES PROPOSED TO BE OUTSOURCED

13.3.1 The following services have been proposed to be outsourced for improved efficiency in daily operations. Suitable funds have been provided for each service to be outsourced. The services proposed to be outsourced are:

- Security services
- Canteen services
- Rest house services
- Colony maintenance services
- Biological reclamation services
- Sanitary works


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13.3.2 Considering the provisions for outsourcing, manpower in the project has been proposed.

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 Gaurangdih Coal Limited

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 of Coal & Mines, Govt. of India vide
 14/2002 - Dtd. 17.10.2002

13.4 TRAINING

13.4.1 For efficient, effective and safe operation of the mine, a comprehensive and punctilious training program for all levels of employees is imperative. The training would be

13.4.2 The module should cover overall training in respect of the following:

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13.5 AUTOMATION

Efficient management and control of project depend upon the management information system. Availability of accurate information at proper time is backbone for decision making and implementation and control thereof. At Gourangdih Opencast Project emphasis will be given on the use of Information technology and other modern system as a tool to the management. Provisions have been made for the following:

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XIII-3

Gourangdih Coal Limited

1. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
 2. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
 3. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
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 5. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
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 7. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
 8. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
 9. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)
 10. (C) (U) (S) (P) (A) (M) (I) (N) (T) (E) (R) (S)

- Surface Mine Communication System for monitoring, control of line function, etc.
- Modular System (TDS) as a tool of MIS to achieve optimal result.
- Modern survey equipment (TOTAL STATION) compatible with computer and CAD system.
- GPS based day-to-day mine planning for optimisation of haulroad layouts and lengths for reducing the requirement of dumper fleet.
- Slope stability radars/monitors to predict slope failures.

A suitable feedback evaluation system is proposed to evaluate the efficiency of the automation proposed and its modification if required.

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CHAPTER- XIV

LAND REQUIREMENT

14.1 LAND REQUIREMENT

- 14.1.1 Total requirement of land for the Gourangdih ABC block OCP is 356.67 ha. The break up of the land requirement is shown in Table 14.1.
- 14.1.2 92.53 Ha of forest land is required for mining operation. Forest clearance is necessary for starting Gourangdih-A and C quarries.
- 14.1.3 The area for colony will be on the north of the block boundary and is to be finalized later after surface survey.
- 14.1.4 A suitable area has to be found out for rehabilitation and resettlement on the north of block boundary of those persons who are directly affected and have to be evacuated.

Table-14.1
Break up of Land

Sl. No.	Particulars of utilization	Total land Required (Ha)	Type of land. (Ha)	
			Non-Forest	Forest
1	Quarry area	214.00	121.47	92.53
2	External dump	62.97	62.97	0.00
3	Infrastructure	9.5	9.5	0.00
4	Rehabilitation colony	12.00	12.00	0.00
5	Workers Colony	5.00	5.00	0.00
6	Road	8.00	8.00	0.00
7	Others including safety zone	45.2	45.2	0.00
Total		356.67	264.14	92.53

[Signature]
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XIV-1

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 Valid for 10 yrs.

14.2 PRE MINING LAND USE PATTERN

14.2.1 Pre-mining land use pattern has been shown in the table-14.2.

Table- 14.2
Pre- Mining Land Use

Sr. No.	Existing Land Use	Area (in Hectares)
1	Agricultural Land	48.43
2	Fallow (Danga) Land	62.19
3	Degraded Land (Old Quarry Area)	60.22
4	Built up Area	60.86
5	Water Body	15.44
6	Forest Land (Protected and jungle)	92.53
7	Non Agricultural Land for Colony (outside core area)	5.00
8	Non Agricultural Land for Rehabilitation (outside core	12.00
	Total	356.67

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CHAPTER- XV

SAFETY & ENERGY CONSERVATION

15.1 SAFETY

15.1.1 Haul Road

15.1.1.1 Haul road for rear dumpers of 60 T is proposed with double lane and shoulders on both sides for movement of dumpers and ancillary equipment. The haul roads have been designed at a gradient of 1 in 16.

15.1.2 Stability of benches

15.1.2.1 OB benches are proposed to be at an angle of 70° from the horizontal & coal benches are proposed to be at an angle of 80° from the horizontal. The benches are proposed to be graded with a slope of 1 in 100 towards the sump to facilitate smooth flow of water towards the sump. The height and width of the main OB bench will be 12 m and 30 m respectively. For coal, the bench height will be usually 6 m.

15.1.3 OB dump

15.1.3.1 OB will be dumped in the external and internal dumping areas at the natural angle of repose to avoid sliding of OB. OB dump will be terraced at intervals of 30 m height. The barrier distance between internal dump and coal production bench will be maintained at a minimum of 100 m to have smooth functioning of the machineries. The surface of OB dump will be leveled and graded. Afforestation will be done on the slope of OB dumps to

consolidate the spoil. The slope of OB dump will not exceed 37° from horizontal.

15.1.4 Water management

15.1.4.1 Garland drains around the proposed quarry boundaries will be provided and periodically maintained for adequate safety.

15.1.4.2 Proper drainage system will be provided in haul roads and other roads to guard against damage of pavement and slippery condition during heavy shower.

15.1.5 Fire

15.1.5.1 To take care of fire, adequate provisions of fire fighting arrangements have to be provided.

15.1.6 Blasting

15.1.6.1 Controlled blasting techniques including muffled blasting will have to be adopted during blasting within 300 m zone but beyond 100 m from the village, dwellings, surface structure, road etc. Total quantity of explosive to be detonated at a time will be so regulated that ground vibration which may affect the nearby surface structures, are kept within the stipulated limit.

15.1.7 Safety Zone

15.1.7.1 Land requirement for safety zone has been assessed from quarry surface edge on the assumption that Controlled blasting techniques will be adopted during mining operation with prior permission from Directorate General of Mines Safety.

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15.1.8 Dust suppression

15.1.8.1 Water spraying has been envisaged on the haul roads starting from the quarry bench to external dump yard and around CHP to prevent rising of dust in the air.

15.1.9 Lighting & Signaling

15.1.9.1 Adequate lighting arrangement will be provided at all working places. In addition to this some mobile lighting arrangement should be made in the proximity of the equipment to prevent accident during power failure.

15.1.10 Power line

15.1.10.1 Where dumper/crane/other HEMM are to pass below power line, a corridor with appropriate ground clearance considering the maximum height of the equipment which are required to pass has to be maintained. Other places along the power lines, where appropriate ground clearance can not be kept should be effectively barricaded/ guarded.

15.2 CONSERVATION

15.2.1 Suitable measures should be taken to minimize coal loss during mining operations. It is proposed not to dump OB over coal bearing area, where opencast mining, may be done now or at a future date.



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No. MC 142/2002 dated 17.10.2002
Ministry of Coal Production for 10 yrs.

CHAPTER XVI

PROJECT IMPLEMENTATION SCHEDULE

16.1 GENERAL

The life of the project has been estimated as 27 years. The rated capacity of 2.50 Mtpa, is expected to be achieved in the Year-3. The implementation schedule envisaged herewith deals with the major activities like planning, approval, land acquisition, construction and initial mining operations till achieving the targeted production of 2.50 Mtpa. The schedule has been proposed considering the objective of achieving the target as early as possible with minimum gestation period. Accordingly, most likely time frame for each activity has been proposed.

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16.2 SCHEDULE

The zero date of project implementation is the beginning of Year-1 when construction work starts after government approval is given for Mining Plan & EMP. The activities envisaged during pre-construction stage are environmental data generation, preparation of Mining Plan, EMP preparation and approval thereof, land acquisition (including forest land for start of initial mining activity), preparation of specifications, design/engineering and scientific studies, tendering and award of work.

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XVI-1

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Advance action is proposed for laying out the specification & award of tender for major construction activities like service buildings, residential buildings, roads & culverts, water supply arrangements, power supply arrangements and mine site development activities so that construction / commissioning of the same can be completed before commencement of mining operations.

The proposed implementation schedule, vide Fig. 16.1, which has been developed considering third quarter of Year1 as the off-take date for start of mining activity.

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Project Schedule Indicating Major Activities upto Year 4

Sl.No.	Year of mine operation	Advance action	Year 1	Year 2	Year 3	Year 4
A.	Approval of the Project					
B.	Major mine related activities					
1	Land					
1.1	Forest Land Clearance from MOEF & Physical Possession					
1.2	Non-Forest Land Acquisition, Compensation & Physical possession					
2	Rehabilitation & Resettlement					
3	Power Supply Arrangements					
3.1	Electrical system drawing/design					
3.2	Tender & award of work and					
3.3	Procurement & Erection of Power Supply Arrangements					
4	Workshop					
4.1	Civil & Structural drawing/design					
4.2	Tender & award of work					
4.3	Construction of Workshop					
4.4	Procurement & Commissioning of Workshop P&M					
5	Procurement of HEMM					
5.1	Preparation of tender document					
5.2	Tendering, Scrutiny & award of work					
5.3	Procurement of HEMM					
6	OB removal (Mcum)					
7	Coal Production (Mt.)					

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17 10 2002
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Rehabilitation of Gourangdih village proposed to be shifted shall be taken up well in advance before mining activity approaches within its vicinity.

Immediately after the approval, the construction schedule will be re-defined and firmed up to suit local site conditions and to up-date the schedule considering unforeseen slippages, if any.

In the proposed construction schedule, although a tentative estimate of the calendar year has been mentioned but this may change depending on time actually required for various activities. Basic construction activities related directly to project infrastructure, which is essential to start the mining operation, shall be completed mostly in the first two quarters of Year1. Time estimates are broad and indicative. Necessary modifications to suit local site conditions are to be incorporated subsequently.

Slippage of activities on the critical path is responsible for delay in the project. However, efforts to achieve the target in time will avoid any slippage of the project as a whole.

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CHAPTER-XVII


ENVIRONMENTAL MANAGEMENT

17.1 Introduction


Environmental Pollution in mining is a consequence of mining activities involving drilling, blasting, crushing, transportation of coal etc. Mining and associated activities not only affect air, noise and water environment but it also degrades land and upsets the drainage system of the area. To assess the impact of mining operation on different components of environment, one season environmental data on air, water, noise and soil environment are generated by CIMFR, Dhanbad. The environmental status of the area monitored is discussed briefly in following paragraphs based on the primary and secondary data.

17.2 Air Environment

Air pollution includes one or more contaminants (pollutants), in the outdoor atmosphere in such quantities and of such duration that may be injurious to human, plant or animal life. The topographical information of project site as well as of the study area, different activities related to the coal mining and associated activities were collected. Different air pollution parameters like, RSPM (PM10 & PM2.5), Pb, CO, SO₂, and NO_x were identified as related to the project activities for representing baseline status of ambient air quality with the study area. In addition fugitive emissions were also estimated with reference to mining operation. To assess the base line ambient air quality five air quality monitoring locations were selected in core and buffer zone area.


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The results of air quality monitoring has been given below in Table 17.1. Air quality monitored data for the Gaurangdih mine show that the average PM_{10} 60.1, $PM_{2.5}$ 18.8 and SPM ranges from 142.2 to 191.2 μg which is below the permissible limit. Similarly SO_2 values is ranging from 7.6 to 15.3 $\mu g/m^3$. The concentration of lead (Pb), CO and HC are found below the detectable limit.

