BIRLA CORPORATION LTD.

REVISED MINING PLAN

FOR

BIKRAM COAL BLOCK

SOHAGPUR COALFIELD

DIST. SHAHDOL, MADHYA PRADESH

(Under Rule 22 (4) of Mineral Concessions (Amendment) Rules, 1994

(Extent : 239 Ha within ML)

(TEXT, ANNEXURES & PLATES)

MARCH, 2011

Prepared by:

B.D.SHARMA

(Recognised Qualified Person)

MIN MEC CONSULTANCY PVT. LTD.

A-121, Paryavaran Complex, IGNOU Road, New Delhi – 110 030

Ph : 29534777, 29532236, 29535891 ; Fax +91-11-29532568

Email: min_mec@vsnl.com, Web site : http://www.minmec.co.in

An ISO 9001:2000 approved company

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डी. एस. राणा/D.S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA

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ABBREVIATIONS

AMSL		Above Mean Sea Level
bgl	-	Below ground level
CV	-	Calorific Value
CSM	-	Continuous Surface Miner
CMPDII	-	Central Mine Planning and Design Institute Ltd.
cum	-	Cubic metre
DGMS	-	Directorate General of Mine Safety
DGM	-	Directorate of Geology and Mining
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
E&M		Electrical and Mechanical
FE Loader	-	Front End Loader
FC	-	Fixed Carbon
GT	-	Grand Trunk
GR	-	Geological Report
GSI	-	Geological Survey of India
HFL	-	High Flood Level
HEMM	-	Heavy Earth Moving Machinery
Ha	-	Hectare
IB	-	Interburden
IMD	-	India Meteorological Department
K.Cal/kg	-	Kilo Calorie per Kilogram
Ltd	-	Limited
LTPA	-	Lakh Tonne Per Annum
LHV	-	Load Haul Dump
MTPA	-	Million Tonne Per Annum
MCPA	-	Million Cubic Metre Per Annum
M cum	-	Million cubic metre
MBCM	-	Million Bank Cubic Metre
m		Metre
Mt	-	Million tonne
ML	-	Mining Lease
Mty	-	Million tonne per year
MOC	-	Ministry of Coal
Mil. cum	-	Million cubic metre
Mil. Te.	-	Million Tonne
MoEF	-	Ministry of Environment and Forest
NTU		Units of measurement
NH	-	National Highway
OC	-	Opencast

वी. एस. [illegible] SHARMA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

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OB	-	Overburden
PA	-	Per Annum
R&R	-	Rehabilitation & Resettlement Plan
RQP	-	Recognised Qualified Person
ROM	-	Run of Mine
RH	-	Relative Humidity
RPM	-	Respirable Particulate Matter
SDL	-	Side Discharge Loader
SPM	-	Suspended Particulate Matter
SC	-	Scheduled Cast
SH	-	State Highway
ST	-	Scheduled Tribe
SLPP	-	Surat Lignite Power Plant
TPD	-	Tonne Per Day
TS	-	Topsoil
UG	-	Under Ground
UHV		Useful Heat Value
VM	-	Volatile Matter

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UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Bikram Block represents the northern contiguous area of the Karkati Sector of the Sohagpur Coalfield. The exploratory drilling was undertaken to find out the continuity of workable coal horizons proved to occurs in the adjacent Karkati Sector.

Drilling in the area was initiated by CMPDI in April'88 and completed in October'94 in two spells. A total of 57 boreholes were drilled by CMPDL. DGM (MP) drilled 4 Nos. of boreholes during the period Oct.'93 to April'94. Out of these total boreholes drilled in the area, only 36 boreholes falling within Bikram Block boundary and 25 Nos. of boreholes were falling outside the block boundary. The data generated by the aforesaid boreholes did not indicate the area to be very promising, hence a small portion in the southern part of the total area was identified for detailed proving and geological report preparation. The area of the block is 2.39 sq km.

The Bikram block has been allotted to Birla Corporation Limited along vide allotment letter no 38011/2/2007-CA-1 dt 12th August, 2008. The allotment letter specifies that the annual production of the mine is proposed as about 0.36 MT of grade C to D as per the allotment letter.

1.2 LOCATION

The Bikram Block is located approximately 7 km. SW of Burhar town in the western part of Sohagpur Coalfield in Shahdol district of Madhya Pradesh. The block is bounded by latitude N 23°11'5.6" to N 23°11'29.9" and longitude E 81°28'44.12" to E 81°31'6.12".

The limits of the block are detailed below:

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Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

TABLE 1.1
BLOCK BOUNDARIES

North	:	Surface position fault F7-F7, part of fault F5-F5, F3-F3 and an arbitrary line passing through boreholes CMSB-25 & 48.
South	:	An arbitrary line passing through boreholes CMSB-44,34,13 & 22
East	:	An arbitrary line presumably representing Incrop floor of Seam IX. The coordinates of the NE corner are Easting 4010; Northing 4830 and that of SE corner are Easting 4265; Northing 4150. The National coordinates of NE corner are Latitude - 23°11'28.32"; Longitude - 81°31'6.12" and that of SE corner are Latitude - 23°11' 5.9"; Longitude - 81°30'56.70"

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West : An arbitrary line passing east of borehole CMSB-46 and touching the northern & southern boundary with coordinates of NW corner are Easting 8030; Northing 4630 and that of SW corner are Easting 8030; Northing 4152.5.

The National coordinates of NW corner are Latitude - 23°11'21.18", Longitude - 81°28'44.27" and that of SW corner are Latitude - 23°11' 5.6"; Longitude - 81°28'44.12"

The coordinates of the corners are given above. The perimeter of the block is 9.2 km.

The National coordinates of various points on the boundary are given in Location Plan (Plate-I) and local coordinates of various points of the boundary are given in Master Plan (Plate-IV).

The digital values of both types of coordinates are given in Table 1.2

TABLE 1.2
COORDINATES OF VARIOUS POINTS ON THE BLOCK BOUNDARY

Sl. No.	Local Coordinates		National Coordinates		Remark
	Northing	Easting	Latitude	Longitude	
A	4152.5	-8030	23° 11' 5.6"N	81° 28' 44.12"E	SW corner
B	4630	-8030	23° 11' 21.18"N	81° 28' 44.27"E	NW corner
C	4880	-6355	23° 11' 29.9"N	81° 28' 43.41"E	Point on Northern boundary
D	4855	-5295	23° 11' 28.99"N	81° 30' 20.85"E	Point on Northern boundary
E	4830	-4010	23° 11' 28.32"N	81° 31' 6.12"E	NE corner
F	4670	-4175	23° 11' 23.13"N	81° 31' 0.25"E	Point on Eastern boundary
G	4440	-4055	23° 11' 15.54"N	81° 31' 4.46"E	Point on Eastern boundary
H	4150	-4265	23° 11' 5.9"N	81° 30' 56.70"E	SE corner

1.3 DETAILS OF EARLIER APPROVED MINING PLAN

The earlier Mining plan was approved vide MOC letter No. 13016/60/2008-CA-I dt 16-7-2010 (Refer Annexure 1-1). In the revised Mining plan, there is no change with respect to earlier approved Mining plan except in revenue details (Plate III, Annexure 3-1, Table 3-1, 13-2 & 14.1). The revised Mining plan is being submitted in response to MOC letter No. 34011-14-2011-CPAM dt 10-03-2011 (Refer Annexure 1-2)

V.S. RANA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

B.D.SHARMA
EQP

CHAPTER 2

GENERAL

2.1 NAME OF APPLICANT WITH COMPLETE ADDRESS

Office
Birla Corporation Limited
(Cement Division)
PO Birla Vikas, Satna (MP) 485 005
Ph: (07672) 25 0641 – 43, 25 7844 – 47, 410 300
Fax: (07672) 25 7578 / 7456
Email: admin@satnacement.com

2.2 STATUS OF THE APPLICANT

Limited Company

2.3 MINERAL OR MINERALS WHICH ARE OCCURRING IN THE AREA AND WHICH THE APPLICANT INTENDS TO MINE

Coal

V. S. RANA
Joint Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

2.4 ANNUAL COAL REQUIREMENT

Birla Corporation Ltd has cement plants (6 MTPA) and power plants (88 MW) at Satna (MP), Chanderia, (Rajasthan) & Durgapur (WB). It is proposed to augment the cement manufacturing capacity to 11.8 MTPA and power generation to 148 MW by way of expansions and establishing new Greenfield projects at and/ or near the existing facilities.

The present linkage is only for 1.076 MTPA of coal and the rest gap shall be partly filled by the proposed 0.36 MTPA coal production from Bikram Block. The details of the requirement of coal are given in Table 2.1.

2.5 ANNUAL TARGET COAL PRODUCTION

The mine has been planned to produce 0.36 MTPA keeping in mind the possible production from UG mining which is predominant for most of the period during the tenure of life of the block. CMPDIL has also assessed the annual capacity of mine as 0.36 MT as per allotment letter.

2.6 PERIOD FOR WHICH THE MINING LEASE IS REQUIRED

Thirty years.

B.D.SHARMA
RQP

2.7 NAME OF RQP PREPARING MINING PLAN

Name	:	Mr. B. D. Sharma
Address		
(i) Office	:	A-121,
		Paryavaran Complex,
		IGNOU Road,
		New Delhi – 110030
Phone	:	29534777, 29532236, 29535891
Fax	:	091-011-29532568
E-mail	:	min_mec@vsnl.com; minmec@bol.net.in
Web site	:	http://www.minmec.com
Registration Number	:	13016/18/2004-CA
Date of grant / renewal	:	01.06.2004
(ii) Residence	:	A-121,
		Paryavaran Complex,
		IGNOU Road,
		New Delhi – 110030
Phone	:	29534777, 29535891

V. S. RANA
Under Secretary
Ministry of Coal
Shastri Bhawan, New Delhi

(Xerox copy of certificate is attached as Annexure 2-1)

2.8 NAME OF PROSPECTING AGENCY

Central Mine Planning and Design Institute Ltd, Ranchi

Reference No. and date of letter from the Ministry of Coal

Letter No. 38011/2/2007-CA-1, Government of India, Ministry of Coal, dt. 12th August, 2008 (Annexure 2-2).

Letter No GG/ 033.7/captive/865-66 dt. 27-03-2009 from CMPDIL along with which the DD worth the cost of the GR was returned saying that CMPDI has some tax related problem and the matter has been referred to MOC (Annexure 2-3).

2.9 COAL REQUIREMENT

The coal requirement is given below in Table 2.1.

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TABLE 2.1
COAL REQUIREMENT

Sl. No.	Particulars	Capacity of end use plant		Total Coal requirement, MTPA	Linkage Quantity MTPA	Balance requirement, MTPA
		Power (MW)	Cement (MTPA)			
1	EXISTING CAPACITY*	88	6.00	1.721	1.076	0.645
2	EXPANSION OF CAPACITY AND PROPOSED CAPACITY	60 (Approx)	5.80 (Approx)	1.48	Applied / to be applied	1.48
3	ULTIMATE CAPACITY (TOTAL)	148	11.80			
4	COAL REQUIREMENT MTPA (Approx)	1.085	2.116	3.201	1.076	2.125
5	LOCATION of plant (District State)	At or near SATNA (MP), CHANDERIA, (Rajasthan) & DURGAPUR (WB)	At SATNA (MP), CHANDERIA, (Rajasthan) & DURGAPUR (WB)			

* *The present coal requirement is 1.721 MT out of which 1.076 MT is being fulfilled by linkage coal and remaining requirement of 0.645 MT is being met by E-auction/imported coal. The total balance requirement is 2.125 MTPA*

2.10 PRECISE CALCULATION OF COAL REQUIREMENT

i. **Captive Power Plant (Proposed Projects)**

1MW/Hr requires 0.9 Kg of Coal

Therefore 60 MW will require = 60X0.90 = 54 Kg of coal per Hr

So quantity of coal required in a day = 54 Kg X 24 Hrs = 1296 kg per day
Accordingly per annum quantity of Coal will be required for 340 days will be

= 1296 X 340 = 440640 Kg

= 0.44 MT

ii. **For Cement (Expansion/Green Field Projects)**

For 1MT of Cement requires 0.18 MT of Coal

For 6MT Cement of existing capacity 1.076 MT of Coal is required

= 6 X 0.18 = 1.08 (approx)

Similarly for 5.8 MT Cement of proposed expansion /Green Field project capacity 1.04 MT of Coal is required = 5.8 X 0.18 = 1.04 MT (approx)

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अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
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CHAPTER 3

LOCATION AND ACCESSIBILITY

3.1 DETAILS OF AREA (WITH LOCATION MAP)

- District and state : Shahdol, Madhya Pradesh
- Taluka : Sohagpur Tehsil
- Village : Bartara, Gopalpur
- Khasra No./Plot No./Block range/ felling series etc. : Refer Annexure 3-1 (Plate III)
- Lease area (Ha.) : 239 Ha;
- Whether the area is recorded to be in forest (Please specify whether protected, reserved etc.) : Out of 239 ha, 142.075 ha (59.44%) is Reserved Forest, 9.020 ha (3.77%) is Revenue Forest
- Ownership / occupancy : Refer Annexure 3-1.

Summary of the land schedule is given in Table 3.1

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TABLE 3.1
LAND SCHEDULE FOR MINING LEASE APPLIED (In Hect.)

Land use (Hectares)	Gopalpur	Bartara	RF	Total
Agriculture	20.570	56.271		76.841
Barren	2.549	1.618		4.167
Judpi Gungle (Revenue Forest)	3.514	5.506		9.020
Pond , Road, School etc (Govt. Land)	0.822	5.699		6.521
Boundary (Merh)	0.376	-		0.376
Total	27.831	69.094		
Reserve Forest	50.835	91.240	142.075	142.075
				239.000

3.2 GENERAL LOCATION AND VICINITY INFORMATION

Bikram Block represents the northern contiguous area of the Karkali Sector of the Sohagpur Coalfield. The Bikram Block lies to the immediate north of the working Navgaon and Rajendra Mines of Sohagpur Area, SECL. The Shahdol-Amarkantak Highway No. 14 passes 7 km due NE of the block area. The block can be approached from this road by an all-weather feeder road. The nearest railway station is Burhar, on the Bilaspur-Katni Section of

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S .E. railway, it is located at a distance of about 9 km due NE of the Block. Baisaha nala flowing in the west and Nargara nala in the east constitute the main drainage of the area.

The only village falling within the block boundary is Bartara. Almost half of the block is covered by Burhar Reserve forest. Out of the remaining area, area in the western part of the block is covered by partially cultivated land.

The status of mine workings in the vicinity of Bikram Block is as follows:

Mine/its location with respect to Bikram block	Coal Seam	Status of mine workings
Navgaon/ 2 km south	Seam VII	Mining in progress
Rajendra/ 3 km south	Seam VIB	Mining in progress
Bangwar/8.0 km south-east	Seam VIB	Mining is progress
Dhanpuri U.G./8.5 km east	Seam VII Seam VIT	Development & depillaring in progress

Bikram block is virgin.

V. S. RANA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

B.D.SHARMA
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CHAPTER 4

GEOLOGY AND EXPLORATION

4.1 TOPOGRAPHY, REGIONAL GEOLOGY AND LOCAL / MINE GEOLOGY OF MINERAL DEPOSIT INCLUDING DRAINAGE PATTERN

Bikram block was extensively explored by CMPDIL and data used in this mining plan has been taken from "**Geological Report on Coal Exploration Bikram Block Sohagpur Coalfield Distt. Shahdol, Madhya Pradesh**" prepared by CMPDIL, Regional Institute-V, Bilaspur-495001 in October, 1997.

4.1.1 Topography

The Bikram Block has a gentle rolling topography with a general slope towards north. The variation in surface elevations, excluding nala cuttings, is from 479 m (above MSL) in the northern part to 493 m (above MSL) in the south-western part of the block. Basic intrusive bodies stand out as E-W trending low ridge to the north-western & south-western corners of the block. One spring in the northern part, adjacent to the block is also found

4.1.2 Drainage pattern

There is no prominent drainage pattern developed in the block. Only seasonal streamlets drain the area. However, Barsaha nala flowing in the west and Nargara nala in the east constitute the main drainage of the area. These two along with a number of seasonal streamlets drain the area and finally discharge their water into the river Son near village Nahalpur about 12 km NW of the Bikram Block. Three ponds are falling within the block boundary and few others very close to the western boundary of the block.

4.2 REGIONAL GEOLOGY

4.2.1 Geology

The major coal forming event was the Permian, popularly known as Lower Gondwana, followed by Eocene and Oligocene of the North-Eastern Region and Pleistocene lignites of Kashmir. The Gondwana basins of Peninsular India are considered to represent rift-related graben belts which generally coincide with the boundary zones of Pre-cambrian Protoplate components of the Peninsular shield mosaic. The Gondwana formations collectively represent about 6000-7000 m of thick sediments, though a complete sequence from base to the top is not exposed at any one place. Each isolated individual occurrence of the coal measures has been considered a

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separate coalfield by the workers on Gondwana geology. One of such occurrences in the valley of Son has been named as Sohagpur Coalfield.

Sohagpur Coalfield has been a traditional source of superior quality, low rank, high volatile coal. Such coal has been under active exploitation in the entire track in south Sohagpur.

4.2.2 Stratigraphy

The generalised stratigraphic succession for the entire Sohagpur Coalfield is given in Table 4.1.

TABLE 4.1
GENERALISED STRATIGRAPHIC SUCCESSION, SOHAGPUR COALFIELD

Age	Formation	Lithology
Recent/Sub-recent	Soil & Alluvium	
	.....Unconformity.....	
Eocene-Upper Cretaceous	Deccan Trap	Effusive and intrusive rocks, mostly basalt and dolerite
	.....Unconformity.....	
Upper Triassic	Supra Barakars	Pink buff & red sandstone, red shale etc.
Lower Permian	Transitional to Unconformable contract Barakar	Coarse to medium grained sandstone, sub-ordinate shales & coal seams.
Basal Permian(?) to Upper Carboniferous	Transitional to Unconformable contract Talchir	Diamictite, sandstone, siltstone & needle shales
	.....Unconformity.....	
Pre-cambrian		Porphyritic granite-gneiss with aplite & pegmatite veins.

The Amlai-Burhar sub-basin preserves a total of about 300m of Barakar Strata. Of this nearly 160-200 m of Basal Barakar Formation is devoid of workable coal horizons. The workable coal horizons are confined to the succeeding 100-140m of Barakar strata. It contains 9 correlatable carbonaceous horizons of which only six have attained workable thickness in one or the other part of the area. However, Seam VI has been found to have workable thickness almost in the entire area. Seam IX & Seam VIII have been encountered in Karkati and Bikram blocks, which represent the deeper part of the basin. Lower seams have been found to successively either outcrop, incrop or sub-crop along the periphery of the basin.

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4.2.3 Structure

Inconformity to the basinal nature, the strata exhibit a centripetal dip varying from sub-horizontal to 4°. The strata are also affected by faults of varying magnitude. The prominent structural features in the presence of a set of faults associated with dolerite dykes aligned in an E-W direction in between Bikarm block and Burhar mine on to the north & Chachai Dhampuri OC-Bangwar-Karkati block on to the south

4.3 LOCAL GEOLOGY OF BLOCK

4.3.1 General

Bikram Block is located almost in the central part of the Amlai-Burhar sub-basin, Sohagpur Coalfield. The area is mainly covered by thin cover of soil and alluvium, ranging in thickness from 1.75 m to 8.55 m. Rock exposures are largely confined to seasonal nala sections. Supra Barakars are found in the entire block above Seam IX. Lameta occurs as thin cappings over Barakars and Supra Barakars in isolated patches confined in the south-eastern part (around CMSB-8) and north eastern part (around CMSB-48) of the block. The strata being soft, the depth of the weathering ranges between 8.35 m (CMSB-3) to 31.85m (CMSB-48) below the surface. The geological plan has been shown in Plate V

The coal bearing Barakar Formation is chiefly composed of grayish white coarse and very coarse grained sandstone, a few coal seams, carbonaceous Shale and sandy shale.

The overlying Supra Barakars consist of yellow-brown to blue green clay with ferruginous bands at places particularly above Seam IX. The typical Supra-Barakar lithological assemblage, however, occurs in the over Seam IX. Towards south it is represented by arenaceous facies, which renders its identification difficult because of the absence of pronounced lithological difference with the underlying Barakar Formation.

Though an attempt has been made to identify the Supra Barakars in the southern part of the area on colour and compactness of the sandstone and often presence of garnets in it, the identification, however, should be regarded as tentative.

The stratigraphic sequence of the block, established from Sub-surface data, is given in Table 4.2.

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT OF INDIA
NEW DELHI

TABLE 4.2

STRATIGRAPHIC SEQUENCE IN BIKRAM BLOCK, SOHAGPUR COALFIELD

Group	System	Series	Lithology	Thickness	Range (m)
	Recent/ sub-Recent		Soil & Alluvium	1.75 (CMSB-49)	8.55 (CMSB-31,32)
Unconformity					
	Eocene-	Deccan	Dolerite dykes &	0.10	3.05

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Group	System	Series	Lithology	Thickness	Range (m)
	Upper Cretaceous	Trap	sills	(CMSB-3)	(MPSB-4)
------ Unconformity ------					
	Upper Cretaceous	Lameta	Calcareous sandstone and nodular limestone	10.90 (CMSB-8)	36.90 (CMSB-48)
------- Unconformity----------					
Upper Gondwana	Upper Triassic	Supra Barakars	Pink & buff coloured sandstone and variagated shales	7.20 (CMSB-49)	33.90 (CMSB-31)
Lower Gondwana	Lower Permian	Barakar	Greyish-white coarse grained sandstone with a few coal seams, carb shale and shale bands	79.20 (MPSB-3)	179.75 (CMSB-43)

4.3.2 Igneous intrusive

Dolerite has been intersected in boreholes CMSB-3 (0-10 m), MPSB-2 (0 93 m) and MPSB-4(3.05m). Out of these boreholes, MPSB-2 and 4 are located in eastern boundary of the block and CMSB-3 in the north-western part of the block. From these isolated intersections of dolerite body at different locales, the intrusive body is surmised to have a discordant relation with the host rock. However, presence of some more isolated dykes in the area can not be ruled out.

4.3.3 Soil and alluvium

Bikram Block is located almost in the central part of the Amlai-Burhar sub-basin, Sohagpur Coalfield. The area is mainly covered by thin cover of soil and alluvium, ranging in thickness from 1.75 m to 8.55m. Rock exposures are largely confined to seasonal nala sections. Supra Barakars are found in the entire block above Seam IX. Lameta occurs as thin cappings over Barakars and Supra Barakars in isolated patches confined in the south-eastern part (around CMSB-8) and north-eastern part (around CMSB-48) of the block. The strata being soft, the depth of the weathering ranges between 8 35 m (CMSB-3) to 31.85m (CMSB-48) below the surface.

4.3.4 Structural set up of the block

The featureless rolling topography and a thick soil cover in and around Bikram Block have completely masked the surface manifestation of the structural elements. The entire structural set-up of the area therefore, has been worked out on the basis of sub-surface data obtained through drill holes. While deciphering the geological structure, due weightage has been given to the vast structural elements available from the extensive workings of coal seams in various collieries of the area.

Top split got unworkable height in most of the part leaving a very narrow patch where the seam has attained workable height. Though the grade of the seam in the workable seam thickness area is better, however, due to its restriction in a narrow patch the seam has been excluded from reserve estimation. The bottom split of Seam VI Bottom is nearly two third of the area has got workable thickness, hence has been considered for reserve estimation. In the southern part of the block the Seam VI Bottom has a combined thickness of workable height. Due to its better quality and workable thickness, the seam has been considered for reserve estimation.

The sequence of coal seam, their thickness variation and range of interseam parting in the block are given in Table 4.4.

TABLE 4.4
SEQUENCE OF COAL SEAMS, BIKARAM BLOCK

Coal Seam	Thickness Range (m)		General thickness range (m)	No. of boreholes intersecting full seam thickness	Remarks
	Min.	Max.			
Seam IX	0.42 (CMSB-11)	3.75 (CMSB-56)	1.20-3.0	34	Excluding CMSB-25 where only carb. Shale intersected
Parting	9.8 (CMSB-3)	17.07 (CMSB-10)	12.0-15.50	34	
Seam VIII	0.10 (CMSB-18)	2.30 (CMSB-44)	0.90-2.00	34	Excluding CMSB-11 where only carb. Shale intersected
Parting	53.15 (CMSB-18)	64.93 (CMSB-43)	54.0-60.0	37	Excluding MPSB-1, where the interseam parting has thickness reduction and CMSB-44 has splitted seam.
Seam VII	0.55 (CMSB-48)	4.79 (CMSB-43)	1.2-4.0	33	Excluding CMSB-6 where faulted coal seam thickness intersected
Seam VII T	2.27 (CMSB-44)		2.27	1	Parting range between Seam VII & VIB (C)/VIB(T) is 28.26m (CMSB-20) to 34.96 (CMSB-34)
Parting	1.32 (CMSB-44)		1.32	1	
Seam VII B	2.14 (CMSB-44)		2.14	1	
Parting	8.32 (CMSB-13)	24.59 (CMSB-36)		18	Parting between VII and VI Top
Seam VI Top	0.05 (CMSB-14)	3.36 (CMSB-43)	0.90-1.50	18	
Parting	8.05 (CMSB-36)	26.81 (CMSB-23)		15	Parting between VI Top and VI Bot. (Comb.) and also VI Top & VI Bot.(T)

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Coal Seam	Thickness Range (m) Min.	Max.	General thickness range (m)	No. of boreholes intersecting full seam thickness	Remarks
Seam VI B(C)	2.04 (CMSB-7)	3.78 (CMSB-13)	2.0 3.0	10	
Seam VIB(T)	0.36 (CMSB-28)	2.05 (CMSB-10)	0 90-1 50	16	
Parting	1.20 (CMSB-57)	11.00 (CMSB-28)	<2 0-7 0	15	
Seam VIB (B)	0.11 (CMSB-20)	1.8 (CMSB-4)	0.90-1.50	17	

Seam / section delincation

The coal seam/sections have been delineated on the basis of analytical results of coal cores supplied by CFRI, Bilaspur and M/s Superintendence Company of India (P) Ltd., Bilaspur. The coal cores of the boreholes where the seam thickness is normally of unworkable height were not analyzed. In case of boreholes which were not subjected to band by band analysis, the seam sections have been delineated on the basis of visual logging. The seam sections thus delineated have been considered for the assessment of thickness, quality and other characteristics of the seam. The parameters adopted for the delineation of seam/sections are as follows:

(i) The coal, shaly coal, carbonaceous shale and obvious bands have been classified as follows:

Coal	:	Ash + Moisture upto 40%
Shaly Coal	:	Ash + Moisture >40% and upto 55%
Carbonaceous shale (Combustible band)	:	Ash + moisture >55% and upto 75%
Shale/obvious dirt band (non-combustible band)	:	Ash+Moisture >75%

(ii) While delineating the workable section of coal seam, the coal/shaly coal bands at roof and floor having thickness equal to or greater than the following or preceding dirt band respectively have been considered within the coal seam after correlating the horizon.

(iii) For computing the effective workable thickness of coal seam for the purpose of qualitative and quantitative assessment, carbonaceous shale bands having thickness more than 0.30m and all obvious dirt bands have been excluded.

(iv) The data of borcholes with part thickness have not been considered for the purpose of assessment of thickness, quality and reserves.

(v) The iso-parting of 1m between Seam VI Bot. (T) & VI Bot.(B) and VII T & VII B have been considered as the line of split of VI Bottom and VII Seams.

बी. एस. शाह/B. S. SHAH
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.D.SHARMA
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The Bikram block is located in the central part of the Amlai-Burhar sub-basin. It can be observed from the floor contour that strike variation is between N40°55'E – S40°55'W in the western and central part of the block, N60°65'E - S60°65'W in the north eastern part to almost E-W in the south-eastern part and ultimately veer to rarely NS in the eastern most part of the block. Thereby, this indicates a gentle down warp of the strata along a NNE-SSW axis passing through the central region of the block. The coal beds have a corresponding dip direction and the dip amount varies from about a degree to 6°.

Seven normal faults, five trending roughly E-W and two trending NE-SW and NNE-SSW, have been deciphered in the area. Among these faults, fault F1 – F1 extends along or near the block boundary in the southern part. Presence of a few more major normal faults has been indicated by the data of boreholes drilled in the regionally explored northern and southern portion, and faults of small magnitude, like those found in the surrounding mines and block are expected within the block. The details of the faults, postulated to have affected the coal seams in Bikram Block are mentioned in the Table 4.3

TABLE 4.3
DETAILS OF FAULTS IN BIKRAM BLOCK, SOHAGPUR COALFIELD

Sl. No.	Fault No.	Extent of Fault	Trend	Throw		Evidence
				Direction	Amount (m)	
1.	F1-F1	South of borehole Nos. CMSB-47, 23, 22, 26, 7, 13, 34, 36 & 44, running parallel to the southern boundary but adjacent to it and extending from east to west.	E-W	Southerly	>100	Presence of Coal seams in bhs CMSB-2, 7, 13, 22, 23, 26 and 34, but absence in bhs. CMSB-1 & 8.
2.	F2-F2	Originating from between bhs. CMSB-10 and 28 and going beyond north of bh. No. CMSB-18.	N 70°E to S 70°W	NNW	0-30	Difference in the level of floor of seams intersected in bhs. CMSB-3 on the upthrown side and CMSB-48 on the down thrown side and CMSB-48 on the downthrown side.
3.	F3-F3	North of bh. CMSB-25, running south of borehole CMSB-12 and merging in fault F5-F5 near bh. CMSB-53.	N 60°E, veers to E-W	Northely	0-72	Difference in the level of floor of seams intersected in bhs. CMSB-12 on the downthrown side and bhs. CMSB-25 & 30 on the upthrown side
4.	F4-F4	Originating east of bh. CMSB-34, running between boreholes CMSB-56 & 57 and dying out north.	N 35°E	SE	0-3	Floor of Seam VII faulted encountered in bh. CMSB-6.

एस. के. राणा / S. K. RANA
अवर सचिव / UNDER SECRETARY
कोयला मंत्रालय / MINISTRY OF COAL
भारत सरकार / GOVT. OF INDIA
नई दिल्ली / NEW DELHI

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Sl. No.	Fault No.	Extent of Fault	Trend	Throw		Evidence
				Direction	Amount (m)	
5	F5-F5	Running north of bhs. CMSB-5, 53 and 12.	EW in the centre veers to ENE in eastern side and WNW in the western side.	Northerly	Not established	Difference in floor levels of seams intersected in bh. CMSB 9 on the downthrown side and CMSB-53 on the upthrown side.
6.	F6-F6	Originating south of bh. CMSB-51 in the western part, runs between bhs. Nos. CMSB-55 & 32 and merges with fault F5-F5 in the north	Almost EW in the western part of veers to NE in the north	Northerly to NNW	0-24	Difference in floor levels of seams intersected in bh. CMSB-55 in the down thrown side and bh. CMSB-32 & 4 in the upthrown side and also reduction in parting between Seam IX and Seam VIII.
7	F7-F7	Located north of bh CMSB-51 & 5 and extending on both side in the west and NE side.	EW, veers to NNE in eastern part	Northerly to NNW	25-30	Difference in floor levels of seams intersected in bh CMSB-37 on downthrown side and CMSB-5 on upthrown side.

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

4.4 SEQUENCE OF SEAMS

A study of drill hole data reveals that of the nine correlatable carbonaceous horizons present in Amlai-Burhar sub-basin, only seven coal seams viz VI Bottom alongwith two splits – VIB (B) & VIB (T), VI Top, VII, VIII & IX in ascending order have attained identifiable thickness in Bikram block. Coal seams below Seam VIB either exhibit no development or are represented by thin carbonaceous horizons, where the boreholes have been deepened to that depth. Out of the seven identifiable coal seams, Seam VI T and VIB (T) are mostly unworkable due to either non-development of the seams or reduction of the seam thickness. The remaining four seams i.e. Seam IX, VIII, VII & VIB (B) alongwith VI Bot. combined have attained workable heights almost in the major part of the area of their spread. However, Seam IX is inferior in quality and interbanded. The seam thickness has reached below 0.90 m and also undeveloped in almost 10% of the total area of the block. These facts may not prove the seam techno-economically viable for exploitation at present. Moreover almost 50% of the area covered by Burhar Reserve Forest is one of those prime factors to be considered while planning. Seam VIII is the potential workable coal horizon in the area. Except in the northern and central part in small patches where the seam is thin and/or not developed, mostly the seam is workable. The Seam VII has been splitted only in the south-western part of the block in a very small patch, otherwise throughout the block the seam has attained workable thickness. In most of the area Seam VI Top has been undeveloped/ thinned out. Due to being economically unviable the seam has not been considered for reserve estimation. Seam VI Bottom has been splitted up along an arbitrary line passing almost from north-western to the south-eastern part of the block. The northern part of the block where the seam has splitted, the

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4.5 SEAM DESCRIPTION

The disposition and behavior of the Seam IX, Seam VIII, Seam VII, VI (1) and VIB (B)/VI Comb has been shown with the help of stratum contours, isochors and isograde lines. A description of their thickness and quality variations in Bikram Block are provided in the following paragraphs. The proximate quality parameters of the seams have been described excluding non-combustible dirt bands irrespective of their thickness and more than 0.30 m thick combustible dirt bands. The details of band by band analysis are available and the proximate analysis at 60% RH & 40°C are also available

a) Seam IX

Disposition & thickness

Seam IX is the topmost coal horizon in the area. Out of 36 boreholes (CMPDI-34 and DGM (MP)-2) drilled within the block boundary 34 boreholes intersected coal horizon, one borehole (CMSB-22) got faulted and the other one (CMSB-25), has coal seam deteriorated to carb shale. However, out of the 34 boreholes which have intersected Seam IX, two boreholes (CMSB-18 and CMSB-49) have part thickness due to falling in the incrop region. The remaining boreholes (3 Nos.) which have intersected lesser thickness are only due to the quality deterioration of the seam. The seam incrops in the eastern part of the block has been ascertained on the basis of the seam thickness encountered in boreholes. Due to non-availability of detailed surface contour map the exact spread of the incrop is difficult to find out. The seam occurs at a depth range of 11.29 m (CMSB-49) to 87.95m (CMSB-55) below the surface within the block.

The seam is 0.42 m (CMSB-11) to 3.75m (CMSB-56) thick. The seam is observed to have unworkable thickness limited to incrop region, boreholes CMSB-25 & CMSB-11 in the eastern, north-eastern & central part of the block. The effective thickness range in the block varies between 0.42m (CMSB 11) to 3.10m (MSPB-1). The general thickness variation is between 1.2 m to more than 3.0 m, though the seam thickness reduced to less than 1.2 m in the eastern part around CMSB-21, 24 in the central part CMSB-11 and in the northern part around borehole CMSB-53.

Dirt bands

The seam is highly interbanded in nature. At times, the carb Shale bands exceed the shaly coal and coal in thickness, rendering the entire seam unworkable from mining point of view. In one case (CMSB 25) the entire seam is represented by carb shale alone. The total band thickness, ranges between almost 0.30 m to 0.80m except in the northern part where it is more than 0.80 m. The details of the dirt bands encountered in the seam are available.

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Roof and floor

The immediate roof of the seam is represented by shale and carb shale except in north-eastern & south-eastern patches where it is clay. The floor of the seam consists of carb shale, shale, sandy shale and intercalations to sandstone. However, in general the roof of the seam consists of shale & clay and the floor is of sandstones. The floor plan of this seam has been shown in Plate IX.

Coal quality

Proximate analysis

Seam IX coal, as is evident from band by band analysis data, varies in grade from E to G, through mostly between E to F. The quality variation for the effective seam thickness is depicted by isograde lines. It can be observed from it that in the small areas in central and north-western part the grade is G. Out of the total 35 boreholes encountered the IX seam in the block, band by band analysis of 31 boreholes, seam overall at 60% RH & 40°C of 22 boreholes, ultimate analysis of two boreholes and ash fusion temperature of one borehole have been determined by CFRI, Bilaspur and M/s SUPCO, Bilaspur.

The general quality variation of seam IX on I_{20} samples are provided in the Table 4.5.

TABLE 4.5
RANGE OF PROXIMATE ANALYSIS, UVM, UHV, GRADE AND GCV OF SEAM IX

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal./Kg.
	M%	Ash%	VM%				
Range							
Min.	2.7	28.0	21.1	29.3	1448	G	3221
Max.	7.8	49.1	24.4	38.2	3960	E	5019
No. of samples	31	31	3	3	31	31	31
Mean	6.6	36.7	23.3	35.0	2928.4	F	4142
S.D.	0.96	4.36	1.53	4.06	564.3		380.76

The moisture and ash percentage in the block varies between 2.7-7.8 and 28.0-49.1 respectively, but the general variation appears between 5.3-7.8 and 28.0-42.8 respectively. The low moisture i.e. 2.7 (CMSB-28) occurs in the northern part and 4.9 (CMSB-011) in the central part of the block. In case of ash the abnormal rise to 49.1 is found only in CMSB-11 where the seam grades into shaly coal and also the thickness reduces considerably. The reflection of thickness reduction and quality in CMSB-11 has also affected the grade where the normal grade variation from E-F has gone down to grade G.

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Ultimate analysis & ash fusion range

The result of ultimate analysis and ash fusion range carried on samples of 3 boreholes falling in and adjacent to the block are provided in the Table 4.6.

TABLE 4.6
ULTIMATE ANALYSIS AND ASH FUSION RANGE OF SEAM IX

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion Temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST°(C)	HT°(C)	FT°(C)
*CMSB-2	48.57	51.91	3.34	Bcs	49.6 (80.8)	2.9 (4.7)	1.0 (1.6)	0.4 (0.7)	0.3	1100	>1400	>1400
CMSB-10	20.80	23.63	2.83	Brs/I_{90}	44.8 (82.9)	2.7 (5.0)	0.8 (1.5)	0.7 (1.3)	0.3	1130	>1400	>1400
	20.80	23.63	2.83	I	39.4 (82.8)	2.4 (5.04)	0.7 (1.47)	0.6 (1.26)	0.3	1200	>1400	>1400
CMSB-21	18.72	20.84	2.12	Bcs			0.89 (1.6)					

b) Seam VIII

Disposition & thickness

Seam VIII occurs at a parting range of 9.80 m (CMSB-3) to 17.07m (CMSB-10) from the overlying Seam IX, and at a depth range of 25.73m (CMSB-49) to 104.00 m (CMSB-55) below the surface within the block. The parting is minimum in the south-western part and increases towards eastern part.

The thickness of the seam varies between 0.10m (CMSB-18) to 2.30 m (CMSB-44). However, the general thickness variation is mostly between 0.90 m to 2.0 m. The seam grades into carb Shale in borehole CMSB-11 in the central part of the block. In the block where the undeveloped zone lies in the central part around borehole CMSB-11, the unworkable zones are confined to patches and scattered throughout the block. These unworkable zones may well be located around borehole CMSB-51 in the north-western part, around boreholes CMSB-31, 32 & 52 in northern part and around borehole CMSB-20 and MPSB-3 in the north-eastern part. However as the seam is workable in the major portion of the block, hence has been considered for reserve estimation. The seam folio and floor contour plans are available.

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

Dirt bands

In the eastern and north-western part the seam is free from any dirt band. One dirt band which grades from carb. Shale into shale has been found to occur at the top portion of the seam. At times it became part of the seam where it is thin and the top coaly portion is thick, which occur in the central and south-western part of the block. But when the dirt band mostly shale, became thick and the coal portion at the top of these bands either have

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small thickness or they do not exist, the seam appears as a clean coal section which covers major part of the block. The details of the dirt bands found in the seam are available.

Roof & floor

The immediate roof of the seam in four small patches in north-western corner around borehole CMSB-51, in the central part around borehole (CMSB-31, in the north-eastern part around borehole CMSB-25 and in the south-eastern part around borehole CMSB-23 & 49 are of carb. shale. The major part of the block consists of shale/sandy shale and sandstones. However, the lithogloy of roof is dominated by sandstones. The immediate floor of the seam consists of carb. shale, intercalations & sandy shale around borehole CMSB-5 & 52, CMSB-51 & 13 and MPSB-1, CMSB-14,56, 6,31, 30, 30,21 & 48 respectively. Though the major part is dominated by fine to coarse grained sandstones. The floor plan of this seam has been shown in Plate X.

Coal quality

Proximate analysis

Seam VIII coals, varies in grade from A to F. With the coals having grade D in four patches located in the northern part, southern part, north-western and eastern part of the block Grade E & F is confined in a very small patch in the northern part and grade A in the southern part. Mostly the coal ranges in grade between B to C. The quality variation for the effective seam thickness is depicted by iso-grade lines. The seam has been intersected in 34 boreholes within the block, out of which band by band analysis of 30 boreholes have been done. Altogether, proximate analysis of 16 boreholes, ultimate analysis of two boreholes and ash fusion temperature range of only one borehole have been determined by CFRI, bilaspur. The range of quality variation of the effective coal seam thickness is shown in the Table 4.7.

TABLE 4.7
RANGE OF PROXIMATE ANALYSIS, UVM, UHV, GRADE & GCV OF SEAM VIII

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal./ Kg.
	M%	Ash%	VM%				
Range							
Min.	1.9 (CMSB-25)	11.8 (CMSB-54)	19.3 (CMSB-25)	22.3	2483	F	4056
Max.	10.9 (CMSB-26)	44.1 (CMSB-31)	30.9 (CMSB-13)	39.9	6361	A	6604
No. of samples	30	30	11	10	30	30	30
Mean	7.4	18.8	26.8	34.2	5294	C	5711
S.D.	2.99	5.74	3.75	6.29	707.82		515.12

In general the moisture percentages vary between 6 to 10 and ash percentage between 14-23. Though the low moisture percentage around 2

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has been located in the northern part around borehole CMSB 25, 28 etc. in case of ash percentage only one borehole CMSB-31 having a seam thickness of only 0.22m exhibits 44.1% which is quite high against the normal variation, is due to the coal grades into shaly coal located in a small patch in the northern part of the block. This high percentage of ash has also affected the grade which has been deteriorated to grade F against of the normal range of grade B-C.

Ultimate analysis & ash fusion range

The result of the ultimate analysis and ash fusion range of only 3 boreholes falling within and adjacent to the block are provided in the Table 4.8.

