Diary No. 886
For Addl. Gen. Mgr
Barora Area
B.C.C.Ltd

GMPP 846/1 17-9-19

भारत कोकिंग कोल लिमिटेड
Bharat Coking Coal Limited
(A Mini Ratna Company)
(A Subsidiary of Coal India Ltd.)
(www.bcclweb.in)

पं.का -:.कोयला भवन, कोयला नगर, धनबाद –826005,
Regd. Off: Koyla Bhawan, Koyla Nagar,
Dhanbad - 826005.
CIN: U10101JH1972GOI000918
दूरभाष: 0326-2230190/ फ़ेक्स -0326-2230050,
ईमेल: cos.bccl@coalindia.in

बोई सचिवालय /Board Secretariat

Ref. No. BCCL:CS:F-1A: 435 Dated: 16.09.2019

To,
GM(P&P)
BCCL, Koyla Bhawan.

Sub: Certified copy of Minutes of 354th Board Meeting held on 06.09.2019.

Dear Sir,

We send herewith certified copy of Minutes of **Item No. 354.4D, Item No. 354.5D and Item No. 354.6M** of 354th Meeting of the Board of Directors of Bharat Coking Coal Limited held at Registered Office, Koyla Bhawan, Dhanbad on 06.09.2019 for taking necessary action at your end.

Yours faithfully

(B.K. Parui)
Company Secretary

Encl: As above

Item No. 354.4D

Status for Capital expenditure of BCCL till 31.07.2019 (F.Y. 2019-20).

Board noted the information furnished in the agenda note. Board emphasized the need for spending the capital budget on uniform basis so that the target for spending the capital budget for the year 2019-20 can be achieved.

Item No. 354.5D

ATR & Status of Action Plan to achieve the targets set as part of 100 days program.

Board noted the information furnished in the agenda note and reviewed the status of estat lishment of Washeries and Maheshpur SILO.

Item No. 354.6M

Mining Plan along with Mine Closure Plan of Amalgamated Muraidih-Phularitand (part) Colliery.

Background:

The proposal for 'Mining Plan along with Mine Closure Plan of Amalgamated Muraidih-Phularitand (part) Colliery' was placed before 15th Empowered Sub-Committee Meeting and 100th Audit Committee Meeting of BCCL held on 05.09.2019. Both Empowered Sub-Committee and Audit Committee agreed with the proposal with modification and the same was recommended for placing before Board for approval.

Decision:

After detailed deliberation following resolution was approved by the Board:

"The Mining Plan alongwith Mine Closure Plan of Amalgamated Muraidih, Phularitand(Part) Colliery having normative capacity of 9.90 MTPA and the total Mine Closure cost being ₹7127.158 Lakhs (Rupees Seven Thousand one hundred twenty seven Lakhs fifteen thousand and eight hundred only), to be deposited in the new Escrow Account, to be opened (including already deposited amount of Rupees three thousand ninety six lakhs seventy two thousand and eight hundred only in two escrow accounts namely Phularitand mixed mine and Muraidih Shatabdi group of mines) already deposited was approved by the Board. The amount shall be transferred to the new **Escrow Account** and the expenditure already incurred towards Mine Closure activities shall be claimed from the new Escrow Account".

Certified to be True Copy

B. K. Paul
Company Secretary
Bharat Coking Coal Limited
Koyla Bhawan
Dhanbad - 826005

BHARAT COKING COAL LIMITED

MINING PLAN AND MINE CLOSURE PLAN

FOR

AMALGAMATED

MURAIDIH-PHULARITAND(Part) COLLIERY

(Falling in Cluster-II Group of Mines of BCCL)

(BARORA AREA)

(PREPARED IN ASSOCIATION WITH BCCL)

May - 2019

CENTRAL MINE PLANNING & DESIGN INSTITUTE LTD.
REGIONAL INSTITUTE NO.-II
DHANBAD

CONTENTS

LIST OF PLATES

List of Annexure

GENERAL INFORMATION

1. Name of the Coal Block (Acre/Hactare/Sq.Km) Block: OCP-III Geological Block

2. Total Amalgamated Area of Muraidih-Phularitand Colliery(Part) : 1118.71 Ha
   (Falling in Cluster-II Group of Mines of BCCL)

3. Name of the Coalfield and its location i.e District and State :Jharia Coalfield,
   District-Dhanbad
   State-Jharkhand

4. Name and Address of the Applicant : Sri C.Kumar
   General Manager
   Barora Area,
   Bharat Coking Coal Limited
   Post- Nawagarh
   Dist.- Dhanbad, Jharkhand
   Pin- 828306

5. Indication, if it is a Revised Mining Plan and if so,
   the Revision no. i.e First Revision, Second Revision etc : Not Applicable

6. Total Targeted Capacity : 9.90 Mty
   (UG- 2.60 Mty, OC- 7.30 Mty)

7. Date of preparation of Mining Plan : May 2019

8. Indication, if the Mining plan is re-submitted : No
   after incorporation the suggestions of Standing Committee

SUMMARISED DATA

1. General	
a) Name and Addresses of the applicant company	Bharat Coking Coal Limited, Public Sector Undertaking, owned by Govt. of India. Koyla Bhawan, Koyla Nagar, Dhanbad-826005, Jharkhand
b) Name and address of the Block allottee	Not Applicable
c) Relationship between the applicant allottee company	Not Applicable
d) Status of the applicant company: Central / Public Sector Undertaking / state Government Undertaking / IV Company/ Pvt Company / Public Co/ Others (Specify).	Public Sector Undertaking
e) Name of the coal block together with name of coalfield & state where located	OCP-III Geological Block Jharia Coalfield, Jharkhand
f) Date of allotment	By Nationalisation
g) End use of coal as per approval by the Competent Authority	As per linkage
h) ROM quantity proposed to be produced as per mining plan	UG- 2.60 Mt / Year OC- 7.30 Mt / Year **Total- 9.90 Mt / Year**
i) Norms adopted for calculating ROM quantity requirement is case is differs from the quantity indicated in the allotment order.	Not Applicable
j) Beneficiation required – Yes/No	No
k) Requirement of beneficiated coal & expected availability thereof.	Not decided. ROM coal is presently being sent to Power Sector through Railway
l) Period for which mining lease is to be renewed	30 years
m) Date of Expiry of earlier mining lease, if any	2002 for Coking Coal and 2003 for non-Coking Coal.
n) RQP who has prepared the mining plan	

The data/information about the colliery and different seam working plans submitted by colliery authority has been kept in mind during preparation of this mining plan. This Mining Plan has been prepared by CMPDI, RI-II in association with BCCL.

D. Information regarding earlier approved Mining Plans, if any	
a) Approval letter no and date	Not Applicable
b) Lease Area	
c) Date of grant of lease	
d) Date of Expiry of lease	
e) Targeted Production	
f) Proposed year of start of production	
g) Propose year of achieving the targeted production level	
h) Envisaged life of the colliery (in years)	
i) Date of actual commencement of mining operations, if operations already started	
j) Likely date of Mining Operations, if operations not yet started & reasons for non-commencement of operations	
k) Planned production and actual levels achieved in last 3 years.	
l) Coal – U/G	
m) Reasons for difference between the planned and actual production levels.	
n) Reason for revision of the Mining Plan	
o) Details of changes in the new mining plan compared to earlier approval	
(i) Lease Area	
(ii) Block boundary	
(iii) Production level	
(iv) Reserves	
(v) Mining technology / (Additional sheets to be used, if required)	
(vi) Land use pattern	
E. Location	
a) Location of the Block Taluka / Village / Khasra / Plot / Block Range/ Etc.	The area of OCP III Geological block lies between latitude 23°46´23˝ to 23°48´34˝ N and longitude 86°12´46˝ to 86°15´36˝ E (As per GR). The area falls in Open Source Survey of India Toposheet No. (RF-1:50000/Year-2009).
b) Name of the Coalfield / Coal belt	Jharia Coal Fields
c) Particulars of adjacent blocks / Colliery North, South, East, West	The block is bounded as follows- North- Metamophics/Talchirs South- Kharkharee-Dharmaband & Madhuban-Phularitand UG Blocks East- OCP-IV Geological Block West- OCP-II Geological Block / Madhuban-Phularitand UG/ Mahuda-Gomoh Rly. Line (S.E Rly)

d) Area of the allotted block (hectares) i. Geological block area ii. Mining block area	1400.0 Ha (OCP-III) 1118.71 Ha (Out of which, Project area of 887.75 Ha is considered in Mining Plan of Amalgamated Muraidih- Phularitand (part) Colliery falling in Cluster-III)
e) Reference no. of plan of block boundary issued by CMPDI/SCCL / NLCL (a copy of the plan also to be annexed)	Enclosed Surface Plan
f) Whether the lease boundary / required boundary is same as demarcated by CMPDI/SCCL / NLCL for delineating block / sub-block.	No. Lease hold boundary and Geological Block boundary of OCP-III are different.
g) Existing Mining Lease Area in case of existing Collieries, (hectares)	Lease Hold area of different Collieries – Muraidih Colliery - 536.40 Ha, Shatabdi Colliery - 181.31 Ha Phularitand Colliery - 741.88 Ha. (Total area falling in Cluster-II and also in Cluster-XV)
h) Applied / Required Lease area as per the Mining Plan under consideration	For mining operation, DGMS has already given permission for amalgamation of above Muraidih Colliery & Shatabdi Colliery and presently amalgamated Colliery is named as amalgamated Muraidih Colliery. Part of Phularitand total Lease hold area (i.e an area of 401 Ha lying on northern side of D.C Railway line) falls within boundary of Cluster-II group of mines of BCCL. For ease of mining operation in Cluster-II, BCCL management has decided to further amalgamate already amalgamated Muraidih-Shatabdih Colliery along with the above part of Phularitand Colliery which falls in Cluster-II. Considering the above, the Amalgamated area of Muraidih- Phularitand (part) Colliery falling in Cluster II is measured as 1118.71 Ha. Details as below- Amalgamated Muraidih Colliery - 717.71 Ha, Phularitand (Part) Colliery - 401.0 Ha. **Total Amalgamated area 1118.71 Ha**
i) Whether the applied lease area falls within the allotted block	Both amalgamated Muraidih Colliery & Phularitand Colliery (part) are existing Collieries of BCCL and they are lying in geological Block of OCP-III
j) Area (hectares) of lease which falls outside the block/ sub-block delineated by CMPDI/SCCL/NLC.	About 146.2 Ha towards northern side of OCP-III Geological Block.

k) Details of outside area: - Whether forms part of any other coal block - Whether it contains any coal/ lignite reserves - Purpose for which it is required, e.g. roads/ OB dumps/service buildings/ colony safety zone / others (specify)	 No It is in Metmophic/Talchirs (Non-coal bearing area) For Quarters(NHS), Magazine, roads, external OB Dumps, plantation in future, etc
l) Whether some part(s) of the allotted block has not been applied for mining lease. - Total area in Ha. of such part(s) - Total reserves in such part(s) - Brief reasoning for leaving such part(s)	Yes Approximately an area of 487.77 Ha of OCP-III geological block falls in Cluster-XV Not yet estimated Environmental Clearance for Collieries falling in Cluster-II group of mines of BCCL is required. Hence, the area falling in Cluster-XV has not been considered in this Amalgamated Mining Plan.
m) Type of land involved in Hectares (within the amalgamated area of Muraidih-Phularitand (Part) Colliery falling in Cluster-II) - Forest land :- - Non Forest land:- - Private/Tenancy land - Govt. land - BCCL Land **Total Land**	 **46.16 Ha** 254.67 Ha } 269.33 Ha }- **1072.55 Ha** 548.55 Ha } **1118.71 Ha**
n) Broad land use pattern (Forest, Township, Industrial, Agricultural, Grazing, Barren etc.)	Details of existing Land Use Pattern within **land area of 1118.71** Ha is given below-

	Phularitand (North of DC line)	**Amalg Muraidih**
1)**Running Quarry**		
Back filled	7.00 Ha	56.00 Ha
Not Back filled	35.29 Ha	82.55 Ha
1)**Abandoned**		
Back filled	39.00 Ha	61.00 Ha
Not Back filled	1.35 Ha	-
3) Agriculture Land-	133.00 Ha	103.00 Ha
4) Barren land-	5.20 Ha.	125.00 Ha
5) Homestead-	80.00 Ha	64.25 Ha.
6) Service Building-	0.71 Ha	15.00 Ha
7) Road	14.07 Ha	21.41 Ha
8) Rail -	34.98 Ha.	-
9) Water Body-	7.20 Ha	29.40 Ha
10)Plantation -	17.50 Ha	135.60 Ha
11)Fire area -	12.00 Ha	17.50 Ha
12)Coal dump	3.28 Ha	7.00 Ha
13)Ext. OB Dump -	10.42 Ha	- Ha
Total	**401.00 Ha**	**717.71 Ha**

o) Proximity of public road / railway line/ major water body if any and approximate distance.	1) The area is easily negotiable by Hirak Ring Road (Dhanbad-Chandrapura Road) from Dhanbad town. Distance of proposed Project of Amalgamated Muraidih-Phularitand(part) Colliery from Dhanbad town is 40Km. 2)The Dhanbad-Chandrapura Railway line passes through southern part forms the southern boundary whereas the Gomoh-Mohuda Railway lines of S.E Railway forms the western side boundary of the amalgamated Muraidih-Phularitand (part) Colliery. From Dhanbad Railway station, distance of of Amalgamated Muraidih-Phularitand(part) Colliery is about 35Km. 3) Khudia(Khodo) Nala is flowing along the north-eastern side of the proposed area of Amalgamated Muraidih-Phularitand(part) Colliery.
p) Topo sheet no. with latitude and longitude	It is included in Open Source Survey of India Topo Sheet No.F45C1. Latitude- 23°46´30.732˝ to 23°49´0.436˝ N Longitude-86°12´38.997˝ to 86°15'15.998" E

F. GEOLOGY AND EXPLORATION					
a) Name of the Geological Block and area in hectares		OCP-III Geological block, Total area of the block is 14 Sq.Km			
b) Name of the Geological Report (GR) with year of preparation		The amalgamated area under consideration falls in "Geological Report on Exploration for coal in Opencast Block-III, Jharia Coalfield" prepared by CMPDIL in March 1982			
c) Name of the agency which conducted exploration and prepared GR		CMPDIL			
d) Period of conducting exploration		October 1976 to April 1980			
e) Details of drilling (by all agencies)	**Series**	**Agency**		**No. of BHs**	**Meterage**
	BA	CMPDI		23	4876.25
	MR	CMPDI		25	4876.09
	PH	CMPDI		05	1045.72
	Total			**53**	**10793.06**
f) No. of boreholes drilled within the block		53 boreholes drilled in OCP-III geological Block			
g) Overall borehole density within the block (no./sq.km)		**BH Density- 5** boreholes(approx.)/Sq.Km			

h)	Area covered by ' detailed' exploration within the block(hectares)		1118.71 Ha (Amalgamated Muraidih-Phularitand (Part) area falling in Cluster-II)		
i)	Area covered by ' detailed' exploration outside the block(hectares)		Not Available		
-	No. of boreholes drilled outside the block		Not Available		
-	Borehole density for outside area (no./sq.km)		Not Available		
j)	Whether entire lease area has been covered by 'detailed' exploration.		Amalgamated area of 1118.71 Ha considered in this Amalgamated Mining Plan falls within the detailed exploration.		
k)	Whether any further exploration is required or suggested and time frame in which it is to be completed		Yes, because no bore holes have been drilled upto Seam-III in south-western corner of the amalgamated area considered in this mining plan. Area is considered as indicated area for Seam-III and seams lying below of this seam.		
l)	Number of coal/lignite seams/horizons		Details are given in Chapter-IV Table No.		
-	Thickness range of coal seams				
-	Mean Thickness of total coal horizon				
-	Standard Deviation of thickness				
-	Minimum & maximum depth of coal seams				
m)	Gross Calorific Value (GCV in K Cal/kg) and useful Heat Value (UHV in K. Cal/Kg) as per GR :		Seam wise details of Grade are given in Chapter-IV		
	Range				
	Mean				
n)	Quality(Grade) of coal as per GR:	**Geo Name**	**Colliery. Name**	**Coking**	**Non-Coking**
	Range Mean	XIII	XIII	W-III	
		XI/XII	XI/XII	W-IV	
		IX/X	10 Seam	W-IV	
		VIIIC	9 Seam(Top)	W-III to UG	G5
		VIIIB	9 Seam (Bot)	W-IV to UG	G5-G7
		VIIIA	8 Seam	W-IV to UG	G4
		VIII		W-IV	
		V/VI/VII Comb.	7 Seam	-	G4 to G6
		IV T	Virgin(Impersistent)	-	G8
		IV Comb/IV	Virgin	-	G7 to G9

<table>
<tr><td></td><td>IVB</td><td>Virgin (Impersistent)</td><td>-</td><td>G9 to G18</td></tr>
<tr><td></td><td>III</td><td>III</td><td>-</td><td>G4 to G15</td></tr>
<tr><td></td><td>II</td><td>II</td><td></td><td>G1 to G5</td></tr>
<tr><td></td><td>I/II Comb</td><td>I/II Comb</td><td>-</td><td>G4</td></tr>
<tr><td></td><td>I</td><td>I</td><td>-</td><td>G3 to G10</td></tr>
<tr><td>o) Total geological reserves in the block</td><td colspan="4">The present geological reserve (Amalgamated Muraidih-Phularitand(part) Leasehold Area) in OCP-III block is given below-</td></tr>
<tr><td></td><td colspan="4"><table>
<tr><th>Geo Name</th><th>Colli. Name</th><th>Geo.Resv.(Mt)</th></tr>
<tr><td>XIII</td><td>XIII</td><td>0.271</td></tr>
<tr><td>XI/XII</td><td>XI/XII</td><td>5.229</td></tr>
<tr><td>IX/X</td><td>10 Seam</td><td>9.83</td></tr>
<tr><td>VIIIC</td><td>9 Seam(Top)</td><td>3.827</td></tr>
<tr><td>VIIIB</td><td>9 Seam(Bot)</td><td>5.537</td></tr>
<tr><td>VIIIA</td><td>8 Seam</td><td>9.296</td></tr>
<tr><td>VIII</td><td></td><td>1.149</td></tr>
<tr><td>V/VI/VII Comb.</td><td>7 Seam</td><td>99.66</td></tr>
<tr><td>IV T</td><td>Virgin (Impersistent)</td><td>2.42</td></tr>
<tr><td>IV Comb /IV</td><td>Virgin</td><td>7.64</td></tr>
<tr><td>IVB</td><td>Virgin (Impersistent)</td><td>0.94</td></tr>
<tr><td>III</td><td>III</td><td>50.07</td></tr>
<tr><td>II</td><td>II</td><td>12.93</td></tr>
<tr><td>I/II Comb</td><td>I/II Comb</td><td>6.59</td></tr>
<tr><td>I</td><td>I</td><td>31.65</td></tr>
<tr><td>Total</td><td></td><td>247.039</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>p) Depletion of reserves (in case of running colliery)</td><td></td><td colspan="3">Muraidih OCP was initially sanctioned as patch in 1979. Earlier production data is not available with the Barora Area. The Production of Shatabdih OC was started from 2000-01.
The total production from following Collieries since 1989-90 is as follows-
i) Muraidih- 50.07 Mt
ii) Shatabdi- 12.90 Mt
iii) Phularitand- 17.97 Mt
Total 80.94 Mt</td></tr>
<tr><td>q) Additional reserves established (if any for running colliery)
r) Geological reserves considered for mining:

by opencast
by underground</td><td></td><td colspan="3">Nil

Total OC- 62.92 Mt
Total UG- 85.95 Mt
(Excluding of 12.93 Mt of Seam-II reserves)</td></tr>
</table>

s) Corresponding Extractable reserves: by opencast- by Underground		**Total OC - 56.63 Mt** (Seam-V/VI/VII OCP - 54.50 Mt Seam- III OCP - 2.13 Mt) **Total UG- 36.594 Mt** (Muraidih UG - 25.794 Mt Phularitand UG(part) - 10.80 Mt) **Total (OC+UG) - 93.224 Mt**
t) Percentage of recovery w.r.t. geological reserves by opencast by Underground		**90 %** **42.57 %**

G. Mining	
a) Existing and proposed method of mining (opencast for OB & coal separately with dragline/ shovel / surface collieryrs / manual / etc.) (Underground by long wall/ Bord & Pillar / continuous collieryrs/ LHD/SDL / manual / etc..)	**Existing-** **<u>Opencast Mining-</u>** In Muraidih Colliery (i.e in area of amalgamated Muraidih & Shatabdi Colliery), a departmental opencast mine is in operation with V/VI/VII seam base. Transportation of Coal & OB is being done with Shovel- Dumper combination. In Phularitand Colliery, a hired HEMM opencast patch is in operation with V/VI/VII seam base. Transportation of Coal & OB is being done with Shovel- Dumper combination. **<u>Underground Mining</u>-** **Existing-** In Muraidih Colliery, a Global Bid Project was approved in 265th meeting by Board of Directors of BCCL and work is awarded to the successful Bidder/Contractor (M/s Minop/BHEC Consortium) to extract coal from Seams-III & I by Longwall Technology package. Two numbers of Inclines & drift drivges have been completed by the successful bidder. Drifts have touched the coal of Seam-III. All type of works was suspended by the Contractor since 01.06.2016 due to financial dispute with BCCL. It is expected that the contractor is likely to re-start / commence the suspended project work soon. In Phularitand Colliery, two inclines and drift drivages have been made departmentally to approach coal of Seam-III and presently it is being developed by Bord & Pillar method of mining. Coal is being produced by drilling–blasting method at coal faces and transported to surface by SDL-Haulage Combination.

	Proposed- Opencast Mining- This Mining plan has been prepared after amalgamating the area of amalgamated Muraidih Colliery & part of Phularitand Colliery falling in Cluster-II. It has been proposed to make one single opencast mine after amalgamation of existing Muraidih Colliery OCP (operating departmental) with existing Hired HEMM patch quarry with base as V/VI/VII seam lying within the Project area. Another OCP with base as floor of seam-III has also been proposed in area lying in-between Incrop of Seam-III and northern side of Khodo River. As per the approved DPR, Longwall panel of Seam-I has been identified by successful bidder below this proposed Seam-III OCP. To extract longwall panels in Seam-I below this area, earlier developed B&P workings along with virgin areas of overlying Seam-III has to be excavated. Hence, this OCP of Seam-III is proposed in this amalgamated Mining plan. It has to be decided by BCCL whether these OCPs to operated departmentally or Hired basis. Underground Mining- In Muraidih Colliery, extraction of Seam-III & Seam-I by longwall method have already been awarded to Bidder/Contractor for 9 years for guaranteed production of minimum 2.0 Mty as per the agreement made between M/s Minop Consortium and BCCL. Since it is an approved project, hence, same mining strategy is considered in this amalgamated mining plan as it is considered by the Contractor in the approved DPR/ Supplementary Note submitted in January 2015. In Phularitand, Seam-III is presently being extracted by B&P with SDL-Haulage combination. In this amalgamated mining plan, it has been proposed to extract coal from Seam-III and Seam-I/II(Comb.) & its split section Seam-I by Bord & Pillar method of mining. It has been proposed to operate total two panels with SDL- Belt combination and one Panel with Continuous Miner Package initially in Seam-III property and after extraction of Seam-III, similar number of panels will be also be opened for extraction of underlying Seam-I to sustain the target production from the Colliery.

b) The peak capacity as well in addition to targeted capacity in mtpa when the colliery is fully developed and the year which proposed to be achieved- By underground: By opencast : **Total:**	**Proposed Production from Amalgamated Project area of Muraidih-Phularitand(Part) Colliery-** **Underground -** Normative - 2.60 Mty Peak Capacity - 3.38 Mty (i.e +30% of Normative) **Opencast-** Normative - 7.30 Mty Peak Capacity - 9.49 Mty (i.e +30% of Normative) **Normative - 9.90 Mty** **Peak Capacity - 12.87 Mty (i.e +30% of Normative)**
c) **Life of the Colliery** -Underground workings: - Opencast workings: **Total:**	**For Underground mining - 21 Years** (During preparation of underground mining schedule, it has been considered that Contractor will commence its work within the year 2019-20 after settling disputes otherwise the above mentioned life will differ from the figure as proposed in mining plan). The work is suspended since 01.06.2016 due to financial dispute with BCCL. Banning of business imposed by BCCL on M/s Minop has been recently quashed by Honorable High Court, Jharkhand. It is expected that work is likely to be restart / commenced within a year or so. Mine Schedule Plan has been prepared considering the above period) **For Opencast mining - 10 Years** (Seam-V/VI/VII OCP + Seam-III OCP) **21 Years** (Both OCPs proposed to be excavated within this life period)

Indicate quantum of production and expected grade: Details given below-

Year		Underground	Opencast			ROM coal (Mt)	Saleable coal (Mt)	Washery rejects (Mt)
		UG Coal production Mt	OC Coal Production Mt	OB (M.Cum)	Stripping ratio (Cum/Te)			
Year wise till targeted production is reached	**2019-2020**	**0.09**	**4.63**	8.30	1.80	4.720	4.720	
	2020-2021	**0.128**	**6.0**	10.70	1.80	6.128	6.128	
	2021-2022	**0.867**	**7.3**	13.10	1.80	8.167	8.167	
	2022-2023	**0.885**	**7.3**	13.10	1.80	8.185	8.185	
	2023-2024	**0.887**	**7.3**	13.10	1.80	8.187	8.187	
	2024-2025	**2.811**	**7.3**	13.10	1.80	10.111	10.111	
Total for full life **(As per extraction Schedule)**		**36.594**	**56.63**	**101.6**		**93.224**	**93.224**	

The details of year wise and seam wise coal production Schedule for proposed amalgamated Muraidih-Phularitand(Part) Colliery has been given in Chapter V

e) Whether the proposed external OB dump site is coal/ lignite bearing: No - If so, whether coal/lignite below waste disposal area is extractable.	
f) Whether negative proving for coal / lignite in the proposed site for OB dump / infrastructure has been done.	No
g) Proposed configuration of HEMM for OC (Coal & OB)	Opencast- Shovel-Dumper Combination
h) Mode of entry for underground Collieries	**Existing-** Phularitand UG - Two Inclines (one act as Main Intake and another act as Main Return) Muraidih UG - Two Inclines/Drift drivages (Intakes) have already been made up to Seam-III. Sinking of Air Shaft (Return) has been done partly. Fan drift Completed. **Proposed-** Phularitand UG – Sinking of one Air Shaft (up to Seam-I) is proposed to act as Main return in future. To approach Seam-I/II & Seam-I, two drifts from floor of Seam-III has to been proposed. Muraidih UG- Sinking of rest part of the air shaft is to be done. No additional entries are proposed to be made.
i) Operations that are proposed to be outsource-	**Underground-** Presently Longwall operation of Muraidih Global bid project for extraction of Seam-III & Seam-I has already been awarded to successful Bidder through Global Bidding an it is an on-going project of BCCL. For Phularitand underground mine, one panel is proposed with Continuous Miner operation which may be done by Global Bidding or departmentally depends on BCCL. SDL panels will be operated departmentally **Opencast-** Operations of Opencast in proposed amalgamated area to be decided by BCCL

j) Proposed coal evacuation facilities-	
a) Face to surface -	In Phularitand UG- Proposed- SDL-Belt Conveyor Muraidih UG- Proposed- Belt Conveyor
b) Surface to end use plants-	By Dumpers/Tipping Trucks to KKC Link Railway Siding. By Rail to end users as per linkage (mainly to different Power Sectors). As per the data submitted by mine authority, Supply of coal to MPL is presently being done partly by road & partly by rail.

H. END USE OF COAL	
a) Capacity of the approved end use plants	As per existing linkage of BCCL
b) Coal/ lignite requirement for end use plant with grade / quality	(As per agreement between BCCL & End Users)
c) % age of end use requirement to be met from this colliery	Depends on end users requirement
d) If washing / beneficiation of the coal / lignite is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the beneficiation and recovery rate with consumption of water etc.	Presently, no beneficiation of coal produced from existing OCP is being done. It has not yet been decided by BCCL
e) Proposed Use of Rejects/Middlings	Not Applicable
I. ENVIRONMENTAL MANAGEMENT	
a) Existing land use pattern	Given in Chapter-IX
b) Land area indicating the area likely to be degraded due to mining, dumping, roads, workshop, washery, township etc.	Internal OB dump is being done within the excavated area of OC and also proposed to be made in future. Land reclamation like plantation etc is being made and proposed in future to arrest land degradation in the area.
c) Surface features over the block area/Colliery	Villages, Basti, High Tension Lines, D B Road, Village road, and other infra-structures like, Office Buildings, Substation, BCCL Colony, Hospital/ Dispensary, Temples etc

d) No. of villages/ houses to be shifted (Colliery)	A total no. of houses to be rehabilitated is 1408 as per the approved Jharia Master Plan, March 2008 (Details is given in Chapter-X)
e) Population to be affected by	Not available
f) Year wise proposal for reclamation of land affected by mining activities	Year-wise reclamation/plantations are given in Chapter-X
g) Monitoring schedules for different environmental components after the commencement of mining and other related activities.	Air and Water quality is monitored on regular basis by RI-II, CMPDIL

J. PROGRESSIVE AND FINAL COLLIERY CLOSURE PLAN	
a) Estimated total capital expenditure for colliery closure activities	As per Colliery Closure Plan (Details given in Chapter XII)
b) Major closure activities with proposed Capital expenditure	
i. Dismantling of Structures	
ii. Permanent Sealing of colliery entries (incline mouth and air shaft)	
iii. Subsidence Management	
iv. Landscaping	As per Colliery Closure Plan (Details given in Chapter XII)
v. Plantation	
vi. Monitoring/Testing of parameters for three years	
vii. Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	
viii. Miscellaneous and other mitigative measures	
ix. Manpower Cost for Supervision	

K. OTHERS	
a) Base date of Mining Plan	Dec 2018
b) Calendar year from which the production will start	Muraidih and Phularitand Collieries are two existing Colliery and presently producing coal
c) Results of any investigation carried out for scientific mining conservation of minerals and protection of environment, future proposals.	NA

CHAPTER- I

INTRODUCTION

1.1 Background of the Mining Company:-

Bharat Coking Coal Limited (BCCL), a subsidiary of Coal India Limited, is a Central Public Sector undertaking, owned by the Govt of India, engaged for extraction of Coal in Jharkhand and West Bengal. BCCL was incorporated in January 1972 to operate coking coal mines in the Jharia & Raniganj Coalfields, taken over by the Govt. of India on 16th Oct 1971 to ensure planned development of the scare coking coal resources in the country. Nationalisation of the non-coking coal mines followed soon after in May 1973 when 182 non-coking units located near to coking coal mines were also put under the control of BCCL. BCCL has 37 coal mines which includes 11 underground, 19 opencast and 7 mixed mines as on 31st March 2018.

1.2 Location of End use Plants-

The existing amalgamated Muridih Colliery (i.e amalgamated Muraidih Colliery & Shabdi Colliery) is departmentally producing coking coal of Washery II to IV grade by opencast mining on the other hand, Phularitand Colliery is producing Washery-II to IV grade coal through opencast method by outsourcing i.e Hired OC HEMM Patch. The Phularitand Colliery is also producing non coking coal by underground mining method in small scale.

Presently, the ROM (run off mine) coal of amalgamated Muraidih OC Colliery is being sized by three(3) number of Feeder Breaker/Crusher and dispatched to KKC Link Siding located besides of Mahuda-Gomoh Railway line passing (NS) through western part of the property.

In Phularitand Colliery, ROM coal is also sized to the required size by two (2) number of existing feeder breakers before dispatching of coal to the same KKC link siding. Presently, ROM coal produced from Phularitand Colliery is partly dispatched to the different end users through siding and partly by road transport as per existing linkage. From KKC siding, coal is being sent to different Power Plants like Mithon Power Plant (MPL),BTPS,NTCD,GHDL,HDCG, etc. Coal is also being sent to Mithon Power Plant partly by road and partly by rail.

1.3 Brief on Amalgamated Muraidih-Phularitand (part) Colliery

Earlier, there were three separate Collieries namely Muraidih, Shatabdi and Phularitand Colliery having separate lease boundaries. All these Collieries are under the administrative control of Barora area, BCCL. In past, these Collieries were worked in large scale by opencast as well as underground Board & Pillar mining method upto V/VI/VII combined seam.

In Muraidih Colliery, seams incrops within the property are VIIIA to I and in Shatabdi Colliery, VIIIC to I seam in descending order upto Mahespur Dyke located on southern part of the Colliery.

In Phularitand Colliery, incrop occur from Seam-XIII to Seam-I in descending order within the property considering upto Dhanbad Chandrapura Railway Line passing on southern side of the property.

The V/VI/VII seam is a thick seam and occurs as combined seam in all these Collieries. Earlier large scale of underground mining by Bord & Pillar method has been done in three to four sections in this thick V/VI/VII combined seam in all these collieries and except in small areas on southern side which are left as virgin. Seams lying above this combined seam were also partly developed /parlty depillared by underground mining method.

Later-on separate opencasts mines were made in Muraidih Colliery, Shatabdi Colliery as well as Phularitand Colliery to extract this V/VI/VII combined seam keeping the floor of this seam as base for the opencast. Thus, all the underground working of V/VI/VII combined seam along with B&P workings of overlying seams have been extracted and still extraction is in progress in these areas.

Due to large scale of opencast mining in Muraidih Colliery and Shatabdi Colliery, the common boundaries between these two mines have been excavated and merged and becomes a single mine. Subsequently, these two Collieries are amalgamated intone single Colliery after obtaining permission from DGMS (Annexure-IX) and it is presently known as Amalgamated Muraidih Colliery. At present, excavation is being done departmentally with shovel dumper combination only at one location on the south-western corner of amalgamated Muraidih Colliery existing boundary.

In Phularitand Colliery, a quarry named as Pure Benedih Section (P B Quarry)) was worked in past with floor of V/VI/VII seam as base on north-western part of Phularitand Colliery which is lying between D B Road & Mahuda-Gomoh Railway Line and presently it is abandoned. Except this, a number of small quarries were also made in incrop regions of V/VI/VII Seam. At present, an quarry is running on outsourced basis (i.e hired HEMM patch) with floor of V/VI/VII combined seam as base which is located almost southern part of the Phularitand property and located on northern side of Dhanbad-Chandrapura (DC) Railway line.

To extract seams lying below V/VI/VII seam in Phularitand Colliery, Mine Officials initiated a proposal to drive Inclines from the floor of abandoned V/VI/VII seam quarry (P B Section) to Seam-III. The Incline sites are selected by the Colliery Officials. Subsequently, two Inclines/drift drivages were made upto the floor of Seam-III as shown in Plate no.II. Presently, coal is being extracted from Seam-III by Bord & Pillar method of mining and produced coal is transported to surface by SDL-Haulage combination.

The EC (Environmental clearance) of Cluster-II was granted by MoEF on 6th Feb 2013 when these mines were operating independently. Now, the life of the earlier Muraidih OCP has exhausted. Moreover, area of Muraidih and Shatabdih mines are amalgamated due to operational safety to excavate fire in common boundary and made a one amalgamated mine for which permission has been obtained from DGMS. Presently amalgamated area is named as “Amalgamated Muraidih Colliery” and it is operational. Due to exhaustion of life of Muraidih Colliery and also due to amalgamation of two independent mines, amendment is required for earlier granted EC.

It is to be noted that the area of Cluster-II for group of mines of BCCL is located on northern side of Dhanbad-Chandrapura Railway line and Cluster-XV is located on southern side of this line. Thus, this D C Railway line divides the boundary of two Clusters. The entire area of amalgamated Muraidih Colliery is located in Cluster-II but the northern part of the lease boundary of Phularitand Colliery falls within Cluster-II and southern part of this Colliery in Cluster-XV. Thus, the amalgamated Muraidih Colliery and part of lease hold area of Phularitand Colliery which is lying on northern side of D C Railway line falls in Cluster-II group of mines of BCCL.

Hence, to decide the strategy for preparation of mining plan and mine closure plan for these two Collieries of Cluster-II, a meeting has been convened with Officials of P&P

Dept, Env. Dept, Mine authorities of BCCL along with Officials of CMPDIL,RI-II in the Conference Hall of CMPDIL RI-II on 17-12-2018 (Refer Annexure-I)

It has been decided in the meeting that instead of preparing separate mining plan for the above to independent Collieries, one amalgamated mining plan will be prepared considering the area of existing Muraidih Colliery and part of Phularitand Colliery falling in Cluster-II as stated above. Both Collieries are presently operating independently.

BCCL desires to operate as one mine by amalgamation of two independent Collieries falling in Cluster-II. As per the mine authorities, application has been processed to DGMS for further amalgamation of “amalgamated Muraidih Colliery” and “Phularitand Colliery (part)” falling in Cluster-II.

It has been considered that the area proposed to be amalgamated as stated in above paragraph, DGMS permission would be required and has to be adhere to all conditions as mentioned in permission of DGMS before commencement of any work as proposed in this amalgamated mining plan.

1.4 Mining activity/History

As stated in earlier paragraph that Muraidih, Shatabdi & Phularitand Collieries are three independent Collieries with separate lease boundaries. Incrop of different coal seams occur within the property of these Collieries. The number of seams increases from north to south-western side. The V/VI/VII seam occurs as combined seam within the entire property of these Collieries. To extract these coal seams in past, underground Bord & Pillar mining as well as number of small quarries were made within the lease area of above mentioned Collieries. Underground workings were left as partly developed and partly depillared whereas quarries were made in scatter manner and mostly located near the incrop regions. In V/VI/VII combined seam is a thick seam; hence, underground workings were made in three to four sections in this seam. Underground mining by Bord & Pillar method has also been done in past in different seams lying above this combined seam. Underlying Seam-IV to Seam-I are almost virgin in entire area of proposed amalgamated property except in Muraidih Colliery, where an small area on rise side property of Seam-III has been worked by B&P underground method in the year 1988 and abandoned working is located near incrop region of Seam-III. Presently Inclines of these workings were sealed or dozed.

BCCL management had taken decision to extract coal from all these old underground B&P and patch working of different seams as well as virgin areas by opencast mining method with floor of V/VI/VII seam as base in all these Collieries. Thus, surface and underground fire can be controlled which was broke out in these old workings. Muraidih was an operational mine at the time of nationalization. The Muraidih OCP was sanctioned as patch deposited scheme in 1979 for an annual coal production of 0.45 Mt. Due to favourable geo-mining conditions and availability of free mineable area, a Feasibility report for Muraidih Expansion(OCP) was preared and approved by BCCL Board in its 160thmeetingon 3rd Dec 1994 for capatity of 2.16 Mty with capital investment of Rs.19.84 Crores.