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**Table 17.1: Ambient Air Quality in Gourangdih Opencast Mine Area
Core Zone – Gourangdih Site
(November 2010 to February 2011)**

Period		Parameters (µg/m³)				
Month	Weeks	RPM (PM 10)	RPM (PM 2.5)	SPM	SO ₂	NO _x
2010-November	1 st Week	63.4	24.5	160.1	19.8	22.3
		65.7	23.5	169.2	17.37	15.3
	2 nd Week	70.2	22.5	163.5	11.01	10.6
		68.9	20.5	169.7	19.6	19.5
	3 rd Week	68.2	20.8	162.4	17.4	22.5
		55.3	18.6	177.4	13.5	16.8
	4 th Week	59.9	19.2	190.4	16.3	30.3
		60.2	20.1	191.2	16.7	17.4
2010 December	1 st Week	54.1	17.2	184.2	12.6	19.5
		53.2	18.2	179.2	11.3	10.6
	2 nd Week	60.3	20.0	153.2	11.8	11.9
		61.2	21.0	159.4	14.2	23.4
	3 rd Week	64.2	23.0	152.5	13.9	22.7
		52.2	16.0	145.3	13.7	20.5
	4 th Week	58.4	17.0	152.7	20.2	28.3
		58.7	18.0	142.2	11.3	27.4
2011 January	1 st Week	54.2	16.0	142.3	18.7	20.6
		55.7	17.0	145.3	11.4	29.8
	2 nd Week	55.9	17.5	162.3	17.7	29.2
		53.2	16.5	143.2	19.5	25.5
	3 rd Week	59.1	17.5	150.9	16.4	20.2
		63.2	18.0	167.3	13.2	21.2
	4 th Week	55.3	17.5	153.2	12.2	30.5
		62.1	18.0	149.5	11.9	19.5
2011 February	1 st Week	73.5	20.0	149.9	13.7	28.4
		59.3	18.0	153.6	17.5	10.4
	2 nd Week	58.3	17.0	152.5	18.5	26.7
		60.2	18.0	150.3	19.3	27.4
	3 rd Week	58.7	17.0	150.5	16.2	23.2
		60.8	18.0	144.2	13.5	22.3
	4 th Week	62.4	19.0	170.4	11.6	20.2
		58.3	18.5	190.3	17.8	25.3
Minimum		52.2	16.0	142.2	11.0	10.4
Maximum		73.5	24.5	191.2	20.2	30.5
Average		60.1	18.86	160.2	15.3	22.0

CO and SO₂ are found below detectable limit.

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17.3 Water Environment (Water Quality & Hydro-geology)

Informations on water resources in the study area were collected. The water resource in the study area are mainly river, ponds and groundwater. Ajoy and Barakar flowing in the east and south of the Gourangdih Block. Ajoy and Barakar Rivers control the main drainage of the area. Though some ground water have been tapped by shallow wells for drinking and irrigation needs, the deep aquifers were neglected in most of the area. With proper technique, the ground water can be successfully tapped to meet the water demand both for domestic and agriculture. The common sources for domestic and irrigation in the core zone villages include shallow dug wells, river and ponds. The other system is tapping deep aquifers in some of the villages by deep tube wells i.e. hand pumps. These wells have been an average depth of 40-50 meters. In the reconnaissance survey, it is found that most of the villages have three to five tube wells and/or dug wells; either belongs to the private or public. The water table in the dug wells ranges in between 6-12 m in pre-monsoon and 2-8 meter in post-monsoon periods except in few cases when the water table is somewhat deeper.

To assess the impact of mining on water quality, five water samples have been collected from different locations. This comprises of tube well water and two river water (Ajoy) and one mine water. The water samples were collected and analysed as per IS:10500 standards. Results of ground water and surface water analysis shows that concentration of some ions like SO_4 , Cl and Dissolved Solids (TDS) are relatively high in some ground water and mine water samples. However, in general all the measured values are found well within the maximum permissible limit as specified in the test parameters of drinking water as per IS:10500.

The possible source of waste water due to the project activities are (i) mine water (ii) waste water from workshops and township/colony etc.

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The major pollutant expected to be coming with underground mine water will be suspended sediments and coal particles. Provision will be made for proper sewage disposal system for domestic and industrial effluents. As mentioned above most of the measured parameters in the surface and ground water of the study area is below the threshold values as per IS: 10500 and CPCB. The effluents and mine water will be collected in settling ponds for settlement of suspended sediments and no wastewater will be discharged directly in to the drainage system. The wastewater will be treated and clear water will be used in mining and reclamation process. Thus, there will be no possibility of the wastewater having any impact on the existing water regime; instead it will meet the demand of water for mining, washing & other operations.

Three area were selected for testing of drinking water as Tube well Gourangdih village (W1), Tube well of Lalgunj village (W2), and Tube well of Mohanpur village (W3). In addition to this, two samples W4 & W5 collected from U/S and D/S of Ajoy River. The result of the water quality analysis shows that all the measured values are well within the threshold limit.

The proposed block falls within the catchment area of Ajoy River. Some tests of tubewells located in the vicinity of the block indicated that ground water is potable and safe. The water samples were collected and analysed as per IS:10500 standards. Results of ground water and surface water analysis have been given in the Table 17.2 – 17.3 respectively. All the measured values are found well within the threshold limit.

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of Coal vide
No. 10/10/2002

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Table 17.2 -Drinking Water Quality of the Study Area (Post-monsoon Season)

W1 Gourandoli village, W2 – Laiguni village, W3 - Mohanpur

All parameters are expressed in mg/l except pH.

- * Pesticides are measured by following APHA, (Page 6-91) method using Gas Chromatography for Organochlorine pesticides like BHC, Lindane (γ -BHC), DDE, DDT, DDD, endosulfan etc.)

Table 17.3: Surface Water Quality of the Study Area (Post-monsoon Season)

S.N.	Parameters	Station Code		IS:10500
		W4	W5	
1.	Temperature ($^{\circ}\text{C}$)	13.6	12.3	
2.	pH	7.23	6.98	6.5-8.5
3.	Turbidity (NTU)	742	739	
4.	Total Suspended Solids	28	33	-
5.	Total Dissolved Solids	277	291	500
6.	Alkalinity to M.O. ($\text{mg CaCO}_3/\text{l}$)	79	71	
7.	Alkalinity to Phen ($\text{mg CaCO}_3/\text{l}$)	7.4	7.7	
8.	Dissolved Oxygen	26	21	-
9.	BOD	5	4	-
10.	COD	21	17	-
11.	Temp. Hardness ($\text{mg CaCO}_3/\text{l}$)	64.2	63.7	
12.	Perm. Hardness ($\text{mg CaCO}_3/\text{l}$)	46.3	43.7	
13.	Nitrate	5	3	
14.	Sulphates (as SO_4^{2-})	6	3	150
15.	Ammonia	BDL	BDL	
16.	Chloride (as Cl^-)	10	12	250
17.	Oil & Grease	BDL	BDL	-
18.	Fluorides as (F)	0.7	0.8	0.6-1.2
19.	Phosphate	BDL	BDL	
20.	Phenol	BDL	BDL	
21.	Iron (as Fe)	0.07	0.04	0.3
22.	Manganese (as Mg)	3	5	30
23.	Micro-Organisms (MPN/ 100 ml)	1641	1622	

W4 - U/S Ajoy River, W5 - D/S Ajoy River

All parameters are expressed in mg/l , except pH.

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17.4 Noise Environment

Noise level was measured at several locations in the human settlements around the proposed mining site by using precision noise level meter. Detailed analysis of noise has revealed that there is no noticeable impact of noise in the surrounding environment. All the study sites in the residential areas exhibited a noise level well within the corresponding threshold limit value as prescribed by CPCB, both during the day and night time.

Table 17.4 : Noise Level in the Study Area

Stn. Code	Monitoring Station	Day (06.00 – 2200 Hrs.)			Night (22.00-6.00 Hrs)		
		Min.	Max.	Avg.	Min.	Max.	Avg.
N1	Gourangdih	43.6	49.6	53.4	32	42.6	43.7
N2	Panuria	40.7	49.8	54.2	16.5	38.6	40.4
N3	Lalganj	46.5	51.6	52.4	13	39.3	37.4
N4	Mohanpur	42	50.5	46	17	37.4	38.5
N5	Tara	39.2	48.5	49	30.5	33.5	38.2
N6	Begunia	45.7	53.7	48.9	33	30.3	38.5
N7	Salanpur	38.2	47.8	45.3	20.4	36.7	36.4
Central Pollution Control Board Standard (Residential Area)		55.0			45.0		

Average Leq value in dB (A)

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17.5 Land Environment

Total requirement of land for the OCP project is 356.67 Ha. The land requirement for actual quarrying operation is 214 Ha. out of which 92.53 Ha is forest land. The break up of the land required for different purposes are given in the following table 17.5.

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Table-17.5: Break up of Land

Sl. No.	Particulars	Total land Required (Ha)	Type of land	
			Non-Forest	Forest
1	Quarry area	214.00	121.47	92.53
2	External dump	62.97	62.97	0.00
3	Infrastructure	9.50	9.50	0.00
4	Rehabilitation colony	12.00	12.00	0.00
5	Colony	5.00	5.00	0.00
6	Road	8.00	8.00	0.00
7	Others	45.20	45.20	0.00
Total		356.67	264.14	92.53

17.6 Soil Environment

To predict the future mining impact on soil quality in and around Gourangdih Block, the baseline soil quality of the area has been evaluated with respect to physical and chemical parameters. Analysis of soil samples reveals that there is no wide variation in the natural material. Particle size analysis shows that the texture of the soil is of sandy loam in nature. The bulk density was found to vary from 1.38 to 1.62 g/cm³ showing compactness while moisture content ranged from 12.6% to 24.2%. All the samples showed moderate water holding capacity ranging from 27.3 to 35.8 %. Further soil of agricultural field was found slightly acidic in nature while the waste land soil samples shows neutral pH. Electrical conductivity measurement of the samples clearly suggests that total soluble solid concentration are in the normal range and all the values are found below 1 mmoh/cm the values of EC ranged from 0.19 to 0.29 mmoh/cm. The values of organic carbon of all samples

were found to be lower. Available phosphorus and potassium have been found in medium range.

17.7 Biological Environment

The area contains large part of agricultural, waste land, mining pit and dumping area. There is a large area for agricultural land across the site. Rice is the main staple food of the district and it is chiefly grown. Vegetables are also cultivated in some parts of the area. Paddy, fruits and vegetables, cattle rearing, poultry, piggery, etc. are the natural way of living. The miscellaneous flora consists of the following species:- Khair, Asan, Karam, Guri, Sidha, Mahua, Gamhar, Bid, Semal, Piar, Bel, Dhaura, Salai, Kusum, Sisam etc. The area is not very rich in floral and faunal diversity. There is no endangered species of flora and fauna in the core & buffer zone of the mining site

Among wildlife Snakes and lizards are quite common. Different varieties of birds are also observed in the winter season. The low vegetative cover, long mining history and disturbed surrounding area does not support growth of variety of faunal species. Prominent wild species include wild boar, jungle cat, civet cat, black napped hare; squirrel, jackals and porcupines are also occasionally spotted. Amongst birds the bulbul, the white-breasted kingfisher, magpie robin, spotted dove, myna, jungle ubbler are prominent. Amongst reptiles, several poisonous like cobra, viper, krait and non-poisonous snakes (like boa, rat snakes, green whip, bronze backed tree snake, etc) abound in this area. The garden lizard and monitor lizard are also seen. Variety of butterflies (like common grass yellow/common jezebel) and insects (such as beetles, spiders, red ants, and flies) are spotted in abundance in the study zone.