TABLE 4.8
ULTIMATE ANALYSIS AND ASH FUSION RANGE OF SEAM VIII

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion Temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST(°C)	HT(°C)	FT(°C)
*CMSB-2	60.90	63.47	2.57	Bcs/I_{30}	58.3 (79.6)	3.7 (5.1)	1.2 (1.6)	0.9 (1.2)	0.32	1020	1290	1340
				I	47.3 (79.58)	3.1 (5.2)	1.0 (1.68)	0.8 (1.35)	0.25	1060	1350	1390
CMSB-6	47.42	48.98	1.56	$Bcs/I_{30}/I$	59.9 (83.1)	3.7 (5.1)	1.3 (1.8)	0.6 (0.8)	0.30	1140	>1400	>1400
CMSB-21	34.85	36.70	1.85	$Bcs/I_{30}/I$			1.08 (1.6)					

Borehole falling outside block boundary

c) Seam VII

Disposition & thickness

Seam VII underlies Seam VIII after a parting range of 53.15m (CMSB-18) to 64.93m (CMSB-43), though in general the variation is between 54m to 60m. The interseam parting in borehole MPSB-1 has been reduced due to faulting and in CMSB-44 the seam is splitted, hence both have not been included in determination of parting thickness range. The seam occurs within a depth range of 82.17 m (CMSB-49) to 160.70m (CMSB-55) from the surface.

The thickness of the seam varies between 0.55m (CMSB-48) to 4.79 m (CMSB-43), but the general thickness range is 1.2 to >4m. The seam occurs as composite horizon through out the block except a very small patch in south western part in borehole CMSB-44, where it has been splitted into two sections. Both the splits are having thickness of more than 2 m. The seam has become unworkable in the north-eastern part due to thinning of the seam in CMSB-48. Except this small patch the thickness of the seam generally increases from east to west.

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Dirt bands

The seam is free from any dirt band in the central and eastern part of the block. In the western and south-western part around boreholes CMSB-43 & 44 the band thickness increases to around 1 m and hence splitting of the seam in top and bottom sections in CMSB-44 However obvious dirt band is found in two boreholes, in CMSB-36 it is of 0.05m and in CMSB-43 it is 0.99m thickness comprising of shale

Roof & floor

The roof of Seam VII consists of sandstones ranging from fine grained to coarse and very coarse grained. The immediate floor of the seam largely consists of shale/sandy shale and sandstones. Carb shale formation is found to occur in the eastern and in the central part around boreholes CMSB-10, 21, 24 & CMSB-4, 54 & 55 respectively. This formation is also restricted in small patches in the northern and north-eastern part around boreholes CMSB-5 & 53 and CMSB-20 respectively. However, lithology of floor of the seam predominantly consists of sandstones The floor plan of this seam has been shown in Plate XI.

Coal quality

Proximate analysis

The quality variation of the seam can be seen in folio plana. The seam is general contains grade C and grade D coals, though the variation of grade found in the block is from grade B to E. Grade E coals are confined of two small patches in the western part of the block around boreholes CMSB-3 & 46, whereas grade B also occurs in two patches, one in the north western part around borehole CMSB-55 and another in the central part in linear fashion around boreholes CMSB-34, 56, 11 & 10. A summary of the quality variation of effective thickness of Seam VII over its workable spread is provided in the Table 4 9.

TABLE 4.9

RANGE OF PROXIMATE ANALYSIS, UVM, UHV, GRADE & GCV OF SEAM VII

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./ Kg	Grade on UHV	Gross CV K.cal./ Kg.
	M%	Ash%	VM%				
Range							
Min	3.7	11.2	24.8	34.0	3946	E	4765
Max	10.6	28.5	29.9	39.4	5919	B	6144
No. of samples	31	31	22	22	31		31
Mean	8.8	18.6	27.9	36.6	5131	C	5530
S.D.	1.14	3.83	1.30	1.31	492.71		335.68

The range of moisture and ash percentage variation in the area is between 3.7-10.6 and 11.2 to 28.5 respectively, but in general the moisture percentage varies between 7.2 to 9.7 and ash percentage between 14 to 25. The lowest moisture percentage is limited to the northern extremity of

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the block around borehole CMSB-25. The highest percentage of moisture 10.6 is confined to the north western fringe of the block around borehole CMSB-55 and the lowest ash percentage 2.2 also occurred in this borehole. The highest ash percentage 28.5 is found in borehole CMSB-49 in the eastern boundary of the block.

Ultimate analysis

The result of ultimate analysis and ash fusion temperature range carried out on samples of only two boreholes is given in Table 4.10.

TABLE 4.10
ULTIMATE ANALYSIS AND ASH FUSION RANGE OF SEAM VII

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST°(C)	HT°(C)	FT°(C)
*CMSB-2	121.46	124.05	2.59	Bcs	56.6 (78.5)	3.5 (4.9)	1.1 (1.5)	0.4 (0.6)	0.45	1130	>1400	>1400
				I	55.00	3.40	1.00	0.40	0.40	1160	>1400	>1400
CMSB-10	98.35	100.03	68	Bcs/I$_{sy}$I	59 (78.6)	3.7 (4.9)	1.4 (1.9)	0.7 (0.9)	0.30	1120	>1400	>1400

** Borehole falling outside block boundary*

d) Seam VI TOP

Disposition & thickness

Seam VI Top occurs after a parting range of 8.32 m (CMSB-13) to 24.59 m (CMSB-36) from the overlying Seam VII. The depth range within the block varies between 95.29 m (CMSB-18) to 186.40 m (CMSB-43) from the surface. The seam has been intersected in 18 boreholes. However, in the remaining boreholes mostly it is not developed.

The thickness of the seam varies between 0.05m (CMSB-14) to 3.36m (CMSB-43). The thickness variation has been shown in the seam folio plan. The seam in the most part of the block either is not developed or is of unworkable thickness. A small patch in the western part of the block the seam has attained not only workable height but the maximum thickness of 3.01 m in borehole CMSB-43. In addition a small patch in the central part of the block also have a thickness rise upto 1.5 m.

In view of the non-development/unworkable height of the seam in the major part of the block, the seam was not considered for reserve estimation in GR. However, the meager reserves available in this seam have been calculated by RQP and incorporated in this Mining Plan (Refer Table 4.31). The data pertaining to the seam for the boreholes falling in the block are available.

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Dirt bands

The seam is free from any dirt band in the block, except in the western part, where an obvious band of 0.35m has been found in CMSB-43 and combustible dirt bands of 0.24m & 0.22 m in CMSB-43 & 44 respectively.

Roof & floor

The roof of Seam VI top consists of coarse to very coarse grained sandstone except in the south-central part where the sandstone is fine grained. The immediate floor of the seam mostly consist of fine to coarse grained sandstone, sandy shale and intercalations, except in south-eastern part around borehole CMSB-22 where it is carb shale. However, the predominant lithology of the roof of the seam is sandstones of various grain size.

Quality of seam

Proximate analysis

The quality variation of the seam is depicted in folio plan. The seam in general contains grade D and grade E coal. Grade D coal is found in the western and central part though in the eastern part the coal quality grades into E.

A summary of the quality variation of Seam VI top over its workable spread is given in Table 4.11.

TABLE 4.11
RANGE OF PROXIMATE ANALYSIS, UVM, UHV, GRADE AND GCV OF SEAM VI TOP

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal./ Kg.
	M%	Ash%	VM%				
Range							
Min.	7.0	19.7	25.5	37.1	3408	E	4450
Max.	9.0	32.8	27.8	39.6	4939	D	5392
No. of samples	11	11	5	5	11	11	11
Mean	7.8	26.2	26.8	38.5	4206	D	4943
S.D.	0.59	3.76	0.83	0.85	444.29		284.12

Ultimate analysis

The ultimate analysis for any of the boreholes having Seam VI Top, falling within or adjacent to the block has not been carried out, except in borehole CMSB-21, where only N% of 0.89 has been determined.

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA

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RQP

e) Seam VI Bottom

Disposition & thickness

The Seam VI Bottom occurs as a composite horizon in the southern and western part, which however, splits into two coal sections designated as VI Bottom (T) and VI Bottom (B) in the northern and eastern part of the block. The line of splitting is running almost north-west to south-east in the block. Due to thinning of the seam VI Bottom (T) in the major portion of its spread in the block, the seam has not been considered for reserve estimation, though the seam folio plan has been prepared and the quality variation of the seam has also been described in the subsequent paragraphs

f) Seam VI Bot (Comb)

Disposition & thickness

The seam occurs at a depth range of 126.66 m (CMSB-21) to 185.30m (CMSB-5) from the surface within the block boundary. Its parting with the overlying Seam VI Top is varying from 8.05 m (CMSB-36) to 26.81 (CMSB 23). The parting increases toward south-eastern part and gradually decreases in the central and western portion of the block.

The thickness of the seam varies between 2.04 m (CMSB-7) to 3.78 m (CMSB-13). The thickness is less than 2.50 m in the western and south-eastern part, and increasing in the central part towards the southern boundary of the block. The general thickness variation is between 2.0 m to 3.0 m the seam has been intersected in 10 boreholes in the block.

Dirt bands

A prominent dirt band ranging in thickness from 0.30m to 0.94m is found to occur almost running from the middle part of the composite horizon. The thickness rises in the eastern side which caused split up of the seam. The dirt band predominantly constitutes of shale/sandy shale. However, the coaly horizon often grades into shaly coal and carb shale forming the bottom part of the obvious bands. The thickness of obvious dirt band increases along line of splitting.

Roof & floor

The immediate roof of Seam VI Bot (Comb) consists of coarse grained sandstone except in the central part where it is shale around borehole CMSB-7, sandy shale around CMSB-6 and intercalations around CMSB-56 The immediate floor of the seam mainly consists of carb shale, and sandy shale except in the south-western corner around CMSB-44 where it is sandstone. However, the predominant lithology of the roof is coarse grained sandstone The floor plan of this seam has been shown in Plate XII.

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

B.D SHARMA
RQP

Quality of seam

Proximate analysis

The quality variation of the seam is depicted in folio plan. Seam VI Bot (Comb.) largely contains grade D coal. Though in three small patches the coal grades into C and E. In the northern part around CMSB-14 the grade is C, at the southern boundary in the central portion around CMSB-13 & 34, and in the south-eastern part around CMSB-26 it is grade E.

The summarized quality variation of the seam over its workable spread is given in the Table 4.12.

TABLE 4.12
RANGE OF PROXIMATE ANALYSIS UVM, UHV, GRADE AND GCV OF SEAM VI BOT (COMB.)

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal / Kg.
	M%	Ash%	VM%				
Range							
Min.	6.9	21.1	24.6	32.4	3932	E	4813
Max.	8.2	29.1	25.5	34.1	4953	C	5483
No of samples	7	7	3	3	7	7	7
Mean	7.5	23.7	25.0	33.3	4586	D	5220
S.D.	0.44	3.09	0.37	0.69	375.76		234.5

Ultimate analysis

The ultimate analysis of Seam VI Bot (comb.) for one borehole which is falling outside the block and of different seam thickness has been carried out.

The data is given in Table 4.13.

TABLE 4.13
ULTIMATE ANALYSIS & ASH FUSION RANGE OF SEAM VI BOT. (COMB.)

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion Temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST°(C)	HT°(C)	FT°(C)
*CMSB-2	158.30	161.22	2.92	Bcs	53.4 (78.0)	3.2 (4.7)	1.20 (1.80)	0.30 (0.4)	0.50	1150	>1400	>1400

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g) Seam VI Bot (Top)

Disposition & thickness

The seam occurs at a depth range of 126.66m (CMSB-21) to 185.30 m (CMSB-5) from the surface. The parting variation from the overlying Seam VII is 10.91m (CMSB-32) to 16.06 mm (CMSB-21). The parting is minimum in the central part of the block and increases gradually towards eastern side reaching maximum in CMSB-21.

The thickness range of the seam varies between 0.38 m (CMSB-28) to 2.05m (CMSB-13) and the seam is intersected in 16 Nos. of boreholes. The eastern part of the block where the seam thinned out and became unworkable (<0.90 m) constitutes the major part of the spread of the seam in the block. A small patch confined around borehole nos. CMSB-32 and MPSB-1 in the northern part has got unworkable thickness of the seam. In the remaining part seam has attained workable height. But due to the small workable area the seam was not considered for reserve estimation in GR. However, the meager reserves have been estimated in this Mining Plan and in corporated by the RQP (Refer Table 4.31).

Dirt bands

The seam is free from any dirt band excepl in borehole CMSB-28 which got only one carb shale band of 0.06m.

Roof & floor

The immediate roof of VI Bot (T) seam is mostly coarse grained sandstone except in few small patches where around borehole MPSB-1 and CMSB-11 it is carb shale and around boreholes CMSB-28 & 57 it is sandy shale. However, the roof mainly consists of coarse grained sandstone.

The immediate floor consist of sandy shale except in two small patches, one around boreholes MPSB-1 & CMSB-5 in the north western part along the northern block boundary where it is shale and another around boreholes CMSB-25 & 28 in the north-eastern part along the northern boundary of the block where it is fine to coarse grained sandstone.

Quality of seam

Proximate analysis

The quality variation of seam VI Bot (T) is shown in folio plan. Seam VI Bot (T) contains only grade C and D coal in the area where the seam is having workable thickness, but in the area where the seam is thinned out and became unworkable, the quality of coal has been degraded to grade E coals.

The summarized quality variation of the seam is given in the Table 4.14.

श्री. एस. शर्मा/S. SHARMA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.D. SHARMA
RQP

TABLE 4.14
RANGE OF PROXIMATE ANALYSIS UVM, UHV, GRADE & GCV, SEAM VI BOT (T)

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal./ Kg.
	M%	Ash%	VM%				
Range							
Min.	6.8	16.1	23.5	31.5	3504	E	4506
Max.	8.4	31.9	26.2	37.6	5519	C	5818
No. of samples	15	15	8	8	15	15	15
Mean	7.8	21.8	25.5	34.3	4819	D	5356
S.D.	0.46	3.98	0.85	1.66	512.57		331.72

Ultimate analysis

The ultimate analysis data cored out of only one borehole CMSB-10 is provided in the Table 4.15.

TABLE 4.15
ULTIMATE ANALYSIS & ASH FUSION RANGE OF SEAM VI BOT. (T)

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion Temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST°(C)	HT°(C)	FT°(C)
CMSB-10	127.93	129.98	2.05	Bcs	56.00 (78.0)	3.3 (4.6)	1.3 (1.8)	0.4 (0.6)	0.32	1340	>1400	>1400

h) Seam VI Bot (B)

Disposition & thickness

The seam occurs at a depth range of 130.50m (CMSB-23) to 189.71m (CMSB-5) from the surface in the block. The parting range from overlying Seam VI Bot(T) varies from 1.20m (CMSB-57) to 11.00 m (CMSB-28). The parting is minimum along the line of split and gradually increases towards northern and eastern part. Around borehole CMSB-28 in almost at the central part parting increases to maximum. The seam has been intersected in 17 boreholes.

The thickness of Seam VI Bot (B) varies between 0.11m (CMSB-20) to 1.80m (CMSB-4). The seam has thinned out in the northern part along the northern boundary of the block and to some extent in the eastern part. The thickness increases towards the southern part attaining a thickness of more than 1.8m. The reduction of seam thickness is probably due to the die out of the seam in the northern part.

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Dirt bands

The seam is totally free from any dirt band except in borehole CMSB-4 in the western part, having a carb. shale band of 0.20 m.

Roof & floor

The roof of the seam consist of carb. shale, shale sandy shale to sandstone and the floor is of shale/sandy shale and sandstone. At the floor of the seam the lithology is predominantly of sandy shale followed by sandstone. However, at the roof coal seam of Seam VI Bot. (T) is found to overlain by sandstone.

Quality of seam

Proximate analysis

The quality variation of Seam VI Bot. (B) is depicted in folio plan. The quality of coal in the maximum spread or the block is of grade C and D coal. Grade E coal is confined to two small pockets in the north-western part around boreholes CMSB-4 and in the south eastern part around borehole CMSB-22.

A summary of the quality variation of Seam VI Bot(B) over its workable spread has been provided in Table 4.16.

TABLE 4.16
RANGE OF PROXIMATE ANALYSIS, UVM, UHV, GRADE AND GCV OF SEAM VI BOT (B)

Particulars	Proximate analysis at 60% RH & 40°C			UVM %	UHV K.Cal./kg	Grade on UHV	Gross CV K.cal./ Kg.
	M%	Ash%	VM%				
Range							
Min.	6.4	16.3	23.4	30.4	4001	E	4885
Max	7.8	29.1	24.8	32.7	5574	C	5886
No. of samples	12	12	5	5	12	12	12
Mean	7.3	22.1	24.2	31.8	4846	D	5410
S.D.	0.45	3.92	0.52	0.81	481.70		300.37

The ash percentage is minimum of 16.3 (CMSB-57) and maximum of 29.1 (CMSB-22). The percentage of ash is low in the central part of the block near the line of splitting which increases towards eastern and western part. The variation in moisture and VM percentage is however not very sharp.

Ultimate analysis

The ultimate analysis and ash fusion range temperature carried out for only one borehole CMSB-10 for seam VI Bot (B) is presented in Table 4.17.

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TABLE 4.17
ULTIMATE ANALYSIS & ASH FUSION RANGE OF SEAM VI BOT. (B)

Borehole No.	Depth			Basis of analysis	Ultimate analysis on 60% RH & 40°C (On unit coal basis)				Ash fusion Temperature			
	From (m)	To (m)	Thick (m)		C%	H%	N%	S%	Co_2	ST°(C)	HT°(C)	FT°(C)
CMSB-10	132.89	134.11	1.22	Bcs/I$_{m}$/I	59.00 (81.9)	3.50 (4.7)	1.20 (1.7)	0.50 (0.7)	0.30	1360	>1400	>1400

Coal rank

The rank parameters of Seam IX, Seam VIII, Seam VII are given in Table 4.18.

TABLE 4.18
COMPOSITION OF COAL, BIKRAM BLOCK

Borehole	On Unit Coal Basis			
	C%	H%	N%	S%
Seam IX				
CMSB-2*	80.8	4.7	1.6	0.7
CMSB-10	82.9	5.0	1.5	1.3
CMSB-21	-	-	1.6	-
Seam VIII				
CMSB-2*	79.6	5.1	1.6	1.2
CMSB-6	83.1	5.1	1.8	0.8
CMSB-21	-	-	1.6	-
Seam VII				
CMSB-2*	78.5	4.9	1.5	0.6
CMSB-11	78.6	4.9	1.9	0.9
Seam VI Bot. (Comb.)				
CMSB-2*	78.0	4.7	1.8	0.4
Seam VI Bot. (T)				
CMSB-10	78.6	4.6	1.8	0.6
Seam VI Bot. (B)				
CMSB-10	81.9	4.9	1.7	0.7

Boreholes falling outside block boundary

As can be observed from Table 4.18, the total Carbon of coal seams usually vary from 78.0-83.1 percent. The general hydrogen content of all the coal horizon are found to range from 4.6-5.1 percent. Thus the coal property on elemental composition are expected to be B_2 group of bituminous coals (ref IS:770-1977).

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Gray king LTC assay at 600°C

The result of LTC assay at 600°C of borehole CMSB-21, in respect of coal from Seam IX, VIII and VI Top is given in Table 4.19.

TABLE 4.19
GRAY KING LTC ASSAY AT 600°C, BIKRAM BLOCK

Seam	Dry Ash (%)	Coke (Kg)	Tar (ltr.)	Liquor (ltr.)	Gas (cu.m)	Ammonia (k.g.)	Coke Type
IX	34.80	784.00	80.50	65.00	71.00	1.00	A
VIII	22.50	740.00	93.00	72.50	97.10	1.40	A
VI Top	33.70	778.50	79.50	70.00	75.50	1.10	A

It may be observed that tar yields are moderate but coke type is poor.

Long flame characteristics

The evaluation of long flame characteristics has been made in respect of the coal seams viz. Seam VIII, Seam VII, Seam VI Top & Seam VIB. For ascertaining the long flame nature of these seams, their volatile matter and gross calorific value, both on unit coal basis, and moisture content at 60% RH & 40°C on mineral matter free basis, have been calculated and tallied with the following laid down parameters.

Group	On Unit Coal basis		Moisture percent at 60% RH & 40°C on MMF
	VM%	Gross CV K.cal./kg.	
B4	Over 32	8060-8440	3 to 7
B5	Over 32	7500-8060	7 to 14

The above three parameters calculated for Seam VIII, VII & VIB are given in Table 4.20.

TABLE 4.20
LONG FLAME CHARACTERISTICS OF COAL SEAMS, BIKRAM BLOCK

Sl. No.	Borehole No.	On unit coal basis		Moisture% at 60% RH & 40°C on MMF	Remarks
		VM %	Gross CV K.cal./kg.		
	Seam VIII				
1.	CMSB-6	32.5	8056	3.9*	*Falling within B4 group
2.	CMSB-13	39.8	7809	12.5	
3.	CMSB-14	39.9	7731	13.7	
4.	CMSB-21	37.6	7738	13.6	
5.	CMSB-23	39.7	7688	14.5	
6.	CMSB-26	37.7	7656	15.0	
7	CMSB-44	38.5	7717	14.0	

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Sl. No.	Borehole No.	On unit coal basis		Moisture% at 60% RH & 40°C on MMF	Remarks
		VM %	Gross CV K.cal./kg.		
	Summary				
	Min.	37.6	7656	12.5	
	Max.	39.9	7808	15.0	
	No. of samples	6	6	6	
	Mean	38.9	7723	13.9	
	Seam VII				
1.	CMSB-3	37.3	7628	15.5	
2.	CMSB-5	36.3	7713	12.9	
3	CMSB-7	38.7	7664	13.4	
4.	CMSB-10	35.9	7773	12.3	
5.	CMSB-11	37.1	7824	12.2	
6.	CMSB-18	36.1	7848	11.8	
7.	CMSB-20	37.1	7804	12.5	
8.	CMSB-21	36.3	7840	11.9	
9.	CMSB-22	39.3	7802	12.6	
10	CMSB-23	38.6	7778	13.0	
11.	CMSB-24	36.3	7888	11.1	
12	CMSB-25	34.0	8257	5.0*	*Falling within B4 group
13	CMSB-26	36.8	7764	13.2	
14.	CMSB-28	36.1	7808	12.5	
15.	CMSB-30	37.3	7659	12.9	
16	CMSB-31	34.8	7840	10.3	
17	CMSB-32	35.7	7776	13.0	
18	CMSB-34	36.8	7925	10.5	
19	CMSB-36	37.2	7754	13.1	
20	CMSB-43	35.7	7800	12.6	
21	CMSB-44	37.9	7725	13.8	
22	CMSB-49	36.9	7886	11.2	
	Summary				
	Min	34.8	7628	10.3	
	Max.	39.3	7925	15.5	
	No. of samples	21	21	21	
	Mean	36.9	7786	12.5	
	Seam VI Top				
1.	CMSB-11	38.6	7671	11.5	
2.	CMSB-13	39.1	7805	12.5	
3.	CMSB-21	38.3	7816	12.3	
4.	CMSB-23	39.6	7821	12.2	
5.	CMSB-30	37.1	7819	12.3	

श्री एम. एस. राणा
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.D.SHARMA
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Sl. No.	Borehole No.	On unit coal basis		Moisture% at 60% RH & 40°C on MMF	Remarks
		VM %	Gross CV K.cal./kg.		
	Summary				
	Min.	37.1	7671	11.5	
	Max.	39.6	7821	12.5	
	No. of samples	5	5	5	
	Mean	38.5	7786.4	12.2	
	Seam VI Bot. (Comb.)				
1.	CMSB-3	34.1	7764	12.0	
2	CMSB-14	32.4	7914	10.7	
3.	CMSB-36	33.3	7857	11.6	
	Summary				
	Min.	32.4	7764	10.7	
	Max	34.1	7914	12.0	
	No. of samples	3	3	3	
	Mean	33.3	7845	11.4	
	Seam VI Bot. (T)				
1.	CMSB-4	34.5	7638	11.9	
2	CMSB-10	33.7	7796	10.6	
3.	CMSB-11	33.2	7931	10.4	
4	CMSB-21	37.6	7808	12.5	
5.	CMSB-22	35.2	7812	12.4	
6	CMSB-25	35.0	7917	10.6	
7.	CMSB-30	33.7	7902	10.9	*UVM is less than the desired parameter
8.	CMSB-31	31.5	7862	11.6	
	Summary				
	Min.	31.5	7638	10.4	
	Max.	37.6	7931	12.5	
	No. of samples	8	8	8	
	Mean	34.3	7833.3	11.4	
	Seam VI Bot. (B)				
1.	CMSB-10	31.6	7801	10.4	* UVM is less than the desired parameter
2.	CMSB-11	31.7	7920	10.6	
3.	CMSB-23	32.7	7910	10.8	
4.	CMSB-31	32.5	7895	11.0	
	Summary				
	Min.	31.6	7801	10.4	
	Max.	32.7	7920	11.0	
	No. of samples	4	4	4	
	Mean	32.1	7881.5	10.7	

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

B.D.SHARMA
RQP

From above, it may be observed that Seam VIII coal in general satisfy the stipulated parameters of long flame coals of B5 group except in borehole CMSB-6 where the seam falls in Group B4. The other seams VII, VI Top, VI Bot (T) and VI Bot (R) are observed to satisfy parameters pertaining to B5 group of long flame coals. These seams are therefore expected to ignite and burn more easily and quickly with moderate draught and responds more readily to demands for increased rate of heat production.

4.6 SOIL & WEATHERED MANTLE

As the area is mostly covered by either soil or forest plantation, hence outcrops of any rock formations are in side in the area except in few places along the seasonal nala cuttings where sandstone is exposed. Bikram Block is located almost in the central part of the Amlai-Burhar sub-basin, Sohagpur Coalfield. The area is mainly covered by thin cover of soil and alluvium, ranging in thickness from 1.75 m to 8.55 m. Rock exposures are largely confined to seasonal nala sections. Supra Barakars are found in the entire block above Seam IX. Lameta occurs as thin cappings over Barakars and Supra Barakars in isolated patches confined in the south-eastern part (around CMSB-8) and north eastern part (around CMSB-48) of the block. The strata being soft, the depth of the weathering ranges between 8.35 m (CMSB-3) to 31.85m (CMSB-48) below the surface.

4.7 DETAILS OF EXPLORATION

Drilling operation for detailed proving in the Bikram Block was initiated by CMPDIL in April'88. Mostly the drilling has been done by wire-line method and coring. Using double tube barrel, boreholes were completed in NQ and BQ sizes (diameters). Due to the unconsolidated formation, water alongwith Bentonite mud was used as drilling fluid many of the times. The boreholes were taken up in square grid pattern at spacings of about 400m. However, due to structurally disturbed formation and also for incrop proving few boreholes were drilled at a lesser spacing of about 200 m or so.

The core recovery in non-coal strata has shown substantial variation from sludge to cent percent, despite exercising utmost drilling care. The low core recovery is because of formational characteristics. The lithology of non-coal strata is chiefly coarse grained sandstone of variable compaction and hardness and the zone of loosely cemented strata is not confined to a particular horizon. As a result, the poor core recovery is not limited to any particular horizon but randomly occurs throughout the entire length of the borehole.

In total 57 boreholes by CMPDIL and 4 by DGM (MP) were drilled in this area in three spells CMPDIL drilled during April'88 to Jan'90 and June'93 to Oct'93 and DGM (MP) during Oct.'93 to April'94. Out of these total boreholes drilled in the area, 34 bhs (CMSB series) drilled by CMPDIL & bhs. (MPSB series) drilled by DGM (MP) are falling within the block boundary of Bikram block and 25 bhs. (23 bhs. Of CMPDIL & 2 bhs. of DGM (MP) are falling outside the block. The depth range of the boreholes

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falling within the block is between 90.18 m (MPSB-3) to 245.45 m (CMSB-34). Borehole density in the block is about 12 nos./sq.km

A total of 61 boreholes, located in and around the block, have been considered for preparation of the report. Agency-wise and financial year-wise details of boreholes and meterage drilled are given in Table 4.21

TABLE 4.21
AGENCY-WISE & FINANCIAL YEAR-WISE DRILLING METERAGE IN BIKRAM BLOCK

Borehole Located	Financial Year	CMPDIL		DGM(MP)		TOTAL	
		No. of Bhs.	Total meterage	No. of Bhs.	Total Meterage	No. of Bhs.	Total meterage
Within Block Boundary	1988-89	15	2279.75	-	-	15	2279.75
	1989-90	12	1835.25	-	-	12	1835.25
	1993-94	7	1073.95	2	264.78	9	1338.73
Total		**34**	**5188.95**	**2**	**264.78**	**36**	**5453.73**
Adjoining of block boundary	1988-89	9	1251.60	-	-	9	1251.60
	1989.90	14	2652.30	-	-	14	2652.30
	1993.94	-	0	2	178.49	2	178.49
Total		**23**	**3903.90**	**2**	**178.49**	**25**	**4082.39**
Grand Total		**57**	**9092.85**	**4**	**443.27**	**61**	**9536.12**

The co-ordinates and reduced levels of above boreholes are available. The run wise lithology of CMSB-series of boreholes are available. Graphic logs of CMSB & MPSB series of boreholes are shown in Plate VII. Correlation of coal seams met in all the 61 boreholes are available and the same has been graphically represented.

4.7.1 Scope and limitations

The objective of the present exercise is to decipher lay and disposition of coal seams and qualitative & quantitative assessment of workable coal seams viz. Seam VIB, VIT VII, VIII & XI.

The present report is based on the data of 57 boreholes of CMPDIL and 4 boreholes of DGM (MP). The core recovery in the boreholes shows substantial variation because of formational characteristics. Although sufficient care has been taken to distribute the core loss to different litho units, nevertheless an element of error in depicting the exact thickness of different litho units cannot be ruled out.

The floor contours isochores and iso-grades have been drawn based on the ssumption of gradual change between the points of observation.

The structural interpretation of the block is based on the sub surface data obtained from boreholes. The faults interpreted on the basis of difference in level of floor of coal seams on its either sides and also in case of omission of seam and seam thickness reduction. Presence and extension of few major faults in the northern and southern side of the block could not be

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deciphered due to no-availability of sufficient boreholes data. As why the block boundary has been fixed up confined between almost E-W trending major faults in northern & southern side. The formation got gentle dips, so rolls between the points of observation can not be ruled out.

The contouring work was not taken up due to small area, that too structurally disturbed and a part of each seam having unworkable thickness. As such outcrop of coal Seam IX has been delineated on the basis of projection of borehole data. Therefore, there is possibility of minor variations in its projected location.

4.7.2 Geophysical logging

Geophysical studies have not been carried out in the Bikram Block. However, "Magnetic/Gravity survey" in an area of 24 sq km, Lat. N (23°9'57" – 23°11'10"), Long. E (81°28'23" – 81°31'54") had been done during April-May'85 and Nov.'86 in the Karkati Block area, to delineate the concealed dykes/sills as well as their nature of alignment. A part of which is falling adjacent to Bikram block in the southwestern part and represents as elevation.

From the magnetic/gravity survey it has been established that the elevated exposures which are trending almost E-W direction are of massive intrusive bodies and dolerite. The details have been provided in the "Report on Magnetic Survey for locating the dyke/skills in Karkati Burhar extension block, Dhanpuri Area, Sohagpur Coalfield", March'89.

4.8 GEOLOGICAL SECTIONS

For the purpose of geological correlation and assessment of reserves geological cross sections have been prepared with the help of adjoining bore holes. Different number of boreholes considered for making cross section is given in Table 4.22. (Refer Plate VI for Geological cross section).

TABLE 4.22
SECTION WISE NUMBERS OF THE BORE HOLES

Sections	Bore hole nos.
A-A'	CMSB-46(P), CMSB-43, CMSB-33, CMSB-4, CMSB-14(P), CMSB-57(P), CMSB-6, CMSB-11, CMSB-10(P), CMSB-21, CMSB-24(P), CMSB-49(P)
B-B'	CMSB-5(P), MPSB-1, MPSB-3, CMSB-2(P), CMSB-14(P), CMSB-34, CMSB-1
C-C'	CMSB-25, CMSB-28, CMSB-10, CMSB-26, CMSB-8

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

4.9 RESERVES AND GRADE

The detailed exploration in Bikram Block has established existence of seams IX, VIII, VII, VI Top, VI Bot and its two splits viz. Top and Bottom. Coal seams below seam VI Bot either exhibit no development or are represented by thin carbonaceous horizons, where the boreholes have

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been deepened to that depth. Out of these identifiable coal seams, Seam VI Top and VI Bot (T) are mostly unworkable either due to deterioration of the seams or of their being unworkable thickness and therefore their reserves were not calculated in the GR, however, RQP has calculated their reserves in workable patches and included in this Mining Plan. The remaining seams i.e Seam IX, VIII, VII & VI Bot (Comb) along with VI Bot (B) have attained workable heights in a considerable part of the block. The estimation of reserves in the present assessment has therefore, been made only for potential coal seams viz. Seam VI Bot (Comb) and its one split VI Bot (B), Seam VII Seam VIII & Seam IX in GR.

4.9.1 Basic assumptions and norms followed

The net insitu geological reserves of the seams mentioned above have been computed on the following considerations:

(i) The isochores and isochores have been drawn on the basis of principle of gradual changes. It is assumed that the variation between any two points of observation is uniform and gradual. Sudden deterioration in seam thickness, not in conformity to the general trend, has been considered localized to the observation point.

(ii) Isochore and Isograde lines have been drawn for effective workable thickness of coal seams after excluding all non combustible obvious dirt bands (Moisture + Ash>75%) and carbonaceous shale bands having thickness more than 0.30m. The isochore and isograde lines thus drawn are shown in folio plans.

(iii) The minimum workable thickness considered for reserves estimation has been upto 0.50 m for grade A, B & C coal (i.e. for superior grade coal) and 0.90m for coal of grade D and below (i.e. for inferior grade coal). The reserves have been estimated for thickness ranges of 0.5 m to 0.9m, 0.9 m to 1.20m, 1.20m to 1.50m, 1.50m to 1.80 m, 1.80m to 2.0m, 2.0m to 2.50m, 2.50m to 3.0m, 3.0m to 3.50m and so on.

(iv) The iso-parting line of 1.0m between VI Bottom (T) & VI Bottom (B) and VIIT & VIIB has been considered as line of split. The area where parting between VI Bot (T) and VI Bot (B) is less than 1m the seam has been considered as VI Bot (Comb)

(v) The grade of coal seams is based on Useful Heat Value. The UHV has been calculated as per Govt. of India Notification No. 28072/1/82A dt. 07.01.1984. The formula used is as follows:

HU* = 8900-138(A+M)

Where HU = Useful heat value in K.cal/kg.
A = Ash%
M = Moisture%

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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(vi) Reserves have been estimated seam-wise, thickness wise and grade-wise

(vii) About half portion of the block falls within forest. Reserves falling within and outside forest have been estimated separately for each seam.

(viii) The area falling within the have zones of faults have been excluded from the estimation of reserves.

(ix) A deduction of 10% from the gross reserves has been made to arrive at the net in-situ reserves of coal in virgin area for unforeseen geological disturbances e.g. unidentified faults and abrupt change in seam thickness etc.

(x) Specific gravity of coal has been calculated seam-wise for each grade by the following procedure.

a) The mean of ash percentage is found for each grade and for each seam.

b) From the mean ash percentage, average specific gravity is calculated by the following formula.

Specific gravity = 1.28 + 0.01 x Ash% (mean value)

The specific gravity thus calculated is given in the Table 4.23.

TABLE 4.23
AVERAGE GRADE-WISE SPECIFIC GRAVITY OF COAL SEAMS, BIKRAM BLOCK

Seam Name	Grade of coal						
	A	B	C	D	E	F	G
IX	-	-	-	-	1.59	1.65	1.73
VIII	1.42	1.44	1.46	1.49	1.56	1.72	-
VII	-	1.42	1.46	1.50	1.55	-	-
VII T	-	-	-	1.53	-		
VII B	-	-	-	1.48			
VI Bot. (B)	-	-	1.47	1.52			
VI Bot. (Comb.)	-	-	1.49	1.50			-

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(xi) Area considered for reserve estimation, seam-wise, within forest and outside forest etc is provided in the Table 4.24. However, the block has not been divided into any sector due to small area as well as absence of any structural features.

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TABLE 4.24
SEAM-WISE AREA TAKEN FOR RESERVE CALCULATION, BIKRAM BLOCK

Seam	Within forest (sq.km.)	Outside forest (sq.km.)	Heave zone (sq.km.)	Incrop (Sq.km)	Non-working zone (sq.km.)	Total (sq.km.)
IX	1.2949	0.8595	0.0125	0.0397	0.1472	2.3538
VIII	1.1696	0.8657	0.0125	-	0.3456	2.3934
VII	1.3694	0.9123	0.0125	-	0.0629	2.3771
VII T	-	0.0163	-	-	-	0.0163
VII B	-	0.0163	-	-	-	0.0163
VI Bot (B)	0.6320	0.1726	0.0122	-	0.5512	1.3680
VI Bot (Comb)	0.3683	0.6568	0.0003	-	-	1.0254

4.9.2 Limits of reserve estimation

Block boundary

North : Surface position fault F7-F7, part of fault F5-F5, F3-F3 and an arbitrary line passing through boreholes CMSB-25 & 48.

South : An arbitrary line passing through boreholes CMSB-44,34,13 & 22

East : An arbitrary line presumably representing Incrop floor of Seam IX. The coordinates of the NE corner are Easting 4010; Northing 4830 and that of SE corner are Easting 4265; Northing 4150.

The National coordinates of NE corner are Latitude - 23°11'28.32"; Longitude - 81°31'6.12" and that of SE corner are Latitude - 23°11' 5.9"; Longitude - 81°30'56.70"

West : An arbitrary line passing east of borehole CMSB-46 and touching the northern & southern boundary with coordinates of NW corner are Easting 8030; Northing 4630 and that of SW corner are Easting 8030; Northing 4152.5.

The National coordinates of NW corner are Latitude - 23°11'21.18"; Longitude - 81°28'44.27" and that of SW corner are Latitude - 23°11' 5.6"; Longitude - 81°28'44.12"

The coordinates of the corners are given above. The perimeter of the block is 9.2 km.

4.9.3 Methods of reserve estimation

Following methods were used for estimation of coal reserves in the GR

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

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(i) Areas have been measured from the seam folio plans with the help of planimeter. All the segments formed by isochore, isograde, faults and forest boundary were measured.

(ii) For the areas falling between two successive isochors, the average thickness of isochors has been considered as the thickness of the seam for that part of the area.

(iii) The following standard formula has been used for the calculation of reserves

R = A x T x sp.gr

Where,

R = Gross reserve in million tones
A = Area in sq.km.
T = Thickness of the coal seam in meter
Sq.gr. = Specific gravity

(iv) To arrive at the 'net' reserves a deduction of 10% has been made from "Gross Reserve"

Category of reserves

All the reserves for Seam IX, VIII and VII (including Top and Bot) have been included under 'Proved Category', though for the seams VI Bot (Comb) and VI Bot (B) reserves have been estimated both for 'proved' and 'indicated' categories.

4.9.4 Summary of reserves

(A) As per GR

A total 'net' coal reserves (proved and indicated) available for underground exploitation have been assessed at 20.975 MT. The share of seam IX, VIII, VII along with top and bottom splits, VI Bot. (Comb.) and VI Bot (B) in the total reserves are 6.494, 3.220, 6.420, 3.586 and 1.255 MT respectively. Out of the total reserves of 20.975 MT, 10.897 MT of coal is found under the forest and remaining 10.078 MT is found outside of the forest area. Coal within the incrop region of Seam IX is only 0.053 MT. Out of the indicated reserve 0.903 MT of coal for Seam VI Bot (Comb) and VI Bot (B) are 0.839 MT and 0.064 MT respectively. Moreover, coal reserves within less than 15m hard cover line and more than 15 m hard cover line for Seam IX are 3.303 MT and 3.138 MT respectively. The percentage share of different grades of coal in the total 'net' proved reserves are grade A-0.1%, grade, B-4.3% grade, C-27.7% grade, D-31.8% grade, E-8.0%, grade F-25.7% and grade G-2.5% and the indicated reserve completely falls under grade D. Thickness-wise, seam-wise and grade-wise net reserves for different seams are provided in Table 4.25.