The Project report for Shatabdi OCP was approved by BCCL Board on 27.09.1999 for capital investment of Rs.60.04 Crs. Shatabdih OCP was carved out of Muraidih OCP in 2000 on the southern side of Dumra-Tundoo D B road and since then it was an independent mine. A supplementary note was prepared considering the aspects of power supply, land acquisition and rehabilitation as pointed out by CMD, BCCL. The project report along with supplementary note was discussed in TSC of BCCL board on 12.01.2000. and it was approved by BCCL Board on 20th January 2000 for Capital investment of Rs.57.00Crs. The comprehensive Project Report incorporating the supplementary Note was placed before the ESC of CIL Board in its 53rd meeting held on 23.05.2000. Later-on a Recast Project report Shatabdih OCP was approved by BCCL Board on October 2002 for production of 0.80Mty. As per Colliery record, the production from Shatabdih OC was commenced from 2000-01 with production 0.515Mty.

At present, the common boundary between Muaridih & Shatabdi OCP has been excavated and became a one mine “Amalgamated Muraidih Colliery” after obtaining permission from DGMS on 03.08.2012. Regarding Opencast activities, presently Coal/OB excavation is being carried out departmentally with V/VI/VII seam as base of the opencast in south-western part near the earlier Barora Railway siding (which has been dismantled at present) in area of existing amalgamated Muraidih Colliery

In Phularitand Colliery, a Phularitand(West) opencast was operated departmentally with floor of V/VI/VII combined seam as base of the Quarry/OC upto the year 2002-03. Later-on, the same OC was outsourced to continue further excavation as Hired HEMM patch with floor of V/VI/VII seam as base of the quarry. The production from this hired patch OCP was started from 2009-10 and still it is in operation. The quarry face is advancing towards eastern side within the lease area of Phularitand Colliery and extracting

overlying earlier developed Bord & Pillar workings of different coal seams including virgin areas.

As stated earlier that seams lying below V/VI/VII combined seam are Seam-IV(Top)/IV(Bot), Seam-III, Seam-II & Seam I in descending order in all these Collieries and mostly virgin in entire area under consideration.

To extract coal from these underlying seams, BCCL has proposed for opening of Muraidih underground mine within the lease area of Muraidih OCP Colliery and Shatabdi OCP Colliery covering an area of about 4.758 Sq.km which presently falls under existing “Amalgamated Muraidih Colliery”.

Taking that into consideration, BCCL decided to go for Global Bid Tender for extraction of virgin seams (i.e III & I) by underground mining method. BCCL floated a tender on 26th March 2010, on total turnkey basis starting from planning, designing, and construction, execution, supply, and procurement, installation/operation of equipment/machineries, production and evacuation of coal up to the desired location on surface of the mine. The NIT envisaged the “Development of Muraidih Underground mines and extraction of coal from Muraidih III,II & I Seam by mass production technology package for minimum guaranteed production of 2.0 MTPA of coal on turnkey basis”. The scope of work involves mining operation for production of guaranteed quantity of 2.0 mty for a minimum nine (9) years of commercial production period.

Subsequent to completion of tender process, M/s MINOP Innovative Technologies(P) Ltd & Beijing Huayu Engineering Co. Ltd (BHEC) (consortium partner of MINOP) emerged as L1 bidder, The successful bidder proposed for extraction of Seam-III & Seam-I by longwall method of mining deploying one PSLW set and gate road development by one Bolter Miner The project report (DPR) was approved in 265th Board meeting held on 14.02.2011 for an estimated capital of Rs.339.875 Crores.

BCCL had entered into contracts for supplies and services with the successful bidder, Minop Innovative Technologies (P) Limited (MINOP) on March 25, 2011 (‘Supply Contract’ or ‘Original Agreement’) and Minop had since commenced work on the Project. Subsequently, the parties had executed amendments to the contracts for supplies and services on June 22, 2012 (‘Amendment Agreement’). The Consortium submitted its DPR which was accepted by BCCL on 29.01.2013.

Based on the above, Incline drivage at proposed site has been started in January 2014. Air Shaft Excavation started around 23.01.2015. Shaft sinking work was suspended since Dec' 2015 as DGMS has imposed violation due water logging in Seam III workings of adjacent Jogidih Colliery.

Due to the constraint of handing over the land by BCCL at the proposed site of Inclines and Shaft as well as land required for construction of infra-structure, BCCL authority has suggested for changing the location of the inclines as well as shaft site so that the requirement of private land is kept as minimum as possible. Based on that the location of Air shaft as well as Auxiliary incline has been changed and MINOP has prepared a revised surface layout plan showing mining complex at three isolated locations. In view of the above, MINOP has submitted a supplementary report on approved DPR and the "Supplementary report on approved DPR" was accepted by BCCL vide letter no. BCCL/D(T) P&P/F-114/2015/297 dated 24.12.2015.

Opening of LC for procurement of Equipment is delayed as M/S MINOP has asked for modification in terms of payment as contained in the agreement. Work has been suspended by the contractor, M/S MINOP, since 01.06.2016. It is expected that the Contractor is likely to re-start / commence the suspended project work soon.

In Phularitand Colliery, a proposal to drive three nos. of Inclined Shafts No. 1/III, 2/III & 3/III from floor of V/VI/VII Seam abandoned old quarry (PB Section) to III Seam was initiated by Phularitand Mine officials. The same was sent to CMPDI, RI-II for preparation of cost estimates for the above drifts. The opinion of the CMPDI, RI-II was communicated to General Manager (P&P), BCCL, vide letter No. RI-II/M/01/4703 dated 26.02.2011.

However, drivage of two inclines was started departmentally at the site selected by the Colliery officials. Presently, Incline/drift drivages for Incline no.1 and Incline no.2 have already been made from the selected site upto Seam-III. Incline No.1/III is being used as intake airways whereas Incline No.2 as return airways and fan is installed at the Incline mouth of Incline no.2. Instead of driving Incline no.3, sinking of an air shaft is under consideration which will act as main return in future. Presently, development in Seam-III is going on by Board & Pillar method with SDL-Haulage combination.

1.5 Need for preparation Mining Plan-

Earlier Muraidih Colliery and Shatabdi Colliery were operating as separate mine. Later-on due to operational constraint, occurrence of fires etc, these two mines have been amalgamated into a single mine and named as “amalgamated Muraidih Colliery” for which permission from DGMS has been obtained. This Colliery falls in Cluster-II.

On the western side, a part of the lease area Phularitand Colliery (i.e northern side of Dhanbad-Chandrapura Railway line) also falls in Cluster-II which forms the western boundary of above mentioned amalgamated Muraidih Colliery.

Environmental Clearence (EC) for Cluster-II group of mines of BCCL was obtained in 6th Feb 2013 for 5 Mines namely Block-II Colliery (UG &OC), Jamunia OC, Shatabdih OC, Muraidih (OC & UG) and Phularitand OC. Presently Muraidih & Shatabdih has been amalgamated to an one Muraidih Colliery. Out of 5 mines of Cluster-II, there is no Phularitand UG section which has to be included in Cluster-II group of Mines. Moreover, as per BCCL authority, the life of Muraidih OCP has been expired. Hence, the EC of Cluster-II which was granted in 6th Feb 2013, has to be amended for which approved Mining Plan by board of directors of BCCL is required.

Further, BCCL management desires to amalgamate the part area of Phularitand Colliery falling in Cluster-II with already amalgamated Muraidih Colliery to make an “Amalgamated Muraidih-Phularitand(part) Colliery” and a single amalgamated Mining Plan should be prepared considering the area of these two Collieries as states above. Hence, this amalgamated Mining plan and mine Closure has been prepared.

This amalgamated mining plan has to be approved by Board of Directors of BCCL for amendment of Environmental Clearance for Cluster-II. The permission from DGMS has to be obtained for such amalgamation and according to mine authority, application for amalgamation has been submitted to DGMS on January 2019 (Letter no. D(T) P&P/F/12(1)/2019/20 dated 31.01.2019 (Annexure-XIII).

1.6 Coal Washery –

Presently, produced coal from existing amalgamated Muraidih Colliery and Phularitand Colliery are not linked to any existing Washery. A number of Non-coking coal Washeries of BCCL are under construction. It is proposed to send coal from these Collieries to Madhuband NLW Washery which is under construction and, about 61% construction has been done upto the end of first quarter of 2018-19. Coal produced from these Collieries are presently being sent to KKC Link Railway Siding lying on Mohuda-Gomoh S E Railway line and from the siding, coal is sent to different linkages mostly to the Power Sectors. According to Mine authority, only in MPL, coal is being sent partly by road and partly by Railway wagons.

CHAPTER-II

DETAILS OF EARLIER APPROVAL OF MINING PLAN AND MINE CLOSURE PLAN

The Mine Closure Plan for Muraidih - Shatabdi Group of mines was approved in 300th meeting by Board of Director of BCCL held on 21.09.2013

The Mine Closure Plan for Phularitand Mixed mines (Cluster-II) was approved in 305th meeting by Board of Director of BCCL 12.03.2014

The Environmental Clearance for Cluster-II group of mines of BCCL was granted by MoEF on 6th Feb 2013.

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CHAPTER-III

LOCATIONS, TOPOGRAPHY & COMMUNICATION

3.1 Location-

3.1.1. The area under consideration is located in the Western part of Jharia Coalfield and constitutes of amalgamated boundary of Muraidih Colliery and Phularitand Colliery (Part) falling in Cluster-II. These Mines are under administrative control of Barora Area of BCCL. The amalgamated area of Muraidih-Phularitand (part) Colliery under consideration has a total surface area of 1118.71 Ha. Out of which, area of "amalgamated Muraidih Colliery" is 717.71 Ha and area of Phularitand (part) falling in Cluster-II is 401 Ha. The considered area lies between Latitude 23º46'30.732" to 23º49'0.436" (N) and Longitude 86º12'38.997" to 86º15'15.998" (E). The area falls in Open Source Survey of India Toposheet No. F45C1 (RF-1:50000/Year-2009). (Refer Plate no.II)

The Project Area is demarcated as 887.75 Ha considering the mining area proposed within this amalgamated Muraidih-Phularitand (Part) Colliery.

3.2. Accessibility-

The Project area is about 30 Km West of Dhanbad town and is well connected by road and rail. The Project area is easily negotiable by Hirak ring road (Dhanbad – Chandrapura Road) from Dhanbad town and distance is about 40 Km.

The Dhanbad-Chandrapura (E C Rly) Railway Line passes through the southern part of the considered area and also form southern boundary limit which also southern limit of Cluster-II. Phularitand railway station is located on Dhanbad-Chandrapura (E C Rly) Railway Line. The Mohuda-Gomoh (SE Rly.) Railway Line passes towards western side of the area and also forms western boundary of the considered area. (Refer Plate no.-II)

3.3. Climate & Rainfall data-

The area under consideration falls in the sub-humid region of the state of Jharkhand. The maximum temperature rises as high as 48°C during summer (April to middle of June) and falls down to minimum of 6°C during winter (December to January). The area receives fair to moderate rainfall, the average annual precipitation being 1400 mm, most of which is received between Junes to September.

3.4. Topography -

The area has a general undulating topography with a gentle slope towards east to South East. The mining activity which is going on in the area for decades has severely obliterated the general topography. Several small quarries, subsided goaf, OB dump, fire etc. have shattered the original topography of the area. The highest elevation (224.69) has been observed near borehole no.BA-10 in the west-central part, whereas, the lowest ground elevation (185.45m) has been observed in the eastern part of the project area.

3.5. Boundaries of Amalgamated Muraidih-Phularitand (part) Colliery -

As stated earlier that this mining plan considers amalgamated area of existing amlagamated Muraidih Colliery and part of Phularitand Colliery falls in Cluster-II which is measured as 1118.71 Ha. Both Collieries are mixed mine. The boundaries of this amalgamated Muaridih-Phaularitand (part) Colliery has been demarcated as follows-

North	-	Talcher formation
South	-	Dhanbad-Chandrapura Railway Line and Mahespur Dyke
East	-	Western Boundary of Jogidih Colliery
West	-	Gomoh-Mohuda Railway Line of S.E Railway

The Project boundaries considering the extent of both opencast and underground mine workings within the above mentioned amalgamated boundaries is as follows-

North	-	Incrop of Seam I
South	-	Upto a line keeping 45m barrier from Railway property of Dhanbad-Chandrapura Railway Line and Mahespur Dyke
East	-	Western Boundary of Jogidih Colliery
West	-	Upto a line keeping 45m barrier from Railway property of Gomoh-Mohuda Railway Line of S.E Railway

3.6 Availibility of Water in the area-

The drainage and topography of the project area is mainly controlled by Damodar River. The Khudia (Khodo)-nala flowing easterly in the north western part swings to south easterly in the the north western part swings to south easterly in the eastern part. It eventually meets the Katri Jore which is a tributary to Damodar River. A drain also flows on western side and joins with Khudia nala.

The accumulated mine water from opencast sump of Muraidih Colliery is pumped to surface reservoir and water is made available for utilization for various purpose after proper treatment.

3.7 Highest Flood Level- As per the Mine record, the HFL of Khudo Nala is 197.43m

3.10 Ownership and occupancy of land and involvement of Forest land

The total amalgamated surface area under consideration is 1118.71 Ha Out of which, BCCL area is 379.42 Ha. Total Forest land involved within this area is 46.16 Ha and these forest land falls within the property of existing amalgamated Muraidih Colliery. As per the record, there is no forest land involved in part area of Phularitand Colliery falling in Cluster-II which is considered in this mining plan.

3.11 Important surface features and major diversion or shifting etc-

Important surface features present within the above mentioned amalgamated area of Muaridih-Phaularitand(part) Colliery are Hirak Road, District Board Road, High Tension Lines (132 KV), Villages/Temples, BCCL Colonies, Nala etc. which may require to be diverted, rehabilitated or shifted in future to extract coal lying below this property.

1) Diversion of D B Road-

It was decided in the meeting held on 17/12/2018 at CMPDIL, RI-II (refer letter no. RD:PS:048:3721-26 dated 18/21.12.2018 and 29/12/2018) that D B Road will be diverted and will be laid along the Railway property on western side (Annexure-I).

Later-on, GM (Barora Area) has sent a letter (vide letter no.BCCL/GM/AR-1/2019/03 dated 17.01.2019) to RD, RI-II CMPDIL stating that it will be very difficult to divert D B Road at present scenario and requested not to consider diversion of D B Road during preparation of amalgamated Mining plan for Muraidih-Phularitand(part) Colliery (Annexure-IV). Hence, diversion of D B Road has not been considered during preparation of this Mining Plan.

2) Diversion of Khodo Nala-

A Khodo Nala is flowing west to east and then flows north to south after crossing the lease hold boundary of Muraidih Colliery. The Muraidih OC has excavated coal from southern side of this nala flowing west to east. To extract coal from underlying Seam-III & Seam-I, the successful bidder has proposed for diversion of Khudo(Khudia) nala towards northern side i.e outside of proposed mining area of seam-I to release coal for Longwall panels identified by Bidders. Since this an approved project by VCCL Board, hence in this mining Plan, diversion of khodo nala is considered. As per the approved DPR and agreement, this diversion has to be made by BCCL. (Refer Plate No.XVIII)

CHAPTER-IV

GEOLOGY AND DEPOSIT APPRAISAL

4.0 Geology

4.1. Regional Geology of Jharia coalfield

The Jharia coalfield (453 Km^2) is sickle shaped on plan and occurs in the form of syncline with its axis trending broadly in E-W direction and plunging towards west. The southern flank of this coalfield is truncated by boundary fault having maximum throw about 2.5 Km at Mohuda Basin. The non-coal bearing Talchir formation is mainly exposed along the northern and western portion of the coalfield. The Barakar formation covering an area of 218 Km^2 which is exposed in the northern, eastern and south-eastern part of the coalfield area contains over 40 coal horizons including local and persistent seams, some of which are exclusive store house of metallurgical coal in India. The Barakar formation is successively overlain by Barren Measure formation which is devoid of workable coal seams. This is mainly exposed in the central part of the coalfield. The Barren Measure is overlain by the coal bearing Raniganj formation (54 Km^2). These are exposed within a sub-elliptical basin the south-western part of the coalfield.

4.2. Stratigraphy

The Regional stratigraphic succession of Jharia coalfield is given in table no. 4.1

Archeans: The Archeans, consisting of gneisses and mica schists are exposed all along the periphery of Jharia Coalfield. A tongue or protrusion of metamorphic, thrusting into the Gondwanas, is observed near Patherdih in the south-eastern part of the coalfield. Besides, a small inlier of metamorphic has been noticed near Khenudih in the north-western part of the coalfield. Metamorphic high has been interpreted in the south-eastern part of the coalfield in Sitanala area, resulting in the omission of older seams. The metamorphics are profusely intruded by quartz veins.

Talchir: In an Archean basement, the lower Gondwana sediments are deposited with a pronounced unconformity. The lowermost Gondwana sediments of Talchir formation are represented by variegated shale and greenish sandstones which at times show laths of unaltered feldspars. They are exposed all along the northern

fringe of the coalfield. They are, however not exposed along the southern fringe due to boundary fault. Near Lutipahar in the north-western part of the coalfield, Talchir formation is comparatively well developed in a large area and boulder bed shows exposures of spheroidal weathering.

Barakar: In the eastern, northern and north-eastern parts of the coalfield, the Barakar are extensively developed. All along the southern boundary they are extending under the thick over of Barren Measures. The Barakar formation comprises of pebbly sandstones, conglomerate, grit, coarse to fine grained sandstones, shales, carbonaceous shales and coal seams. Verma *et. al*. (1989) have observed a gradual decrease in thickness of Barakar from east to west. A maximum thickness more than 1250 m has been observed in the south-eastern part of the coalfield in Tasra region, while minimum thickness of around 600m is noticed in Damuda area. Barakar is the most important geological formation as it contains more than 40 coal horizons having thickness more than 50 cm. In general seam X (Ten) and younger seams are better quality coal (prime coking) than older seams which change with depth to non-coking coal.

Barren Measure: The Barren Measure formation lying conformably over the Barakar formation consists of massive multistoried sandstone alternating with carbonaceous shale, grey shale and sandstone/shale intercalations with occasionally very thin impersistent, non-workable coal horizons in the lower part of the formation. The Barren Measures shows a widespread development extending from the central part of the coalfield up to the southern margin. The maximum thickness of the Barren Measure has been estimated to be around 625m in the central part of the basin. It gradually decreases westward and eastward and reduces to a minimum of 375m in the south-eastern part.

Raniganj: Raniganj formation is deposited in sub-elliptical basin that is called Mohuda basin the south-western part of the coalfield. The formation is represented by sandstone, shale, carbonaceous shale and coal seams. 24 coal seams have been reported from this formation. These seams comprise high volatile, high moisture, medium coking coal. The maximum thickness around 725m of Raniganj formation has been observed.

Igneous Intrusive: Mica peridotite and dolerite are the two most common Post Gondwana intrusives. The mica peridotite occurs as dyke and sill throughout the coalfield and has caused widespread devolatisation of the coal seams. The dolerite dyke is mostly confined in the western part of the coalfield and has limited effect on coal seams. A number of dykes and their offshoots have been established in the coalfield, but the most surprising phenomenon of a 250m zone characterized by pyrolitization and devolatisation has been observed in the north-western part of the coalfield at Daumda Block where presence of any igneous intrusives has not been noticed. The mica periodotite sills have devolatised the extensive resource of good quality coal in the coalfield.

As mentioned earlier, most of the area is covered by sandy soil and alluvium. The thickness of soil varies from 1.0 m to 10.0 meter.

Table-4.1

Geological Succession of Jharia Coalfield

Stratigraphic Division	Age	Formation	Lithological characters
	Recent	Alluvium/Soil/Sand	
	Cretaceous to Jurassic	Mica Peridotite/Dolerite Dyke	
	---------- Unconformity ----------		
Lower Gondwana	Upper Permian	Raniganj Formation	Mainly fine to medium grained grey current bedded sandstone with shale and coal seam
	Middle Permian	Barren Measures	Black carbonaceous micaceous shale with clay, ironstone and sandstone.
	Lower Permian	Barakar Formation	Coarse grained to conglomeratic white sandstone with shale and coal seams
	Lower Permian	Talchir Formation	Coarse grained sandstone, white or slightly variegated at Top, green shale with undecomposed feldspar, boulder bed etc.
	---------- Unconformity ----------		
	Archeans		Granites, gneisses and schists.

4.3. Geology of Amalgamated Muraidih-Phularitand (part) Colliery-

The area under consideration is located in the north western corner of the Jharia coalfield, and it is primarily covered by the Barakar formation which is overlain by thin layers of sandy soil and clay. The thickness of soil ranges between <1.0 m. (MR-22, PH-19) to 13.83.0 m. (BA009). Metamorphics is exposed as faulted contact in the north-eastern part of the leasehold area. The rocks of Barakar formation consist of grits, fine to coarse grained sandstone, intercalation of sandstone and shale, sandy shale, grey shale, carbonaceous shale, and number of coal seams. Coal seams XIII to I occur within the project area and are under the purview of this Geological Report (Plate No.II).

Good rock exposures are rather are observed extensively, particularly in the northern and north western portion area and in quarries. These rock exposures are mainly of sandstone. The thickness of soil and weathered mantle varies upto 13.83m. The incrop position of coal seams has been taken from the geological reports and are interpretative. Geology and correlation of the seams have been established mainly on the basis of sub-surface data obtained from borehole and mine workings.

Igneous Intrusion:

Mahespur dolerite dyke-This dyke is located in the south eastern quadrant of the block and runs almost NE-SW along the boundary of Maheshpur-Phularitand collieries and thereafter through Jogidih colliery. It is reported to be upto about 40m thick. The dip of the dyke is 80^0 due SE.

4.3.1 Amalgamated Muraidih-Phularitand(Part) Colliery Boundary-

The project boundary is demarcated on surface and individual seam folio /floor contour plans of XIII, XI/XII, IX/X,VIIIC,VIIIB, VIIIA, VIII, V/VI/VII, VI Top, IV/IV Bot, III,II I& I/II seam.

4.3.2 **Status of Exploration**

A total of 53 boreholes have been drilled within the project area involving a total meterage of 10793.06 meters within the project area.

Status of Exploration

Serial No	Series	Drilling Agency	No. of BH	Meterage drilled
1	BA	CMPDI	23	4876.25
2	MR	CMPDI	25	4871.09
4	PH	CMPDI	5	1045.72
Total			**53**	**10793.06**

The density of boreholes comes to about 5 BHs/Km^2 within the leasehold area.

4.3.2 **Scope and Limitations**

1. The scope of the present assessment is to assess the potentiality of seams (XIII to I Bottom) occurring within the project area and their extraction by opencast (XIII to V/VI/VII seam) as well by underground mining method (III to I&I/II seam).
2. The updated mine plan / data generated and supplied by colliery authorities have been used in preparing this report. Additionally, few old workings present in the geological report of OCP-III Block have also been considered in the present report. The surface plan of this report is mainly based on colliery plan and Open Source Survey of India toposheet of Survey of India.
3. Only standard geological nomenclature of seams has been used in the present note.
4. An element of approximation exists in location and extent of mine workings when matched with borehole location plan. Surface features like quarries, Incline, roads etc. shown on the plan supplied by colliery do not match well with Open Source Survey of India Survey Toposheet and surface plan of OCP-III Block.
5. Areas having thickness less than 0.5 m have not been considered for geological resource estimation.

6. In the past, seams V/VI/VII has been reported to be affected by fire in the central part and seam VIIIA, IX/X and XI/XII have been reported to be affected by fire in the south-western part of the project limit. There are many old underground workings of these seams present in and around that earlier fire affected area, possibility remains that some of the underground workings of these seams may also affected by fire. However Colliery authority could not able to provide the data regarding loss of coal resource damage due to fire, therefore coal resource has been estimated without consideration of fire therefore coal resource may vary within the fire affected area with actual insitu coal resource.
7. Quality for seam boreholes (seam III, II, I/II, & I) in these reports is given based on opencast norms (I100) and that has been converted to (I30) norm for their extraction by underground method.

8. As per data received as per colliery authorities damage of coal due to fire is not known therefore resource of fire area has been estimated assuming that no coal has been damage due to fire, therefore resource may vary from actual resource.

9. **Nomenclature of different Coal Seams used in "Geology chapter" is Geological coal Seam name only**.

4.4 Sequence of Coal Seams

The seam sequence and parting within the amalgamated area (northern part of DC Line falling in Cluster-II) is covered in Table-4.2.

Table-4.2

Seam/ Parting (P)	Range of thickness of coal seams and their intervening parting (m)			No. of full seam intersection	Depth Range (m)
	Minimum	Maximum	Average		
1	2	3	4	5	6
XIII	4.61(PH009)	4.61(PH009)	4.61	1	INCROP-50
P	18.8(PH009)	18.8(PH009)	18.80	1	
XII/XI	6.1(PH009)	6.1(PH009)	6.10	1	INCROP-60
P	32.78(PH009)	32.78(PH009)	32.78	1	
IX/X	4.05(BA020)	8.5(PH019)	6.78	4	INCROP-110
P	10.65(PH009)	15.05(PH018)	12.63	4	
VIIIC	1.26(BA016)	2.98(BA004)	2.20	7	INCROP-115
P	5.35(BA020)	11.95(BA004)	7.19	7	
VIIIB	1.11(PH009)	4.4(PH019)	2.38	11	INCROP-120
P	1.52(BA004)	20.63(PH009)	8.60	11	
VIIIA	2.55(PH018,PH019)	5.45(MR017)	3.48	12	INCROP-130
P	15.83(PH016)	28.3(BA004)	19.01	6	
VIII	0.2(PH020)	1.06(PH016)	0.48	7	INCROP-145
P(VIIIA-V/VI/VII)	31.91(BA016)	37.76(MR009)	34.55	6	
P(VIII-V/VI/VII)	7.41(BA004)	15.6(PH018)	10.39	7	
V/VI/VII	0.76(BA019)	28.05(BA012)	22.31	31	INCROP-200
P(V/VI/VI-IVT)	24.65(BA012)	31.67(MR013)	27.22	10	
P(V/VI/VII-IV)	3.56(BA014)	31.69(MR017)	24.13	20	
IVT	0.2(MR008)	1.55(MR024)	0.71	23	INCROP-105
P	1.04(BA010)	7(MR006)	3.91	23	
IVB	0.12(BA001)	1.83(BA013)	0.65	24	INCROP-115
IV	0.25(MR012)	3.21(BA003)	1.57	23	INCROP-205
P(IVB-III)	22.33(MR024)	31.35(BA022)	26.66	23	
P(IV-III)	15.99(BA011)	32.3(BA019)	26.25	22	
III	2(BA021)	6(BA001)	3.86	50	INCROP-235
P(III-II)	6.35(MR012)	16.73(MR006)	12.26	45	
P(III-II/I)	11.39(BA022)	13.92(BA019)	12.27	4	
II	0.07(MR006)	2.15(MR028)	1.09	47	INCROP-245
II/I	4.63(BA019)	5.2(BA021)	4.91	4	INCROP-130
P(II-I)	1.18(BA015)	12.23(MR018)	5.23	51	
I	1.05(MR002)	4.28(BA004)	2.50	46	INCROP-250

4.5 Nomenclature of coal seams Vs-À-Vis Colliery Nomenclature

Table – 4.3

Geological Nomenclature (Present Work)	Colliery Nomenclature (Phularitand Colliery)	Colliery Nomenclature (Muraidih Colliery
XIII	XIII	
XI/XII	XI/XII	
IX/X	10	
VIIIC	9 TOP	IX TOP
VIII B	9 BOT	VIII TOP
VIII A	8	VIII BOT
VIII	-	Virgin
V/VI/VII Comb	7 (V/VI/VII Comb)	V/VI/VII Comb
IV Top	Virgin	Virgin
IV	Virgin	Virgin
IV Bot	Virgin	Virgin
III	III	III
II	II	II
I/II comb	I/II comb	-
I	I	I

4.6 Geological Structure of the Block

4.6.1 Strike & Dip

The general strike of the area is E-W which swings to N-S locally in the central part and again swinging to NW-SE to almost E-W in the eastern part. The dip of the beds is varying from 5^{o}-10^{o} in the boundary regions to 10^{o}-20^{o} in the central part. The dip direction is generally towards SE.

4.6.2. Faults

Geological structure of the project area is highly complicated as a number of faults have repeatedly dislocated the strata. Based on boreholes/colliery data 6 nos. of faults have been interpreted within the project area. Throw of these faults varies from 5 m to 20 m. The details of fault are given in Table No–4.4.

Description of faults

Table- 4.4

Sl. No.	Fault No.	Extent & Location	Strike/Dip	Max Throw (m)/ Direction	Evidence	
					B.H No.	Nature
1	**$F_1 – F_1$**	Central Eastern part of the Block	E-W /northerly Dip.	15m	MR-23 MR-12	V/VI/VII seam is faulted from roof in MR-23. V/VI/VII seam is faulted from floor in MR-12. Reduction in parting between V/VI/VII and IV seam. Encountered in the workings of V/VI/VII and VIIIB seam in Barora and Jogidih collieries respectively.
2	**$F_2 – F_2$**	North Eastern part of the area	NE-SW	10m		Encountered in the working of VIIIA & VIIIb seams of Jogidih Colliery.
3	**$F_3 – F_3$**	Occurring in the Central part of Block	WNW-ESE/ SSW dip	5m.	BA-14	Reduction in the parting between IV and III seam in BA-14 Encountered in the workings of V/VI/VIII seam in Barora colliery
4	**$F_4 – F_4$**	Western Part of the Block	NE-SW/ Northerly dip. .	10m	NK-21	Reduction in parting between seams IV & III seam in NK21.
5	**$F_5 – F_5$**	Occur in the north-western part of the area.	E-W/ southerly dip.	15m	MR-20	III seam is missing in MR-20.
6	**$F_6 – F_6$**	North-Western part of the Area.	E-W/ southerly dip.	20		Barakar is in direct contact with metamorphic.

Besides the above mentioned faults, occurrence of additional minor faults having throws less than 10m and low angle faults cannot be ruled out.

4.7 Methodology for assessment of coal seams

4.7.1. Thickness & Spatial Variation of Seams

The description and the assessment of the quality of coal seam are primarily based on the seam folio plans which depict the iso-core line, iso-ash and iso-GCV lines besides the outer extent of the underground and opencast developments.

4.7.2. Iso-chore Line

Only the vertical thickness (In-band) of the coal seams, as encountered in the boreholes, has been considered for drawing iso-chore. 50 cm thickness has been considered as the minimum limit for resource estimation. Iso-core of 50 cm have been drawn followed by iso-core of 0.9, 1.2, 2, 2.5, 3, 4, 6m and so on.

4.7.3. Iso-ash Line

The ash content forms the basis for grading of coking coals as per notification by Gov. of India, Ministry of Energy, Dept. of Coal, dated 13.02.1981. Coal having ash > 50% (in case of coking coal) have not been assessed.

4.7.4. Iso-GCV Line

The Gross Calorific value forms the basis for grading of non-coking coals. Coal having ash > 50% have not been graded in the present work.(Refer: 4.7.6)

4.7.5. Floor contour plans

Floor contour plans of all persistent coal seams have been drawn. Spot levels of various seam workings have been considered during preparation of floor contour plans. However in some cases, a little variation exists between the floor value and the spot level data of the respective seams. It may be noted that the spot levels are not necessarily on the floor of the respective seams. Necessary corrections have been made while using the data.

4.7.6. Basis for thickness and quality determination

Analytical results of coal cores have been utilized to assess the thickness and quality of the coal seams. To arrive at the in-band thickness of the coal seams as per opencast norms, all dirt bands (combustible) up to 1.00 m thickness occurring within

the seam have been included. Dirt bands having thickness more than 1.00 m occurring within the seam have been excluded. If the non-combustible bands that are developed within the seam persist in a considerable area, the seams have been considered as split and line of split or merger has been drawn in relevant floor contour and seam folio plans. Faulted, partly faulted, worked seam/part worked, part weathered seam thickness encountered in the boreholes have not been considered for the purpose of quality assessment.

To arrive at the in-band thickness of the coal seams as per underground norms, all dirt bands (combustible) up to 0.30 m thickness occurring within the seam have been included. Dirt bands having thickness more than 0.30 m occurring within the seam have been excluded.

The volatile matter on unit coal basis (UVM) wherever unavailable, has been calculated by the following empirical formula –

UVM% =100-(100xFC)/100-(1.1A+M)…… (i)

Where:

FC = Fixed carbon

A = Ash%

M = Moisture %

Carbonate correction, wherever required have been carried out.

In general, Gross Calorific Values (GCV) that have been determined in the laboratory have been considered for preparation of seam folio plan but where the GCV values are not available, it has been calculated by the following formula (Majumder's formula for low moisture coal).

$$GCV = \frac{165F+136(VM-0.1A)-108M}{1.8} \quad \text{..... (ii)}$$

Where:

F = Fixed carbon %, VM = Volatile Matter %

A = Ash %, M = Moisture %

It has to be noted that the classification of coal into Coking and Non-coking coal has been done as per the criteria mentioned in the Geological Report of OCP-III Block, where seam V/VI/VII and above has been considered as coking coal.

4.8. Seam-wise Description-

Seam XIII to I exist within the amalgamated boundary considered in this mining plan. In the present work detailed description is given only for persistent seams. (Seams having thickness >0.50m).

Seam XIII

This seam occurs below L-6 seam and incrops in Phularitand Colliery and south and west part of the leasehold area. The full coal thickness has been intersected in only 1 borehole within the project limit. The In-band thickness of seam is 4.61m (PH009). The seam has been considered as coking coal within the project area. Detailed quality parameters is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Ash%	UVM%	Grade Range	C.I.	G.K.L.T	S.I.	CO_2%
22.9	25.5	W-III	18-21	E-F/G-G1	2.5-4.5	0.27

Roof & Floor

The immediate roof of the seam is mostly sandy shale and intercalation of sandstone and shale whereas floor of the seam is Sandy shale and at places shale/ intercalation of sandstone and shale.

Exploitation

This seam has been extensively worked and goaved in major part of the area. Net geological resource is given below in table.

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)	Within Proposed Floor Limit
0.271	0.028

Seam XI/XII

Seam XI/XII occurs below XIII seam with a parting 18.5m. The full coal thickness has been intersected into only 1 boreholes within the project limit. The In-band thickness of the seam is 6.1m (PH009). The seam has been considered as coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Ash%	UVM%	Grade Range	C.I.	G.K.L.T	S.I.	CO_2%
30.00	25.00	W-IV	19-22	F-G/G-G1	3.5-4.5	0.21-0.33

Roof & Floor

The roof is generally of grey shale and, while the floor is generally made up with intercalation sandstone and shale.

Exploitation

The seam has been quarried and goaved in major part of the area and part of the seam is under fire. This seam appears to be free from any pyrolitisation in the assessment area.

Fire

Evidence of active fire has been found in the workings of incrop area of the seam which lies in south western part of the leasehold area.

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)	Within Proposed Floor Limit
5.229	2.459

Seam IX/X

This seam underlies seam XI/XII with a parting of m to 32.7m and the full coal thickness has been intersected in 4 boreholes within the project limit. In-band thickness of the seam is from 7.2m (PH018) to 8.5m (PH019). The seam has been

considered as coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Ash%	UVM%	Grade Range	C.I.	G.K.L.T	S.I.	CO_2%
30.2-32.2	23.2-24.8	W-IV	18-22	F/G-G/G1	3-4.5	27.0-41.0

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)	Within Proposed Floor Limit
9.83	3.617

Roof & Floor

The immediate roof of the seam is mostly carbonaceous shale and grey shale whereas floor of the seam is carbonaceous shale and at places intercalation of sandstone and shale.

Exploitation

The seam has been quarried out along the incrop region. The seam has also been worked by U/G method of mining. Part area of the seam has been developed in one section. At places the seam is under fire. The seam appears to be free from any pyrolitisation and the UG working of the seam is very old.

Fire

Evidence of active fire has been found in the south-western part in the working of incrop area of the seam IX/X.

Seam VIIIC

Seam VIIIC underlies seam IX/X with a parting of 10.65m to 15.05 m and the full coal thickness has been intersected in 7 boreholes within the project limit. In-band thickness of the seam varies from 1.26m (BA016) to 2.98m (BA004). The seam has

been considered as both coking and non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Coking Coal

Ash%	UVM%	Grade	C.I.	G.K.L.T	S.I.	CO_2%
26.5-36.8	21.7-24.6	UG-WIII	21	G	4.5-5.5	0.31-0.45

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
30.9	5847	G5

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Coking	Non-coking	Total	Coking	Non-coking	Total
3.627	0.2	3.827	1.479	-	1.479

Roof & Floor

The roof of the seam is generally medium grained sandstone and sandy shale while floor is constituted of the seam is grey shale and sandy shale.

Exploitation

The seam has been worked by both opencast and underground method in the leasehold area. The seam has been developed in one section only and has been goaved in south eastern part of area.

Fire-

Evidence of active fire has been found in the western part in the working of incrop area of the seam VIII seam (southern side of P B Old Quarry).

Seam VIIIB

Seam VIIIB occur below seam VIIIC with a parting of 5.35m to 11.95m whereas full coal thickness of seam VIIB has been intersected in 11 boreholes within the project limit. In-band thickness of the seam varies from 1.11m (PH009) to 4.4m (PH019).

The seam has been considered as both coking and non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Coking Coal-

Ash%	UVM%	Grade	C.I.	G.K.L.T	S.I.	CO_2%
28.9-47.7	21.3-25.3	UG-W-IV	10-22	F-G/G1	2.5-5.5	0.19-0.61

Non-Coking Coal-

Ash%	GCV (K.Cal/kg)	Grade Range
33.5-34.9	5330-5913	G5-G7

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Coking	Non-coking	Total	Coking	Non-coking	Total
4.867	0.67	5.537	3.227	0.1	3.327

Roof & Floor

The immediate roof of the seam is mostly medium grained sandstone and sandy shale whereas floor of the seam is carbonaceous shale, medium grained sandstone and Grey shale.

Exploitation

The seam has been worked extensively by both opencast and underground method in eastern south eastern & south western part of the leasehold area. The seam is developed in small part of the area. The seam is goaved in the western part of the incrop area.

Seam VIII A

This seam is lying below seam VIIIB with a parting of 1.52 m to 20.63m and the full coal thickness has been intersected in 12 boreholes within the project limit. In-band thickness of the seam varies from 1.47m (BA004) to 4.43m (MR009). The seam has been considered as both coking and non-coking coal within the project area. Evidence of active fire has been found in the working of incrop region of the seam. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Coking Coal-

Ash%	UVM%	Grade	C.I.	G.K.L.T	S.I.	CO_2%
28.9-47.9	21.4-29.3	UG-W-IV	12-22	E/F-G/G1	2.5-6.0	0.25-8.51

Non-Coking Coal-

Ash%	GCV (K.Cal/kg)	Grade Range
30.1	6298	G4

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Coking	Non-coking	Total	Coking	Non-coking	Total
9.166	0.13	9.296	4.967		4.967

Roof & Floor

The roof of the seam is mostly medium grained sandstone and grey shale whereas floor of the seam is intercalation of shale and sandstone.