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17.8 Socio-economic Environment

Gourangdih block area comes under three mouzas namely Panuria, Gourangdih and Katapahari covering seven villages. These villages are Shivdhaura, Bandhura, Lalbandh, Panuria, Jamgram, Katapahari & Bhuiapara. The population of these villages will be affected by proposed coal mining.

The socio economic study in detail and Resettlement and Rehabilitation plan is been prepared by a reputed NGO. However the available census report shows that Katapahari, Panuria and Jamgram are the major villages under Barabani block, Asansol Sub-division of Burdwan District. Panuria is a big village with total population of 6838 (3501 Male & 3337 female). The Schedule Caste (SC) population is 1895 and Schedule Tribe (ST) 950 only. The literacy level is more than 50% of the total population. About 30% of the population are dominated by workers only. Agriculture activity is very less. Similarly Katapahari (153.86 Ha) has 395 no. of houses with around 1691 population (855 male & 806 female). In this village SC population is 238 and ST population 377 only.

Most of the houses in these villages are electrified with communication system and transport facilities available. A large no. of work force come from adjoining of Dumka district of Jharkhand. Education facilities comprises of lower, middle and higher secondary school at Panurai. Post office facilities exist in Panuria along with telephone and mobile tower. The table 17.7 below shown the population to be displaced from this villages.

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Table 17.6: Population to be Displaced

Block	Name of the Village	Population to be displaced	Total
Gourangdih-A	Shivdhaura	500	950
	Banddhaura	400	
	Lalband	50	
Gourangdih-C	Panuria	400	1090
	Gourangdih	40	
	Katapahari	600	
	Bhuiapara	50	

17.9 Anticipated Environmental Impacts and Mitigation Measures

The section summarizes the pollution potential of the proposed mining project and its possible impact on the surrounding environment during pre-operational and operational phases and the necessary management actions proposed for control and abatement of pollution.

17.9.1 Impact due to Air Pollution and its Management

Different mining operations such as blasting, coal transportation (haul road), excavation with shovel, wind erosion of overburden & coal dump etc. generate dust, which usually get air borne. The major source of dust pollution is due to the movement of dumpers and other heavy earth moving machineries. Apart from dust, gaseous pollutants like hydrocarbons, NO_x, Pb, CO, CO₂, SO₂, H₂S, etc. are also generated from the vehicle exhaust, due to blasting, spontaneous heating in coal stock and waste dump.

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17.9.1.3 Gaseous Pollutants

In mining dominated area, air is expected to contain gaseous pollutants, besides dusts. Gaseous pollutants like CO, CH₄ & CO₂ are emitted from the coal yard. Spontaneous heating may also lead to fire in the coal dump and release variety of other toxic gasses. To minimize such gaseous pollutants following steps should be taken:

- i. Production & delivery planning should be such that the minimum coal stock will present in the coal yard.
- ii. While dumping the coal, it should be compacted by heavy earth moving machineries so that minimum air is allowed to stay in the coal dump.
- iii. It should always be watered regularly.

17.9.2 Impact due to Water Pollution and its Management

The mine discharge water may contain high-suspended solids and other pollutants. The treatment scheme thus needs to focus on the removal of suspended solids from the water. Pit water must be treated to meet the prescribed standards before being discharged into water bodies. When the water is used for agricultural or domestic work, it should undergo further treatment. The important factors to be considered in selecting the appropriate method for treatment are as follows:

- i. Settling tank will be provided to collect the mine discharged water for settling the suspended solids.
- ii. The flow and the quality of pit water vary seasonally. Therefore settling tank should be able to absorb these fluctuations.
- iii. The mine water must be neutral in nature and therefore necessary neutraliser may be provided to maintain the pH of the settling pond water.

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- iv. In order to reduce the dependence on fresh water sources for meeting the demands of water in the mining related operations, the entire mining effluents water will be utilised. The entire effluents mine water will be utilised in water spraying for dust suppression and in green belt, hydraulic stowing, equipment washing and other industrial requirements. Only water for drinking water will be withdrawn from ground water source.
- v. Mine water discharge and drainage in the core zone has been planned to be regulated in a manner so that impact on surface and other water bodies of the area is not affected. No diversion of any surface drainage channel is require as other than civil constructions, surface land will not be affected. Expected increase of solids due to surface handling of coal shall be controlled by:
 - vi. Construction of garland drain around the coal yard area
 - vii. Construction of settling tanks of adequate size for removal of particulate matters
 - viii. Provision for small stone barriers across the drain to check water current and to arrests solids
 - ix. Stone pitching will be made at suitable places to regulate water flow.
 - x. De-silting of settling ponds and drains at regular intervals
 - xi. Effluents from washing areas, garage and workshop will be collected in garlands and routed through a settling ponds and oil and grease trap.

17.9.3 Impact due to Noise Pollution and its Management

In this coal mining project heavy earth moving machines will be deployed for mining, which is the major source of noise pollution. Blasting will also cause vibration and it has also the significant impact in the area. The sources and causes of noise have been discussed in previous chapter and its negligible impact has also


been noticed. However, the following measures have been taken to minimise the possible adverse impact of noise in around the mining area:

- i. The DG sets shall be used and placed on vibration isolators.
- ii. Conventional drilling and blasting operation will be replaced with ripping and dozing by deploying state of art ripper dozer i.e. CTD, DIIN, DION & DIOR.
- iii. Noise protectors, sound insulation operator cabin and the reduction of noise from plant and other equipment are achieved by fitting of special silencer and proper lubrication and maintenance.
- iv. Increase in ambient noise level may be expected from exhaust ventilation fan for the underground mine. By following the precautionary measures like fan balancing, bearing lubrication, fastener tightness, the undue noise and vibration may be controlled.
- v. Provision of earplug for heavy earth moving machinery operator.
- vi. Provision of green belt is made surrounding the lease boundary to arrest dispersion of noise in buffer zone area on surface.
- vii. Roads should be smooth, so that pollution will be less due to vehicular movement.

17.9.4 Management of Socio-economic impacts

Coal Mining in the area will be involved in various socio-economic activities, which will generate employment, health services, schooling and drinking water facilities to local people. The following measures will be taken to improve quality of life of the people:

- i) Planting of economically important trees
- ii) Use of clean an boiled water
- iii) Providing drinking water
- iv) Personal hygiene and small dispensary
- v) Approach roads to surrounding villages


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- vi) Preference in skilled and non-skilled job
- vii) Company will take all necessary steps to help and create self-employment opportunities for nearby villagers.

Occupational safety and health is very closely related to productivity and good employee relationship. The main factors of occupational health on coalmine are fugitive dust and noise. To avoid any adverse effects on the health of workers due to dust, noise and other causes following measures have been taken by the company:

- i. Provision of rest shelters for mine workers.
- ii. Provision of personal protection devices to the workers.
- iii. Training of employees for use of safety appliances and first aid.
- iv. Regular maintenance and testing of all equipments as per manufacturer guideline.
- v. Rotation of workers exposed to noise premises.
- vi. Effective dust suppression of haul roads.
- vii. First-aid facilities in mining area.
- viii. Provision of amenities like drinking water, toilets etc.
- ix. Periodical medical examination of all workers by medical specialist so that any adverse effects may be detected in its early stage.
- x. Close surveillance of the factors in working environment and work practices, which may affect environment and workers health. Monitoring of the values of various factors which may lead to occupational health hazards.
- xi. Working of the mines as per approved mining and environmental plans.

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17.10

Total Investment on Environmental Control Measures

The total capital investment on Environmental Control Measures in the project has been estimated at Rs. 3789.73 lakhs as per the report, the break-up of which is given in Table-17.7.

Table-17.7**Estimated Capital Investment on Environmental Control Measures**

Sl. No.	Particulars	(Amount in Rs. Lakhs)
I	Rehabilitation of Villages	1013.13
II	Compensation to land losers	636.52
III	Community Development at Rehab. Colony	925.01
IV	Plant and Machinery	
a	HEMM & Water sprinklers	477.30
b	Dust suppression & extraction in CHP	75.00
c	Pollution control at proposed Rly. siding	19.20
V	Capital for Restoration	
a	Biological Reclamation of mined out land	167.18
b	Afforestation	167.18
VI	Other Provisions	
a	Colony potable water treatment plant	93.91
b	Storm water channel in residential areas	9.14+
c	Domestic Effluent Treatment Plant (lump sum)	37.66
d	Open surface drains in industrial areas	19.13
e	Garland drains	5.00
f	Sewerage disposal system for service buildings including settling tanks, O&G trap	99.89
g	Consent to establish fee payment	7.50
h	Baseline data generation, EMP preparation cost and Hydrogeological investigation	22.00
i	Storm water pumping channel	5.00
j	Diversion of road	10.00
Total		3789.73

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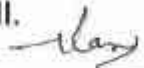
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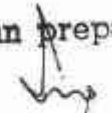
CHAPTER- XVIII

PROGRESSIVE MINE CLOSURE

A separate Mine Closure Plan incorporating all the required details has been prepared as per the guidelines issued by the Ministry of Coal, Government of India. The Mine closure Plan is enclosed as **Annexure – VIII**.


Joint Secretary
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CHAPTER- XIX

ECONOMIC EVALUATION

19.1 TOTAL CAPITAL INVESTMENT

19.1.1 The initial capital investment required for Gourangdih opencast project has been estimated as Rs. 621.71 Crores up to the target achieving year for the rated output of 2.5 Mty of coal. The head-wise break-up of the estimated capital investment with year-wise phasing is given in Table-19.1

Table- 19.1
Capital Investment

(Rupee Lakh)

SL NO.	PARTICULARS	TOTAL CAPITAL INVESTMENT
1	Land	4608.10
2	Buildings	
	a) Non Residential	2377.31
	b) Residential	1305.04
	Sub-Total - (2)	3682.35
3	Plants & machineries	
	a)HEMM	22567.48
	b) Other than HEMM	15273.45
	Sub-Total - (3)	37840.93
4	Furniture & Fittings	23.00
5	Railway Siding	6000.00
6	Vehicles	106.20
7	Prospecting & Boring	50.00
8	Development	
8.1	Capital outlay in mines	8233.33
8.2	Roads & Culverts	500.00
8.3	Water Supply & sewerage	431.77
8.4	EMP Preparation Cost	44.97
	Sub - Total (8)	9510.07
	SUB-TOTAL OF 1 TO 8	61920.65
9.0	Revenue Exp Capitalized during Development	250.00
	TOTAL INITIAL CAPITAL	62170.65

XIX-1

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- 19.1.2 The specific investment works out to Rs.2486.83 per tonne of annual output based on the estimated capital investment.
- 19.1.3 Cost of land has been derived from present value.
- 19.1.4 For estimation of capital cost for civil construction such as buildings, roads etc cost of building materials as prevalent in the in the project area in October '10 have been taken into consideration.
- 19.1.5 The capital investment on Plant and Machinery has been estimated as 378.41 crores. This includes capital for HEMM, power supply, workshop machineries, pumps and other miscellaneous items like survey equipments etc.
- 19.1.6 Rs 60 crores has been provided for construction of new railway siding near Bojemehari siding which has to be finalised with the Railways.
- 19.1.7 Fund to be generated for mine closure activities will be borne on revenue account.