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TABLE 4.25
THICKNESS-WISE, SEAM-WISE AND GRADE-WISE NET RESERVES

Thickness Range	Seam	Grade							Total
		A	B	C	D	E	F	G	
1	2	3	4	5	6	7	8	9	10
A. Proved									
A Within forest									
>0.50 - <0.90	VIII	0.001	0.090	0.110					0.201
	VIBB			0.118					0.118
Sub-Total		**0.001**	**0.090**	**0.228**					**0.319**
>0.90 - <1.20	IX<15					0.117	0.047	0.036	0.200
	HCL								
	IX>15	-	-	-	-	-	0.012	-	0.012
	HCL								
	VIII		0.144	0.274	0.067	0.001			0.486
	VII			0.274	0.042				0.316
	VIBB			0.216	0.184	0.010			0.410
Sub-Total			**0.144**	**0.764**	**0.293**	**0.128**	**0.059**	**0.036**	**1.424**
>1.20 - <1.50	IX<15					0.145	0.189	0.039	0.373
	HCL								
	IX>15					0.020	0.028	-	0.048
	HCL								
	VIII		0.075	0.411	0.090	0.001			0.577
	VII		0.003	0.483	0.130				0.616
	VIBB			0.200	0.140	0.028			0.368
Sub-Total			**0.078**	**1.094**	**0.360**	**0.194**	**0.217**	**0.039**	**1.982**
>1.50 - <1.80	IX<15					0.104	0.332	0.032	0.468
	HCL								
	IX>15					0.041	0.010		0.051
	HCL								
	VIII		0.005	0.418	0.044	0.048	0.006		0.521
	VII		0.095	0.470	0.002				0.567
	VIBB				0.007	0.014			0.021
Sub-Total			**0.100**	**0.888**	**0.053**	**0.207**	**0.348**	**0.032**	**1.628**
> 1.80 - <2.00	IX<15					0.080	0.291	0.019	0.390
	HCL								
	IX>15					0.021	0.031		0.052
	HCL								
	VIII		0.020	0.012	0.011				0.043
	VII		0.102	0.457	0.014				0.573
	VIBB					0.012			0.012
Sub-Total			**0.122**	**0.469**	**0.025**	**0.113**	**0.322**	**0.019**	**1.070**

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Thickness Range	Seam	Grade							Total
		A	B	C	D	E	F	G	
1	2	3	4	5	6	7	8	9	10
>2.00 - <2.50	IX<15					0.142	0.792	0.040	0.974
	HCL								
	IX>15					0.051	0.146		0.197
	HCL								
	VII		0.081	0.471	0.277				0.829
	VIBC				0.299	0.054			0.353
Sub-Total			**0.081**	**0.471**	**0.576**	**0.247**	**0.938**	**0.040**	**2.353**
>2.50 – <3.00	IX<15					0.039	0.254		0.293
	HCL								
	IX>15						0.297		0.297
	HCL								
	VII			0.054	0.104				0.158
	VIBC			0.081	0.448	0.015			0.544
Sub-Total				**0.135**	**0.552**	**0.054**	**0.551**		**1.292**
>3.00 – <3.50	IX<15					0.001	0.201		0.202
	HCL								
	IX>15						0.166		0.166
	HCL								
	VIBC				0.343	0.028			0.371
Sub-Total					**0.343**	**0.029**	**0.367**		**0.739**
>3.50 – <4.00	VIBC				0.046	0.044			0.090
Total (A)		**0.001**	**0.615**	**4.049**	**2.248**	**1.016**	**2.802**	**0.166**	**10.897**
B. Outside forest									
Incrop	IX						0.053		0.053
>0.50 - <0.90	VIII		0.055	0.079					0.134
				0.014					0.014
Sub Total			**0.055**	**0.093**					**0.148**
>0.90 - <1.20	IX<15						0.009		0.009
	HCL								
	IX>15						0.004		0.004
	HCL								
	VIII	0.001	0.008	0.243	0.072	0.001			0.325
	VII			0.096	0.006				0.102
	VIBB				0.010				0.010
Sub Total		**0.001**	**0.008**	**0.339**	**0.088**	**0.001**	**0.013**		**0.450**

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Thickness Range	Seam	Grade							Total
		A	B	C	D	E	F	G	
1	2	3	4	5	6	7	8	9	10
>1.20 - <1.50	IX<15					0.020	0.006	0.005	0.031
	HCL								
	IX>15						0.002	0.109	0.111
	HCL								
	VIII		0.016	0.402	0.146				0.564
	VII			0.169	0.004				0.173
	VIBB				0.040	0.028			0.068
Sub Total			**0.016**	**0.571**	**0.190**	**0.048**	**0.008**	**0.114**	**0.947**
>1.50 – <1.80	IX<15					0.027	0.021	0.013	0.061
	HCL								
	IX>15						0.157	0.143	0.300
	HCL								
	VIII		0.041	0.119	0.061				0.221
	VII		0.003	0.041	0.007				0.051
	VIBB				0.028	0.068			0.096
Sub Total			**0.044**	**0.160**	**0.096**	**0.095**	**0.178**	**0.156**	**0.729**
>1.80-<2.00	IX<15					0.024	0.019	0.017	0.060
	HCL								
	IX>15						0.240	0.027	0.267
	HCL								
	VIII		0.031	0.030	0.022				0.083
	VII		0.043	0.020	0.011				0.074
	VIBB				0.005	0.069			0.074
Sub-Total			**0.074**	**0.050**	**0.038**	**0.093**	**0.259**	**0.044**	**0.558**
>2.00 - <2.50	IX<15					0.006	0.067	0.004	0.077
	HCL								
	IX>15						1.057	0.026	1.083
	[illegible]		0.018	0.031	0.016				0.065
	[illegible]		0.034	0.252	0.296				0.582
	VIIB				0.048				0.048
	VII F				0.049				0.049
	VIBC				0.350				0.350
Sub Total			**0.052**	**0.283**	**0.759**	**0.006**	**1.124**	**0.030**	**2.254**
>2.50 – <3.00	IX<15						0.107		0.107

श्री. एस. सान्याल
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.O.SHARMA

Thickness Range	Seam	Grade							Total
		A	B	C	D	E	F	G	
1	2	3	4	5	6	7	8	9	10
	HCL								
	IX>15						0.434		0.434
	HCL								
	VII			0.015	0.583				0.598
	VIBC				1.028				1.028
Sub Total				**0.015**	**.611**		**0.541**		**2.167**
>3.00 - <3.50	IX<15						0.058		0.058
	HCL								
	IX>15						0.116		0.166
	HCL								
	VII				0.307	0.116			0.423
	VIBC				0 011				0.011
Sub Total					**0.318**	**0.116**	**0.174**		**0.608**
>3.50 - <4.00	VII				0.672	0.074			0.746
>4.00 - <4.50	VII				0.358	0.157			0.515
Total (B)		**0.001**	**0.249**	**1.511**	**4.130**	**0.590**	**2.350**	**0.344**	**9.175**
Grand Total (Proved)		**0.002**	**0.864**	**5.560**	**6.378**	**1.606**	**5.152**	**0.510**	**20.072**
B. Indicated									
>0.90 - <1.20	VIBB				0.064				0.064
Total					**0.064**				**0.064**
>2.00 - <2.50	VIBC				0.749				0.749
>2.50 - <3.00					0.090				0.090
Total					**0.839**				**0.839**
Grand Total					**0.903**				**0.903**
Grand Total (Proved+Indicated)		**0.002**	**0.864**	**5.560**	**7.281**	**1.606**	**5.152**	**0.510**	**20.975**

HCL – Hard Cover Line

Summary of thickness-wise-seam-wise, thickness-wise-grade-wise & seam-wise-grade wise reserves have been provided in Table 4.26, 4.27 & 4.28 respectively.

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TABLE 4.26

THICKNESS-WISE & SEAM-WISE RESERVES OF COAL, BIKRAM BLOCK

Thickness Range	Within Forest						Total	Outside Forest							Total	Grand Total
	IX HCL		VIII	VII	VIB(B)	VIB (Comb.)		IX HCL		VIII	VII	VIIT	VIIB	VIB(B)	VIB (Comb.		
	<15	>15						<15	>15								
PROVED																	
>0.50<0.90	-	-	0.201	-	0.118	-	0.319	-	-	0.134	-	-	-	0.014	-	0.148	0.467
>0.90<1.20	0.200	0.012	0.486	0.316	0.410	-	1.424	0.009	0.004	0.325	0.102	-	-	0.010	-	0.450	1.874
>1.20<1.50	0.373	0.048	0.577	0.616	0.368	-	1.982	0.031	0.111	0.564	0.173	-	-	0.068	-	0.947	2.929
>1.50<1.80	0.468	0.051	0.521	0.567	0.021	-	1.628	0.061	0.300	0.221	0.051	-	-	0.096	-	0.729	2.357
Total (1)	1.041	0.111	1.785	1.499	0.917		5.353	0.101	0.415	1.244	0.326			0.188	-	2.274	7.627
>1.80<2.00	0.390	0.052	0.043	0.573	0.012	-	1.070	0.060	0.257	0.083	0.074	-	-	0.074	-	0.559	1.628
>2.00<2.50	0.974	0.197	-	0.829	-	0.353	2.353	0.077	1.083	0.065	0.582	0.049	0.048	-	0.350	2.254	4.607
>2.50<3.00	0.293	0.297	-	0.158	-	0.544	1.292	0.107	0.434	-	0.598	-	-	-	1.026	2.167	3.459
>3.00<3.50	0.202	0.166	-	-	-	0.371	0.739	0.056	0.116	-	0.423	-	-	-	0.011	0.606	1.347
>3.50<4.00	-	-	-	-	-	0.090	0.090	-	-	-	0.746	-	-	-	-	0.746	0.836
>4.00<4.50	-	-	-	-	-	-	-	-	-	-	0.515	-	-	-	-	0.515	0.515
Incrop	-	-	-	-	-	-	-	0.053	-	-	-	-	-	-	-	0.053	0.053
Total (2)	1.859	0.712	0.043	1.560	0.012	1.358	5.544	0.355	1.900	0.148	2.938	0.049	0.048	0.074	1.389	6.901	12.445
Total (1+2)	1.858	0.712	1.828	3.059	0.929	1.358	10.897	0.466	2.315	1.392	3.264	0.049	0.048	0.074	1.389	9.175	20.072
INDICATED																	
>0.90<1.20																	
>2.00<2.50														0.067		0.064	0.064
>2.50<3.00															0.749	0.749	0.749
Total															0.090	0.090	0.090
Grand Total	1.858	0.712	1.828	3.059	0.929	1.358	10.897	0.466	2.315	1.392	3.264	0.049	0.048	0.064	0.839	0.903	0.903
														0.326	2.228	10.078	20.975

HCL – Hard Coke

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TABLE 4.27
THICKNESS-WISE & GRADE-WISE RESERVES OF COAL (IN MILLION TONNES)

Thickness Range	Within Forest							Total	Outside Forest							Total	Grand Total
	Grade								Grade								
	A	B	C	D	E	F	G		A	B	C	D	E	F	G		
PROVED																	
>0.50<0.90	0.001	0.090	0.228	-	-	-	-	0.319	-	0.05	0.093	-	-	-	-	0.148	0.467
>0.90<1.20	-	0.144	0.764	0.293	0.128	0.059	0.036	1.424	0.001	0.088	0.339	0.088	0.001	0.013	-	0.450	1.874
>1.20<1.50	-	0.978	1.094	0.360	0.194	0.217	0.039	1.962	-	0.016	0.571	0.190	0.048	0.008	0.114	0.947	2.929
>1.50<1.80	-	0.100	0.688	0.053	0.207	0.348	0.032	1.628	-	0.014	0.160	0.096	0.095	0.178	0.156	0.729	2.357
Total (1)	**0.011**	**0.412**	**2.974**	**0.706**	**0.529**	**0.624**	**0.107**	**5.353**	**0.001**	**0.168**	**1.163**	**0.374**	**0.144**	**0.199**	**0.270**	**2.274**	**7.627**
>1.80<2.00	-	0.122	0.469	0.025	0.113	0.322	0.019	1.070	-	0.014	0.050	0.038	0.093	0.259	0.044	0.558	0.628
>2.00<2.50	-	0.081	0.471	0.576	0.247	0.938	0.040	2.353	-	0.052	0.283	0.759	0.006	1.124	0.030	2.254	4.607
>2.50<3.00	-	-	0.135	0.552	0.054	0.551	-	0.129	-	-	-	1.511	-	0.541	-	2.167	3.459
>3.00<3.50	-	-	-	0.343	0.029	0.367	-	0.739	-	-	-	0.318	0.116	0.174	-	0.608	1.347
>3.50<4.00	-	-	-	0.046	0.044	0.090	-	-	-	-	-	0.672	0.074	-	-	0.746	0.836
>4.00<4.50	-	-	-	-	-	-	-	-	-	-	-	0.358	0.157	-	-	0.515	0.575
Incrop	-	-	-	-	-	-	-	-	-	-	-	-	-	0.053	-	0.053	0.053
Total (2)	-	0.203	1.075	1.642	0.487	2.178	0.059	5.544	-	0.126	0.348	3.756	0.446	2.151	0.074	6.901	**12.445**
Total (1+2)	0.001	0.615	4.049	2.248	1.016	2.802	0.166	10.897	0.001	0.294	1.511	4.130	0.590	2.350	0.344	9.175	**20.072**
INDICATED																	
>0.90<1.20												0.064				0.064	0.064
>2.00<2.50												0.749				0.749	0.749
>2.50<3.00												0.090				0.090	0.090
Total												**0.903**				**0.903**	**0.903**
Grand Total	0.001	0.615	4.049	2.248	1.016	2.802	0.166	10.897	0.001	0.249	1.511	5.033	0.590	2.350	0.344	10.078	**20.975**

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UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

TABLE 4.28
SEAM-WISE & GRADE-WISE RESERVES OF COAL (IN MILLION TONES)

Thickness Range	Within Forest						Total	Outside Forest							Total	Grand Total
	IX HCL		VIII	VII	VIB(B)	VIB (Comb.)		IX HCL		VIII	VII	VIIT	VIIB	VIB(B)	VIB (Comb.)		
	<15	>15						<15	>15								
PROVED																	
Incrop-F	-	-		-	-	-	-	0.053	-	-	-	-	-	-	-	0.053	0.05
A	-	-	0.001	-	-	-	0.001	-	-	0.001	-	-	-	-	-	0.001	0.00
B	-	-	0.330	0.280	-	-	0626			0.170	0.080	-	-	-	-	0.249	0.86
C	-	-	1.225	2.209	0.534	0.081	4.045			0.904	0.593	-	-	0.014	-	1.511	5.56
Total (1)			1.560	2.490	0.534	0.081	4.663			1.074	0.673	-	-	0.014	-	1.814	6.47
D	-		0.212	0.569	0.331	1.136	2.248	-	-	0.317	2.244	0.049	0.048	0.083	1.389	4.130	6.37
E	0.628	0.133	0.050	-	0.064	0.141	1.016	0.077	-	0.001	0.347	-	-	0.165	-	0.590	1.60
F	2.106	0.690	0.006	-	-	-	2.802	0.287	2.010	-	-	-	-	-	-	2.297	5.09
G	0.166	-	-	-	-	-	0.166	0.039	0.305	-	-	-	-	-		0.344	0.51
Total (2)	2.900	0.823	0.268	0.569	0.395	1.277	6.232	0.403	2.315	0.318	2.591	0.049	0.048	0.248	1.389	7.361	13.59
Total (1+2 + Icrop)	2.900	0.823	1.828	3.059	0.929	1.358	10.897	0.456	2.315	1.392	3.264	0.049	0.048	0.262	1.389	9.175	20.08
INDICATED																	
Total														0.064	0.839	0.903	0.90
Grand Total (indicated + Proved)	2.900	0.823	1.828	3.059	0.929	1.358	10.897	0.456	2.771	1.392	3.264	0.049	0.048	0.326	2.228	10.078	20.97

HCL – Hard Cover Line

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(B) Additional reserves as per RQP:

The reserves of two seams which are not well developed have been calculated by the RQP and the same have been given below in Table 4.29 along with their quality.

These reserves are in addition to those given in the GR.

TABLE 4.29
VIABILITY OF MINING NOT-WELL DEVELOPED SEAMS IN BIKRAM BLOCK

Seam in ascending order	Net reserves, MT	Mineable reserves MT	Thickness	Grade	Length of incline drift	Location / Patch
VI Top Patch-1:	0.443	0.18	1.5-3.2m	C; D	2x92m from upper seam VII	Around BH No. CMSI 43
Pach-2*	0.02	0.01		D		
Total	**0.467**	**0.19**				
VI Bottom (Top)	0.574	0.23	1.5 to 2m	C; D	2x104m from upper seam VITop	Around Bl No. CMSB
Total	**1.041**	**0.42**				

** Patch-2 in seam VI top not considered for mining as reserves are very less hence, the mineable reserves have been considered as 0.41 MT.*

4.10 ROM QUALITY

As already indicated, about 61.2% of the coal reserve in the block is of superior grade (Grade C 26.5% and Grade D 34.7%) and 24.5% is grade F. The ROM will be mostly of these grades.

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CHAPTER 5

MINING

5.0 GEOMINING PARAMETERS

The geological parameters of coal seams considered for reserve and mining in geological report are as follows:

Total block area	=	239 ha
Total geological reserve as per GR	=	20.975 MT*
Coal reserves per sq. km	=	8.77 MT (approx)

** Additionally 1.041 MT net geological reserves have been identified by the RQP in seam VI(T) and VI Bot(T) in line with the suggestion of MOC*

5.1 SURFACE CONSTRAINTS

Before we start discussing about the options of mining and methods of mining, let us discuss about the constraints which we will have to overcome before accomplishing the mining operations.

The major general constraints irrespective of the Options of mining are as follows:

1. There are 48 houses within the block area and few of them may have to be rehabilitated due to proposed mining operations.
2. Forest area to the extent of 119.198 ha (49.87%) is lying within the block, which can be disturbed to different extents depending upon Option selected.

5.2 OPTIONS FOR GROUPING THE SEAMS FOR MAKING OVERALL BROAD STRATEGY FOR EXPLOITING THE BLOCK

There are in total, 7 coal seams/horizons in the block in descending order: Seams IX, VIII, VII, VII Top, VI Bot (Top), VI Bot (Bot), VI Bot (Comb). Borehole density in the block is about 12 nos./sq.km. As a result, the bore holes density in various seams is less as is evident from the Table 5.1.

TABLE 5.1
SEAM WISE THICKNESS AND BORE HOLE DENSITY

Coal Seam	No. of boreholes intersecting full seam thickness	Area, sq km	Bore hole density
Seam IX	34	2.39	14.23
Seam VIII	34	2.39	14.23
Seam VII	33	2.39	13.81
Seam VI Top	18	2.39	7.53
Seam VI B(C)	10	1.03	9.71
Seam VIB(T)	16	1.36	11.76
Seam VIB (B)	17	1.36	12.50

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A perusal of above table shows that bore holes density is adequate in line with the guidelines of MOC issued along with the allotment letter.

In the Geological report, the total Net Geological Reserves are given as 20.975 MT which include reserves upto 0.50m thickness of coal in which the contribution of coal thickness of 0.50m-0.9m is 0.319 MT. Out of 20.975 MT, 20.072 MT are proved and only 0.03 MT are indicated reserves. Interestingly, all the indicated reserves are of D grade.

a) Option I

Total block to be mined by Underground Method

The extractable reserves are calculated further.

1	The total net reserves as per GR	:	20.975
2.	(-) Reserves in 0.5-01.2m thickness	:	1.892
3.	(-) Reserves in <15m hard cover	:	3.303
4.	Balance reserves for UG mining (1-2-3)	:	15.78
5.	Extractable by UG mining (about 40% of 4)*	:	6.312
6.	Life @ 0.36 MTPA	:	17.53 years

* Additionally 0.41 MT extactable reserves will be available in patces of seam VI (T) and VI Bot (T) which will increase the life by another 1.14 years

A perusal of point 3 above shows that 3.303 MT coal lying at shallow depth near the outcrop of seam IX cannot be mined by under ground method in line with the Mines Act/ Mines Rules as the hard cover is less than 15m. For mineral conservation point of view, this coal, lying at shallow depth should not be left unmined.

Negative points of this option

a. Out of 20.975 MT coal reserves, 3.303 MT (15.75%) reserves are not permitted to be attempted for UG mining, hence will be fully lost

b. The extraction of remaining reserves will be only about 40%.

c. The resultant extracted reserves will be only 30% (6.312 MT) of the total net geological reserves.

d. The maximum depth of underground mining will be 230m (max) and 90m (min) (average 140) out of which the coal thickness combined comes to about 7m which means that the extracted thickness of coal will be about 20 times (average) (between 12.85 and 27.14) less than the depth of mining. Though a specific study of surface subsidence will give the exact values but as a general thumb rule, ratio of depth to coal thickness should be at least 100 times to keep the surface unaffected by underground mining. Hence all surface structures as well as trees will not remain safe.

e. Underground mining is not safer than opencast mining

f. OMS of this option will be very low (about 1) w.r.t. opencast mining

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This option is not, therefore, advisable to be adopted due to almost all the points clocked as negative. Accordingly, Option II has been devised below.

b) Option II

The block to be mined by Underground Method as well as by OC method.

In this option, it is proposed to mine the shallow coal of seam IX underlying less than 15m hard cover and also the next lower seam VIII under exactly the same area with a parting of only about 15m (without disturbing any additional area at surface). The remaining dip side portion of both the above mentioned seams along with all the remaining three lower seams VII, VI T and VI BOT [VI BOT(Top), VI BOT (Comb) and VI BOT (Bot)] will be mined by underground method. The summary of detailed calculation of reserves under this option is given below in Table 5.2.

A perusal of the above table shows that in this option, positive points will be as follows:

i. It will be possible to extract 3.303 MT (15.75%) of the reserves lying at shallow depth of less than 15m hard cover which was not possible in Option-I

ii. It will be possible to extract as much coal as 9.44 MT of reserves (3.758 MT by OC + 5.682 MT by UG method) which account for 45% of the total net geological reserves. This extraction is 15% higher than that in Option-I. Besides 0.41 MT extractable coal will be available for UG mining from patches of seam VI (T) and VI Bot (T).

iii. The maximum depth of OC mining will be about 60m and the depth of underground mining will vary between 90m and 180m (average 140m) out of which the coal thickness combined comes to about 7m which means that the "depth to extracted coal thickness" ratio will be about 20 on an average (between 12.85 and 27.14). Though a specific study of surface subsidence for this block will give the exact values of resultant subsidence but as a general thumb rule, ratio of depth to coal thickness should be at least 100 to keep the surface unaffected from subsidence from underground mining. Hence, all surface structures as well as trees will not remain safe.

iv. Out of 239 ha total block area, 151.095 is forest (Revenue + DP) which will be partly excavated to the extent of 99.23 ha.

v. As the operation will be OC as well as UG, it will be comparatively safer than Option-I

Accordingly, another Option-III has been devised below for comparison of advantages and disadvantages.

V. S. RANA
Under Secretary
Govt. of India
Ministry of Coal
New Delhi

B.D. SHARMA
RQP

ii. Selection of opencast mining technology

There are following types of equipment systems available for opencast mining:

a) Bucket wheel mining

b) Dragline mining

c) Shovel dumper combination

d) Continuous surface miners (CSM)

Each of them has been explained below:

a) The bucket wheel alternative has not been considered due to following reasons:

- The strata below the upper most weathered mantle, is hard and strong, requiring blasting hence bucket wheel excavators are not viable
- The volume of coal and OB required to be handled is comparatively low for this technology machines which use conveyor as evacuation mode.
- The pit width is very less which becomes as less as 90m at the quarry bottom on the eastern side where as thus equipment system requires comparatively wider space.
- Out of seven faults within the block, three faults F2-F2, F4-F4 and F6-F6 are falling within the operational area with throw varying upto 30m, which will pose problems in the smooth operation of this equipment system.

b) The dragline has not been recommended mainly due to the reason that

- The lowermost seam is very thin (about 1.4m) and the parting over it is also very thin (4.5m) which makes this high capacity machine not suitable for this particular project though other conditions like less dip (<6deg) and absence of structural disturbances makes it suitable.
- Out of seven faults within the block, three faults F2-F2, F4-F4 and F6-F6 are falling within the operational area with throw varying upto 30m, which will pose problems in the smooth operation of this equipment system.

c) Keeping in mind that there are 2 seams (which has to be worked by Opencast method) and their splits and equal nos. of inter burden layers to be tackled, an equipment system which is capable of dealing many layers at a time (flexibility) of operations with the help of smaller units

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has been recommended as shovel dumper combination. The quality problem can be handed with the help of hydraulic excavators which have three dimensional movement of bucket.

They are capable of carrying out selective mining. Further more, to tackle about 1.57 mm^3 OB and 0.16 MT of coal at a number of locations in the mine, comparatively small size shovels of 3.3 cum bucket capacity have been envisaged along with 30 T rear dumpers for OB and 0.9- 1.1 cum bucket capacity along with 10T tippers for coal. Flexibility in operation will be available due to such equipment system.

The main objectives of mine development have been

i. to design an economical production of required coal quality for the life of mine

ii. to minimize transportation distance for coal and waste

iii. to minimise adverse effects on environment and

iv. non-sterilizing the remaining potential reserves for future mining

The stripping ratio above seam VI Bot (Bot) is very high 9.80 cum:te which has been considered in this mining plan.

(d) Continuous surface miners are capable of cutting coal precisely and selectively. They are highly productive machines. However, since there are number of seams in the block and the production is very small (0.16 MTPA) as such these machines are not being considered.

iii. Coal production

It is proposed to use shovel/ back hoe of 0.0-1.1 M^3 bucket (Diesel operated) in combination with 10 T.R.D. dump Trucks (Diesel Operated) for coal production.

4 number of 10 tonner dumpers will be able to meet the requirement.

iv. Sequence of mining

Generally, the coal opencast mines propose to open up a box cut in the outcrop/ incrop of lower most seam and plan to advance the mining operation from rise side to dip side. The main reason of such sequence lies behind the fact that the OB : Coal ratios are lower at the outcrop side and the back filling will be started at the early stage of mining operation. This will reduce the expenditure on transport of OB partially, till the full stage back filling starts.

Hence, it is planned to work from rise side to dip side due to following reasons:

1. The eastern (rise side) area of ML houses the incrop of uppermost seam Seam IX (in which the box cut will be driven).
2. The OB : Coal ratio while proceeding from rise to dip is less than that encountered from dip to rise.
3. The surface dumping requirement is substantially less in case of mining from rise side to dip side than vice versa.

It has been decided that the mining will be started from the rise side (east) and advance towards dip side (west).

v. Year wise development of the first five years

The Shahdol-Amarkantak Highway No. 14 passes 7 km due NE of the block area. The block can be approached from this road by an all-weather feeder road. The nearest railway station is Burhar, on the Bilaspur-Katni Section of S.E. railway it is located at a distance of about 9 km due NE of the Block.

No approach road is required to be made from outside the block as feeder road is existing. Any roads will only be internal roads i.e. roads inside the block.

a) Year 1

The initial mine entry will start in eastern portion of the block from a point (with SRL 489m), located in the west of bore hole No MPSB-02 which will be driven towards the SW direction at 1:16 gradient to touch the 475m floor contour of incrop of seam IX on SE of BH No MPSB-24. This road from here will be then driven towards SE to touch floor of seam VIII at 465m FRL.

A box cut will thus be created along the eastern boundary of outcrop of seam IX. By the end of this year, the OB generation will be 1.83 mcum (B) with a coal production of 0.15 MT from seam IX and VIII. Two OB benches immediately below the surface and parting between seam IX & seam VIII will be worked out during the year. The OB will be disposed at the surface dump, this surface dump will be created over the non-forest area within the limit of opencast conceptual pit and will be rehandled later by the end of 15th year, as MOC is not likely to agree without rehandling. The mine pit configuration at the end of this year is shown in Plate XIII.

There will be no coal production from UG mining in this year.

b) Year 2

The same benches are further extended and coal production takes place from the coal seams IX & VIII. After evacuating the SE corner of the OC mine, the operation will be oriented towards northern portion to facilitate

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backfilling over the area excavated during the 1st year over seam VIII floor. During this stage the OB excavation is about 3.08 mcum including IB from partings in between seam IX & VIII.

All the OB produced during this year will be backfilled. The backfilled area will be higher than the surrounding surface area by about 15 m. The mine pit configuration at the end of this year is shown in Plate XIV.

There will be no coal production from UG mining in this year. However the drivage of 1st set of inclines will be started in the western half portion of the block from SRL 481 which will touch seam IX floor at FRL 442. The length of inclines in 4:1 gradient will be 156m which will take about 6 months time.

c) Year 3

The mine pit configuration remains the same as in the previous year. The previously worked out OB benches along with partings between seams mentioned above will be extended towards west resulting in waste generation of 2.02 (B) Mcum. All the OB produced during this year will be backfilled. Coal is obtained by mining the above seams upto floor of seam VIII and coal production is 0.16 MT. The mine pit configuration at the end of this year is shown in Plate XV.

There will be coal production from UG mining in this year to an extent of 0.2 MT as the 2nd half of 2nd year will be used for forming the production panels and drives along the main dip towards west.

d) Year 4

The benches previously created are advanced and all the 3 seams are worked and new OB benches created to tackle the increasing height of the OB above seam IX. At the end of this year, the production of waste & coal is 1.85 (B) Mcum and 0.16 MT respectively. Total OB will be backfilled. There will be coal production from UG mining in this year to an extent of 0.2 MT. The mine pit configuration at the end of this year is shown in Plate XVI.

e) Year 5

During the 5th year, the benches created during the previous year are advanced all the two seams also similarly worked. The waste generation is 1.84 Mcum and coal production is 0.16 MT. All OB will be backfilled. The mine pit configuration at the end of this year is shown in Plate XVII.

There will be coal production from UG mining in this year to an extent of 0.2 MT. Ultimate Opencast Pit Floor can be seen in Plate VIII.

vi. Calendar program of excavation by OC mining

Year wise production for the life of the mine is tabulated in Table 5.6.

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TABLE 5.6
BANK CALENDAR PROGRAMME OF OC PRODUCTION & EXCAVATION

Year	Coal M Te		OB + T.S., M cum		Rehandling		OB + T.S. with Rehandling, M cum		Stripping ratio OB : Coal (without Rehandling)		Stripping ratio OB : Coal (without Rehandling)	
	Prog	Cum	Prog	Cum	Prog	Cum	Prog	Cum	Prog	Cum	Prog	Cum
1	0.15	0.15	1.83	1.83			1.83	1.83	12.20	12.20	12.20	12 20
2	0.36	0.51	3.08	4.91			3.08	4.91	8.56	9.63	8.56	9.63
3	0.16	0.67	2.02	6.93			2.02	6.93	12.63	10.34	12.63	10.34
4	0.16	0 83	1.85	8.78			1.85	8.78	11.56	10.58	11.56	10 58
5	0.16	0.99	1.84	10 62			1.84	10.62	11.50	10.73	11.50	10 73
6-10	0.8	1.79	7.5	18.12	1.78	1.78	9.28	19.9	9.38	10.12	11 60	11.12
11-15	0.8	2.59	7.5	25.62	0	1.78	7.50	27.4	9.38	9 89	9.38	10.58
16-20	0.8	3.39	7.5	33.12	0	1.78	7.50	34.9	9.38	9.77	9.38	10 29
21-23	0 368	3.758	3.69	36 81	0	1.78	3.69	38.59	10.03	9.80	10.03	10.27
Total	**3.758**		**36.81**		**1.78**		**38.59**		9.80		10.27	

vii. Proposed rate of production by OC when the mine is fully developed

Coal production	0.36 MT in 2nd year then @ 0.16 MTPA
Overburden excavation (Average)	1 5 Mcum. (from 4th to 23rd year)
Average OB : Coal (cum . te)	9.80:1 (without rehandling)

viii. Mineable reserves and anticipated life of the mine

The recoverable (extractable) reserves are given in Table 5.5 above as 3 758 MT by OC method with a life of opencast mine as 23 years.

Hence the life of the mine will be about 23 years at annual production rate of 0.36 MT in the 2nd year and then @ 0.16 MTPA as per the calendar programme of production. The conceptual plan at the end of life of mine can be seen in Plate XIX.

ix. Proposed method of working

Opencast mining method is selected for mining only two upper coal seams i.e. Seam IX & Seam VIII upto favourable overburden to coal ratio (9.8:1 without rehandling & 10:27 with rehandling). The proposed mining operations in the block will commence from the eastern portion of the lease area viz. rise side of the deposit. It is proposed to adopt mechanised opencast method on three shift basis with the deployment of drill machine, shovels, dumpers etc. The initial box-cut will be made in the Seam VIII after the initial trench (with 489 SRL) 1st touches 475 FRL contour of seam IX and then touches 465 FRL contour of seam VIII as the incrop is available

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here at shallow depth of about 16 m. The box cut will be aligned along lower half span of eastern boundary of incrop of seam IX. Normal mining method by aligning the benched along the seam floor will be adopted as the seams are virtually flat with a dip from zero to 6 degrees.

The cross section showing the conceptual mining is shown in Plate XX.

a) Overburden removal : trucks and shovels

The overburden comprises soil cover underlain by weathered mantle which is in turn, underlain by comparatively stronger OB strata.

6 m to 8m high benches will be developed to excavate the OB. To start with, the topsoil material (0.6 m thick) will be excavated by 0.9/1.2 cum hydraulic shovel and transported to a designated area by dumpers. Two types of topsoil storages will be made-one permanent type over the underground area lying in the western portion of the block and another temporary stack on the backfilled area for immediate use within the same year before the onset of monsoon. This topsoil will be eventually re-used for reclamation. It is estimated that a total of 0.71 mcum (B) of top soil will be generated during the entire period of OC mining operations i.e. 23 years.

The 6 m to 8 m bench in waste material specifically soil and weathered mantle will not require any drilling/blasting where as the underlying stronger strata of OB will be drilled by rotary blast hole drill using a bit size of 110-160mm. The blast hole will be loaded with explosive and blasted. Hydraulic excavators equipped with 2.5-3.3 cum bucket capacity will be used for OB. The dumpers will haul the material either to the surface waste dump or to previously mined pit section for backfilling. At the dump site, dozer will be used for the purpose of grading the dumps. Transport will be affected by 35 T rear dumpers.

b) Coal mining

Conventional methods of mining employing shovel-dumper combination will be mainly used to excavate coal. 110/115 mm dia drills will be used for blast hole drilling and the blasted coal will be loaded in 10 T dumpers (coal body) by 0.9-1.1 cum hydraulic shovel/ backhoe.

The coal benches will also be maintained at their prevalent thickness. All haulage roads and dumps will be maintained at a gradient of 1 in 16. (Refer Plate XIII-to-XVII).

c) Extent of mechanisation

Mining and transport of coal and OB will be fully mechanised. The details of the equipment are given in Table 5.7.

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TABLE 5.7
LIST OF PRODUCTION AND AUXILIARY EQUIPMENT

Sl. No.	Particulars	Unit	Quantity
I.	**Heavy Earth Moving Machinery**		
A.	**Coal**		
a)	0.9-1.1 M^3 shovel/backhoe (Diesel operated)	Nos.	1
b)	10 T.R.D. Trucks (Diesel Operated)	Nos.	4
c)	R.B.H Drills 110/115 mm (Diesel Operated)	Nos.	1
d)	Dozer 275-320 HP (Tyre mounted dozer with ripper attachment)	Nos	1
B.	**Overburden**		
a)	Hydraulic Shovel 2.5-3.3 m^3	Nos.	2
b)	35 T.R.D. trucks (Diesel Operated)	Nos	10
c)	R.B.H drills 110/160 mm (Diesel Operated)	Nos.	2
d)	Dozer 410 HP (Diesel Operated)	Nos.	2
e)	Dozer 275-320 HP (Diesel Operated)	Nos.	2
II.	**Auxiliary & Service Equipment**		
a)	3.5 m^3 front end loader (Coal) (Diesel Operated)	Nos.	1
c)	Graders 145 HP (Diesel Operated)	Nos.	1
d)	Diesel Bouser	Nos.	1
e)	Construction backhoe -0.9 CUM (Diesel Operated)	Nos.	1
f)	Water sprinkler (26 KL) (Diesel Operated)	Nos.	3
g)	TOW truck on 50T truck chassis (Diesel Operated)	Nos.	1
h)	100 T tractors (Diesel Operated)	Nos.	-
i)	Rough terrain crane - 40T mobile (Diesel Operated)	Nos	1
J)	Service trucks	Nos	3
k)	Explosive van (Diesel Operated)	Nos.	1
l)	Portable air compressor	Nos.	1
m)	Tyre handler	Nos.	1
III.	**Reclamation**		
	2.5 cum front end loader	Nos.	1
	10 T Truck	Nos.	4
	0.9-1.2 cum hydraulic excavator	Nos.	1

All material handling will be carried out on contract basis & other jobs will be done departmentally.

d) Drilling

Crawler-mounted, pneumatically operated, down the hole drilling rigs with hole diameter of 110-160 mm will be deployed in OB. These rigs are capable to meet the future requirement of 8 m/hr in OB. In coal, R.B.H drills will be used for drilling 110/115 mm dia. holes.

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e) Loading

The excavation backhoe deployed for coal will be used for loading the coal at the face.

5.3.2 Under ground mining

The under ground mining will be carried out by two sets of inclines from surface.

Both of them have been described below. A pair of stone drifts of size 4.5 X 3 m. in gradient 4.1 will be driven to get in to Seams IX and VIII lying on the western side in the dip area of the opencast mine as proposed.

There will be negligible coal production from UG mining for the 1st two years as work at the initial stages will be confined to Inset developments and starting of four coal dips drivage in seams IX and VIII soon after the coal seams are encountered. The drivage of 1st set of incline drifts will be started in the western half portion of the block from SRL 481 m which will touch seam IX floor at FRL 442m. The length of incline drifts in will be 156m which will take about 6 months time to drive. The same incline will continue down at the same gradient and meet the seam VIII at 426.5m FRL. Once the incline drifts touch the seams a set of dip drives along the floor of the seems will be driven and panels created for development and production.

i, Reserves for under ground mining

The overall % of extraction is considered 40 restricting the workable thickness of seams to a range of above 1.2m. The extractable reserve will be 5.682 MT. The details of calculation can be seen in Table 5.8. The reserves and other details of seams are given below.

TABLE 5.8
SEAM THICKNESS, EXTRACTABLE THICKNESS, RESERVES AND MINING DEPTH FOR UG MINING

Seam IX	Total coal as per GR	Reserves for UG mining			Grade
		Net geological	Net mineable	Extractable (40%)*	
(i) <15m hard cover line	3.303	0.00	0.00	0.00	F
(ii) >15m hard cover line	3.138	3.138	3.081	1.23	F
Outcrop	0.053	0.00	0.00	0.00	
Total Seam IX	**6.494**	**3.138**	**3.081**	**1.23**	**F**
Seam VIII	3.920	1.908	1.328	0.53	C
Seam VII	6.323	6.323	5.697	2.28	C-D
Seam VII B	0.048	0.048	0.000		D
Seam VIIT	0.049	0.049	0.000		D
Seam VIB (B)	1.255	1.255	0.639		C-D
Seam VIB (B) combined	3.586	3.586	3.459	1.38	C-D
Total coal reserves	**20.975**	**16.307**	**14.204**	**5.682**	

** Additionally 0.41 MT mineable reserves will be available in pillars of seam VI (T) and VI Bot (T).*

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ii. Selection of underground mining technology

The coal seams lay and disposition is such that any large mechanization like long wall power support system and use of continuous miners etc is not feasible. It is therefore proposed to use simple board and pillar system with solid blasting in panel development using Load Haul Dump (LHD) with chain and belt conveyor as the floor of the seam appears to be good and gradient is found to be gentle all through the mine.

The coal seams will be touched through a pairs of incline drifts of suitable size. After touching the coal seam; the development will be carried by driving four dips in coal in top seams (IX and VIII) and four dips and rise in the lower seams (VII and VI). Suitable panels have been planned and shown in the plan for development of the mine (Refer Plate / Plan No XXII).

iii. Coal production

Each regular panel operating in strike direction will give production at the rate of 300 TPD. This in affect will give a production of 600 TPD from the two working panels While driving the 4 dip drivages, it will be almost like developing a panel as the gradient of seam is not high and therefore, a production 150 to 200 TPD is expected to be obtained from such drivage Also some production will come from the preparation of 3rd panel.
Thus total production per day will be over 800 TPD will be as follows:

Output from each panel	=	300 te/day
Output from two panels	=	600 te/day
Output from Dip development etc	=	200 te/day
Total output		800 te/day

However only 600 TPD has been adopted for all calculations, working 330 days in a year. Accordingly, this mining plan has adopted 0.2 MTPA productions from underground which will be easily achieved.

iv. Sequence of mining and location of Inclines

The OC mining operations will start in seam IX and VIII in the 1st year. The production from UG mining operations in the dip side of seam IX and VIII will start from 3rd year and finish by 11th year As the OC will last upto 23rd year, the production from lower seams by UG mining of seam VII and VI should start in sequence to the ending year of upper 2 seams i.e by 12th year for which the development work will have to be started by 9th year.

There will be a separate pair of inclines (1st pair) for seam IX and VIII driven from near the centre of the northern side of the block (between bore hole no. CMSB-30 and 31 which will operate 1st. There will be 2nd pair of incline driven from the same site (just from south of 1st pair) meant for Seams VII

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and VI which will mine the seams below the worked out OC mine (towards rise side) and towards dip side upto the western boundary of the block (Refer Plate No.- IV).

v. Year wise development during initial years

Underground mining will be worked by two pairs of inclines

A) The 1st Set of inclines will be driven from surface to the floor of Seam IX and VIII lying on the western side of the opencast mine proposed through stone. Each of the inclines will be 156m long up to the floor of Seam IX with a crossection of 4.5m x 3.0m which will take about 6 months time to drive.

There will be no coal production from UG mining in first two years. However the drivage of 1st set of inclines will be started in the western half portion of the block from SRL 481m which will touch seam IX floor at FRL 442m (refer Plate XXI and XXII). The same incline will continue down at the same gradient and meet the seam VIII at 426.5m FRL. Once the incline touches the seam a set of dip drives along the floor of the seams will be driven and panel created for development and production.

B) **2nd pair of inclines:** MOC had suggested that the possibility of driving the incline entries from northern side of the block (instead of the one incorporated in the Mining Plan of Aug, 2009 version) be investigated to reduce the lead for transportation. Accordingly the exercise has been done, found better and has been incorporated in this Mining Plan. So there will be 2nd pair of incline driven from the northern side of the block (located between BH no. CMSB-30 and CMSB-31 over non forest area) meant for Seams VII and VI. This will touch the seams almost in the middle of the property which will be used for extracting coal from underneath the OC mine in the rise side (east side) and also from the dip side (west side upto the western block boundary (refer Plate XXIII and XXIV). As the reserves extractable from seam VII and VI are expected to be only 3.92 MT, a drivage of separate ventilation shaft/incline has not been considered necessary. It is proposed to have one incline as intake in which the belt conveyor and track in the side for supply of material will be planned and the other incline will be used as return with adequate number of leakage proof gates at return. This will also be used for traveling of men upto entry into the coal seam.

The mouth of the incline will be at 482 m SRL and it will meet seam VII floor at 372m FRL and by extending further meet seam VI (Lower) floor at 337m FRL. The length of inclines at 4:1 gradient therefore will be 440m upto upper seam and additional 140m with a crossection of 4.5m x 3.0m which will take about more than an year by conventional method of driving time to drive. Once the incline touches the seam a set of dip drives along the floor of the seams will be driven and panel created for development and production.

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Seam VI Top will be approached from Seam VII by a pair of 92m long drift from around the location south of BH No CMSB 03. Similarly Seam VI Bot (Top) will be approached from Seam VII by a pair of 104m long drift from around the location NE of BH No. CMSB 56. Both are very small patches of coal.

vi.a. Target output & life of the mine

The target is kept 0.20 MTPA. The life of the underground mine will be 31 years (with production from 3rd year to 31st year). Additionally, there will be construction activities for two years prior to start of production (during 1st and 2nd year).

b. Coal preparation & blasting

The bord & pillar development is generally carried only through process of solid blasting. Only permitted safe explosive as in the approved list of DGMS can be used for blasting. The charge in each hole should not exceed one kg., and as a result, the pull is generally between 1 to 1.2 m. only. Each round of blast in gallery section of 4.5 X 2.5 to 3m.will provide coal between 12 to 18 tonnes. In order to improve the efficiency of LHD operation, constant effort is to be made to see that pull of blasting is brought to 1.5 to 2m. either by use of improved drilling pattern (including use of some machine for creation of free face) or improved blasting.

Recently one Explosive Company has reportedly developed special explosive with approval of DGMS and conducting extensive tests / trials on solid blasting with a view to provide pull of around 2 m. Hopefully, such approved explosive will soon be in market for regular use on solid blasting. This should improve efficiency in SDL / LHD operations in general.

vii. Transport

It is proposed to use main and gate/ trunk belt conveyor along with chain conveyor at the face for the transportation of coal from the mine to the surface outlet. 1000mm belt size as a main conveyor and 750mm belt on gate belt will meet the transport requirement for the coal transport. Material supply will be done by laying tracks along side the conveyor from the surface to the production panel.