Exploitation

The seam has been worked extensively by both opencast and underground method in the leasehold area. Seam is developed partly by underground method in the leasehold area. The seam is goaved in the western part of the incrop area.

Fire-

Evidence of active fire in two (2) small patch has been found in the working of VIIIA seam in the south western part of incrop area of the seam.

Seam VIII

Seam VIII underlies seam VIII A with a parting of 15.83 m to 20.63 m. The full coal thickness of the seam has been intersected in 7 boreholes within the project limit. In-band thickness of the seam in boreholes varies from 0.2m (PH020) to 1.06m (PH016).

The seam has been considered as both coking & non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Coking Coal-

Ash%	UVM%	Grade Range	C.I.	G.K.L.T	S.I.	CO_2%
27.3-32.00	23.7	W-IV	-	-	-	-

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Coking	Non-coking	Total	Coking	Non-coking	Total
1.149	-	1.149	0.673		0.673

Roof & Floor

The roof is generally medium grained sandstone and floor are generally of grey shale.

Exploitation

The seam has mined by open cast method only.

Seam V/VI/VII Combined-

Seam V/VI/VII combined underlies seam VIII with a parting of 7.41 m to 15.6m. The full coal thickness of the seam has been intersected in 31 boreholes within the

project limit. In-band thickness of the seam in boreholes varies from 16.64m (BA006) to 32.5m (BA016).

The seam has been considered as non-coking coal within the project area. Evidence of active fire has been found in the workings of the seam in the central part of leasehold area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
36.68-47.7	5654-6239	G4-G6

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)	Within Proposed Floor Limit
99.66	40.010

Roof & Floor

The roof of the seam mostly medium grained sandstone and floor are generally of medium to coarse grained sandstone.

Exploitation

This seam has been quarried in major part of the area along outcrop region and has been extensively developed and goaved. The seam has also been worked by UG method of mining in four sections.1st section of development extend in the south western part of the leasehold area, 2nd section of development found in the central and eastern part of the area and 3rd & 4th section of development extend in south western as well as central and eastern part of the leasehold area. Seam has been goaved in the western part of the area.

Fire-

Evidence of old fire has been reported in the seam in workings near incrop region of the seam in central part.

Seam IV Top

Seam IV Top underlies seam V/VI/VII with a parting of 24.65m to 31.65 m and the full coal thickness has been intersected in 23 boreholes within the project limit. In-band thickness of the seam varies from 0.2m (MR008) to 1.55m (MR024). The seam has been considered as non-coking coal within the project area. Detailed quality parameters and net geological resource are given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
29.31-42	5027	G8

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)
2.42

Roof & Floor

Coarse grained sandstone forms the roof of the seam and shale generally forms the floor of the seam.

Exploitation

The seam is considered virgin in entire leasehold area.

Seam IV Combined

This seam IV combined underlies seam V/VI/VIII combined with a parting of 3.56 m to 31.69 m and the full coal thickness has been intersected in 23 boreholes within the project limit. In-band thickness of the seam varies from0.25 m (MR012) to 3.21m (BA003). The seam has been considered as non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)
Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
35.09-49.92	3978-5423	G7-G9

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)
7.64

Roof & Floor

Coarse grained sandstone forms the roof of the seam and shale generally forms the floor of the seam.

Exploitation

The seam is considered virgin within the project area.

Seam IV Bottom

Seam IV bottom underlies seam IV top with a parting of 1.04 m to 7 m and the full coal thickness has been intersected in 24 boreholes within the project limit. In-band thickness of the seam varies from 0.14m (MR-13) to 1.45m (BA-10). The seam has been considered as non-coking within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	Grade Range
30.05-59.82	G9-G18

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)
0.94

Roof & Floor

The roof and floor of this seam is generally made of shale.

Exploitation

The seam is considered virgin within the project area.

Seam III

This seam III underlies seam IV Bot & IV combined with a parting of 15.99 m to 32.3 m and the full coal thickness has been intersected in 50 boreholes within the proposed project limit. In-band thickness of the seam varies from 2m (BA021) to 6.00m (BA001). The seam has been considered as non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
16.87-46.7	2988-6232	G4-G15

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Proved	Indicated	Total	Proved	Indicated	Total
46.8	3.27	50.07	2.36	-	2.36

Roof & Floor

The roof is generally carbonaceous shale and medium to coarse grained sandstone while immediate floor is carbonaceous shale and medium to coarse grained sandstone.

.**Exploitation**

The seam has been mined by underground method in south western part and quarried out by opencast method in small patches in incrop region.

Seam II

Seam II underlies seam III with a parting of 6.35 m to 16.73m and the full coal thickness has been intersected in 47 boreholes within the project limit. In-band thickness of the seam varies from 0.07m (MR006) to 2.15m (MR026). The seam has

been considered as non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters
Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
15.4-37.2	6098-7267	G1-G5

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)		
Proved	Indicated	Total
11.4	1.52	12.93

Roof & Floor

The roof is generally medium to coarse grained sandstone while immediate floor is either shale or intercalation of shale and sandstone.

Exploitation

The seam is virgin in the entire area.

Seam I/II Combined

Seam I/II combined underlies seam III with a parting of 11.39 m to 13.92 m and the full coal thickness has been intersected in 4 boreholes within the project limit. In-band thickness of the seam varies from 3.67m (BA017) to 5.07m (BA022). The seam has been considered as non-coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade Range
33.5-37.37	6167-6393	G4

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Proved	Indicated	Total	Proved	Indicated	Total
6.59		6.59			

Roof & Floor

The roof is generally coarse grained sandstone while immediate floor is either carbonaceous shale.

Exploitation

The seam is virgin in the entire area.

Seam I

Seam I underlies seam II with a parting of 1.18m to 12.28m and the full coal thickness has been intersected in 46 boreholes within the project limit. In-band thickness of the seam varies from 1.05m (MR002) to 4.28m (BA004). Detailed quality parameters and net geological resource is given below in table.

Quality Parameters
Proximate Analysis (On air-dried basis)

Non-Coking Coal

Ash%	GCV (K.Cal/kg)	Grade
26.98-44.80	4510-6652	G3-G10

Net Geological Resource (Mt.)

Within Leasehold Boundary (falling in Cluster-II)			Within Proposed Floor Limit		
Proved	Indicated	Total	Proved	Indicated	Total
28.4	3.29	31.65			

Roof & Floor

The roof is generally intercalation of shale and sand while immediate floor is coarse grained sandstone or shale.

Exploitation

The seam is considered virgin within the project area.

4.9 Insitu Coal Qualities

The quality of coal seams in this report is taken from seam overall analysis data as available in respective Geological report. Quality for seam boreholes (seam III, II, I/II, & I) in these reports is given based on opencast norms (I100) and that has been converted to (I30) norm for their extraction by underground method. The non-combustible bands like sandy shale, sandstone, siderite, grey shale (Ash > 75 %) etc. irrespective of their thickness have been excluded from the total thickness of the seam for computing the effective thickness of coal seams for the purpose of quality consideration.

Faulted, partly faulted, worked seam/part worked seam thickness encountered in the boreholes have not been considered for the purpose of quality assessment.

4.10.1 Resource/Reserve Estimation Criteria

A. The seam wise status of developed, depillared and goaved areas in addition to virgin patches has been identified on the basis of seam working plan provided by the colliery authorities. These have been clearly marked on the seam folio plans and floor contour plans of all the seams proposed for quarrying in the area.

B. **Goaf & Quarries**: These areas have been considered as devoid of coal, however in case of goaf, the depillared zone is considered according to the approximate height of the seam since at present workings are unapproachable.

C. **Developed Areas:** In developed areas, where resource are standing on pillars, seam wise dimension of extraction (height & width) have been decided on the basis of seam working plan made available by colliery authorities and after detailed discussion with them.

D. **Thickness:** Iso-chore thickness of the seam has been considered for resource estimation. Areas having thickness less than 0.5 m have not been considered for resource estimation.

E. Resource of different coal seams has been estimated considering base data as per January 2019 submitted by Colliery authority.

F. Not developed zone

Not developed areas have been demarcated and these areas have been excluded from resource estimation.

G. Assumption on Fire:

As per data received as per colliery authorities (Annexure-I) damage of coal due to fire is not known therefore resource of fire area has been estimated assuming that no coal has been damage due to fire, therefore resource may vary from actual resource. Coal resource estimation of individual seam within the proposed floor limit has been assessed by taking the area of each seam extent marked in individual floor contour plan/seam folio plan and considering all the assumptions as discussed above.

4.10.2 Methodology of Resource Calculation-

The resource has been estimated through “MINEX” software.

1. The resource has been calculated using “Detailed Resource Reporting” menu of **MINEX 6.5.3** software.
2. A deduction of 10% from the ‘gross resources’ of coal has been made to account for unidentified geological uncertainties like structural disturbances, washout zones etc. to arrive at the ‘net geological resources’.
3. The seam wise status of developed, depillared, stook, in addition to virgin patches has been identified on the basis of seam working plan supplied by the concerned area/colliery officials. These have been clearly marked on the seam folio plans and floor contour plans of all the seams.
4. **Heave Zone**: The areas falling within the heave zone of a fault has been excluded for the purpose of resource estimation.
5. Coal resource estimation of individual seam within the proposed quarry limit of Muraidih-Phularitand Colliery has been assessed by taking the area of each seam extent marked in individual floor contour plan/seam folio plan.

4.11 Band in Coal Seam-

All the seams contain several number of bands. The thickness of the band varies from 2 centimeters to 2 meter. The bands generally composed of carbonaceous shale, dark shale, fine grained sandstone, MP etc.

4.12 Conclusion-

1. Resource within Leasehold Area (Falling in Cluster-II).

The integrated geological assessment on the basis of available surface and sub-surface data have clearly established 247.039 million tons of coal within leasehold area falling in Cluster-II. Out of which 34.139 million tons is coking coal and 212.90 million tons is non-coking coal.

2. Resource within proposed Quarry limit.

Resource within proposed Quarry limit estimated 62.920 million tons of coal. Out of which 16.450 million tons of coking coal and 46.470 million tons of non-coking has been estimated within the proposed quarry limit.

Net Geological Resource of Coal & Jhama

(Within the Leasehold Area)
Table No: 4.7
Seam wise/grade wise proved resource of coking coal (Million Tonnes)

Resource of Coking Coal Proved (in million tonnes)								
Within Leasehold Area								
Seam	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**UG**	**TOTAL**
XIII				0.155	0.1	0.016		0.271
XI/XII					0.172	4.537	0.52	5.229
IX/X						9.83		9.83
VIIIC					0.082	3.202	0.343	3.627
VIIIB						0.978	3.889	4.867
VIIIA					0.091	5.783	3.292	9.166
VIII					0.018	1.082	0.049	1.149
Total				**0.155**	**0.463**	**25.43**	**8.093**	**34.139**
GRAND TOTAL								

Seam wise/grade wise proved resource of Non-coking coal (MT) is given in tables below-

Non Coking Coal Resource Proved (in million Tonnes)																		
Within the Leasehold Area(falling in Cluster-II)																		
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	G7	G8	G9	G10	G11	G12	**G13**	**G14**	**G15**	**G16**	**G17**	**G18**	**TOTAL**
XIII																			
XI/XII																			
IX/X																			
VIIIC					0.05	0.15													0.200
VIIIB					0.18	0.23	0.26												0.670
VIIIA				0.01	0.12														0.130
VIII				0	0														0.000
V/VI/VII				6.52	79.5	13.6													99.66
IVT									0.02	0.15	0.26	0.24	0.09	0.12	0.12	0.13	0.13	1.16	2.420
IV							1.08	2.01	1.34	0.57	0.74	0.54	0.11	0.09	0.08	0.07	0.06	0.95	7.640
IVB									0.01	0.11	0.2	0.13	0.11	0.1	0.09	0.06	0.05	0.08	0.940
III				0.39	0.66	0.94	1.8	9.81	23.6	8.67	0.31	0.22	0.18	0.17	0.04				46.800
II	0.56	5.4	4.97	0.48															11.410
I/II			0.72	4.01	1.86														6.590
I			0.43	3.88	8.17	12.6	2.79	0.28	0.15	0.02									28.360
Total	**0.56**	**5.4**	**6.12**	**15.3**	**90.6**	**27.6**	**5.93**	**12.1**	**25.1**	**9.52**	**1.51**	**1.13**	**0.49**	**0.48**	**0.33**	**0.26**	**0.24**	**2.19**	**204.820**
TOTAL																			
Non Coking Coal Resource indicated (in million Tonnes)																			
Within the Leasehold Area (falling in Cluster-II)																			
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	G7	G8	G9	G10	G11	G12	**G13**	**G14**	**G15**	**G16**	**G17**	**G18**	**TOTAL**
III									1.54	1.73									3.27
II	0.26	1.02	0.24																1.52
I/II																			
I			0.64	2.39	0.26														3.29
Total	**0.26**	**1.02**	**0.88**	**2.39**	**0.26**				**1.54**	**1.73**									**8.080**
TOTAL																			
GRAND TOTAL (non-Coking) (Proved +Indicated)																			**212.900**

TOTAL RESERVES (In Mt) (Falling inCluster-II)

Total Coking & Non Coking Coal Resource (in million Tonnes)						
Within the Leasehold Area falling in Cluster-II						
SEAM	COKING		NON-COKING		TOTAL	
	PROVED	INDICATED	PROVED	INDICATED		
XIII	0.271				0.271	Open Cast Norm
XI/XII	5.229				5.229	
IX/X	9.83				9.83	
VIIIC	3.627		0.2		3.827	
VIIIB	4.867		0.67		5.537	
VIIIA	9.166		0.13		9.296	
VIII	1.149		0		1.149	
V/VI/VII			99.66		99.66	
IVT			2.42		2.42	
IV			7.64		7.64	
IVB			0.94		0.94	
III (for OC)			2.36		2.36	
Sub total	**34.139**	**0**	**114.02**	**0**	**148.159**	
III (Rest)			44.44	3.27	47.71	Under Ground Norm
II			11.41	1.52	12.93	
I/II			6.59		6.59	
I			28.36	3.29	31.65	
Sub-Total	**0**	**0**	**90.8**	**8.08**	**98.880**	
Grand Total	**34.139**		**204.82**	**8.08**	**247.039**	

Seam wise/grade wise proved resource of Non-coking & Coking coal (Million Tonnes) (Within the Quarry Extent Area)

Table No: 4.8

Coking Coal Resource Proved(in million Tonnes)					
Within the Extent (Quarry limit)					
Seam	**W-II**	**W-III**	**W-IV**	**UG**	**TOTAL**
XIII	0.002	0.004			0.028
XI/XII			2.156	0.303	2.459
IX/X			3.617		3.617
VIIIC		0.026	1.296	0.157	1.479
VIIIB			0.851	2.376	3.227
VIIIA			2.007	2.96	4.967
VIII			0.673		0.673
Total	**0.002**	**0.03**	**10.6**	**5.796**	**16.450**
TOTAL					

		Non Coking Coal Resource (Proved)						
		Within the Extent (Quarry limit)						
Seam	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**		**TOTAL**
VIIIB	0	0.03	0.05	0.02				0.100
V/VI/VII	2.11	41.9						44.010
III	0.31	0.64	0.64	0.32	0.29	0.16		2.360
	2.42	**42.6**	**0.69**	**0.34**	**0.29**	**0.16**		**46.470**
TOTAL								

Total Coking & Non Coking Coal Resource (in million Tonnes)			
Within the Extent (Total)			
SEAM	**COKING**	**NON-COKING**	**TOTAL**
XIII	0.028		0.028
XI/XII	2.459		2.459
IX/X	3.617		3.617
VIIIC	1.479		1.479
VIIIB	3.227	0.100	3.327
VIIIA	4.967		4.967
VIII	0.673		0.673
V/VI/VII		44.010	44.010
IVT			
IV			
IVB			
III		2.360	2.360
II			
I/II			
I			
TOTAL	**16.450**	**46.47**	**62.920**

CHAPTER - V

MINING

5.0 Mining Status:-

Existing Status-

Phularitand Colliery-

Phularitand Colliery has a total Lease hold area of 741.88 Ha as per the official record of the Colliery. In this mining plan, a part of total Lease hold area falls in Cluster-II and rest part in Cluster-XV group of mines of BCCL. The Dhanbad-Chandrapura Railway line separates these two Clusters as common boundary. The northern part of Lease hold area of Phularitand Colliery falls in Cluster-II group of mines of BCCL whereas southern part falls in Cluster-XV.

Presently Phularitand Colliery is operating both underground and opencast/Quarry which are under consideration in this mining plan.

In past, a number of small quarries had been worked in scattered way towards northern side of lease hold area and mostly located along the incrop regions of different coal seams. Such old quarry (P.B Section) also exist on western part of the Colliery which was also worked in past with base as the floor of V/VI/VII seam and it was left as partially filled.

Later-on, BCCL/ Colliery authority has decided to make drivages from this quarry floor to approach underlying Seam-III. Two Inclines and drift drivages have been made and touched the coal seam. Coal production from Seam-III has been started from the year 2014-15. Coal is being produced from underground by Bord & Pillar mining method by drilling/blasting at face and produced coal is then transported to surface by SDL-Haulage combination through these Inclines.

In this Colliery, a quarry (Phularitand west patch) was also operated departmentally with floor of V/VI/VII seam as base of the quarry upto the year 2002-03. Later-on, a patch has been identified by BCCL in continuation of this quarry and work has been outsourced as hired HEMM patch. Production from this hired patch quarry on hired basis was commenced from 2009-10.This quarry is presently extracting earlier developed/depillared underground workings/sections of V/VI/VII Seam and also other seams lying above V/VI/VII combined Seam. The quarry face is advancing towards east of Phularitand Colliery property.

As this quarry is being operating on hiring basis, after drilling/blasting at faces of Coal benches, produced coal is transported contractually by tipper trucks to Coal dump from where partly is send for local sale and rest is send to Mithon Power Limited by road. Produced coal from quarry is also sent to Coal Crushers to crush it in to required sizes before dispatch to KKC Railway sidings. Presently, overburden is being dumped within the excavated area and also in earlier worked old quarries.

Muraidih Colliery -

Earlier, there were two independent Collieries namely Muraidih Colliery and Shatabdi Colliery having separate lease boundaries. These Collieries were operated separately by underground as well as opencast mining method within their lease boundaries. In long back, both Muraidih and Shatabdi Collieries had underground B&P workings in V/VI/VII combined seam worked in different sections and also in seams lying above this combined seam.

In past, Muraidih Colliery had also an isolated underground B&P workings (partly developed/partly depillared) in limited area near incrop region of Seam-III and lying on northern side of Khudia(Khodo) Nala. A number of Inclines were made near incrop region of Seam-III & Seam-I which are sealed/dozed. In this area, small quarries were also worked with floor of Seam-III as base. OB dumps were also made at two/three places in this area. A small unused quarry of Seam-III is still exists in this area towards eastern part near Muridih Inclines made for Global bid project. In rest of the area, Seam-III and seams lying below this seam are still remains as virgin.

In Muraidih Colliery, a entire area has been excavated by opencast method with floor of V/VI/VII combined seam as base on southern side of Khuida(Khodo) Nala and mostly excavated earlier developed/depillared workings along with virgin areas of this seams as well as other seams lying above this V/VI/VII combined seam. A number of overburden dumps have been made on the floor of this V/VI/VII combined seam in scattered manner.

Shatabdih Colliery -

Shatabdi OCP was located on southern side of Muraidih OCP. This OCP has also excavated large area by opencast method with floor of V/VI/VII seam as base and excavated earlier developed /depillared workings or virgin areas within its lease hold

area and dumps were made on the floor of V/VI/VII seam. Production from Shatabdi OCP was continued upto the year 2013-14 by departmental as well as contractual means.

In both Muraidih & Shataddih Colliery, there was active fire and excavated during opencast operation. Still fire exists in certain part of the existing Muraidih Colliery which is formed after amalgamation of earlier Muraidih Colliery and Shatabdih Colliery.

Amalgamated Muraidih Colliery-

Opencast-

Due to large scale of opencast operation in both Muraidih & Shatabdih opencast mines having same base, the common boundary separating both Collieries has been excavated to eliminate fire in the common boundary and as a result, workings of both Collieries are merged with each other. Considering this merger, BCCL authority has applied to DGMS for amalgamation of earlier Muraidih and Shatabdi Collieries into a single amalgamated Colliery. DGMS has given permission for amalgamation of Muraidih and Shatabdi Collieries into a single mine and presently amalgamated area is known as “amalgamated Muraidih Colliery” (Annexure-IX). The amalgamated Muraidih Colliery is presently excavating coal/OB departmentally from south-western part of the quarry i.e near to the earlier NLW Barora siding. After drilling/blasting at faces of Coal/OB benches, it is transported departmentally to respective Coal dump/OB dump sites by Shovel/Dumper combination. OB dumps are made on the floor of V/VI/VII seam within the excavated area (Refer Plate no.II). Though most of the fire area has been excavated but still two separate active fire exists at different location within the boundary of amalgamated Muraidih Colliery (Refer Plate no.II)..

Underground-

For enhancement of production from underground from this mine, BCCL wants to extract coal by underground method from underlying virgin seams (e.g III,II & I) of amalgamated area of Muraidih Colliery. For this, Bharat Coking Coal Limited (BCCL) had floated a global tender in March 2010 for development of Muraidih underground mine and extraction of coal from Muraidih III, II & I seam by mass production technology package for a minimum guaranteed production of 2 MTPA of coal on turnkey basis. After scrutiny of tenders, M/s Minop/BHEC Consortium has

emerged as successful Bidder/Contractor for the above work and proposed for extraction of Seam-III & Seam-I by Longwall method of mining.

The Project was approved in 265th CIL Board Meeting held on February 14, 2011 and the initial services and supply contract was executed on March 25, 2011 between BCCL and the supplier for the Project. Subsequently, an amendment to this agreement was executed between parties on June 22, 2012 to realign the agreement with the provisions of NIT. The final DPR was submitted by the bidder on September 22, 2012 which was accepted by technical committee of BCCL on January 29, 2013 (vide letter Ref. no. D(T)PP/F-78/2013/34, Dated; 29.01.2013). The M/s Minop Consortium approached BCCL for handing over encumbrance free project site as per approved DPR and the Consortium put continued effort to demarcate project site till June'2013, but it was futile due to tremendous land dispute by private owners whose land was falling within approved project site. Finally BCCL handed over a part of the land (vide letter no. GM/AR-I/AGM/MINOP/2014/5207, dated: 10/11.02.2014) to relocate the position of Inclines and all other surface Infrastructures so as to reduce requirement of private land to a bare minimum which necessitating shifting of Inclines towards the northern side of the newly constructed metaled village road.

In view of the above, M/s Minop Consortium submitted a supplementary report on approved D.P.R to D(T) P&P BCCL on 10th Feb 20115 (Annexure-VIII) with the name as "Supplementary Report on Approved DPR for development of Muraidih underground mines and extraction of coal from Muraidih seam no. III and seam no. I by mass production technology package" prepared on January 2015.
BCCL has accepted the above mentioned supplementary report as per letter no. BCCL/D(T) P&P/F-114/2015/297 dated 24.12.2015 (Annexure-VII).

At present, as per the DPR/Supplementary note, two inclines (Main Inclines & Auxiliary Inclines) have been made and drift drivages of both inclines has touched the coal of Seam-III. A return air shaft having inner diameter of 6.0m has also been sunk upto 11m from surface of OB dump as identified by Bidder in the above mentioned Supplementary note. Fan drift of 20m (approx.) has been completed and made upto surface. Work has been suspended by the contractor, M/S MINOP, since 01.06.2016.

M/s MINOP, lead member of the consortium of the executing agencies, has asked for modification in terms of payment as contained in the agreement. Representation of M/s MINOP was referred to M/s SBI Capitals, whose Report was referred to M/s Fox & Mandal, Kolkata for legal vetting. Final Report was submitted to on 26.06.2017. The committee set up for the purpose has examined the Report from Fox & Mondal and submitted its recommendation to the competent authority. M/s MINOP has been asked to confirm supply of imported P&M as per Price BID (Vide letter no BCCL/GM(CMC)/F-Global-Muraidih/2017/516 dated 19.12.2017). M/s MINOP has submitted vague reply reiterating its earlier position.

In separate case, M/s Minop has been suspended for six month on 13.02.2017. Proposal for management decision regarding termination of contact has been initiated in the light of inordinate delay in completion of activities and business ban for three years from 18/19.01.2018. The proposal has been vetted by the legal department.

In recent development, Honorable High Court of Jharkhand vide order no.10 dated 28/8/2018 has quashed the “Banning of Business Order” issued to M/s Minop Innovative Technologies Pvt. Ltd. Considering the above, BCCL has asked to commence the project work in Muraidih global bid Project as per NIT provision. At present, no work is being going on at the mine site of Muraidih Colliery. Inclines are filled with water up to the mouth. It is expected that the Contractor is likely to re-start / commence the suspended project work soon. A chronology of Muraidih Global bid Project is enclosed as Annexure-IV

5.1 Amalgamated Muraidih-Phularitand (part) Colliery boundaries –

It has been stated earlier that mining plan of amalgamated Muraidih-Phularitand (part) Colliery is prepared considering the area of existing amalgamated Muraidih Colliery and part of the lease hold area of neighbouring Phularitand Colliery on western side. Both areas are falling in Cluster-II group of mines of BCCL.

Considering the above, the total amalgamated area (as per official record) is measured as 1118.71 Hectares. Out of which, area of existing amalgamated Muraidih Colliery is 717.71 Ha and part of Phularitand Colliery is 401 Ha.

The boundaries of the proposed amalgamated Muraidih-Phularitand (part) Colliery is defined as below (Refer Plate No.II) -

North - Lease hold boundary of Phularitand and Muraidih Colliery

South - Dhanbad-Chandrapura Railway line and Masehspur Dyke

East Eastern side lease hold boundary of Muraidih Colliery/ Western Side mine boundary of Jogidih Colliery

West Mahuda-Gomoh (S.E.Railway) Railway line

5.2 Project Area for amalgamated Muraidih-Phularitand (part) Colliery -

Out of total amalgamated area of 1118.71 Ha as mentioned in paragraph 5.1, the mining area is measured as 887.75 Ha considering extent of mining of existing workings along with proposed in both underground and opencast mines.

The boundaries of above project area is considered for mining is demarcated as follows (Refer Plate No.II) -

North - 15m Hard Cover line of Seam-I and Fault F6F6 & Fault F5F5

South - Dhanbad-Chandrapura Railway line and Masehspur Dyke

East Eastern side lease hold boundary of Muraidih Colliery/ Western Side mine boundary of Jogidih Colliery

West A line keeping 45m barrier from Railway property of Mahuda-Gomoh (S.E.Railway) Railway line

5.3 Seams Nomenclature (Geological name vis-à-vis Colliery name):

The standard geological nomenclature vis-à-vis Colliery nomenclature of different coal seams in descending order which has been extracted or proposed to be extracted are given below-

Geological Nomenclature	Colliery Nomenclature (Phularitand Colliery)	Colliery Nomenclature (Amalgamated Muraidih Colliery)
XIII	XIII	
XI/XII	XI/XII	
XI/X	10	
VIIIC	9 TOP	IX TOP
VIII B	9BOT	VIII TOP
VIII A	8	VIII BOT
VIII	-	Virgin
V/VI/VII Comb	7 (In old Plans), Worked in sections (presently V/VI/VII Comb)	V/VI/VII Comb.
IV Top	Virgin	Virgin
IV	Virgin	Virgin
IV Bot	Virgin	Virgin
III	III	III (Virgin)

Geological Nomenclature	Colliery Nomenclature (Phularitand Colliery)	Colliery Nomenclature (Amalgamated Muraidih Colliery)
	(Mostly Virgin) (B&P development is being done in this seam)	(B&P mining was done in past between Khodo Nala & Incrop)
II	II (Virgin)	II (Virgin)
I/II comb	I/II comb (Virgin)	-
I	I (Virgin)	I (Virgin)

5.3 Present status of underground mining in different Seams within Amalgamated Muraidih-Phularitand (part) Colliery:-

Within the amalgamated Muraidih-Phularitand(part) Colliery boundary, Seam XIII to Seam-I exist in descending order. The status of exploitation of various coal seams and area under fire considered in this mining is based on the mine working plan supplied by the colliery authorities. The status of working and fire limit of different seams in proposed amalgamated mining boundary falling in Cluster-II is given below:-

XIII Seam-

This seam is the top most coal seam located on the southernmost of the considered area near DC railway line. Seam incrops only in Phularitand Colliery boundary and it has not continued in existing amalgamated Muraidih Colliery. This seam has been extensively worked by underground mining in past and goaved in major part falling within the considered area. The underground workings are water logged and unapproachable. (Refer Plate No.VI). It has been proposed for excavation in this mining plan.

XI/XII Seam-

Seam XI/XII occurs as combined seam and lying is below XIII seam. This seam has been quarried out in small patches in past near incrop region and has been extensively worked by underground method (through incline and pits also). The seam has been goaved in major part of the area. As per the earlier study, the seam is under fire at places. The dip side underground workings are water logged and unapproachable. A hired patch quarry is in operation near the incrop region. Though, surface edge has extended over the incrop but coal horizon has not yet exposed. It has been proposed for excavation in this mining plan.(Refer Plate No.VII).

IX/X Seam-

Underlying seam is IX/X Seam and incrop of this seam occur in southern part which has continued from Phularitand Colliery to existing amalgamated Muraidih Colliery on southernmost part. The seam has been quarried in the incrop zone and it was extensively worked by underground B&P method in one/two sections. As per the record, the seam is under fire in part area towards western side near Mahuda-Gomoh Railway line. The earlier underground workings in this seam including fire area is presently being extracted by opencast method through hired HEMM patch operating in Phularitand area. Near fiery zone, exposed coal of developed galleries in batter is of different colour indicates once it was firey and due to waterlogging the fire was suppresed. The dip side underground workings are water logged and unapproachable. (Refer Plate No.VIII). It has also been proposed for excavation in this mining plan

VIIIC Seam

Incrop of this seam occur in southern part of the amalgamated Muraidih-Phularitand (part) Colliery. This seam has been worked in the section by B&P method and working is goaved in patches. The seam has been also quarried in patches in past. The seam is presently being excavated in Phularitand part through hired patch OCP in a limited area near incrop and rest of the area is virgin on southern side of this Colliery. At present, this seam is also being excavated departmentally within existing amalgamated Muraidh Colliery in southern part. (Refer Plate No.IX). It has been proposed for excavation in this mining plan

VIIIB Seam

Next underlying seam is VIIIB. In past, this seam has also been worked in one section and is goaved in patches near incrop zone which occurs centrally in Phularitand property and continued in amalgamated Muraidih Colliery where it is being extracted departmentally. The seam has been quarried also in patches near incrop zones in past. The seam is virgin in major part of the area on southern side mostly in Phularitand property i.e southern side of proposed amalgamated Muraidih-Phularitand Colliery where it is being extracted through hired patch OCP. The seam has also been extracted in near past on the south-eastern part in amalgamated Muraidih Colliery. (Refer Plate No.X). This Seam has also been proposed to excavate by opencast method within the area considered in this mining plan.

VIIIA Seam

The seam is extensively developed in one section in part area and is standing on pillars while, rest of the seam is virgin in the area in Phularitand Colliery whereas this seam has mostly excavated in existing amalgamated Muraidih Colliery except in small area on south-west corner. The seam has been quarried out in patches along incrop region in Phularitand property and a part of which is being excavated through hired patch. There is occurrence of active fire in underground B&P workings/incrop region near southern side of old P B section quarry within Phularitand property in incrop region of this seam (Refer Plate No.XI).

VIII Seam

Seam VIII underlies seam VIIIA. This is thin seam having seam thickness <1.0m and no underground workings were made in this seam. This seam is partly being excavated through hired patch in Phularitand Colliery in limited area leaving rest as virgin whereas it has been mostly excavated in amalgamated Muraidih Colliery. (Refer Plate No.XII). Extraction of this seam by opencast method has also been proposed in this mining plan.

V/VI/VII Seam

This is a combined seam in whole of the property. In past, this seam was quarried in the outcrop zone scatter way in patches. This seam has also been developed in past by underground B & P method in three sections (1^{st}, 3^{rd} & 4^{th}) in Phularitand Colliery and is goaved in patches. The seam is virgin in the southern part area in this colliery. In amalgamated Muraidih Colliery, earlier underground B&P workings were also worked in three sections (1^{st}, 2^{nd} and 4^{th}) which are mostly excavated in entire area except small area at center where active fire exists and unable to excavate due to land dispute, existence of forest land etc. A limited area is also remains as unexcavated on south-west corner of the amalgamated Muraidih Colliery. Presently, this seam is being extracted departmentally on southern side with floor of V/VI/VII as base in this Colliery. (Refer Plate No.XIII).

Seam IV,

This seam is virgin in entire area. The seam is impersistent due to less seam thickness in major part of the proposed area. This seam occurs as combined in Phularitand Colliery and splits in two section as IVT & IVB towards eastern side mainly in Muraidih Colliery. Seam-IV has attained thickness 1.5m to 2.0m in limited

area in central-southern part of the amalgamated area and cannot be approached separately from surface as the area is excavated and huge OB dump has been made on this area. Seam IVT & IVB seams are thin seam and thickness varies from 0.5 to 1.2m in IVT seam and 0.5m or less in IVB seam**.** No underground working has been made in this seam in both Collieries. (Refer Plate No.XIV & XV).

Seam-III

Seam-III is virgin and it has attained workable thickness in entire area. In north-eastern part i.e on northern side of Khodo (Khudia) nala where it was worked by underground B&P method in the year 1988. This seam is presently being extracted by underground B&P method on western part in Phularitand Colliery. It is virgin in rest of the proposed project area of amalgamated Muaridih-Phularitand(Part) Colliery.

It is to be noted that in south-western corner of the amalgamated Muraidih-Phularitand(part) Colliery, drilling has not been done up to III seam, hence an area of indicated zone has been demarcated and accordingly net geological reserve estimation has been done in indicated category in this seam as well as other seams lying below Seam-III. (Refer Plate No.XVI).

Seam-II

This seam is virgin in entire area and has attained seam thickness 1.5m to 2.0m in limited area in central part within Phularitand Colliery area. This seam has not been worked in past. This seam has not been proposed for extraction due to less parting i.e <3.0m with Seam-I and has limited workable area. ((Refer Plate No.XVII).

Seam-I & I/II Comb

This seam occur as combined seam on north-west corner and splits into Seam-II and Seam-I in rest of the area. In south-western corner, drilling has not been done upto this seam, hence an area of indicated zone has been demarcated and accordingly net geological reserve estimation has been done in indicated category in this seam. No underground as well as opencast working has been done in this seam within the proposed area. (Refer Plate No.XVIII).

5.4 Choice of Mining Method and justification for optimized target production:-

Opencast-

At present, two Quarries/OCs in operation within the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery. One is hired HEMM patch quarry within the property of Phularitand Colliery and another is departmental quarry which is operating in amalgamated Muraidih Colliery. Both quarries/opencast are excavating seams with floor of V/VI/VII seam as base and during excavation, overlying seams (developed/virgin) are being extracted. Seam wise Opencast workings have been shown in plates as stated earlier.

Proposed-

As stated earlier that part area of existing Phularitand Colliery laying on northern side of D C Railway Line falling in cluster-II and existing amalgamated Muraidih Colliery will be further amalgamated to make a single amalgamated Muraidih-Phularitand (part) Colliery because rest of the lease hold area of Phularitand Colliery falling in another cluster i.e Cluster-XV located on southern side of D C Railway line. Due to large scale of opencast operation (hired as well as departmental) within the above mentioned amalgamated area, there is very small area is left to excavate. Moreover, surface constraint like D B Road, Village/Basti, etc restricts the opencast operation in this area. Such constraints are slowly overcome.

In this amalgamated mining plan, it has been proposed to make one combined opencast project within the area of amalgamated Muraidih-Phularitand(part) Colliery with floor of V/VI/VII seam as base. Underlying Seam-IV is impersistent and this seam will be left un-extracted. Moreover, huge overburden dumps in scattered way have been made on the floor of V/VI/VII seam in all over the excavated area and still it is being done. Due to constraint in acquisition of surface land, it has been decided in the meeting (Annexure-I) that no opencast will be made on northern side of incrop of V/VI/VII seam in existing property of Phularitand Colliery.

It is to be mentioned that a small quarry with floor of Seam-III has been proposed in this mining plan on north-eastern part of existing amalgamated Muraidih Colliery. In this area, Seam-III was worked by underground B&P mining method in past and left as partly developed / partly depillared. Unless, this earlier worked area along with virgin area is excavated, underground longwall panel of Seam-I identified by successful bidder in approved DPR of Muraidih Global bid project cannot be

extracted. Hence a separate quarry has been proposed on rise side of Khudia Nala and this proposal has been mentioned in the approved DPR. It has also been proposed that before extraction of longwall panels in Seam-III & I, Khudia Nala has to be diverted on rise side just outside of the proposed project area. If Khodo nala is not diverted, huge amount of coal will be left in this area and from coal conservation point of view it is necessary to extract coal from this area. To excavate this small opencasts, drilling-blasting with shovel-dumper combination has been proposed in this mining plan for extraction of both coal and overburden benches. Over burden will be dumped on the quarry floor by dumpers.

Underground-

In past, large scale of underground B&P mining was made in V/VI/VII combined seam in different sections and also in other seams lying above this combined seam These seams are presently being extracted by opencast method and will continue to be extracted in future within the proposed mining/project area. It is to be noted that the old underground workings in these seams are seems to be waterlogged on the dip side as these workings are unapproachable at present. In this mining plan, virgin area of V/VI/VII combined seam and other seams lying over this combined seam will be extracted by opencast method. Seam-IV underlies V/VI/VII combined seam. This seam and its split sections are impersistent due to less seam thickness, hence not considered for underground mining.

Seams lying below IV seam are Seam-III, II & I in descending order and virgin in entire project area considered in this mining plan. Out of the above, Seam-III and I are potential seams for underground mining whereas Seam-II is thin seam and having inconsistent thickness in major area within the proposed mining area. In small are on the north-western side, seam-I and II are combined together. However, in major part of the property II and I seam are split into two independent coal horizons. All these seams are non-coking type and average GCV grade of Seam-III is G9 (i.e 4601 to 4900 Kcal/Kg) and average GCV grade of Seam-I/II & I is G5-G9 (i.e 4601 to 6100 Kcal/Kg). As per the “Grade notification for the year 2019-20” for different mines of BCCL, coal produced from Muraidih OCP (excavating the floor of V/VI/VII Combined seam as base) is declared as Steam / Slack as W-III /W-IV respectively. In Phularitand Colliery, coal produced from the hired OCP (excavating the floor of V/VI/VII Combined seam as base) is also declared as Steam / Slack as W-III /W-IV respectively but where hired OCP which is also extracting VIII(A) Seam, the grade of coal is declared as Steam / Slack as W-II /W-IV respectively.