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CHAPTER- XX

CONCLUSIONS & RECOMMENDATIONS

- 20.1** The study of Gourangdih block indicates that it is feasible to operate a 2.5 MTY capacity mine within the defined boundaries for supply of power grade coal.
- 20.2** The project area has a large no. of habitations which will need to be suitably rehabilitated and resettled in proper time.
- 20.3** Total mineable reserves, is estimated as 61.54 Mt. without shifting of Gourangdih and Panuria villages. The average stripping ratio works out to 2.91 m³/t.
- 20.4** With the projected target output of 2.5 MTY, the mine life is estimated as 27 years.
- 20.5** Total land required has been estimated as 356.67 ha, including 92.53 ha of forest land. This includes requirement of land for mining, external OB dumping, infrastructure, employee's colony, rehabilitation and resettlement colony etc.
- 20.6** The mine area will have to be restored to original state as far as possible after proper reclamation and will be used for Agro Forestry and other purposes.
- 20.7** The requirement of land for the project is indicated below:

Gourangdih Coal Limited

XX-1

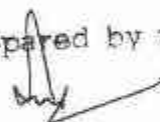
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APPENDICES

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ESTIMATED TOTAL CAPITAL INVESTMENT

Appendix-A

(Amount in Rs. Lakhs)

SL NO.	PARTICULARS	Total capital Investment	YEAR WISE PHASING														
			1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH
1	Land	4000.10	921.62	921.62	921.62	921.62	921.62	921.62									
2	Buildings																
	a) Non Residential	2377.31	71.02	854.28	832.80	885.63	23.59										
	b) Residential	1305.04		325.26	326.26	326.26	326.26										
	Sub-Total - (2)	3682.35	71.02	1180.54	1159.06	921.89	348.86										
3	Plants & machineries																
	a)HEMM	22557.46	7352.24	8564.17	6398.61	13.09											
	b) Other than HEMM	15273.45	6686.73	7133.34	1022.48	416.80	9.00	5.00									
	Sub-Total - (3)	37830.91	14038.97	15697.51	7421.10	429.89	9.00	5.00									
4	Furniture & Fittings	23.00		2.00	4.00	3.50	5.50	7.00									
5	Railway Siding	6000.00	1100.00	1200.00	3700.00												
6	Vehicles	106.20	38.12	14.13	53.94												
7	Prospecting & Boring	150.00	150.00														
8	Development																
	8.1 Capital outlay in mines -	8435.33	275.06	362.43	396.00	386.24	381.64	386.07	390.78	397.04	403.81	411.76	417.76	425.37	433.36	441.74	2854.37
	8.2 Roads & Culverts	600.00		150.00	150.00	150.00	150.00										
	8.3 Water Supply & sewerage	431.77		132.20	132.20	132.20	35.16										
	8.4 HR & EMP Preparation Cost	44.97	40.97	4.00													
	Sub - Total (8)	9510.07	316.02	678.63	668.29	668.44	576.82	386.07	390.78	397.04	403.81	411.76	417.76	425.37	433.36	441.74	2854.37
	SUB-TOTAL OF 1 TO 8	61820.55	16675.75	19684.43	13928.00	2945.43	1863.79	396.07	390.78	397.04	403.81	411.76	417.76	425.37	433.36	441.74	2854.37
9.1	Revenue Exp Capitalised during Development	250.00	250.00														
9.2	QBR-QRE																
	Less - Depreciation																
	Capitalised																
	Land Reclamation/ Environment Related Costs																
10	TOTAL INITIAL CAPITAL	52170.65	16925.75	19684.43	13928.00	2945.43	1863.79	396.07	390.78	397.04	403.81	411.76	417.76	425.37	433.36	441.74	2854.37

Plan prepared by me

S. C. CHAKRABARTY

Approved u/s 22 (C) of
Ministry of Coal
New Delhi

ESTIMATED CAPITAL INVESTMENT ON LAND

(Amount in Rs. Lakh)

Sl. No.	Particulars	Total Capital		Capital in Construction Period		Capital Provision in Productive years											
		Ha	Cost	PC1	PC2	1ST	2ND	3RD	4TH	5TH	7TH	8TH	11TH	12TH	13TH	14TH	15TH
1	Land requirement																
i)	Mine	212.45	1678.88														
ii)	External OE dump	90.40	1265.60														
iii)	Infrastructure	25.00	350.00														
iv)	Township	15.00	210.00														
v)	Rehabilitation Colony	36.00	504.00														
vi)	Forest* (included in Capital outlay in Mine)	92.53															
vii)	Other	42.83	599.62														
	Total	421.68	4608.10			921.62	921.62	921.62	921.62	921.62							

* Considered in Development Capital Outlay

Plan Prepared by me

(S.C. CHAUDHARY)
 Approved u/s 22(c) of
 MMRDA Act, 1974 by Ministry
 of Coal vide
 No. 23341/2002
 Dated 10.10.2002
 (Validity of recommendation for 30 yrs.)

Ministry of Coal
 GOVT. OF INDIA
 NEW DELHI

SUMMARY OF CAPITAL INVESTMENT ON BUILDINGS

(Amount in Rs. Lakh)

Sl. No.	Particulars	Total Capital	Construction Period		Capital Provision in Productive years				
			PC1	PC2	1ST	2ND	3RD	4TH	5TH
1	Non Residential Buildings	2377.31			71.02	854.28	832.80	595.63	23.59
2	Residential Buildings	1305.04				326.259	326.259	326.259	326.259
	Total Of Buildings	3682.348			71.0185	1180.54	1159.06	921.886	349.853


 K. S. CHATTERJEE
 SECRETARY
 MINISTRY OF COAL
 WITH MINISTRIES OF INDIA
 10, B-1, NEW DELHI

Prepared by me

(S. C. CHATTERJEE)

Recognized by the Government u/s 22 (C) of
 Mines Act, 1953 by Ministry
 of Coal vide
 dated 17.10.2002

ESTIMATED CAPITAL INVESTMENT ON PLANT AND MACHINERY

(Amount in Rs. Lakhs)

Appendices No	Particulars	Total capital investment	YEAR WISE PHASING						
			1ST	2ND	3RD	4TH	5TH	6TH	7TH
A.3.1	HEMM								
	i) OB	14816.91	5146.48	5345.93	4324.50				
	ii) Coal	5023.26	1255.15	2394.02	1374.09				
	iii) Reclamation	477.30	94.94	287.42	94.94				
	iii) Common	1175.38	543.66	128.99	300.39	12.46			
	TOTAL HEMM (excluding contingency)	21492.84	7040.23	8156.35	6093.92	12.46			
	Add contingency @ 5%	1074.64	352.01	407.82	304.70	0.62			
	TOTAL HEMM (including contingency)	22567.48	7392.24	8564.17	6398.61	13.09			
	OTHER THAN HEMM								
A.3.2	Electricals	1929.52	595.31	529.26	402.47	402.47			
A.3.3	Workshop & Store	985.23		500.94	478.51	5.78			
A.3.4	Pumping & Drainage	354.42	121.55	122.77	110.10				
A.3.5	Coal Handling Plant	11930.73	5965.37	5965.37					
A.3.6	Other P & M	46.30		2.00	22.15	8.15	9.00	5.00	
A.3.7	Communication System	27.25	4.50	13.00	9.25	0.50			
	SUB - TOTAL (OTHER P&M)	15273.45	6686.73	7133.34	1022.48	416.90	9.00	5.00	
	GRAND TOTAL P&M	37840.93	14078.97	15697.51	7421.10	429.99	9.00	5.00	

Plan Prepared by me

(S.C. CHATOPADHYAY)
 Recognized by Ministry
 of Coal & Mines
 vide
 No. 100/2002
 (Muzaffargarh, 10/10/2002)

ESTIMATED CAPITAL INVESTMENT ON HEMM

(Amount in Rs. Lakh)

Sl. No.	HEMM	Total Cost	Capital Provision in Productive years														
			1ST		2ND		3RD		4TH		5TH		6TH		7TH		
			No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	
A	OB																
1	Diesel Hydraulic Shovel 5 m ³	1218.10	1	406.03	1	406.03	1	406.03									
2	Diesel Hydraulic Backhoe 5 m ³	1262.98	1	315.75	2	631.49	1	315.75									
3	60 T RD	9406.12	16	3345.47	16	3345.47	13	2718.19									
4	160 mm RBH Drill	465.16	2	232.58	1	116.29	1	116.29									
5	410 HP Dozer with Ripper	1142.58	2	380.86	2	380.86	2	380.86									
6	Float Assy	1318.96		465.78		465.78		387.38									
	Total-A	14816.91		5146		5346		4325									
B	COAL																
1	Diesel Hydraulic Shovel 3.2 m ³	534.02	1	267.01	1	267.01											
2	Diesel Hydraulic Backhoe 2.5 m ³	534.02			1	267.01	1	267.01									
3	60 T RD	2718.12	3	627.27	6	1254.55	4	836.37									
4	160 mm RBH Drill	232.58	1	116.29	1	116.29											
5	320 HP Dozer	590.82	1	147.71	2	295.41	1	147.71									
6	Float Assy	413.83		96.87		193.75		123.01									
	Total-B	5023.26		1255.15		2394.02		1374.09									
C	RECLAMATION																
1	Diesel Hydraulic Backhoe 1.0 m ³	73.18			1	73.18											
2	410 HP Dozer	190.43			1	190.43											
3	28 KL Water Sprinkler	189.88	1	94.94			1	94.94									
4	Float Assy	23.80				23.80											
	Total-C	477.30	1	94.94		287.42		94.94									
D	COMMON																
1	Pay Loader 2.5 m ³	47.47			1	47.47											
2	110-115 mm CA Drill	56.96			1	56.96											
3	40 T Mobile Crane	172.07	1	172.07													
5	28 KL Water Sprinkler	379.76	1	94.94			1	94.94									
7	Motor Grader 280 hp	310.01	1	155.01			1	155.01									
8	Maintenance Van	36.74	1	36.74													
8	Fuel & Lubrication Truck	21.40	1	21.40													
10	Boom Truck	14.18			1	14.18											
11	Line Truck	10.39			1	10.39											
12	25 T Vibratory Roller	23.52	1	23.52													
13	Spare Rock Bucket with attachment	24.92					1	12.46									
14	Ripper attachment with Dozer	75.98	1	37.98			1	37.98									
	Total-D	1175.38		543.66		128.99		300.39									
	Total (A to D) (excluding Contingency)	21492.84		7040.23		8156.35		6093.92									
	Contingency	1074.64		352.01		407.82		304.70									
	Total (A to D) (including Contingency)	22567.48		7392.24		8564.17		6398.61									

(S C CHAPTER 15)

Recognized by the Government of India approved u/s 22 (C) of
 the Coal Mines Act, 1902 by Ministry
 of Mines, Government of India vide
 No. 1421/2002 dated 17.10.2002
 (10th edition) 10th year.

CAPITAL EXPENDITURE ON PLANT AND MACHINERY - ELECTRICALS

(S.C. CHATTERJEE)

Recognized as per Form No. 22(c) of
Mineral Development and Planning
of Govt. of India
No. 22(c) of 1962
(Validity of Recognition No. 10/116.)