The LHD will load coal on to chain conveyor

viii. Ventilation

There will be separate ventilation system for 1st and 2nd set of inclines.

(a) Ventilation system for 1st set of inclines to seam IX and VIII:

There are two inclines, the southern one will work as intake airway and the northern one equipped with an air shaft (ventilation shaft) will work as return

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airway. The requirement of air is 2.5 cum/ minute/ te of daily output i e 2.5x700 = 1750 cum/minute. Therefore a mechanical ventilator of following specification will be installed in an air drift connecting to shaft.

Type	-	Axial flow fan
KW	-	150
RPM	-	750
Air flow	-	60-80m3/Sec
W g	-	60 mm

Evacuee of suitable design will be constructed for improving the efficiency of the main mechanical ventilator.

(b) Ventilation system for 2nd set of inclines to seam VII and VI:

There are two inclines, the southern one will work as intake airway and the northern one equipped with an air shaft (ventilation shaft) will work as return airway. The ist set and the 2nd set of inclines will work in sequence with an overlap (dove tailing) period of about 3-4 and hence the same ventilater can be utilised as described above provided that a stand by provision is made for the overlapping period. The capacity requied will be same as there is no difference in manpower or coal production rate.

ix. Pumping

A main pumping station will be created at suitable location at around 100m depth All water from development of mine above 100m will be channeled to this sump. Three pumps of 37 litres /sec capacity each with 120m head will be installed.

Below 100m, water will be pumped through face pumps having capacity of 7 to 10 litres/sec and head of 30 to 35m. Small intermediate sump will be created at 130m depth level where couple of pumps with 15 to18 litres /sec with head of 40 to 45m will be installed from where water will be pumped to the main sump.

Further pumping below 130 m will be done through face pumps delivering water to the intermediate sump.

A final intermediate sump will be at depth of 160 to 165m level from where two to three pumps of 15 to 18 litres and 70 m head will be installed and pumping water directly to the main sump. Pumping of lower levels at depths greater than 160 m will be carried through face pumps delivering to the intermediate sump located at depth around 160m.

5.3.3 List of some of the main UG Equipments

Main mining equipments as required to be used have been indicated in the above connected paragraphs. Indicative list is noted in Table 5.9.

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ADDITIONAL SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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TABLE 5.9
INDICATIVE LIST OF MAIN UG. EQUIPMENTS

Sl. No.	Name of Equipments	General Specifications	Approx. Number	Remarks
1.	L. H. D.s	Low height LHD Bucketcap.0.75M³	6	Load haul and dump (LHD)
2.	Chain Conveyors	100 m. 30 HP	4	Medium duty
3.	Coal drills & panels	110v, 1.1 kw	6	
4.	Roof bolting machines	Improved type	3	
5.	Auxiliary Fans	11m³/sec.	4	With reqd size and lengths of ducts.
6.	Gate / Trunk belt Conveyors	750 mm fire resistant belt	4	Conv. Structurals as per requirement
7	Main Belt conveyors	1000 mm. fire resistant belt	2	Conv. Structurals as per reqd. length to work in 1 in 4 drift & extension
8	a) Direct haulages b) Endless haulages	50 / 30 HP 10 /15 HP	2 2	
9	a) Face b) Auxiliary & c) Main Pumps	37 lps & 120m head; 7/10 lps & 30 to 35m head; 15/18 lps & 40 to 45m head; 15/18 lps & 70 m head	3 2 2 3	In main sump at 100m depth; In intermediate sump at 130m depth; Advancing sumps; In intermediate sump at 165m depth;

5.3.4 Combined calendar programme of production

The combined calendar programme of production from opencast as well as of underground mining is given in Table 5.10.

TABLE 5.10
COMBINED CALENDER PROGRAMME OF PRODUCTION FROM OC AND UG MINING

Year	COAL (MT) PROG.		
	OC	UG#	TOTAL
1*	0.15	0.00	0.15
2	0.36	0.00	0.36
3	0.16	0.20	0.36
4	0.16	0.20	0.36
5	0.16	0.20	0.36
6-10**	0.80	1.00	1.8
11-15***	0.80	1.00	1.8
16-20	0.60	1.00	1.6
21-23	0.368	0.60	0.968
24-25	0.00	0.40	0.4
26-30	0.00	1.00	1
31		0.082	0.082
Total	**3.758**	**5.682**	**9.44**

* *The construction activities of 1st set of inclines will start from 1st year itself*
** *The drivage of 2nd set of inclines will start from 9th year.*
*** *The production from 1st set of inclines will exhaust by 11th year and it will be made up by the production from the 2nd set of inclines in the 12th year*
\# *Additionally 0.41 MT extractable reserves will be available in patces of seam VI (T) and VI Bot (T) which will increase the life by another 1.14 years*

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CHAPTER 6

BLASTING

As explained in the previous chapter, the coal will be extracted by OC as well as by UG method. Blasting has been separately discussed for the both in the following paragraphs.

6.1 OPENCAST MINING

After shot holes are drilled into the horizontal bench cut by the shovel, the faces are blasted using explosives and detonators. Coal is also extracted after blasting off the coal faces when shovel dumper is used. In this mine, main waste is overburden in the form of top soil, alluvium and weathered mantle. The area is mainly covered by thin cover of soil and alluvium ranging in thickness from 1.75 m to 8.55 m. Only 0.6m average thickness of top soil has been considered for separate removal and stacking for use in mine reclamation later.

Rock exposures are largely confined to seasonal nala sections. The strata being soft, the depth of the weathering ranges between 8.35 m (CMSB-3) to 31.85m (CMSB-48) below the surface.

It has been assumed that about 50% of the material may not require blasting in OC mining operations.

6.1.1 Broad blasting parameters

The drill is deployed on the horizontal bench cut by the shovel. From this level, blast holes are drilled down to the floor of the seam. The length of hole ranging between 8 and 10 m. Easy access to the drill is provided via the waste bench. In the blasting operations, shaking blast practices are proposed using low powder factor. This method will generate a set of cracks in the blasted strata with material movement reduced to minimum.

Normal dia. holes of 110-160 mm will be drilled in order to excavate on an average of 1.50 million BCM (Bank Cubic Metre) of OB per year, while 110/115mm dia drill will be used in coal. A powder factor of 0.30 to 0.35 kg per BCM has been adopted for overburden in OC operations. The powder factor for coal has been adopted as 0.2 kg/m^3 in OC operations

Short delay detonators shall be used. The control technique to be adopted at the time of blasting to reduce noise, ground vibrations and fly-rocks are given under Environmental Management Plan.

6.1.2 Type and quantity of explosives to be used

Heavy ANFO explosive in OC mine is proposed to be used and the daily requirement will be 0.87 te as follows:

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For OB 1.5 MCUM x 10^6 x 0.32 x 0.50 ÷ 300	=	0.8 te/day
For coal 0.16 MT x 10^6 ÷ 1.6 x 0.2 ÷ 300	=	0.07 te/day
Total	=	**0.87 te/day**

However, flexibility may have to be provided for usage of suitable alternative/available explosives.

6.2 UNDERGROUND MINING

6.2.1 Broad blasting parameters

Mine is planned to be worked on bord & pillar development in panels. The width of the development galleries will be 4.5 m and height of such gallery will generally be as per thickness of the seam which may be between 1.5m. to 3m and the average may be around 2.5m. The advances in the galleries are done generally by resorting to solid blasting these days by use of hand held coal drills through coal bits and drill rods of around 2 m length and dia of about 5 cm.

The drilling pattern has to be evolved for best results on the basis of hardness, cleat, and other parameters. However, wedge cut is generally practised and in section of 4.5X2.5 by putting around 12 holes, a pull of 1.5 m. could be obtained getting coal around 25 tonnes in one round of blast, charging the holes between 0.6 to 0.7 kg each with permitted explosive like Soligex etc. Blasting efficiency could be achieved to over 3 tonnes/ kg. Average efficiency may be taken only as 2.5 tonne per kg.

It is understood that trial is being conducted by one manufacturer of explosive with some special type of approved explosive on solid blasting which is able to give pull of 2 m. Blasting efficiency will improve if such explosive come in regular use. Blasting will be required for breaking the coal in case of UG mining.

6.2.2 Type and quantity of explosives to be used

Permitted Explosive for UG mining will be used.

The daily requirement of exlosives for mining @ 0.20 MTPA from UG will be 200 000/2.5/ 300/ 1000 = 0.266 te/day.

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

6.3 STORAGE OF EXPLOSIVES TO BE USED

Since site mixed slurry will be used in OC mine, there will be no large storage facilities. Manufacturers and suppliers of permitted explosives are few and there could be delay in supplies for several reasons. 10 tonne magazine capacity for 4 to 5 weeks of storage of permitted explosive, detonators primers and fuse etc will be reasonable for the storage of explosives, primers, detonators, fuse etc.

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CHAPTER 7

MINE DRAINAGE

The proposed mine occupies a part of northern contiguous area of the Kaikati Sector of the Sohagpur Coalfield in Shahdol district in MP State. The area receives moderately high rainfall (1235 mm annual average for the period 1951-1980 at Umariya IMD station). The ground water table within the ML area varies between 8 to 10 m below ground in pre-monsoon season

7.1 OPENCAST MINE

During 1st year of mining, 40 m excavation depth will be achieved in outcrop side of seam IX. Hence, the ground water table will be intersected even during the 1st year of mining. The water will accumulate through precipitation as well as mine seepage in the mine sump.

The water will be pumped out from mine sump to nearest Baisaha nala flowing in the west and Nargara nala in the east constituting the main drainage. Ultimately they meet Son river in NW at a distance of about 12 km. A sump of suitable size will be provided in the pit.

The maximum 24 hourly rainfall recorded at Umariya, the nearest IMD station, is 365.3 mm on 19th august, 1923. The mining activity as per mining plan will be carried out. The void created in 5th year will have an area of 19.945 ha of mining which will accumulate rainwater. The largest rainwater collection during 24 hours will be 72859 cum. Giving an allowance of 10% for additional rainwater collection from lease area and 700 cum/day mine seepage, total rainwater to be handled for evacuation will be 158418 Cum. This rainwater may have to be evacuated with in three days time to facilitate mining operation for which suitable pumping arrangement will be required, the required capacity of which would be 36.67 cum/minute.

The stage wise pumping requirement is given Table 7.1.

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

TABLE 7.1
WATER ACCUMULATION

Stage	Void (ha)	Rainwater (Peak 24 hours cum)	Additional 10% from lease Area cum	Mine seepage	Total	Pump capacity cum/m
1st	7.67	28018	2802	500	31320	7.25
2nd	12.85	46941	4694	550	52185	12.08
3rd	17.18	62758	6276	600	69634	16.12
4th	20.23	73900	7390	650	81940	18.96
5th	39.25	143380	14338	700	158418	36.67

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The depth of the OC mine will be less than 60m hence the pumps of less than 70-80m head will be deployed.

As per pumping requirement worked out based on rainfall data of the past, the pumping load works out to be heavy requiring at least 5 to 6, 75 litres / sec pumps installations in the event of water accumulation due to perceived heavy rainfall and dewatering the same within 3 days. To ensure that the main pumping station does not get flooded, it will be necessary that at least four pontoon pumping sets are placed connecting such pumps through part flexible delivery and full suction of adequate size. Such pumping arrangement will ensure that pumping continues even water level envelopes routine pumping station.

As far as the surface water is concerned, Baisaha nala flowing in the west and Nargara nala in the east of ML area forms the drainage network.

Adequate measures to protect the mine workings from surface water flow during the rains will be taken by way of providing garland drains around the mine excavation, surface dumps and also providing suitable drainage gradients for mine benches. Sumps of adequate capacity will be provided on the quarry floor. The coal excavation and transport machinery are organized to be sited over the lowermost coal bench top and will not be affected by water accumulation from rains or strata seepage.

7.2 UNDERGROUND MINE

The underground mining will be conducted with the help of two independent sets of inclines.

The 1st set will be for winning coal from the upper two seams (IX and VIII). The maximum depth of mine achieved through this set of inclines will be 105m. The pumps with a head of upto 120-130m will meet the requirement in these inclines. Alternatively, pumps with less head can also be used adopting stage pumping.

The 2nd set will be for winning coal from the lower two seams (VII and VI). The maximum depth of mine achieved through this set of inclines will be 190m.

A main pumping station will be created with adequate size sump if possible in two compartments with arrangements for cleaning sump at intervals and pump house with lifting arrangements for convenience of any change and repairs at suitable location around 100m depth. All water from development of mine above 100m will be channeled to main sump. Three pumps each with 37 litres /sec with 120m head will be installed.

As the development proceeds below 100m water will be pumped directly through face pumps having capacity of 7 to 10 litres/sec. and head of 30 to 35m. Small intermediate sump with pumping arrangement will be created at 130m depth level, where couple of pumps with 15 to18 litres /sec with head

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of 40 to 45m will be installed. Water from this sump will be pumped to the main sump

Further pumping below 130 m as development continues will be done through face pumps delivering water to the intermediate sump.

A final intermediate sump will be necessary at depth of 160 to 165m level, from where two to three pumps of 15 to 18 litres and 70 m head will be installed and pumping water directly to the main sump. Pumping from intermediate sump of 130 m level will be discontinued. Pumping of lower levels at depths greater than160 m as development and mining work continues will be carried through face pumps delivering to the intermediate sump created at depth around 160m.

The underground make of water will be collected in the sumps. Suspended particles will get settled and clean water will be pumped to the surface reservoir from where it will be used for indusial needs of the mine and surplus water, if any, will be discharged into Baisaha nala flowing in the west after treating in a limited manner, if required to meet the discharge standards, .

7.3 REQUIREMENT OF WATER

The requirement of water for dust suppression, plantation, dump trucks washing workshop etc is estimated to be about 200 cum/day and will be met from the mine water which will be duly treated in a limited manner for this purpose. The requirement of potable water for other site services i.e. canteen, Rest shelter, Offices, (244 cum/day) will be met by bore-well and the same will be treated if required before its use. The total requirement will be 444 cum/day.

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CHAPTER 8

STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

8.1 NATURE OF TOP SOIL AND OVERBURDEN/WASTE

In this mine, main waste is overburden in the form of top soil, alluvium and weathered mantle. The area is mainly covered by thin cover of soil and alluvium ranging in thickness from 1.75 m to 8.55 m. Only 0.6m average thickness of top soil has been considered for separate removal and stacking for use in mine reclamation later.

Rock exposures are largely confined to seasonal nala sections. The strata being soft, the depth of the weathering ranges between 8.35 m (CMSB-3) to 31.85m (CMSB-46) below the surface.

Only 0.6m average thickness of top soil has been considered for separate removal and stacking for use in mine reclamation later.

8.2 YEAR/STAGE WISE WASTE GENERATION

The waste generation year/stage wise is given in Table 8.1.

TABLE 8.1
WASTE GENERATION (TOPSOIL& OVERBURDEN) IN M.CUM (BANK)

Year	Excavated area (Ha.)	Topsoil generated	Pure OB generated	Total waste generated	
				Progressive	Cumulative
1st year	7.67	0.05	1.78	1.83	1.83
2nd year	12.53	0.08	3.00	3.08	4.91
3rd year	7.10	0.04	1.98	2.02	6.93
4th year	7.04	0.04	1.81	1.85	8.78
5th year	7.20	0.04	1.80	1.84	10.62
Conceptual (23 yr.)	77.06	0.46	25.73	26.19	36.81
Total	**118.60**	**0.71**	**36.10**	**36.81**	

8.3 WASTE DISPOSAL SITES

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

There are one waste disposal site and one top soil disposal site as follows:

i. The surface dump located inside the ML

The Surface dump of OB generated during the 1st year will be made on the non-forest zone over the opencast mining area within the block along its center of block boundary.

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The height of the dump achieved will be 50m. This OB will be re-handled from the start of 6th year at a rate of 0.37 mcum per year.

ii. Backfill dump

Backfilling will start from 2nd year of the project operation with a quantity of 3.03 mcum, 2.02 mcum, 1.83 mcum and 1.83 mcum in 2nd, 3rd, 4th, and 5th respectively. The total generated OB will be simultaneously backfilled from 2nd year onwards (Refer Table 8.2).

iii. Top soil dump

The total topsoil generated {0.71 mcum (B)} during the development of mine will be stacked separately in a soil stack pile in non-forest area in the southern side of the block. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled area. The top soil stockpiles will be low height not exceeding 3 m and will be grassed to retain fertility. Besides this, topsoil stacks there would be temporary stacks near the excavation area and area to be reclaimed which will be made use of for concurrent filling without bringing the topsoil to the soil stack near the OB dump.

8.4 THE VOID

The remaining void area of the excavated pit will ultimately become a water reservoir, having a maximum depth of about 60 m. This void area will also be suitably sloped, bunded and fenced. The Conceptual plan and conceptual mine section has been shown in Plate XIX and Plate XX which shows the final stage at the end of mine operations with external dump and final void.

The generation and disposal of total waste quantities for the life of the mine are shown in Table 8.2.

TABLE 8.2
WASTE DISPOSAL (PURE OB) IN MCUM (BANK) - PROGRESSIVE

Year	Total surface dump	Topsoil dump	Total backfill	Total bund	Total OB disposal
1st year	1.78	0.02	0.00	0.00	1.80
2nd year	0.00	0.03	3.01	0.00	3.03
3rd year	0.00	0.04	1.98	0.00	2.02
4th year	0.00	0.02	1.81	0.00	1.83
5th year	0.00	0.03	1.80	0.00	1.83
Conceptual (23rd Year)	0.00	0.58	25.73	0.00	26.31
Total	**1.78**	**0.71**	**34.31**	**0.00**	**36.81**
Rehandling in 6th to 10th year	**-1.78**	**0**	**1.78**	**0**	**1.78**
Grand total	**0**	**0.71**	**36.09**	**0.00**	**38.59**

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CHAPTER 9

USE OF MINERAL (COAL)

As given in Table 2.1 of Chapter 2, the total requirement of coal is 3.201 MTPA out of which only 1.076 MTPA is obtained from linkage at present. The gap is 2.125 MTPA. Part of the gap will be filled by the proposed 0.36 MTPA production from the Bikram Block. This coal will be mostly used in existing and proposed expansions of cement plant and power plant at Satna and rarely at Chanderia (Rajasthan). The details of use of coal are given in Table 9.1.

Transportation

All the coal produced from the mine will be directly transported to Satna and other places by road. The alternative of transportation by rail is also being evaluated by taking a siding at Burhar railway station located at a distance of 9 km due NE. The distance of Satna is 285 km by rail and 248 km by road. The distance of Chanderia (rajasthan) is 875 km and the transportation will be by rail

Stocking

Provision has been made to keep a stock of coal at the mine site to accommodate upto one week's production which will take care of feeding the down stream in case of any breakdown.

TABLE 9.1
COAL USE FOR EXPANSION/GREEN FIELD PROJECTS FOR CEMENT & CAPTIVE POWER PLANTS

(1) Expansion of cement capacity/Green Field Projects for Cement Plants :

Sl. No.	Brief Description of the Project	Coal requirement (mtpa) per annum (Approx.)
i)	Expansion of cement capacity at Satna (Madhya Pradesh) by 1.5 Million Tonnes	0.27
ii)	Expansion of cement capacity at Chanderia (Rajasthan) by 0.3 Million Tonnes	0.05
iii)	Green field Project for 2.0 Million Tonnes Cement capacity at or near Chanderia	0.36
iv)	Green field Project for 2.0 Million Tonnes cement capacity at or near Satna	0.36
v)	After considering wastage and rejects for Coal Beneficiation	1.04

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(2)	PROPOSED Projects for Captive Power Plants :		
	Sl No.	Brief Description of the Project	Coal requirement (mtpa) per annum (Approx)
	i)	30 MW Captive Power Plant at or near Chanderia (Rajasthan)	0.22
	ii)	30 MW Captive Power Plant at or near Satna (Madhya Pradesh)	0.22
		Total : 60 MW Captive Power Plants	0.44
		Total for proposed expansions and GF projects:	**1.48**
(3)		**Existing gap (1.721-linkage 1.076=0.645**	**0.645**
		Grand Total	**2.125**

Note: The proposed production of 0.36 MTPA shall be mostly used in existing cement plants and power plants at Satna (MP) and some times in Chanderia (Rajasthan)

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CHAPTER 10

MINERAL PROCESSING

No coal beneficiation is required as the coal is utilizable directly as produced. Hence no provision of washery etc has been made. Only coal handling plant will be there to load/ dispatch the coal produced.

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SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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CHAPTER 11

SURFACE TRANSPORT

The surface transport of coal at Bikram Block will be done by Coal Tippers from OC pit to the pit head stockpile. The coal from UG mine will be brought out by conveyors and lead to a surface bunker underneath which the trucks can be loaded by chutes. The coal can also be diverted to the stockpile in case bunker is full. The OB from OC will be transported by dumpers to the surface dumps and backfill dumps.

Initially, the coal will be transported by road to Satna Cement Plant via Shahdol. Shahdol is 18 km from the block and Satna is 230 km from Shahdol. Subsequently, the company intends to transport coal by railways by taking a siding at Burhar. The railway transportation distance to Satna will be about 285 km via Shahdol and Katni

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SECRETARY
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CHAPTER 12

OTHER FACILITIES

12.1 SITE SERVICES

Complete facilities near to the site are very important for coal production and overburden removal. It is imperative to develop core infrastructure like power, road, telecommunication, housing, service buildings viz. office, store, first aid centre, canteen, etc. for a large number of employees for the project. The mine project is near to Shahdol (18 km), the district headquarter. The site services required at proposed mine will be housed within the premises of proposed mine complex shown in Plate II.

12.1.1 Workshop

Garage-cum-workshop-cum-engineering stores is meant for regular repairs and maintenance of earth moving equipment and dumpers etc. for quarry operation. The garage and workshop complex comprises repairs bays for dumpers and pay-loaders, washing bays, storage rooms, inspection pits, engine repair room, auto-electrician room, open yard for parking Heavy Earth Moving Equipment (HEMM) and repairing of excavators and shovels Arrangement for repair of underground machinery will also be available.

12.1.2 Road and Rail

Initially, the coal will be transported by road to Satna Cement Plant via Shahdol. Shahdol is 18 km from the block and Satna is 230 km from Shahdol.

Subsequently, the company intends to transport coal by railways by taking a siding at Burhar. The railway transportation distance to Satna will be about 285 km via Shahdol and Katni.

12.1.3 Water supply

Industrial water required for HEMM washing, sprinkling on haul roads for dust suppression and for watering the mine site plantations, will be supplied from pumping installation at mine sump and surface reservoir.

The drinking water will be supplied from bore well and stored in overhead tank near the facilities area and distributed through pipe lines to different facilities area for drinking and domestic purposes

Total requirement of water for mining and allied activities are estimated as 444 m^3/day. The break up of the required water for different activities are as follows:

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Sprinkling @ 30 cum per km per day of haul road for 3 km	=	90.00
Plantation @ 20 cum/hac for 5 Ha	=	100.00
Vehicles washing @ 2.0 m^3/vehicle/day for 10 vehicles considering 50% recirculation	=	10.00
Drinking at working place @ 45 lpd/head for 701+50=751 (workers and visitors)	=	34.00
For colony (total manpower in mine 701 out of which colony provision has been made for 50% (351) i.e. 351 x 4 x 135 lpd=345 KLD		190.00
For peripheral villages (potable)	=	20.00
Total		**444**

Requirement of water for fire fighting will be only some times for which no provision for daily requirement has been made as the occasional need can be met from the settling tanks provided at surface which receive mine water continuously.

12.1.4 Power supply

The power requirement is expected to be about 5 MVA. The power line of 11 KV will be drawn from Burhar sub station of MPSEB to the local sub-station from where the power will be supplied to the mine and other functional buildings. An emergency arrangement for power supply has been made by providing a set of 2x500 KVA DG sets which will take care of ventilation and pumping.

12.1.5 Residential facilities

Mining activities are existing in this Coalfield in the nearby area, hence most of the required type of manpower will be available in the area. However a provision for colony for about 50% manpower has been made. The colony is proposed to be located within 4 km from the project boundary

12.1.6 Stores

A store will be provided alongside the workshop to take care of providing necessary consumable, maintenance and repair store house.

12.1.7 Diesel storage

Most of the HEMM will operate on diesel. Hence, an underground 50 kl diesel pump will be established at the mine site. A diesel bouzer will also be provided for the crawler mounted machines operating in the mine.

12.1.8 Canteen and site office

A canteen, first aid center, rest shelter and site office will be available at site while the main facilities will be within the ML area.

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12.1.9 Vocation training centre

A Vocational Training Centre will be provided for training of operators and other workmen adjoining to the main mines office located inside mine site.

12.1.10 Explosive magazine

A 5 T capacity magazine will be provided with in the ML area which will take care of the requirement of the block.

12.2 EMPLOYMENT POTENTIAL

Large number of local personnel including land losers would be mostly recruited in unskilled, semi skilled office assistant categories etc. These personnel need training and orientation before the project starts. Besides, some I.T.I qualified young people from the region can be recruited for operation and maintenance of plant and machineries after proper training. The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. But, some skilled and highly skilled personnel have to be brought from outside. Employment potential for the proposed mine is given in Table 12.1.

TABLE 12.1
EMPLOYMENT POTENTIAL

Sl. No.	Designation	No. of Equipment	Manpower Required
A	**Overburden Removal**		
1	Dumper operator	10	30
2	Shovel operator	2	6
3	Dozer operator	4	12
4	Drill operator	2	6
5	Drill helper	2	6
	Sub Total		**60**
B	**Coal Production**		
1	Dumper operator		12
2	Shovel operator		3
4	Drill operator		3
5	Drill helper	1	3
6	Wheel dozer operator	1	3
	Sub Total		**24**
C	**Common**		
1.	Back hoe operator	1	2
2.	Dozer operator	1	3
3.	Grader operator	1	3
4.	Front End Loader	1	3
5.	Crane operator	2	4
6.	Service Truck operator	3	9
7.	Explosive van operator	1	1

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Sl. No.	Designation	No. of Equipment	Manpower Required
8.	Tyre handler	1	1
9.	Pump air compressor operator	1	3
	Sub Total		29
D	**Excavation**		
1	Sr. Engineer excavation		1
2	Engineer excavation		3
3	Foreman excavation		3
4	Asst. Store keeper		1
5	Time keeper		3
6	Mechanical fitter		9
7	Electrician		6
8	Welder		2
9	Turner		1
10	Mechinist		1
11	Blacksmith		2
12	Helper/greaser		9
13	Mazdoor		9
	Sub Total		50
E	**Coal Handling & General**		
1	Engineer		1
2	Electric supervisor		1
3	Foreman (elect)		1
4	Foreman (mech)		1
5	Machine fitter		1
6	Electric fitter		1
7	Turner		1
8	Welder		1
9	Electrician		1
10	S/s attendant		3
11	Mazdoor		3
	Sub Total		15
F	**Communication**		
1	Foreman		1
2	Tele communicator mechanic		1
3	Battery charging personal		1
	Sub Total		3
G.	**Quality Control, Mining Safety, Dispatch**		
1	Agent		1
2	Manager		1
3	Safety officer		1
4	Assistant colliery manager		3
5	Under manager		3

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Sl. No.	Designation	No. of Equipment	Manpower Required
6	Blasting overman		2
7	OB & coal overman		3
8	Mining sardar/shot firer		3
9	Blasting mazdoor (OB & coal)		3
10	Surveyor		1
11	Draftman/ferro printer operator		1
12	Chainman		3
13	Mazdoor		4
14	Quality control & dispatch		2
15	Pitmunshi/tripman		3
	Sub Total		**34**
H	**Store & Purchase**		
1	Senior store keeper		1
2	Store keeper/issue clerk		2
3	Magazine clerk		1
4	Mazdoor		3
	Sub Total		**7**
I	**Water Supply**		
1	Filter plant attendant		3
2	Pump khalashi		3
3	Pipe fitter		2
4	Helper		4
	Sub Total		**12**
J	**Environment Protection**		
1	Environmental Engineer	1	1
2	Mali	1	1
3	Chemist	1	1
4	Assistant to chemist	1	1
5	Lab mazdoor cum sampler	3	3
6	Water sprinkler operator	3	9
7	FE loader operator	1	2
8	Truck operator	4	8
	Sub Total		**26**
K	**Personal/welfare**		
1	Welfare officer		
2	Personal & wages clerk		
	Sub Total		
L	**Finance/Accounts**		
1	Accounts officer		1
2	Account clerk		2
3	Cashier		1
	Sub Total		**4**

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Sl. No.	Designation	No. of Equipment	Manpower Required
M	**General Staff (L.D.C)**		
1	Excavation record clerk		1
2	Electric & mechanical department clerk		1
3	Safety officers clerk		1
4	P.A. to agent		1
5	Clerk to P.A.		1
	Sub Total		5
N	**medical Staff**		
	Medical (Doctor, Nurse, Compounder, boy)		4
	Sub Total		4
	Total (A to N)		277
	Add 10% absentism		28
	Grand Total		305

Note : Security services will be outsourced

TABLE 12.2
SUMMARY OF MANPOWER

Sl. No.	Particulars	Employees
I	**FOR OC MINING**	
1.	OB	60
2.	COAL	24
3.	COMMON	29
4.	EXCAVATION	50
5.	COAL HANDLING ETC	15
6.	COMMUNICATION	3
7.	QUALITY CONTROL, SAFETY, DESPATCH	34
8.	STORE & PURCHASE	7
9.	WATER SUPPLY	12
10.	ENVIRONMENT	26
11.	WELFARE	4
12.	ACCOUNT	4
13.	MEDICAL	5
14.	GENERAL	4
	TOTAL	277
	ADD 10%FOR ABSENTISM	28
	TOTAL FOR OC INCLUDING ABSENTEEISM	305
II	**FOR UG MINING @ OMS=2**	360
	ADD 10% FOR ABSENTISM	36
	TOTAL FOR UG INCLUDING ABSENTEEISM	396
	GRAND TOTAL OC + UG	701

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UNDER SECRETARY
GOVERNMENT OF INDIA
NEW DELHI

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12.3 UNDERGROUND MANPOWER

The underground mine will be worked in three shifts six days in a week. The man power for mine is estimated at 415 persons. The estimated OMS is 1.82 te. The details are given below.

Sl. No.	Particulars	Manpower
A.	**UNDERGROUND**	
a1)	**Production District**	
1	Drilling crew	30
2	SDL operator	20
3	SDL Helper	20
4	Roof bolting crew	20
5	Shot firer	10
6	Explosive carrier	30
7	Dresser	10
8	Mech fitter	7
9	Mech helper	7
10	Elect fitter	3
11	Elect helper	3
12	Spraying Mazdoor	9
13	Chain Conveyor khalasi	20
14	Mining Sirdar	11
15	Over man	6
16	Foreman	4
	Sub Total	210
a2)	**Other Production Services**	
1	Gate/Trunk Belt operator	10
2	Haulage operator	2
3	Trammer / Clip men	6
4	Line mistry gang	3
5	Oil platform/belt cleaner	4
6	Material supply gang	6
7	Mech. fitter	2
8	Mech. helper	
9	Elect fitter	
10	Elect helper	
11	Sub station attendant	3
12	Pump khalasi	6
13	Support gang	6
14	Miscellaneous	4
	Sub Total	56

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MINISTRY OF COAL
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Sl. No.	Particulars	Manpower
a3)	**Ventilation**	
1	Mason	2
2	Helper	4
3	Multi skilled gang	4
	Sub Total	**10**
a4)	**Supervision**	
1	Sr Over man	1
2	Mining Sirdar	3
3	Foreman E&M	1
4	Dust In charge	1
5	Sampling In charge	1
6	Elec. Supervisor	1
	Sub Total	**8**
a5)	**Executive u/G**	
1	Colliery Manager	1
2	A C M	1
3	Under Manager	2
4	Ventilation officer	1
5	Safety Officer	1
6	Executive Engr. E&M	1
	Sub Total	7
	Total Underground A	**291**
B.	**SURFACE MANPOWER**	
b1)	**MTK**	**4**
1	Body Searcher	3
2	Sub Station attendant	4
3	Fan khalasi	4
4	Haulage Khalasi	1
5	Belt Conveyor Operator	3
6	Lamp room in charge	1
7	Lamp filter	3
8	Magazine clerk	3
	Sub Total	**26**
b2)	**Manager Office**	
1	Stenographer/Typist	1
2	UDC/LDC	2
3	L.V. Driver	4
4	Canteen	4
5	Peon	1
	Sub Total	**12**

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Sl. No.	Particulars	Manpower
b3)	**Survey Office**	
1	Surveyor	1
2	Assitt. Surveyor	1
3	Draftsman / Tracer	1
4	Chainman / Mazdoor	2
	Sub Total	**5**
b4)	**Coal Handling**	
1	Chute Operator	3
2	Mazdoor	2
3	Weigh bridge clerk	3
	Sub Total	**8**
b5)	**Workshop manpower**	**10**
b6)	**Environment**	**5**
b7)	**Store**	**3**
	Sub Total	**18**
	Total surface B	**69**
	Grand Total (A+B)	**360**

डॉ. एस. रंगाचारी/Dr. S. RANGACHARI
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.D.SHARMA
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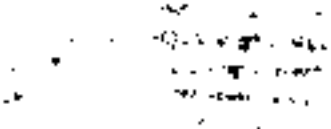

CHAPTER 13

ENVIRONMENTAL MANAGEMENT PLAN

13.1 INTRODUCTION

The environmental management plan has been prepared for the proposed Bikram open cast and underground coal mine of M/s Birla Corporation Limited in the administrative region of Shahdol district of MP state as per the requirement of Ministry of Environment & Forest, Government of India.

The mine will be captive to cement plant of the Allottee located in Satna, Madhya Pradesh.

Surface mining to some extent (and UG mining to a limited extent) is related to land, air, water and its inter-relationship with inhabitants and organic life in the immediate surroundings. The operations have also a direct bearing on the socio-economic environment of the area. Therefore, as an essential part of the mining plan, an environmental management plan has been incorporated which includes a study covering the following major aspects:

- Collection of baseline information related to relevant environmental aspects for establishment of prevailing environmental status.
- Assessment of environmental impacts due to mining activities.
- Management plan stipulating control measures to mitigate possible environmental hazards resulting from mining.

The environmental management plan includes the evaluation of total impacts after superimposing the predicted impacts over base line data. This helps in incorporating proper mitigation measures wherever necessary for preventing deterioration in environmental quality.

V. S. RANA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

The mining lease area constitutes the 'core zone' and the area falling within 10 km radius of the leasehold area has been considered as the 'buffer zone' for general information. Both are together referred to as the 'study area'. The key map (Plate II) and location map (Plate I) depicts the situation of the core area and location of the mine site with respect to the surrounding region. The salient features of the mine that have been taken into consideration while planning the study are described below briefly :

a)	Lease area	239 Ha
b)	Nature of land	Reserve Forest, Revenue Forest, Govt land and Agriculture land
c)	Mineral to be mined	Coal
d)	Scale of operation	0.36 million tonnes per annum (MTPA)
e)	Anticipated life of mine	23 years for OC mine as per calendar programme while that for underground mining will be about 29 years (including construction year i.e. 1st and 2nd year)

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Micro-meteorological Survey

On-site monitoring was undertaken for various meteorological variables in order to generate the site-specific data. The central micro-meteorological station was installed at a height of about 5 meters from ground level free from any obstruction. The data generated is then compared with the meteorological data generated by nearest India Meteorological Department (IMD) station located at Umaria.

Hourly micro-meteorological data was recorded at the site for a period of 3 months comprising one full summer season from March to May 2009. Daily average, minimum and maximum values of the recorded data are given in Table 13.8.

TABLE 13.8
SUMMARY OF MICRO-METEOROLOGICAL DATA

Particulars	Maximum	Minimum	Average
Temperature (°C)	44.4	24.0	34.28
Relative humidity	70.6	9.0	24.11
Wind speed (km/hr)	21.7	Calm	5.89
Predominant wind direction	NW (17.93% of readings)		

13.2.7 Human settlements

A socio-economic study has been carried for the study area. The data are based on 2001 Census report. The break-up of population for male and female is given in Annexure 13-8 and the same is summarized in Table 13.9.

TABLE 13.9
DISTRICT AND BLOCK WISE POPULATION IN THE STUDY AREA

District	CD Block	No. of villages	Total population	Male	Female
Shahdol	Sohagpur	78	91275	84621	175896
	Anuppur	1	280	282	562
Total		**79**	**91555**	**84903**	**176458**

The employment pattern, break-up of main workers and SC/ST are given in Annexure 13-8 and summarised in Table 13.10.

TABLE 13.10
EMPLOYMENT PATTERN IN STUDY AREA

Occupation	Population	%
Main Workers	39623	22.45
Marginal workers	16974	9.62
Total workers	56597	**32.07**
Non workers	119861	67.93
Break-up of main workers		
Cultivators	7167	18.09

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Occupation	Population	%
Agriculture labour	5408	13.65
Household industry	948	2.39
Others	26100	65.87
Total	**39623**	**100.00**
Other Details		
Literate	95207	53.95
SC	13564	7.69
ST	51946	29.44

From the above table, it can be observed that about 68% of the population is non workers. Out of the total main workers, about 66% are involved in other activities other than agriculture and household industries. The literacy in the study area is about 54% as compared to the national rate of 65 %

13.2.8 Places of Historical, Tourist and Religious Importance

There is no such place within core or study area.

13.2.9 Industries/Mines within study area

The block is free from any mining activity. However, in the adjacent West Karkali Block in the southern side, Rajendra & Navagaon U/G mines are operating. Only youngest coal seam IX outcrops in the eastern most part of the block which also limits the eastern boundary of the block. The status of mine workings adjoining Bikram Block is as follows

Mine/its location with respect to Bikram block	Coal Seam	Status of mine workings
Navgaon/ 2 km south	Seam VII	Mining in progress
Rajendra/ 3 km south	Seam VIB	Mining in progress
Bangwar/8.0 km south-east	Seam VIB	Mining is progress
Dhanpuri U.G./8.5 km east	Seam VII Seam VIT	Development & depillaring in progress

13.2.10 Does area (Partly or fully) fall under notified area under water (Prevention & control of Pollution) Act 1974.

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13.3 ENVIRONMENTAL IMPACT ASSESSMENT

Baseline information on various relevant environmental aspects generated and compiled for the project area, covering both core and buffer zones has been incorporated in para 13.1 and paragraphs there under. This information provides an outline of the prevailing environmental scenario at the mining site and its surroundings. Mining, like any other development activity, is bound to have some impact on the existing environment; both adverse and beneficial.

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The impacts on the physical, ecological and socio-economic environment of the area due to the proposed project are given in the following paragraphs

i. Land Environment

Land degradation and aesthetic environment:

The total mine lease area is 239 Ha. Out of which, 125.40 Ha i.e. 52.46% of land will be disturbed. So 47.53% land will remain undisturbed. The disturbed area within ML will comprise excavated land, external dumps, area occupied by infrastructure, roads etc. Year/stage wise area excavated is given in Table 13.11. The anticipated land use at the end of mining operations is tabulated in Table 13.12.

TABLE 13.11
YEAR / STAGE WISE AREA EXCAVATED

Year	Area excavated (Ha.)	
	Progressive	Cumulative
1	7.67	7.67
2	12.53	20.20
3	7.10	27.30
4	7.04	34.34
5	7.20	41.54
Conceptual (23rd)	77.06	**118.60**
Total	**118.60**	

TABLE 13.12
LAND USE WITHIN ML AREA AT END OF 5TH YEAR AND END OF MINING

Sl. No.	Description	Area (Ha.)	
		5th year	End of Mine
I	**Within ML area**		
1.	Mining / Excavation	41.54	118.60
2.	Surface dump	11.8	0.00
3.	Top soil dump	3.00	0.00
4.	Magazine	0.20	0.20
5.	Road	3.00	3.00
6.	Water reservoir (settling pond)*	1.60	1.60
7.	Facility	2.00	2.00
8.	Sub Total Disturbed	63.14	125.4
9.	Undisturbed	175.86	113.60
	Sub Total-I	**239.00**	**239.00**
II	**Out side the ML**		
1 .	Surface dump	0.00	0.00
2	Facilities	0.00	0.00
	Sub Total-II	**0.00**	**0.00**
	Grand Total I and II	**239.00**	**239.00**

* *Out of 5 ha, 2 ha is for water pumped out from mine and the rest for various dumps.*

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Impact due to solid waste

There would one OB surface dump and one top soil dump both located within the ML area. The solid waste dumping of OB dump will not lead to land degradation as it will be of a temporary nature and will be placed over the coal bearing area to be later excavated by OC method for extraction of coal underneath. Its area will be 8.23 ha with a 50 m height which will accommodate 1.78 mcum(B) OB.

The area of top soil dump will be only 3 ha with maximum height of 3m. It will be lying over coal bearing area to be excavated by UG method.

Land profile

Presently, the core zone is virgin and plain terrain sloping towards north-west. The mining operations are not anticipated to cause any adverse impact on topography outside the core zone. Within core zone about 6m deep void will be formed. The surface dump will not remain and hence will not cause any adverse impact

Visual intrusion

Due care has to be taken (from the conception stage of the project) for reducing the visual intrusion to a minimum. However, the movement of vehicles for transportation of coal from the mine to the railway station or directly to the cement plant may cause some intrusion. The other visual intrusion will be the outside dump with 50 m height within the ML which will be visible from a distance but it will be of temporary nature and will be backfilled after rehandling. Appropriate measures such as green belt cover will be needed to reduce visual intrusion from dumps, roads and facilities.

ii. Impact on air quality

The opencast mining operations are prone to generation of higher levels of SPM and to a limited extent of SO_2, NO_x and CO due to blasting, fuel, oil combustion, burning of coals etc. However, there are no point source emissions. Moreover the transportation of coal by tippers from the mine site to the railway siding may cause increased air pollution along the roads, if adequate control measure like regular maintenance of road, tree plantation along road and maintenance of leak proof truck bodies are not taken.

iii. Impact on water quality

The surface water quality is likely to be affected with higher load of suspended solids by the following:

- Wash off from dumps
- Soil erosion from mine and roads
- Pumping out mine water to surface water channels

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अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

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The outside dump may contribute to the pollution of surface water in terms of suspended solids, however the dump will exist for a limited period only after which it will be rehandled. Since dumping location proposed to be carried out is at a safe distance from existing surface water channels, it will have limited impact on water quality. The pumped out water during dewatering may carry higher levels of suspended solids. Other sources of pollution are by oil spillage at the pit head and at the facilities viz. workshop, resulting in oil and grease contamination of surface water if appropriate control measures are not adopted.

Ground water pollution can take place only if dumps and stock piles contain harmful chemical substances, which may get leached by precipitation of water and percolate to the ground water table, thus causing water pollution.