Coal produced from Pure Benedih Section Incline i.e Phularitand Incline, the declared grade is G-10.

Considering the above, Seam-III and Seam-I along with Seam-I/II combined part has been considered for underground mining within the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery.

As stated earlier that, development in Seam-III by B&P method is presently going on with SDL-haulage combination on the western part of the existing Phularitand Colliery falling in Cluster-II.
Different underground mining methods that are generally followed are-

1) Conventional Bord & Pillar method with caving or with stowing
2) Bord & Pillar with Continuous Miner package
3) Longwall retreating or advancing with caving

To choose a method for underground mining depends on geo-mining parameter as well as its techno-economic viability.

5.4.1 Proposed Mining Method-

Underground-

A Global bid project has been approved by BCCL Board in Muraidih Colliery for extraction of Seam-III & Seam-I from the area lying below excavated opencast working and work has been awarded to M/s Minop/BHEC Consortium. The Global bid project report has envisaged longwall retreating with caving method using PSLW set and gate road development by Bolter Miner with minimum guarantee production of 2.0 Mt per annum in commercial period of 9 years from Seam-III and Seam-I. Major part of the area proposed to be extracted by longwall mining except at few places B&P working is proposed where laying of longwall panels is not possible. Based on this approved DPR and the Supplementary note of approved DPR, the successful bidder has already developed mine site with limited civil infra-structures, completed two incline/ drift drivages to touch coal of Seam-III, partly sunk a return air shaft from OB dump and completed fan drift upto surface. Since work has been awarded to successful bidder as per approved DPR and it is an on-going project, hence the same method of mining and other provisions as envisaged in approved DPR /Supplementary note of approved DPR has been considered in this amalgamated mining plan of Muraidih-Phularitand(Part) Colliery.

Considering the above, most of the remaining area of Seam-III & Seam-I are falling in existing the property of Phularitand Colliery falling in Cluster-II and a certain area towards western part of existing amalgamated Muraidih Colliery. It has been proposed that excluding the area considered in Global Bid project, rest of the area will be extracted by Bord & Pillar method from existing mine entries of Phularitand Colliery. In this amalgamated mining plan, proposed mining method in these areas of Seam-III and Seam-I/II(comb) & its split Seam-I is detailed below.

Considering the geo-mining parameter of these seams, conventional Bord & Pillar with SDL-Belt conveyor combination and Continuous Miner with Belt conveyor have been proposed for extraction of Seam-III and Seam-I/II(comb) & I in from above mentioned area of Phularitand Colliery and its annexed part of Muraidih Colliery toward eastern side. Due wide range of thickness variation of above seams, it has been proposed that area having seam thickness more than 2.2m, panels will be extracted by Continuous Miner package with belt conveyor whereas in area where thickness is less than 2.2m, will be extracted by conventional drilling blasting at face and transportation by SDL-Belt combination to surface. At present, Seam-III is being developed by SDL-haulage Combination.

5.5 Depth of proposed Panels/ Workings-

The details of depth range of different seams and partings between seams within the amalgamated Muraidih-Phularitand(part) Colliery falling in Cluster-II has been given in Geology chapter (Chapter-IV) in table no.4.2.

The approximate depth range of proposed panels/workings of target seams i.e in Seam-III and Seam-I/II & I within the proposed project area of 887.75 Ha is given below-

Approximate depth of proposed panels in Muraidih-Phularitand(part) Colliery

Seams considered for underground extraction	**Phularitand(Part) (SDL & CM area)**		**Amalgamated Muraidih Colliery (Longwall Project area)**	
	From	**To**	**From**	**To**
Seam-III (upto roof of seam)	48m	227m	47m	140m
Seam-I/II Combined	35m	93m	-	-
Seam-I	35m	242m	27m	163m

The Seam-II is having seam thickness more than 1.5m in limited area on western part of area considered for B&P mining. Whereas Seam-I is workable in entire area.

The parting between Seam-II and Seam-I is less than 3.0m in this area. To maintain a minimum parting thickness of 3.0m between two workings, a portion of coal of seam-II has to be considered to maintain parting thickness of 3.0m and thus, seam thickness of Seam-II becomes to unworkable thickness i.e less than 1.5m. Seeing the extent of workability, Seam-II has not been considered for extraction in the mining plan.

5.6 Parting between Seams -

V/VI/VII Seam	
Parting	3.56m – 31.69m
IV / IV (Top) Seam	
Parting	1.04m – 7.0m
IV / IV (Bot) Seam	
Parting	15.99m -32.30m
III Seam	
Parting	6.35m – 16.73m
I/II comb and II Seam	
Parting	1.18m – 12.23m
I Seam	

From the above, the parting of Seam-III with V/VI/VII seam varies from 20.6m to 71m within the project area.

Borehole wise Parting Table between II & Seam-I :-

Parting between Seam-II and Seam-I in area where Seam-II is having workable seam thickness.

BH No.--->	MR-30	MR28	BA-10	BA-15	BA-9	BA-2	BA-18	BA-11	BA-16	BA-20	PH-18
Seam-II FRL	164.02	185.94	172.24	161.95	126	135.58	124.5	85.99	32.48	28.76	-5.75
Seam-I FRL	158.8	182.76	168.34	158.11	121.71	130.18	120.64	82.09	26.99	24.51	-11.22
Seam-I Thickness (m)	2.82	1.64	2.64	2.66	2.71	2.71	2.21	2.3	2.98	3.00	2.80
Parting	**2.40**	**1.54**	**1.26**	**1.18**	**1.58**	**2.69**	**1.65**	**1.60**	**2.51**	**1.25**	**2.67**

5.7 Seam thickness and gradient, Strike & Dip etc.-

The seam considered for underground mining within the proposed project area of alamgamated Muraidih-Phularitand(part) Colliery are Seam-III and Seam-I in descending order. Both seams has attained workable thickness more than 1.5m in entire area considered in this mining plan except in one or two boreholes where seam thickness of seam-I is less than 1.5m.

5.7.1 Seam thickness and gradient in Global Bid Project area lying in existing amalgamated Muraidih Colliery i.e in the area of Longwall panels -

The seam folio plan shows the seam thickness of Seam-III varies from 2.48m (MR-03) to 5.25m (MR-15) and average seam thickness is 4.0m considering the proposed panels in working areas. Bidder has considered average thickness of this seam as 4.4m for reserve estimation. In seam-I, the thickness varies from 1.85m (MR-07) to 3.49m (MR-10) except one borehole MR-02 where seam thickness is 1.05m. Considering the major part of proposed working area, the average thickness is 2.4m which is also considered same by the successful bidder during estimation of reserves.

The gradient of Seam-III within above mentioned area varies from 1 in 7.8 to as much as 1 in 40 and the gradient of Seam-I varies from 1 in 6 to 1 in 36 in central part. Due to swing of floor contours, the gradient of these seams are flatter along the axis in central part of this property in both seams and seam dips from north-west to south-east.

5.7.2 Seam thickness and gradient in remaining part of the Project area (i.e in Phularitand Colliery falling in Cluster-II and annexed part of amalgamated Muraidih Colliery) -

The thickness of Seam-III varies from 2.01m (BA-22) to 4.12m(PH-18) and average seam thickness is 2.8m considering the proposed panels in considered areas. In seam-I, the thickness varies from 1.63m (PH-20) to 3.61m (PH-16) whereas in combined areas of Seam- I/II, the seam thickness varies from 3.67m (BA-22) to 5.07m (BA-17). Considering the entire workable area for in this seam where SDL and CM panels are proposed, the average seam thickness is 3.22m.

It is to be noted that there is an indicated zones on south-west corner of this property where boreholes have not been drilled upto Seam-III and its below. The thickness of seams for development of maindip and panels in this indicated area of both seams has been considered as an average of surrounding boreholes.

The gradient of Seam-III within above mentioned area varies from 1 in 5.8 to 1 in 13 and the gradient of Seam-I varies from 1 in 6.5 to 1 in Due to swing of floor contours, the dip of both seams are from east to south-west i.e just opposite as it is in the property of existing amalgamated Muraidih Colliery.

5.7.3 **Strike -**

Within the project area of amalgamated Muraidih-Phularitand(part) Colliery, the general strike of the area is E-W which swings to N-S locally in the central part and again swinging to NW-SE to almost E-W in the eastern part.

5.7.4 **Dip -**

In general, the dip of the beds is varying from 5^{o}-10^{o} in the boundary regions to 10^{o}-20^{o} in the central part. The dip direction is generally towards SE in existing amalgamated Muraidih Colliery area where longwall panels are proposed whereas in Phularitand property dip is towards SW (Refer Plate no. XVI & XVIII)

5.8 Mining strategy-

5.8.1 Underground Mining strategy-

Within the proposed global bid project area, Longwall retreating method with caving will done in Seam-III & Seam-I in the area of existing amalgamated Muraidih Colliery as proposed in approved DPR/Supplementary note on approved DPR. Due to thinness of seams, Seam-IVT & IVB and Seam-II has also not been considered for extraction in DPR.

As per the approved DPR, two Inclines (Main Incline & Auxiliary Incline} including drift drivages in stone are proposed to be made upto Seam-I by intersecting Seam-III. From intersecting point in Seam-III, development of trunk headings and then longwall panels will be made in Seam-III. Development of trunk headings in Seam-I will be made keeping superimposition with the trunk headings of overlying Seam-III. Location of Inclines and return air shaft are selected by the bidder on north-eastern rise most side within lease hold boundary. As per the approved DPR, all the infra-structures were proposed to be constructed in a complex near the inclines. Due to land constraint, the location of auxiliary Incline, return air shaft and site for infra-structures as proposed in approved DPR has been revised. To construct infra-structures, three different location has been considered to minimize land acquisition. Considering the above mentioned changes, M/s Minop Consortium has submitted a supplementary note on approved DPR showing new location of incline, return air shaft, shifting of drift drivages and trunk headings. Later-on, the same was approved by BCCL management with certain condition that there should not be any financial changes and schedule as made in approved DPR.

As per the approved supplementary note, auxiliary inclines and return airs shaft has been made at revised location. In the revised layout plan, it has been proposed to make drift dirvages upto Seam-III and after touching of coal, trunk headings will be made in coal upto a distance of 497.2m in seam-III from drift touch point. Further two drift drivages will be made to touch coal of Seam-I where parting between seam-III & Seam-I is less. Proposed drifts drivages to touch Seam-I has been shown in the revised layout plan of Seam-III. As per the area authority, Inclines/drift drivages has touched the coal of Seam-III and air shaft has sunk upto 11m measuring from top of OB dump at revised location.

In this mining plan, the revised plan of Seam-III submitted by M/s Minop Consortium has been incorporated showing trunk headings drivages, location of proposed drift drivages from seam-III to Seam-I, return air shaft position etc but the revised layout plan of Seam-I as well as revised surface layout plan showing new sites / location for construction of Infra-structures is not available at area office as well as BCCL HQ. Hence, the above revised layout plan of Seam-I as submitted in approved DPR is considered

By shifting of auxiliary incline and air shaft position, the layout of trunk headings drivages in both seams has changed but panel layout of both seams remain same as proposed in the approved DPR except one or two panels where length is increased due to shifting of trunk headings. As per the revised plan, both inclines will act as main Intake airways whereas air shaft act as main return airway for workings of both seams. Auxiliary incline and air shaft is made at the revised location as proposed in approved supplementary note. The revised location of Air shaft is sited over old OB dump

As per existing status, both Inclines have been made and touched the coal of seam-III after making drift drivages from surface. Return Air shaft has been sunk upto a depth of 11m. M/s Minop has suspended the work from 2016. BCCL management imposed ban on M/s Minop for three years but Honorable high Court has quashed the ban imposed on M/s Minop. After lifting of banning, BCCL management has asked to commence the work as soon as possible. In this mining plan, it has been considered in mine schedule that work will commence within one year.

The trunk headings in both seams are to be laid on the dip side i.e on the extreme eastern side of the property and Longwall panels will be opened from the dip-rise

trunk headings towards western side upto the western boundary of existing amalgamated Muraidih Colliery. Only one longwall retreating panel with caving method will be worked at a time. Longwall Panel of Seam-III will be extracted first and then panels of underlying Seam-I. After development of trunk headings in each seam, sumps (e.g B&P-I & B&P-IV) in each seam will be made by bord & pillar method further eastern side of trunk headings i.e further on dip side of the property. During development of trunk headings, upthrow faults e.g F2F2 and F1F1 has to be crossed to approach areas on other side of the faults. Bord & Pillar workings have also been proposed in each seam in-between longwall panels where laying of Longwall panel is not justified due to geo-mining constraint.

As per the approved DPR, as soon as the trunk headings including sump is made in Seam-III, development of gate roads (each of twin headings) will be commenced from trunk headings so that longwall panels can be made for early production.

It has been proposed by successful that one Bolter Miner will be deployed for development of trunk headings, sump preparation, gate roads and also crossings of faults.

Successful Bidder/Contractor has identified six(6) longwall panels named as 301 to 306 in Seam-III and eight (8) panels in Seam-I. As per the agreement, the contract tenure is 14 years, out of which 5 years is earmarked as development period and 9 years will be for production excluding the time for face installation & transfer and overhauling of equipment. Later on the gestation/ development period is reduced to 2.5 years and total contract tenure reduced to 11.5 years. To meet the guaranteed production for nine (9) years, contractor has considered initially for extraction of all the six(6) panels of seam-III and then four panels (Panle no.101 to 104) from Seam-I. As stated earlier that a small area in the north of mine near incrop / outcrop region in Muraidih property, Seam III was exploited by Bord and Pillar method through incline. The mine is abandoned since 1988. In the early of year 2000, a small patch of Seam III near the outcrop was extracted by opencast method and OB dumps were made on and around these old workings. Due to heavy blasting, the underground pillars of the old workings might have weakened. Additionally OB dumps were also made over this area produce from Muraidih Colliery. It may not be possible to extract this coal by underground mining method due to safety reasons. BHEC/ Minop propose that the virgin area of Seam III near the incrop / outcrop and the old Bord and Pillar workings which are standing on pillars are to be extracted by

opencast mining method. This will not only help to ensure the safe underground mining but also will enhance the resource recovery. The Khodo nala flows from west to east within the Muraidih underground project. It will not only block substantial coal but it will remain a source of danger throughout the life of underground mine. BHEC/Minop also proposes that after the extraction coal near the northern property by opencast method as proposed earlier, the Khodo nala is to be diverted along the northern boundary and will ultimately meet to it's own natural course on the eastern part of the property.

Since trunk heading drivages will encounter fault at longwall panel no.303 & diversion of nala will take time, to expedite the production of coal it is proposed to start mining from the rise side of the property and first panel will be longwall panel no.301 (refer plate no. XVI).

For preparing a longwall panel, initially top & bottom gate roads has to be developed on both side of the panel and gate roads will be extended upto the end of the panel. It has been proposed in DPR that each gate road will be developed twin headings by Bolter Miner and inter connection between twin headings will be made. It is proposed to make interconnection between two headings to maintain adequate ventilation and ease operation during gate road development.

To prepare first longwall panel, development of two gate roads i.e top gate and bottom gate will be made for this panel. After making of face connection between Top gate & bottom gate of Panel no.301, bolter miner will be shifted for development of bottom gate road (by twin headings) of panel no.302 lying on dip side of panel no.301 and production will commence from longwall Panel no.301 by retreating with caving method. Thus, all the panels of seam-III will be extracted and last panel will be extracted is panel no.306 located on rise side of this seam. While developing of gate roads, development B&P workings i.e B&P-II & B&P-III will also be made. Depillaring of B&P-II proposed to be done before retreat of longwall panel because approach to this area will be cut off once nearby longwall panel is extracted. Once the development of gate roads in seam-III completes, Bolter Miner will be shifted to underlying seam-I for development of trunk headings, sumps etc. As per the DPR, after retreat of last longwall panel no.306 of seam-III, Longwall equipment including powered support will be brought to surface for major over hauling before installing in panels of Seam-I .

As such major overhauling is planned after the completion of extraction of all panels in Seam III. However to avoid any major breakdown during operation of the panel,

repair of moving equipment will be undertaken at the time of face transfer. Since the thickness of the coal Seam in Seam I is lesser than that of Seam III, the same powered support and the shearer cannot be used unless these are modified. It will be necessary for modification & overhauling of the Seam-III equipment after the exhaustion of longwall panel in Seam III and the equipment will be made suitable for using in Seam-I. The main modification of the supports will be support leg and lemniscates linkages. As the height of the coal Seam in Seam I will be lows, the shearer of Seam III may not likely match the requirement. Since the shearer will have much useful service life left, shearer manufacturer may examine the possibility of modification to make the shearer of Seam III compatible for Seam I. Otherwise the shearer to be replaced by new shearer. BCCL desires to deploy a new set of PSLW equipment in panels of Seam-I instead of changes as proposed by Contractor. But it will be done as per condition stipulated in the agreement between M/s Minop Consortium and BCCL and also as per the supplementary note.

In remaining part of existing amalgamated Muraidih Colliery area, i.e on western part of global bid project area identified by Bidder, it has been proposed to extract Seam-III and Seam-I by underground B&P mining method. This part of the property of Muraidih Colliery will be annexed with the property of existing Phularitand Colliery falling in Cluster-II for extraction of Seam-III & Seam-I. Seam-III is already under extraction by Bord and pillar method whereas Seam-I is completely virgin. Both seams are potential for underground mining. Above this area, overlying seams are being extracted by opencast method with floor of V/VI/VII seam as base. Seam-III is approached by two Incline drifts which has touched coal of seam-III on mid of the property. The present development is being made on dip side of the property by SDL-Haulage combination with drilling-blasting at face. In this mining plan, Bord & Pillar mining method is proposed for extraction of Seam-III and Seam-I by deploying SDL and Continuous Miner package. Initially, Seam-III will be extracted and then Seam-I. In both seam, SDL panel with drilling blasting is proposed where seam thickness is less than 2.2m whereas area having seam thickness more than 2.2m, will be extracted by Continuous Miner package except in north-west part where Seam-I & II is combined. In this area, seam thickness in more than 2.2m but only development of panel is proposed due to surface and sub-surface constraint.

A conceptual meeting with (P&P),BCCL and Area Official has been conducted at CMPDI for deciding the strategy for mining operation (Annexure-I). According to the area official, acquiring of land will be major constraint in the area lying on northern

side of incrop of V/VI/VII seam in Phularitand Colliery. Moreover, as per the area official, diversion of D B Road (Nawagarh to Dumra) which is crossing the property in north–south direction is also major constraint and at present scenario, diversion of this D B road and vilages/basti located besides this road is not possible (Annexure-III). Considering the above, it has been decided in the meeting that no depillaring will be proposed in area lying on northern side of incrop of V/VI/VII seam and also mining operation below villages/basties lying beside D B Road (Dumra to Nawagarh) mainly on the western side of the road.

In this mining plan, underground mining in the area lying in between Mohuda-Gomoh Railway line and western side of D B Road (Dumar to Nawagarh) has not been considered for extraction because in past, a number of B&P workings were made in V/VI/VII Seam in different sections as well as also in other overlying seams. These underground workings were left partly developed and partly depillared. Presently these seams are un-approachable and dipside workings are assumed to be water logged. Moreover, V/VI/VII seam is virgin on dipside of the considered property. On the eastern side of D B Road, the existing opencast workings (Hired HEMM patch) has excavated these old workings with floor V/VI/VII seam as base and earlier developed galleries are opened along the batter of the opencast. Unless the overlying virgin seams are extracted, underlying seams cannot be depillared. The workings of overlying V/VI/VII seam is assumed to be water logged and parting with Seam-III is less than 60m. A part of IX/X seam as well as XI/XII seam is in fire. Moreover, active fire occur in incrop region of VIIIA seam on southern side of old P B Quarry (refer Plate no.XI). Unless the D B Road is diverted, the existing hired HEMM patch cannot be extended further on western side to excavate these old workings. Though, it has been decided for diversion of D B Road to release the property for opencast but as per the mine authority, diversion of D B Road is not is not possible at present scenario. (Refer Annexure-III). Considering the above constraint, Seam-III and Seam-I has not been proposed in this area unless overlying seams are excavated.

As stated earlier that development of dip headings are in progress. Considering the same, it is proposed to develop five(5) headings maindip and mainrise almost parallel to the D B Road keeping a solid coal barrier of 45m with the road. Although, Seam-III & Seam-II are not contiguous, but the proposed maindip and panels in seam-III and seam-I are proposed to be kept super-imposed for ease of mining except on dip side panels in seam-I, where the pillar size increases with depth.

Thus, two three panels on dip side of seam-III are wider than the seam-III The floor contour plans of Seam-III & I shows that there is a swing of floor from west to east hence seams area dipping from east to west in Phularitand Colleiry whereas from west to east in amalgamated Muraidih Colliery. Hence, all Continuous Miner panels will be opened on the eastern part of the maindip and all panels will be self draining type dipping towards maindip of respective seams.

Depillaring of panels in seam-III & seam-I will be done from dipside upto the incrop of V/VI/VII seam. No depillaring is proposed beyond incrop of V/VI/VII seam. Most of the area of V/VI/VII seam has been excavated by opencast workings either by departmental basis or by hired basis. Hence depillaring is proposed in this area.

To extract Seam-III, Bord & Pillar method of mining is proposed. Total three numbers of panels will be worked at a time to achieve the target production. Out of which two will be SDL panels and onel will be Continuous Miner Panel. It has been proposed to make two sets with SDL for deploying in two panels. First set will be of 3 nos. of standard height SDLs in one panel whereas second set will be of 2 nos. of SDL in 2nd panel. Thus, total area of SDL panels can be extracted in both seams. The third panel will be Continuous Miner package panel. In all panels, out-bye transportation of coal will be done through belt conveyor and material will be through haulage.

From the existing development headings of Seam-III, five headings maindip will be developed by first set of SDL towards further dip side to develop maindip upto the dip side boundary. In dip side, boreholes were not drilled upto seam-III. Hence, there is an indicated zone where seam parameters may change during actual operation.

To approach underlying Seam-I, two drifts will be made from the floor of Seam-III in developed area and after touching of coal, four headings development in coal will be made in strike direction in seam-I by 2nd set of SDL upto a certain distance from coal touch point and these headings will be kept in superimposition with galleries/pillars of already developed in overlying Seam-III. A strata bunker in stone is proposed in-between Seam-III & Seam-I. By doing such development, strata bunker can be made in early stage of the mine development. To manage underground water, a sump will also be developed in this seam on western side.

At present, two inclines are in use for development of Seam-III. Out of which, one incline acts as main Intake airway and another as main return airway. In this mining plan, a return air shaft is proposed to be sunk upto Seam-I and this shaft will act as main return. The existing inclines will act as main intake for both seams. Since main dip of Seam-III is already developed to a certain distance in proposed maindip, hence initially Continuous miner can be deployed for opening of panel (P3-9) on strike direction. In this area, overlying V/VI/VII Seam already extracted by opencast method in past. Thus, depillaring of panel can be done in this area. It has been proposed to develop Mainrise towards southern side in both seams with five headings upto the fault F4F4 by SDL. The Fault F4F4 is a down throw fault with throw of about 5m because fault is dying in these areas. This fault will be crossed by three numbers of drifts in respective seams and from coal touch touch point of these drifts, further development of mianrise will be made upto the northern boundary. From these five headings, mainrises of Seam-III & Seam-I on down-throw side of fault F4F4, panels will be opened in strike direction. Underground workings area proposed in area having more than 15m hard cover line in both seams.

To maintain production from the mine on later stage, it has been proposed to deploy Continuous miner in rise panels on eastern side only for development of panel because depillaring is not considered due to land acquisition constraint towards northern side of incrop of V/VI/VII seam as decided in the meeting. It has been proposed for deployment of Continuous miner equipment package for extraction of Seam-III & Seam-I which depends on the economic viability of the Project. If it becomes un-economic then proposed panels in respective seams will be extracted by SDLs only which is already considered in this mining plan for extraction of seams for north-western part. The Phularitand mine along with annexed area of Muraidih Colliery does not have sufficient extractable reserves for longwall mining in Seam-III & Seam-I and non-coking grade of coal i.e average of G10 for Seam-III & G5 for Seam-I.

5.8.2 Opencast Mining Strategy:-

At present the production is being obtained from two independent Opencast Collieries namely Muraidih Opencast (departmental) and Phularitand Opencast (Hired patch).

Muraidih Opencast mine worked with base seam as V/VI/VII/VIII Seam and above seams by opencast method. Opencast operation is being carried out through departmental means adopting Shovel-Dumper system of mining.

Phularitand Opencast mine worked with base seam as V/VI/VII/VIII Seam and above seams by opencast method. Opencast operation is being carried out through outsourcing means adopting Shovel-Dumper system of mining.

In this mining plan and mine closure plan, it is proposed to extract the V/VI/VII Seam & all above occurring seams in the mine through opencast operation. It is also proposed to extract the III Seam & all above occurring seams in the north side of khodo river through opencast operation.

The details of the quarry are given in relevant Para. Opencast operation is being carried out through departmental / outsourcing means adopting Shovel-Dumper system of mining.

Assumptions made, if any-

It is assumed that opencast method with Shovel-Dumper System of mining may be done by departmental HEMM or by hired HEMM basis. It is also assumed that required excavation & transport capacity will be available for opencast mining operation.

5.8.2.1 Brief Description of Opencast Operations-

Proposed Opencast Mine Boundaries for V/VI/VII Seam Quarry:

The quarry limits of the Amalgamated Muraidih Phularitand (Part) Colliery on the surface for V/ VI/ VII Seam working is delineated within the leasehold boundary as under:

North : Incrop of V/VI/VII seam
South : Minimum of about 45 m from the railway acquired land
East : Minimum of 60 m from khodo river.
West : Minimum Distance of about 100m from the D.B. Road

Proposed Opencast Mine boundaries for III Seam Quarry:-

The quarry limits of the Amalgamated Muraidih Phularitand (Part) Colliery on the surface for III seam is delineated within the leasehold boundary as under:

North : Minimum Distance of about 60m from the diverted khodo river
South : Boundary proposed by MINOP
East : Minimum of 100 m from Incline and Boundary proposed by MINOP.
West : Minimum Distance of about 100m from the Hirak Road and Minimum Distance of about 60m from the Khodo river.

Basic dimensions of the Quarries-

Basic dimensions of the **V/VI/ VII Seam quarry** is tabulated below:

Sl. No.	Description	Unit	Value
1	Area of Excavation	Ha	499.91
2	Strike Length	Km	3.2-3.3
3	Dip rise width	m	800-1600
4	Maximum depth	m	160
5	Base of quarry		Floor of V/VI/VII Seam

Basic dimensions of the **III Seam quarry** are tabulated below:

Sl. No.	Description	Unit	Value
1	Area of Excavation	Ha	42.28
2	Strike Length	Km	1.5
3	Dip rise width	m	315
4	Maximum depth	m	60
5	Base of quarry		Floor of III seam

Opencast Operations-

It has been proposed to mine out all occuring seams (V/VI/VII seam and above occurring seam) only by opencast mining in the Amalgamated Muraidih Phularitand (Part) Colliery falling in Cluster II except on the north side of khodo river where opencast will be made with floor of Seam-III as base of the quarry. Opencast has a life of about 10 years considering the seams & area as stated above. It is also proposed to extract the III Seam & all above occurring seams in the north side of khodo river through opencast operation. III Seam quarry production will start after two (2) years i.e from 2021-22, considering time for land acquisition, taking necessary permission from DGMS and other agencies etc. The broad parameters of proposed Amalgamated Muraidih-Phularitand(Part) Colliery are given here-

Mineable/Extractable Coal : 56.63 Mt.
Overburden including Loose OB : 101.6 M. Cum.
Av. Stripping Ratio : 1.8 M^3/Te

Base of the Quarry

Floor of V/VI/VII seam is the base of the quarry for V/VI/VII seam Quarry and Floor of Seam-III for III-seam Quarry.

Haul Road Layout : It is proposed to lay 20 m haul road at 1 in 16 gradient to reach the maximum quarry depth,

Excavation

All the seams considered for exploitation will be mined in separate single benches where ever possible.

Variation in thickness of OB will make it difficult to maintain uniform bench height in OB horizons. However, it is proposed to have a ceiling on OB bench height from safety reasons. The height of the bench generally shall not exceed the boom height of shovel. The height of the OB bench is proposed as 10 m. Height of the coal bench will be equal to seam thickness subject to maximum bench height as 10 m.

At present 73.02 M.cum. of In-situ OB is internally dumped at the floor of combined seam. Till the completion of mining operations, 93.09 M.cum of In-situ OB will be excavated which is proposed to be dumped internally. Hence total volume of OB to be dumped internally is 166.11 M.cum of In-situ. Final Stage dump Plan has been shown in Plate no. XXVII. Existing externally dumped OB should be re-handled along surface edge of the quarry and should be accommodated with in the proposed internal dump. Hot OB should be quenched and dumped in non-coal bearing area.

In III-Seam Quarry, out of total 8.48 Mm^3 OB volume, 2.96Mcum of OB will be dumped internally in the decoaled area of the quarry and the rest around 5.52 M.cum will have to be dumped externally. The balance remaining 5.52 M.cum of OB will be placed in V/VI/VII seam dump.

Parting wise OB to be removed (solid OB) of V/VI/VII seam quarry-

Partings	Volume in M.Cum
Top OB above XIII seam	1.48
Parting in between XIII & XII	5.83
Parting in between XII & XI seam	0.11
Parting in between XI & IX/X seam	12.10
Parting in between IX/X & VIIIC	8.30
Parting between VIIIC & VIIIB	8.51
Parting between VIIIB & VIIIA	10.65
Parting between VIIIA & VIII	26.14
Parting between VIII & V/VI/VII	19.97
Total	**93.09**

Parting wise OB to be removed (solid OB) of III seam quarry-

Partings	Volume in M.Cum
OB above III seam	8.48
Total	**8.48**

Total OB to be handled - 101.57 M.Cum

For convenience of operation it is proposed to keep a minimum working width of coal and OB bench as 10 to 20 m. The working benches of OB and coal will be kept at a slope angle of 70^{o} and 80^{0} respectively during operation.

The final pit slope of the quarry has been planned at 39o for the final depth of the quarry (160 m). In the light of the experience gained of mining system can be modified during the actual mining operations depending upon the physical and mechanical properties of the rock. Final Pit layout should be maintained as shown in plate no. XXVII and filling of OB should be done wherever it is required keeping stability of OB benches. Care should be taken to avoid the formation of highwall.

At present, 4K pit and 1K pit is closed which was used in past for underground mining operation on the southern side of the D C Railway line. The final pit layout is proposed considering the above. But, if any underground mining activities are re-started in future through these pits, the surface edge of the proposed layout should be maintained safe distance from 4K pit and 1K pit.

Compliance of Conditions given in DGMS Permission Letter:

Amalgamated Muraidih Phularitand (Part) Colliery authority should comply with the condition as given in permission letter of DGMS for opencast mining operation at Phularitand Colliery vide letter no. R-3/010220/P-21/2014/390 dated 29.03.16 & at Muraidih Colliery R-3/010212/P-32-2017/Reg. 106 / 2018/ 297 dated 28.03.2018 received from Director of Mines Safety.

OB Dump Benches

Bench height for OB dumps will be 30 m and slope of individual dump benches will be 37^{0}. Width of berm between two adjacent benches will be about 40 m. Dumping will be done by End-Tipping method.

Drilling and Blasting

O.B. will be excavated in benches after proper drilling & blasting. Drilling in OB benches will be done by 160mm drills or as decided by the outsourcing agency. The blasted OB will be dozed, heaped and loaded on to 35t/ 60t dumpers or as decided by the outsourcing agency for transportation to OB dumps.

Drilling in coal benches will be done by 100 mm/ 160mm drills or as decided by the outsourcing agency and after proper drilling & blasting, the blasted coal will be loaded by hydraulic Shovels on to 35t/60t dumpers or as decided by the outsourcing agency for transportation up to the surface stock yard.

Transportation

The ROM coal from the OC will be transported to feeder breaker to crush it in to required sizes and from feeder breaker to KKC link Sidings. Coal from face to coal dump in Muraidih colliery is done by dumper / tipper. Coal is further transported from KKC link Sidings for onward transport to Power Stations. The distance from Dump to KKC Link siding is about 7 km (Muraidih Colliery). The coal / OB is to be transported either by departmentally or contractually as decided by BCCL Authority.

5.8.2.2 Fire Dealing Measures in Opencast workings-

As reported by Colliery / Area authorities, there is fire in Amalgamated Muraidih Phularitand (Part) Colliery. The excavation of fire area will be required during opencast operation of Amalgamated Muraidih Phularitand (Part) Colliery. Therefore, method of work and other statutory provisions in this respect must be adhered to while working in the fire zone.

However, the method may be improved / upgraded after suitable scientific field trials. During implementation of the fire dealing measures and excavation & dumping of hot materials, monitoring of status of fire, its movement, temperature condition and efficiency of fire dealing measures, is to be done regularly. Even on dump sites, such a monitoring is required so that quenching can be done in time to avoid dump fire

5.8.2.3 Modification in unit operations for excavation over fire area-

For excavation of the area, standard unit operations of opencast mining e.g. drilling, blasting, excavation, transportation and dumping will be followed. But due to presence of fire, the unit operation will be modified slightly which are as follows:

a) Cooling of faces:

Over the benches under excavation, application of firefighting chemicals/ additives like Di-Ammonium Phosphate (DAP) with Urea, mixed with water has to be carried out for suppressing the fire, extracting the heat and reducing the flame rapidly followed by profused water jetting by high pressure nozzles for safe deployment of man & machines.

b) Cooling of Blast-hole & Insertion of Fire Resistant & Thermal Insulation Casing in the Blast Hole-

Over the benches under excavation, drilling of blast-hole will be followed by cooling of the hole by use of water and / or water-chemical mixture to bring down the

temperature below 70^{o}C (if temp is very high). Finally fire resistant and thermal insulator casing will be inserted inside the hole before charging the explosive into it.

c) Blasting of the Excavation Bench-

The size of each blast will be small with fewer number of blast holes established on the basis of rate of increase in temperature within the blast-hole, so that temp inside the hole before blasting is kept under detonation limit.

d) Quenching of Blasted Bench with Flushing of Water-

After blasting the bench, the excavation area will be quenched by profused use of water. For this, pipe range be laid along the strike of benches on fire and high pressure nozzles has been proposed to be connected at regular interval with T-joint so that water can be sprayed over hot/fire excavation benches. Water will be pumped out at faces for quenching purpose.

Excavation of the blasted & quenched material shall be done by use of Shovels and loaded into Rear Dumpers.

5.8.2.4 Transportation & Dumping of OB & Coal-

OB will be transported to external/internal OB dumps for dumping. After dumping, the OB will be again sprayed with water to quench the fire, if any, completely, so that chances of re-appearance of fire at OB dumps is eliminated.

Coal, if recovered, will be transported to Surface Coal Stock Pit (located within the coal stock yard) filled up with water where hot ROM coal will be quenched completely. However, the fire area has been considered devoid of coal reserve.

5.8.2.4 Sealing off at Pit Limit-

At the end of the mine life, end pit slope within the seam and every exposed mouths of development gallery along the length of the bench / box-cut should be closed with non-combustible material (OB rock & mutti), compacted properly and sprayed with Thermoseal (a mica based sealant). The exposed gallaries will be filled up first followed by sealing of exposed coal on the highwalls of the quarry.

5.8.2.5 **Mining strategy proposed to work below Forest Land area :-**

The surface plan submitted by Area authority shows that a major area of forest land of Muraidih Colliery has been excavated/used by opencast mining operation details of which are described in Chapter-IX. As per the Colliery record, there are few hactares of balance forest land exists which are still untouched/unused. No forest

land exists in the area of Phularitand(Part) Colliery falling in Cluster-II. Application for regularization/diversion of forest land of 46.61 Ha is under process.

It has been decided in the draft report meeting (Annexure-XVI) that the following mining strategy is to be adopted during mining operation –

Opencast operation-

At present, opencast operation (Hired as well as departmental) is being done on the southern part of the proposed amalgamated area. In the mining plan, it is proposed to continue the opencast mining operations on the southern part of the amalgamated property for atleast 2 years so that within this period, the required Forest Clearance is obtained by BCCL from respective forest department. After obtaining of forest clearance, the left out area of opencast which lie on the north-central part near incrop of V/VI/VII seam will be excavated which are presently under active fire.

Underground Operation-

In Muraidih Colliery, extraction of Seam-III and Seam-I will be carried out as per the approved Global Bid Project on turnkey basis. The layout of longwall panels and B&P workings as proposed by the successful Bidder/Contractor is lying below these forest lands (refre plate no.XVI & XVIII). Hence, before commencing of any type of underground operations below these forest land, forest clearance has to be obtained. Considering the present scenario, a tentative period of 2 years may be required for commencing of mining operations mainly below forest land which is still remains as untouched/unused. It is to be noted that major area of the forest land towards north-eastern part of the property has already been extracted by opencast operations. Hence, forest clearance has to be taken as early as possible to keep the mining operation un-interrupted. Already mine authority has processed for the same.

5.9 Mining system-

The proposed project area of amalgamated Muraidih-Phularitand(part) Colliery is divided in two parts considering mining operation. One part on eastern side where Global bid longwall projects have been proposed covering major area of amalgamated Muraidih Colliery and another part on western side where major area is in existing Phularitand Colliery annexing rest area of amalgamated Muraidih Colliery where SDL and Continuous Miner panels are proposed. A common vertical boundary of 60m solid coal barrier is proposed to be maintained

in both seams i.e Seam-III & Seam-I between working area of longwall panels and working area of SDL/CM panel.

Mine entries on surface and trunk headings for Longwall workings have been proposed on extreme eastern side of the designated area whereas same for SDL/CM workings have been made on extreme western side of the project area. This is mainly due to swing of the floor contours of seams in both parts so that panels can be laid as self-draining type for better water management.

Contractor has considered the mine entries for Longwall project on north-eastern corner due to the following advantages-

- All the panels can be laid for downhill transportation of coal and will require moderate capacity conveyors.
- Power cost will be reduced.
- As the water will be the self-draining in all of the panels, it would be easier and simpler to handle water from the goaf.
- Operational ease.
- Length of the panel will be very long resulting lesser face transfer.
- De-watering of old underground water logged workings of Seam III of Muraidih mines by the side of the inclines will help to lay few more panels in Seam I.
- Higher recovery of coal.
- Requirement of lesser number of belt conveyors.
- The coal quantity blocked in safety pillars will be lesser.
- The amount of work for mine development will be lesser.

Mine entries of existing Phularitand Colliery has been selected by the Area authority and driven from the floor of earlier excavated V/VI/VII seam old quarry to reduce the drivage length. After touching of coal of Seam-III, main dip drivages toward dip direction have been made in this seam and it is progress.

Considering the above, same mine entries have been considered in this amalgamated mining plan of Muraidih-Phularitand(part) Collliery for extrcation of Seam-III & Seam-I.