(Amount in Rs. Lakh)

Sl. No.	Particulars	Total Capital		YEAR WISE PHASING											
				1ST			2ND			3RD			4TH		
		Qty.	Cost	Qty.	Cost	Qty.	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Cost
1	MAIN SUBSTATION, POWER SUPPLY ARRANGEMENT TO QUARRY-BED POWER CONSUMERS AND ILLUMINATION	LS	1333.24	LS	333.31	LS	LS	333.31	LS	333.31	LS	333.31	LS	333.31	
2	POWER SUPPLY TO CHP	LS	200.00	LS	100	LS	LS	100							
3	POWER SUPPLY TO WORKSHOP	LS	10.00	LS	10	LS									
4	POWER SUPPLY TO COLONY	LS	10.00	LS	5	LS	LS	5							
5	INTERIM POWER SUPPLY	LS	44.70	LS	44.70	LS									
	TOTAL		1597.94		493.01			438.31		333.31		333.31		333.31	
	Erection Charge @ 15%		239.69		73.95			65.75		50.00		50.00		50.00	
	Contingency @ 5% of Total with Erection charge		91.8817143		28.348239			25.202825		19.165325		19.165325		19.165325	
	Grand Total		1929.52		595.31			529.26		402.47		402.47		402.47	

सी. एस. राजगुरु
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

ESTIMATED CAPITAL INVESTMENT ON PLANT AND MACHINERY, WORKSHOP AND STORE

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Total Capital	PHASING				
			1ST	2ND	3RD	4TH	5TH
I.	EXCAVATION WORKSHOP						
1	Dumper maintenance and repair complex	435.04	0.00	158.93	276.11		
2	Face equipment and Dozer repair complex	27.09	0.00	14.47	12.62		
3	Washing station	9.17	0.00	9.17	0.00		
4	Mobile/ Field Service Equipment	65.33	0.00	65.33	0.00		
5	Compressor Pipe Line	6.62	0.00	6.62	0.00		
6	Fire fighting Equipment	5.09	0.00	5.09	0.00		
7	Material Handling Equipment	100.78	0.00	68.47	32.31		
8	Pit Top Workshop	29.18	0.00	19.84	9.34		
	Sub total - I (1.0 to 8.0)	678.32	0.00	347.94	330.38		
II.	E&M WORKSHOP	0.00					
1	E&M repair Complex	18.92		9.96	4.74	4.22	
2	LMV Repair Shop	0.00		0.00	0.00	0.00	
3	LMV Washing Station	0.00		0.00	0.00	0.00	
4	Miscellaneous Equipment	6.62		2.65	3.97	0.00	
	Sub total - II (1.0 to 4.0)	25.54		12.61	8.71	4.22	
III.	STORE P&M AND OTHER COMMON EQUIPMENT	15.28		5.09	10.19	0.00	
	TOTAL (I to III)	719.15		365.65	349.28	4.22	
IV	Electricals @ 20% of (I to III)	143.83		73.13	69.86	0.84	
V	Erection, installation, Design Engg, initial spares, contingencies, etc. @ 17% of (I to III)	122.25		62.16	59.38	0.72	
	Sub total - I (I to V)	985.23		500.94	478.51	5.78	

Prepared by me
(S C CHATTERJEE)

Recognized by the Government of India
Ministry of Coal
20.10.2003

(S.C. CHARTER)

Recognized under 22(c) of
Mineral Con-
of Coal & Mines
No. 35011/2002
(Validity of recognition for 10 yrs.)

वी. एस. राणा V. S. RANA
मुख्य सचिव/UNDER SECRETARY
कोयला विभाग/COAL DIVISION
भारत सरकार/GOV. OF INDIA
नई दिल्ली/NEW DELHI

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Total Cost			Year wise Phasing																
		Qty.	Unit	Unit cost	Cost	PC1			PC2			1ST			2ND			3RD			
						Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost		
1	Pumps.:																				
1.1	Centrifugal pump, 300 Cum/hr, 250 m Head Diesel complete with engine	6	Nos.	13.24	79.42									2	26.47	2	26.47	2	26.47	2	26.47
1.3	Centrifugal pump,300 Cum/hr, 150 m Head Diesel complete with engine	4	Nos.	6.62	26.47									2	13.24	2	13.24				
1.4	Face pump, 50 Cum/hr, 50 m Head Diesel complete with engine	3	Nos.	2.50	7.49									1	2.50	1	2.50	1	2.50	1	2.50
1.5	Slurry pump, 50 Cum/hr, 45 m Head complete with 75 kW	3	Nos.	1.22	3.67											1	1.22	2	2.45		
2	ERW/GI Pipes																				
i)	250 mm nom dia	1	km	13.94	13.94									0.33	4.65	0.33	4.65	0.33	4.65	0.33	4.65
ii)	200 mm nom dia	16	km	10.73	171.76									5.33	57.25	5.33	57.25	5.33	57.25	5.33	57.25
iii)	150 mm nom dia	2	km	7.51	15.02									0.67	5.01	0.67	5.01	0.67	5.01	0.67	5.01
3	CI Pipes																				
i)	100 mm nom dia	1	km	4.23	4.23									0.33	1.41	0.33	1.41	0.33	1.41	0.33	1.41
ii)	80 mm nom dia	1.5	km	3.80	5.69									0.50	1.90	0.50	1.90	0.50	1.90	0.50	1.90
4.	Pipe fittings, Bends, Armoured suction and delivery hoses, etc. @ 10 % of cost of pipes		LS		21.06									LS	7.02	LS	7.02	LS	7.02	LS	7.02
	Sub-total				348.75										119.44				120.66		108.65
5.	Installation charges @ 5% of cost of pumps				5.67										2.11				2.11		1.45
	Grand total				354.42										121.55				122.77		110.10

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SECRETARY
MINISTRY OF COA
GOVT. OF INDIA
NEW DELHI

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ESTIMATED CAPITAL INVESTMENT ON OTHER F AND M

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Nos.	Unit Cost	Total Cost	Phasing					
					1ST	2ND	3RD	4TH	5TH	6TH
1	Pollution control equipment	LS		12.00			4.00	4.00	4.00	
2	Total station (Survey equipment, PC, Software and Plotter)	1	15.00	15.00			15.00			
3	Personal computer incl. Hardware, software & printers	LS		8.00		1.00	2.00	2.00	2.00	1.00
4	Explosion with continuity tester 200 shots	2	0.15	0.30			0.15	0.15		
5	Fire Fighting Equipment	LS		1.00					1.00	
6	Miscellaneous	LS		10.00		1.00	1.00	2.00	2.00	4.00
	Total			46.30	0.00	2.00	22.15	8.15	9.00	5.00

वी. एस. राणा/V. S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

Plan Prepared by me

(S.C. CHATURVEDI)

Recognized by the Government of India vide No. 22/1750 of Ministry of Coal & Mines dated 17.10.2002
(Validity of recognition for 10 yrs.)

ESTIMATED CAPITAL INVESTMENT ON COMMUNICATION

(Amount in Rs. Lakhs)

Sl. No.	Particular	Qty	Unit Cost	Total Cost	Year Wise Phasing							
					1ST		2ND		3RD		4TH	
					Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
COMMUNICATION												
1	Surface Mine Communication											
a	IP Enabled Exchange 350 Lines	LS	15.00	15.00			LS	10	LS	3	LS	2
b	BSNL Telephone line	15	4.00	60.00	10	40.00	5	20.00				
c	Point to Point Radio	LS	2.00	2.00			LS	2.00				
2	VHF/UHF Communication/ trunked radio and VHF Repeater with Tower	LS	5.00	5.00	LS	2.00	LS	2.00	LS	1.00		
3	PC alongwith LAN/Internet Hardware & Software	15	0.65	9.75			10	6.50	5	3.25		
4	Layer 3 Ethernet switch	1	3.50	3.50					1	3.50		
5	Trunk dispatch system	LS					LS		LS		LS	
6	Cables & Overhead lines etc.	LS	5.00	5.00	LS	2.00	LS	2	LS	1		
7	Testing & measuring Equipment	LS	2.00	2.00	LS	0.50	LS	0.50	LS	0.50	LS	0.50
8	Misc.											
	Total			27.25		4.50		13.00		9.25		0.50

Plan prepared by me

(S C CHATTERJEE)

Recognized Person approved u/s 22 (C) of
Mines Act, 1923 by Ministry of Coal
New Delhi dated 17.10.2002
Valid for 10 yrs.

SCHEDULE OF CAPITAL AND FITTINGS

Sl. No.	Particulars	No.	Unit Cost	Total Capital	Phasing					
					1ST	2ND	3RD	4TH	5TH	6TH
1	General furniture & fittings	LS		5.00		1.00	2.00	2.00		
2	Office equipment including fax machine, photocopier	LS		5.00		1.00	1.00	1.00		
3	Air conditioner	LS		1.00					1.00	
4	Refrigerators and water coolers etc.	LS		0.50			0.50			
5	Dispensary furniture & equipment	LS		0.50			0.50			
6	School, Club, Rest House, Store & Canteen furniture	LS		1.00				0.50	0.50	
7	Misc.			10.00					5.00	5.00
	Total			23.00	0.00	2.00	4.00	3.50	6.50	7.00

(Amount in Rs. Lakhs)

श्री. एस. राणा
 UNDER SECRETARY
 GOVT. OF INDIA
 नई दिल्ली/NEW DELHI

Plan Prepared by me

(S.C. CHATURVEDI)

Recognized Person for period up to 24(c) of Mineral Concession granted by Ministry of Coal, Government of India vide No. 10/2002 (Valid for 10 yrs.)

Note The cost of railway line is subject to change and estimated cost will be obtained from Railway after approval of the project.

IS C 4 - 22 (C) 1
Approved u/s 22 (C) of
the Coal Mines Act, 1902 by Ministry
of Coal vide
dated 17.10.2002
for 10 yrs.

ESTIMATED CAPITAL INVESTMENT ON VEHICLES WITH PHASING AND DEPRICIATION

Appendix-A.6

Sl. No.	Particulars	No.	Unit Price	Total Amount	YEAR WISE PHASING									
					No.	1ST Amount	No.	2ND Amount	No.	3RD Amount	No.	4TH Amount	No.	5TH Amount
1	Jeep	1	5.28	5.28			1	5.28						
2	Car	1	5.39	5.39			1	5.39						
3	Jeep with trailer	1	5.86	5.86			0.5	2.93	0.5	2.93				
4	Motor Cycle	3	0.53	1.58	1	0.53	1	0.53	1	0.53				
5	Ambulance	1	7.34	7.34	1	7.34								
6	School Bus	1	14.37	14.37					1	14.37				
7	Shift Bus	2	14.37	28.73	1	14.37			1	14.37				
8	Explosive Van	1	9.44	9.44	1	9.44								
9	Trucks	1	9.44	9.44					1	9.44				
10	Pick-up Van	1	6.45	6.45					1	6.45				
11	Tractor with Trailer	1	5.86	5.86					1	5.86				
12	Cash Van	1	6.45	6.45	1	6.45								
	Total	15		106.20		38.12		14.13		53.94				

Note: 1 no of jeep and 1 no of truck has been considered for Environment Management.

Plan Prepared by me

(S.C. CHATTERJEE)

Recognized Person as per notified u/s 22(c) of
Mines Act, 1923. Approved by Ministry
of Coal & Mines, Government of India vide
No. 3801/H/2002 - C.A dated 17.10.2002
(valid for 10 yrs.)

ESTIMATED CAPITAL INVESTMENT ON PROSPECTING AND BORING

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Total Provision	Phasing			
			1ST	2ND	3RD	4TH
1	Drilling for Gourangdih	150.00	150.00			
2	Misc.					
	Total	150.00	150.00			

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 वी. एस. राणा/V. S. RANA
 अवर सचिव/UNDER SECRETARY
 कोयला/COAL
 भाव. विभाग/GOVT. OF INDIA
 नई दिल्ली/NEW DELHI


Plan prepared by me

(S C CHATTERJEE)

Recognized and approved u/s 22 (C) of
 Mineral Concessions Rules 1960 by Ministry
 of Coal & Mines, Government of India vide
 No. 14/2002 dated 17.10.2002
 Validity of recognition for 10 yrs.