However, this is not the case with this mine, as neither the coal nor the OB, contains any harmful ingredients which may leach down to the water table and pollute it. Therefore, no adverse impact on ground water quality is anticipated considering this aspect. The leaching down of pollutants (oil, grease etc.) to the ground water may render the water un-potable and hence cannot be used by the local people. The percolation of sewage waste from the pit head as well as colony area can also pollute the ground water if control measures are not adopted as envisaged in the management plan.

Meager amount of sanitary waste, expected to be generated from various facilities will be treated properly through septic tanks and soak pits and is not anticipated to cause any water pollution.

iv. Impact on Noise level

Noise is unwanted and unpleasant sound which causes distraction, disturbance and annoyance. Continuous exposure to high level of noise can impair human hearing power. The mining activities generate noise mainly on account of:

- Operating mining machinery
- Use of explosives
- Moving road vehicles

The impact of this airborne noise will be more on the operating personnel and on the persons working nearby and not so much on the surroundings.

The noise of activities also disturbs animals/birds living in the surroundings forcing them to change their habitat. In the present case, the noise caused will be mainly restricted to the core zone. However, the transportation activities will have impact on the noise levels enroute to the railway station.

The noise level data recorded at various places in the study area is well within the desired limit. But, the future establishment of noise due the proposed project activity may pose some problem if project management does not adopt appropriate control measures.

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v. **Effect on vibration level (due to blasting)**

No ground vibration study has been conducted hence the impact of the proposed activity on ground vibration cannot be exactly anticipated. But, based on experience of similar mines appropriate control measures have been spelt out in management plan.

vi. **Impact on water regime**

No impact on the surface water resources is envisaged as no water is drawn specifically. However, in view of availability of ground water at shallow levels, most of water requirement is planned to be drawn from ground water (mine sump), which will have some impact on the ground water resources.

vii. **Impact on socio-economic environment**

Human settlement

As already mentioned earlier, about 48 households within the mine lease area will have to be rehabilitated. The land owners will be deprived of their land and the non land owners who depend upon agriculture will be deprived of their earnings. Care will be taken for rehabilitation and employment of the displaced people.

On the other hand, the mining and allied activities will provide job opportunities for eligible persons and many will find employment in service sector and marketing of day-to-day needs viz. poultry and other agricultural products. The facilities and amenities like dispensary and communication, to be set up for the project will improve the basic infrastructure and these amenities can also be used by the people of the nearby villagers. The proposed long term activity will open up market and opportunities growth for self employed and cultivators. To this extent, the impact will be significantly beneficial since un-employment and under employment is the main socio-economic problem faced by the people in this area.

viii. **Impact on Historical Monument/ religious place/ tourist places**

There is no such place within and outside the ML boundary upto 10 km radius. Hence, question of impact on historical monument does not arise.

13.4 ENVIRONMENTAL MANAGEMENT PLAN

The environmental impact assessment made in the preceding section has identified the areas where certain control measures are called for to minimise the negative impacts. Subsequent paragraphs deals with effective measures proposed to be taken up with regard to the following aspects so that the proposed mining and allied activities can be continued in an environment-friendly manner:

- Land use planning – Afforestation and landscape development
- Air pollution control
- Blasting and noise control
- Water pollution control
- Socio-economic aspects

A. Land use planning

i. Land degradation control measures

Land degradation is one of the major adverse outcomes of opencast mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation strategy is not adopted. Since the land degradation in this mine is partly in the form of excavated void and partly in the form of external and internal dumps, the reclamation strategy must include a programme for the reclamation of the disturbed land.

Mined area reclamation

The lessee will have to take necessary steps to keep the area under disturbance at any stage of mining operation to a minimum. This can be achieved by carrying out the reclamation programme simultaneously with excavation. The gap can be reduced between degradation and the reclamation by this programme. The post mining land use of core zone shows that all the disturbed areas will be reclaimed before abandoning the mine excluding the void.

Reclamation procedure

Reclamation procedure has been described stage wise in the following paragraphs. Year wise reclamation programme is as shown in Table 13 13.

TABLE 13.13
RECLAMATION PROGRAMME OF EXCAVATED AND BACKFILLED AREA (CUMULATIVE)

Upto the end of Year	Area mined (Ha.)	Backfilled area (Ha.)	Planted area (Ha.)
1st	7.67	0.000	0.00
2nd	20.20	7.352	0.00
3rd	27.30	10.120	7.64
4th	34.34	14.106	11.17
5th	41.54	19.945	16.62
Conceptual (23rd)	118.60	79.533	79.533

ii. Top soil management

The average topsoil thickness over the whole pit area envisaged for mining is proposed to be removed to the extent of about 0.60 m. About 0.71 M cumB of topsoil will have to be handled from areas to be excavated. About 0.14 M cum stock (max.) of the topsoil will be kept over an area of 3.0 Ha.

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Extra generation of top soil will be utilised in two ways, part of the surplus top soil will be used for reclamation annually whereas the rest will be stacked at pit head temporarily for consecutive laying over backfilling. Usually about 0.5 m thick layer of topsoil will be laid for afforestation.

The topsoil shall be excavated by small hydraulic shovel/front end loader and transported by trucks/dumpers to the stack site located in the western side of the pit. The height of the stacks will be kept less than 3m. For retaining fertility beyond one season, a vegetation cover will be created by growing local grass and shrubs. Topsoil availability and utilisation are shown in Table 13.14.

TABLE 13.14
AVAILABILITY/REQUIREMENT OF TOPSOIL FOR RECLAMATION STAGES (MCUM) CUMULATIVE (LOOSE)

End of year	Top soil available	Topsoil utilised	Topsoil stack
1	0.053	0.02	0.04
2	0.139	0.05	0.09
3	0 188	0.09	0 10
4	0.237	0 12	0.12
5	0.287	0.15	0.14
Conceptual (23rd)	0.82	0.82	0.00

iii. Post reclamation land use

The first step in a successful reclamation programme is to decide the post reclamation land use. The post mining land use with environment management is given in Table 13.15.

TABLE 13.15
POST MINING LAND USE WITH ENVIRONMENT MANAGEMENT WITHIN ML

Sl. No.	Description of area	Land use (Ha.)				
		Plantation	Water body	Public use	Undisturbed	Total
I.	**ML Area**					
1.	Top soil dump	3.00	0 00	0.00	0.00	3.00
2	Surface dump	0.00	0.00	0.00	0.00	0.00
3.	a) Excavation	79.53	39.07	0.00	0.00	118.60
	b) Surface water reservoir	0 00	1.60	0.00	0.00	1.60
4.	Facilities	2.00	0 00	0.00	0.00	2.00
5.	Roads	0.00	0.00	3.00	0 00	3.00
6.	Green belt	6.89	0.00	0.00	0.00	6.89
7.	Undisturbed area by OC	0.00	0.00	0.00	103.91	103.91
	Total	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**
II	**Out side the ML area**					
	Surface dump	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00
	Grand Total I +II	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**

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In case of this mine, it would be appropriate to restore the lands to the original land use to the extent possible due to following reasons:

Whole of the excavated area is proposed to be developed into a picnic spot due to the formation of water body created as a result of the left out void. The water body will be used for irrigation, watering the forest at earlier stages and it will also attract avifauna. The plan showing the mine at the abandoned stage is given in Plate XIX.

iv. Soil conservation measures

The following control measures to prevent soil erosion and wash off of fines from freshly excavated benches and dumps will be adopted:

- Garland drains will be provided around the mine whenever required to arrest any soil from the mine area being carried away by the rain water.
- The bench levels will be provided with water gradient against the general pit slope to decrease the speed of storm water and prevent its uncontrolled descent
- Special local stone paved chutes and channels will be provided wherever required, to allow controlled descent of water, especially from external dumps
- Gullies formed, if any, on side of the benches shall be provided with check dams of local stone or sand filled bags.
- The inactive dump slopes will be planted with bushes, grass, shrubs and trees to prevent soil erosion after applying top soil.
- Retaining walls (with gabion, concrete or local stone) will be provided, wherever required, to support the benches or any loose material and also to arrest sliding of loose debris.

v. Afforestation

Compensatory afforestation

Compensatory plantation will be provided in line with the prevailing rules of Forest Department.

Plantation during mining

A plantation program over life of the mine has been planned in a phase wise manner. The plantation will be started from first year of mining along the boundary of ML area from south to north. A 7.5 m width of green belt development around the ML area will be carried out and more width of green belt will be taken up wherever space is available. Plantation over backfilled area will be commenced from 2nd year of mining.

A thick plantation is proposed to be provided and maintained around the mining area and along the roads. The yearly requirement of plants during

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the various years and stages of the mining project is as shown in the Table 13.16

TABLE 13.16
REQUIREMENT OF PLANTS (YEAR/STAGE WISE AND LOCATION WISE)

Year	Requirement of plants for mine reclamation/afforestation & green belt						
	Area (Ha.)						No. of trees @ 2500/Ha
	Green belt	Surface dump	Backfill	Facilities	Virgin	Total	
1st	1.378	3.48	0.00	0.00	0.00	4.858	12145
2nd	1.378	4.75	0.00	0.00	0.00	6.128	15320
3rd	1.378	0.00	7.64	0.00	0.00	9.018	22545
4th	1.378	0.00	3.53	0.00	0.00	4.908	12270
5th	1.376	0.00	5.35	0.00	0.00	6.728	16820
Conceptual	0.000	0.00	63.01	2.00	0.00	65.01	162525
Total	6.890	8.23	79.53	2.00	0.00	96.65	241625

To fulfill the requirements of nursery plants, a nursery will be established at the site. During peak requirements, additional plants will be transported from Govt. / Forest nurseries, located around the area. The common species used for plantation in the region are Sal, Mahua, Gulmohar, Neem, Siris, Acacia, Casuarina, Mango, China rose, Kaner, etc.

B. Air and dust pollution control measures

The SPM, CO, SO_2 and NO_x concentrations are within limits as already discussed earlier. The mining operations and related activities are anticipated to increase the levels of SPM and gaseous pollutants to a limited extent. The control measures to be adopted are mentioned in the following paragraphs:

i. Controlling fugitive dust

Dust particles, which are normally generated during mining operation and transportation, deteriorate the ambient air quality. Adequate control measures are, therefore, proposed to be taken during mining operations, transportation and crushing/loading operations. These control measures are discussed as follows:

Mines

a) Dust suppression systems (like water spraying) will be adopted at

- Faces before and after blasting
- Faces while loading

b) Dust extraction systems will be used in drill machines and coal handling systems.

डी. एस. राणा/D. S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
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c) Dust generation will also be reduced by using sharp drill bits for drilling holes, drills with flushing system.

Haul roads and stock-piles

- Dust suppression system (like water spraying) would be adopted at roads, which are used for transportation. Fixed sprinklers (Whirling) have been proposed with timers to be installed along the haul roads and coal transportation roads to suppress the dust.
- Transport vehicles shall be maintained leak proof.
- Suitable dust suppression systems such as mist sprays with or without chemical will be provided at appropriate places for preventing dust pollution during handling and stockpiling of coal.
- Transfer points of coal will be provided with appropriate hoods/chutes to prevent fugitive dust emission.

ii. Preventing dispersal of air borne dust

In addition to the control measures proposed during mining and transportation operations, following steps will be taken to prevent air pollution due to airborne dust:

- Dense tree belts will be planted around the mine and sites housing handling/ loading facilities.
- Plantation over already mined out area will be done after backfilling as per schedule (with minimum gap between excavation and afforestation)
- Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/unloading points, crushers etc.

iii. Measures to mitigate CO levels

It has already been discussed that the concentration of CO in the ambient air is negligible and is far below the prescribed limit of CPCB and is not anticipated to exceed it in future. Still all heavy and light vehicles shall be tested for pollutants concentration in their exhausts regularly and well maintained. Strict vigil will be kept in and around the operational area for any fire which shall be immediately controlled.

iv. Measures to mitigate NO_x levels

The main reasons of production of NO_x gases are:

a. Poor quality of explosive having large oxygen imbalance which can be due to following reasons:

- Manufacturing defect

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The use of expired explosives in which disintegration of ingredients has taken place.

b. Incomplete detonation is caused mainly due to low primer: column ratio.

To ensure that NO_x levels do not increase during the proposed mining operations, the following control measures will be adopted.

a Good quality explosives will be used for which the oxygen balance will be checked from time to time. The expired explosives will not be used for which a strict vigil will be kept on the date of manufacture. Even as a normal procedure, all explosives will be subjected to a visual inspection and if disintegrated ingredient are spotted, the explosives will not be used even if it is within expiry date.

b. Primer: Column ratio will be rationalised. The ratio thus established, for producing minimum NO_x, will be adhered to.

The mine ambient air quality will be regularly tested to detect the presence of any pollutants above prescribed limits and appropriate measures will be adopted.

C. Noise and Blasting

Measures to control noise pollution

The following control measures will be adopted to keep the ambient noise levels below permissible limits of 75 dB(A).

i. Provision and maintenance of thick tree belts to screen noise.

ii. Avenue plantation within the project area to dampen the noise.

iii. Proper maintenance of noise generating machinery including the transport vehicles will be ensured.

iv. Provision of the air silencer to modulate the noise generated by the machines will be made wherever required.

To protect the workers from exposures to higher noise levels, the following measures will be adopted:

i. Provision of protective devices like ear muffs/ear plugs to those workers who cannot be isolated from the source of noise.

ii. Confining the noise by isolating the source of noise.

iii. Reducing the exposure time of workers to the higher noise levels.

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Measures to reduce ground vibrations due to blasting and prevent fly rocks

The vibrations due to blasting will be studied during stages of mining operations and the recommendations/ suggestions given as per the result of the said study will be strictly adhered to especially the charge per delay.

General recommendations and suggestion

i. The peak particle velocity (PPV) of ground vibration will be kept below permissible limits by controlled blasting techniques.

ii. Suitable powder factor will be adopted for overburden and coal.

iii Drilling and charging pattern will be modified, if required, based on the vibration study to be carried out.

iv. Short delay detonators will preferably be used in blasting rounds rather than detonating fuse as trunk line.

v. To contain fly rocks, stemming column will not be less than burden of the hole and the blasting area will be muffled.

vi. Each blast will be carefully planned, checked, executed and observed. Blasting data will be recorded. During blasting, a responsible officer will be supervising the whole operation

vii. Covering the detonating fuse, in case it is used, at least with 150 mm thick cover of sand or drill cuttings

viii. Blasting will be carried out at mid-day and never at night.

ix. Blasting will not be carried out when strong winds are blowing towards the inhabited areas.

Apart from the above, in order to ensure slope stabilisation, controlled production blasting will be adopted to avoid tension cracks and back breaks. Such cracks filled with water reduce stability of excavated slopes and angle of slopes. Good drainage system will be provided in and around the mine.

D. Water pollution control measures

Effluent from mine

i. To prevent surface and ground water contamination by oil/grease and sewage waste, following control measures are proposed to be implemented:

- Leak proof containers will be used for storage and transportation of oil/grease. In the store also, the container containing oil/grease will be kept in empty safe open containers of higher volume than the containers to avoid oil/grease spillage. The area over which oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained

through impervious drains, collected in specially constructed pit and treated appropriately to remove any oil/grease and the water will be recycled. The oil grease will be sold to authorized vendors and sludge disposed off in specially constructed pit.

- The sewage waste generated will be drained by underground impervious drains, lead to appropriately designed septic tanks and soak pits to prevent any pollution of surface or ground water.

ii. The surface and ground water in and around the mine, loading plant and infrastructure will be regularly tested and appropriate control measures adopted in case of any pollutant is detected above the prescribed limit.

iii. All stacking and loading areas will be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

iv. A domestic waste water treatment plant will be provided in colony so that the water after treatment can be reused.

Storm water

Control measures to be adopted are briefly discussed below:

- Check dams will be provided to prevent solids from wash off and screen if any from the mine related activities.
- Peripheral bunds will be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by storm water.
- A water gradient of about 1 in 100 will be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes causing serious erosion.
- Chutes will be constructed by using local stone or masonry to guide the water in areas with loose soil to prevent erosion and uncontrolled descent of water wherever necessary.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented. The mine water will be passed through specially constructed settling ponds to arrest any loose material being carried away with water.
- Any areas with loose debris within the lease hold will be planted.

Measures to minimise adverse effects on water regime

During the process of mine rehabilitation and with the completion of backfilling, a water body will be created in the mined out pit which will act as water reservoir improving the ground water recharge, source of attraction

for fauna and will help in the maintenance of afforested areas. To enhance aesthetic appearance, parks and lawns will be made around the water body.

E. Socio-Economic Aspects including Resettlement and Benefits

As there will be displacement of about 48 households, a detailed rehabilitation programme will be prepared in the with the Guidelines in Model Rehabilitation Policy 2002. A summary of the same is given below:

(1) Employment

Employment of at least one person from each of those families, whose land is acquired for the project would be given employment in the project according to the eligibility and skill of the person.

(a) Preference would be given to effected family while giving employment in the project.

(b) Special efforts would be made to provide employment to technically qualified youth.

(2) Facilities

(a) We shall be purchasing land for resettlement of these family separately out of the lease area and help to construct the houses.
(b) The affected families will resettle in separate area with proper water and sanitation facility. "The policy of one family one plot" would be followed for land allotment.
(c) The affected families shall be given Medical facilities in project Dispensary provided for employees of the Company.
(d) 50% of the shops in Colony Market place will be allowed to run by the affected families members.
(e) Children of affected families would be entitled for admission in Company's primary School.
(f) Company will provide training in tailoring, knitting and embroidery to the female members of affected families.
(g) Company will encourage the affected families to maintain their culture and social fabric.

(3) Compensation

Compensation for the land, hutment and others in-movable properties would be paid following the State Government guideline directly to the families whose land have been acquired for the project.

13.5 MONITORING SCHEDULE OF EMP

i. In order to keep a watch on the environmental control measures discussed about air quality, water quality and noise level monitoring shall be done regularly every year by taking measurements near the

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mine and residential areas preferably close to some of the earlier stations so as to keep a comparative check with respect to the base line data. For air quality monitoring, continuous monitoring on 24 hours sampling basis should be done for two days per week and analytical checks made for SPM, SO_2, NO_x and CO.

ii For effective management of the environment, it is envisaged to have an organisational set up under the administrative supervision of the Mines Management where responsibilities can be delegated to technical personnel like Mining Engineer, Geologist/Chemist and Horticulturist with regard to specific aspects of environment management plan. The organisation for the purpose is as indicated in the chart given in Plate XXV.

iii. The Environment Management Plan (Plate No. XVIII) on 1. 5000 scale and the Key Map (Plate II) portray the general environmental picture of the area and the region surrounding it.

Conclusion

1. Displacement of 48 households is anticipated.
2. Compensatory plantation is to be planned in line with Forest Department Rules.
3. Agricultural land shall be converted to industrial or mining site during mining tenure.
4. No surface dump will remain as the same will be rehandled and backfilled
5. After the change in land use, the mining will provide the opportunity to create a water storage reservoir and comparatively higher tree plantation and greenery will improve the general quality of the environment. In the process, sustained production of energy vital for the power industry and economy of the area will be ensured.
6. Meteorology and general air quality of the area will not suffer and the planned operations will not have any significant adverse impact on the hydrography and water quality in the area.
7. Only minor nature of air pollution is visualized for which more than adequate preventive measures have been contemplated.

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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CHAPTER 14

PROGRESSIVE MINE CLOSURE PLAN

14.1 INTRODUCTION

14.1.1 Name and address of the owner

Works & Corporate Office:

Birla Corporation Limited
(Cement Division)
PO Birla Vikas, Satna
Madhya Pradesh - 485 005
Ph: (07672) 25 0641 – 43, 25 7844 – 47, 410 300
Fax: (07672) 25 7576 / 7456
Email: admin@satnacement.com

V. S. RANA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

14.1.2 Location

Bikram coal block covering an area of 239 Ha represents the northern contiguous area of the Karkati Sector of the Sohagpur Coalfield. The Bikram Block lies to the immediate north of the working Navgaon and Rajendra Mines of Sohagpur Area, SECL. Bikram block is virgin. The block is covered in the Survey of India Toposheet no. 64 E/12, 8 (R. F. 1:50,000) and is bounded by

Latitudes	-	N 23°11'6" to N 23°11'24"
Longitudes	-	E 81°28'48" to E 81°3154"

The geological boundary of Bikram coal block is as follows:

North	:	Surface position fault F7-F7, part of fault F5-F5, F3-F3 and an arbitrary line passing through boreholes CMSB-25 & 48.
South	:	An arbitrary line passing through boreholes CMSB-44,34,13 & 22
East	:	An arbitrary line presumably representing Incrop floor of Seam IX. The coordinates of the NE corner are Easting 4010; Northing 4830 and that of SE corner are Easting 4265; Northing 4150. The National coordinates of NE corner are Lat 23deg 11' 28.73" ; Long 81deg 31' 2.82" and that of SE corner are Lat 23deg 11' 5.94" ; Long 81deg 31' 52.52"

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West	:	An arbitrary line passing east of borehole CMSB-46 and touching the northern & southern boundary with coordinates of NW corner are Easting 8030; Northing 4630 and that of SW corner are Easting 8030; Northing 4152.5. The National coordinates of NW corner are Lat 23deg 11' 22.87" ; Long 81deg 28' 39.13" and that of SW corner are Lat 23deg 11' 7.44" ; Long 81deg 28' 38.95"

The coordinates of the corners are given above. The perimeter of the block is 9.2 km.

14.1.3 Extent of ML area and present land use

The extent of ML area and the present landuse is given in Table 14.1.

TABLE 14.1
AREA DETAILS FOR MINING LEASE APPLIED (In Hec.)

Land use (Hectares)	Gopalpur	Bartara	RF	Total
Agriculture	20.670	56.271		76.841
Barren	2.549	1.618		4.167
Judpi Gungle (Revenue Forest)	3.514	5.506		9.020
Pond , Road, School etc (Govt. Land)	0.822	5.699		6.521
Boundary (Merb)	0.376	-		0.376
Total	**27.931**	**69.094**		
Reserve Forest	50.835	91.240	142.075	142.075
Grand Total				**239.000**

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Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

14.1.4 Reasons for closure

Not Applicable as it is a new allotted block.

14.1.5 Statutory obligations

It is a new block allotted hence, there are no statutory obligations imposed by any authority except that there is one allotment letter from the Ministry of Coal.

The allotment Letter No. 38011/2/2007-CA-1, Government of India, Ministry of Coal dated 12th August, 2008 is enclosed as Annexure 2-2 of Mining plan.

The main points of the letter are as follows:

1. The annual production of the mine is proposed as about 0.36 MT of grade C to D.

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2 A Bank Guarantee worth Rs 4.43 crores will be given within 3 months from the date of issue of the allotment letter.

3 The company shall submit Mining Plan for approval of the competent authority within 6 months after the date of the allotment letter.

4. The allotment letter may be cancelled on unsatisfactory progress of the end user plant or the development of the block.

14.1.6 Closure plan preparation

The Progressive Mine Closure Plan and Mine Closure Plan have the approval of the authorised signatory of the Company and the relevant document is attached as Annexure A-1 of the Mining plan.

14.2 MINE DESCRIPTION

14.2.1 Geology

a) Topography

The block has a gentle rolling topography with a general slope towards north. The variation in surface elevations, excluding nala cuttings, is from 479 m (above MSL) in the northern part to 493 m (above MSL) in the south-western part of the block. Basic intrusive bodies stand out as E-W trending low ridge to the north-western & south-western corners of the block.

b) Geology

Sohagpur Coalfield has been a traditional source of superior quality, low rank, high volatile coal. Such coal has been under active exploitation in the entire tract in south Sohagpur. Bikram Block is located almost in the central part of the Amlai-Burhar sub-basin of Sohagpur Coalfield. The area is mainly covered by thin cover of soil and alluvium, ranging in thickness from 1.75 m to 8.55 m. Rock exposures are largely confined to seasonal nala sections.

The generalized stratigraphic sequence of the block is given in Table 14.2.

TABLE 14.2
STRATIGRAPHIC SEQUENCE IN BIKRAM BLOCK, SOHAGPUR COALFIELD

Group	System	Series	Lithology	Thickness	Range (m)
	Recent/ sub-Recent		Soil & Alluvium	1.75 (CMSB-49)	8.55 (CMSB-31,32)
			Unconformity		
	Eocene-Upper Cretaceous	Deccan Trap	Dolerite dykes & sills	0.10 (CMSB-3)	3.05 (MPSB-4)

Group	System	Series	Lithology	Thickness	Range (m)
------ Unconformity ------					
	Upper Cretaceous	Lameta	Calcareous sandstone and nodular limestone	10.90 (CMSB-8)	38.90 (CMSB-48)
------ Unconformity------					
Upper Gondwana	Upper Triassic	Supra Barakars	Pink & buff coloured sandstone and variagated shales	7.20 (CMSB-49)	33.90 (CMSB-31)
Lower Gondwana	Lower Permian	Barakar	Greyish-white coarse grained sandstone with a few coal seams, carb shale and shale bands	79.20 (MPSB-3)	179.75 (CMSB-43)

The geological map of Bikram coal block has been prepared based on surface and sub-surface geological data obtained during exploration campaign. The block is mostly soil covered with some exposures of laterite and weathered Barakar sandstone

c) Description of formations

The description of different geological formations encountered in boreholes drilled in Bikram coal block are summarized below:

Soil/Alluvium and weathered mantle

The Bikram block is covered with soil ranging in thickness from 1.75 m to 8.55 m. Supra Barakars are found in the entire block above Seam IX. Lameta occurs as thin capping over Barakars and Supra Barakars in isolated patches confined in the south-eastern part (around CMSB-8) and north-eastern part (around CMSB-48) of the block. The strata being soft, the depth of the weathering ranges between 8.35 m (CMSB-3) to 31.85m (CMSB-48) below the surface.

Igneous intrusive

Dolerite has been intersected in boreholes CMSB-3 (0-10 m), MPSB-2 (0.93 m) and MPSB-4(3.05m). Out of these boreholes, MPSB-2 and 4 are located in eastern boundary of the block and CMSB-3 in the north-western part of the block. From these isolated intersections of dolerite body at different locales, the intrusive body is surmised to have a discordant relation with the host rock. However, presence of some more isolated dykes in the area can not be ruled out.

Structural set up of the block

The entire structural set-up of the area has been worked out on the basis of sub-surface data obtained through drill holes. While deciphering the

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geological structure, due weightage has been given to the vast structural elements available from the extensive workings of coal seams in various collieries of the area.

The block can be observed from the floor contour that strike variation is between N40°55'E – S40°55'W in the western and central part of the block, N60°65'E - S60°65'W in the north-eastern part to almost E-W in the south-eastern part and ultimately veer to rarely NS in the eastern most part of the block. This indicates a gentle down warp of tho strata along a NNE-SSW axis passing through the central region of the block. The coal beds have a corresponding dip direction and the dip amount varies from about a degree to 6°.

d) Coal seams

A study of drill hole data reveals that of the nine correlatable carbonaceous horizons present in Amlai-Burhar sub-basin, only seven coal seams viz VI Bottom alongwith two splits – VIB (B) & VIB (T), VI Top, VII, VIII & IX in ascending order have attained identifiable thickness in Bikram block.

The correlation of thc coal seams, their thickness range and range of intervening parting between the coal seams in Bikram coal block is furnished in Table 14.3 and their graphic presentations is given in Plate VI.

TABLE 14.3
SEQUENCE OF COAL SEAMS OF BIKRAM COAL BLOCK

Coal Seam	Thickness Range (m)		General thickness range (m)	No. of boreholes intersecting full seam thickness	Remarks
	Min.	Max.			
Seam IX	0.42 (CMSB-11)	3.75 (CMSB-56)	1.20-3.0	34	Excluding CMSB-25 where only carb. Shale intersected
Parting	9.8 (CMSB-3)	17.07 (CMSB-10)	12.0-15.50	34	
Seam VIII	0.10 (CMSB-18)	2.30 (CMSB-44)	0.90-2.00	34	Excluding CMSB-11 where only carb. Shale intersected
Parting	53.15 (CMSB-18)	64.93 (CMSB-43)	54.0-60.0	32	Excluding MPSB-1, where the interseam parting has thickness reduction and CMSB-44 has splitted seam.
Seam VII	0.55 (CMSB-48)	4.79 (CMSB-43)	1.2-4.0	33	Excluding CMSB-6 where faulted coal seam thickness intersected
Seam VII T	2.27 (CMSB-44)		2.27	1	Parting range between Seam VII & VIB (C)/VIB(T) is 28.26m (CMSB-20) to 34.96 (CMSB-34)

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Coal Seam	Thickness Range (m)		General thickness range (m)	No. of boreholes intersecting full seam thickness	Remarks
	Min.	Max.			
Parting	1.32 (CMSB-44)		1 32	1	
Seam VII B	2.14 (CMSB-44)		2 14	1	
Parting	8.32 (CMSB-13)	24.59 (CMSB-36)		18	Parting between VII and VI Top
Seam VI Top	0.05 (CMSB-14)	3.36 (CMSB-43)	0.90-1.50	18	
Parting	8.05 (CMSB-36)	26.81 (CMSB-23)		15	Parting between VI Top and VI Bot. (Comb.) and also VI Top & VI Bot.(T)
Seam VI B(C)	2.04 (CMSB-7)	3.78 (CMSB-13)	2.0-3 0	10	
Seam VIB(T)	0.38 (CMSB-28)	2.05 (CMSB-10)	0.90-1.50	16	
Parting	1 20 (CMSB-57)	11.00 (CMSB-28)	<2.0-7.0	15	
Seam VIB (B)	0 11 (CMSB-20)	1.6 (CMSB-4)	0.90-1.50	17	

**Thickness of weathered seam not considered*

14.2.2 Reserves

a) Category of reserves

All the reserves for Seam IX, VIII and VII (including Top and Bot) have been included under 'Proved Category', though for the seams VI Bot (Comb) and VI Bot (B) reserves have been estimated both for 'proved' and 'indicated' categories.

The coal reserves are assessed based on detailed study and geological mapping, where 61 boreholes were drilled. A total 'net' coal reserves (proved and indicated) available for underground exploitation have been assessed at 20.975 MT. The share of seam IX, VIII, VII along with top and bottom splits, VI Bot (Comb.) and VI Bot (B) in the total reserves are 6.494, 3.220, 6.420, 3.586 and 1.255 MT respectively. Out of the total reserves of 20.975 MT, 10.897 MT of coal is found under the forest and remaining 10.078 MT is found outside of the forest area. The details of reserves are given below in Table 14.4.

Additionally 1.041 MT net geological reserves will be available in patches of seam VI (T) and VI Bot (T)

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TABLE 14.4
SEAM-WISE AND GRADE WISE RESERVES (IN MILLION TONNES)

Thickness Range	Within Forest						Total	Outside Forest							Total	Grand Total
	IX HCL		VIII	VII	VIB(B)	VIB (Comb.)		IX HCL		VIII	VII	VIIT	VIIB	VIB(B)	VIB (Comb.)		
	<15	>15						<15	>15								
PROVED																	
Incrop-F	-	-	-	-	-	-	-	0.053	-	-	-	-	-	-	-	0.053	0.05
A	-	-	0.001	-	-	-	0.001	-	-	0.001	-	-	-	-	-	0.001	0.00
B	-	-	0.330	0.280	-	-	0626			0.170	0.080	-	-	-	-	0.249	0.86
C	-	-	1.225	2.209	0.534	0.081	4.045			0.904	0.593	-	-	0.014	-	1.511	5.56
Total (1)			**1.550**	**2.490**	**0.534**	**0.081**	**4.663**			**1.074**	**0.673**	-	-	**0.014**	-	**1.814**	**6.47**
D	-		0.212	0.569	0.331	1.136	2.248	-	-	0.317	2.244	0.049	0.048	0.083	1.389	4.130	6.37
E	0.628	0.133	0.050	-	0.064	0.141	1.016	0.077	-	0.001	0.347	-	-	0.185	-	0.590	1.60
F	2.106	0.690	0.006	-	-	-	2.802	0.297	2.010	-	-	-	-	-	-	2.297	5.09
G	0.166	-	-	-	-	-	0.166	0.039	0.305	-	-	-	-	-		0.344	0.51
Total (2)	**2.900**	**0.823**	**0.268**	**0.569**	**0.395**	**1.277**	**6.232**	**0.403**	**2.315**	**0.318**	**2.591**	**0.049**	**0.048**	**0.248**	**1.389**	**7.361**	**13.59**
Total (1+2 + Icrop)	**2.900**	**0.823**	**1.828**	**3.059**	**0.929**	**1.358**	**10.897**	**0.456**	**2.315**	**1.392**	**3.264**	**0.049**	**0.048**	**0.262**	**1.389**	**9.175**	**20.09**
INDICATED																	
Total														0.064	0.839	0.903	0.90
														0.064	**0.839**	**0.903**	**0.90**
Grand Total (indicated + Proved)	**2.900**	**0.823**	**1.828**	**3.059**	**0.929**	**1.358**	**10.897**	**0.456**	**2.771**	**1.392**	**3.264**	**0.049**	**0.048**	**0.326**	**2.228**	**10.078**	**20.97**

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The reserves mineable by OC method are given in the following Table 14.5.

TABLE 14.5
EXTRACTABLE RESERVES BY OPENCAST METHOD

1 Seam IX	2 Total coal	3 OC barrier	4 OC batter	5=2-3-4 Net mineable reserve of OC	6=97% of 5 OC extractable reserve of 3% mining losses	7 Grade
(i) <15m Hard cover line	3.303					
(ii) >15m hard cover line	3.138					
outcrop	0.053					
TOTAL	**6.494**	**0.166**	**1.218**	**5.110**	**4.957**	F
Seam VIII	3.220	0.0927	0.739	2.388	2.317	C
Seam VII	6.323	0.268	2.915	3.140	3.046	C-D
Seam VII B	0.048			0.048	0.047	D
Seam VIIT	0.049			0.049	0.048	D
Seam VIB (T)	1.255	0.0123	0.386	0.857	0.831	C-D
Seam VIB (B) combined	3.586	0.1295	2.644	0.813	0.788	C-D
Total coal reserves	**20.975**	**0.669**	**7.902**	**12.405**	**12.032**	

Total excavation	:	239.30 mcum
Av. Weighted Coal density for the block as a whole is	:	1.54
Coal volume (12.032 MT/1.54)	:	7.81 mcum
OB waste volume (239.3-7.81)	:	231.49
OB: Coal ratio (231.49/12.032)	:	19.24

A perusal of the above table shows that 3.303 MT (15.75%) of the reserves, lying at shallow depth of less than 15m hard cover, which is not possible to be mined by UG method can be extracted through opencast mining. The reserves mineable by UG mining method are given in Table 14.6.

TABLE 14.6
EXTRACTABLE RESERVES BY UNDERGROUND METHOD

1.	The total net reserves as per GR	20.975
2.	(-) Reserves in 0.5-01.2m thickness	1.892
3.	(-) Reserves in <15m hard cover	3.303
4.	Balance reserves for UG mining (1-2-3)	15.78
5.	Extractable by UG mining (about 40% of 4)*	6.312
6.	Life @ 0.36 MTPA	17.53 years

* *Besides 0.41 MT extractable from seam VI T and VI Bot (T) patches.*

A perusal of the above table shows that 3.303 MT coal lying at shallow depth near the outcrop of seam IX cannot be mined by under ground method in line with the Mines Act / Mines Rules as the hard cover is less than 15m.

The reserves mineable by OC as well as UG method are summarised in the following Table 14.7. It will be possible to extract as much coal as 9.44 MT of reserves (3.758 MT by OC + 5.682 MT by UG method) which account for 45% of the total net geological reserves. This extraction is 15% higher than that by UG method.

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TABLE 14.7
EXTRACTABLE RESERVES BY OPENCAST AND UNDERGROUND METHOD

Seam IX	Total coal as per GR	Reserves for opencast mining			Reserves for underground mining			Grade
		Net geological	Net mineable	Extractable after 3% mining losses	Net geological	Net mineable	Extratrable (40%)	
(i) <15m hard cover line	3.303	3.303	2.766	2.683				F
(ii) >15m hard cover line	3.138				3.138	3.081	1.23	F
outcrop	0.053	0.04	0.027	0.026				
Total Seam IX	**6.494**	**3.343**	**2.793**	**2.709**	**3.138**	**3.081**	**1.23**	**F**
Seam VIII	3.220	1.312	1.081	1.049	1.908	1.328	0.53	C
Seam VII	6.323				6.323	5.697	2.28	C-D
Seam VII B	0.048				0.048	0.000		D
Seam VIIT	0.049				0.049	0.000		D
Seam VIB (B).	1.255				1.255	0.639	0.26	C-D
Seam VIB (B) Combined	3.586				3.586	3.459	1.38	C-D
Total coal reserves	**20.975**	**4.655**	**3.874**	**3.758**	**16.307**	**14.204**	**5.682**	
Total OC OB			**36.81**	**36.81**				
OB : Coal			**9.50**	**9.80**				

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14.2.3 Mining method

14.2.3.1 Opencast mining of Seam-IX and VIII upto 15m hard cover line

Seams IX & VIII will be worked by mechanized opencast method comprising shovel/dumper combination in OB and coal. The maximum depth of OC is expected to be around 60m. The gradient of seams will vary from 0° to 6°. Seams beyond 60m hard cover line are envisaged to be mined by underground method. It may be observed that drilling and blasting is envisaged. The surface transport of coal will be done by Coal Tippers to the pit head despatch point or to the railway siding.

Mining and transport of coal and OB will be fully mechanised. The details of equipment are given in Table 14.8.

TABLE 14.8
LIST OF PRODUCTION AND AUXILIARY EQUIPMENT

Sl. No.	Particulars	Unit	Quantity
I.	**Heavy Earth Moving Machinery**		
A.	**Coal**		
a)	0.9-1.1 M^3 shovel/backhoe (Diesel operated)	Nos.	1
b)	10 T.R.D. Trucks (Diesel Operated)	Nos.	4
c)	R.B.H Drills 110/115 mm (Diesel Operated)	Nos.	1
d)	Dozer 275-320 HP (Tyre mounted dozer with ripper atlachment)	Nos.	1
B.	**Overburden**		
a)	Hydraulic Shovel 2.5-3.3 m^3	Nos.	2
b)	35 T.R.D. trucks (Diesel Operated)	Nos.	10
c)	R.B.H drills 110/160 mm (Diesel Operated)	Nos.	2
d)	Dozer 410 HP (Diesel Operated)	Nos.	2
e)	Dozer 275-320 HP (Diesel Operated)	Nos.	2
II.	**Auxiliary & Service Equipment**		
a)	3.5 m^3 front end loader (Coal) (Diesel Operated)	Nos.	1
c)	Graders 145 HP (Diesel Operated)	Nos.	1
d)	Diesel Bouser	Nos.	1
e)	Construction backhoe -0.9 CUM (Diesel Operated)	Nos.	1
f)	Water sprinkler (26 KL) (Diesel Operated)	Nos.	3
g)	TOW truck on 50T truck chassis (Diesel Operated)	Nos.	1
h)	100 T tractors (Diesel Operated)	Nos.	-
i)	Rough terrain crane - 40T mobile (Diesel Operated)	Nos.	1
J)	Service trucks	Nos	3
k)	Explosive van (Diesel Operated)	Nos.	1
l)	Portable air compressor	Nos.	1
m)	Tyre handler	Nos.	1
III.	**Reclamation**		
	2.5 cum front end loader	Nos.	1
	10 T Truck	Nos.	4
	0.9-1.2 cum hydraulic excavator	Nos.	1

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All material handling will be carried out on contract basis & other jobs will be done departmentally.

14.2.3.2 Underground mining

There will be no coal production from UG mining for the 1st two years. The underground mining will be carried out by two sets of inclines from surface. The drivage of 1st set of inclines will be started in the western half portion of the block from SRL 481m, which will touch the floor of seam IX at FRL 442m. The same incline will continue down at the same gradient and meet the seam VIII at 426.5m FRL. Once the incline touches the seam, a set of dip drives along the floor of the seams will be driven and panels will be created for development and production.

The floor of the seam appears to be good and gradient is found to be gentle all through the mine. It has been proposed to use simple board and pillar system with solid blasting in panel development using Load Haul Dump (LHD) with chain and belt conveyor.

The target output will be 0.20 MTPA. The life of the underground mine will be 31 years (with production from 3rd year to 31st year). Additionally, there will be construction activities for two years prior to start of production (during 1st and 2nd year). The combined calendar programme of production from opencast as well as underground mining is given in Table 14.9.

TABLE 14.9
COMBINED CALENDER PROGRAMME OF PRODUCTION FROM OC AND UG

Year	COAL (MT) PROG.		
	OC	UG	TOTAL
1*	0.15	0.00	0.15
2	0.36	0.00	0.36
3	0.16	0.20	0.36
4	0.16	0.20	0.36
5	0.16	0.20	0.36
6-10**	0.80	1.00	1.8
11-15***	0.80	1.00	1.8
16-20	0.80	1.00	1.8
21-23	0.368	0.60	0.968
24-25	0.00	0.40	0.4
26-30	0.00	1.00	1
31		0.082	0.082
Total	**3.758**	**5.682**	**9.44**

- ** The construction activities of 1st set of inclines will start from 1st year itself*
- *** The drivage of 2nd set of inclines will start from 9th year*
- **** The production from 1st set of inclines will exhaust by 11th year and it will be made up by the production from the 2nd set of inclines in the 12th year.*
- Additionally 0.41 MT extractable reserves will be available in patches of seam VI (T) and VI Bot (T) which will increase the life by another 1.14 years

14.2.4 Mineral beneficiation

No coal beneficiation is required as the coal is utilizable directly as produced. Hence no provision of washery etc. has been made.

14.3 CLOSURE PLAN

14.3.1 Mined out land

i. Land degradation control measures

Land degradation is one of the major adverse outcomes of opencast mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation stralegy is not adopted. Since the land degradation in this mine is partly in the form of excavated void and partly in the form of external and internal dumps, the reclamation strategy must include a programme for the reclamation of the disturbed land.

a) Mined area reclamation

The lessee will have to take necessary steps to keep the area under disturbance at any stage of mining operation to a minimum. This can be achieved by carrying out the reclamation programme simultaneously with excavation. The gap can be reduced between degradation and the reclamation by this programme. The post mining land use of the core zone shows that all the disturbed areas will be reclaimed before abandoning the mine, excluding the void.

b) Reclamation procedure

Reclamation procedure has been described stage wise in the following paragraphs. Year wise reclamation programme is as shown in Table 14.10.