5.9.1 Longwall Panel development in Seam-III & Seam-I Seam -

Gate Road Development-

Each Gate road will be developed by developing two coal headings simultaneously along with interconnection to be made after advance to a certain distance of the headings. Thus, chain pillars are formed as the gate road headings progresses and thus reaches upto the end of a panel. Dimension of a Chain Pillar depends mainly on the depth from surface, abutment pressure and time period.

Initially Top and bottom gate roads will be made on both side of a longwall panel. Thereafter, only one Gate road with two headings will be developed for forming of adjoining Longwall panel. If panels are located at different place, then two parallel twin gate roads have to be developed for forming a longwall panel.

Contractor has proposed to extract the identified panels by Longwall retreating with caving, hence each pair of headings of a twin gate road will be developed upto the end of the proposed longwall panel and face connection will be made between Top Gate & Bottom gate roads of the panel for installation of PSLW equipment set for retreating of panel for coal production. Gate road of the panel are kept rising to facilitate self-drainage. Inter-connected galleries within a twin gate road are in dip-rise direction hence connections are self-draining type. The above strategies will be maintained in both seams for development of longwall panels

As stated earlier that seam thickness of seam-III varies from 2.48m (MR-03) to 5.25m (MR-15) in the area considered for extraction by longwall panel whereas seam thickness of seam-I varies from 1.85m (MR-07) to 3.49m (MR-10) except one borehole MR-02 where seam thickness is 1.05m. The average seam thickness is considered as 4.0m for Seam-III and 2.40m for Seam-I for reserve estimation in this mining plan.

The successful bidder/Contractor has considered the width of each coal heading or gallery of a gate road as 5.2m in both seams. For the purpose of face capacity, height of extraction has been considered as seam height maximum upto 4.4 m for Seam-III and 2.4m for Seam-I.

As per the DPR, Since the incubation period of both seams is 15-18 months, MINOP have planned to extract the Seam as maximum as possible at one lift; this will not allow any coal to be left in roof and possibility of spontaneous combustions will be eliminated.

Hence, for extraction coal of Seam-III by longwall method, equipment so selected will be able to extract up to a height of 4.8 m in one lift. For the purpose of face capacity, height of extraction has been considered as 4.4 m. For Seam-I, it will be extracted up to a height of 2.4 m in one lift on average. For the purpose of face capacity, height of extraction has been considered by bidder as 2.4 m.

During development of gate road by twin headings, rectangular chain pillars will be formed due to inter-connection between headings in both seams. As per the successful bidder/Contractor, the spacing of gate roads in Seam-III is considered as 35m and the width of solid pillars is 30m whereas the spacing of gate roads in Seam-I is considered as 45m and width of solid pillars in Seam I is considered as 40m.

Face length of Longwall panel -

Bidder has proposed inward staggered layout where the length of face in upper seam is longer than the length of face in lower seam. In this layout, Gate road pillars in Seam III takes the load of the caved arch after extraction and thereafter it transfer to the pillar of the lower seam if the parting between the seams is lesser because coal seam and stratum in fracture zone are destroyed, stress will be released. Thus, the gate road failure of lower seam will also be decreased. Hence, inward staggered layout of panels is the most suitable layout of panels, which has been considered in this mine.

For high recovery of coal and less drivage of the gate roads, successful Bidder/Contractor has proposed the face length of 200m for Seam-III and 190m for Seam-I. The longer face length will also help for easier caving of the roof.

Length of Longwall panel-

The length of the panel is another critical area which influences to maximize the production in a yearly basis. Planners always prefer to have the length of the panel as long as it is manageable & within the product range of the equipment. This helps to reduce the numbers of face shifting, making more time available for the coal production.

As per the revised layout plan of Seam-III, the length of panel varies from 1052m (Panel no.305) to 2231.72m (Panel no.301) whereas as per layout plan of Seam-I submitted with DPR, the length of longwall panels varies from 1236m (Panel no.101) to 2305m (Panel no.101). It has been stated earlier that the revised layout plan of Seam-I as per Supplementary note is not available with Area authority not at HQ, BCCL. Hence it could not be furnished in this mining plan. According to Bidder/Contractor and as per their submitted supplementary note, due to shifting of Auxiliary Incline and Return Air Shaft, there is slight shifting of trunk headings in both seams. Due to this, there is slight increase in panel length of rise side panels which may be a pillar or so.

Longwall Face mining technique-

For maximization of the available shift time into shearer cutting time, design has considered bi-direction cutting instead of uni-directional cutting having the web depth as 0.865m.

Face working organization-

For maximization of gainful deployment of high investment in the longwall package, “four shift operations” has been envisaged. Out of the 4shifts, 3 will be the production shift and 1 for maintenance. The duration of each production shift will be for 6 hours at face**.**

5.9.2 Continuous Miner (CM) Panel/SDL Panel development in Seam-III & Seam-I Seam –

5.9.2.1 Development of Panel-

The coal seams (III, I/II Comb. and I seam) will be developed by Bord and Pillar method with panel system. The development shall be done along the floor upto a minimum height of 1.5 m or the seam thickness whichever is less.

After approaching the respective seam, each seam will be developed by driving five main dip/rise headings which will be developed upto the project boundary on the dip side and on the rise side up to the location where the thickness of hard cover from the surface is not less than 15m

Continuous Miner panels area proposed in Seam-III and Seam-I within the area of existing property of Phularitand Colliery annexing with remaining part of existing amalgamated Muraidih Colliery (i.e where longwall panels are not proposed). These panels will be either departmentally or outsourced depends on techno-ecomonic viability of the project.

From the maindip, five headings panels will be developed by Continuous Miner package equipment in strike direction (i.e towards eastern side of maindip) leaving panel barrier between two panels equal to one pillar width as per Reg. 99 of CMR 1957. The levels are proposed to be driven slightly rising to facilitate the self-drainage of seepage/spraying water at the face. The size of the panels will depend on incubation period of the seam. The size of the coal pillars will be according to the Reg. 99 (1) of CMR 1957. The maximum width and height of development galleries will be 4.8 m and 3.0 m respectively. However, considering

the introduction of CM, the width and height of the development galleries in a panel may be increased beyond 4.8m and 3.0m respectively and for this permission from the DGMS has to be obtained. It has been proposed to develop eastern side panels by CM with 5 headings level galleries whereas rest panels proposed on north-western part including main-rise and main-dip will be SDL panels of 5 headings level galleries in both seams. In CM panel, Continuous mine package equipment will be deployed for formation of pillars during development with place changing technique between Continuous Miner (CM) and Roof Bolting machine. In this method, CM will cut the headings upto permitted distance by remote operation and then shifted to next heading. Roof bolting machine will support the un-supported roof cut by CM. Same type of operation is followed during splitting/slicing of pillars.

On north-western side, development of few panels is proposed by 4 or 3 headings due to restricted mining area and also due to proposed location of air shaft as shown in Panel projection layout.

In a five heading SDL Panel, development and depillaring will be done by drilling –solid blasting at coal face. After supporting of immediate exposed roof, SDL will load the blasted coal at face and unload onto a pony belt conveyor. Pony belts will discharge coal onto a gathering belt and then onto gate belt for out-bye transportation from the panel. The panels proposed to be developed in Seam III and Seam-I/II & Split Seam-I have been shown in Plate Nos. XVI & XVIII respectively.

The general mining parameters of the panels (CM as well as SDL Panel) are as below:

No. of Headings	-	5 nos. (Panel/Maindip)
Gallery width	-	4.8m
Development Height	-	2.2m (min) to 3.0m for CM panel
	-	1.5m to 3.0 m (min) for SDL panel
Extraction Height	-	4.5m (max.)/seam thickness (CM/SDL Panel)

Pillar sizes(Centre to Centre) -

a) In Panels- For Seam-III: 26mX26m to 36m x 36m
For Seam-I/II & Seam-I: 26m x 26m, 36m x 36m & 45m x 45m.

b) In Main Dip For Seam- III, I/II & I : 36m x 45m & 45m x 45m
c) In Main Rise- For Seam- III & I/II : 26m x 26m

A Typical five heading development district by SDL and Continuous Miner package has been shown in figures-Fig.No.1 (SDL) and Fig.No.2 to Fig.No.4 (CM district) respectively for both seams i.e Seam-III and Seam-I.

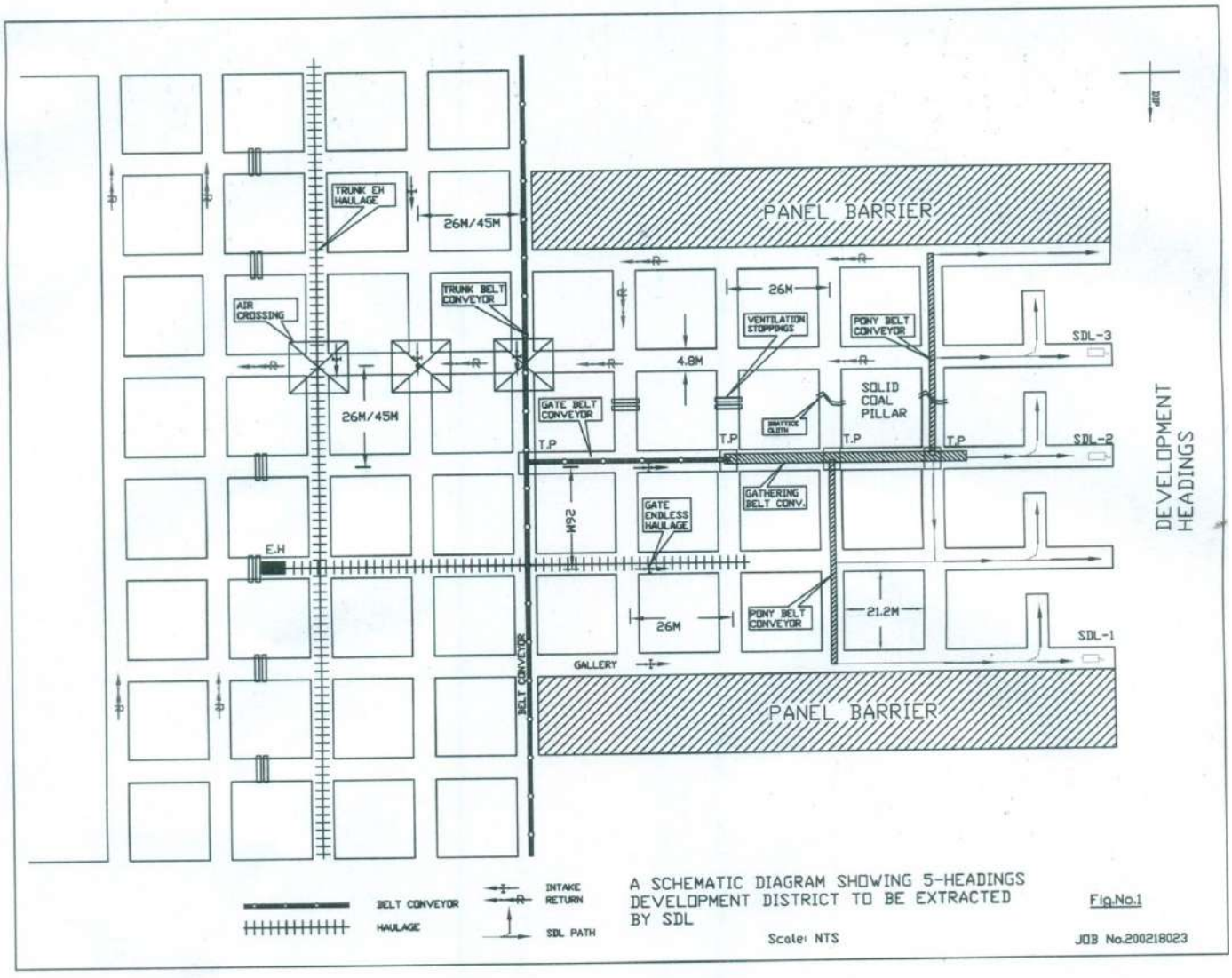
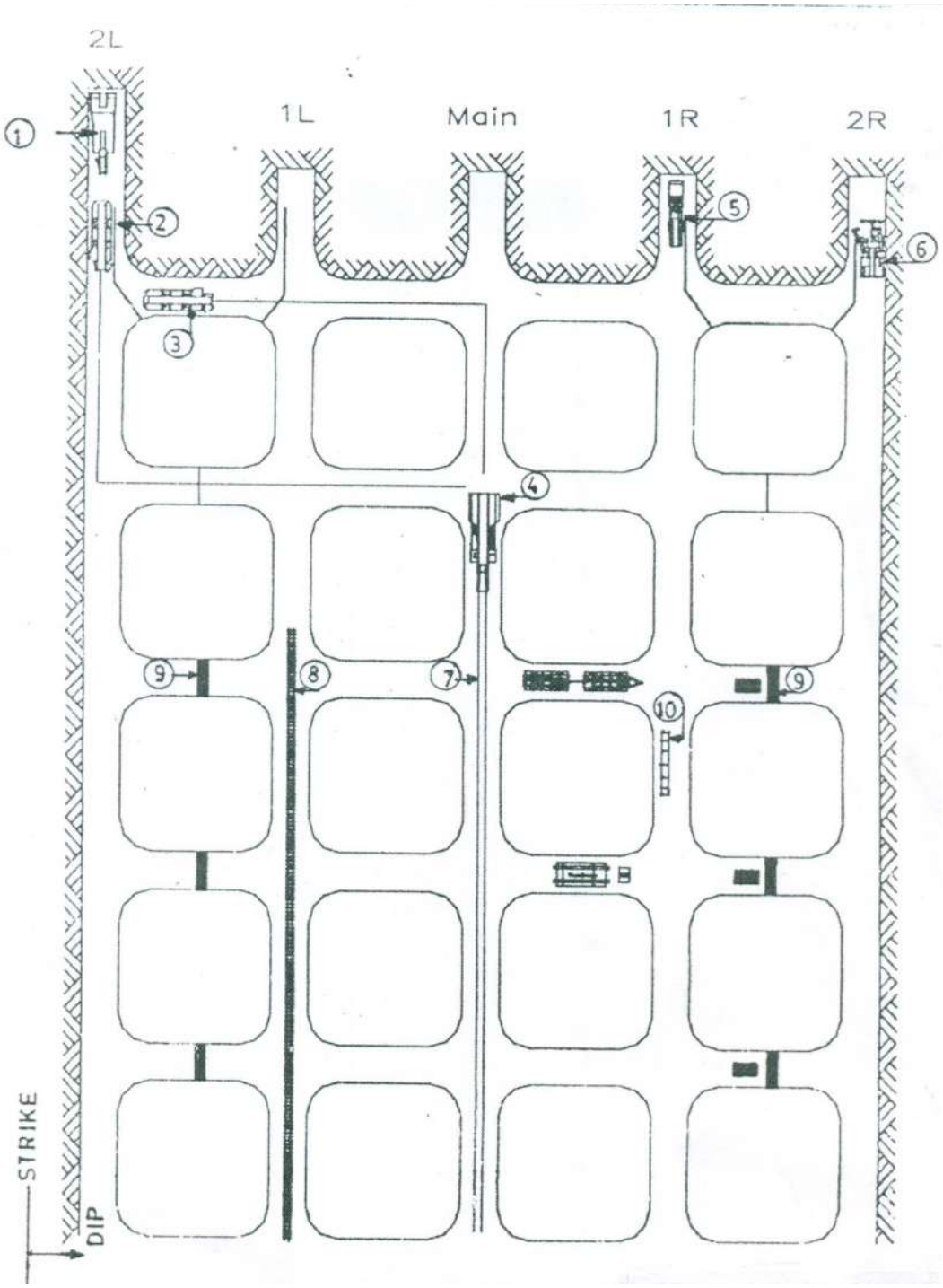


Fig No.1



A TYPICAL 5 HEADINGS MINING LAYOUT

1. Continuous Miner
2. Shuttle Car
3. Shuttle Car
4. Feeder Breaker
5. LHD
6. Roof Bolter
7. Gate Belt
8. Haulage Track
9. Ventilation Stoppings
10. Electrical Equip.

Fig No.2

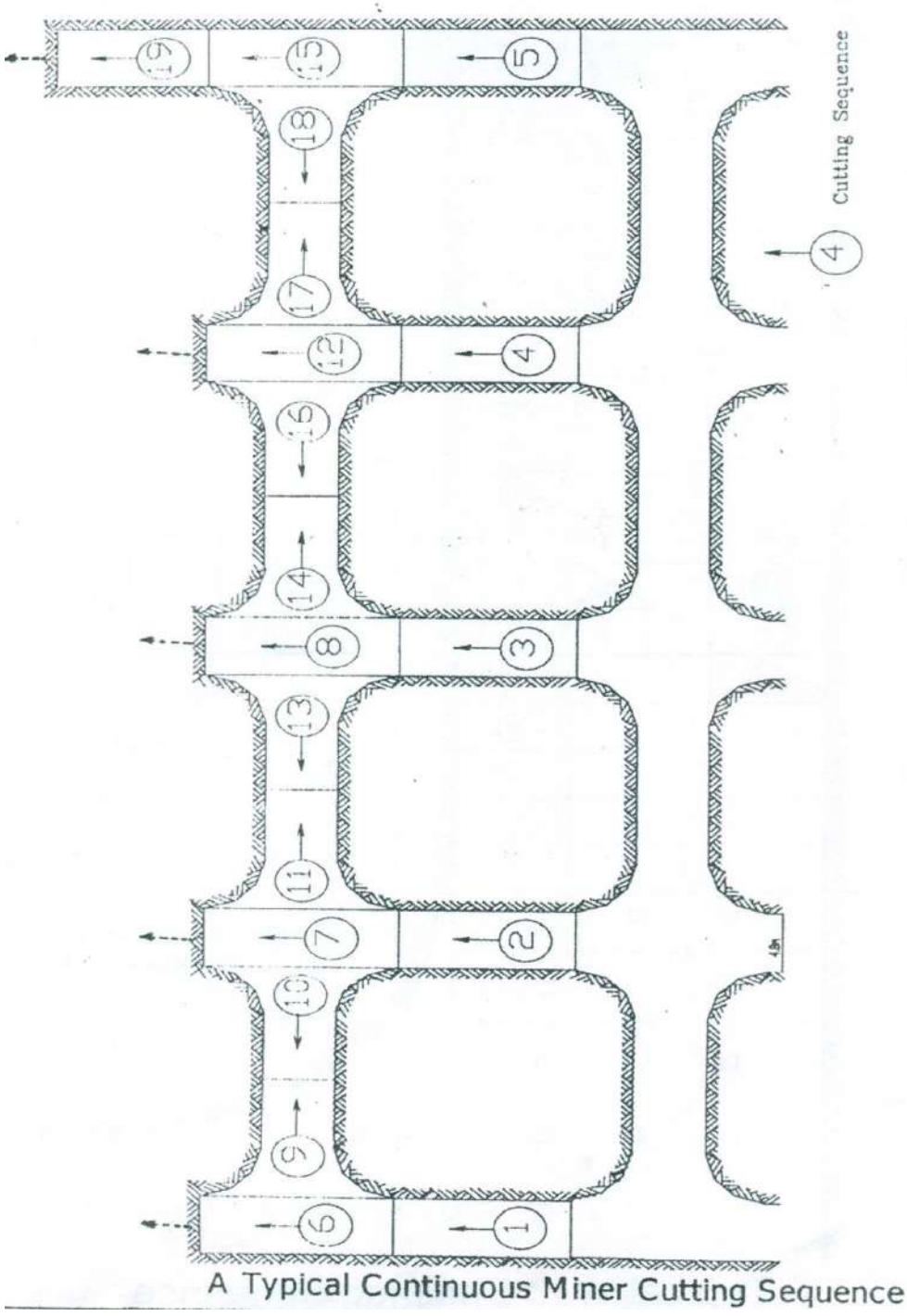
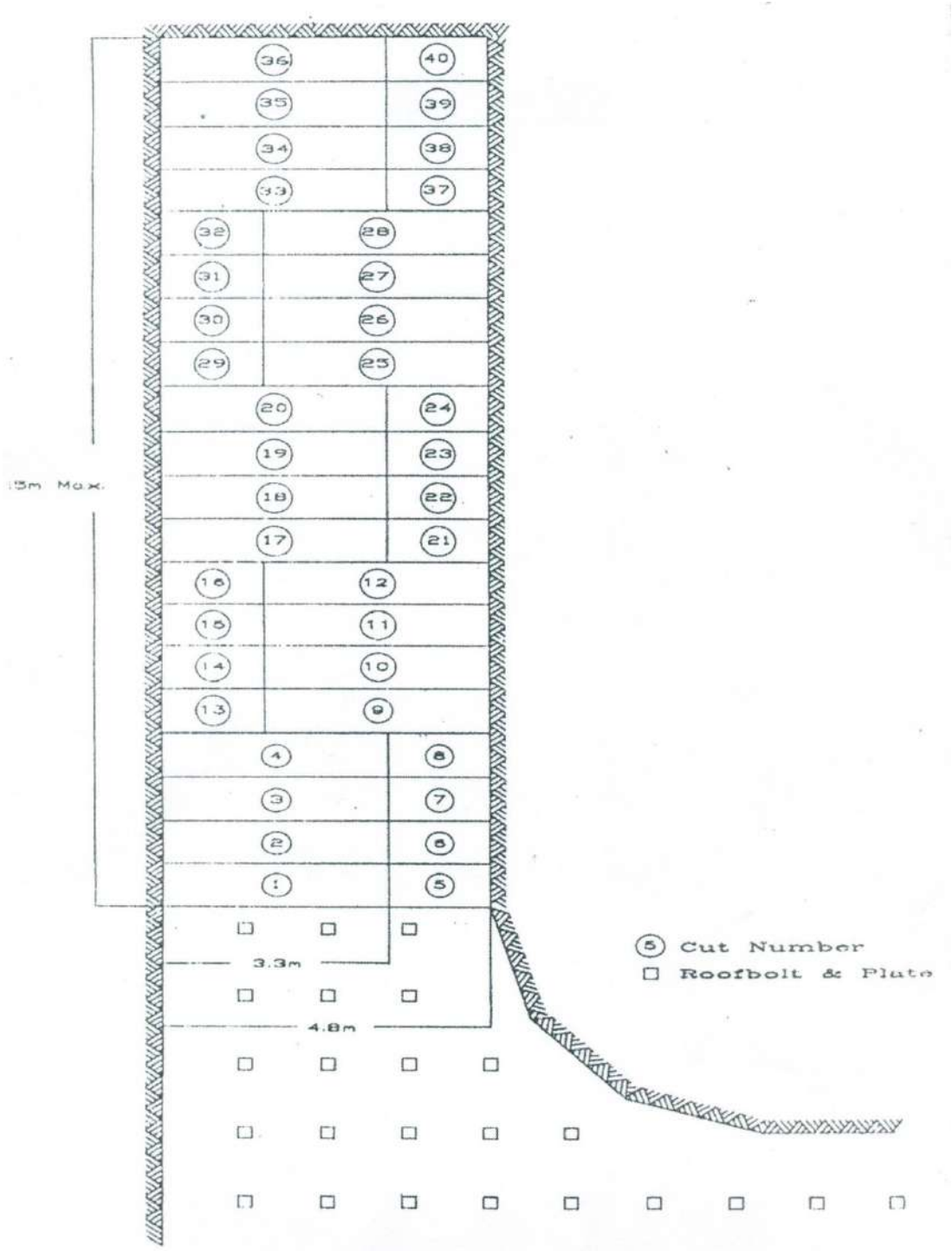

Cutting Sequence
A Typical Continuous Miner Cutting Sequence

Fig No.3



A Typical Web Shearing Sequence

Fig No.4

5.9.2.2 Depillaring of Panel -

The method of extraction/depillaring is proposed by caving. The manner of extraction is envisaged as follows:

Depillaring of SDL Panel –

As per the proposed seam extraction layout plan, a few SDL panels are proposed for depillaring due to Land acquisition constraint as well as surface constraint. However, where depillaring is proposed following method of extraction will be followed-

In a developed SDL panel, each pillar shall to be split into two equal parts by a 4.8m wide level split gallery. Each half of the pillar shall be extracted in slices (4.8 m wide), leaving coal rib of suitable thickness against goaf / slice not less than 2.0 m keeping factor of safety more than two (2). The ribs shall be robbed off judiciously on retreat if safety permits. After completion of the slice, the goaf edge support (like cogs) will be shifted outbye and the roof of the extracted area will be allowed to cave in.

Depillaring of Continuous Miner (CM) Panel –

As stated earlier that CM panels are proposed on eastern side of maidips in both seams. Panels to be worked by CM, each pillar shall to be split into two equal parts by about 6.6m wide level split gallery. Each half of the pillar shall be extracted in slices (about 6.6 m wide), leaving coal rib of suitable thickness against goaf / slice. After completion of the slice, the goaf edge support (Breaker Line Support) will be maintained/shifted outbye and the roof of the extracted area will be allowed to cave in.

Splitting of pillars shall not be done more than two pillars from the pillars under extraction by slicing. The manner of extraction including the maximum void allowed at a time shall be governed by the provisions of DGMS permission granted for the purpose.

A Typical five heading depillaring district by SDL has been shown in figures- Fig.No.5. and depillaring of a panel by Continuous Miner package along with sequence of operation has been shown in Fig.No.6.

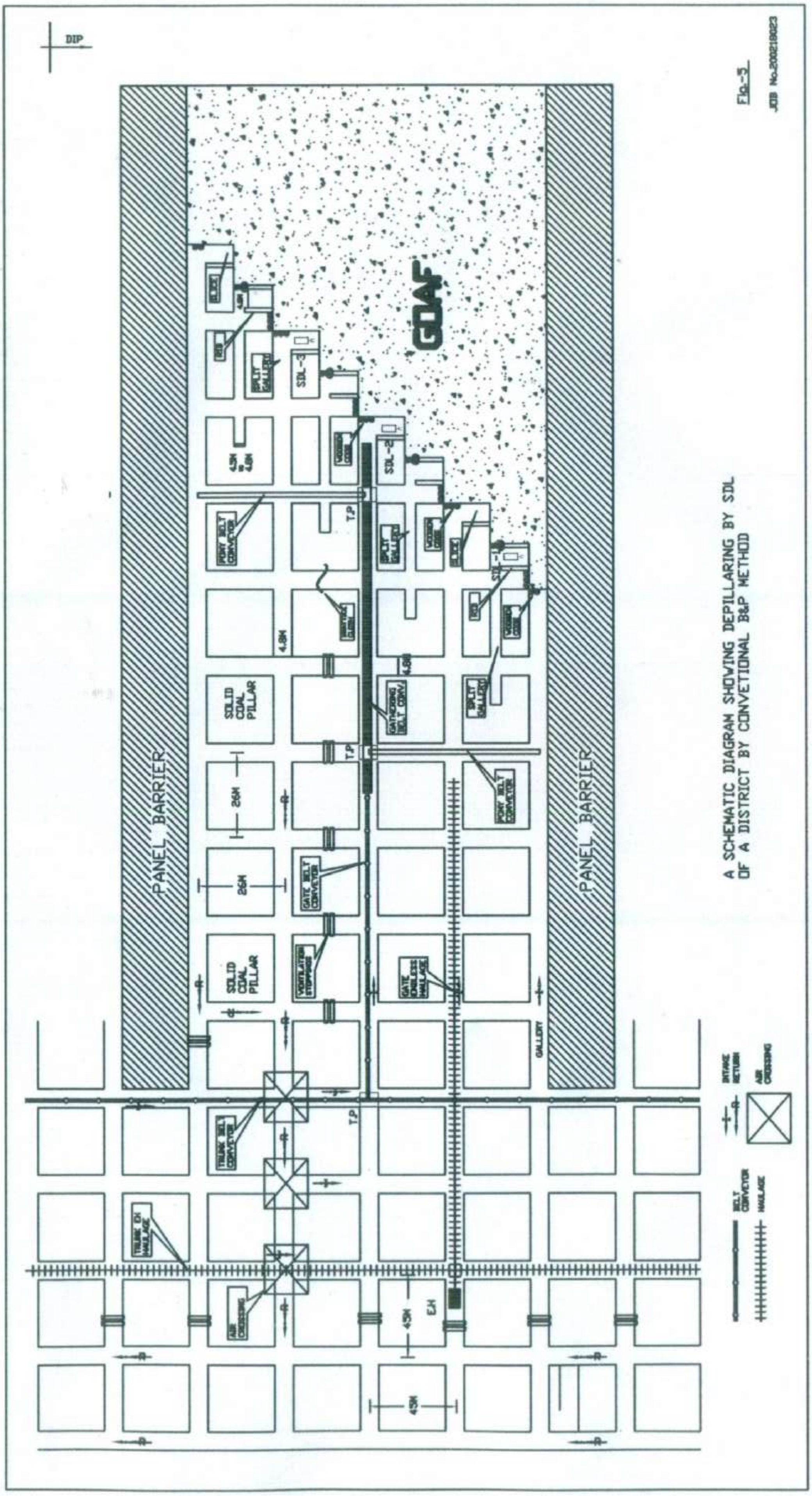

DIP
PANEL BARRIER
PANEL BARRIER
GOAF
SOLID COAL PILLAR
SOLID COAL PILLAR
SDL-3
SDL-2
T.P
T.P
T.P
26M
26M
4.8M
4.8M
GALLERY
A SCHEMATIC DIAGRAM SHOWING DEPILLARING BY SDL
OF A DISTRICT BY CONVETIONAL B&P METHOD
Fig.-5
JOB No.200218023

Fig No.5

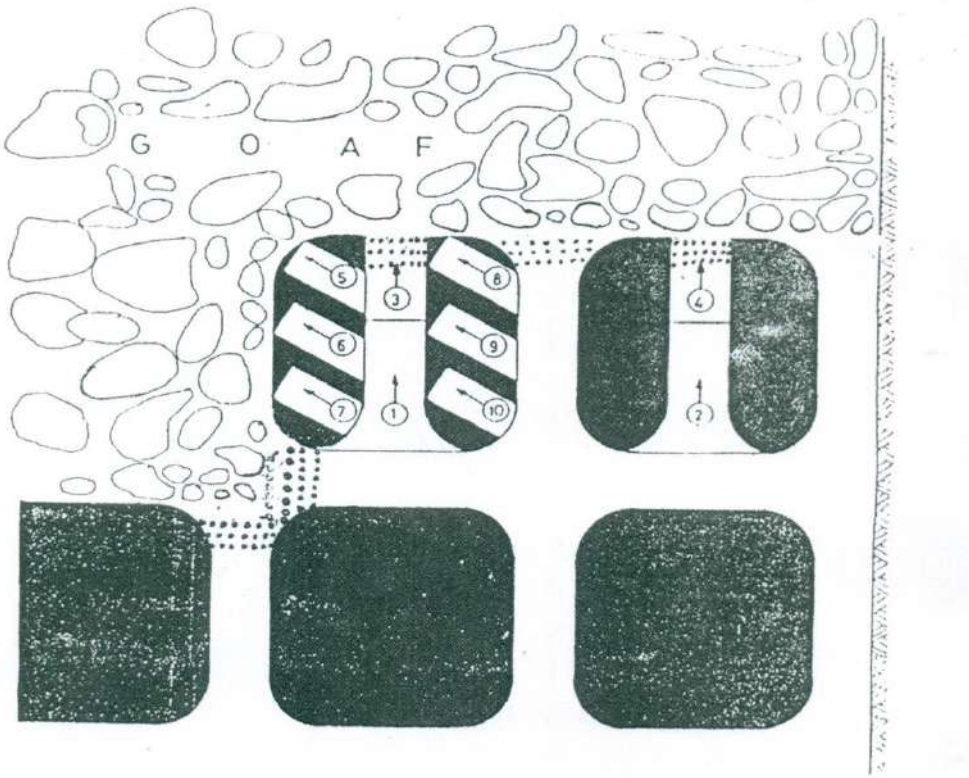


Fig No.6

5.10 List of Equipment

5.10.1 For longwall operation –

Sl. No.	Name	Model No./Equivalent	Unit	QTY
1	Double ended ranging drum shearer for Seam III	MG500/1180-WD/ N=1180kW	SET	1
2	Hydraulic powered roof support face for Seam III	ZY11000/25/50D	PC	111
3	Transition powered roof support for Seam-III	ZYG11000/25/50D	PC	2
4	Face-end powered roof support for Seam III	ZYT11000/25/50D	PC	5
5	Modified Double ended ranging drum shearer of Seam III for Seam I	MG500/1180-WD N=1180kW	-	-
6	Modified Hydraulic powered roof support face of Seam III for Seam I	ZY11000/16.5/30D	-	-
7	Modified Transition powered roof support of Seam III for Seam-I	ZYG11000/16.5/30D	-	-
8	Modified Face-end powered roof support (№1～3) of Seam III for Seam I	ZYT11000/16.5/30D	-	-
9	Self advancing main gate support set	ZY800/25/48	SET	1
10	AFC (Armoured Face Conveyor)	SGZ800/2×525,2×525	SET	1
11	Bridge Stage loader	SZZ800/400, 375kW	SET	1
12	Self-advance tail end of belt conveyor	MT1200	SET	1
13	Crusher	PLM2200, 250kW	SET	1
14	Emulsion power pack(Three pumps and two tanks)	S-300/50, 262kW	SET	1
15	Water pump(two pumps and one tank)	BPW 315/10	SET	1
16	Hydraulic open circuit props for tail gate supporting	DWQ 35-250/110X	PC	120
17	Pneumatic pump	BQF-11	PC	4
18	Set of Gate belt conveyor for PSLW	B=1200mm, L= 2400m 2×250 KW, 1200 TPH	SET	1
19	Electrical Package	Baldwin & Francis Make	SET	1
20	Misc installation & salvage equip, including 2Nos. shield hauler		SET	1
21.	Bolter Miner Package	Sandvik or any international Reputed manufacturers	SET	1
22 a	Trunk conveyor, TB1	Width 1200mm, TPH 1200, Power 2 x 400 KW	SET	1
22 b.	Trunk conveyor, TB2	Width 1200mm, TPH 1200, Power 2 x250 KW	SET	1
23 a	Set of gate conveyors for Bolter Miner / LCCM	Width 900 mm, L-2400 m, TPH 575, Power 2 x 90 KW	SET	2
23.b	Set of gate conveyors for Bolter Miner / LCCM	Width 900 mm, L- 500 mm, TPH 575, Power 1x 90 KW	SET	1
24	Set of main pumps	-	SET	1
25	Set of intermediate pumps	-	SET	1
26	Direct Haulage	150 KW	SET	3
27	Endless Haulage	75 KW	SET	4

Shearer-

According to mining thickness of seam-III as well as adaptability and reliability of Shearer to geological condition, MG500/1180-WD type of chainless electric haulage double drum shearer is selected by the successful bidder/Contractor which can easily meet the requirements for both theoretical as well as realistic production capacity.

The main technical feature of shearer as follows:

Type:	MG500/1180-WD
Mining height:	1.9~5.0m
Web:	0.865m
Total installed power:	1180kW
Power supply voltage:	3300V
Haulage speed:	0~13.5m/min
Haulage force:	975kN
Diameter of drum:	2500mm

Above shearer will be used in Seam III. Seam I will be mined after completion of mining for Seam III. One set of shearer will be used in Seam III and Seam I, cutting drum and base frame will only be changed to make it suitable for working in Seam I. Considering the thinner Seam, the same type of MG500/1180-WD shearer will be used after modification. So the detailed parameters for Seam-I operation is as follows:

Type:	MG500/1180-WD
Mining height:	1.4~3.1 m
Web:	0.865m
Total installed power:	1180kW
Power supply voltage:	3300V
Haulage speed:	0~13.5m/min
Haulage force:	975kN
Diameter of drum:	1600mm

AFC

The average cutting capacity of shearer is about 1100 t/h. The capacities of AFC scraper conveyor, stage loader and crusher should not be less than 1500t/h. For extraction of both Seam III and Seam I, one set of AFC scraper conveyor, stage loader and crusher will be used in above Seams.

The Contractor has considered 210m long, double drive each of 525 KW motor armoured face conveyor for transportation of coal along with the coal face. The AFC has the capacity as high as 1500 tonne/hour at a chain speed of 1.3m per second. The main gate drive may be end or cross side-discharged type. The line pan is 1750 mm. The height is 310 mm and inner width is 800mm. It is a closed bottom pan. Since it is closed bottom pan, it may be necessary to inspect the chain or pan in the closed bottom section. To facilitate the inspection, adequate nos. of inspection pans have been provided. It is fitted with twin in bord chain of 34 x 126 mm size placed at centre distance 200 mm. The ram plate is an integral part of the line pan while the spill plate is attached with the AFC.

The main functions of the AFC are:-

- It conveys coal along face and discharge on to bridge stage loader.
- It provides an anchor to the powered roof support.
- It works as rail for the shearer
- It makes the system continuous.

AFC scraper conveyor:	Type:
Design length:	SGZ800/2×525;
Average Transport capacity:	210m
Peak Transport capacity:	1200t/h
Motor power:	1500t/h
Rated voltage:	2×525kW
	3300V
Stage loader:	
Design length:	Type: SZZ800/400
Average Conveying capacity:	40m
Peak Conveying capacity:	1200t/h
Rated voltage:	1500t/h
Installed power:	3300V
	375kW
Crusher:	
Rated crushing capacity:	Type: PLM1500
Installed power:	1500 t/h
Rated voltage:	160 kW
	3300 V

Gate Belt Conveyor-

The length of gate belt conveyor should meet the length of the panel and the conveying capacity per hour should also be matched with production capacity of face. The conveying capacity is selected as 1200t/h. The main parameters of gate belt conveyor will be as follows: Belt width: 1200mm, Conveying capacity: 1200t/h, Conveyor length: 2300m, Belt speed: 3 m/s, Power: 2 x250 KW, Rated voltage: 3300V.

Emulsion Pump Station

For the high productive face, one of the key objective of the planner to reduce the cycle time of the support shifting. It is therefore necessary to ensure that the flow rate of the pump will be adequate to operate efficiently. In a PSLW face, higher setting of the powered support is more important than the capacity of the powered support. Emulsion pump is one of the key equipment in the longwall package. The underground longwall face pump station consists of emulsion pump unit and water pump unit. For the faster movement of the powered support, BHEC/Minop has planned to include three pumps and two tanks, where two pumps work and one remain as spare in the emulsion power pack. The pump station is arranged at the track car, which located at 100m far from the longwall face. Its major technical parameters are: working pressure 31.5bar, filtering fineness 40μm, flow rate 400L/min.