ESTIMATED CAPITAL INVESTMENT ON DEVELOPMENT WORK IN MINES

Appendix-A.8


 वी. एस. राना/V. S. RANA
 अवर सचिव/UNDER SECRETARY
 संयुक्त विद्युत विभाग/JOINT MINISTRY OF COAL
 भारत सरकार/GOVT. OF INDIA
 नई दिल्ली/NEW DELHI

Sl. No.	Particulars	Total Capital	Phasing											
			1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH
1	Development Capital Outlay in Mine	6433.33	275.06	392.43	386.09	386.24	391.64	386.07	390.78	397.04	403.61	411.76	417.76	425.37
2	Roads and Culverts	600.00		150.00	150.00	150.00	150.00							
3	Water Supply and Sverage	431.77		132.20	132.20	132.20	35.18							
4	P.R. and EMP Preparation Cost	44.97	40.97	4.00										
	Total	9510.07	316.02	678.63	668.29	668.44	576.82	386.07	390.78	397.04	403.61	411.76	417.76	425.37

(Amount in Rs. Lakh)

Plan Prepared by me

(S.C. CHATTERJEE)

Prepared by me as approved w/s 22(c) of Mineral Concessions Act, 1920 by Ministry of Coal & Industries, Government of India vide No. 12/10.2002 dated 12.10.2002
 valid for 10 yrs.)

ESTIMATED CAPITAL INVESTMENT ON CAPITAL OUTLAY IN MINES

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Total Capital	Phasing														
			1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH
1	Rehabilitation of Villages	1013.13	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54	67.54
2	Community Development for Rehabilitation Colony	925.01	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67	61.67
3	Compensation of Land Losers in lieu of loss of earning	636.52	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43	42.43
4	Diversion of Road	10.00		5.00	5.00												
7	Garland Drain	5.00		0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
8	Storm Water/Pumping Water Channel	5.00		0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
9	Temporary Structures in Existing Project Complex	5.00		1.25				1.25				1.25					1.25
10	Peripheral Road (7 km)	50.00		12.50	12.50	12.50	12.50										
12	Biological Reclamation of Mined Out Land	167.18		8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	58.51
13	Afforestation in Project Site and Town ship Area	167.18		8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	58.51
15	Wire-net Fencing fixed on poles around the entire	10.00		0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
17	Forest Land (including cost of substitute land)	1295.42		92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53	92.53
18	Coal Transportation Road	20.00	10.00	10.00													
19	Grass Fund	4128.90	93.41	81.36	86.27	91.42	96.82	102.50	108.46	114.72	121.29	128.19	135.44	143.05	151.04	159.42	2510.50
	Total	8433.83	275.06	392.43	386.09	386.24	391.64	386.07	390.78	397.04	403.61	411.76	417.76	425.37	433.36	441.74	2894.37

is approved u/s 22 (C) of
 the Coal Mines Act, 1902 by Ministry
 of Coal, Govt. of India
 dated 17.10.2002

ESTIMATED CAPITAL INVESTMENT ON ROADS AND CULVERTS

Appendix-A.8.2

Sl. No.	Particulars	Total Capital	Phasing					
			1ST	2ND	3RD	4TH	5TH	6TH
1	Approach Roads and Culverts							
2	Colony Roads and Culverts (3.5 km)	100.00		25.00	25.00	25.00	25.00	
3	Haul Roads (OB-3 km, Coal-4 km)	500.00		125.00	125.00	125.00	125.00	
4	Service Roads							
	Total Roads and Culverts	600.00		150.00	150.00	150.00	150.00	

(Amount in Rs. Lakhs)

राणा V. S. DANA
UNDER SECRETARY
GOVT. OF NCT OF DELHI
दिल्ली सरकार

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Form as approved vide 22(c) of Mineral Concessions Rules 1950 by Ministry of Coal & Mines, Government of India vide No. 17.10.2002 (1. Recognition for 10 yrs.)


ESTIMATED CAPITAL INVESTMENT ON WATER SUPPLY AND SEWERAGE

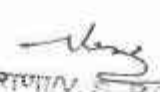
Appendix-A.8.3

(Amount in Rs. Lakhs)

Sl. No.	Particulars	Existing Cost as on 31/03/07	Additional Cost	Total Capital	Phasing				
					1ST	2ND	3RD	4TH	5TH
1	Colony Water Supply		93.91	93.91		23.48	23.48	23.48	23.48
2	Colony Sewerage System		46.79	46.79		11.70	11.70	11.70	11.70
3	Industrial Water Supply		172.05	172.05		57.35	57.35	57.35	
4	Industrial Sewerage System		119.02	119.02		39.67	39.67	39.67	
	Total		431.77	431.77		132.20	132.20	132.20	35.18


Plan prepared by me


 S. G. CHAUDHARY
 Joint Secretary, Government of India
 Department of Public Works, Ministry of Urban Affairs
 New Delhi-110002
 Date: 17.10.2002


 V. S. RANA
 Joint Secretary, Government of India
 Department of Public Works, Ministry of Urban Affairs
 New Delhi-110002

ESTIMATED CAPITAL INVESTMENT ON PROJECT REPORT AND EMP PREPARATION

Sl. No.	Particulars	Total Capital	Phasing				
			1ST	2ND	3RD	4TH	5TH
I	PR Preparation & scientific Investigations etc.						
1	PR Preparation Cost	15.47	15.47				
2	EMP Preparation Cost & scientific Investigations etc.	12.00	8.00	4.00			
3	Hydrogeological Study	10.00	10.00				
4	Consent to Establish Fee Payment*	7.5	7.5				
	Total (I)	44.97	40.97	4.00			


 S. RAMA
 JOINT SECRETARY
 MINISTRY OF COAL
 GOVT. OF INDIA
 NEW DELHI
 (Approx. Rs. Lakhs)

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Form as approved vide 22(c) of
 Mineral Concession Rules 1950 by Ministry
 of Coal & Mines, Government of India vide
 No. 3501/MAY/2002 - CA dated 17.10.2002
 (Valid for 10 yrs.)

ANNEXURES


वी. एस. पार्वी/V. S. PARVA
Joint Minister Secretary
Ministry of Coal
Government of India
New Delhi

Plan Prepared by me

(S.C. CHATTERJEE)

Recognised Person as approved u/s 22(c) of
Mineral Concession Rules 1950 by Ministry
of Coal & Mines, Department of Coal vide
No. 5901/14/2002 - CA dated 17.10.2002
(Validity of recognition for 10 yrs.)

No 13016/79/2008-
Government of India
Ministry of Coal

New Delhi, dated the 10th July, 2009.

To
(1) M/s Himachal EMTA Power Ltd.
New Himras Building,
Circular Road, Shimla-171005, H.P.

(2) M/s JSW Steel Ltd.,
5A, Dr.G.Deshmukh Marg,
Mumbai-400026, Maharashtra.

Subject: Allocation of Gourangdih ABC coal block in the State of West Bengal for captive mining of coal jointly by M/s Himachal EMTA Power Ltd. and M/s JSW Steel Ltd. - under Option-I.

Sir,

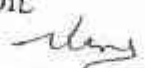
I am directed to refer to your application and this Ministry's offer letter No.38011/1/2007-CA-I dated 6th November, 2007 and to state that the request of the companies have been considered by the Central Government and it has been decided to allocate Gourangdih ABC non-coking coal block in Raniganj coalfields of Eastern Coalfields Limited command area in the State of West Bengal for captive mining of coal jointly by M/s Himachal EMTA Power Ltd. and M/s JSW Steel Ltd. by working through a Joint Venture Company for meeting their proportionate share of requirement of coal. Based on the total geological reserves and requirement of coal as assessed by CMPDIL, tentative proportionate share of reserves is indicated in the table below :-

Name of Company	Geological Reserves (MT)	Requirement of Coal for 30 years (MT)/Location of EUP	Proportionate of Share of reserves of coal in MT
1. M/s Himachal EMTA Power Ltd. (IPP)	131.7	2.3 x 30 = 69.00 for 500 MW Raniganj, West Bengal	65.85 (on equal sharing basis)
2. M/s JSW Steel Ltd. (CPP)		4.14 x 30 = 124.20 for 900 MW Paschim Medinipur, West Bengal	65.85 (on equal sharing basis)

2. This allocation is in pursuance of the provisions contained in Section 3(3)(a)(iii) of the Coal Mines (Nationalization) Act, 1973 and subject to the following conditions :-

जी. एस. राना / J. S. RANA
अवर सचिव / ASST. SECRETARY
कोयला विभाग / MINISTRY OF COAL
भारत सरकार / GOVT. OF INDIA
नई दिल्ली / NEW DELHI

- i) A joint venture company be formed between M/s Himachal EMTA Power Ltd. and M/s JSW Steel Ltd. The equity holding in the joint venture company will be in proportion to the assessed coal requirement of the companies.
- ii) The joint venture company shall be formed and registered by the allocatees within 60 days from the date of allocation of this letter.
- iii) The mining lease shall be obtained in the name of the Joint Venture Company and coal extracted from the mine shall be distributed among the allocatees in the proportion of their assessed requirement.
- iv) The block is meant for captive use in their own specified end use projects to be set up as per details given in the table above. The coal produced from the block shall not replace any coal linkages given to you by the Coal India Ltd. / its subsidiary and/or by the Eastern Coalfields Limited, without prior permission of this Ministry.
- v) Coal mining shall be carried out as per the provisions of the Coal Mines (Nationalization) Act, 1973, the Mines and Minerals (Development and Regulation) Act, 1957, the Contract Labour (Regulation & Abolition) Act, 1970, all the minerals, environmental and labour laws along with other regulations, orders, directions governing coal industry.
- vi) Middlings generated in the process of washing the coal shall be used for power generation in their own power plant i.e., the useable middlings/rejects generated during beneficiation shall be used captively by the allocatee. The modalities of disposal of surplus coal/middlings/rejects, if any, would be as per the prevailing policy/instruction of the government at the relevant point in time and could also include handing over such surplus coal/middling/rejects to the local CIL subsidiary or to any person designated by it at a transfer price to be determined by the Government.
- vii) Coal production from the captive block shall commence within 36 months (42 months in case the area is in forest land) in case of open cast mine and in 48 months (54 months in case the area falls under forest land) in case of underground mine from the date of this letter. The end-use project schedule and the coal mine development schedule should be modified accordingly and submitted to the Ministry within 3 months from the date of this letter. A copy of the indicative milestone chart is enclosed.
- viii) The joint venture company shall buy geological report from CMPDIL within six weeks from the date of this letter.


 श्री. एम. रामचन्द्र प्रसाद
 जूनियर सचिव, ई. ए. ई. विभाग
 कोयला एवं खनिज विभाग, ई. ए. ई. विभाग
 भारत सरकार, नई दिल्ली (NEW DELHI)

- ix) The joint venture company shall submit a bank guarantee for Rs.17.08 crore (equal to one year's royalty amount based on mine capacity of 3.2 mtpa assessed by CMPDIL, grade of coal D-F and the average royalty @ Rs 53.37 per tonne) within three months from the date of this letter. Subsequently, upon approval of the mining plan, the Bank Guarantee amount will be modified based on the final peak/ rated capacity of the mine:
- 50% of the bank guarantee shall be linked to the milestones (time schedule) set for development of captive block, and the remaining 50% to the guaranteed production. The bank guarantee shall be liable to be encashed in the following eventuality:
 - There shall be an annual review of progress achieved by an allocatee company. In the event of lapses, if any, in the achievements vis-à-vis the milestones set for that year, a proportionate amount shall be encashed and deducted from the bank guarantee.
 - Once production commences, in case of any lag in the production of coal/lignite, a percentage of the bank guarantee amount will be deducted for the year. This percentage will be equal to the percentage of deficit in production for the year with respect to the rated/peak capacity of the mine, e.g., if rated/peak capacity is 100, production as per the approved mining plan for the relevant year is 50 and actual production is 35, then $(50-35)/100 \times 100 = 15\%$ will lead to deduction of 15% of the original bank guarantee amount, the block shall be liable for de-allocation/cancellation of mining lease.
 - The allocatee shall ensure that the bank guarantee remains valid at all times till the mine reaches its rated capacity or till the bank guarantee is exhausted. Any lapses on this count shall lead to de-allocation/ cancellation of mining lease.
- x) The Joint Venture Company shall submit a mining plan for approval by the competent authority under the Central Government within six months from the date of this letter.
- xi) The Joint Venture Company shall be required to comply with the guidelines/rules laid down by the Central Government from time to time relating to mine closure (both progressive and final). The Joint Venture Company shall be required to submit mine closure plan alongwith the mining plan as per the guidelines issued in this regard.