TABLE 14.10
RECLAMATION PROGRAMME OF EXCAVATED AND BACKFILLED AREA (CUMULATIVE)

Upto the end of Year	Area mined (Ha.)	Backfilled area (Ha.)	Planted area (Ha.)
1st	7.67	0.000	0.00
2nd	20.20	7.352	0.00
3rd	27.30	10.120	7.64
4th	34.34	14.106	11.17
5th	41.54	19.945	16.52
Conceptual (23rd)	118.60	79.533	79.533

ii. **Post reclamation land use**

The first step in a successful reclamation programme is to decide the post reclamation land use. The post mining land use with environment management is given in Table 14.11.

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TABLE 14.11

POST MINING LAND USE WITH ENVIRONMENT MANAGEMENT WITHIN ML

Sl. No.	Description of area	Land use (Ha.)				
		Plantation	Water body	Public use	Undisturbed	Total
I.	**ML Area**					
1.	Top soil dump	3.00	0.00	0.00	0.00	3.00
2.	Surface dump	0.00	0.00	0.00	0.00	0.00
3.	a) Excavation	79.53	39.07	0.00	0.00	118.60
	b) Surface water reservoir	0.00	1.60	0.00	0.00	1.60
4.	Facilities	2.00	0.00	0.00	0.00	2.00
5.	Roads	0.00	0.00	3.00	0.00	3.00
6	Green belt	6.89	0.00	0.00	0.00	6.89
7.	Undisturbed area by OC	0.00	0.00	0.00	103.91	103.91
	Total	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**
II	**Out side the ML area**					
	Surface dump	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00
	Grand Total I +II	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**

In case of this mine, it would be appropriate to restore the lands to the original land use to the extent possible due to following reasons:

Whole of the excavated area is proposed to be developed into a picnic spot due to the formation of water body created as a result of the left out void. The water body will be used for irrigation, watering the forest at earlier stages and it will also attract avifauna. The plan showing the mine at the abandoned stage is given as Plate XIX in the Mining Plan.

iii. Soil conservation measures

The following control measures to prevent soil erosion and wash off of fines from freshly excavated benches and dumps will be adopted:

- Garland drains will be provided around the mine whenever required to arrest any soil from the mine area being carried away by the rain water.
- The bench levels will be provided with water gradient against the general pit slope to decrease the speed of storm water and prevent its uncontrolled descent.
- Special local stone paved chules and channels will be provided wherever required, to allow controlled descent of water, especially from external dumps.
- Gullies formed, if any, on side of the benches shall be provided with check dams of local stone or sand filled bags.
- The inactive dump slopes will be planted with bushes, grass, shrubs and trees to prevent soil erosion after applying top soil.

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- Retaining walls (with gabion, concrete or local stone) will be provided wherever required, to support the benches or any loose material and also to arrest sliding of loose debris.

iv. **Afforestation**

Compensatory afforestation

Compensatory plantation will be provided in line with the prevailing rules of the Forest Department.

Plantation during mining

A plantation program over life of the mine has been planned in a phase wise manner. The plantation will be started from first year of mining along the boundary of ML area from south to north. A 7.5 m width of green belt development around the ML area will be carried out and more width of green belt will be taken up wherever space is available. Plantation over backfilled area will be commenced from 2nd year of mining.

A thick plantation is proposed to be provided and maintained around the mining area and along the roads. The yearly requirement of plants during the various years and stages of the mining project is as shown in the Table 14.12.

TABLE 14.12
REQUIREMENT OF PLANTS (YEAR/STAGE WISE AND LOCATION WISE)

Year	Requirement of plants for mine rectamation/afforestation & green belt						
	Area (Ha.)						No. of trees @ 2500/Ha
	Green belt	Surface dump	Backfill	Facilities	Virgin	Total	
1st	1.378	3.48	0.00	0.00	0.00	4.858	12145
2nd	1.378	4.75	0.00	0.00	0.00	6.128	15320
3rd	1.378	0.00	7.64	0.00	0.00	9.018	22545
4th	1.378	0.00	3.53	0.00	0.00	4.908	12270
5th	1.378	0.00	5.35	0.00	0.00	6.728	16820
Conceptual	0.000	0.00	63.01	2.00	0.00	65.01	162525
Total	6.890	8.23	79.53	2.00	0.00	96.65	241625

To fulfill the requirements of nursery plants, a nursery will be established at the site. During peak requirements, additional plants will be transported from Govt. / Forest nurseries, located around the area. The common species used for plantation in the region are Sal, Mahua, Gulmohar, Neem, Siris, Acacia, Casuarina, Mango, China rose, Kaner, etc.

The plan showing the mine at the abandoned stage is given in Plate XIX.

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14.3.2 Water quality management

The general land slope of the study area is towards north. The maximum and minimum elevation of the block is 493 m AMSL in the south-western part of the block and 479 m AMSL in the northern part.

There is no prominent drainage pattern developed in the block. Only seasonal streamlets drain the area. However, Balsaha nala flowing in the west and Nargara nala in the east constitute the main drainage of the area. These two along with a number of seasonal streamlets drain the area and finally discharge their water into the river Son near village Nahalpur about 12 km NW of the Bikram Block.

a) Water balance

Total requirement of water for mining and allied activities are estimated as 444 m^3/day. The break up of the required water for different activities is shown in Table 14.13.

TABLE 14.13
WATER BALANCE

Sprinkling @ 30 cum per km per day of haul road for 3 km	=	90.00
Plantation @ 20 cum/hec. for 5 Ha	=	100.00
Vehicles washing @ 2.0 m^3/vehicle/day for 10 vehicles considering 50% recirculation	=	10.00
Drinking at working place @ 45 lpd/head for 701+50=751 (workers and visitors)	=	34.00
For colony {total manpower in mine 701 out of which colony provision has been made for 50% (351) i.e. 351 x 4 x 135 lpd=190 K/LD		190.00
For peripheral villages (potable)	=	20.00
Total		**444.00**

Effluent from mine

i. To prevent surface and ground water contamination by oil/grease and sewage waste, following control measures are proposed to be implemented:

- Leak proof containers will be used for storage and transportation of oil/grease. In the store also, the container containing oil/grease will be kept in empty safe open containers of higher volume than the containers to avoid oil/grease spillage. The area over which oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained through impervious drains, collected in specially constructed pit and treated appropriately to remove any oil/grease and the water

will be recycled. The oil grease will be sold to authorized vendors and sludge disposed off in specially constructed pit.

- The sewage waste generated will be drained by underground impervious drains, lead to appropriately designed septic tanks and soak pits to prevent any pollution of surface or ground water.

ii. The surface and ground water in and around the mine, loading plant and infrastructure will be regularly tested and appropriate control measures adopted in case of any pollutant is detected above the prescribed limit.

iii. All stacking and loading areas will be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

iv. A domestic waste water treatment plant will be provided in colony so that the water after treatment can be reused.

Storm water

Control measures to be adopted are briefly discussed below:

- Check dams will be provided to prevent solids from wash off and screen if any from the mine related activities.
- Peripheral bunds will be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by storm water.
- A water gradient of about 1 in 100 will be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes causing serious erosion.
- Chutes will be constructed by using local stone or masonry to guide the water in areas with loose soil to prevent erosion and uncontrolled descent of water wherever necessary.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented. The mine water will be passed through specially constructed settling ponds to arrest any loose material being carried away with water.
- Any areas with loose debris within the lease hold will be planted.

Measures to minimise adverse effects on water regime

During the process of mine rehabilitation and with the completion of backfilling, a water body will be created in the mined out pit which will act as water reservoir improving the ground water recharge, source of attraction for fauna and will help in the maintenance of afforested areas. To enhance aesthetic appearance, parks and lawns will be made around the water body.

14.3.3 Air quality management

Ambient air quality monitoring was undertaken at 7 different stations within the study area during summer season. The monitoring results indicated that the air quality is good and conforms to the standards stipulated for rural areas

The test results are given in Table 14.14 below and details are shown in Annexure 13-5 of Mining plan.

TABLE 14.14
AIR QUALITY OF THE STUDY AREA

	RPM	SPM	SO_2	NO_x	CO	RPM	SPM	SO_2	NO_x	CO	RPM	SPM	SO_2	NO_x	CO
	Core zone					Chooradih (BA1)					Ahirgaon (BA2)				
Min.	32	90	6.1	6.1	182	34	96	6.1	7.2	181	35	96	6.8	8.8	180
Max.	46	128	7.9	7.9	217	47	132	7.9	9.5	219	50	142	8.9	11.5	224
Avg.	39	111	6.9	6.9	198	41	115	6.8	8.4	200	42	119	8.0	9.8	199
98%tile	44	125	7.9	7.9	217	47	132	7.9	9.5	217	50	142	8.9	11.5	222
	1.5km N of Sangwar (BA3)					Saraikapa (BA4)					Karkati (BA5)				
Min.	33	95	6.0	9.4	186	36	102	8.3	9.7	204	37	103	7.9	10.1	202
Max.	47	132	8.2	11.1	228	50	141	12.0	14.0	242	53	149	12.0	14.0	241
Avg.	41	117	7.2	9.7	210	44	123	10.4	12.4	222	46	129	10.0	12.2	223
98%tile	47	131	8.2	11.1	228	50	140	12.0	13.9	242	53	149	11.9	13.9	240
	Nuagaon (BA6)														
Min.	38	107	8.6	10.7	206										
Max.	54	151	12.0	13.7	253										
Avg.	45	127	10.1	12.1	233										
98%tile	52	147	12.0	13.7	250										

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Although all pollutants are generated during blasting and while operating diesel equipment, these will be kept at minimum levels by ensuring good blast design and good equipment maintenance. Adequate arrangement for water sprinkling has been planned to prevent and suppress dust due to mining and transportation. Part of the operations is proposed to be carried out by UG method, which is comparatively less polluting.

The control measures to be adopted are mentioned in the following paragraphs:

i. Controlling fugitive dust

Dust particles, which are normally generated during mining operation and transportation, deteriorate the ambient air quality. Adequate control measures are, therefore, proposed to be taken during mining operations, transportation and crushing/loading operations. These control measures are discussed as follows:

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a) Dust suppression systems (like water spraying) will be adopted at.
   - Faces before and after blasting
   - Faces while loading

b) Dust extraction systems will be used in drill machines and coal handling systems.

c) Dust generation will also be reduced by using sharp drill bits for drilling holes, drills with flushing system.

Haul roads and stock-piles

- Dust suppression system (like water spraying) would be adopted at roads, which are used for transportation. Fixed sprinklers (Whirling) have been proposed with timers to be installed along the haul roads and coal transportation roads to suppress the dust.
- Transport vehicles shall be maintained leak proof.
- Suitable dust suppression systems such as mist sprays with or without chemical will be provided at appropriate places for preventing dust pollution during handling and stockpiling of coal.
- Transfer points of coal will be provided with appropriate hoods/chutes to prevent fugitive dust emission.

ii. Preventing dispersal of air borne dust

In addition to the control measures proposed during mining and transportation operations, following steps will be taken to prevent air pollution due to airborne dust:

- Dense tree belts will be planted around the mine and siles housing handling/ loading facilities.
- Plantation over already mined out area will be done after backfilling as per schedule (with minimum gap between excavation and afforestation)
- Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/unloading points, crushers etc.

iii. Measures to mitigate CO levels

It has already been discussed that the concentration of CO in the ambient air is negligible and is far below the prescribed limit of CPCB and is not anticipated to exceed it in future. Still all heavy and light vehicles shall be tested for pollutants concentration in their exhausts regularly and well maintained. Strict vigil will be kept in and around the operational area for any fire which shall be immediately controlled.

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iv. **Measures to mitigate NO_x levels**

The main reasons of production of NO_x gases are.

a. Poor quality of explosive having large oxygen imbalance which can be due to following reasons:

- Manufacturing defect
- The use of expired explosives in which disintegration of ingredients has taken place.

b Incomplete detonation is caused mainly due to low primer: column ratio

To ensure that NO_x levels do not increase during the proposed mining operations, the following control measures will be adopted:

a Good quality explosives will be used for which the oxygen balance will be checked from time to time. The expired explosives will not be used for which a strict vigil will be kept on the date of manufacture. Even as a normal procedure, all explosives will be subjected to a visual inspection and if disintegrated ingredient are spotted, the explosives will not be used even if it is within expiry date.

b. Primer: Column ratio will be rationalised. The ratio thus established, for producing minimum NO_x will be adhered to.

The mine ambient air quality will be regularly tested to detect the presence of any pollutants above prescribed limits and appropriate measures will be adopted

14.3.4 Waste management

a) Nature of top soil and overburden/waste

In this mine, main waste is overburden in the form of top soil, alluvium and weathered mantle. The area is mainly covered by thin cover of soil and alluvium ranging in thickness from 1.75 m to 8.55 m. Only 0.6m average thickness of top soil has been considered for separate removal and stacking for use in mine reclamation later.

Rock exposures are largely confined to seasonal nala sections. The strata being soft, the depth of the weathering ranges between 8.35m (CMSR-3) to 31.85m (CMSB-48) below the surface.

Only 0.6m average thickness of top soil has been considered for separate removal and stacking for use in mine reclamation later.

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b) Year/stage wise waste generation

The year/stage wise waste generation is given in Table 14.15.

TABLE 14.15
WASTE GENERATION (TOPSOIL& OVERBURDEN) IN M.CUM (BANK)

Year	Excavated area (Ha.)	Topsoil generated	Pure OB generated	Total waste generated	
				Progressive	Cumulative
1st year	7.67	0.05	1.78	1.83	1.83
2nd year	12.53	0.08	3.00	3.08	4.91
3rd year	7.10	0.04	1.98	2.02	6.93
4th year	7.04	0.04	1.81	1.85	8.78
5th year	7.20	0.04	1.80	1.84	10.62
Conceptual (23 yr.)	77.06	0.46	25.73	26.19	36.81
Total	**118.60**	**0.71**	**36.10**	**36.81**	

c) Waste disposal sites

There is one waste disposal site and one top soil disposal site as follows:

i. The surface dump located inside the ML area

The Suface dump of OB generated during the 1st year will be made on the non-forest zone over the opencast mining area within the block along the center of its boundary.

The height of the dump achieved will be 50m. This OB will be re-handled from the start of 6th year at a rate of 0.37 MCum per year.

ii. Backfill dump

Backfilling will start from 2nd year of the project operation with a quantity of 3.03 MCum, 2.02 MCum, 1.83 MCum and 1.83 MCum in 2nd, 3rd, 4th, and 5th year respectively. The total generated OB will be simultaneously backfilled from 2nd year onwards (Refer Table 14.16).

iii. Top soil dump

The total topsoil generated (0.71 MCum [illegible] the development of mine will be stacked separately in a soil stack pile in non-forest area in the southern side of the block. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled area. The top soil stockpiles will be low height not exceeding 3 m and will be grassed to retain fertility. Besides this topsoil stack, there would be temporary stacks near the excavation area and area to be reclaimed which will be made use of for concurrent filling without bringing the topsoil to the soil stack near the OB dump.

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d) The void

The remaining void area of the excavated pit will ultimately become a water reservoir, having a maximum depth of about 60 m. This void area will also be suitably sloped, bunded and fenced. The Conceptual plan and conceptual mine section have been shown in Plate XIX and Plate XX in the Mining Plan, which shows the final stage at the end of mine operations with external dump and final void.

The generation and disposal of total waste quantities for the life of mine are shown in Table 14.16.

TABLE 14.16
WASTE DISPOSAL (PURE OB) IN MCUM (BANK) - PROGRESSIVE

Year	Total surface dump	Topsoil dump	Total backfill	Total bund	Total OB disposal
1st year	1.78	0.02	0.00	0.00	1.80
2nd year	0.00	0.03	3.01	0.00	3.03
3rd year	0.00	0.04	1.98	0.00	2.02
4th year	0.00	0.02	1.81	0.00	1.83
5th year	0.00	0.03	1.80	0.00	1.83
Conceptual (23rd Year)	0.00	0.58	25.73	0.00	26.31
Total	**1.78**	**0.71**	**34.31**	**0.00**	**36.81**
Rehandling in 6th to 10th year	**-1.78**	**0**	**1.78**	**0**	**1.78**
Grand total	**0**	**0.71**	**36.09**	**0.00**	**38.59**

14.3.5 Topsoil management

The average topsoil thickness over the whole pit area envisaged for mining is proposed to be removed to the extent of about 0.60 m. About 0.71 Mcum B of topsoil will have to be handled from areas to be excavated. About 0.14 Mcum stock (max.) of the topsoil will be kept over an area of 3.0 Ha. Extra generation of top soil will be utilised in two ways, part of the surplus top soil will be used for reclamation annually, whereas the rest will be stacked at pit head temporarily for consecutive laying over backfilling. Usually about 0.5 m thick layer of topsoil will be laid for afforestation. Topsoil availability and utilisation are shown in Table 14.17.

TABLE 14.17
AVAILABILITY/REQUIREMENT OF TOPSOIL FOR RECLAMATION STAGES (MCUM) CUMULATIVE (LOOSE)

End of year	Top soil available	Topsoil utilised	Topsoil stack
1	0.053	0.02	0.04
2	0.139	0.05	0.09
3	0.188	0.09	0.10
4	0.237	0.12	0.12
5	0.287	0.15	0.14
Conceptual (23rd)	0.82	0.82	0.00

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14.3.6 Infrastructure

Bikram Block represents the northern contiguous area of the Karkati Sector of the Sohagpur Coalfield. The Bikram Block lies to the immediate north of the working Navgaon and Rajendra Mines of Sohagpur Area, SECL. The Shahdol-Amarkantak Highway No 14 passes 7 km due NE of the block area. The block can be approached from this road by an all-weather feeder road. The nearest railway station is Burhar, on the Bilaspur-Katni Section of S.E. railway, it is located at a distance of about 9 km due NE of the Block. Baisaha nala flowing in the west and Nargara nala in the east constitute the main drainage of the area.

The only village falling within the block boundary is Bardara. Almost half of the block is covered by Burhar Reserve forest. Out of the remaining area, area in the western part of the block is covered by partially cultivated land.

Initially, the coal will be transported by road to Satna Cement Plant via Shahdol. Shahdol is 18 km from the block and Satna is 230 km from Shahdol.

Subsequently, the company intends to transport coal by railways by taking a siding at Burhar. The railway transportation distance to Satna will be about 285 km via Shahdol and Katni.

No approach road is required to be made from outside the block as a feeder road already exists. Any roads will only be internal roads i.e roads inside the block. No new routes will be required to be created for transport. No diversion or closure of existing roads needed.

No transmission line will be required to be diverted. A power line of 11 KV will be drawn from Burhar sub station of MPSEB to the local sub-station from where the power will be supplied to the mine and other functional buildings. An emergency arrangement for power supply will be made by providing a set of 2x500 KVA DG sets which will take care of ventilation and pumping.

Infrastructure like canteen, first aid centre, rest shelter and site office will be available at site while the main facilities will be within the ML area.

It is a new proposed Greenfield project hence, there are no existing facilities of the mine within the ML area. Dismantling of some of the pit head facilities will only be involved in the post mining stage.

14.3.7 Disposal of mining machinery

It is a new proposed mine and hence any dismantling of mine machinery will be involved only after exhausting the mine i.e. 25 years after the OC operations cease.

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14.3.8 Safety and security

The life of the OC mine operations is 23 years. During the tenure of mining operations, the following safety precautions will be implemented:

i. Erecting barbered wire fencing around the areas being excavated
ii. Erecting barbered wire fencing around the areas being dumped
iii. Erecting bunds/ toe walls around the surface dumps to prevent damage to property or injury to persons by rolling stones

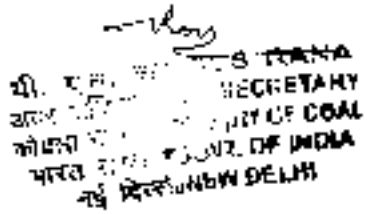
After finishing the mining operations, all areas which will be inaccessible and dangerous (excavated, dumps etc) will be fenced. In the post mining scenario, proper approach to the water body will be made for men and animals and the route will be thrown open for the public.

14.4 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE AND MANPOWER RETRENCHMENT

Not applicable as it is a new proposed mine

14.5 TIME SCHEDULING FOR ABANDONMENT

Not Applicable as it is a new proposed mine.



14.6 ABANDONMENT COST

Out of 239 ha area of ML, the following area as tabulated in Table 14.18 will be disturbed by various activities during the life of mine:

TABLE 14.18
AREA TO BE DISTURBED BY MINING

Sl. No.	Description of area	Land use (Ha.)				
		Plantation	Water body	Public use	Undisturbed	Total
I.	ML Area					
8.	Top soil dump	3.00	0.00	0.00	0.00	3.00
9.	Surface dump	0.00	0.00	0.00	0.00	0.00
10.	a) Excavation	79.53	39.07	0.00	0.00	118.60
	b) Surface water reservoir	0.00	1.60	0.00	0.00	1.60
11.	Facilities	2.00	0.00	0.00	0.00	2.00
12.	Roads	0.00	0.00	3.00	0.00	3.00
13.	Green belt	6.89	0.00	0.00	0.00	6.89
14.	Undisturbed area by OC	0.00	0.00	0.00	103.91	103.91
	Total	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**
II	**Out side the ML area**					
	Surface dump	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00
	Grand Total I +II =	**91.42**	**40.67**	**3.00**	**103.91**	**239.00**

The economic involvement will be as follows.

In line with the Guidelines, it has been estimated by MOC that typically closure cost of an OC mine will be about Rs 6 lakhs / ha and of an UG mine it will be Rs 1 lakh/ ha.

The area disturbed by OC mining and related surface activities = **(91.42 + 40.67 + 3.00) ha** = 135.09 ha
The rest area used for UG mining = 103.91 ha
Total = **239.00 ha**

Total cost to be deposited in Escrow account in 25 years (as the life of the OC mine will be 23 years and it will be 33 years including the UG operations) will be as follows:

For OC mining: 135.09 ha x Rs 6.0 lakhs = Rs 810.54 lakhs
For UG mining: 103.91 ha x Rs 1.0 lakh = Rs 103.91 lakhs
Total at base cost of Aug. 2009 = **Rs 914.45 lakhs**

The cost in the 1st year to be deposited= Rs 914.45 / 25= Rs 36.58 lakhs

The cost to be deposited in every subsequent year will be 5% higher than the cost of the previous year and so on as follows:

Year	Amount to be deposited in Escrow Account (Rs Lakhs)
1	36.58
2	38.41
3	40.33
4	42.35
5	44.46
6	46.69
7	49.02
8	51.47
9	54.05
10	56.75
11	59.58
12	62.56
13	65.69
14	68.98
15	72.43
16	76.05
17	79.85
18	83.84
19	88.03
20	92.44
21	97.06
22	101.91

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NEW DELHI

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Year	Amount to be deposited in Escrow Account (Rs Lakhs)
23	107.01
24	112.36
25	117.97
26	123.87
27	130.07
28	136.57
29	143.40
30	150.57
31	158.10
Total	**2513.44**

Thus the total amount which will be deposited upto the end of post mine closure plan will be Rs. 25 13 crores which will be used for technical and biological reclamation, landscaping, plantation, water coursing, dismantling of unwanted structures, creating safe and beautiful ambience etc

14.7 FINANCIAL ASSURANCE

i. The mining company shall open an Escrow account, with the Coal Controller Organisation (on behalf of the Central Govt.) as executive beneficiary The mining company shall cause payments to be deposited in such Escrow account at the rate computed as indicated in table given above.

ii. When implementation of the final mine closure scheme is undertaken by the mine owner starting 5 years before the scheduled closure of the mining operations, the Coal Controller may permit withdrawals (4 year before final mine closure date) from the Escrow account proportionate to the quantum of the work carried out as reimbursement. The withdrawn amount each year will not exceed 20% of the total amount deposited in the account.

iii. An agreement, outlining the detailed terms and conditions of operating the Escrow account, shall be executed between the Mining company, Coal Controller and the concerned bank in order to give effect to this. The agreement will be executed before the grant of the permission by the Coal Controller to open the mine.

14.8 RESPONSIBILITY OF THE MINE OWNER

It is the responsibility of the mine owner to ensure that the protective measures contained in the Mine Closure Plan including reclamation and rehabilitation works have been carried out in accordance with the approved Mine Closure Plan and Final Mine Closure Plan.

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The owner shall submit an yearly report to the Coal Controller before 1st July of every year setting forth the extent of protective and rehabilitative works carried out as envisaged in the approved mine closure plan (Progressive and Post mine Closure Plan).

14.9 PROVISION FOR MINE CLOSURE

The mine owner will be required to obtain a mine closure certificate from Coal Controller to the effect that the protective, reclamation and rehabilitation works in accordance with the approved mine closure plan/ Final mine Closure Plan have been carried out by the mine owner for surrendering the reclaimed land to the State Govt. concerned.

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ANNEXURES TO CHAPTER - 2

2-1 RQP Certificate from Ministry of Coal and Mines

2-2 Block allocation letter

2-3 Letter addressed to joint president, Birla Corporation Ltd., from CMPDL conveying that the matter for settling the cost has been referred to MOC dt 27.03.2009

V. S. RAINA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

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ANNEXURE : 2-1

No.13016/18/2004-CA
Government of India
Ministry of Coal & Mines
Department of Coal
***

New Delhi, dated the ~~19th~~ 24th August, 2004.

To

Shri B.D.Sharma,
M/s Min Mec Consultancy Pvt. Ltd.
A-121, Parayavaran Complex, IGNOU Road,
New Delhi – 110 030.

Subject: Grant of recognition as competent person to prepare mining plan.

Sir,

I am directed to invite your attention to our letter of even number dated 01.06.2004 on the subject mentioned above and to state that the Government has widened the scope of recognition to prepare mining plan. Under this decision you can prepare mining plan for coal and lignite for any block up-to 10 (ten) years from the date of last recognition i.e., 01.06.2004.

N. S. RANA
UNDER SECRETARY
TO GOVT. OF INDIA
NEW DELHI

Yours faithfully,

(S.K.Kakkar)
Under Secretary to the Govt. of India

B.D.SHARMA
RQP

ANNEXURE : 2-2

No 38011/2/2007-CA-I
Government of India
Ministry of Coal

.....

New Delhi, dated the 12th August, 2008.

To

M/s. Birla Corporation Ltd.,
9/1, R.N. Mukherjee Road,
Kolkata – 700 001.

Subject : Allocation of **Bikram** coal block in the State of **Madhya Pradesh** for captive mining of coal by **M/s. Birla Corporation Ltd.** for their **11.8 mtpa Cement Plants** in Dist. Satna (MP), Dist. Chanderia (Rajasthan), Dist. Durgapur (WB).

.....

Sir,

I am directed to refer to the application of **M/s. Birla Corporation Ltd.**, for allocation of coal block in the State of **Madhya Pradesh** and to state that this has been considered by the Central Government and it has been decided to allot **Bikram** coal block in the command area of Western Coalfields Ltd. to **M/s. Birla Corporation Ltd.**, to meet the coal requirement for **11.8 mtpa** of capacity in their **Cement Plants** in Dist. Satna (MP), Dist. Chanderia (Rajasthan), Dist. Durgapur (WB). The allocation of **Bikram** coal block to **M/s. Birla Corporation Ltd.**, 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 :-

i. The allocation of Bikram coal block to M/s. Birla Corporation Ltd., has been made to meet the coal requirement of **11.8 mtpa** of capacity in their **Cement Plants** in Dist. Satna (MP), Dist. Chanderia (Rajasthan), Dist. Durgapur (WB).

ii. The block is meant for captive use in their own specified end use project i.e. cement.

iii. The coal produced from the block shall not replace any coal linkages given to **M/s. Birla Corporation Ltd.**, by the Coal India Ltd. / its subsidiary and/or by the Singareni Collieries Company Ltd., without prior permission of this Ministry.

iv. 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.

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48 months (54 months in case the area falls under forest land) in case of UG mine from the date of preparation of GR. The end-use project schedule and the coal mine development schedule should be modified accordingly and submitted to the Ministry within 6 months from the date of this letter. A copy of the indicative milestone chart is enclosed.

vi. The company shall submit a bank guarantee for Rs. 4.43 crores (equal to one year's royalty amount based on mine capacity of 0.36 mtpa assessed by CMPDIL, grade of coal of C to D and the weighted average royalty @ Rs 123.11 per tonne) within three months from the date of issue of this letter. Subsequently, upon approval of mining plan, the Bank Guarantee amount will be modified based on the final peak/rated capacity of the mine.

(a) 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:

(b) There shall be an annual review of progress achieved by an allocattee 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.

(c) Once production commences, in case of any lag in the production of coal, 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)/100x100 = 15% will lead to deduction of 15% of the original bank guarantee amount for that year. Upon exhaustion of the bank guarantee amount, the block shall be liable for de-allocation/cancellation of mining lease.

(d) The allocattee 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.

vii. The 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.

S. RANA
UNDER SECRETARY
TO THE GOVT. OF INDIA
MINISTRY OF COAL
SHASTRI BHAWAN
NEW DELHI

viii. The 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 company shall be required to submit mine closure plan alongwith the mining plan as per the guidelines issued in this regard.

ix. 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.

B.D.SHARMA
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x. Mining of coal from the allocated captive coal block shall be carried out in accordance with the applicable Statutes/Rules/Orders/Directions governing the mining of coal in the country.

xi. 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.

xii. 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.

2. 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 sponge iron plant / power plant/cement plant.
b. Unsatisfactory progress in the development of coal mining project.
c. For breach of any of the conditions of allocation mentioned above.

3. 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 allocattee 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 company may approach CMPDIL for geological report and contact the State Government authorities concerned for necessary permissions/clearances etc. for attaining mining rights and related matters.

5. The arrangement of transport of coal will have to be worked out by the company in consultation with the Ministry of Railways / Ministry of Surface Transport depending on the mode of transport.

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

Yours faithfully,

(V.S. Rana)
Under Secretary to the Govt. of India.

Encls. As above.

B.D.SHARMA
RQP

To

1. Secretary, Ministry of Commerce & Industry (Deptt. of Industrial Policy & Promotion), Udyog Bhawan, New Delhi.
2. The Chief Secretary, Government of Madhya Pradesh, Secretariat, Bhopal.
3. The Chairman, Coal India Ltd., 10-Netaji Subash Marg, Kolkatta-700001
4. Chairman-cum-Mng.-Director, Central Mine Planning and Design Institute Ltd., Gondwana Place, Kanke Road, Ranchi, Jharkhand.
5. Chairman-cum-Mng.-Director, Western Coalfields Limited, Coal Estate, Civil Lines, Nagpur.
6. The Coal Controller, Office of the Coal Controller, 1, Council Street, Kolkata – 700 001.
7. CPAM Section.

(V.S. Rana)
Under Secretary to the Govt. of India.

B.D.SHARMA
RQP

MILESTONES CHART

Sl.No.	EVENT	TIME LIMIT IN MONTHS (FROM THE DATE OF ALLOCATION)
1.	PROSPECTING LICENSE	3
2.	COMPLETION OF EXPLORATION AND PREPARATION OF GEOLOGICAL REPORT (GR)	27
	EVENTS AFTER PREPARATION OF GR	TIME LIMIT IN MONTHS AFTER PREPARATION OF GR
3	MINING LEASE APPLICATION	3
4	SUBMISSION OF MINING PLAN	6
5	MINING PLAN APPROVAL	8
6	PREVIOUS APPROVAL APPLICATION	11
7	PREVIOUS APPROVAL	11
8	FOREST CLEARANCE APPLICATION	12
9	ENVIRONMENT CLEARANCE	18
10	GRANT OF MINING LEASE	24
11	LAND ACQUISITION BEGIN	9, 19
12	LAND ACQUISITION	30, 36
13	OPENING PERMISSION APPLICATION	34, 40 (FOR UG) 46, 52 (FOR UG)
14	GRANT OF OPENING PERMISSION	36, 42 (FOR UG) 48, 54 (FOR UG)
15	PRODUCTION	36, 42 (FOR OC) 48, 54 (FOR UG)
16	REACHING RATED CAPACITY	

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ANNEXURE : 2-3

CMPDI

An ISO 9001 Company

Central Mine Planning & Design Institute Limited

Gondwana Place, Kanke Road, Ranchi-834031 (Jharkhand)

No. DG/033.7/Captive/ 866 - BY SPEED POST Date : 27.03.2009 2/3

To,
The Joint President,
M/s. Birla Corporation Ltd.,
Birla Building,
9/1, R.N.Mukherjee Road,
Kolkata-700001

Sub : **Payment of Cost of exploration of Bikram Block in Shahdol Dist. Madhya Pradesh**

Dear Sir,

This has reference to your letter dated 19.03.2009 on the above subject.

CMPDI is having some Tax related problem in respect of the cost of Geological Report and the matter has been referred to Ministry of Coal. As such we are not in a position to accept the cost of exploration of Bikram Block till necessary clarifications are received from MoC.

The Draft No. 159399 for Rs. 2,89,04,769/- (Rupees two crore eighty nine lakh four thousand seven hundred sixty nine) is being returned herewith.

Yours faithfully,

Encl : Draft No.159399 dtd. 19.3.2009

Chief General Manager (Expln.)

बी. एन. ... S. RANA

[illegible]

☎ (0651) (Off) 2230358, 2232827, 2230201 (Fax No.) 2231447 & 2231851, 2230475 Gram MINEPLAN, E-Mail : [illegible]

B.D.SHARMA
RQP.

ANNEXURES TO CHAPTER - 3

3-I Khasra wise land use of core zone

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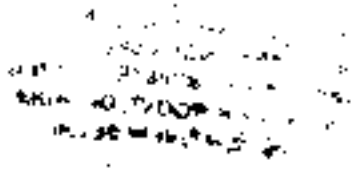

ANNEXURE : 3-1

Land use (Hectares)	Gopalpur(Hec.)	Bartara (Hec.)
Agriculture	20.570	56.271
Barren	2.549	1.618
Judpi Gungle (Revenue Forest)	3.514	5.506
Pond , Road, School etc (Govt. L	0.822	5.699
House	8 Nos.	45 nos.
Well	9 nos.	38 nos.
Boundary (Merh)	0.376	Nil

V. S. RANA
Under Secretary
Govt. of I
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B.D.SHARMA
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BIKRAM COAL BLOCK (Distt Shahdol).
(Birla Corporation Limited)

Khasra Schedule of the area applied for Bikram Coal Block Lease in Village – Gopalpur, Tehsil Sohagpur, District Shahdol

Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land			In Hectares	in Acres	
			Revenue Forest	Others				
1	85	0.676			part	0.502	1.24	Agriculture
2	86	0.672			part	0.526	1.30	Barren
3	87	0.700			Full	0.700	1.73	Agriculture
4	88	0.069			Full	0.069	0.17	Boundary (Merh)
5	89	0.709			Full	0.709	1.75	Agriculture
6	90		0.081		Full	0.081	0.20	Jhudpi jungle
7	91	0.121			Full	0.121	0.30	Agriculture
8	92	0.138			Full	0.138	0.34	Agriculture
9	93	0.450			Full	0.450	1.11	Agriculture
10	94	0.081			Full	0.081	0.20	Agriculture
11	95		0.769		Full	0.769	1.90	Jhudpi jungle
12	96		0.437		part	0.101	0.25	Jhudpi jungle
13	106/1	0.405			part	0.061	0.15	Agriculture
14	106/2	0.480			part	0.040	0.10	Agriculture
15	106/3	0.041			part	0.020	0.05	Agriculture
16	107			0.202	part	0.101	0.26	Road
17	181	0.028			Full	0.028	0.07	Boundary (Merh)
18	182/1	0.405			Full	0.405	1.00	Agriculture
19	182/2		1.113		part	0.506	1.25	Judpi jungle
20	183	0.247			Full	0.247	0.61	Boundary (Merh)
21	184	0.417			Full	0.417	1.03	Agriculture
22	185	0.405			Full	0.405	1.00	Agriculture
23	186	0.781			Full	0.781	1.93	Agriculture
24	187/1	0.821			Full	0.821	2.03	Agriculture
25	187/2	0.405			Full	0.405	1.00	Barren
26	188	0.210			Full	0.210	0.52	Agriculture
27	189		0.069		Full	0.069	0.17	Judpi jungle
28	190	0.834			Full	0.834	2.06	Agriculture
29	191	0.486			Full	0.486	1.20	Agriculture
30	192	0.121			Full	0.121	0.30	Agriculture
31	193	0.320			Full	0.320	0.79	Agriculture
32	194	0.320			Full	0.320	0.79	Agriculture
33	195		0.717		Full	0.717	1.77	Judpi jungle
34	196	0.142			Full	0.142	0.35	Agriculture
35	197	0.061			Full	0.061	0.15	Agriculture
36	198	0.308			Full	0.308	0.76	Agriculture
37	199	0.032			Full	0.032	0.08	Boundary (Merh)
38	200	0.866			part	0.433	1.07	Agriculture
39	202	2.643			part	1.618	4.00	Barren
40	206	1.319			part	1.132	2.80	Agriculture

V. S. KHANNA
Under Secretary
Govt. of India
Ministry of Coal, New Delhi

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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land			In Hectares	In Acres	
			Revenue Forest	Others				
41	207	1.489			Full	1.489	3.68	Agriculture
42	208	0.275			Full	0.275	0.68	Agriculture
43	209	0.368			part	0.282	0.70	Agriculture
44	210/1	0.405			Full	0.405	1.00	Agriculture
45	210/2	0.728			Full	0.728	1.80	Agriculture
46	211	0.633			part	0.405	1.00	Agriculture
47	215/1Ka	1.066			part	0.202	0.50	Agriculture
48	227/1	1.315			part	0.129	0.32	Agriculture
49	227/2Ka	0.329			part	0.311	0.77	Agriculture
50	227/2Kha	0.329			part	0.311	0.77	Agriculture
51	227/2Ga	0.329			part	0.311	0.77	Agriculture
52	227/2Gha	0.329			part	0.311	0.77	Agriculture
53	228			0.587	part	0.283	0.70	Pond Merh
54	229			0.757	part	0.377	0.93	Pond
55	230			0.134	part	0.061	0.15	Pond Merh
56	231	0.182			part	0.040	0.10	Agriculture
57	232	1.052			part	0.526	1.30	Agriculture
58	233/1		1.271		Full	1.271	3.14	Jadpi jungle
59	233/2	1.214			Full	1.214	3.00	Agriculture
60	234	1.416			Full	1.416	3.50	Agriculture
61	235/1	0.421			part	0.202	0.50	Agriculture
62	235/2	0.744			part	0.405	1.00	Agriculture
63	236	0.607			Full	0.607	1.50	Agriculture
64	237/1	1.214			part	0.242	0.60	Agriculture
65	237/2	0.324			Full	0.324	0.80	Agriculture
66	266/381	0.417			Full	0.417	1.03	Agriculture
	Total	31.079	4.467	1.880		27.631	68.78	

V. S. RANA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

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BIKRAM COAL BLOCK (Distt Shahdol)
(Birla Corporation Limited)

Khasra Schedule of the area applied for Bikram Coal Block Lease in Village - Bartara, Tehsil Sohagpur, District Shahdol

Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	In Acres	
1	719	0.146			part	0.085	0.21	Agriculture
2	720	0.040			part	0.028	0.07	Agriculture
3	721/1	0.109			part	0.081	0.20	Agriculture
4	721/2	0.121			part	0.093	0.23	Agriculture
5	722	0.024			Full	0.024	0.06	Agriculture
6	723	0.045			Full	0.045	0.11	Agriculture
7	724	0.129			Part	0.081	0.20	Agriculture
8	725	0.162			Part	0.020	0.05	Agriculture
9	729	0.409			part	0.121	0.30	Agriculture
10	741	0.543			Part	0.041	0.10	Agriculture
11	742	0.704			Part	0.351	0.87	Agriculture
12	743	0.162			Full	0.162	0.40	Agriculture
13	744	0.745			Full	0.745	1.84	Agriculture
14	745	0.142			Full	0.142	0.35	Agriculture
15	746	0.588			Part	0.446	1.10	Agriculture
16	747	0.162			part	0.142	0.35	Agriculture
17	748	0.162			Full	0.162	0.40	Agriculture
18	749	0.344			Part	0.121	0.30	Agriculture
19	751/1			5.551	part	1.416	3.50	Barren
20	751/1Ka	0.053			Full	0.053	0.13	Agriculture
21	751/1Kha	0.246			part	0.053	0.13	Agriculture
22	751/2	0.081			Full	0.081	0.20	Agriculture
23	751/3	0.202			part	0.053	0.13	Agriculture
24	751/4	0.202			part	0.053	0.13	Agriculture
25	751/5	0.109			part	0.053	0.13	Agriculture
26	751/6	0.133			part	0.053	0.13	Agriculture
27	751/7	0.182			part	0.053	0.13	Agriculture
28	751/8	0.202			part	0.053	0.13	Agriculture
29	751/9	0.202			part	0.053	0.13	Agriculture
30	751/10	0.202			part	0.053	0.13	Agriculture

J. S. RAJPA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

B.D.SHARMA
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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	in Acres	
31	770/1			1.585	Full	1.585	3.92	Barren
32	770/2	0.227			Full	0.227	0.56	Agriculture
33	770/3	0.202			Full	0.202	0.50	Agriculture
34	770/4	0.405			Full	0.405	1.00	Agriculture
35	770/5	0.081			Full	0.081	0.20	Agriculture
36	771	0.040			Full	0.040	0.10	Agriculture
37	772	0.041			Full	0.041	0.10	Agriculture
38	773	0.081			Full	0.081	0.20	Agriculture
39	774	0.040			Full	0.040	0.10	Agriculture
40	775	0.040			Full	0.040	0.10	Agriculture
41	776	0.202			Full	0.202	0.50	Agriculture
42	777	0.251			Full	0.251	0.62	Agriculture
43	778	0.154			Full	0.154	0.38	Agriculture
44	779			0.162	Full	0.162	0.40	Barren
45	780	0.121			Full	0.121	0.33	Agriculture
46	781	0.202			Full	0.202	0.50	Agriculture
47	782/1Ka	0.809			Full	0.809	2.00	Agriculture
48	782/1Kha	0.101			Full	0.101	0.25	Agriculture
49	782/2Ka	0.113			Full	0.113	0.28	Agriculture
50	782/2Kha	0.109			Full	0.109	0.27	Agriculture
51	783	0.243			Full	0.243	0.60	Agriculture
52	784	0.243			Full	0.243	0.60	Agriculture
53	785	1.048			Full	1.048	2.59	Agriculture
54	786/1	1.031			Full	1.031	2.55	Agriculture
55	786/2	0.385			Full	0.385	0.95	Agriculture
56	787	1.214			Full	1.214	3.00	Agriculture
57	788			0.336	Full	0.336	0.83	School-Building
58	789	0.202			Full	0.202	0.50	Agriculture
59	790	0.040			Full	0.040	0.10	Agriculture
60	791	0.049			Full	0.049	0.12	Agriculture
61	792	0.040			Full	0.040	0.10	Agriculture
62	793	0.304			Full	0.304	0.75	Agriculture
63	794	0.267			Full	0.267	0.66	Agriculture
64	795	0.202			Full	0.202	0.50	Agriculture
65	796	0.202			Full	0.202	0.50	Agriculture
66	797/1	0.126			Full	0.126	0.31	Agriculture
67	797/2	0.084			Full	0.084	0.21	Agriculture
68	797/3	0.042			Full	0.042	0.10	Agriculture
69	797/4	0.032			Full	0.032	0.08	Agriculture