Powered support

The powered support of ZY11000/25/50D type has been selected for Seam III with supporting resistance of 1.21-1.35MPa; 48.4-54.00m height of rock can be supported in unit area. According to calculation, the maximum height of caving zone and fissure zone is 22.727+13.4=36.127 m during mining of Seam III and it is less than 48.4m, thus the strength & capacity of support is adequate to take care of and not likely to pose problem. Similarly, during the extraction of seam I, supporting strength is 1.15 to 1.32 MPa, 46.0 to 52.8m height of rock can be supported in unit area. According to calculation, the height of caving zone and fissure zone for Seam-I is 20.32m. whereas the support can take the dead load of 46 m. Even the height of caving zone in Seam III as 22.727 m, the total height will be 43.047m (22.727 +20.32) which is lower than 46.0m , so the support force is fine. After 3 years for completing extraction in Seam III, only less pressure generated from caving zone and fissure zone will transmit to hydraulic support.

Self advancing Gate road supports

It is one of the safety requirement for advance support in the gate roads both top & bottom gate to take care of the front abutment pressure. It is generally about 25/30 m in advance from the goaf edge. Generally individual open or the closed circuit hydraulic prop is used for the support of the gate roads. It takes longer time for shifting and one of the key constraints for the delays between two cutting cycles. Since it has been proposed high capacity longwall package, the performance of the package will greatly depend on faster rearrangement or shifting of the gate supports. Generally the main gate is very congested & shifting of individual prop is a time consuming event as such it has been provided new generation self-advancing type gate road support for the main gate road. It will not require any physical shifting. It will be shifted like self advancing powered support. It is being commonly used in all high production longwall face. However, for the support of the tailgate, conventional single telescopic hydraulic prop shall be used.

Self-advancing device of stage loader

Over the years, it has been realized that advancing of BSL after each shear is one of major constraints to achieve the higher production from a mechanised longwall face. In the recent years, a self-advancing device for shifting BSL have been developed. Compared with the traditional advancing method, the self-advancing device ensures the BSL supported mutually by stage loader, crusher and the ground surface, based on the rolling friction principle, is able to realize the automatic moving of stage loader and crusher, so as to meet the requirement of big cutting height and fast advancing of high productive and high efficiency working face.

Self advancing gate belt tail end device

Traditionally the drive head of the BSL moves on the belt return end structure & the travel distance is generally about 9m. After advancement of the face by 9m, the belt return end is pulled. This is very arduous & time consuming. This causes delays & adversely affects the production cycle of the longwall face. The self-advancing belt conveyor tail-end device is developed for fast advancing of BSL and tail end of belt conveyor in high productive mines. The gate belt conveyor has the facility of auto loop take up with storage of 100 m conveyor belting. With the advancement of the tail end the conveyor is shortened automatically. The connecting devices of belt tail end and BSL can rotate horizontally, swing from left to right and front to back; thus the belt tail end can adapt to the uneven,

bending and inclined gateway and advance once after the Shearer working for one/two cycles depending on the web depth.

Auto loop take up for the gate belt conveyor

Bridge Stage Loader will deliver the coal on to the 1200 mm wide gate belt conveyor. The length of the panel will be over 2300 m. The belt conveyor tail end is self-advancing type and continuously backed with progress of face. It is provided with auto loop take up with storage of 100 m of belting and the belt conveyor is thus gradually shortened. 2×200KW drive motor is selected. For the soft start, we have selected hydraulic fluid coupling. The type of belting will be PVC which is duly approved by DGMS.

Bolter Miner (BM) for Gate Road development-

To ensure the higher rate of gate road development Bolter miner is used in gate road. In this case no shuttle car is required. Bolter miner is continuous miner. It can cut coal as well does the support simultaneously. As per the Contractor, the floor of the gate road is likely be soft, the operation of shuttle car will be difficult. It is proposed to drive the two headings together which will act as gate road of two adjacent panels. As the length of panel will be long, considering the better ventilation & operational comfort, gate roads will be interconnected after 100 m. It has been planned to lay gate belt conveyor in both the headings. Bolter miner will discharge coal on the extendable belt conveyors, through feeder conveyor. After the drivages of 100m, the bolter miner will retreat & will be taken to the next heading of the twin gate road for drivage. BM will start cutting & will continue to drive 100m. The interconnection will be made from both the side with the help of the crawler mounted feeder conveyor.

Transport of equipment to underground

The equipments will be dismantled as per requirement & loaded on the special transport trolley. These will be lowered from surface by slow speed haulage to minimize the possibility of derailment through the material transport haulage road. The lowering of the equipment will be made as per the installation sequence so that materials are not jumbled up at underground. At the underground transfer point, it will be shifted from the direct haulage route to a slow speed endless haulage installed in the gate roads. A towing car will be used for proper & positive attachment with the haulage rope to prevent any runaway.

Shield hauler & utility vehicle

A modern high capacity longwall face will require handling of about 6000 tonne of steel materials. It is the management's object and desire as to how those materials can be handled safely, economically within the shortest period so that the equipment can be deployed gainfully for coal production. Generally such transport equipment is kept for a nos. of longwall panels for proper utilization of the mechanized transporters. Contractor has proposed 2 nos. of shield hauler having capacity of transportation of 40 tonne shields. This is tyre mounted diesel machines with attachment of forks at the front. The support which will be transported from surface on trolley through a series of haulages to the face. The chock transporters will lift from the trolley and carry through the face and place at the appropriate location. Apart from the chock transportation, the transport will also carry the shearer, AFC pans, etc; this mechanized transportation will help to complete the installing within 40 days. For the easy and faster transportation, there will be a parallel gallery with the face having a couple of entries between the escape gallery and coal face gallery for the movement of the chock transporter.

Out of the 2 nos. of shield haulers, one shield hauler will be earmarked for the recovery of the support at the time of face shifting and the other one will be engaged for face installation at the new panel. Shield hauler will have an extremely robust and failsafe longwall recovery vehicle capable of hauling larger longwall equipment with optional cameras fitted at the front and rear, along with LCD displays in the operators cabin ensure the operator has excellent visibility in all directions at all times.

5.10.2 List of equipment for Continuous Miner Panel (Proposed)-

Sl No.	Equipment	Quantity
1	Continuous Miner, Cutting height, Operating range 2.16m to 4.6m, Cutting width-3.3m, Cutting Power-621 kW,1100V	1 no.
2	Shuttle car (electric) Capacity-10.19m^3, Power-219 kW, 1100V	2 nos.
3	Roof Bolter, Operating range 2.16m to 4.6m, power 2X37 Kw, 550 V	1 set
4	Feeder Breaker, 500 tph, Power 112 kW, 1100V	1 no.
5	Load Haul Dumper, 1.5 m^3, 550V,5.7t	1 no.
6	Gate Belt Conveyor,500tph, 1000mm width, 2x90kW,550V	1 set
7	Electricals for the above equipment	1 set
8	Face pump, Discharge-11 lps, head- 33 m, power-7.5kw with 550V FLP electricals.	3 nos.
9	Aux. fan 12 m3/s, 100mm WG, 22.5 Kw with 550v, FLP electricals.	3 nos.
10	Endless haulage, 30 kw with 550V with FLP electricals.	1 no.
11	Ventilation duct, 800mm dia, semi-rigid type	300m
12	Pipe , dia – 100mm	LS
13	Rail Track	LS

5.10.3 List of equipment for SDL Panel (Proposed along with existing equipment)-

For Standard height & low height SDL Panels-

Sl No.	Equipment	Quantity
1	SDL, Standard height,1.1m3, 48 kw 550V, 8t with bi- directional chain conveyor bucket including cable reel and gate end bow, crawler mounted with FLP electrical.	3 nos.
2	SDL, low height,1.0m3, 48 kw 550V with bi-directional chain conveyor bucket including cable reel and gate end bow, crawler mounted with FLP electrical.	2 nos.
3	Pony conveyor, L-100m W-800mm 1x22 kW, 150 tph, 550V with FLP electrical.	6 sets
4	Gathering Belt Conveyor, L-200m W-800mm 1x30kW, 150 tph, 550V with FLP electricals.	2 nos.
5	Gate belt conveyor (Length depends on Panel length), W-800mm, 1x55 kW, 550V, FLP	2 set
6	Endless haulage, 30 kw with 550V with FLP electrical.	1 no.
7	Endless haulage, 22 kw with 550V with FLP electrical.	1 no.
8	Hand held drill machine 1.1 kw with 110V FLP electrical.	6 nos.
9	Face pump, Discharge - 11 lps, head – 33m, power-7.5kw with 550v FLP electricals.	4 nos.
10	Aux. fan 3-6m3/s, 250-60mm WG,15 Kw with 550v, FLP electrical.	4 nos.
11	Exploder (Multi shot)	4 nos.
12	Ventilation duct, 800mm dia, semi rigid type	1000m
13	Pipe , dia – 100mm	LS
14	Rail Track (15 Kg)	LS

5.10.3 List of existing equipment in Opencast Operation-

Existing machinery details-

a) Muraidih OCP Colliery (Departmental)-

The list of Equipment presently being operated departmentally in Muraidih colliery OCP with base of floor of V/VI/VII seam is given below-

Sl. No.	Equipment	Capacity	Nos.
1	Shovel	10 Cu.m.	1
2	Shovel	5 Cu.m.	2
3	Hydraulic Shovel	4.8 Cu.m.	3
4	Hydraulic Shovel	3.2 Cu.m.	2
5	Dumper	85 Te.	4
6	Dumper	60 Te.	21
7	Water Tanker	28KL	1
8	Water Tanker	20KL	3
9	Crane	80 Te.	1
10	Crane	40 Te.	1
11	Crane	30 Te.	1
12	Crane	20 Te.	1
13	Crane	8 Te.	1

b) Phularitand OCP Colliery-

OB Loading			
Category	**Model**	**Qty**	**Capacity (CuM)**
Excavator	Volvo EC-480	10	2.45
Excavator	Cat 349	3	3.4

Coal Loading			
Excavator	Hyundai 390	1	2.3
Excavator	Hyundai 340	1	2
Excavator	Hyundai 220	1	1.7
Excavator	Hyundai 210	1	0.92

OB Transporation			
Tipper	Volvo - 440 / 460	42	19.5

OB Transporation (Mines to CHP)			
Tipper	Volvo - 440 / Eicher Pro 8030 / MAN	15	

OB Transporation (CHP to Railway Siding)			
Tipper	Tata / MAN	8	

Rack Loading			
Payloader	HM - 2021/L&T 9020 / LiuGong	8	

Supporting Equipments			
Dozer	Catterpiller D8R & D6R	6	
Grader	Catterpiller 140k2	3	
Water Tanker	Volvo / AMW	3	
Wheel Loader	L&T 9020 / HM-2021	2	
Service Van	Eicher	3	

In this mining plan, additional provisioning of HEMM has not been made considering the final pit layout because this OCP will be made by amalgamating of existing Muraidih Colliery (departmental) and Hired HEMM of Phularitand Colliery. The final operation is to be decided by BCCL management for operation of this amalgamated OCP whether by Outsourced or departmental method.

5.11 Mine Entries-

5.11.1 **Details of existing Mine Entries for Global Bid Longwall Project**-

(Located on north-eastern part in existing Muraidih Colliery)

Sl. No.	**Particulars**	**Main Incline No.1** (Existing)	**Auxiliary Incline No.2** (Existing)	**Air Shaft (**Existing)
1.	Length of Open excavation/ Concreating for Incline / shaft including drift drivage in stone to touch coal of seam-III	**52.7m** (actual) (as per Plan-51.2m)	**48.2m** (actual)	**11.1 m**(actual) (Out of 125m depth as per approved Supplementary note'2015)
2.	Cross-sectional dimension (width/height)	**5.0m x 3.5 m**	**5.0m x 3.5 m**	**Inner Dia-6.0m & Outer Dia 6.8m,** Concrete lining, located on OB dump
3.	Gradient of Incline/Drift (as per FDPR)	**13^0**	**15^0**	
4.	Fan Drift			**Length-19.3m, 4.2m x 3.5m Gradient-1 in 2**
5.	Status	Completed.(touched Seam-III). Presently water logged	Completed.(touched Seam-III). Presently water logged	Sinking partly Constructed. Yet to touch Seam-III Fan drift - completed
6.	Length of drift drivage /Sinking to be made	**228m (**Seam-III to Seam-I) (as per Plan submitted with approved Supplementary note' 2015)	**228m** Seam-III to Seam-I) (as per Plan submitted with approved Supplementary note' 2015)	**113.9m** (to be sunk rest part upto Seam-I)
7.	Name of coal Seam to be touched	**Seam-I**	**Seam-I**	**Seam-III and then Seam-I**
8.	Status	**Work is suspended since 01.06.2016 by Contractor**		
9.	Inclines proposed to be equipped with Belt/Haulage and capacity (Kw)	Belt conveyor		
4.	Purpose	Intake airway, Coal Transportation, Travelling Roadway	Intake airway, Material Transportation, Emergency exist	Return Airway

5.11.1 **Details of existing/proposed Mine Entries in property of Phularitand Colliery**-

(Located on Western part)

Sl. No.	**Particulars**	**Incline No.1** (Existing)	**Incline No.2** (Existing)	**Air Shaft (**Proposed)
1.	Length of Open excavation/ Concreating for Incline including drift drivage in stone to touch coal of seam-III	Total Length - 319m (Including 40m incline mouth)	**Total Length - 323m** (Including 40m incline mouth)	**Total depth 85m (**upto Seam-I)
2.	Cross-sectional dimension (width/height)	**4.8 m x 3.0 m**	**4.8 m x 3.0 m**	Inner Dia-6.0m
3.	Status	**Existing (in operation)** (being used as return airway), Exhaust Fan installed at Incl.mouth.	**Existing (in operation)** (being used as Intake airway), Direct Haulage installed at surface, Coal transport, material & Travelling	Proposed
4.	Purpose (to be used in future)	Intake airway, Coal transportation through Belt Conveyor, Travelling roadway	Intake airway, material transportation through Haulage	Return airway
5.	Proposed Drift Drivages (D1 & D2) from Seam-III to Seam-I/II Comb.floor)	**Drift Length(D1)** Length-100m(approx.), 4.8m x 3.0m, 1 in 5	**Drift Length(D2)** Length-85m(approx.), 4.8m x 3.0m, 1 in 4.5	**Fan Drift** Length- 25m 4.5m x 2.5 m
6.	Purpose (to be used in future)	Intake airway, Coal transportation through Belt Conveyor, Travelling roadway to Seam-I	Intake airway, material transportation through Haulage to Seam-I,	Return, Air shaft will be sunk upto Seam-I.

Proposed Drifts

Sl. No.	**Activity**	**Width x Height**	**Length**	**Gradient**	**Location**	**Purpose**
1	Drift from Seam-I/II Comb to Seam-III (top of Strata bunker in stone). Drift (D3)	4.5 m X 2.5 m	60m (approx)	1 in 5 (Parting 12m)	Seam-I/II comb. floor to Seam-III floor	Coal Transport from Seam-I/II to Seam-I
2	Drift to Cross Fault (F4F4), Throw-5m (approx.) in Seam-III Drifts (D4 & D5)	4.5 m X 2.5 m	25m (approx)	1 in 5	III seam to III seam	Both Intake airways
3	Drift to Cross Fault (F4F4), Throw-5m (approx.) in Seam-III Drifts (D6)	4.5 m X 2.5 m	25m (approx)	1 in 5	III seam to III seam	Return airway
4	Drift to Cross Fault (F4F4), Throw-5m (approx.) in Seam-I/II combined Drifts (D7 & D8)	4.5 m X 2.5 m	25m (approx)	1 in 5	I/II comb. seam to I/II comb seam	Both Intake airways
5	Drift to Cross Fault (F4F4), Throw-5m (approx.) in Seam-I/II Comb. Drifts (D9)	4.5 m X 2.5 m	25m (approx)	1 in 5	I/II comb. seam to I/II comb seam	Return airway

5.12 Highest Flood Level (HFL)-

The Khodo Nala (Khudia) is flowing from west to east within the property of amalgamated Muraidih Colliery and after crossing the western side lease boundary, it flows from north to south. The highest flood level (HFL) of Khodo Nala is 197.3m as shown in surface plan submitted by area authority.

5.13 Degree of Gassiness-

In existing Phularitand Colliery, development in Seam-III is going on and Seam-I/II & I is virgin. This mine has been categorised as Degree-I gassy mine. In future, it is assumed that workings in both seam will be Degree-I. In amalgamated Muraidih Colliery, Both seam-III & Seam-I is virgin and assumed to be Degree-I

5.14. Roof & Floor

Seam-III-

As per the geological parameter, the roof of Seam-III within the proposed project area of amalgamated Muraidih-Phularitand (part) Collier is generally carbonaceous shale and medium to coarse grained sandstone while immediate floor is carbonaceous shale and medium to coarse grained sandstone.

Seam-I/II combined-

The roof is generally coarse grained sandstone while immediate floor is either carbonaceous shale.

Seam-I -

The roof is generally intercalation of shale and sand while immediate floor is coarse grained sandstone or shale.

5.15 Reserves

The integrated geological assessment on the basis of available surface and sub-surface data have clearly established 247.039 million tons of coal within the proposed Project area of Muraidih-Phularitand(part) Colliery) falling in Cluster-II. Out of which 34.139 million tons is coking coal and 212.90 million tons is non-coking coal.

TOTAL RESERVES (In Mt) (Falling inCluster-II)

Total Coking & Non Coking Coal Resource (in million Tonnes) Within the Leasehold Area falling in Cluster-II						
SEAM	**COKING**		**NON-COKING**		**TOTAL**	
	PROVED	**INDICATED**	**PROVED**	**INDICATED**		
XIII	0.271				0.271	**Open Cast Norm**
XI/XII	5.229				5.229	
IX/X	9.83				9.83	
VIIIC	3.627		0.2		3.827	
VIIIB	4.867		0.67		5.537	
VIIIA	9.166		0.13		9.296	
VIII	1.149		0		1.149	
V/VI/VII			99.66		99.66	
IVT			2.42		2.42	
IV			7.64		7.64	
IVB			0.94		0.94	
III (for OC) (Northern side of Khodo Nala)			2.36		2.36	
Sub total	**34.139**	**0**	**114.02**	**0**	**148.159**	
III (Rest)			44.44	3.27	47.71	**Under Ground Norm**
II			11.41	1.52	12.93	
I/II			6.59		6.59	
I			28.36	3.29	31.65	
Sub-Total	**0**	**0**	**90.8**	**8.08**	**98.880**	
Grand Total	**34.139**		**204.82**	**8.08**	**247.039**	

Production from 1989-90 to March 2019-

Production from 1989-90 to March'19				Production in Mt
Production in Mt	Phularutand Colliery	Muraidih OC Colliery	Shatabdih OC Colliery	Total
	North of DC Line(Cluster-II)			
UG Prod.	0.292			0.292
OC Prod. (Departmental)	6.226	50.023	10.798	67.047
OC Prod. (Contractual)	11.556	0.587	2.105	14.248
Total	**18.074**	**50.610**	**12.903**	**81.587**
Note :- Production before 1989-90 is not available with the Mine authority				

5.16. Extractable Reserves-

5.16.1 Underground Extractable Reserves-

Underground extractable reserves have been estimated in area having more than 15m Hard cover.

A) Extractable reserves of Seam-III and Seam-I/II Combined & Seam-I where SDL/Continuous Miner Panels area proposed within the Project area

SEAM	Proved		Indicated		Total		Total Proved	Total Indicated	Grand Total
	Dev	Dep	Dev	Dep	Dev	Dep			
Seam-III	1.78	1.83	0.71	1.04	2.48	2.87	3.61	1.75	5.35
Seam-I & I/II Comb	2.52	2.30	0.26	0.37	2.78	2.67	4.82	0.63	5.45
Total	4.292	4.130	0.968	1.410	5.260	5.540	8.422	2.378	10.80

B) Extractable reserves of Seam-III and Seam-I where Longwall Panels area proposed within the Project area i.e in Global bid Project area.

Extractable Reserves Longwall Panels, Gate Roads & other Development (in Mt)			
	Seam-III	Seam-I	Total
Longwall Reserves	12.551	8.687	21.238
Gate Road Development Reserves	1.49	0.904	2.394
Development (B&P) Reserves	1.489	0.673	2.162
Total Reserves	15.53	10.264	25.794

Total Extractable Reserves (Mt) (A+B) within the proposed project area is given below-

Seams	SDL+CM	Longwall+Gate Road+B&P	Total
Seam-III	5.35	15.53	20.88
Seam-I/II & Seam-I	5.45	10.264	15.714
Total	**10.80**	**25.794**	**36.594**

Details of Seam wise & Equipment wise Extractable Reserves are given below-

Underground Extractable Reserves (Seam-wise & Panel-wise)

The panel wise extractable reserve of Seam-III and Seam-I/II & Seam-I has been shown below and next pages-

LONGWALL PANEL PRODUCTION **Reserves in Mt**

Panel No.	Panel Length (m)	Face width (m) (Coal to Coal)	Caving with retreating (% of extraction.) As considered by Contractor	Av Seam Th.(m) considered for Reserve estimation (Data of BHs near panels)	Av. Ash% of Coking coal	Av. GCV	Av. Sp.gr (t/m3	Longwall Prod. (Mt)	LW Prod. Per Day (Considered for 2.0 Mty production)	Working Months (Considered 305 working Days in a year as per bidder)
LONGWALL PANELS OF SEAM-III										
301	2332	200	90%	4.24	39.32	4781	1.55	**2.759**	6500	**16.70**
302	2270	200	90%	4.01	41.11	4843	1.55	**2.54**	6500	**15.37**
303	1884	200	90%	3.90	42.25	4510	1.60	**2.116**	6500	**12.81**
304	1419	200	90%	4.14	40.93	4500	1.55	**1.639**	6500	**9.92**
305	1052	200	90%	4.24	43.38	4207	1.60	**1.285**	6500	**7.78**
306	1943	200	90%	4.08	39.63	4771	1.55	**2.212**	6500	**13.39**
Total Longwall Reserves of Seam-III								**12.551**		
Average				**4.10**		**4602 Grade G9**	**1.57**		**6500**	
LONGWALL PANELS OF SEAM-I										
101	2305	190	90%	2.70	36.68	5960	1.45	**1.543**	6500	**9.34**
102	2171	190	90%	2.41	38.00	5543	1.50	**1.342**	6500	**8.12**
103	1748	190	90%	2.42	38.48	5658	1.50	**1.085**	6500	**6.57**
104	1275	190	90%	2.42	38.18	5735	1.50	**0.791**	6500	**4.79**
105	1236	190	90%	2.11	41.46	5323	1.50	**0.669**	6500	**4.05**
106	1159	190	90%	2.42	40.24	5564	1.50	**0.719**	6500	**4.35**
107	1652	190	90%	2.53	39.33	5603	1.50	**1.072**	6500	**6.49**
108	2064	190	90%	2.77	38.38	5776	1.50	**1.466**	6500	**8.87**
Total Longwall Reserves of Seam-I								**8.687**		
Average				**2.47**		**5645 Grade G6**	**1.49**		**6500**	
Total Longwall Reserves of Seam-III & Seam-I								**21.238**		

The Longwall equipment selected by bidder has higher production capacity of around 9000 Tpd which can produce upto 2.6 Mty but to match with schedule of gate road development, reducing frequent shifting face equipment and preparing longwall panel, the average production considered as 6500 Tpd with annual target of 2.0Mt as per the NIT requirement.

GATE ROAD DEVELOPMENT EXTACTABLE RESERVES **Reserves in Mt**

BOLTER MINER RESERVES SEAM-III

Panel/Heading name to be dev. by Bolter Miner	Dev Length (m)	Weight av. Seam Thick(m)	Av Seam Th.(m) Considered for Resv.Estimate	Av Width (m) considered by Bidder	Area of Cross Section (Sq.M)	% of extraction	Av. GCV	Sp.gr (t/m3	Development Coal by BM (Mt)	Prod./ Day (Te) (BM Adv. 40m/Day/BM)	Working Months
	As per FDPR, Service Life of BM considered as @0.335 Mty i.e 1098 TPD for Seam-III with 305 working days										
	For Mine Scheduling, Gate road Development and B&P Development/depillaring for both Seam-III & Seam-I by Bolter Miner is considered as 1000 Tpd										
Seam-III Gate Road Dev.	Total working Days considered by Bidder as=				305	Days/Year					
	For Extraction of Gate road, Mining height and width is considered by Bidder as 4.4m and 5.2m respectively										
Main Trunk Headings Development in Seam-III	4251	4.73	4.40	5.2	22.88	1	4386	1.60	0.156	1000	6.14
Gate Road Seam-III BM-2	5406	4.21	4.21	5.2	21.89	1	4676	1.55	0.183	1000	7.20
Gate Road Seam-III BM-3	5440	4.41	4.40	5.2	22.88	1	4781	1.55	0.193	1000	7.59
Face Connection Panel 301	200	3.24	3.24	5.2	16.85	1	4536	1.6	0.005	1000	0.20
Gate Road Seam-III BM-4	5440	4.05	4.05	5.2	21.06	1	4825	1.55	0.178	1000	7.00
Face Connection Panel 302	200	2.70	2.70	5.2	14.04	1	4367	1.6	0.004	1000	0.16
Gate Road Seam-III BM-5	5418	3.90	3.90	5.2	20.28	1	4423	1.6	0.176	1000	6.92
Face Connection Panel 303	200	2.94	2.94	5.2	15.29	1	4351	1.6	0.005	1000	0.20
Gate Road Seam-III BM-6	5846	4.19	4.19	5.2	21.79	1	4275	1.6	0.204	1000	8.03
Face Connection Panel 304	200	3.19	3.19	5.2	16.59	1	4525	1.6	0.005	1000	0.20
Gate Road Seam-III BM-7	1308	4.71	4.40	5.2	22.88	1	4835	1.55	0.046	1000	1.81
Gate Road Seam-III BM-8	2731	4.07	4.07	5.2	21.16	1	4338	1.6	0.092	1000	3.62
Face Commection Panel 305	200	4.06	4.06	5.2	21.11	1	4858	1.55	0.007	1000	0.28
Gate Road Seam-III BM-9	2558	4.26	4.26	5.2	22.15	1	4771	1.55	0.088	1000	3.46
Gate Road Seam-III BM-10	4748	3.70	3.70	5.2	19.24	1	4820	1.55	0.142	1000	5.59
Face Connection Panel 306	200	3.52	3.52	5.2	18.3	1	4536	1.6	0.006	1000	0.24
Total Resaves of Gate Road Dev (Seam-III)		**3.87**	**3.83**		**←----Average→**		**4581**	**1.58**	**1.49**		
	44346						**i.e Av.Grade G9**				

BOLTER MINER RESERVES SEAM-I Reserves in Mt

Seam-I Gate Road Dev	**As per FDPR, Service Life of BM considered as @0.305 Mty i.e 1000 TPD for Seam-I with 305 working days**										
	Max. Height of Seam Extraction of Gate road is also considered by Bidder as 2.4m and width as 5.2m										
Panel/Heading name to be dev. by Bolter Miner	**Dev Length (m)**	**Weight av. Seam Thick(m)**	**Av Seam Th.(m) Considered for Resv.Estimate**	**Av Width (m) considered by Bidder**	**Area of Cross Section (Sq.M)**	**% of extraction**	**Av. GCV**	**Sp.gr (t/m3**	**Development Coal by BM (Mt)**	**Prod./ Day (Te) (BM Adv. 40m/Day/BM)**	**Working Months**
Main Trunk Headings Development in Seam-I	4739	2.28	**2.28**	5.2	11.86	1	5652	1.50	0.084	1000	3.30
Gate Road BM I-2	5643	2.55	**2.40**	5.2	12.48	1	6007	1.45	0.102	1000	4.01
Gate Road BM I-3	5607	2.41	**2.40**	5.2	12.48	1	5510	1.5	0.105	1000	4.13
Face Connection Panel 101	190	3.01	**2.40**	5.2	12.48	1	5869	1.45	0.003	1000	0.12
Gate Road BM I-4	5596	2.42	**2.40**	5.2	12.48	1	5523	1.5	0.105	1000	4.13
Face Connection Panel 102	190	2.77	**2.40**	5.2	12.48	1	5742	1.5	0.004	1000	0.16
Gate Road BM I-5	5713	2.45	**2.40**	5.2	12.48	1	5683	1.5	0.107	1000	4.21
Face Connection Panel 103	190	2.73	**2.40**	5.2	12.48	1	5746	1.50	0.004	1000	0.16
Gate Road BM I-6	5659	2.24	**2.24**	5.2	11.65	1	5671	1.5	0.099	1000	3.89
Face Connection Panel 104	190	3.01	**2.40**	5.2	12.48	1	5590	1.5	0.004	1000	0.16
Gate Road BM I-7	3011	2.54	**2.40**	5.2	12.48	1	5762	1.5	0.056	1000	2.20
Face Connection Panel 105	190	2.14	**2.14**	5.2	11.13	1	5323	1.5	0.003	1000	0.12
Gate Road BM I-8	2887	2.4	**2.40**	5.2	12.48	1	5827	1.45	0.052	1000	2.05
Gate Road BM I-9	4033	2.56	**2.40**	5.2	12.48	1	5602	1.5	0.075	1000	2.95
Face Connection Panel 106	190	2.40	**2.40**	5.2	12.48	1	5627	1.50	0.004	1000	0.16
Gate Road BM I-10	5016	2.57	**2.40**	5.2	12.48	1	5844	1.45	0.091	1000	3.58
Face Connnection Panel 107	190	2.78	**2.40**	5.2	12.48	1	5895	1.45	0.003	1000	0.12
Face Connection Panel 108	190	3.23	**2.40**	5.2	12.48	1	6152	1.45	0.003	1000	0.12
Total Reseves of Gate Road Dev Seam-I		**2.58**	**2.37**		**←----Average-→**		**5724**	**1.48**	**0.904**		
	49424					**i.e Av.Grade G6**					
Total BM Reserves of Seam-III & Seam-I									**2.394**		

BORD & PILLAR DEVELOPMENT RESERVES SEAM-III & SEAM-I Reserves in Mt

	For Mine Scheduling, Gate road Development and B&P Development/Depillaring for both Seam-III & Seam-I by Bolter Miner is considered as 1000 Tpd																			
		As per FDPR, Service Life of BM considered as @0.335 Mty i.e 1098 TPD for Seam-III with 305 working days																		
SEAM	PANEL NO.	DEV. AREA (m2)	DEP. AREA (m2)	PILLAR SIZE (M x M) Center to Center) Considered by Bidder	% Extrn. By Bidder		AV. Thickness (m)			Equipment	Av. Sp. Gravity (t/m3)	Extractable Reserve (Mt.)								
					DEV	DEP	Seam	Dev	Dep			Total Dev. (Mt)	Av. Prod./ per/Day (By Bidder	Working Months			Total Dep (Mt)	Prod./ per/ Day	Working Months	Total Ext. Resv. (Mt)
III SEAM	Dev. Seam-III (B&P-IV)	33976	26476	35 x 35	0.28	0.42	5.15	4.4	4.4	BM	1.55	**0.064**	1000	**2.52**			**0.08**	1000	**3.15**	**0.14**
	Main Sump Dev. Seam-III (B&P)-I	84515	80262	35 x 35	0.28	0.42	4.92	4.4	4.4	BM	1.55	**0.159**	1000	**6.25**			**0.23**	1000	**9.05**	**0.39**
	Dev.t Seam-III (B&P)-II	98502	98502	35 x 35	0.28	0.42	4.74	4.4	4.4	BM	1.55	**0.185**	1000	**7.28**			**0.29**	1000	**11.41**	**0.48**
	Dev. Seam-III (B&P)-III	116834	116834	35 x 35	0.28	0.42	3.83	3.83	3.83	BM	1.55	**0.191**	1000	**7.51**			**0.29**	1000	**11.41**	**0.48**
	Total Reaserves of Seam-III											**0.599**					**0.890**			**1.489**
				As per FDPR, Service Life of BM considered as @0.305 Mty i.e 1000 TPD for Seam-I with 305 working days																
I SEAM	Dev. Seam-I (B&P-IV)	34641	26436	45 x 45	0.28	0.42	2.59	2.40	2.40	BM	1.45	**0.033**	1000	**1.30**			**0.04**	1000	**1.57**	**0.07**
	Main Sump Dev. Seam-I (B&P)-I	82465	63792	45 x 45	0.28	0.42	2.32	2.32	2.32	BM	1.5	**0.079**	1000	**3.11**			**0.09**	1000	**3.54**	**0.17**
	Dev. Seam-I (B&P)-II	56550	56550	45 x 45	0.28	0.42	1.98	1.98	1.98	BM	1.5	**0.046**	1000	**1.81**			**0.07**	1000	**2.75**	**0.12**
	Dev. Seam-I (B&P)-III	126309	126309	45 x 45	0.28	0.42	2.63	2.40	2.40	BM	1.5	**0.125**	1000	**4.92**			**0.19**	1000	**7.47**	**0.32**
	Total Reaserves of Seam-I											**0.283**					**0.390**			**0.673**
	Total B&P Development Reserves of Seam-III & Seam-I by BM											**0.882**					**1.280**			**2.162**

Reserves in Phularitand Colliery (part) and annexed area of amalgamated Muraidih Colliery in Project Area Reseves in Mt
Seam-III Where SDL & Continuous Miner is proposed

Reserve type	PANEL No. OF SEAM-III	DEV. AREA (m2)	DEP. AREA (m2)	PILLAR SIZE (M x M)	Dev % Extc	Dep % Extc	Seam Th (m)	Dev Th (m)	Dep Th (m)	Type of Equpt.	Av. Sp. Gravity (t/m3)	Total Dev. (Mt)	Prod./ per/ Day	Working Months (Dev)	Total Dep (Mt)	Prod. / per / Day	Working Months (Dep)	Total Ext. Resv. (Mt)
	MAINDIP-IIIA		50400	26 x 26	0.34	0.36	3.14	3.00	3.14	SDL	1.60		0		0.09	1000	3.60	0.09
	MAINDIP-IIIB	78167	35572	36 x 36	0.25	0.45	2.91	2.91	2.91	SDL	1.60	0.09	300	12.12	0.07	300	9.32	0.16
	MAINDIP-IIIB (Rest)	41291	41290	36 x 36	0.25	0.45	2.91	2.91	2.91	SDL	1.60	0.05	300	6.40	0.09	300	12.00	0.14
Indicated	MAINDIP-IIIC	87805	87805	36 x 36	0.25	0.45	2.94	2.94	2.94	SDL	1.60	0.10	300	13.72	0.19	300	25.32	0.29
	MAINRISE-IIID	30120		26 x 26	0.34	0.36	2.83	2.83	2.83	SDL	1.60	0.05	300	6.12		300		0.05
	MAINRISE-IIIE	15087		26 x 26	0.34	0.36	2.01	2.01	2.01	SDL	1.55	0.02	300	2.12		300		0.02
	P3-1	35480		26 x 26	0.34	0.36	2.47	2.47	2.47	SDL	1.55	0.05	300	6.12		300		0.05
	P3-2	25930	9130	26 x 26	0.34	0.36	2.47	2.47	2.47	SDL	1.55	0.03	300	4.40	0.01	300	1.32	0.04
	P3-3	22621		26 x 26	0.34	0.36	2.31	2.31	2.31	SDL	1.55	0.03	300	3.60		300		0.03
	P3-4	13727		26 x 26	0.34	0.36	2.65	2.65	2.65	CM	1.55	0.02	300	2.52		300		0.02
	P3-5	77108		26 x 26	0.34	0.36	3.13	3.00	3.13	CM	1.55	0.12	1500	3.20		1500		0.12
	P3-6	85895		26 x 26	0.34	0.36	3.32	3.00	3.32	CM	1.55	0.13	1500	3.56		1500		0.13
	P3-7	95005		36 x 36	0.25	0.45	3.27	3.00	3.27	CM	1.55	0.11	1500	2.92		1500		0.11
	P3-8	148971		36 x 36	0.25	0.45	3.56	3.00	3.56	CM	1.55	0.17	1500	4.60		1500		0.17
	P3-9	168743	163558	36 x 36	0.25	0.45	3.32	3.00	3.32	CM	1.55	0.20	1500	5.20	0.38	1500	10.12	0.58
	P3-10	180817	175634	36 x 36	0.25	0.45	3.46	3.00	3.46	CM	1.55	0.21	1500	5.56	0.43	1500	11.48	0.64
	P3-11	185078	179894	36 x 36	0.25	0.45	2.98	2.98	2.98	CM	1.60	0.22	1500	5.88	0.39	1500	10.40	0.61
	P3-12	185000	179816	36 x 36	0.25	0.45	2.83	2.83	2.83	CM	1.60	0.21	1500	5.56	0.37	1500	9.88	0.58
Indicated	P3-13	192382	187198	36 x 36	0.25	0.45	3.17	3.00	3.17	CM	1.55	0.22	1500	5.96	0.42	1500	11.20	0.64
Indicated	P3-14	210464	194926	36 x 36	0.25	0.45	3.16	3.00	3.16	CM	1.55	0.24	1500	6.52	0.43	1500	11.48	0.67
Indicated	P3-15	122612		36 x 36	0.25	0.45	2.66	2.66	2.66	CM	1.66	0.14	1500	3.60		1500		0.14
	P3-16	53594		26 x 26	0.34	0.36	1.90	1.90	1.90	SDL	1.55	0.05	300	7.08		300		0.05
	P3-17	11878		26 x 26	0.34	0.36	1.90	1.90	1.90	SDL	1.55	0.01	300	1.60		300		0.01
	P3-18	17383		26 x 26	0.34	0.36	1.90	1.90	1.90	SDL	1.55	0.02	300	2.28		300		0.02
	Total of Seam-III											2.48			2.87			5.35