दी. एस. राणा D. S. RANA
 जूनियर सचिव JUNIOR SECRETARY
 कोयला विभाग MINISTRY OF COAL
 भारत सरकार GOVT OF INDIA
 नई दिल्ली NEW DELHI

- xii) No coal shall be sold, delivered, transferred or disposed of except for the stated captive mining purposes, and except with the previous approval of the Central Government.
 - xiii) Those of the above conditions relevant at the time of grant of mining lease, shall be included as additional conditions in the mining lease in addition to any further conditions imposed by or agreed to by the Central Government.
 - xiv) The State Government at the time of seeking previous approval for the grant of mining lease shall submit a draft of the mining lease containing the above relevant conditions for vetting by the Central Government. The final mining lease shall be as vetted/modified by the Central Government. Any deviation from the vetted/modified draft shall render the mining lease deed ab-initio null and void and without effect.
3. Allocation / mining lease of the coal block may be cancelled, inter-alia, on the following grounds :-
- a. Unsatisfactory progress of implementation of their end use power plant.
 - b. Unsatisfactory progress in the development of coal mining project.
 - c. For breach of any of the conditions of allocation mentioned above.

The de-allocation/cancellation of mining lease shall be without any liability to the Government or its agencies, whatsoever. Any expenses incurred by the allocatee or any right or liability arising on the allocatee out of the measures taken by him shall solely be to his account and in no way be transferred to or borne by the Government or its agencies.

4. The Joint Venture Company may approach CMPDIL for the geological report and contact the State Government authorities concerned for the necessary permissions/clearances etc, for attaining mining rights and related matters. The arrangement of transport of coal will have to be worked out by the company in consultation with the Ministry of Railways / the Ministry of Surface Transport depending on the mode of transport.

Yours faithfully,


(V.S.Rana)

Under Secretary to the Govt. of India

Encls. As above.

श्री. एस. राना / S. RANA
अवर सचिव / UNDER SECRETARY
कोयला विभाग / MINISTRY OF COAL
भारत सरकार / GOVT. OF INDIA
नई दिल्ली / NEW DELHI

No. 13016/48/2004-CA
Government of India
Ministry of Coal and Mines
Department of Coal

New Delhi, dated 6.8.2004


To

Shri Subhash Chandra Chatterjee,
Street No. 1, Hindustan Park,
P.O. Asansol-713304,
Distt. Burdwan,
West Bengal

Subject :- Recognition under Rule 22(C) of the Mineral Concession Rules, 1960 to prepare mining plan in respect of any coal and lignite project.

Sir,

I am directed to refer to your letter dated 19.7.2004 on the subject mentioned above and to state that recognition of Central Government under Rule 22(C) of the Mineral Concession Rules, 1960 has already been accorded vide letter No. 38011/4/2002-CA dated 17.10.2002 in your name for a period of 10 years to prepare mining plan in respect of the Pachwara Central block allocated for captive mining to the Punjab State Electricity Board. The same has been reconsidered in this Department and it has been decided to accord recognition to all those who have been recognized in the past to prepare mining plan specific to a block and such recognition is valid as on date, to prepare mining plan in respect of any coal or lignite block, as the case may be, in general for a period of 10 years commencing from the date of his last recognition. Accordingly, recognition of the Central Government is hereby accorded to you under rule 22(C) of the Mineral Concession Rules, 1960 to prepare mining plans in respect of any coal and lignite block for a period of 10 years commencing from 17.10.2002 i.e. the date of last recognition.


Yours faithfully,
वी. एस. राणा/V. S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

(S.K.Kakkar)
Under Secretary

Gourangdih Coal Limited



Tower – A, 3rd Floor, DLF IT Park
8, Major Arterial Road, Block – AF
New Town, Kolkata 700156
Tel: 033 4000 2020
Fax: 033 4000 2019

Ref.: GCL/MP/MC/2010/12A

10 August 2010

To
Subhash Chandra Chatterjee
Street No.1, Hindustan Park,
P.O. Asansol – 713 304
Dist. Burdwan, West Bengal.

Sub: **Preparation of Mining Plan for Gourangdih ABC coal block of M/s Gourangdih Coal Limited.**


Dear Sir,


You are hereby authorized as the recognised qualified person to prepare the mining plan for **Gourangdih ABC** coal block of M/s Gourangdih Coal Limited on the basis of the geological report of **Gourangdih ABC block** procured from CMPDI.

This has reference to the Govt. of India, Ministry of Coal & Mines, Dept. of Coals ref. No.13016/48/2004-CA dated 6.8.2004 according recognition of the Central Government under Rule 22 (C) of the Mineral Concession rule 1960 to prepare Mining Plans in respect of any coal & Lignite block for a period of 10 years commencing from 17.10.2002.

Thanking you.

Yours faithfully
For **GOURANGDIH COAL LIMITED**


(N.C. MUKHERJEE)
DIRECTOR CUM CEO


वी. एस. रणाय V. S. RANA
अध्यक्ष निम्नलिखित निदेशिका
कोयला विभाग, भारतीय न्याय
भारत सरकार GOVT. OF INDIA
नई दिल्ली NEW DELHI

Ref. No.

Date:

TO WHOM IT MAY CONCERN


This is to certify that I, Subhash Chandra Chatterjee (S. C. Chatterjee), have been approved as Recognized Qualified Person (RQP) under section 22(C) of Mineral Concession Rules 1960, by Ministry of Coal, vide Letter No. 13016/48/2004-CA dated 06.08.2004 for a period of 10 years to prepare Mining Plans in respect of any coal and lignite block commencing from 17.10.2002. The approval letter from the Ministry of Coal is enclosed as an Annexure in the Mining Plan.

It is hereby certified that Mining Plan of Gourangdih ABC captive coal blocks, has been prepared by me as authorized by Gourangdih Coal Mines Ltd., Tower-A, 3rd Floor, DLF IT Park 8, Major Arterial Road, Block – AF, New Town, Kolkata – 700156. The letter of authorization from Gourangdih Coal Ltd. is enclosed as Annexure in the Revised Mining Plan

The provisions of the Mines Act, Rules and Regulations made there under have been observed in the Mining Plan and wherever specific permissions are required, the applicant shall approach the Director General of Mines Safety, Government of India and other agencies.

In my opinion, the most suitable technology has been proposed in the Project Report.


(S. C. CHATTERJEE)


শ্রী. সুব্র. চট্টোপাধ্যায়
অধ্যক্ষ, কলিকাতা
কলিকাতা
ভারত
নতুন দিল্লী/NEW DELHI



Head Office : G.T. ROAD (EAST), MURGASOL, ASANSOL-713303, PH. : 0341-2275430-34, Fax : 2275436
Regd. Office : Tower-A, 3rd Floor, DLF IT Park, 8, Major Arterial Road, Block-AF, New Town, Kolkata-700 156
PH.: 033-40002020, Fax : 033-40002010

TO WHOM IT MAY CONCERN

(N.C. MUKHERJEE)
DIRECTOR CUM CEO

[Signature]

Date:

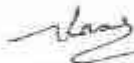
Ref. No.:

TO WHOM IT MAY CONCERN

This is to certify that I, Subhash Chandra Chatterjee(S. C. Chatterjee), have been approved as Recognised Qualified Person (RQP) under section 22(C) of Mineral Concession Rules 1960, by Ministry of Coal, vide Letter No. 13016/48/2004-CA dated 06.08.2004 for a period of 10 years to prepare Mining Plans in respect of any coal and lignite block commencing from 17.10.2002. The approval letter from the Ministry of Coal is enclosed as an Annexure in the Revised Mining Plan.

This is to certify that the block boundary shown in the Mining Plan of Gourangdih ABC coal block OCP is as per the boundaries shown in the geological plans of the Gourangdih ABC blocks prepared by CMPDI and the block boundary does not encroach upon the property of other coal blocks.


(S. C. CHATTERJEE)


वी. क. सिंह, सहायक निदेशक
अपर प्रशासकीय निदेशक
कोयला विभाग, भारत सरकार
नई दिल्ली

FROM :

FAX NO. :

Dec. 01 2010 05:22PM P1

FROM : CGM(EMPLN)CMPDI, RANCHI

FAX NO. : 06512230875

Dec. 15 2009 02:28PM P1

1707
16/12/09

cmpdi
A Steel-Ratna Company

सेन्ट्रल माईन प्लानिंग एण्ड डिजाइन इंस्टीट्यूट लिमिटेड
(कोल इण्डिया लिमिटेड का अनुबंधित कम्पनी / भारत सरकार का एक सौंप उद्योग)
गोखलेवासा प्लेस, कान्का रोड, रांची - 834 031, झारखंड (भारत)
Central Mine Planning & Design Institute Limited
(A Subsidiary of Coal India Limited / Govt. of India Public Sector Undertaking)
Goswami Place, Kanku Road, Ranchi - 834 031, Jharkhand (INDIA)

No.CMPDI/DG/033.7/ 5551-64

Dated: 16.12.2009

FAX NO.033-40002021

To,

Shri N.C. Mukherjee,
Director,
Gaurangdi Coal Limited,
Tower-A, 3rd Floor, DLF IT Park,
8, Major Arterial Road,
Block-AF, New Town,
KOLKATA - 700 155.

Sub: Purchase of Geological Report for Gaurangdi ABC Coal block.

Dear Sir,

In response to letter dated 13th July, 2009 received from Mr. Biswadip Gupta, Jt. Managing Director & CEO, JSWBSL/Authorized Signatory, communicating the formation of joint venture company between JSW Steel Ltd. and M/s.Himachal EMTA Power Ltd., we had communicated the cost of exploration of Gaurangdi ABC coal block vide our letter No.CMPDI/DG/033.7/4274-77 dated 02.08.2009. We have now been informed vide your letter No.GCL/CMPDI/GR/2009 dated 15th December, 2009 that a joint venture company has been formed in the name and style of Gaurangdi Coal Ltd.

As communicated earlier vide our letter referred above the recoverable cost of exploration in respect of Gaurangdi ABC coal block has been assessed as Rs. 4,77,62,520.00/- (Rupees Four crores seventy seven lakhs sixty two thousand five hundred twenty) only, which is to be deposited with Eastern Coalfields Ltd. You are requested to contact CGM(P&P), Eastern Coalfields Ltd., Sanctoria, P.O. Dishergarh, Dist- Burdwan-713333 (West Bengal) in this regard.

The Geological Report can be collected from CMPDI (HQ), Ranchi after confirmation of payment of exploration costs is received by us from ECL.

This cost is valid upto March, 2010.