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Sl No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	In Acres	
70	797/5	0.032			Full	0.032	0.08	Agriculture
71	797/6	0.032			Full	0.032	0.08	Agriculture
72	797/7	0.032			Full	0.032	0.08	Agriculture
73	798/1	0.147			Full	0.147	0.36	Agriculture
74	798/2	0.100			Full	0.100	0.25	Agriculture
75	798/3	0.048			Full	0.048	0.12	Agriculture
76	799	0.668			Full	0.668	1.65	Agriculture
77	800	0.117			Full	0.117	0.29	Agriculture
78	801/1	0.105			Full	0.105	0.26	Agriculture
79	801/2	0.105			Full	0.105	0.26	Agriculture
80	802	0.093			Full	0.093	0.23	Agriculture
81	803	0.057			Full	0.057	0.14	Agriculture
82	804/1	0.210			Full	0.210	0.52	Agriculture
83	804/2	0.211			Full	0.211	0.52	Agriculture
84	805/1KA	0.080			Full	0.080	0.20	Agriculture
85	805/1KHA	0.080			Full	0.080	0.20	Agriculture
86	805/2	0.162			Full	0.162	0.40	Agriculture
87	806	0.146			Full	0.146	0.36	Agriculture
88	807	0.291			Full	0.291	0.72	Agriculture
89	808/1	0.137			Full	0.137	0.34	Agriculture
90	808/2	0.138			Full	0.138	0.34	Agriculture
91	809/1		0.040		Full	0.040	0.10	Jhudpi Jungle
92	809/2	0.137			Full	0.137	0.34	Agriculture
93	810	0.122			Full	0.122	0.30	Agriculture
94	811	0.077			Full	0.077	0.19	Agriculture
95	812	0.243			Full	0.243	0.60	Agriculture
96	813	0.081			Full	0.081	0.20	Agriculture
97	814	0.190			Full	0.190	0.47	Agriculture
98	815	0.222			Full	0.222	0.55	Agriculture
99	816	0.073			Full	0.073	0.18	Agriculture
100	817	0.134			Full	0.134	0.33	Agriculture
101	818	0.085			Full	0.085	0.21	Agriculture
102	819	0.121			Full	0.121	0.30	Agriculture
103	820	0.117			Full	0.117	0.29	Agriculture
104	821	0.105			Full	0.105	0.26	Agriculture
105	822	0.069			Full	0.069	0.17	Agriculture
106	823	0.417			Full	0.417	1.03	Agriculture
107	824	0.040			Full	0.040	0.10	Agriculture
108	825	0.024			Full	0.024	0.06	Agriculture

V.S. SAINA
Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New Delhi

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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		in Hectares	In Acres	
109	826/1	0.319			Full	0.319	0.79	Agriculture
110	826/2	0.159			Full	0.159	0.39	Agriculture
111	827/1	0.303			Full	0.303	0.75	Agriculture
112	827/2	0.210			Full	0.210	0.52	Agriculture
113	827/3	0.162			Full	0.162	0.40	Agriculture
114	827/4	0.121			Full	0.121	0.30	Agriculture
115	827/5	0.202			Full	0.202	0.50	Agriculture
116	827/6	0.323			Full	0.323	0.80	Agriculture
117	828	0.283			Full	0.283	0.70	Agriculture
118	829			0.372	Full	0.372	0.92	Road
119	830	0.360			Full	0.360	0.89	Agriculture
120	831/1	0.040			Full	0.040	0.10	Agriculture
121	831/2	0.040			Full	0.040	0.10	Agriculture
122	832/1		1.036		Full	1.036	2.56	Dhodpi Jungle/ Cr
123	832/2	0.607			Full	0.607	1.50	Agriculture
124	833	0.526			Full	0.526	1.30	Agriculture
125	834	0.162			part	0.162	0.40	Agriculture
126	835/1			0.198	Full	0.198	0.49	Barren
127	835/2	0.748			Full	0.748	1.84	Agriculture
128	835/3	0.372			Full	0.372	0.92	Agriculture
129	835/4	0.255			Full	0.255	0.63	Agriculture
130	835/5	0.286			Full	0.286	0.71	Agriculture
131	835/6	0.081			Full	0.081	0.20	Agriculture
132	836	0.583			Full	0.583	1.44	Agriculture
133	837	0.271			Full	0.271	0.67	Agriculture
134	838	0.271			Full	0.271	0.67	Agriculture
135	839	0.482			Full	0.482	1.19	Agriculture
136	840	0.093			Full	0.093	0.23	Agriculture
137	841	0.033			Full	0.033	0.08	Agriculture
138	842	0.032			Full	0.032	0.08	Agriculture
139	843	0.028			Full	0.028	0.07	Agriculture
140	844	0.032			Full	0.032	0.08	Agriculture
141	845	0.271			Full	0.271	0.72	Agriculture
142	846	0.028			Full	0.028	0.07	Agriculture
143	847	0.024			Full	0.024	0.06	Agriculture
144	848	0.040			Full	0.040	0.10	Agriculture
145	849	0.036			Full	0.036	0.09	Agriculture
146	850	0.028			Full	0.028	0.07	Agriculture
147	851/1	0.014			Full	0.014	0.035	Agriculture

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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		in Hectares	In Acres	
148	851/2	0.014			Full	0.014	0.035	Agriculture
149	852	0.024			Full	0.024	0.06	Agriculture
150	853	0.032			Full	0.032	0.08	Agriculture
151	854/1	0.012			Full	0.012	0.03	Agriculture
152	854/2	0.012			Full	0.012	0.03	Agriculture
153	855	0.036			Full	0.036	0.09	Agriculture
154	856	0.024			Full	0.024	0.06	Agriculture
155	857	0.016			Full	0.016	0.04	Agriculture
156	858	0.065			Full	0.065	0.16	Agriculture
157	859/1	0.016			Full	0.016	0.04	Agriculture
158	859/2	0.016			Full	0.016	0.04	Agriculture
159	860	0.032			Full	0.032	0.08	Agriculture
160	861	0.077			Full	0.077	0.19	Agriculture
161	862	0.077			Full	0.077	0.19	Agriculture
162	863/1	0.036			Full	0.036	0.09	Agriculture
163	863/2	0.037			Full	0.037	0.09	Agriculture
164	864	0.073			Full	0.073	0.18	Agriculture
165	865	0.061			part	0.028	0.07	Agriculture
166	866/1	0.031			part	0.016	0.04	Agriculture
167	866/2	0.030			part	0.016	0.04	Agriculture
168	867	0.016			Full	0.016	0.04	Agriculture
169	868	0.020			Full	0.020	0.05	Agriculture
170	869	0.053			Full	0.053	0.13	Agriculture
171	870/1	0.016			part	0.012	0.03	Agriculture
172	870/2	0.016			part	0.012	0.03	Agriculture
173	871	0.028			part	0.008	0.02	Agriculture
174	872	0.081			part	0.040	0.10	Agriculture
175	873	0.045			part	0.041	0.10	Agriculture
176	874	0.085			Part	0.020	0.05	Agriculture
177	884	0.603			part	0.263	0.65	Agriculture
178	887	0.097			part	0.016	0.04	Agriculture
179	889	0.202			part	0.161	0.40	Agriculture
180	890	0.032			Full	0.032	0.08	Agriculture
181	891	0.118			Full	0.118	0.29	Agriculture
182	892	0.142			Full	0.142	0.35	Agriculture
183	893	0.085			part	0.040	0.10	Agriculture
184	1309	0.049			part	0.020	0.05	Agriculture
185	1310	0.049			Full	0.049	0.12	Agriculture
186	1311/1	0.086			Full	0.086	0.21	Agriculture

V. S. RANA
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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	In Acres	
187	1311/2	0.048			Full	0.048	0.12	Agriculture
188	1312	0.129			Full	0.129	0.32	Agriculture
189	1313	0.308			part	0.121	0.30	Agriculture
190	1322	3.941			part	1.214	3.00	Agriculture
191	1323			0.186	Full	0.186	0.46	Barren
192	1324			0.433	Full	0.433	1.07	Pond
193	1325			0.113	Full	0.113	0.28	Barren
194	1326	0.405			Full	0.405	1.00	Barren
195	1327	0.081			Full	0.081	0.20	Agriculture
196	1328	0.206			Full	0.206	0.51	Agriculture
197	1329/1	0.190			Full	0.190	0.47	Agriculture
198	1329/2	0.114			Full	0.114	0.28	Agriculture
199	1330	0.299			Full	0.299	0.74	Agriculture
200	1331	4.650			part	0.405	1.00	Agriculture
201	1332	0.194			part	0.061	0.15	Agriculture
202	1349	0.243			part	0.041	0.10	Agriculture
203	1351	0.267			part	0.061	0.15	Agriculture
204	1352	0.376			Full	0.376	0.93	Agriculture
205	1353	0.267			part	0.242	0.60	Agriculture
206	1354	0.158			Full	0.158	0.39	Agriculture
207	1355	0.166			Full	0.166	0.41	Agriculture
208	1356	0.348			Full	0.348	0.86	Agriculture
209	1357	0.348			Full	0.348	0.86	Agriculture
210	1358/1	0.149			part	0.061	0.15	Agriculture
211	1358/2	0.150			part	0.061	0.15	Agriculture
212	1358/3	0.150			part	0.061	0.15	Agriculture
213	1359	0.202			Full	0.202	0.50	Agriculture
214	1360	0.211			Full	0.211	0.52	Agriculture
215	1361	0.093			Full	0.093	0.23	Agriculture
216	1362	0.453			part	0.405	1.00	Agriculture
217	1363	0.397			part	0.040	0.10	Agriculture
218	1419	0.409			part	0.142	0.35	Agriculture
219	1420	0.493			part	0.060	0.15	Agriculture
220	1421	0.409			Full	0.409	1.01	Agriculture
221	1422	0.081			Full	0.081	0.20	Agriculture
222	1423	0.499			Full	0.499	1.22	Agriculture
223	1424/1	1.063			part	0.506	1.25	Agriculture
224	1424/2	1.192			part	0.506	1.25	Agriculture
225	1425	0.644			Full	0.644	1.59	Agriculture

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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	In Acres	
226	1426	0.910			Full	0.910	2.25	Barren
227	1427	0.607			Full	0.607	1.50	Agriculture
228	1428/1		1.137		Full	1.137	2.81	Jhudpi Jungle
229	1428/2	0.186			Full	0.186	0.46	Agriculture
230	1429	0.405			Full	0.405	1.00	Agriculture
231	1430	0.660			Full	0.660	1.63	Agriculture
232	1431	0.478			Full	0.478	1.18	Agriculture
233	1432		0.231		Full	0.231	0.57	Jhudpi Jungle
234	1433	0.146			Full	0.146	0.36	Agriculture
235	1434	0.283			Full	0.283	0.70	Agriculture
236	1435/1		0.203		Full	0.203	0.50	Jhudpi Jungle
237	1435/2	0.202			Full	0.202	0.50	Agriculture
238	1436	1.214			Full	1.214	3.00	Agriculture
239	1437/1		0.809		part	0.810	2.00	Jhudpi Jungle
240	1437/2	0.304			part	0.203	0.50	Agriculture
241	1437/3	0.405			part	0.303	0.75	Barren
242	1437/4	0.405			part	0.303	0.75	Agriculture
243	1443	0.462			part	0.222	0.55	Agriculture
244	1444		0.405		part	0.101	0.25	Jhudpi Jungle
245	1445	0.283			part	0.041	0.10	Agriculture
246	1542		0.065		Full	0.065	0.16	Jhudpi Jungle
247	1543/1 Ka	0.138			Full	0.138	0.34	Agriculture
248	1543/1 Kha	0.138			Full	0.138	0.34	Agriculture
249	1543/2	1.011			Full	1.011	2.50	Agriculture
250	1544/1	0.276			Full	0.276	0.68	Agriculture
251	1544/2	1.011			Full	1.011	2.50	Agriculture
252	1545	0.941			Full	0.941	2.40	Agriculture
253	1546/1		1.154		Full	1.154	2.85	Jhudpi Jungle
254	1546/2	1.012			Full	1.012	2.50	Agriculture
255	1588/1	0.304			Full	0.304	0.75	Agriculture
256	1588/2	0.303			Full	0.303	0.75	Agriculture
257	1589	0.227			part	0.113	0.28	Agriculture
258	1590	0.057			part	0.032	0.08	Agriculture
259	1591	0.348			part	0.174	0.43	Agriculture
260	1593	2.340			part	1.070	2.64	Agriculture
261	1594	1.404			part	0.810	2.00	Agriculture
262	1595	0.712			Full	0.712	1.76	Agriculture
263	1596/1	0.270			Full	0.270	0.67	Agriculture
264	1596/2	0.270			Full	0.270	0.67	Agriculture

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Sl. No.	Khasra no.	Total Area (Hectares)			part/Full	Total applied Area		Remarks
		Private land	Govt. Land					
			Revenue Forest	Others		In Hectares	In Acres	
265	1596/3	0.260			Full	0.260	0.65	Agriculture
266	1597	1.011			Full	1.011	2.50	Agriculture
267	1598	0.696			Full	0.696	1.72	Agriculture
268	1599		0.729		Full	0.729	1.80	Jhudpi Jungle
269	1600	0.222			Full	0.222	0.55	Agriculture
270	1601			0.364	Full	0.364	0.90	Nallah
271	1602	0.502			Full	0.502	1.24	Agriculture
272	1603	1.801			part	0.910	2.25	Agriculture
273	1604	0.668			part	0.340	0.82	Agriculture
274	1605			0.259	part	0.129	0.32	Nallah
275	1626	1.096			part	0.546	1.35	Agriculture
276	1632	0.809			Part	0.020	0.05	Agriculture
277	1636/1			0.405	Full	0.405	1.00	Beeren
278	1636/2	1.619			part	0.910	2.25	Agriculture
279	1636/3	0.627			part	0.303	0.75	Agriculture
280	1637/1ka	0.396			part	0.170	0.42	Agriculture
281	1637/1kha	0.405			part	0.202	0.50	Agriculture
282	1637/2	0.607			part	0.405	1.00	Agriculture
283	1638	0.344			Part	0.161	0.40	Agriculture
284	793/1695	0.049			Full	0.049	0.12	Agriculture
285	826/1701	0.040			Full	0.040	0.10	Agriculture
286	826/1702	0.045			Full	0.045	0.11	Agriculture
	Total	79.203	5.909	9.964		69.094	170.88	

Under Secretary
Govt. of India
Ministry of Coal
Shastri Bhawan, New

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ANNEXURES TO CHAPTER - 5

5-1 Techno-Economic evaluation to find out whether the extension of OC mining operations should be extended beyond the extent incorporated in the draft Mining Plan (Aug, 09 version).

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

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ANNEXURE : 5-1

TECHNO-ECONOMIC EVALUATION FOR WHETHER OC OPERATIONS CAN BE EXTENDED BEYOND THE LIMITS OF PROPOSED OPTION IN DRAFT MINING PLAN (AUGUST 2009 VERSION) IN BIKRAM BLOCK

I. OPENCAST COAL AND INCOME FROM IT

Seam	Extractable Reserves MT	Grade	Price Rupees per tonne (October 2009)	Total income/tonne Rs. million
IX	2.709	F	570	1544.13
VIII	1.049	C	1180	1237.82
Total	3.758		Av. weighted 740	2781.95

II. THE COST OF PRODUCTION IN OC MINING

OB:Coal ratio – 9.8:1 (cum:te)

Prevailing MDO rate including blasting @ Rs 75/1 (assumed)

hence,

Cost of OB removal = 9.8 X Rs. 75.00 = Rs. 735.0 per tonne
Taking management cost etc. @ Rs. 25 per tonne
The coal will cost as Rs 760 per tonne

The above calculation show that the cost of production will be about Rs. 760 per tonne against the weighted average price of coal at Rs. 740 per tonne within a narrow range of variation of 3% from each other. Hence, it can be concluded that there is no possibility of extending the OC mining operations beyond the ones proposed in Draft mining Plan (August 2009 version). Accordingly, the same status has been kept in this final Mining Plan also.

वी. एस. रामा/V. S. RAMA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

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ANNEXURES TO CHAPTER - 13

13-1	Land use pattern (Census 2001) in buffer zone
13-2	Soil quality analysis
13-3	List of flora in study area and core zone
13-4	List of fauna in study area and core zone
13-5	Ambient air quality analysis results
13-6	Noise levels in study area
13-7	Water test results
13-8	Village wise demography and socio-economic pattern in the study area (Census 2001)

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

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LAND USE PATTTERN WITHIN THE STUDY AREA AS PER CENSUS 2001 (area in Ha.)

PROJECT : BIKRAM COAL MINING BLOCK

Town/ village code	Town/village name	Total area	Forest land	Irrigated land	Unirrigated land	Culturable waste land	Area not available for cultivation
District	Shahdol						
Tehsil	Sohagpur						
01959100	Harra (Tola)	267.00	8.00	50.00	140.00	54.00	15.00
01959200	Semariha	382.00	37.00	31.00	265.00	80.00	29.00
01959300	Chalaha	160.00	0.00	39.00	95.00	19.00	7.00
01960000	Kerha	125.00	0.00	5.00	96.00	9.00	15.00
01960100	Madwa	244.00	0.00	5.00	220.00	9.00	10.00
01960200	Dubha	118.00	0.00	2.00	108.00	2.00	6.00
01960300	Bivafalkhar Abad	110.00	0.00	3.00	76.00	25.00	6.00
01960500	Bhanpur	515.00	0.00	26.00	373.00	47.00	69.00
01961300	Bodri	960.00	0.00	58.00	521.00	309.00	72.00
01961400	Atariya	280.00	0.00	7.00	225.00	27.00	21.00
01961500	Mithauri	723.00	53.00	40.00	499.00	118.00	13.00
01961600	Dulhara	175.00	0.00	12.00	145.00	13.00	5.00
01961700	Chhirpani	207.00	0.00	15.00	167.00	17.00	8.00
01961800	Kamatal	156.00	0.00	3.00	134.00	14.00	5.00
01962000	Nipaniya	203.00	0.00	6.00	179.00	15.00	3.00
01962100	Sigudi	263.00	0.00	8.00	227.00	25.00	3.00
01962300	Akajhar	565.00	116.00	13.00	284.00	11.00	141.00
01962400	Padmaniya Khurd	328.00	17.00	15.00	234.00	3.00	59.00
01962500	Singhpur	1377.00	232.00	64.00	833.00	103.00	145.00
01962900	Jodhpur	792.00	111.00	79.00	503.00	22.00	77.00
01963900	Ralpur	379.00	53.00	13.00	220.00	53.00	40.00
01964000	Padmaniya Kalan	438.00	85.00	4.00	296.00	12.00	41.00
01964100	Nargi	389.00	26.00	30.00	271.00	22.00	40.00
01964200	Urduiya	510.00	0.00	111.00	307.00	34.00	58.00
01964300	Padariya	395.00	0.00	32.00	280.00	30.00	53.00
01983900	Latpur	2117.00	0.00	13.00	853.00	1151.00	100.00
01984000	Kanchanpur	1098.00	0.00	182.00	819.00	0.00	97.00
01984100	Chhata	340.00	0.00	13.00	273.00	44.00	10.00
01984200	Pipartara	327.00	0.00	16.00	240.00	62.00	9.00
01984300	Dhanpuri	307.00	3.00	4.00	183.00	85.00	32.00
01984400	Dhanpura	488.00	13.00	15.00	213.00	180.00	67.00
01984500	Majhiyar	261.00	0.00	1.00	196.00	54.00	10.00
01984600	Chauradih	423.00	49.00	9.00	190.00	124.00	51.00
01984700	Barlara	769.00	127.00	2.00	382.00	185.00	73.00
01984800	Khamnath	531.00	13.00	58.00	216.00	182.00	52.00
01984900	Naugawa	271.00	58.00	5.00	153.00	31.00	24.00
01985000	Khairha	773.00	0.00	14.00	422.00	267.00	70.00
01985100	Kadauha	317.00	0.00	10.00	172.00	98.00	37.00
01985200	Pipariya	256.00	70.00	1.00	144.00	34.00	7.00
01985300	Sarangpur	473.00	5.00	6.00	334.00	112.00	16.00
01985400	Hardee	1068.00	351.00	19.00	421.00	225.00	52.00
01985800	Bhamni Kalan	357.00	0.00	40.00	263.00	41.00	13.00
01985900	Dhamni Khurd	245.00	17.00	2.00	122.00	97.00	7.00
01986000	Kudari	215.00	4.00	22.00	139.00	39.00	11.00
01986100	Garruha	428.00	57.00	8.00	255.00	94.00	14.00
01986200	Jawari	364.00	0.00	3.00	259.00	86.00	16.00
01986300	Semara	306.00	21.00	1.00	263.00	19.00	2.00
01986700	Korasha	671.00	297.00	0.00	206.00	126.00	43.00
01986800	Dhanora	246.00	110.00	0.00	89.00	42.00	5.00
01987400	Bandi Khurd	244.00	3.00	14.00	153.00	63.00	11.00
01987500	Bamhauri	604.00	252.00	5.00	120.00	112.00	115.00
01987600	Garphandiya	190.00	0.00	0.00	110.00	49.00	31.00
01987700	Saigin	61.00	0.00	4.00	45.00	6.00	6.00

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[1/2]

LAND USE PATTTERN WITHIN THE STUDY AREA AS PER CENSUS 2001 (area in Ha.)

PROJECT : BIKRAM COAL MINING BLOCK

Town/ village code	Town/village name	Total area	Forest land	Irrigated land	Unirrigated land	Culturable waste land	Area not available for cultivation
01987600	Arjhula	238.00	62.00	1.00	84.00	61.00	30.00
01988000	Baigin	84 00	0.00	0.00	50 00	22.00	12.00
01988100	Sarai Kunpa	303.00	0.00	16.00	156.00	11 00	120.00
01988200	Karkali	643.00	255.00	24.00	249.00	73.00	42.00
01988300	Chirhati	437 00	114.00	26.00	193 00	67.00	37 00
01988400	Sirouja	419.00	172.00	1.00	169.00	47.00	30.00
01988500	Devgama	186.00	41.00	0 00	99.00	22.00	24 00
01988600	Devgai	159.00	0.00	34.00	99 00	11 00	15.00
01988700	Bagpar	796.00	520.00	15.00	175.00	68.00	18.00
01988800	Bandi Kalan	274 00	60.00	2.00	149.00	37.00	26.00
01988900	Katkona	415.00	10.00	0.00	224.00	100.00	81.00
01989000	Vikrampur	539 00	0.00	0.00	292.00	67.00	180 00
01989100	Chituhela	308.00	0.00	0.00	150.00	75.00	83.00
01989200	Ahigawan	208.00	0.00	0.00	142.00	52.00	14.00
01989300	Gopalpur	329.00	129.00	0.00	142.00	43 00	15.00
01989400	Jati Tola	515.00	39.00	5.00	238.00	113.00	120.00
01989500	Pakriya	352 00	0.00	0.00	196 00	134.00	22.00
01989700	Sonwarsha	230.00	0.00	0.00	141.00	78.00	11.00
01989800	Semra	579 00	0 00	0 00	329.00	177.00	73.00
01989900	Samda Tola	423 00	0.00	0.00	172 00	207 00	44.00
01990000	Jarwahi	769.00	62.00	3.00	301.00	278 00	125.00
01990100	Sobo	1070.00	340.00	1.00	407.00	190.00	132.00
41607000	Burhar (NP)	1276.50	0.00	0.00	0.00	0.00	1276.50
41608000	Dhanpuri Nargada Hari I	2552 90	0.00	0.00	0 00	0.00	2552.90
41609000	Amlai (CT) (Part)	1087.50	0.00	0.00	0.00	0.00	1087.50
	Sub total	**38003.90**	**3992.00**	**1276.00**	**18020.00**	**6613.00**	**8092.90**
Tehsil	**Anuppur**						
02025500	Tummbar	282.00	28.00	3.00	175.00	65 00	11.00
	Sub total	**282.00**	**28.00**	**3.00**	**175.00**	**65.00**	**11.00**
	Total of district	**38285.90**	**4020.00**	**1279.00**	**18205.00**	**6678.00**	**8103.90**
	Other landuse (as per Toposheet)						
Reserved/Protected Forests		4615.51	4615.51	0.00	0.00	0.00	0.00
	Sub total	**4615.51**	**4615.51**	**0.00**	**0.00**	**0.00**	**0.00**
	Grand total	**42901.41**	**8635.51**	**1279.00**	**18205.00**	**6678.00**	**8103.90**
	Percentage	**100.00**	**20.13**	**2.98**	**42.43**	**15.57**	**18.89**

श्री. एस. राणा/ S. RANA
अपर सचिव/ADDL. SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

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ANNEXURE : 13-2

SOIL TEST RESULTS
Bikram Coal Block

Parameter	Units	Burahar	Bartara Village	Dhanipur
pH	-	6.2	6.5	5.1
E.C	µmho/cm	534	440	85
$CaCO_3$	% by mass	6.5	6.5	5
Bulk Density	g/cm^3	1.22	1.29	1.54
Moisture	% by mass	6.44	4 29	0.78
Organic Matter	% by mass	1.94	2.55	0.76
Chloride	% by mass	0.02	0.01	0.01
Sulphate	% by mass	0.012	0.009	0.006
Phosphorous	ppm (mg/kg)	0.5	0.4	0.5
Nitrate	ppm (mg/kg)	32.5	41.2	9.5
Iron	ppm (mg/kg)	3.2	1.6	3.2
Sodium	% by mass	0.008	0.010	0.002
Potasslum	% by mass	0.016	0.012	0.005

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LIST OF FLORA IN THE STUDY AREA OF BIKRAM COAL BLOCK AT SOHAGPUR COAL FIELD, SHAHDOL DISTRICT, MADHYA PRADESH OF BIRLA CORP. LTD.

Sl.No.	Botanical Name	Common Name	Family
	Trees		
1.	*Acacia auriculiformis*	Australian wattle	Mimosacaae
2.	*Acacia leucophloea*	Rlunja	Mimosaceae
3.	*Acacia nilotica*	Babool	Mimosaceae
4.	*Adina cardifolia*	Haldu	Rublaceae
5.	*Aegle marmelos*	Bel	Rutaceae
6.	*Ailanthus excelsa*	Mahanim	Simaroubaceae
7.	*Albizia lebbeck*	Kala siris	Mimosaceae
8.	*Albizia odoratissima*	Chichwa	Mimosaceae
9.	*Alstonia scholaris*	Saptaparni	Apocynaceae
10.	*Annona squamosa*	Sharifa	Annonaceae
11.	*Anogeissus latifolia*	Dhawda	Combretaceae
12.	*Artocarpus heterophyllus*	Kathal	Moraceae
13.	*Azadirachta indica*	Neem	Meliaceae
14.	*Bauhinia racemosa*	Apta	Caesalpiniaceae
15.	*Bauhinia variegata*	Kachnar	Caesalpiniaceae
16.	*Bombax malabaricum*	Semal	Bombacaceae
17.	*Boswellia serrata*	Salai	Burseraceae
18.	*Bridelia retusa*	Kasai	Euphorbiaceae
19.	*Buchanania lanzan*	Achar	Anacardiaceae
20.	*Butea monosperma*	Palas	Papilionaceae
21.	*Careya arborea*	Kumbhi	Myrtaceae
22.	*Cassia fistula*	Amaltas	Caesalpiniaceae
23.	*Chloroxylum swietenia*	Bhirra	Flindersiaceae
24.	*Cleistanthus collinus*	Karra	Euphorbiaceae
25.	*Dalbergia paniculata*	Dhobin	Papilionaceae
26.	*Dalbergia sissoo*	Sissoo	Papilionaceae
27.	*Delonix regia*	Gulmohar	Caesalpiniaceae
28.	*Diospyros melanoxylon*	Tendu	Ebenaceae
29.	*Emblica officinalis*	Aonla	Euphorbiaceae
30.	*Eucalyptus hybrid*	Nilgiri	Myrtaceae
31.	*Eugenia heyneana*	Kath-jamun	Myrtaceae
32.	*Ficus benghalensis*	Bargad	Moraceae
33.	*Ficus glomerata*	Gular	Moraceae
34.	*Ficus infectoria*	Parak	Moraceae
35.	*Ficus racemosa*	Gular	Moraceae
36.	*Ficus religiosa*	Peepal	Moraceae
37.	*Garuga pinnata*	Kekad	Burseraceae
38.	*Gmelina arborea*	Gamari	Verbinaceae

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Sl.No.	Botanical Name	Common Name	Family
39.	*Grewia tiliaefolia*	Dhaman	Teliaceae
40.	*Lagerstroemia parviflora*	Senha	Lythraceae
41.	*Lannea grandis*	Gunja	Anacardiaceae
42.	*Madhuca latifolia*	Mahua	Sapotaceae
43.	*Mangifera indica*	Aam	Anacardiaceae
44.	*Melia azedarach*	Bakain	Meliaceae
45.	*Mitragyna parviflora*	Mundi	Rubiaceae
46.	*Moringa oleifera*	Sahjan	Moringaceae
47.	*Ougeinia dalbergioides*	Tinsa	Papillonaceae
48.	*Phoenix sylvestris*	Khajoor	Palmae
49.	*Pithecellobium dulce*	Jangli jalebee	Mimosaceae
50.	*Pongamia glabra*	Karanz	Papilionaceae
51.	*Psidium guajava*	Amrud	Myrtaceae
52.	*Pterocarpus marsupium*	Bijasal	Papilionaceae
53.	*Schleichera oleosa*	Kusum	Sapindaceae
54.	*Semecarpus anacardium*	Bhelwa	Anacardiaceae
55.	*Shorea robusta*	Sarai	Diplerocarpaceae
56.	*Spondias pinnata*	Amera	Anacardiaceae
57.	*Syzygium cumini*	Jamun	Myrtaceae
58.	*Syzygium jambolana*	Kathjamun	Myrtaceae
59.	*Tamarindus indica*	Imli	Caesalpiniaceae
60.	*Tectona grandis*	Sagaun	Verbenaceae
61.	*Terminalia arjuna*	Arjun	Combretaceae
62.	*Terminalia bellerica*	Bahera	Combretaceae
63.	*Terminalia chebula*	Harara	Combretaceae
64.	*Terminalia tomentosa*	Saja	Combretaceae
65.	*Vitex negundo*	Nirgudi	Verbenaceae
66.	*Zizyphus jujube*	Ber	Rhamnaceae
67.	*Zizyphus xylopyra*	Ghont	Rhamnaceae
	Shrubs		
1.	*Calotropis gigantia*	Aak	Asclepiadaceae
2.	*Cassia alata*	Candle-stick tree	Caesalpiniaceae
3.	*Cassia tora*	Tarota	Caesalpiniaceae
4.	*Datura metel*	Dhaturo	Solanaceae
5.	*Gardenia gummifera*	Kuddu	Rubiaceae
6.	*Gardenia latifolia*	Papra	Rubiaceae
7.	*Holarrhena antidysenterica*	Karchi, Dudhi	Apocynaceae
8.	*Ipomoea carnea*	Hedge glory	Convolvulaceae
9.	*Jatropha curcas*	Ratanjot	Euphorbiaceae
10.	*Lantana camara*	Rajmunia	Verbenaceae
11.	*Leucas aspera*	Gopha	Labiatae
12.	*Nyctanthus arbortristis*	Harsingar	Oleaceae

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Sl.No.	Botanical Name	Common Name	Family
13.	*Ocimum gratissimum*	Banatulsi	Labiatae
14.	*Phoenix acaulis*	Chhind	Palmae
15.	*Ricinus communis*	Arand	Euphorbiaceae
16.	*Woodfordia fruticosa*	Dhawai	Lythraceae
17.	*Xanthium strumarium*	Godaria	Asteraceae
	Herbs		
1.	*Achyranthus aspera*	Chirchira	Amaranthaceae
2.	*Amaranthus spinosus*	chaulii	Amaranthaceae
3.	*Euphorbia hirta*	Dudhi bel	Euphorbiaceae
4.	*Oscimum sanctum*	Tulsi	Labiatae
5.	*Solanum nigrum*	Bhatkadrana	Solanaceae
	Climbers		
1.	*Abrus precatorius*	Gunnj	Papilionaceae
2.	*Asparagus racemosus*	Shatavari	Liliaceae
3.	*Bauhinia Vahlii*	Mahul	Caesalpiniaceae
4.	*Butea superba*	Palasbel	Papilionaceae
5.	*Dioscorea bulbifera*	Kand	Dioscoreaceae
6.	*Zizyphus oenoplia*	Makor	Rhamnaceae
	Grasses		
1.	*Bambusa arundinacea*	Kanta bans	Poaceae
2.	*Cymbopogon martini*	Rusa ghans	Poaceae
3.	*Cynodon dactylon*	Doob	Poaceae
4.	*Cyperus rotundus*	Motha	Cyperaceae
5.	*Dendrocalamus strictus*	Bans	Poaceae
6.	*Heteropogon contortus*	Kushal	Poaceae
7.	*Saccharum spontaneum*	Kans	Poaceae
8.	*Themeda quadivalvis*	Ghonad	Poaceae
	Parasite		
1.	*Cuscuta reflexa*	Amarbel	Cuscutaceae
	Epiphyte		
1.	*Vanda roxburghii*	Banda	Loranthaceae
	Hydrophytes		
1.	*Nelumbo nucifera*	Lotus	Nelumbonaceae
2.	*Nymphaea stellata*	Water lily	Nymphaeaceae

GOVT OF INDIA ... NEW DELHI

प्रमाण पत्र

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वन परिक्षेत्र अधिकारी
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LIST OF FLORA IN THE CORE ZONE OF BIKRAM COAL BLOCK AT SOHAGPUR COAL FIELD, SHAHDOL DISTRICT, MADHYA PRADESH OF BIRLA CORP. LTD.

Sl.No.	Botanical Name	Common Name	Family
	Trees		
1.	*Acacia auriculiformis*	Australian wattle	Mimosaceae
2.	*Acacia leucophloea*	Riunja	Mimosaceae
3.	*Acacia nilotica*	Babool	Mimosaceae
4.	*Aegle marmelos*	Bel	Rutaceae
5.	*Ailanthus excelsa*	Mahanim	Simaroubaceae
6.	*Albizia lebbeck*	Kala siris	Mimosaceae
7.	*Annona squamosa*	Sharifa	Annonaceae
8.	*Anogeissus latifolia*	Dhawda	Combretaceae
9.	*Artocarpus heterophyllus*	Kathal	Moraceae
10.	*Azadirachta indica*	Neem	Meliaceae
11.	*Bauhinia variegata*	Kachnar	Caesalpiniaceae
12.	*Buchanania lanzan*	Achar	Anacardiaceae
13.	*Butea monosperma*	Palas	Papilionaceae
14.	*Cassia fistula*	Amaltas	Caesalpiniaceae
15.	*Dalbergia paniculata*	Dhobin	Papilionaceae
16.	*Dalbergia sissoo*	Sissoo	Papilionaceae
17.	*Diospyros melanoxylon*	Tendu	Ebenaceae
18.	*Eucalyptus hybrid*	Nilgiri	Myrtaceae
19.	*Ficus benghalensis*	Bargad	Moraceae
20.	*Ficus infectoria*	Parak	Moraceae
21.	*Ficus religiosa*	Peepal	Moraceae
22.	*Gmelina arborea*	Gamari	Verbinaceae
23.	*Lagerstroemia parviflora*	Senha	Lythraceae
24.	*Lannea grandis*	Gunja	Anacardiaceae
25.	*Madhuca latifolia*	Mahua	Sapotaceae
26.	*Mangifera indica*	Aam	Anacardiaceae
27.	*Melia azedarach*	Bakain	Meliaceae
28.	*Mitragyna parviflora*	Mundi	Rubiaceae
29.	*Moringa oleifera*	Sahjan	Moringaceae
30.	*Pithecellobium dulce*	Jangli jalebee	Mimosaceae
31.	*Pongamia glabra*	Karanz	Papilionaceae
32.	*Psidium guejava*	Amrud	Myrtaceae

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Sl.No.	Botanical Name	Common Name	Family
33.	*Schleichera oleosa*	Kusum	Sapindaceae
34.	*Shorea robusta*	Sarai	Dipterocarpaceae
35.	*Syzygium cumini*	Jamun	Myrtaceae
36.	*Tamarindus indica*	Imli	Caesalpiniaceae
37.	*Terminalia arjuna*	Arjun	Combretaceae
38.	*Terminalia bellerica*	Bahera	Combretaceae
39.	*Terminalia tomentosa*	Saja	Combretaceae
40.	*Zizyphus jujube*	Ber	Rhamnaceae
	Shrubs		
1.	*Calotropis gigantia*	Aak	Asclepiadaceae
2.	*Cassia alata*	Candle-stick tree	Caesalpiniaceae
3.	*Cassia tora*	Tarota	Caesalpiniaceae
4.	*Datura metel*	Dhaturo	Solanaceae
5.	*Gardenia gummifera*	Kuddu	Rubiaceae
6.	*Holarrhena antidysenterica*	Karchi, Dudhi	Apocynaceae
7.	*Ipomoea carnea*	Hedge glory	Convolvulaceae
8.	*Jatropha curcas*	Ratanjot	Euphorbiaceae
9.	*Lantana camara*	Rajmunia	Verbenaceae
10.	*Leucas aspera*	Gopha	Labiatae
11.	*Ocimum gratissimum*	Banatulsi	Labiatae
12.	*Phoenix acaulis*	Chhind	Palmae
13.	*Ricinus communis*	Arand	Euphorbiaceae
14.	*Woodfordia fruticosa*	Dhawai	Lythraceae
15.	*Xanthium strumarium*	Godaria	Asteraceae
	Herbs		
1.	*Achyranthus aspera*	Chirchira	Amaranthaceae
2.	*Amaranthus spinosus*	chaulli	Amaranthaceae
3.	*Euphorbia hirta*	Dudhi bal	Euphorbiaceae
4.	*Ocsimum sanctum*	Tulsi	Labiatae
5.	*Solanum nigrum*	Bhatkadranti	Solanaceae
	Climbers		
1.	*Asparagus racemosus*	Shatavari	Liliaceae
2.	*Butea superba*	Palasbel	Papilionaceae
3.	*Dioscorea bulbifera*	Kand	Dioscoreaceae
4.	*Zizyphus oenoplia*	Makor	Rhamnaceae
	Grasses		
1.	*Bambusa arundinacea*	Kanta bans	Poaceae

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Sl.No.	Botanical Name	Common Name	Family
2	*Cymbopogon martini*	Rusa ghans	Poaceae
3.	*Cynodon dactylon*	Doob	Poaceae
4	*Dendrocalamus strictus*	Bans	Poaceae
5.	*Heteropogon contortus*	Kushal	Poaceae
6.	*Themeda quadrivulvis*	Ghonad	Poaceae
	Parasite		
1.	*Cuscuta reflexa*	Amarbel	Cuscutaceae
	Epiphyte		
1.	*Vanda roxburghii*	Banda	Loranthaceae
	Hydrophytes		
1.	*Nelumbo nucifera*	Lotus	Nelumbonaceae
2.	*Nymphaea stellata*	Water lily	Nymphaeaceae

श्री. एस. एस. शर्मा
अवर सचिव UNDER SECRETARY
भारत सरकार GOVT OF INDIA

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LIST OF FAUNA IN THE STUDY AREA OF BIKRAM COAL BLOCK AT SOHAGPUR COAL FIELD, SHAHDOL DISTRICT, MADHYA PRADESH OF BIRLA CORP. LTD.

S.No.	Scientific Name	Common Name	Family	Reference to schedule as per Wild Life Protection Act 1972, as amended upto 2006		
				Schedule	Part	Serial
	Mammals					
1.	*Axis axis*	Chital	Cervidae	III	-	5
2.	*Canis aureus*	Jackal	Canidae	II	II	2-B
3.	*Felis chaus affinis*	Jungle cat	Felidae	II	II	2-C
4.	*Funambulus pennanti*	Five striped palm squirrel	Sciuridae	IV	-	3-A
5.	*Lepus nigricollis*	Indian hare	Leporidae	IV	-	4
6.	*Melursus ursinus*	Sloth bear	Ursidae	II	II	5
7.	*Presbytis entellus*	Languor	Cercopithecidae	II	I	4-A
8.	*Rattus rattus*	Common house rat	Muridae	V	-	6
9.	Rhesus macaque	Monkey	Cercopithecidae	II	I	17-A
10.	*Sus scrofa*	Indian wildboar	Suidae	III	-	19
11.	*Vulpes bengalensis*	Fox	Canidae	II	II	1-B
	Aves					
1.	*Acridotheres fuscus*	Jungle myna	Sturnidae	IV	-	11(45)
2.	*Acridotheres tristis*	Myna	Sturnidae	IV	-	11(45)
3.	*Aredea cenerla*	Grey heron	Ardeidae	IV	-	11(22)
4.	*Brachypternus benghalensis*	Golden backed woodpeacker	Picidae	IV	-	11(79)
5.	*Bubo bubo*	Owl	Strigidae	IV	-	11(48)
6.	*Bubucus ibis*	Cattle egret	Ardeidae	IV	-	11(22)
7.	*Columba livia*	Blue rock pigeon	Columbidae	-	-	-
8.	*Coracias bengalensis*	Indian roller	Coraciidae	IV	-	11(59)
9.	*Corvus splendens*	House crow	Corvidae	V		1
10.	*Coturnix coturnix*	Common quail	Phasianidae	IV		11(57)
11.	*Cuculus varius*	Common Hawk-cuckoo	Cuculidae	IV		11(17)
12.	*Francolinus pondicerianus*	Grey patridge	Phaslanidae	IV		11(51)
13.	*Gallus gallus*	Jungle fowl	Phasianidae	IV	-	11(36-A)
14.	*Milvus migrans*	Black kite	Accipitridae	IV	-	11(75)
15.	*Motacilla cinerea*	Grey waig tail	Motacillidae	IV	-	11(55)

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S.No.	Scientific Name	Common Name	Family	Reference to schedule as per Wild Life Protection Act 1972, as amended upto 2006		
				Schedule	Part	Serial
16.	*Passer domesticus*	House sparrow	Passerinae	-	-	-
17.	*Perdicula asiatica*	Grey quail	Phasianidae	IV	-	11(57)
18.	*Psittacula krameri*	Rosenringed parakeet	Psittacidae	IV	-	11(50)
19.	*Pycnonotus luteolus*	White bulbul	Pycnonotidae	IV	-	11(8)
20.	*Streptopelia chinensis*	Spotted dove	Columbidae	IV	-	11(19)
	Reptiles					
1.	*Bungarus caeruleus*	Common Indian krait	Elapidae	IV	-	12(vi)
2.	*Calotes versicolor*	Lizard	Agamidae	-	-	-
3.	*Eryx johnii*	Indian sand boa	Boidae	IV	-	12(iii)
4.	*Ophiophagus Hannah*	King cobra	Elapidae	II	II	12
5.	*Ptyas mucosus*	Dharman	Colubridae	II	II	9
6.	Python molurus	Indian python	Pythonidae	I	II	14-A
7.	*Varanus bengalensis*	Common Indian monitor	Varanidae	I	II	10
8.	*Vipera russelli*	Russel viper	Viperadae	II	II	14
	Fishes					
1.	*Catla catla*	Catla	Cyprinidae	-	-	-
2.	*Cirrhina mrigala*	Mrigal	Cyprinidae	-	-	-
3.	*Labeo fimbriatus*	Mongri rou	Cyprinidae	-	-	-
4.	*Mystus aor*	Dingra	Bagridae	-	-	-
5.	*Mystus seenghala*	Freshwater catfish	Bagridae	-	-	-
6.	*Mystus vittatus*	Singhara	Bagridae	-	-	-

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LIST OF FAUNA IN THE CORE ZONE OF BIKRAM COAL BLOCK AT SOHAGPUR COAL FIELD, SHAHDOL DISTRICT, MADHYA PRADESH OF BIRLA CORP. LTD.