Seam-I/II & Seam-I Where SDL & Continuous Miner is proposed

Reserve type	PANEL No. OF SEAM-III	DEV. AREA (m2)	DEP. AREA (m2	PILLAR SIZE (M x M) (C to C)	Dev % Extc	Dep % Extc	Seam Th (m)	Dev Th (m)	Dep Th (m)	Type	Av. Sp. Gravity (t/m3)	Total Dev. (Mt)	Prod./ per/ Day	Working Months (Dev)	Total Dep (Mt)	Prod./ per / Day	Working Months (Dep)	Total Ext. Resv. (Mt)
I_II COMB	MAINDIP-I_IIA	36151		26 x 26	0.34	0.36	4.21	3.00	4.21	SDL	1.45	0.05	200	10.60		0		0.05
I_II COMB	MAINDIP-I_IIB	19454	19454	26 x 26	0.34	0.36	4.06	3.00	4.06	SDL	1.45	0.03	300	3.72	0.04	1000	1.60	0.07
I	MAINDIP-IB	157434	138637	36 x 36	0.25	0.45	2.88	2.88	2.88	CM	1.45	0.16	300	21.88	0.26	1000	10.40	0.42
	MAINDIP-IB		18797			0.45	2.88		2.88	SDL	1.45				0.04	300	5.32	0.04
I Indicated	MAINDIP-IC	81223	65836	36 x 36 & 45 x 45	0.25	0.45	3.14	3.00	3.14	SDL	1.45	0.09	300	11.72	0.14	300	18.68	0.23
I_II COMB	MAINRISE-I_IID	37280		26 x 26	0.34	0.36	3.67	3.00	3.67	SDL	1.45	0.05	200	10.80				0.05
I_II COMB	MAINRISE-I_IIE	39796		26 x 26	0.34	0.36	5.07	3.00	4.50	SDL	1.45	0.06	200	11.60				0.06
I_II COMB	P1-1	45993	21060	26 x 26	0.34	0.36	3.53	3.00	3.53	SDL	1.45	0.07	200	13.40	0.04	200	8.00	0.11
I_II COMB	P1-2	24118	14577	26 x 26	0.34	0.36	3.53	3.00	3.53	SDL	1.45	0.04	200	7.00	0.03	200	6.00	0.07
I_II COMB	P1-3	35273		26 x 26	0.34	0.36	4.48	3.00	4.48	SDL	1.45	0.05	200	10.20				0.05
I_II COMB	P1-4	13727		26 x 26	0.34	0.36	4.67	3.00	4.50	SDL	1.45	0.02	200	4.00				0.02
I_II COMB	P1-5	20673		26 x 26	0.34	0.36	2.65	2.65	2.65	SDL	1.45	0.03	300	3.60				0.03
I	P1-5	56461		26 x 26	0.34	0.36	2.65	2.65	2.65	SDL	1.45	0.07	300	9.72				0.07
I_II COMB	P1-6	25750		26 x 26	0.34	0.36	2.65	2.65	2.65	SDL	1.45	0.03	300	4.40				0.03
I	P1-6	71518		26 x 26	0.34	0.36	2.65	2.65	2.65	SDL	1.45	0.09	300	12.28				0.09
I	P1-7	106906		36 x 36	0.25	0.45	2.99	2.99	2.99	SDL	1.45	0.12	300	15.32				0.12
I	P1-8	148509	57830	36 x 36	0.25	0.45	2.75	2.75	2.75	CM	1.45	0.15	300	19.60	0.10	1500	2.68	0.25
I	P1-9	147452	131359	36 x 36	0.25	0.45	2.78	2.78	2.78	CM	1.50	0.15	300	20.40	0.25	300	33.32	0.40
I	P1-10	180838	175654	36 x 36	0.25	0.45	2.34	2.34	2.34	CM	1.50	0.16	300	21.08	0.28	300	37.32	0.44
I	P1-11	185071	179887	36 x 36	0.25	0.45	2.55	2.55	2.55	CM	1.50	0.18	300	23.48	0.31	300	41.32	0.49
I	P1-12	185225	180040	36 x 36	0.25	0.45	2.70	2.70	2.70	CM	1.45	0.18	300	24.00	0.32	300	42.68	0.50
I Indicated	P1-13	39889	31790	45 X 45	0.20	0.50	3.14	3.00	3.14	CM	1.45	0.04	300	4.68	0.07	300	9.32	0.11
I	P1-13	200589	200589	45 X 45	0.20	0.50	3.14	3.00	3.14	CM	1.45	0.18	300	23.48	0.45	300	60.00	0.63
I Indicated	P1-14	87607	67357	45 X 45	0.20	0.50	3.27	3.00	3.27	CM	1.45	0.08	300	10.28	0.16	300	21.32	0.24
I	P1-14	153545	76922	45 X 45	0.20	0.50	3.27	3.00	3.27	CM	1.45	0.14	300	18.00	0.18	300	24.00	0.32

	PANEL No. OF SEAM-I/II & SEAM-I	DEV. AREA (m2)	DEP. AREA (m2	PILLAR SIZE (M x M) (C to C)	Dev % Extc	Dep % Extc	Seam Th (m)	Dev Th (m)	Dep Th (m)	Type	Av. Sp. Gravity (t/m3)	Total Dev. (Mt)	Prod./ per/ Day	Working Months (Dev)	Total Dep (Mt)	Prod./ per / Day	Working Months (Dep)	Total Ext. Resv. (Mt)
I Indicated	P1-15	74054		45 X 45	0.20	0.50	2.90	2.90	2.90	CM	1.45	0.06	300	8.40				0.06
I	P1-15	26267		45 X 45	0.20	0.50	2.90	2.90	2.90	CM	1.45	0.02	300	2.92				0.02
I_II COMB	P1-16	52977		26 x 26	0.34	0.36	5.07	3.00	4.50	SDL	1.45	0.08	200	15.40				0.08
I_II COMB	P1-17	20793		26 x 26	0.34	0.36	5.07	3.00	4.50	SDL	1.45	0.03	200	6.00				0.03
I_II COMB	P1-18	21726		26 x 26	0.34	0.36	5.07	3.00	4.50	SDL	1.45	0.03	200	6.40				0.03
I	P1-19	36266		26 x 26	0.34	0.36	2.37	2.37	2.37	SDL	1.50	0.04	300	5.72				0.04
I_II COMB	P1-20	31756		26 x 26	0.34	0.36	2.23	2.23	2.23	SDL	1.50	0.04	200	7.20				0.04
I	P1-20	54971		26 x 26	0.34	0.36	2.23	2.23	2.23	SDL	1.50	0.06	200	12.40				0.06
I	P1-21	39934		26 x 26	0.34	0.36	2.23	2.23	2.23	SDL	1.50	0.05	200	9.00				0.05
I	P1-22	44726		26 x 26	0.34	0.36	2.23	2.23	2.23	SDL	1.50	0.05	200	10.00				0.05
I	P1-23	47921		26 x 26	0.34	0.36	2.23	2.23	2.23	SDL	1.50	0.05	200	10.80				0.05
I	P1-24	47921		26 x 26	0.34	0.36	3.01	3.00	3.01	SDL	1.45	0.07	200	14.00				0.07
	Total of Seam I/II & Seam-I											2.78			2.67			5.45
						Average Seam Thickness	3.23											
	GRAND TOTAL OF SEAM-III AND SEAM-I/II & SEAM-I (SDL+CM PANEL)											5.26			5.54			10.80

Note-The table given below shows an approximate extractable reserves in Seam-III & Seam-I is available in between Railway Property (Mohuda-Gomoh S.E line) and D B Road (Nawagaon-Dumra) which is not proposed for extraction in this Mining Plan because overlying seams are un-extracted, water logged, fire and parting between virgin area of V/VI/VII seam & Seam-III is less than 60m.

Tentative Extractable Reserves of these area is -

Seam	Dev.(Mt)	Dep(Mt)	Total (Mt)
Seam-III	0.23	0.36	0.59
Seam-I	0.17	0.30	0.47
Total	**0.40**	**0.66**	**1.06**

Seam-wise and Panel-wise reasons for not to depillar panels are given below–

Type of Reserves	Panel Name (Seam-III)	Remarks
	MAINDIP-IIIA	**Standing on pillars 42 nos**
	MAINDIP-IIIB	**Development by Existing SDL, Overlying Seams extracted, Partly will be depillared**
	MAINDIP-IIIB (Rest)	
III Indicated	**MAINDIP-IIIC**	
	MAINRISE-IIID	
	MAINRISE-IIIE	
	P3-1	**Main Sump. No Depillaring**
	P3-2	**No Depillaring to Protect Shaft & Inclines**
	P3-3	**No Depillaring to Protect Shaft & Inclines**
	P3-4	**No Depillaring to avoid surface subsidence**
	P3-5	**No Depillaring to avoid surface subsidence**
	P3-6	**No Depillaring to avoid surface subsidence**
	P3-7	**No Depillaring to avoid surface subsidence**
	P3-8	**No Depillaring to avoid surface subsidence**
	P3-9	
	P3-10	
	P3-11	
	P3-12	
III Indicated	**P3-13**	
III Indicated	**P3-14**	**Partly not to Dep to Protect Rly Line/Prooerty**
III Indicated	**P3-15**	**No Dep, Itermediate sump & to Protect Rly Line/Prooerty**
	P3-16	**No Depillaring**
	P3-17	**No Depillaring**
	P3-18	**No Depillaring**
Not considered	**P3-19**	**No Depillaring Overlying Workings are Waterlogged, fire, less parting. Not Considered for extraction**
Not considered	**P3-20**	**---Do----**
Not considered	**P3-21**	**---Do----**
Not considered	**P3-22**	**---Do----**

Type of Reserves	Panel Name (Seam-I/II & I)	Remarks
	MAINDIP-I_IIA	No Depillaring
	MAINDIP-I_IIB	Depillaring will be done by CM
	MAINDIP-IB	Will be Depillared by CM
	MAINDIP-IB	Will be Depillared by SDL
Indicated	MAINDIP-IC	
	MAINRISE-I_IID	No Depillaring to protect surface features like villages as decided in meeting
	MAINRISE-I_IIE	No Depillaring to protect surface features like villages
	P1-1	Part will be depillared
	P1-2	Part will be depillared
	P1-3	No Depillaring to protect Inclines,Drift & Shaft
	P1-4	No Depillaring to protect surface features like villages as decided in meeting
	P1-5	----do----
	P1-5	----do----
	P1-6	----do----
	P1-6	----do----
	P1-7	----do----
	P1-8	Part will be depillared.
	P1-9	Part will be depillared.
	P1-10	
	P1-11	
	P1-12	
Indicated	P1-13	
	P1-13	
Indicated	P1-14	Part will be depillared.
	P1-14	Part will be depillared.
	P1-15	No Dep to protect Railway Propert & Line
Indicated	P1-15	No Dep to protect Railway Propert & Line
	P1-16	No Depillaring to protect surface features like villages as decided in meeting
	P1-17	----do----
	P1-18	----do----
	P1-19	----do----
	P1-20	----do----
	P1-20	----do----
	P1-21	----do----
	P1-22	----do----
	P1-23	----do----
	P1-24	----do----
	P1-25	No Depillaring. Overling V/VI/VII seam exists as partly developed & partly Depillared
	P1-26	----do----
	P1-27 & P1-28	----do----

5.16.2 Opencast Extractable Reserves-

Total Mineable/Extractable Coal : **56.63 M.Te.**

a) V/VI/VII Seam Quarry : 54.51 M.Te

b) III Seam Quarry : 2.12 M.Te

Total Overburden including Loose OB : **101.6 M.Cum.**

a) V/VI/VII Seam Quarry : 93.12 M.Cum.

b) III Seam Quarry : 8.48 M.Cum.

Overall **Av. Stripping Ratio : 1.8 M^3/Te**

5.17 Production-

5.17.1 Existing Production-

A) Underground Production-

Last five years production from underground in Phularitand Colliery is as follows-

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 (upto 31st March,19)
Seam-III	Nil	54967	84702	97396	34830	38529
Seam-I/II & I	Nil	Nil	Nil	Nil	Nil	Nil
Grade (As per Colliery)	G9	G9	G9	G9	G9	G10

A

At present, there is no underground production in amalgamated Muraidih Colliery i.e from Global bid Project**.**

B) Opencast / Hired HEMM Patch Production -

Last five years production from opencast/Hired Patch in Phularitand Colliery with V/VI/VII Seam as base of the Opencast is as follows-

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 (upto 31st March,19)
Hired/Outsourced	837190	2329738	859482	1930145	2079711	2400028
Departmentally	7830					
Grade (As per Colliery)	W-IV	W-IV	W-IV	W-IV	W-IV	W-IV

The above information/data are submitted by Mine authority.

The Grade Notification, year 2019-20 for these Collieries of Barora area are given below-

	Colliery Name	Seam	Size	Notified Grade for 2019-20
1.	Muraidih OCP	V/VI/VII(Comb)	Steam	W-III
			ROM	W-IV
2	Phularitand OCP	V/VI/VII(Comb)	Steam	W-III
			ROM	W-IV
		VIII(A)	Steam	W-II
			ROM	W-IV
3.	Pure Benedih Incline	III	ROM	G-10

Seam-wise geological Grade of coal for different seams in these collieries have been given in Chapter-IV.

5.17.2 Proposed Production from amalgamated Muraidih-Phularitand(part)Colliery-

5.17.2.1 Longwall Production-

As per Seam parameter of Seam-III and Longwall equipment specification, production from Lonwall Panel can be achieved upto 10000 tpd/Panel. Bidder in their extraction schedule plan considered 9000 tpd. Considering the existing surface constraint i.e huge over burden dump on the floor of Seam-V/VI/VII seam, less parting with seam-III and also to achieve minimum target production of 2.0Mty, average LW Panel production for Seam-III & Seam-I is considered uniformly as 6500 tpd. Details of production calculation from LW is given below-

	CALCULATION FOR LONGWALL PANEL PRODUCTION						
	DATA CONSIDERED AS PER FINAL DPR SUBMITTED BY CONTRACTOR						
Sl. No.	**Activity**	**Unit**	**Length**		**Length**		
1	**Longwall Face Width**	**m**		**200**		**190**	
2	**Average Feeting Speed**	**(m/min)**		**10**		**10**	
3	**Average Cutting Speed**	**(m/min)**		**6**		**6**	
4	**Face End cutting Length**	**Min**	**35**	**6.0**	**35**	**6.0**	
5	**AFC Fleeting time**	**Min**		**10**		**10**	
6	**Cutting time for Remaining Face Length**	**Min**	**165**	**28**	**155**	**26**	
7	**Fleeting of AFC**	**Min**	**35**	**3.5**	**35**	**3.5**	
8	**Total time for bi-directional Cutting i.e for two Shears**			**95**		**91**	
9	**Cycle Time for two Cuts or Shears**		**Say**	**100**		**90**	
10	**Cycle time per for One cut or Shear**			**50**		**45**	
11	Available Shift in Min/Shift	**(6 Hrs/Shift)**		360		360	Min/Shift
12	Production Shift/Day			3		3	per Day
13	Available Min/Day	(3*6*60)		1080		1080	Min/day
14	No. of Cut/Day	(1080/50)		22		24	Cuts/Day
15	System Efficiency	As considered by Contractor)		**0.45**		**0.5**	%
16	**Actual No. of Cuts per Day**	**(Cut*0.45)**		**10**		**12**	**Cuts/Day**
17	Efficiency of Web	0.865*90%		0.779		0.779	m

18	**Retreat per Day**	**(No. of cut * Effct. Web)**		**7.79**		7.79	**m/Day**
19	**Face Length including Gate Road(TG & MG)(Center to Center)**			**205.2**		**195.2**	**m**
20	Width of each Gate Road			205.2		5.2	m
21	Av. Height of Extraction (In this Mining Plan, Av Operating Ht is considering all Panels as per reserve table) In DPR, Bidder has considered 4.4m for Seam-III and Seam-I as 2.4m			**4.10**		**2.47**	m
22	Av. Specific Gravity (Av. in Panels stated above)			**1.57**		**1.49**	Kg/Cum
23	**Face Length (Coal to Coal)**			**200**		**190**	**m**
24	**Production/Day**			**10029**		**6537**	**tonne/Day**

Panel-wise Longwall Production

	Panel No.	Seam-III	Panel No.	Seam-I	
	301	**10239**	**101**	**6954**	
	302	**9684**	**102**	**6421**	
	303	**9722**	**103**	**6447**	
	304	**9998**	**104**	**6447**	
	305	**10569**	**105**	**5621**	
	306	**9853**	**106**	**6447**	
			107	**6740**	
			108	**7380**	
Average		**10011**		**6557**	

In this mining plan, for Mine Scheduling and year-wise production, average Production form each Longwall panel in Seam-III & Seam-I is considered as **6500 TPD** for maintaining uniform target production of 2.0Mty as per the minimum requirement of NIT. However this production may vary depend on efficiency of longwall operation to be carried by successful bidder/ Contractor.

5.17.2.2 Continuous Miner Panel Production-

Continuous Miner along with its ancillary equipment will be deployed in one panel and where seam thickness is more than 2.2m to maximum 4.5m. Initially it will be deployed in a panel of Seam-III. After extraction of all proposed CM panels of this seam, it will be shifted to underlying Seam-I. In general, CM develops up to the end of the panel and retreats by splitting & slicing of standing on pillars formed during development. As on date, no Continuous Miner is manufactured in India and hence this CM package equipment are foreign equipment. Hence, deployment of CM will be on risk-gain sharing basis only for panel operation upto gate belt conveyor. In this mining plan, a guaranteed production of 1500 TPD (0.45 Mty) will be obtained from one CM Panel by the successful bidder which is likely to be achievable in geological condition of this colliery. The overlying V/VI/VII has to be excavated first by opencast method before commencement of depillaring operation in a Continuous Miner panel.

5.17.2.3 SDL Panel Production Parameter -

The production parameters of Standard /Low Height SDL panel are shown below-

Particulars		Std. Ht	Low Ht
No. of headings		5	5
No. of dev. Faces (max.)		9	9
Gallery Width(m)		4.8m	4.8m
Gallery Extraction Height (average) considering Seam-III & Seam-I		2.5 m	1.75m
Pull/Round		0.9m	0.9m
Av. Sp. Gravity (Considering Seam-III, I/II Comb. & Seam-I)		1.55 t/m^3	1.6
Coal/Blast/Face		16.74 te	12.10
No. of Blasts/ shift		2	3
No. of Shifts /Day		3	3
No. of faces available for blasting /Shift considering 80% availability		7	7
Coal availability/shift(Te)		100.44 te	108.9 te
Target(Te)/SDL/Day		100 Te	100 Te
Total No. of Panels to be operated		1	1
No. of SDL/Panel		3	2
Target /panel/ day		300 Te	200 Te
Annual Target (Mty) (5 SDLs)		**0.15 Mty**	

Since seam thickness of Seam-III and Seam-I/II combined is good in areas where panels area proposed to be developed with deployment of SDL, hence, production from standard height and low heght SDLhas been kept as 100 tpd per SDL

5.17.2.3 Proposed Number of Panels and their Production from the mine-

Muraidih Global Bid Project-

Longwall Production-	1 no.	6500 tpd
Gate Road Dev./B&P Dev.	1 no.	1000 tpd

Phularitand(Part) Colliery-

Continuous Miner Panel 1 no.		1500 tpd
SDL Panel	2 nos.	500 tpd

The annual working days considered by Contractor are 305 days for Lonwgwall and Gate road development whereas for Continuous Miner and SDL panel operation is considered as 300 working days.

5.18 Production Schedule-

5.18.1 Longwall Global Bid Project-

BCCL has floated a tender for extraction of virgin seams e.g Seam-III,II & Seam-I in descending order from the area of combined property of the then Muraidih Colliery and Shatabdih Colliery. At that time, Muraidih Collier and Shatabdih Colliery were two separate Colliery. The Shatabdih Colliery was lying adjacent to Muraidih Colliery on southern side of Muraidih Colliery. The Muraidih Colliery has almost extracted coal by opencast method with floor of V/VI/VII combined seam as base of opencast whereas Shatabdih Colliery was partly extracted and working on south-western part of the Colliery. As per the NIT, the scope of work is to produce a minimum guaranteed production of 2.0 Mt coal per annum for nine years by mechanized longwall method from Seam-III, Seam-II and Seam-I from the combined area of above mentioned Muraidih and Shatabdih Colliery. The M/s Minop/BECC Consortium has emerged as successful bidder/Contractor for the above work and proposed to work one longwall panel initially in Seam-III and then in Seam-I after some modification in longwall equipment. Otherwise, the shearer to be replaced by new shearer. The Seam-II is a thin seam having seam thickness less than 1.0m in entire area and it has not been considered by the Contractor for extraction. BCCL has awarded the work on turnkey basis to extract coal from virgin Seam-III and Seam-I by longwall method of mining within the. As per the approved DPR, Contractor has identified six panels in Seam-III and eight panels from Seam-I. Moreover, Contractor has proposed to develop trunk headings, four B&P development including sumps and the area where extraction cannot be made by longwall method in both seams. Out of eight longwall panels of Seam-I, two panels (i.e 107 & 108) were proposed to be laid below and northern side of Khodo Nala where depth of cover is 40-50m or so. In this area, Seam-III was partly worked by underground mining method left as water logged unused workings and unapproachable. Small quarry was also made with Seam-III as base in this area. Hence, Longwall panel has not been proposed in Seam-III by the Contractor in this area. Considering the existence of Khodo Nala, underground waterlogged workings and quarry, Contractor has proposed in DPR for diversion of Khodo nala on northern side of the property and also proposes to extract the waterlogged underground workings by small opencast with floor of Seam-III as base. After quarrying, the area will be back filled and Khodo nala will be re-instend into its normal course. The diversion of nala and opencast working will be carried out by BCCL and work has to be completed

before extraction of Longwall panels identified by Contractor in this area. For reserve estimation, all longwall panels and B&P development workings has been considered but to meet the NIT requirement and guaranteed production, Contractor has considered for extraction of all six panels (301 to 306) from seam-III and six panels (101 to106) from Seam-I including B&P development workings. The contractor has proposed for extraction of panels (106 to 108) of seam-I lying below or northern side of Khodo nala on later stage i.e beyond the contract period of 14 years keeping in view that diversion of Khodo nala and opencast working to be done in this area by BCCL will take long time.

Production schedule during the contract period as per Final DPR-

As per the Final DPR, the contract tenure is 14 years, out of which 5 years is earmarked as development period and 9 years will be for production excluding the time for face installation & transfer and overhauling of equipment. There will be 6 panels in Seam III and equipment are to be shifted from one face to another for 5 times. Thereafter the equipment will be shifted to Seam I for extraction of the coal from Seam I. As such major overhauling is planned after the completion of extraction of all panels in Seam III. However to avoid any major breakdown during operation of the panel, repair of moving equipment will be undertaken at the time of face transfer. Since the thickness of the coal Seam in Seam I is lesser than that of Seam III, the same powered support and the shearer cannot be used unless these are modified. Modification & overhauling of the Seam-III equipment after the exhaustion of longwall panel in Seam III and the equipment will be made suitable for using in Seam-I. Contractor proposes that the main modification of the supports will be support leg and lemniscates linkages. As the height of the coal Seam in Seam-I will be low, the shearer of Seam III may not likely match the requirement. Since the shearer will have much useful service life left, shearer manufacturer may examine the possibility of modification to make the shearer of Seam III compatible for Seam I. Otherwise the shearer to be replaced by new shearer

Although the period for the face transfer have been considered about 40 days and about 180 days for the overhauling & modification of the equipment before shifting from Seam III to Seam I. Provision has been kept for shield hauler for the faster transportation of face equipment. The time for installation of 90 days duration has not been considered for the calculation of total durations as this would be done as parallel activity during the operation of Bolter Miner. The face

transfer from Seam III to Seam I has been included in the time period of modification, over hauling and face transfer which has been considered as 180 days. Total time for the face installation, face transfer & overhauling = 10 x 40 + 180 = 580 days , say 2 years.

Considering above, the duration of the contract period during production, will be 1 year(Panel development) + 8 years(Longwall) + 2 years(Face Transfer and over hauling) = 11 years. In order to keep the total contract period as 14 years i.e. 5 years development period and 9 years production period, it is planned to reduce the development period by 2.5 years. The coal production will start from 3rd year. As such the development period 2.5 years and production period 11 years, totaling 13.5 years.

The year wise deployment of bolter miner for the development of longwall panels as well as development of bord and pillar districts and the extraction of the panels by mechanised powered roof support technology as per the guaranteed productions as considered in FDPR scheduled bellow-

Proposed year wise production schedule in DPR-

Year wise Production Schedule(in million tonnes)

Year	1st APP	2nd APP	3rd APP	4th APP	5th APP	6th APP	7th APP	8th APP	9th APP	10th APP	11th APP	12th APP	13th APP
Bolter Miner & other mechanisim													
	0.539	0.269	0.296	0.274	0.213	0.323	0.275	0.215	0.245	0.256	0.095		
(SUMP)													
Longwall	NILL	2.406	2.496	2.493	2.125	2.497	0.908	1.526	1.527	1.294	1.292	1.523	0.529
Total	0.539	2.675	2.792	2.767	2.338	2.82	1.183	1.741	1.772	1.55	1.387	1.523	0.529

Total Production considered in Global Bid project is 18.627 Mt on 9th APP

After awarding of work by BCCL, M/s Minop/BECC Consortium was facing constraint to implement the project development work as per the schedule as stated in their supplementary note on DPR mainly due to land required for opening of incline, Air shaft and other Civil infra-structure development required for this project which are not located on BCCL land. BCCL was facing constraint to hand over encumbrance free land to the Contractor. Later-on, Contractor has submitted a supplementary note on approved DPR by revising the location of Auxiliary Incline position, Return Air shaft and construction of different infra-structure at different locations on BCCL land to ease the land acquisition constraint. According to the Contractor, revised layout plans were also submitted

showing changed locations of Inclines and Infrastructures. But only revised layout plan of Seam-III is available with Area authority. As per the supplementary note, there is no change in the panels layout in both seams except slight changes made in trunk heading drivage in both seams due to change in location of Return air shaft from earlier position in DPR. After obtaining of approval of supplementary note by BCCL management with the condition that there will be no changes in mining schedule and financial provisions as per the agreement, inclines/drift drivages were made by the Contractor and touched the coal of Seam-III. The Return Air Shaft has also been sunk partly at new location along with construction of few infra-strctures/buildings near the Incline mouth. The work was suspended by the Contractor from 01.06.2016 due to financial payment dispute between M/s Minop/BECC Consortium and BCCL. Though BCCL management imposed ban for any type of operation in BCCL for three years onto the M/s Minop in related to other case but later-on in 2018, the Honorable High Court has quashed the banning imposed by BCCL management onto M/s Minop. Till date the work has not yet been commenced by the Contractor at Muraidih Project.

Considering the reasons as stated in earlier paragraphs, the mine schedule and production schedule as proposed by the Contractor in final DPR could not be followed and at present, the total scenario of mine scheduling has changed from the agreed condition.

OPENCAST

Existing Production-

Opencast (Departmental) Production -

Last five years production from opencast of Muraidih Colliery with V/VI/VII Seam as base is as follows-

Opencast	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 (upto 31st March,19)
Hired/Outsourced	400164	463700	35344	Nil	Nil	Nil
Grade	W-IV,III	W-IV,III	W-IV,III			
Departmental OC	1534501	1547323	1785062	1552085	1587318	1362444
Grade (As per Colliery)	W-II,III	W-IV,III	W-IV,III	W-IV,III	W-II,III, IV & G9	W-II,III, IV & G9

The above data are submitted by Mine authority.

Production Schedule-

The normative target production of the mine will be 7.30 MTY. However the peak production capacity of 9.49 MTY which may be achieved occasionally by better utilization of resources & favorable geo mining condition.

The calendar programme of mining operation has been formulated based on the adopted sequence of mine development and optimum condition of mining operation for the entire life of opencast project.
The year wise production from the Amalgamated Muraidih Phularitand(Part) Colliery of V/VI/VII seam is given below:

V/VI/VII SEAM		
YEAR	**COAL PRODUCTION(M.Te)**	**O.B Production (M.Cum)**
1	4.63	8.3
2	6	10.7
3	7.18	12.62
4	7	11.9
5	6.8	11.1
6	6.8	11.1
7	6.8	11.1
8	4.8	8.2
9	3	5.4
10	1.5	2.7
Total	**54.51**	**93.12**

The year wise production from the Amalgamated Muraidih Phularitand(Part) Colliery of III seam quarry is given below:-

III SEAM		
YEAR	**COAL PRODUCTION (M.Te)**	**O.B Production (M.Cum)**
1	0.12	0.48
2	0.3	1.20
3	0.5	2.00
4	0.5	2.00
5	0.5	2.00
6	0.2	0.80
Total	**2.12**	**8.48**

The year wise total production from the Amalgamated Muraidih-Phularitand(Part) Colliery of seam is given below:-

Sr. No.	YEAR	COAL PRODUCTION	O.B Production
1	2019-20	4.63	8.3
2	2020-21	6.0	10.7
3	2021-22	7.3	13.1
4	2022-23	7.3	13.1
5	2023-24	7.3	13.1
6	2024-25	7.3	13.1
7	2025-26	7.3	13.1
8	2026-27	5.0	9.0
9	2027-28	3	5.4
10	2028-29	1.5	2.7
	Total	**56.63**	**101.6**

5.18.1 Mine operation Schedule proposed in this Mining Plan-

A) Longwall Project of amalgamated Muraidih Colliery-

Since, this is an approved on-going project of BCCL and after lifting of ban by the High Court, M/s Minop/BECC Consortium has to commence the work in this part of the project area as early aspossible. Hence, in this Mining plan of amalgamated Muraidih-Phularitand(part) Colliery, a tentative mine schedule plan is proposed keeping in view that the dispute will be settled within a year. During Scheduling, development of trunk headings as well as other development strategies, like fault crossing, Sump preparation, gate road development, sequence of panel extraction, etc in both seams are kept in mind as proposed in final DPR/Supplementary Note. As the per the proposed mine schedule plan, total reserves of both seams will be exhausted within 20 years from the property designated for longwall within existing amalgamated Muraidih Colliery.

B) Scheduling of Continuous Miner and SDL panels proposed in Phularitand Colliery and annexed part of amalgamated Muraidih Colliery-

In this area, development of in Seam-III with SDL maindip is in progress. This seam is touched by driving two numbers of drifts from floor of V/VI/VII seam of an old quarry. Two drifts will be made from the floor of Seam-III to approach Seam-I. To maintain adequate ventilation in the workings, a return air shaft is proposed. To enhance the underground production from this area, one Continuous Miner panels and two SDL panels are proposed. Initially, Seam-III will be exploited and the Seam-I. For development of underground strata bunker in parting between Seam-III & Seam-I, one SDL panel will be deployed for development of level galleries near proposed strata bunker and sump preparation in Seam-I. Then, all SDL panels along with Continuous Miner panel will be worked in Seam-III. The operation of Continuous Miner panel may be done by outsourced method on risk-gain sharing basis or departmental depends on techno-economic viability. At present this part of the project area is being operated departmentally. As per panel extraction schedule, the total reserves of Seam-III and Seam-I will be exploited within 21 years.

Hence, within the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery, extraction of Longwall panel will be made on eastern part along-with extraction of Continuous Miner and SDL Panel on western part. Both working units will have separated mine entries maintaining a 60m solid coal barrier between the workings.

Considering the sequence of extraction of panels in Seam-III and Seam-I in both working units as stated above, a tentative production schedule has been prepared for the project which is given below tabular form-

Mine production schedule Table

TENTATIVE YEARWISE PRODUCTION SCHEDULE (Underground+Opencast) FOR AMALGAMATED MURAIDIH-PHULARITAND(Part) COLLIERY

Year----->		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total	Unit
	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40		
Underground Coal Production-	Existing (Upto March 2019)																							
Phularitand UG (Continuous Miner+SDL)	0.0385	0.090	0.128	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.544	0.540	0.540	0.540	0.456	0.162	10.800	Mt
Muraidih Global bid UG Project(Longwall)		0	0	0.267	0.285	0.287	2.211	2.004	2.019	2.224	2.053	1.989	1.721	0.359	1.932	1.966	1.745	1.96	1.805	0.724	0.243	0	25.794	Mt
Total UG Coal Production from Project a	0.0385	**0.090**	**0.128**	**0.867**	**0.885**	**0.887**	**2.811**	**2.604**	**2.619**	**2.824**	**2.653**	**2.589**	**2.321**	**0.959**	**2.532**	**2.566**	**2.289**	**2.500**	**2.345**	**1.264**	**0.699**	**0.162**	**36.594**	**Mt**
B) Opencast Production-																								
**Year-----> **		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total	
	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40		
Phularitand OC (Hired) (Existing)	2.400																							
Muraidih OC (Departmental) (Existing)	1.362																							
Amalgamated Muraidih-Phularitand(Part) OC (Proposed)-																								
Opencast Coal Production (Proposed)-																								
A) Muridih Seam-III OC (on north-eastern part)	Nil			0.12	0.30	0.50	0.50	0.50	0.20														**2.12**	Mt
B) Muraidih-Phularitand OC (Seam V/VI/VII base merged OCP)		4.63	6.00	7.18	7.00	6.80	6.80	6.80	4.80	3.00	1.50												**54.51**	Mt
Total OC Coal Production from Project area (Seam-III OC & V/VI/VIISeam-OC)	**3.762**	**4.63**	**6.00**	**7.30**	**7.30**	**7.30**	**7.30**	**7.30**	**5.00**	**3.00**	**1.50**												**56.63**	**Mt**
Total UG and OC Coal Production from Project area of Amalgamated Muraidih-Phularitand(part)	3.800	**4.72**	**6.13**	**8.17**	**8.19**	**8.19**	**10.11**	**9.90**	**7.62**	**5.82**	**4.15**	**2.59**	**2.32**	**0.96**	**2.53**	**2.57**	**2.289**	**2.500**	**2.345**	**1.264**	**0.699**	**0.162**	**93.224**	**Mt**
Over Burden (M.Cum) (Proposed)-																								
A) Muridih Seam-III OC (on north-eastern part)				0.48	1.20	2.00	2.00	2.00	0.80														**8.48**	**M.Cum**
B) Muraidih-Phularitand OC (Seam V/VI/VII base merged OCP)		8.3	10.7	12.62	11.9	11.1	11.1	11.1	8.2	5.4	2.7												**93.12**	**M.Cum**
Total Over Burden (M. Cum)		**8.30**	**10.70**	**13.10**	**13.10**	**13.10**	**13.10**	**13.10**	**9.00**	**5.40**	**2.70**												**101.60**	**M.Cum**
Overall Av.Stripping Ratio (Cum/Te)		**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**													**Cum/Te**

From the above coal production table, the amalgamated Muraidih-Phularitand(part) Colliery is expected to achieve its underground target production of 2.60 Mty considering production from longwall panel and CM/SDL panels in 6th year i.e from 2024-25. Out of which, it is proposed for 2.0 Mty from one longwall panel operation and 0.6 Mty from one Continuous Miner and two SDL panels operatation provided that M/s Minop Consortium commences it work within a year (i.e 2019-20) otherwise production schedule will defer from the above. As per the above production schedule table, the tentative year of achieving of underground target production is 2024-25 provided permission from DGMS is obtained for amalgamation of existing amalgamated Muraidih Colliery and existing Phularitand (part) Colliery along with land acquisition, Rehabilitation work, forest land clearance and other related development activities are made in time. In this mining plan, a minimum guaranteed production of 2.0 Mty as per the condition of NIT is considered but production from longwall panel can be more with gaining of better experience of operation after operating of one to two panels because huge OB dumps area made on the floor of V/VI/VII seam and there also exist active fire.

The target Production from Amalgamated Muraidih-Phularitand opencast is proposed to be achieved in 2021-22 provided the surface constraint are removed and rehabilitation is made timely.

If the geo-mining and environmental conditions remain favorable, the mine can achieve 30% more production than the underground target production as considered above by increasing rate of production from longwall panels or by increasing production from Continuous Miner panel. Similarly, 30% more production from the proposed opencast target production can be achieved if geo-mining condition is in favour for mining operation in the area and surface constraint is removed

5.19 Life of the Mine –

The Muraidih-Phularitand(part) Colliery is proposed to be a mixed mine. Opencast workings is upto floor of V/VI/VII Combined seam and underground workings is proposed to be Seam-III & Seam-I/II combined along with Seam-I. Seam-III is already under development in Seam-III in Phularitand colliery. From the production schedule table as shown in earlier page, the life of the Muraidih-Phularitand(part) Colliery is estimated as 21years. The Longwall operation will be

continued upto 20 years keeping in view that M/s Minop/BECC Consortium commences their work at Muraidih Longwall project from 2019-20 whereas Continuous Miner/SDL operation is proposed to be worked within the project area upto 21 years. On the other hand, open cast operation will continue upto 10 years from 2019-20 within the project area provided land is acquired in time which is a major constraint for this Project. If acquisition of land for opencast mining is delayed, life of OC will be changed.

5.20 Coal, Men & Material transportation –

5.20.1 Existing Underground Transport system-

Longwall Project

In Muraidih Longwall Project, two inclines/ drift drivages have been made on the north-eastern corner of the Project area designated for longwall project and inclines are already touched the Coal of Seam-III but due to suspension of work by the Contractor, presently there is no mining activities in the area and inclines are remains as water logged upto the mouth.

Main Incline (Incline no.1)-

It is located on extreme north-eastern side of the longwall property. The width of both inclines is 5.0m and height is 3.5m. The total inclined length from surface to coal touch point of Seam-III is 52.7m As per the FDPR/Supplementary note, Main Incline will be earmarked for coal transportation as well as intake airways, and travelling roadways. The incline roadways will be comprehensively supported by resin bolting. The footstep, handrail and provision for water drainage will also be set up along main incline no 1.

The trunk belt conveyor having belt width of 1200mm and capacity of 1000 t/h will be equipped in main incline. Run of mine (ROM) coal will be transported from underground face to raw coal surge bunkers through main incline by trunk conveyor. From the surface overhead surge bunkers, it will be loaded onto trucks and will be transported to the railway siding.

Auxiliary Incline (Incline no 2)-

Auxiliary incline is located on the west side of main Incline no 1. The width and height of the auxiliary incline is 5.0m and 3.5m respectively. The total inclined length from surface to coal touch point of Seam-III is 48.2m.

It will be earmarked for material transport and intake airways as well as for emergency exit. Roof will be comprehensively supported by resin bolting as per

the requirement of the strata condition. The 900mm track gauge having rails of 30kg/m section, will be laid in this incline and a single drum direct haulage will be installed on surface for the transportation of materials. In addition, handrail, water drain & manhole as per the provision of CMR will be provided in auxiliary incline. At present there is no equipment installed in any of the Inclines

Existing transport system in Phularitand Colliery-

At present, only SDLs are being used for development of Seam-III and engaged in maindip drivage of this seam. Two inclines/drifts exist i.e Incline No.1 and Incline No.2. Incline no.1 is being used as main return airways and exhaust Fan is installed in its mouth. Incline No.2 is being used for coal / material transportation and a direct haulage (75 kW) is installed at surface for this purpose. In underground, another direct haulage (75 kW) is installed in rise most side of the maindip of Seam-III. A Tugger haulage (37 kw) is also being used in further dip side for the same purpose. Mine is producing about 250-300 tpd by using 3 SDLs. Existing transport layout has been shown in Plate No.XXI

Existing Transport Equipment in Phularitand Colliery-

Transport Equip.	Capacity	Location	Purpose
Direct Haulage	75 kW	At Surface near Incline mouth of Incline No.2	Coal/material transport
Direct Haulage	75 kW	On rise side of maindip of Seam-III	Coal/material transport
Tugger Haulage	22.5 kW	In 6 Dip,9 Level of maindip	Coal/material transport

5.20.2 Proposed Underground Transport system-

Proposed in Longwall Project

The total underground coal evacuation system in Muraidih project will be through a series of belt conveyors using different type & capacity of belt conveyor earmarked for the purposes, which includes trunk belt and gate belt conveyors with steel cord/PVC belting.

Trunk Belt-

Coal transportation

Coal coming from face will be fed onto the gate belt conveyor which in turn discharges into the Strata bunker which will be made between seam III & seam I. Strata bunker will then discharge load on to the main trunk conveyor no I. The opening of the Strata Bunker will be controlled by pneumatically/ hydraulically operated closure mechanism. Main trunk conveyor will ultimately discharge on the surface coal handling plant.