Yours faithfully,

(A.K. Wahi)
CHIEF GENERAL MANAGER
(Exploration)

Copy to:

1. CGM(CP), Coal India Ltd., 10, Netaji Subhas Road, Kolkata-700 001.
2. CGM(P&P), Eastern Coalfields Ltd., Sanctoria, P.O. Dishergarh, Dist- Burdwan-713333 (West Bengal) with a request to inform regarding payment of exploration cost by the party to this office, so that Geological Report can be handed over to them. The copy of the letter received from M/s.Gaurangdi Coal Ltd. is enclosed.
3. CGM(Finance), CMPDI (HQ), Ranchi.



फोन नम्बर / Phone No : +91 651 2230637,
फैक्स नम्बर / Fax No : +91 651 2230875,
वेब साईट / Website Address : www.cmpdi.co.in

वी. एस. राणा/V.S. RANA
अवर सचिव/Under Secretary
कोयला विभाग/Coal Division
भारत सरकार/Ministry of Coal
Government of India

EASTERN COALFIELDS LTD.

Office of the Chairman-cum-Managing Director
SANCTORIA, P. O. DISERGARH
(BURDWAN)

No.

2741

Account No.

Date 17.12.09

Received from Gowangdih Coal Limited, Tower-A 3rd Floor DLF IT Park,
8, Major Arterial Road, Block-AF, New Town, Kolkata-700156, the sum of
Rupees Four crore seventy seven lac eighty two by Cash/^{DD}Cheque No. as shown below
thousand five hundred twenty only
drawn on Corporate Bank, payable at Asansol. being

recoverable cost of exploration in respect of Gowangdih ABC and Block of
Raniganj Coalfield.

Rs. 4,77,62,520/- Rep no. EL/PLG/Captive Block/274/497 dt 16.12.09 from
CSM (I & P) EL.

Chief Cashier

ECL Press-6B-07-08/135 Bks. of 50x3 each

S/no.	Date	Part to Account
251951	all	@ 999,000.00 cash
to 251997	14.12.09	47 nos. x 10
251998	14.12.09	8,09,520.00

Total x/dt dt
4,69,53,000.00
4,81,09,520.00

Finance Manager

17/12/09

[Handwritten signatures and stamps]

23rd June, 2010

Office of the Coal Controller
1, Council House Street
Kolkata - 700 001

Kind Attn : Ms. Nilanjana. J. Roy, Dy. Director

Dear Sirs,

Sub : Submission of Bank Guarantee for Gourangdih ABC Coal Block allocated to M/s. Himachal EMTA Power Ltd. and M/s. JSW Steel Ltd. under option -I

This has reference to your letter No.CC/MCBA/103/13/09-Gourangdih dated 9th June, 2010 in connection with the subject stated above on the subject we may submit as under :

1. Gourangdih ABC Coal Block in Raniganj coalfields of Eastern Coalfields Limited command area in the state of West Bengal had been indented for allocation by Ministry of Coal, Govt. of India vide letter dated 6.11.2007 jointly to Himachal EMTA Power Limited (HEPL) and JSW Steel Ltd.
2. The joint allocatees opted the joint venture route for operation of the block and accordingly Joint Venture Agreement dated 29.05.2009 (JVA) had been executed by and between HEPL and JSW.
3. Subsequent to receipt of the said JVA, Ministry issued final allocation letter vide letter No.13016/79/2008-CA-1 dated 10.07.2009 allocating the said Gourangdih ABC Coal Block for captive mining of coal jointly to HEPL and JSW by working through Joint Venture Company for meeting their proportionate requirement of coal. Based on the total Geological Reserve and requirement of coal as assessed by CMPDIL, it has been indicated that the reserve of 131.7 million tones will be shared by the joint allocatees in the ratio of 65.85 million tones each, against the requirement for 30 years being 69 million tones for 500 MW thermal power project of HEPL and 124.20 million tones for 800 MW thermal power project of JSW.
4. Subsequently the said Joint Venture Company under the name and style Gourangdih Coal Limited (GCL) has duly been incorporated with 50:50 participation by HEPL & JSW on 26.10.2009.

वी. एन. रामा
अवर सचिव/उपनिर्देशक, कोयला
कोयला विभाग/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

Contd.. P/2

5. Necessary actions have immediately been initiated to commence the pre-mining activities. The Geological Report has been procured against payment of Rs.477.63 lacs to Eastern Coalfield Limited and action for preparation of Mining Plan has immediately been commenced.
6. In the process, it has been revealed that actual area of the block is just 3.7 Sq.Km. as against 5.5 Sq.Km mentioned in the Geological Report. Over and above, in two patches, within the boundary of the said Gourangdih ABC Coal Block, ECL has been working since long. Such infringement and extensive mining in Khairabad OCP and Gourangdih OCP patches by ECL within the boundary of the allotted block has not only been communicated to ECL, also Ministry of Coal has repeatedly been apprised with the matter to take appropriate action. The situation may call for review of the available extractable reserve of the said block.
7. In the meantime, application for publication of Gazette Notification as per the provision of the Coal Mines (Nationalization) Act, 1973 to the effect specifying end use vis-à-vis operation of the block by GCL has also been submitted to Ministry of Coal, Govt. of India vide letter dated 19.02.2010. Only such notification will enable GCL to apply for mining lease. The publication of the said notification is still pending.
8. It may please be appreciated that above notification shall also facilitate Banks/ Financial Institutions enjoying more comfort to sanction financial assistance including the limit to GCL for furnishing the Bank Guarantee under reference. However, arrangement is being made under the assistance and support of HEPL and JSW so as to submit the Bank Guarantee for Rs.17.08 crores by GCL. We may forward herewith the format of the Bank Guarantee for your approval.
9. Under the above volatile situation of the project having affected due to infringement and extensive mining by ECL in progress, the Joint allocates are extremely concerned with regard to extractable available reserve of the block impacting seriously on the plan for implementation of end use projects.

श्री. एन. व.
अवर सचिव, ई.डी.
जयपुर विभाग

भारत सरकार
पई विभाग
Contd. P/3

Under the above circumstances, we may please be allowed further time to resolve the above issues so as to initiate necessary steps for expeditious implementation of the captive coal mining project by the joint venture company vis-à-vis the end use power projects.

Thanking you,

Yours faithfully,

for **HIMACHAL EMTA POWER LIMITED**

(BIKASH MUKHERJEE)
Director



for **JSW STEEL LIMITED**

(BISWADIP GUPTA)
Authorised Signatory

Encl. : As stated.

Copy to: Advisor Projects, MOC



श्री. एन. पी. ...
अध्यक्ष, ...
कोयला विकास ...
भारत सरकार GOVT. OF INDIA
नई दिल्ली/NEW DELHI

BANK GUARANTEE FORMAT

STAMP

To
The President of India
Acting through Ministry of Coal
Shastri Bhawan
New Delhi

Whereas M/s. Himachal EMTA Power Ltd. having its registered office at New Himrus Building, Circular Road, Shimla-171 001, Himachal Pradesh and M/s. JSW Steel Ltd. having its registered office at 5A Dr. G. Deshmukh Marg, Mumbai-400026, Maharashtra, agree for allocation of Gourangdih ABC Coal block made by the President of India acting through Ministry of Coal, Government of India hereinafter called the "Central Government" in the State of West Bengal for captive mining of coal through a Joint Venture Company on the terms and conditions contained in their letter No. 13016/79/2008-CA-1 dated 10.7.2009 and the allocattees as per clause 2(ix) in the conditions which inter alia are subject matter of the letter of allocation herein referred, agree that said Joint Venture Company shall furnish this bank guarantee for an amount of Rs.17,08,00,000/- (Rupees Seventeen crores eight lacs only) equivalent to one year's royalty amount based on D-F grade capacity of coal assessed by CMPDIL at 3.2 mtpa at an weighted average royalty @ Rs. 53.37 per tonne.

Pursuant to the Joint Venture Agreement dated 29.05.2009 executed by and between the above Himachal EMTA Power Limited and JSW Steel Limited the said Joint Venture Company Gourangdih Coal Limited has been incorporated having its registered office at Tower-A, 3rd Floor, DLF IT Park, 8 Major Arterial Road, Block-AF, New Town, Kolkata-700156 hereinafter called the "Company".

श्री. प्र. व. श. २०१०
श्री. प्र. व. श. २०१०
कॉन्सल्टिंग एंड इंजीनियरिंग फर्म
भारत सरकार/GOV. OF INDIA
नई दिल्ली/NEW DELHI

We, _____ (Name of the bank) Bank, _____ (Branch, City) Branch hereinafter called "the Bank" in consideration of the premises, at the request of the Company, do hereby guarantee and undertake to pay without demur to the Central Government forthwith on demand at any time upto _____ (date at least one year from date of Letter of allocation to be renewed, till exhausted or rated capacity reached) any money or monies not exceeding a total sum of Rs. 17,08,00,000/- (Rupees Seventeen crores eight lacs only) as may be claimed by the Central Government to be due from the Company by way of shortfall in royalty due to failure by the Company in the observance and performance as per clause 2(ix) of the terms and conditions of the said letter of allocation. It is hereby agreed and acknowledged that the decision of the Central Government as to whether any money is payable by the Company to the Central Government or whether the Company has made any such default or defaults as aforesaid and the amount or amounts to which the Central Government is entitled to by reason thereof will be binding on the Bank and the Bank shall not be entitled to ask the Central Government to establish its claim or claims under this Guarantee or to claim any such amount from the company in the first instance but shall pay the same to the Central Government forthwith on demand without any demur, reservation, recourse, contest or protest and/or without any reference to the Company. Any such demand made by the Central Government on the Bank shall be conclusive and binding notwithstanding any difference between the Central Government and the Company or any dispute pending before any Court, Tribunal, Arbitrator or any other authority.

वी. एस. राव
अवर सचिव
कोयला विभाग
भारत सरकार
GOVT. OF INDIA
UNDER SECRETARY
MINISTRY OF COAL
GOVERNMENT OF INDIA

The Bank further undertake not to revoke this Guarantee during its currency except with the previous consent of the Central Government in writing and this Guarantee shall continue to be enforceable till the aforesaid date of its expiry or the last date of the extended period agreed upon as the case may be unless during the currency of the Guarantee all the dues of the Central Government under or by virtue of clause 2(ix) of the said letter of allocation have been duly paid and its claims satisfied or discharge or the

Central Government certifies that the terms and conditions of the said letter of allocation have been fully carried out by the company and accordingly discharged the Guarantee.

Subject to the maximum limit of the Bank's liability as aforesaid, this Guarantee shall cover all claim or claims of the Central Government against the Company from time to time arising out of or under condition number 2(ix) of the said letter of allocation and in respect of which the Central Government's demand or notice in writing be served on the Bank before the date of expiry of this Guarantee mentioned above or of further extended period agreed upon, as the case may be. The Guarantee shall not be affected by any change in the constitution of the Company or any extension or forbearance to the company by the Central Government and the Bank will ensure for and be available to and Guarantee enforceable by the Central Government.

Notwithstanding anything contained herein :-

- i. Our liability under this Bank Guarantee shall not exceed Rs. 17,08,00,000/- (Rupees Seventeen crores eight lacs only).
- ii. This Bank Guarantee shall be valid till _____ (date).
- iii. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if you serve upon us a written claim or demand on or before _____

The Bank has power to issue this Guarantee under the statute and the undersigned has full power to sign this Guarantee on behalf of the Bank.

श्री. एस. राजगोपाल राणा
अवर सचिव, वित्त विभाग
संयुक्त प्रशासन विभाग, दिल्ली
भारत सरकार, नई दिल्ली
2010

Dated this day of at