S.No.	Scientific Name	Common Name	Family	Reference to schedule as per Wild Life Protection Act 1972, as amended upto 2006		
				Schedule	Part	Serial
	Mammals					
1.	*Felis chaus affinis*	Jungle cat	Felidae	II	II	2-C
2.	*Funambulus pennanti*	Five striped palm squirrel	Sciuridae	IV	-	3-A
3.	*Lepus nigricollis*	Indian hare	Leporidae	IV	-	4
4.	*Presbytis entellus*	Languor	Cercopithecidae	II	I	4-A
5.	*Rattus rattus*	Common house rat	Muridae	V	-	6
6.	Rhesus macaque	Monkey	Cercopithecidae	II	I	17-A
7.	*Sus scrofa*	Indian wildboar	Suidae	III	-	19
8.	*Vulpes-bengalensis*	Fox	Canidae	II	II	1-B
	Aves					
1.	*Acridotheres fuscus*	Jungle myna	Sturnidae	IV	-	11(45)
2.	*Acridotheres tristis*	Myna	Sturnidae	IV	-	11(45)
3.	*Aredea cinerea*	Grey heron	Ardeidae	IV	-	11(22)
4.	*Brachypternus benghalensis*	Golden backed woodpeacker	Picidae	IV	-	11(79)
5.	*Bubo bubo*	Owl	Strigidae	IV	-	11(48)
6.	*Bubucus ibis*	Cattle egret	Ardeidae	IV	-	11(22)
7.	*Columba livia*	Blue rock pigeon	Columbidae	-	-	-
8.	*Coracles bengalensis*	Indian roller	Coraciidae	IV	-	11(59)
9.	*Corvus splendens*	House crow	Corvidae	V	-	1
10.	*Coturnix coturnix*	Common quail	Phasianidae	IV	-	11(57)
11.	*Cuculus varius*	Common Hawk-cuckoo	Cuculidae	IV	-	11(17)
12.	*Francolinus pondicerianus*	Grey patridge	Phasianidae	IV	-	11(51)
13.	*Gallus gallus*	Jungle fowl	Phasianidae	IV	-	11(36-A)
14.	*Milvus migrans*	Black kite	Accipitridae	IV	-	11(75)
15.	*Motacilla cinerea*	Grey waig tail	Motacillidae	IV	-	11(55)
16.	*Passer domesticus*	House sparrow	Passerinae	-	-	-
17.	*Perdicula asiatica*	Grey quail	Phasianidae	IV	-	11(57)
18.	*Psittacula krameri*	Roseringed parakeet	Psittacidae	IV	-	11(50)

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S.No.	Scientific Name	Common Name	Family	Reference to schedule as per Wild Life Protection Act 1972, as amended upto 2006		
				Schedule	Part	Serial
	Reptiles					
1.	*Bungarus caeruleus*	Common Indian krait	Elapidae	IV	-	12(vi)
2.	*Calotes versicolor*	Lizard	Agamidae	-	-	-
3.	*Eryx johnii*	Indian sand boa	Boidae	IV	-	12(iii)
4	*Ophiophagus Hannah*	King cobra	Elapidae	II	II	12
5.	*Ptyas mucosus*	Dhaman	Colubridae	II	II	9
6.	*Varanus bengalensis*	Common Indian monitor	Varanidae	I	II	10
7.	*Vipera russelli*	Russel viper	Viperadae	II	II	14

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AMBIENT AIR QUALITY TEST RESULTS
BIKRAM COAL MINING BLOCK OF M/S BIRLA CORPORATION LTD.

Sl. No.	Date of sampling	24 hrly concentrations (in µg/m3)																			
		RPM	SPM	SO2	NOx	CO	RPM	SPM	SO2	NOx	CO	RPM	SPM	SO2	NOx	CO	RPM	SPM	SO2	NOx	CO
	LOCATION :	Core zoe (CA1)					Chooradih (BA1)					Ahirgaon (BA2)					1.5 km N of Sangwar (BA3)				
1	01-02/03/2009	41	115	6.5	6.5	209	34	96	7.0	7.5	193	35	96	7.6	9.9	224	46	129	6.1	10.6	228
2	05-06/03/2009	45	128	6.5	6.5	192	42	120	6.9	7.3	186	49	138	8.4	8.9	219	47	132	7.8	9.1	222
3	08-09/03/2009	42	119	7.4	7.4	212	45	128	7.9	7.9	219	47	133	8.9	9.0	191	45	126	6.0	9.4	217
4	12-13/03/2009	43	121	6.6	6.6	190	34	96	6.3	9.4	188	38	108	6.9	8.9	183	35	100	7.9	9.0	213
5	17-18/03/2009	42	121	7.0	7.0	196	39	110	6.3	8.7	188	50	142	8.1	9.1	195	44	125	6.4	10.2	222
6	21-22/03/2009	38	107	6.1	6.1	211	46	131	6.5	8.3	205	45	127	8.4	11.5	202	39	112	6.8	9.7	198
7	26-27/03/2009	43	121	6.2	6.2	182	36	101	6.3	8.4	211	44	125	6.8	10.0	212	45	128	7.9	11.1	226
8	29-30/03/2009	41	116	7.0	7.0	202	41	116	7.4	9.1	181	38	105	7.4	9.4	189	45	127	6.4	8.4	217
9	02-03/04/2009	33	94	7.8	7.8	190	38	107	7.1	7.2	184	47	131	8.6	9.4	195	42	119	8.0	9.7	205
10	06-07/04/2009	38	107	7.6	7.6	185	41	117	6.2	8.4	196	38	107	8.0	8.8	181	36	99	8.0	9.4	200
11	09-10/04/2009	38	107	6.3	6.3	188	42	119	6.2	9.0	213	50	142	7.8	9.2	212	45	128	8.2	9.0	203
12	13-14/04/2009	44	125	7.9	7.9	216	46	130	7.0	7.7	207	39	109	8.5	10.6	205	39	108	6.7	10.9	189
13	17-18/04/2009	36	102	6.8	6.8	187	38	107	6.4	8.4	199	50	141	6.8	11.3	180	40	112	6.2	8.8	220
14	20-21/04/2009	43	121	7.6	7.6	200	38	108	6.1	9.1	211	38	102	8.2	9.9	188	33	95	7.2	8.7	219
15	24-25/04/2009	39	110	7.5	7.5	200	40	113	6.3	9.5	194	44	125	7.8	11.4	180	44	125	7.5	9.8	204
16	28-29/04/2009	42	120	8.4	8.4	190	39	111	6.2	7.9	184	47	133	8.3	10.0	211	45	127	7.7	8.8	186
17	02-03/05/2009	37	102	7.6	7.6	205	39	110	7.3	8.3	209	35	99	8.5	9.2	209	38	108	7.7	9.4	211
18	06-07/05/2009	32	90	7.4	7.4	188	46	132	7.2	8.6	211	39	111	7.9	10.5	196	44	123	6.2	10.0	199
19	11-12/05/2009	42	117	6.9	6.9	200	38	106	7.9	9.0	214	42	117	8.6	9.5	192	45	127	6.4	9.7	220
20	15-16/05/2009	36	100	6.5	6.5	197	39	110	7.3	7.6	203	38	107	8.0	9.2	184	44	125	7.5	10.0	186
21	19-20/05/2009	43	121	6.6	6.6	200	42	118	6.3	9.2	196	38	106	8.8	9.3	205	42	116	7.6	11.0	228
22	22-23/05/2009	36	102	6.8	6.8	212	47	131	7.2	9.1	209	42	117	8.6	9.9	192	35	97	8.1	9.7	226
23	26-27/05/2009	42	120	6.6	6.6	217	44	124	7.6	8.1	192	43	120	8.3	10.2	212	40	112	7.2	11.1	186
24	29-30/05/2009	33	93	6.9	6.9	193	40	113	6.3	7.4	204	42	118	7.2	8.9	211	37	105	8.0	9.7	205
	Minimum	**32**	**90**	**6.1**	**6.1**	**182**	**34**	**96**	**6.1**	**7.2**	**181**	**35**	**96**	**6.8**	**8.8**	**180**	**33**	**95**	**6.0**	**8.4**	**186**
	Maximum	**45**	**128**	**7.9**	**7.9**	**217**	**47**	**132**	**7.9**	**9.5**	**219**	**50**	**142**	**8.9**	**11.5**	**224**	**47**	**132**	**8.2**	**11.1**	**228**
	Average	**39**	**111**	**6.9**	**6.9**	**198**	**41**	**115**	**6.8**	**8.4**	**200**	**42**	**119**	**8.0**	**9.8**	**199**	**41**	**117**	**7.2**	**9.7**	**210**
	98 percentile	**44**	**125**	**7.9**	**7.9**	**217**	**47**	**132**	**7.9**	**9.5**	**217**	**50**	**142**	**8.9**	**11.5**	**222**	**47**	**131**	**8.2**	**11.1**	**228**

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ANNEXURE : 13-5

AMBIENT AIR QUALITY TEST RESULTS
BIKRAM COAL MINING BLOCK OF M/S BIRLA CORPORATION LTD.

Sl. No.	Date of sampling	24 hrly concentrations (in µg/m3)														
		RPM	SPM	SO2	NOx	CO	RPM	SPM	SO2	NOx	CO	RPM	SPM	SO2	NOx	CO
	LOCATION :	Saraikapa (BA4)					Karkati (BA5)					Naygaon (BA6)				
1	01-02/03/2009	48	137	10.8	11.2	218	45	128	10.3	10.7	209	39	109	10.8	12.4	236
2	05-06/03/2009	45	127	10.7	13.2	209	39	109	9.7	10.1	236	47	133	10.1	11.7	253
3	08-09/03/2009	47	131	9.8	11.5	239	42	118	12.0	12.7	237	50	142	10.6	13.6	245
4	12-13/03/2009	48	135	11.9	12.1	204	44	124	8.4	12.1	236	49	138	8.7	11.2	210
5	17-18/03/2009	36	102	11.1	13.8	208	46	128	10.4	11.8	215	44	125	10.9	11.2	238
6	21-22/03/2009	50	141	9.6	12.1	209	53	149	9.2	10.7	238	54	151	10.0	10.7	240
7	26-27/03/2009	39	111	9.0	11.3	233	45	125	10.8	11.6	221	50	143	9.9	13.1	224
8	29-30/03/2009	43	121	8.8	9.7	241	38	108	10.6	12.7	239	44	125	8.6	12.4	211
9	02-03/04/2009	38	106	9.3	14.0	228	50	142	9.8	10.8	221	43	122	8.9	12.8	236
10	06-07/04/2009	40	114	9.2	13.6	214	52	147	11.1	13.6	225	48	135	11.3	12.3	219
11	09-10/04/2009	48	136	10.7	13.6	207	45	127	8.2	12.8	206	44	124	10.7	10.9	244
12	13-14/04/2009	45	128	11.4	12.0	209	53	148	9.3	12.6	231	39	108	9.1	11.1	245
13	17-18/04/2009	46	130	8.9	12.7	225	51	144	8.2	12.9	204	50	141	8.6	12.3	247
14	20-21/04/2009	40	111	10.6	10.9	215	46	130	10.8	13.8	230	47	133	9.8	10.8	234
15	24-25/04/2009	48	135	11.0	12.6	233	45	127	8.4	11.2	215	39	111	12.0	12.8	231
16	28-29/04/2009	46	129	11.3	13.7	222	47	131	9.4	11.3	204	44	123	11.8	13.7	248
17	02-03/05/2009	42	119	11.8	13.7	210	37	103	7.9	13.6	215	46	130	9.0	12.5	215
18	06-07/05/2009	45	128	9.4	12.2	227	47	135	11.7	14.0	234	40	113	11.5	12.7	206
19	11-12/05/2009	39	109	12.0	12.1	234	48	138	11.8	13.0	230	48	135	9.3	11.2	234
20	15-16/05/2009	50	139	11.6	13.8	242	50	141	9.3	10.8	215	44	124	12.0	13.1	240
21	19-20/05/2009	48	136	11.4	13.3	226	40	112	10.9	12.9	202	38	107	8.6	11.9	215
22	22-23/05/2009	42	120	10.1	11.1	206	43	121	11.7	12.2	211	46	131	10.6	13.0	221
23	26-27/05/2009	36	103	10.9	13.4	232	49	137	10.3	13.6	226	46	128	9.9	12.1	247
24	29-30/05/2009	38	108	8.3	10.5	225	41	116	9.6	12.3	241	43	119	9.4	11.9	246
	Minimum	**36**	**102**	**8.3**	**9.7**	**204**	**37**	**103**	**7.9**	**10.1**	**202**	**38**	**107**	**8.6**	**10.7**	**206**
	Maximum	**50**	**141**	**12.0**	**14.0**	**242**	**53**	**149**	**12.0**	**14.0**	**241**	**54**	**151**	**12.0**	**13.7**	**253**
	Average	**44**	**123**	**10.4**	**12.4**	**222**	**46**	**129**	**10.0**	**12.2**	**223**	**45**	**127**	**10.1**	**12.1**	**233**
	98 percentile	**50**	**140**	**12.0**	**13.9**	**242**	**53**	**149**	**11.9**	**13.9**	**240**	**52**	**147**	**12.0**	**13.7**	**250**

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ANNEXURE : 13-5 Contd...

NOISE LEVELS WITHIN THE STUDY AREA [Leq in dB(A)]
BIKRAM COAL BLOCK (M.P.)

Hours	Dhanpur	Sripapa Village	Neygaon	Karkati Village	Chauradih	Bartara Village	Ahirgaon	Gopalpur
Date of monitoring	30-31/05/09	29-30/05/09	26-27/05/09	25-26/05/09	24-25/05/09	23-24/05/09	28-29/05/09	27-28/05/09
1.00	50.0	50.1	49.0	49.2	48.4	47.9	47.9	46.9
2.00	48.7	47.7	47.7	49.2	47.6	47.9	46.9	47.7
3.00	48.4	47.7	46.9	46.8	48.4	49.2	49.4	47.7
4.00	50.0	51.6	48.4	50.7	49.1	47.6	49.4	48.4
5.00	49.5	50.5	50.1	50.4	50 3	47.9	51.1	50.5
6.00	53.0	47.7	50.1	49.2	49.1	50.3	49.4	50.1
7.00	51.6	50.1	49.6	50.7	48.4	50.1	48.7	49.6
8.00	52.9	51.6	50.1	50.4	50.8	51.5	52.0	51.3
9.00	53.0	54.5	52.5	51.6	52.0	56.6	54.8	50 1
10.00	54.3	57.1	56 2	56.2	53.2	57.6	54 2	56.2
11.00	56.1	54.5	54.6	55.3	55.2	55.2	53 2	55.8
12.00	57.9	53.8	51.6	53.0	55.2	51.3	54.9	51.0
13.00	51.9	55.8	54.5	54.9	55.0	51.3	53.2	54.6
14.00	52.6	53.8	53.9	55.4	56.9	54.8	57.1	54.5
15.00	52.8	54 5	54.6	59.4	55.0	53.9	53.2	54.5
16.00	56.3	56.2	57.1	55 4	56.9	54.8	55.5	55.8
17.00	57.6	52.2	55.7	53.4	55.2	54.5	56 7	53.9
18.00	59.2	55.5	51.3	53.6	54.8	55.2	53.2	51.0
19.00	56.3	51.3	50.5	51.6	51.2	51.2	52.3	52.2
20.00	53.3	50.5	50.5	52.3	50.8	52.7	51.5	50.5
21.00	51.8	50.1	47.7	50 4	49.1	49.6	49.4	48.4
22.00	51.9	49.6	50.1	49.6	47.6	48.6	47.9	47.7
23.00	51.8	51.6	49.6	50.1	49.1	48.8	47.9	48.4
24.00	49.3	49.6	49.0	46.8	47.6	47.9	48.7	47.7
Day time Leq.	**54.6**	**53.4**	**52.7**	**53.6**	**53.3**	**53.4**	**53.3**	**52.6**
Night time Leq.	**50.3**	**49.6**	**49.0**	**49.1**	**48.6**	**48.8**	**48.7**	**48.4**
Average Leq.	**52.9**	**52.0**	**51.3**	**51.9**	**51.6**	**51.6**	**51.6**	**51.0**
Permissible (Day)	**55**	**55**	**55**	**55**	**55**	**55**	**55**	**55**
Permissible (Night)	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**

B.D.SHARMA
EOS

ANNEXURE 13-6

WATER QUALITY TEST RESULTS

Parameters	Prescribed limits IS 10500	Khairha Village GW-1	Singhpur Village GW-2	Bartara Village GW-3	Lalpur GW-4	Dhanpuri Village GW-5	Bimhan Village GW-6	Karkati Village GW-7	Burhar GW-8	Son River SW-1	RamSagar Pond SW-2
Colour, Hazen units	5	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	13	Nil
Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	—	Agreeable
Odour	unobjectionable					unobjectionable					
Turbidity, NTU	10	<5	<5	<5	<5	<5	<5	<5	<5	13	<5
pH value	6.5 to 8.5	6.64	7.13	6.59	6.64	6.55	6.65	5.94	6.74	7.02	7.12
Total Dissolved solids, mg/l	2000	306	550	178	431	422	355	217	519	1420	314
Total hardness (as $CaCO_3$) mg/l	600	208	332	112	312	249	240	148	496	740	135
Alkalinity, mg/l	600	111	325	63	305	127	178	101	333	73	135
Chlorides (as Cl) mg/l	1000	54	77	22	25	77	611	34	105	409	34
Iron (as Fe) mg/l	1.0	BDL	BDL	BDL	0.2	BDL	0.5	0.9	0.6	BDL	BDL
Fluoride (as F) mg/l	1.5	0.28	0.7	0.38	0.5	0.43	0.42	0.39	0.95	1.02	0.45
Sulphate (as SO_4) mg/l	400	30	58	5.5	11.5	107	28.0	27.7	161	419	1.5
Nitrate (as NO_3) mg/l	100	41	1	30	2	5	1	BDL	BDL	19	9
Calcium (as Ca), mg/l	200	10	78	32	89	73	80	45	138	242	41
Magnesium (as Mg)	100	8	33	8	22	18	9	8	57	24	8
Copper (as Cu) mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Manganese (as Mn) mg/l	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg) mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium (as Cd) mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se), mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic (as As), mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb), mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn), mg/l	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium (as Cr^{6+}), mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Aluminium (as Al)	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Boron, mg/l	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL (Below Detectible Level): As, [illegible] Mn,Zn,Al,Pb, Concentrations < 0.01mg/L, Fe- < 0.1mg/L and Mercury < 0.001 mg/L

> Out of Permissable [illegible]

V. S. RANA
UNDER SECRETARY
MINISTRY OF COAL
GOVT. OF INDIA
NEW DELHI

B.D.SHARMA
RQP

VILLAGE WISE POPULATION WITHIN THE STUDY AREA AS PER CENSUS 2001

PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	No. of house-holds	Population			Population (0-6 years)			Schedule Cast	Schedule Tribe	Literacy level		
			Total	Males	Females	Total	Males	Females			Total literates	Male literates	Female literates
District	Shahdol												
Tehsil	Sohagpur												
01959100	Harra (Tola)	132	592	295	297	116	54	64	32	398	140	93	47
01959200	Semariha	103	459	226	233	96	48	48	0	451	126	87	41
01959300	Chateha	62	381	188	193	65	24	41	0	95	201	126	75
01960000	Kerha	299	1454	737	717	277	152	125	24	634	317	236	81
01960100	Madwa	126	613	309	304	108	50	58	60	416	204	153	51
01960200	Dubha	75	368	183	185	74	37	37	0	321	119	87	32
01960300	Bhodalkhar Abed	12	68	39	29	10	6	4	0	68	6	6	0
01960500	Bhanpur	163	748	378	370	146	70	76	0	396	354	209	145
01961300	Bodri	664	3116	1634	1482	608	308	300	476	808	1338	889	449
01961400	Atariya	69	341	176	165	71	34	37	17	284	71	55	16
01961500	Mithaun	466	2335	1195	1140	409	205	204	119	1251	691	595	305
01961600	Dulhara	158	752	401	351	127	74	53	0	363	343	235	108
01961700	Chhirpani	16	90	53	37	8	4	4	0	0	70	48	22
01961900	Karuatal	98	719	364	355	132	67	65	3	347	284	181	103
01962000	Nipaniya	250	1232	625	607	255	131	124	28	759	459	312	147
01962100	Sigudi	111	545	271	274	92	39	53	8	414	217	146	71
01962300	Aitajhar	206	1086	543	543	170	82	88	57	670	475	267	208
01962400	Padmaniya Khurd	487	2387	1228	1159	366	188	178	6	1120	1093	701	392
01962500	Singhpur	944	4476	2295	2181	770	380	390	236	1646	2066	1299	766
01962900	Jodhpur	544	2716	1401	1315	473	223	250	32	1344	1120	722	398
01963900	Raipur	75	321	151	170	46	23	25	1	319	101	65	36
01964000	Padmaniya Kalan	267	1144	549	595	208	103	105	0	750	465	289	176
01964100	Nargi	146	669	347	322	119	64	55	0	484	268	182	86
01964200	Udhiya	490	1986	1007	979	332	173	159	244	565	908	556	352
01964300	Padariya	119	538	276	262	88	49	39	41	327	244	164	80
01963900	Lalpur	1069	5069	2626	2443	798	415	383	180	2192	2337	1496	841
01964000	Kanchanpur	456	2287	1154	1133	413	197	216	181	952	909	609	300
01964100	Chhata	213	1020	496	524	203	88	115	0	656	492	305	187
01964200	Pipariara	124	563	261	302	95	44	51	131	182	343	202	141
01964300	Dhanpuri	274	1268	633	635	175	82	93	28	607	417	281	136
01964400	Dhanpura	139	719	379	340	98	55	43	0	122	261	197	64
01964500	Majhiyar	20	89	46	42	18	9	9	0	87	16	14	2

B.D.SHARMA
RDP

ANNEXURE : 13-8

VILLAGE WISE POPULATION WITHIN THE STUDY AREA AS PER CENSUS 2001

PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	No. of house-holds	Population			Population (0-6 years)			Schedule Cast	Schedule Tribe	Literacy level		
			Total	Males	Females	Total	Males	Females			Total literates	Male literates	Female literates
01984600	Chauradih	184	976	506	470	193	103	90	138	248	431	284	147
01984700	Bartara	483	2340	1194	1146	444	234	210	803	662	835	520	315
01984800	Khannath	304	1585	814	781	304	169	135	0	485	672	424	248
01984900	Naugawa	210	962	474	488	190	90	100	0	591	476	280	196
01985000	Khairha	745	3692	1868	1824	655	333	322	361	565	2162	1255	907
01985100	Kadauha	191	943	474	469	206	92	114	150	540	499	293	206
01985200	Piparlye	114	568	288	280	123	53	70	0	190	337	198	139
01985300	Serangpur	223	1132	582	550	255	124	131	0	873	621	354	267
01985400	Hardee	154	783	386	377	151	71	80	51	315	378	239	137
01985600	Bhamni Kalan	251	1240	654	586	211	111	100	43	727	519	323	196
01985800	Dhamni Khurd	41	209	108	101	45	26	19	0	203	31	21	10
01986000	Kudari	99	491	249	242	104	53	51	0	483	120	85	35
01986100	Garruha	110	538	258	280	101	45	56	0	521	189	120	69
01986200	Jawari	143	640	331	309	112	55	57	22	609	234	163	71
01986300	Semara	16	62	27	35	9	3	6	0	51	20	13	7
01986700	Kollaha	77	417	218	199	99	50	49	0	358	95	72	23
01986800	Dhanora	63	306	162	144	44	24	20	0	221	129	85	44
01987400	Bandi Khurd	148	700	358	342	133	69	64	7	531	155	122	33
01987500	Bimhaun	693	3637	1910	1727	710	371	339	303	777	1942	1201	741
01987600	Garphandiya	111	566	275	291	93	47	46	0	310	271	152	119
01987700	Salgin	43	197	99	98	51	26	25	101	3	60	42	18
01987800	Arjhula	134	646	305	341	123	56	67	57	429	204	116	88
01988000	Baigin	55	271	136	135	59	24	35	0	214	57	41	16
01988100	Sarai Kanpa	494	2377	1213	1164	454	229	225	256	666	1092	667	425
01988200	Karkali	376	1900	980	920	287	152	135	78	810	948	583	365
01988300	Chirhat	276	1490	779	711	279	137	142	36	485	749	475	274
01988400	Sirouja	605	2970	1594	1376	432	235	197	544	656	1809	1095	714
01988500	Devgama	202	948	493	455	161	82	79	105	227	515	323	192
01988600	Devgai	140	716	367	349	132	66	66	4	360	289	174	115
01988700	Bagpar	53	239	106	133	52	21	31	0	170	43	25	15
01988800	Bandi Kalan	127	565	301	264	96	55	41	52	414	172	117	55
01988900	Katkona	263	1152	584	568	201	105	96	128	561	487	304	183
01989000	Vikrampur	337	1580	795	785	254	140	114	202	456	831	511	320
01989100	Chituhala	231	1186	585	601	195	88	107	0	694	447	280	167
01989200	Ahigawan	108	462	237	245	81	39	42	0	365	175	122	53

B.D.SHARMA
RQP

ANNEXURE : 13-8 Contd...

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VILLAGE WISE POPULATION WITHIN THE STUDY AREA AS PER CENSUS 2001
PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	No. of house-holds	Population			Population (0-6 years)			Schedule Cast	Schedule Tribe	Literacy level		
			Total	Males	Females	Total	Males	Females			Total literates	Male literates	Female literates
01989300	Gopalpur	220	890	465	425	138	80	58	0	578	276	191	85
01989400	Jalli Tola	150	814	419	395	99	46	53	0	532	108	77	31
01989500	Pakriya	107	553	287	266	96	52	44	101	158	270	158	112
01989700	Sonwarsha	45	226	108	118	28	14	14	20	5	148	77	71
01989800	Semra	368	1890	991	899	395	207	188	225	603	865	547	318
01989900	Semda Tola	199	1046	526	520	194	96	98	144	629	290	192	98
01990000	Jarwahi	325	1685	826	859	275	145	130	53	830	617	406	211
01990100	Sebo	769	4292	2208	2084	664	328	336	579	1174	2407	1484	923
41607000	Burhar (NP)	3302	17724	9352	8372	2535	1357	1179	1608	1677	12017	6913	5104
41608000	Dhanpuri Nargada Hat	7935	43915	23074	20841	6155	3124	3031	4047	7287	27678	18368	11210
41609000	Amlai (CT) (Part)	4990	24215	12823	11392	3604	1849	1755	1410	2877	15841	9601	6240
	Sub total	34699	175896	91276	84621	28193	14367	13826	13564	51384	96076	57941	37134
Tehsil	Anuppur												
02025500	Tummibar	134	562	280	282	107	52	55	0	562	132	96	36
	Sub total	134	562	280	282	107	52	55	0	562	132	96	36
	Grand total	34833	176458	91555	84903	28300	14409	13881	13564	51946	95207	58037	37170
	Percentage		100.00	51.88	48.12	16.04	8.17	7.87	7.69	29.44	53.96	63.39	43.78

B.D.SHARMA
RCP

ANNEXURE : 13-8 Contd..

VILLAGE WISE EMPLOYMENT WITHIN THE STUDY AREA AS PER CENSUS 2001
PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	Total workers	Employment pattern										
			Main workers					Marginal workers					Non workers
			Total	Cultivators	Agri. labours	HH ind.	Other workers	Total	Cultivators	Agri. labours	HH ind.	Other workers	
District	Shahdol												
Tehsil	Sohagpur												
01959100	Harra (Tola)	342	230	56	149	0	23	112	33	79	0	0	250
01959200	Semariha	244	106	51	49	0	6	138	8	128	0	2	215
01959300	Chatahra	138	42	12	11	0	19	96	58	37	0	1	243
01960000	Kerha	791	408	299	74	13	22	383	26	353	4	0	663
01960100	Madwa	360	176	98	37	34	6	184	8	176	0	0	253
01960200	Dubha	195	113	49	54	0	10	82	9	72	0	1	173
01960300	Bhodelkhar Abad	34	21	18	3	0	0	13	1	12	0	0	34
01960500	Bhanpur	367	326	117	188	5	16	41	16	18	0	5	381
01961300	Bodri	896	453	240	10	19	184	445	86	309	35	35	2218
01961400	Atariya	90	18	11	3	1	4	71	2	66	0	1	251
01961500	Mitheun	1122	648	384	428	30	106	174	53	118	1	2	1213
01961600	Dulhara	361	319	218	82	0	19	42	27	14	1	0	391
01961700	Chhirpani	47	33	26	0	3	4	14	0	14	0	0	43
01961800	Karuatal	401	272	217	40	0	15	129	2	116	2	9	378
01962000	Nipaniya	717	531	382	116	5	28	186	95	61	-	29	515
01962100	Sigudi	308	145	65	64	2	14	163	7	75	3	76	237
01962300	Altajhar	536	138	22	20	6	88	400	61	274	4	61	548
01962400	Padmaniya Khurd	1014	534	133	94	2	305	480	49	369	21	41	1373
01962500	Singhpur	1620	928	289	289	45	305	692	49	454	20	169	2856
01962900	Jodhpur	1079	1071	265	544	26	234	8	3	2	0	3	1537
01963900	Relpur	208	96	5	85	1	5	112	9	102	1	0	113
01964000	Padmaniya Kalan	527	238	52	110	4	70	291	22	260	3	8	617
01964100	Nargi	293	72	7	8	7	50	221	20	197	2	2	376
01964200	Udhiya	702	379	195	49	36	119	328	7	289	12	15	1284
01964300	Padariya	260	108	24	51	7	26	152	0	148	2	2	278
01983900	Lalpur	2050	659	215	13	11	420	1391	259	920	13	99	3019
01984000	Kanchanpur	1015	517	271	110	4	132	498	268	214	6	10	1272
01984100	Chhata	290	83	1	0	0	82	207	27	124	1	55	730
01984200	Pipartera	193	60	1	1	3	55	133	31	58	4	42	390
01984300	Dhanpuri	586	188	38	106	2	42	398	168	223	1	6	692
01984400	Dhanpura	257	173	68	5	2	98	84	14	66	0	4	462
01984500	Majhiyar	56	38	5	0	0	33	18	0	16	0	2	32

ANNEXURE : 13-8 Contd...

B.D.SHARMA

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VILLAGE WISE EMPLOYMENT WITHIN THE STUDY AREA AS PER CENSUS 2001

PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	Employment pattern											
		Total workers	Main workers					Marginal workers					Non workers
			Total	Cultivators	Agril. labours	HH Ind.	Other workers	Total	Cultivators	Agril. labours	HH Ind.	Other workers	
01984600	Chauradih	279	183	71	30	1	81	96	6	89	1	0	897
01984700	Bartara	1028	315	86	74	19	136	711	31	621	13	46	1314
01984800	Khamnath	592	272	222	7	1	42	320	15	206	6	93	1003
01984900	Naugawa	298	264	66	109	1	88	32	4	20	0	6	666
01985000	Khairha	1126	939	297	227	53	362	187	21	102	12	52	2586
01985100	Kadeuha	435	206	71	92	3	40	229	1	224	1	3	508
01985200	Piparlya	193	178	97	47	0	32	17	0	17	0	0	375
01985300	Serangpur	519	394	160	214	0	20	125	0	122	0	3	613
01985400	Hardee	318	282	87	67	3	125	36	6	15	0	15	445
01985800	Bhamni Kalan	540	268	130	98	1	29	282	41	238	1	2	700
01985900	Dhemni Khurd	70	64	10	21	0	33	6	0	4	0	2	139
01986000	Kudarl	257	143	95	40	0	6	114	0	113	1	0	234
01986100	Gamuha	286	161	157	4	0	0	125	6	119	0	0	252
01986200	Jawari	300	244	224	14	0	6	56	1	55	0	0	340
01986300	Semara	17	0	0	0	0	0	17	5	12	0	0	45
01986700	Kollaha	219	218	75	142	1	0	1	0	1	0	0	198
01986800	Dhansora	148	148	48	85	0	15	0	0	0	0	0	158
01987400	Bandi Khurd	327	134	54	21	0	59	193	13	173	1	6	373
01987500	Bimhauri	891	641	40	5	16	580	250	17	174	8	51	2746
01987600	Garphandiya	137	84	35	2	1	46	53	4	32	0	17	429
01987700	Salgin	84	81	20	56	0	5	3	0	3	0	0	113
01987800	Arjhula	302	276	48	206	0	22	26	3	19	0	4	344
01988000	Baigin	138	121	63	36	0	22	17	11	5	0	1	133
01988100	Sarai Kenda	847	672	164	191	3	314	175	39	72	2	62	1530
01988200	Karketi	661	356	71	70	2	213	305	88	43	74	182	1239
01988300	Chirhati	479	290	37	33	8	218	189	1	179	0	9	1011
01988400	Sirouja	794	554	36	48	5	465	240	19	179	22	20	2176
01988500	Devgarna	274	253	26	64	1	142	21	0	18	0	3	674
01988600	Devgai	355	177	63	52	3	39	178	16	129	5	28	361
01988700	Bagpar	61	40	2	28	1	9	21	0	20	0	1	178
01988800	Bandi Kalan	475	65	21	23	0	21	110	0	109	0	1	390
01988900	Katkona	619	290	44	65	2	179	229	85	117	2	21	633
01989000	Vikrampur	924	235	95	1	24	115	289	22	227	1	39	1056
01989100	Chituhala	513	107	41	0	0	66	406	57	205	0	144	673
01989200	Ahigawan	191	28	3	1	0	24	163	17	127	0	19	291

B.D.SHARMA I.A.S.
R.D.

ANNEXURE : 13-8 Contd...

VILLAGE WISE EMPLOYMENT WITHIN THE STUDY AREA AS PER CENSUS 2001
PROJECT : BIKRAM COAL MINING BLOCK

Location code	Location name	Employment pattern											
		Total workers	Main workers					Marginal workers					Non workers
			Total	Cultivators	Agri. labours	HH ind.	Other workers	Total	Cultivators	Agri. labours	HH ind.	Other workers	
01989300	Gopalpur	372	86	25	5	1	55	286	11	238	0	37	516
01989400	Jalli Tola	214	203	29	13	9	152	11	7	0	0	4	600
01989500	Pakriya	232	158	12	4	6	136	74	2	49	5	18	321
01989700	Sonwarsha	66	18	1	1	0	16	48	15	10	0	23	160
01989800	Semra	329	178	38	3	1	136	151	21	72	3	55	1561
01989900	Samda Tola	501	266	10	10	0	246	235	22	125	1	87	545
01990000	Jarwahi	591	208	56	51	1	100	383	54	259	32	28	1074
01990100	Sabo	939	817	184	11	8	614	122	14	70	5	33	3353
41607000	Burhar (NP)	5197	4554	113	233	200	4008	643	27	29	47	540	12527
41608000	Dhanpuri Nargada Ha	10622	9294	14	17	99	9164	1328	4	28	35	1261	33283
41609000	Amlai (CT) (Part)	6284	5633	49	70	220	5294	651	17	149	53	432	17931
	Sub total	56343	39508	7141	5404	946	26017	16835	2125	10192	408	4110	119553
Tehsil	Anuppur												
02025500	Tummibar	254	115	26	4	2	83	139	14	45	1	79	309
	Sub total	254	115	26	4	2	83	139	14	45	1	79	308
	Grand total	56597	39623	7167	5408	948	26100	16974	2139	10237	409	4189	119861
	Percentage	32.07	22.45	18.09	13.65	2.39	65.87	9.62	12.60	60.31	2.41	24.68	57.93

B.D.SHARMA
RQP

डी. एस. राणा/D. S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

ANNEXURES A

A-1 Certificate from the lessee for progressive mine closer plan (PMCP) and undertaking for its implementation

A-2 Authorisation as RQP from the lessee .

A-3 Certificate from RQP about Geological Reserves as per GR

A-4 Certificate from RQP to the effect that Applied lease areas lies within the allotted block boundary

A-5 Certificate from RQP that provisions of Mines Act, Rules, regulations have been observed

A-6 Undertaking by RQP that the Mining plan has been prepare by him

A-7 Certification by RQP that provision of MCDR have been observed

पी. एस. राणा/P. S. RANA
अवर सचिव/UNDER SECRETARY
कोयला मंत्रालय/MINISTRY OF COAL
भारत सरकार/GOVT. OF INDIA
नई दिल्ली/NEW DELHI

B.D.SHARMA
RQP

BIRLA CORPORATION LIMITED

CEMENT DIVISION

P. O. Birla Vikas, Satna - 485 005, Madhya Pradesh, Phone : (07672) 250641 (7 Lines)
Fax : (07672) 257456 / 257570, Gram : CEMENT, E mail : admin@satnacement.com ;

ANNEXURE : A-1

CERTIFICATE

It is certified that while preparing the Progressive Mine Closure Plan of Bikram Coal Block, Shahdol district of MP State, all statutory provisions including Regulations, Rules, Orders passed by the Central and State Government, Statutory Organisations, Others etc. have been taken into consideration.

An undertaking is also given that all the measures proposed in this Progressive Mine Closure Plan will be implemented in a time bound manner as proposed

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

Place : Satna, MP

Date : 10. 08. 2009

Manoj Kavdia
Dy. General Manager (Mines)
Organisation: Birla Corporation Ltd.
(Cement Division)
Address : P. O Birla Vikas,
SATNA – 485005 (Madhya Pradesh)

B.D.SHARMA
RQP

BIRLA CORPORATION LIMITED

CEMENT DIVISION

P. O. Birla Vikas, Satna 485 005, Madhya Pradesh. Phone : (07672) 250641 (7 Lines)
Fax : (07672) 257456 / 257576, Gram : CEMENT, E-mail : admin@satnacement.com ;

ANNEXURE : A-2

CERTIFICATE

To
B. D. Sharma
A – 12, Paryavaran Complex
IGNOU Road
New Delhi – 110030

Sub: Authorisation as Recognised Qualified Person for Preparation of Mining Plan of Bikram Coal Block, district Shahdol, Madhya Pradesh

Dear Sir,

We hereby authorize you as Recognised Qualified Person for preparation, discussion, if any, required for the purpose of approval of Mining Plan of the coal block

Place : Satna, MP

Date : 10. 08. 2009

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

Manoj Kavdia
Dy. General Manager (Mines)
Organisation: Birla Corporation Ltd.
(Cement Division)
Address : P. O. Birla Vikas,
SATNA – 485005 (Madhya Pradesh)

B.D.SHARMA
RQP

ANNEXURE : A-3

CERTIFICATION

It is to certify that reserves in the mining Plan of Bikram Coal Block of M/s Birla Corporation Ltd have been adopted from the

"Geological Report on coal exploration
Bikram block
Sohagpur Coalfield
Distt. Shahdol (MP)"

Prepared by
CMPDI, RI-V, Bilaspur in October, 1997

S. RANA
SECRETARY
MINISTRY OF
GOVT. OF
NEW DE.

B.D. SHARMA
RECOGNISED QUALIFIED PERSON

B.D.SHARMA
RQP

ANNEXURE : A-4

CERTIFICATION

This is to certify that the applied Mine Lease area (239 ha) of Bikram Coal Block of M/s Birla Corporation Ltd lies within the allotted block boundaries.

S. RANA
SECRETARY
MINISTRY OF COAL
GOVERNMENT OF INDIA
NEW DELHI

B.D. SHARMA
RECOGNISED QUALIFIED PERSON

B.D.SHARMA
RQP

ANNEXURE : A-5

CERTIFICATE

This is to certify that the provisions of Mines Act, Rules and Regulations made hereunder have been observed in the Mining Plan for proposed Bikram Coal Block of M/s Birla Corporation Ltd. and wherever specific permissions are required, the applicant will approach the Directorate of Mines Safety.

B.D. Sharma
RQP No.: 13016/18/2004-CA

B.D.SHARMA
RQP

Place: New Delhi
Date: _____

ANNEXURE : A-6

CERTIFICATE

I, B.D. Sharma, duly recognise that I am a qualified person for preparing the Mining plan under rule 22 of MCR, 1960. My registration no. is RQP No./13016/18/2004-CA and I have prepared the Mining plan of the proposed Bikram Coal Block of M/s Birla Corporation Ltd in District Shahdol (MP). The various data and write up enclosed have been compiled and verified by me. The working plans and other details given in the plan have been prepared under my guidance and duly verified by me.

The information provided in the Mining Plan is correct and accurate to the best of my knowledge.

B.D. Sharma
RQP No.: 13016/18/2004-CA

B.D.SHARMA
RQP

Place: New Delhi
Date:_____

ANNEXURE : A-7

CERTIFICATE

This is to certify that the provisions of Mineral Conservation and Development Rules, 1988 and MCR, 1960 have been observed in the Mining plan of proposed Bikram Coal Block of M/s Birla Corporation Ltd in District Shahdol (MP) and wherever specific permissions are required, the applicant will approach the concerned authorities for granting the permission. It is further stated that the information furnished in this plan is correct to the best of my knowledge and belief.

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

B.D. Sharma
RQP No.: 13016/18/2004-CA

B.D.SHARMA
RQP

Place: New Delhi
Date: _____