As regard the coal transportation from the Southern part of the mine property of seam III, the coal conveyance system will be little different. Coal coming from the face will be fed onto the gate belt conveyor which in turn discharges onto trunk conveyor no .2. This belt will feed the strata bunker having capacity of about 500 t which is placed in between seam III & seam I. Strata bunker will discharge load on to the main trunk conveyor no I. Main trunk conveyor I will ultimately discharge on the surface coal handling plant.

For the coal transportation from the north part of the mine property of seam III, Coal coming from face will be fed onto the gate belt conveyor which in turn discharges into trunk conveyor no 2. TB 2 will feed the strata bunker sunk between seam III & seam I. Strata bunker will then load on to the main trunk conveyor no I. Main trunk conveyor will ultimately discharge on the surface coal handling plant. Due to change in trunk drivage strategy in both seams due to shifting of Auxiliary Inclines and return air shaft as proposed in Supplementary note, there may be little bit deviation as proposed in DPR.

Hence, it is to be decided by bidder how to maintain transport system in both seams.

As per the final DPR, there will be following three categories of belt conveyors-

- Trunk conveyor
- Gate conveyor for the powered support longwall face
- Gate conveyors for development of gate roads for the longwall panels and bord & pillar development

a) Trunk conveyor-

There will be two trunk conveyors in tandem. Each of 1200mm wide having different capacity of 1000 tph & 1200 tph and will be operated at 3300 volt. Since the trunk conveyors will be installed in the main intake and Seams being of degree I gassiness, the electrical will be of Non FLP.

Trunk conveyor 1 -Main trunk conveyor for this longwall package will have two drive each of 400KW at 3300 volts without auto tensioning device.

Trunk conveyor 2 -Trunk conveyor will be laid along coal seam and will feed coal to trunk conveyor no1. Initially it will be laid in the seam no III and after the completion of seam III, it will be shifted to seam I. It will have two drives each of 250 KW at 3300 volts without auto tensioning device. The width of the conveyor will be 1200mm having capacity of 1200 tph. Since it will be laid in the main intake in degree I mine, we have selected Non FLP electrical of 3300 volts. Here also we have proposed steel cord belting.

Both belts will be controlled by pull cord signaling system which will be laid all along the belt conveyor. In addition to pull cord system there will be communication system as well.

b) Gate belt conveyor for the powered support longwall face

Bridge stage loader (BSL) will deliver the coal on to the 1200 mm wide gate belt conveyor. The length of the longwall panel will be approx. 2400 ms. Since the coal conveyance will be downhill, it will be possible to manage by single belt conveyor. As such it has been planned for one gate belt conveyor having capacity of 1200 TPH, width 1200 mm and the power rating will be 2 x 250KW. The belt conveyor tail end will be self-advancing type to enable faster shifting of the belt tail end and will continuously back with progress of the longwall face. It is provided with auto loop take up with storage of 100 m of belting and the belt conveyor is thus gradually shortened. For the soft start, The Contractor has selected hydraulic fluid coupling. The type of belting will be PVC which is duly approved by DGMS The drive will be FLP and it will be controlled by pull cord signaling system which will be laid all along the belt conveyor. In addition to pull cord system there will be communication system as well.

c) Gate belt conveyor for the drivage of gate roads

In order to ensure faster drivages of pair of gate roads for the longwall panels by Bolter miner, two numbers of gate belt conveyors have been proposed which will be laid in each gate roads of the longwall panel. Bolter miner will load coal on to the gate belt conveyor through a feeder conveyor or continuous haulage system. For the gate road drivage of longwall panel as well as for development of Bord & Pillar, BHEC/ Minop have proposed the use of Bolter miner. For the coal evacuation from the bolter miner districts it is proposed to use belt conveyor of 900mm width having capacity of 575 TPH at a speed of 2.5 m/sec with 2 X 90 KW motor. The length of the gate road drivages will be around 2400 m. As regard the drivages of the longwall panel, it is proposed two gate conveyors, each of 2400 m long will be installed in each gate road and will work for the drivages of the each long headings by bolter miner. It is provided with auto loop take up with storage of 100 m of belting and the belt conveyor is extended when the tail end is pulled by the feeder conveyor. For the soft start, hydraulic fluid coupling have been selected. The type of belting will be PVC which is duly approved by DGMS.

d) Gate belt conveyor for the development of Bord & Pillar district

It has been stated earlier that the area which cannot be taken by PSLW technology, for maximization of coal recovery & conservation of coal, BHEC/Minop has proposed one more gate conveyor for development of B&P districts. After the completion of formation of LW panels, Bolter miner will be gainfully utilized for the development of the B&P districts to extracts coal which cannot be extracted by LW Method. The gate belt conveyor will be 900mm wide and the capacity is 575 tph. The length of the conveyor will be 500 m. It is provided with auto loop take up with storage of 50 m of belting and the belt conveyor is extended when the tail end is pulled. 1×90 KW drive motor is selected. For the soft start BHEC/Minop has selected hydraulic fluid coupling. The type of belting will be PVC which is duly approved by DGMS.

Muraidih Longwall Project Belt Conveyors Specification as proposed in DPR-

Sl. No.	Name	Capacity	Speed	Length	Width	Strength	Power	Lift	Killo	Loop Take-up
		t/h	m/sec	m	mm	N/mm	KW	m	Volt	(m)
1	TB1	1000	2.6	1000	1200	2500	2X400	140	3300	----
2	TB2	1200	3	1200	1200	2500	2X250	60	3300	----
3	LWGB	1200	3	2400	1200	1000	2X250		3300	100
4	B/M GB	575	2.5	1200	900	875	2X90	(-)40	1100	100
5	B/M GB	575	2.5	1200	900	875	2X90	(-)40	1100	100
6	B&P Gate belt	575	2.5	500	900	875	1X90	(-)15	1100	100

Transportation of equipment at face & utility service vehicle-

As for the longwall face installation & transfer, BHEC/Minop has proposed SANDVIK/ other internationally reputed make shield hauler with a carrying capacity of 40 Tonne. This shield hauler will be used for transportation of the power support as well as longwall equipment for the installation of longwall faces. There will be 2 shield haulers. One will be used for salvaging of the equipment and the other will be used for face installation at the time of face transfer.

Material Transportation system-

The material transport will be done through Incline No.2. There will be a direct haulage of 150 KW capacity at 3.3 Kv which will take care of material transportation from surface to Seam No.III and Seam No.I. The main direct haulage will have two speeds. For the transportation of powered support which will be weighing about 40 tonne, it will work at slow speed about 0.75m/sec. Otherwise for the normal transportation of material, it will operate at normal high speed around 1.5m/sec. There will be two more underground direct haulage of

similar capacity. One will be installed at seam No.III and other will be installed at Seam No.I.

For the transportation of the material to the districts, BHEC/Minop has provided endless haulage of 75 KW in both the gate roads of the operating longwall faces and for the gate roads being developed by bolter miner. As such there will be 4 nos of 75 KW endless haulage for the transportation of materials in the district at underground.

Man Riding System

MINOP/BHEC has proposed high capacity powered support weighing about 30-35 te. So transportation of the material will be one of the critical areas for faster installation as well as face transfer from one panel to another panel. As such the capacity of transport system is so designed, which will take care of the transportation of heavy material safely and efficiently.

The physical parameter of the mine is not very extensive. It will be about 1.5 km along main dip and 2.5 along strike. In a very high capital intensive technology, it is the objective of the management to ensure the higher availability and utilization of the equipment. The common philosophy of the management is to pay for work not for walk. As such MINOP has proposed 4 overlapping shift each of 6 hours duration at the face so that the equipment is handed over as hot-seat condition. In spite of all those actions, Minop/ BHEC have proposed to go for the man rider to minimize the physical fatigue of the work man for traveling along the main incline. The main material transport haulage which will be installed in the auxiliary incline. It will have one 150 KW haulage with dual speed. For the normal transportation, it will go at a higher speed and for the transportation of heavy load and man ridding, it will move at a slower speed. The system will be approved by DGMS. The man riding facility will be given particularly for the face crews.

Proposed underground Transport system for Continuous Miner/SDL panel in Phularitand Colliery-

In this mining plan, it has been proposed to sink an air shaft near the existing Inclines which will be used for main return airway for the mine. Then, existing two inclines will be used for intakes as well as coal/material transport. Incline no.1 will be equipped with Belt conveyor for coal transport along with travelling purpose and Incline no.2 will be used only for material transport. As stated earlier that existing drifts are made upto Seam-III, additional two drifts (D1 & D2) will be made from floor of Seam-III to approach seam-I keeping same alignment with the existing drifts. To increase underground bunkerage capacity, a strata bunker in

stone is proposed in between Seam-III and Seam-I. The location of strata bunker will be in parting having superimposed level galleries. Another drift (D3) is proposed from the floor of rise side level gallery of Seam-I to the top of the bunker located in dip side level gallery of Seam-III.

The rise side drift (D1) will be equipped with belt conveyor which will collect coal from the bottom of the strata bunker in stone and it will discharge onto the tail end of belt conveyor of Incline no.1. Thus, coal from underground strata bunker will be transported to surface bunker through belts conveyors.

To increase underground production from Inclines of Phularitand Colliery, it has been proposed to operate two SDL panels and one Continuous Miner Panel in the amalgamated area of Phularitand Colliery and part of Muraidih Colliery (i.e rest of the area where Longwall panel has not been proposed by the Contractor) falling in Cluster-II. Initially, panels of Seam-III will be extracted and then shifted to Seam-I. Keeping in view, the floor contour of both seams and their seam thicknesses, maindips in both seams are made in western side of the workable area and CM panels are proposed to lay towards eastern side having slightly rising to make it self-draining type. SDL panels are located on northern side of the property.

5.20.2.1 Proposed Coal Transport system-

Three panels are proposed to be worked at a time, first panel by three nos. of SDLs, second panel by two nos. of SDLs and third panel by a Continuous Miner. Transportation of coal from face to surface will be carried by a series of belt conveyors. The system of transport is proposed as under**.**

A) Panel Transport-

Continuous Miner Panel-

Within the five headings Continuous Miner Panel, shuttle cars will receive coal from the Continuous Miner and transport/transfer the same onto the feeder breaker. The feeder breaker will crush the coal in required size and discharge it on to gate belt conveyor GBC-1 proposed to lay along the central gallery of the panel. In CM panel one gate belt conveyor (GBC-1) of 1000 mm width has been proposed. The gate belt conveyor (1000mm wide) will transfer coal on to the trunk belt conveyor to be laid along the maindip and mainrise depending on location of panel operation.

SDL Panel-

Within the five headings SDL Panel, SDLs will load blasted coal from the face and transport/transfer the same onto the pony conveyors. In each SDL panel three numbers pony conveyors have been proposed. SDL will discharge coal on pony belt conveyor. Pony belt conveyor (800 mm wide) will carry coal from the face and discharge to the gate belt conveyor (GBC-3) of 800 mm belt width proposed to lay along the central gallery of the five headings SDL panel. Since, there will be two panels in operation at a time, hence another gate belt conveyor (GBC-5) of 800mm width is proposed. The respective Gate belt conveyor of each panel will discharge coal onto the trunk conveyor installed in the maindip/mainrise trunk belts proposed to lay along the maindip and mainrise depending on location of operation of panels.

B) Trunk Transport-

III Seam-

Dip side transport system in Maindip-

In III Seam, the trunk belt conveyors will be laid along the maindip as well as mainrise. These conveyors will receive coal from the district Gate Belt Conveyors. The trunk belt conveyors of maindip/mainrise will transport/transfer coal on the level belt conveyor laid along the level through transfer point. This level belt conveyor will transport/transfer coal in the strata bunker made in the floor of Seam-III

Rise side transport system in Main dip-

The area/panels on the dip side of the fault (F4–F4) in III Seam will be approached by driving three number of drifts (D4,D5 & D6) which are in reverse direction of maindip from up-throw side of III seam to down throw side of Seam-III. The throw of the fault F4F4 is 5m or so. Hence it is proposed to approach from seam to seam. Out of these three reverse drifts, one drift (D4) will be used for coal transport through belt conveyor, drift (D5) for material transport and third drift (D6) for return airway.

So, coal produced from panels lying on down-throw side of fault F4F4 of seam-III will be brought near the underground strata Bunker through belt conveyors as shown in the transport layout plan and coal will be discharged onto level belt conveyor which will discharge in Strata bunker made in the floor of Seam-III.

From bottom of this strata bunker, coal will be transported to surface through Incline No.1

Proposed trunk belt conveyors are as under:

(a) C-1 : In the main dip III C up to coal transfer point TP-1 on main trunk belt heading,

(b) C-2 in the Main dip III B from TP-1 to TP-2 (on main trunk belt heading),

(c) C-3 in the main dip III A, from TP-2 to underground stone strata bunker,

(d) C-4 in Main rise IIID, from TP-3 to TP-4

(e) C-5 in in drift D-4 in Main rise III E from TP-4 to TP-3.

(f) C-6, from strata bunker B-2 to TP-5.

Coal Flow system-

Seam-III-

The gate belt conveyor of Continuous Miner panel (say GBC-1) will discharge coal on trunk conveyor C-1 and then coal will be discharged on belt conveyor C-2 through TP-1 which will discharge coal on level (strike) belt conveyor C-3 through TP-2. The level belt conveyor C-3 will discharge into underground strata bunker proposed to be made in floor of Seam-III. Thus coal produced from dip side CM panels will be stored in strata bunker

The coal produced from SDLs panel located on northern side (Say GBC-3) will discharge coal on level belt conveyor GBC-2 (lay in Panel P3-16) and this coal will be discharged on trunk conveyor C-5 to be installed in Mainrise-IIIE through TP-4 which will discharge coal on trunk conveyor C-4 to be installed in Mainrise-IIID through TP-3 and discharges on level belt conveyor of gallery align with the underground strata bunker. Thus coal transported from rise side will be finally discharged into the strata bunker.

Seam-I/II and Seam-I -

After completion of extraction in III seam, all the coal transport arrangements will be shifted to lower seam i.e I/II combined and its bottom split Seam-I where same number of panels will be operated to meet the target production..

In Seam-I, the trunk belt conveyors will be laid along the maindip. These conveyors will receive coal from the Gate Belt Conveyors of the panel. The trunk belt conveyors of maindip will transport/transfer coal onto the level belt conveyor to be laid in gallery from where rising drift (D3) is proposed to be driven from floor of Seam-I to floor of III seam i.e upto the top of Bunker.

A belt conveyor will also be installed in this drift(D3) onto which level belt will discharge coal after gathering coal from dip side panel production as well as rise side panels. This drift belt will transport/transfer coal in the top of strata bunker in Seam-III. From level galleries, a five/four headings mainrise will be made and same will be extended upto the northern side working limit after crossing of the fault. The northern side property of fault F4F4 having throw of about 5m will be approached by three numbers of reverse drifts made from up-throw side mainrise headings to down-throw side of the fault in Seam-I. Coal produced in panels lying in down-throw side of the fault F4F4 will be transported through belt conveyors install in drift(D7) to upthrow side mainrise transport network and discharge coal onto level belt conveyor to be laid in gallery near strata bunker as stated in earlier paragraph. Coal will be collected from the bottom of the strata bunker and ultimately will be brought to surface through belt conveyors of Incline no.1 and drifts as stated in transport system of Seam-III.

Coal Flow system-

All the conveyors of seam III will be shifted in seam I/II & Seam-I after extraction of Seam-III panels. For transporting of coal from furthest SDL panel, coal flow transportation layout of Seam-I is considered where distant panel is to be operated. For transport of coal from this panel, it has been proposed to install gate belt (GBC-6) in SDL panel which will discharge coal on level belt conveyor (GBC-5). The Gate belt (GBC-5) will discharge coal on series of trunk belt conveyors of Mainrise-I/II E and Mainrise I/II D consecutively of this seam. The trunk belt conveyors of maindip & mainrise side will discharge coal on level belt conveyor C-3 of this seam. To discharge coal onto top of underground strata bunker, an additional drift belt conveyor (C-3A) in Drift(D3) is to be installed. The level belt C-3A will discharge coal gathered from dip side CM panels as well as rise side SDL panels on to this drift belt.

Main coal Transport system through Incline-

To collect coal from below of underground strata bunker, a belt conveyor C-6 is proposed. The belt conveyor C-7 will receive coal from conveyor C-6 through transfer point TP-5 and coal will be discharge coal on to main incline belt conveyor C-8 through transfer point TP-6 which finally discharge coal into 2 X 250 Te truck loading hoppers on surface for further dispatch of coal to KKC link siding.

Details of Belt Conveyor proposed for operation of Continuous Miner /SDL panels area-

LOCATION		CONV. NO.	OUTPUT, Q (TPH)	BELT WIDTH, M (mm)	BELT SPEED, V (M/SEC)	LEN-GTH, L (M)	LIFT, H (M)	Selected POWER, (Kw)	Voltage	Enclosure type
In seam Maindip/main rise	TBC C-1, in main dip - III C/main dip-IC from GBC-1 to TP-1	C-1	500	1000	2.00	700	85	2x150	3.3 kV	FLP
	TBC C-2, in main dip - III B/main dip-IB from TP-1 to TP-2	C-2	500	1000	2.00	800	85	2x150	3.3 kV	FLP
	TBC C-3, in main dip - III A from TP-2 to strata bunker B-2/In main dip-I_IIA from TP-2 to TP-7	C-3	600	1000	2.50	120	5	1x55	550 V	FLP
	TBC C-4, in main rise IIID/main rise-I_IID from TP-3 to conveyor C-3	C-4	500	1000	2.00	315	5	1x75	550 V	FLP
	TBC cum drift conv. (in drift D-4) C-5, in main rise-IIIE/ main rise-IE from TP-4 to TP-3	C-5	500	1000	2.00	165	5	1x55	550 V	FLP
	TBC C-3A, in main dip-I_IIA from TP-7 to Strata bunker B-2	C-3A	600	1000	2.50	240	5	1x75	550 V	FLP
	TBC C-6, from St. bunker B-2 to TP-5	C-6	600	1000	2.50	150	5	1x55	550 V	FLP
In incline	Incline drift conv. C-7, from TP-5 (in seam II) to TP-6 (in seam III)	C-7	600	1000	2.50	100	20	1x90	550 V	FLP
	Main Incline conv. C-8, fr TP-6 to hopper on surface	C-8	600	1000	2.50	425	80	2x150	3.3 kV	FLP
In panel	GBC-1 in CM Panel	GBC-1	500	1000	2.00	1300	5	2x90	550 V	FLP
	GBC-2 in SDL Panel	GBC-2	150	800	1.00	600	30	1x55	550 V	FLP
	GBC-3 in district Level(strike) gallery	GBC-3	150	800	1.00	200	5	1x55	550 V	FLP
	GBC-4 in SDL Panel	GBC-5	150	800	1.00	500	10	1x55	550 V	FLP
	GBC-5 in district Level(strike) gallery	GBC-4	150	800	1.00	900	20	1x75	550 V	FLP
	Pony Conveyor		100	800	0.75	100	0	1x22	550 V	FLP

5.20.2.2 Proposed Material Transport System-

Panel Transport-

Continuous Miner District-

Within the CM District, an endless haulage will be provided for material transport. The endless haulage will receive material trolleys from the maindip haulage and transport the same at suitable location near the face. From this location the materials will be transported upto the face by LHD.

SDL District -

Within the SDL District, an endless haulage and a tugger haulage will be provided for material transport. The endless haulage will receive material trolleys from the maindip haulage, transport and feed the same to the tugger haulage located about two pillars from the face. From this location the materials will be transported upto the face by tugger haulage.

Material Transport in trunk roadways -

III Seam

In III Seam trunk, material transport will be affected by a combination of Direct Haulage, Tugger Haulage and Endless Haulage. On the dip side of III seam, the endless haulage of the districts will receive material trolleys from the direct haulages to be laid in the maindip. However, on the rise side, the endless haulage of the districts will receive material trolleys from the Endless haulage laid in the mainrise.

The direct haulage on surface will feed material trolleys (loaded or unloaded) to endless Haulage installed in level (strike) gallery. The endless haulage (EH-3) will feed material trolleys to direct Haulage to be laid along the main dip of Seam-III. This Direct Haulage will feed material trolleys to another Direct Haulage in maindip and subsequently to Endless Haulage of panel to transport material to the last workings of this seam. Endless haulage will also be installed in Mainrise headings. A tugger haulage will be used in drift(D5) to supply material in different panels lying on down-throw side of the fault. (Refer Plate No.XXII)

Seam-I/II Combined and its Split Seam-I -

As stated earlier that all panel and transport equipment will be shifted to lower seam i.e in Seam-I/II combined and Seam-I after completion of extraction of Seam-III. So, for supplying material from surface to Seam-I/II and Seam-I workings, direct haulage on surface will directly feed material trolleys (loaded or unloaded) to Endless haulage to be installed in level (strike) gallery and subsequently to direct haulages in maindip and endless haulage in panel for transporting material to last workings of this seam. To supply material on rise side, endless haulage will also be installed in mainrise. Tugger haulage in drift(D8) will be used to supply material on down-throw side of fault F4F4.

To supply material to the down throw side property of Fault F4F4, a Tugger haulage will be installed in up-throw side of the fault laid along the Drift (D8) which will supply material trolleys to Endless haulage proposed to be installed in level gallery

Main Incline / Drift Transport-

The Direct Haulage (75 kW) is already installed on surface and it is laid along Main Incline No.-2. This direct haulage is presently being used to lower or raise material trolleys as well as coal tubes from surface to underground or vice-versa.

After installation of belt conveyor in Incline no.1 for coal transport, lower capacity direct haulage will be used for material transport in future.

Proposed material Transport equipment-

For material transport in Panels-

Material transport to the panel is proposed to be done by endless haulages. In SDL districts Endless Haulages EH-4, EH-5 & EH-6 and one Direct haulage DH-3 has been proposed. In CM panel, one Endless Haulage (EH-1) has been proposed.

For material transport in Trunk roadways-

Two Direct Haulages DH-1 & DH-2 has been proposed in the main trunk in Maindip III C & Maindip IIIB respectively. One Endless Haulage (EH-2) has been proposed in the maindip IIIA in main trunk. Another Endless Haulage (EH-3) in the main trunk in the main rise IIID. One tugger haulage TH-1 has been proposed in drift D5 which will connect EH-4 (in SDL panel) to EH-3.

All trunk road haulages of seam III will be shifted in underlying Seam I/II & Seam-I workings after complete extraction of overlying Seam-III.

Main incline material Transport equipment –

In main Incline drift, A Direct haulage (DH-3) will be installed in the main incline, which will connect to EH-2. Details of material transport equipment shown in table below-

SL. No.	Location			Haulage No.	Length (M)	Gradient	Power, (kW)	Connectivity	
								From	To
1	In III seam	In Trunk	In trunk in dip side of main dip III-C.	DH-1	700	1 in 8	37	EH-1	DH-2
2			Main trunk in main dip III-B	DH-2	800	1 in 8	37	DH-1 & EH-1	EH-2
3			Main trunk in main dip III-A	EH-2	500	1 in 20	30	DH-2 & EH-3	DH-3
4			Main trunk in main rise III-D	EH-3	300	1 in 10	30	TH-1	EH-2
5			In Drift D5	TH-1	175	1 in 5	22	EH-4 & EH-5	EH-3
6		In Panel	**SDL panel**	EH-4	600	1 in 15	30	Panel	TH-1
7				DH-3	225	1 in 7	22		EH-4
8				EH-5	950	1 in 25	30		TH-1/ EH-3
9				EH-6	450	1 in 20	30		EH-5
10			**CM panel**	EH-1	1300	1 in 20	30		DH-1 /DH-2
11	**In Seam I/II and I**		All the haulages of seam III will be shifted to Seam-I/II and I-seam at respective locations.						
12	**Common**		**In main incline**	DH-3	500	1 in 5	37	EH-2	Surface

Travelling roadways-

Incline no.1 will be used for travelling purpose from surface to underground upto Seam-III and Drift (D1) will be used from Seam-III to Seam-I. In main dips of both seams, belt conveyor headings will be used for travelling purpose which is also used as intake airways. **The proposed transport layout of Seam-III and Seam-I have been shown in plate no XXII and plate no. XXIII respectively.**

5.21 Support System:-

5.21.1 Proposed in Longwall workings of Muraidih Global bid Project –

Powered support-

Major parameters for evaluation of powered support will largely depend on the following factors:

- Support efficiency
- Roof to floor convergence
- Active horizontal force
- Roof cavity
- Canopy contact condition
- Uniformity of support load
- Leg resistance

Normally roof support at Longwall face is either 2 legged or 4 legged type Shield powered support. In Muraidih Longwall project, 2 legged Shield powered support is considered by the Contractor.

The main advantages of 2 legged supports are:

- More space along working face
- Lesser element, so easy to maintain
- Less fault and malfunction for hydraulic elements
- More travel space
- Easy to control roof
- Shorter canopy length, short distance of unsupported roof span
- Capacity of overcoming roof cavities
- Wide range of height adjustment
- Active horizontal force during setting
- Lateral force capacity in direction of advance
- Large contraction ratio of support can adopt in change of coal thickness
- Same capacity of support gives higher support resistance
- Features simple structure,
- Ease installation and maintenance

Support resistance-

Although the average thickness of coal Seam is considered at 4.0m in Seam-III, to be on safer side, the maximum height of extraction has been considered for the determination of support capacity as 4.8m and face width is at 200m long.

The M/s Minop/BHEC Consortium has determined the support at yield load as 11000KN. At about 80% setting load, the capacity of the supports is coming 11000* 0.8 = 8800 KN = 2 x 4400KN. Each leg will have the capacity of 4400KN. Which works out the cylinder bore as 420mm diameter at working pressure of pump=31.5MPa. According to standard engineering practice for the design specifications of roof support, the maximum height of the powered support is selected after considering some allowances for convergence which about 0.2 – 0.4 m above the maximum Seam height. Therefore the maximum working height of the support will be 4.8 + 0.2 i.e. 5.0 m.

Thus, Contractor has selected the Powered Support as follows-

- The capacity of support- 11000KN
- The length of the canopy 4.158m
- The width of the canopy 1.75m
- The tip clearance 0.5m

Support resistance before cut is 1.349Mpa or about 134T/M^2

Support resistance after cut is 1.151Mpa or about 115 T /M^2 at maximum span of longwall face

Calculation of support capacity-

The length of designed support canopy is about 4.158 m, and the support width is 1.75m but considering the distance between the tip of the canopy and the face as 0.50 maximum, the area will become 8.15 Sq.m before cut. Since the depth of the web of cut is 0.865m & considering the web efficiency as 0.95, the effective web will be 0.82m. The total length of the canopy + unsupported area of 1.32m will be 5.478 and the area after cut will be 9.58 Sq.m.

Support capacity N= P×S=1.1445×9.58×106 ≈10971 (KN)

So the support capacity is designed as 11000KN.

The maximum height is 5.83m at one borehole (MR-6) within the designated mining area. Considering the overall efficiency it is planned to extract 4.8m in one lift leaving allowance for convergence of 0.2m. Thus, the hydraulic support is designed with the maximum height in 5.0 m and minimum height in 2.5m. The best support range of hydraulic support is 2.5-4.5m. Average thickness within the designated area has been considered as 4.00m. Hydraulic support will be main equipment using for powered supporting system with the powered support hydraulic leg. Hydraulic support and face end shield support will be used in longwall face to prevent bed separation and fall of immediate roof. Roof

convergence and strong dynamic pressure can be caused by using support for low setting load. Roof convergence can be controlled in time by support with high setting load to reduce roof deterioration under variation of stresses of face. Considering the depth of Seams of Muraidih mine, shield support is selected in design. Hence, ZY11000/25/50D type of hydraulic support is selected for mining of Seam III, its supporting height is from 2.5m to 5.0m, center distance is 1.75m, setting load is 11000kN and weight is 38t. In order to ensure higher support set resistance, planning has considered the inclusion of guaranteed pressure valve. The hydraulic circuit is so arranged that the guaranteed set valve takes care of, while it achieves the preset pressure and ensure higher initial set load which is about 80% of the yield load.

Technical parameters table of supports during development of Seam III-

Title	Hydraulic Support	Face end shield support on head	Face end shield support on tail
Supporting Height (mm)	2500-5000	2500-5000	2500-5000
Scope of Working (mm)	2800-4800	2800-4800	2800-4800
Width of Support (mm)	1650	1650	1650
Center Distance (mm)	1750	1750	1750
Working Resistance(kN)	11000	11000	11000
Supporting Strength (MPa)	1.21-1.35	1.18-1.31	1.06-1.18
Weight (t)	38	39	40

Similarly, during the extraction of Seam I, the maximum height of support Hmax ≥ Mmax+S1 =3.00m, the minimum height of support Hmin ≤ Mmin -S2 =1.65m. The same support of Seam III will be used in Seam I after modification of some of the support structure at the time of major overhauling before taking it to Seam I.

Technical parameters table of supports during development of Seam I-

Title	Hydraulic Support	Face end shield support on head	Face end shield support on tail
Supporting Height (mm)	1650-3000	1650-3000	1650-3000
Scope of Working (mm)	1850-2800	1850-2800	1850-2800
Width of Support (mm)	1650	1650	1650
Center Distance (mm)	1750	1750	1750
Working Resistance(kN)	11000	11000	11000
Supporting Strength (MPa)	1.15-1.32	1.15-1.28	1.05-1.15

5.21.2 Proposed support system in Continuous Miner/SDL Project at Phularitand Colliery-

Nature of the Roof & Floor-

The nature of the immediate roof and floor rock are shown in table below-

Immediate Roof and Floor rock-

Seam	Roof Rock	Floor Rock
Seam-III	The immediate roof of the seam is mostly carbonaceous shale and medium to coarse grained sandstone.	The floor of the seam is carbonaceous shale and medium to coarse grained sandstone.
Seam-I and I/II Combined	The immediate roof of the seam is mostly medium grained sandstone and at places shale and sandy shale.	The floor of the seam is shale and coarse grained sandstone.

5.21.2.1 Existing Systematic Support Rules for development of Gallery at Seam-III-

General Information-

- Seam : III Seam
- Working Height : 3.00m
- Gallery Width : 4.8m
- RMR(Calculated by ISM, Dhanbad on June, 2014) : 59

Calculation of Factory Safety-

- RMR : 59
- Rock Load : 2.48 Te/m2
- Distance between Row : 1.2 m
- No. of Bolts in a Row : 4.0
- Area Covered by 4 Bolts : 4.8m x 1.2m = 5.76 m^2
- **Total Rock Load** : 2.48Te/m^2x5.76m^2 = 14.28 Te
- Each Roof Bolt Load Bearing Capacity with Cement Capsule = **6 Te**
- Total Load Bearing Capacity of 4 Bolts : (6 Te x 4 Nos.) = 24 Te
- **Factory of Safety** : 24 Te /14.28 Te = 1.68

Support of Development working within 10m of coal face-

- Roof will be supported by full column grouted bolts with cement capsules. \installed at \maximum interval of 1.2 m in the same row so that distance between the bolt and side gallery will not more than 0.6 m.
- The spacing between the two rows will not be more than 1.2m. However distance of the first row of Bolts from the face will not be more than 0.60 m before blasting and 1.8 m after blasting.
- All the bolts grouted shall be vertical.
- Before engaging persons to drill holes for roof bolts of installing permanent Support, Temporary support, such as props shall be installed to ensure safety of support personnel. No person will be engaged at any time under unsupported Area.

Support of Junction extra 25% of Bolts at Junction-

Support of Ledges, Over Hangs and Slips Etc.

- All ledges in the roof shall be supported by providing Cross-bars set on steel props or I-section Girder.
- Wherever the sides of pillars have tendency to spall, these shall be supported by providing side bolts with wire nets.
- Any overhang which cannot be dressed shall be kept support by incline stay props.
- All faults, visible slips, breaks and other geological disturbance in the roof shall be supported either by cogs or cross-bars or W-straps.

Roof Bolts Design-

- Roof bolts will not be less than 20 to 22 mm diameter mode ribbed bar or for steel with threaded of at least 12.5 cm.
- Length of each bolt is 1.65 m including threaded portion.
- Bearing plate size is 15 cm x 15 cm and 6.0 mm thickness
- Quick setting grout shall be such that an anchorage strength of at least 3 Te is developed in 30 minutes and 5 Te in 2 hours, 10Te after 24 hours. Capsules shall be as per DGMS circular standard.

Installation of Roof Bolts-

- Roof bolts shall be installed under the direct supervision of mining supervisor.
- The holes shall be drilled to correct diameter and length with suitable drill. The bore hole diameter shall not be more than 8mm to 12mm of bolt diameter. Due care will be taken to maintain the verticality of holes.

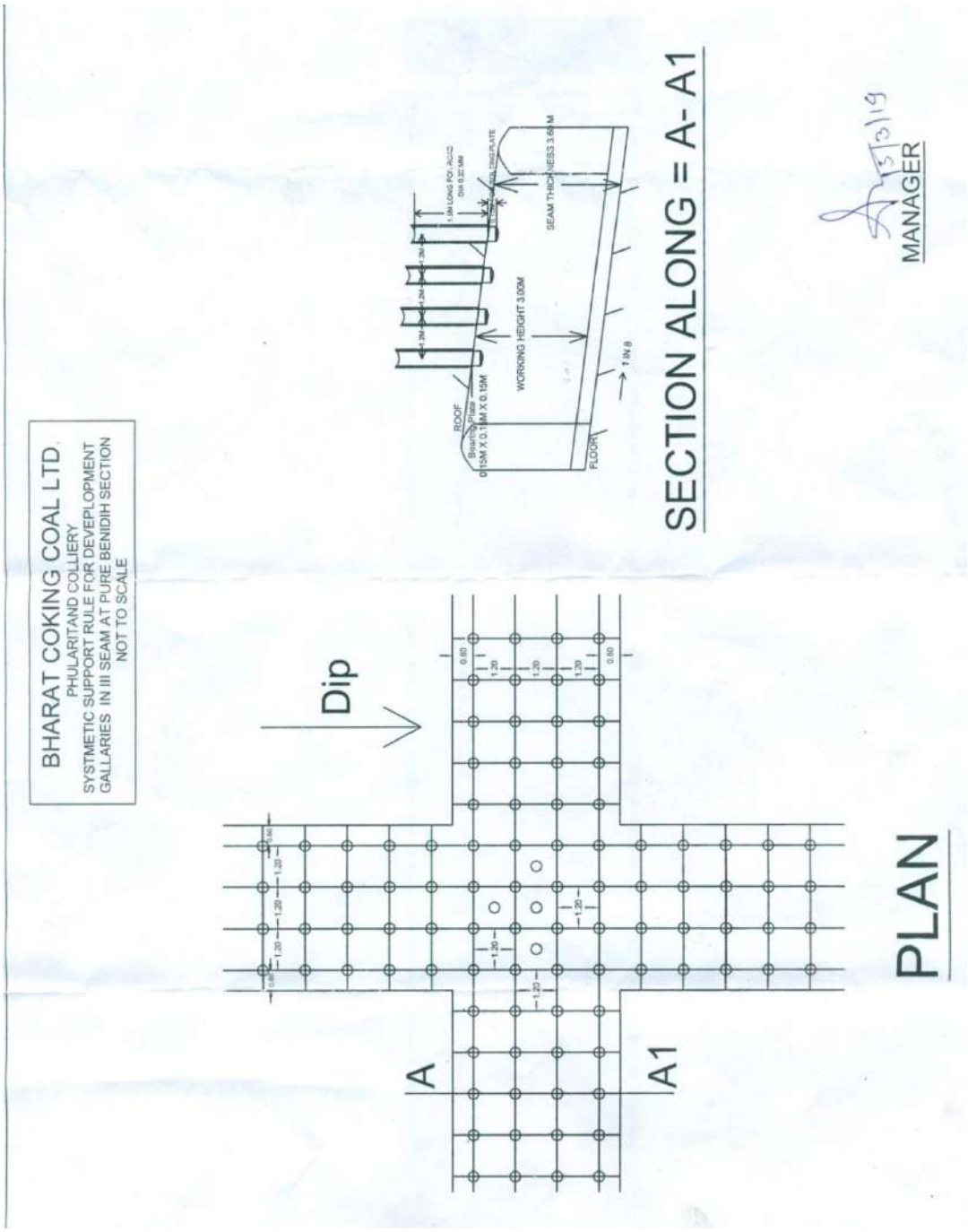
A schematic Layout existing Support System has been shown in Fig No. 7

Monitoring of Roof Bolting Performance

- Anchorage capacity test will be conducted at random of not less than 10% of the installed bolts.
- The test shall be conducted under direct supervision of competent person.
- Records of anchorage test conducted on the installed bolts will be kept in a bound paged book and shall be signed by the person making the test and countersigned by ACM/Manager.

Miscellanceous

- Additional support shall be erected / set as and when necessary.
- No person shall be beneath un-supported area at any time for any reason.



Existing Support system in Panel of Seam-III

Fig no.7

Proposed Support Plan for Panels of Seam-III & I-

Keeping in view of nature of roof & floor of the seam, the mine management should evolve a suitable support design in consultation with expert agencies and DGMS. The proposed support plan will be based on the result of the scientific study conducted by some expert agency for assessing the requirement of the support for working of Seam-I at Phularitand UG Mine.

Based on the scientific study and operational requirement of the proposed method of mining (i.e unsupported cut-out distance etc) the requirement of the roof bolts will be assessed. The dimension of the roof bolts (length, dia., threading length, etc.), type of grouting (cement capsule, resin capsule with their setting time detail etc), number of roof bolts in a row/spacing distance (between the adjacent row and between the adjacent bolts in the same row) shall be judiciously decided based on the result of the scientific study. The support plan thus prepared shall be duly approved by the DGMS prior to the execution of the same in the workings of Seam-I. Continuous Monitoring of strata behavior shall also be done during development as well as during depillaring.

The support plan for the district to be worked by SDL and for the district proposed to be worked by CM will be different. However, based on the experience, the support system for CM District and for SDL District is as follows:

Proposed Support system during Development and Depillaring-

After development of galleries upto a certain distance from the coal touch point, the RMR value are to be ascertain through scientific agency and based on the RMR value, support plan is to be designed for workings of Seam-I.

SDL Panel-

During development of galleries of five heading panel, the development galleries will be supported by full column cement grouted roof bolts of 1.8 m long, 22 m dia. roof bolts would be installed at 1.2m x 1.2 m grid pattern with 4 bolts in a row leaving 0.6m from each side of coal edges. W-straps and wire mesh will be used in conjunction with roof bolts as and when required in the area where immediate roof is disturbed. The above figure depends on the RMR value of immediate roof rock and total rock loads.

In a depillaring panel, it is proposed to reinforce support in the extraction area upto two pillars ahead of the goaf edge line.

a) Support at the junction-

Junction is proposed to be supported by installing additional roof bolts. In addition to this, wire mesh and W-straps will also be used as and when required.

b) Support at goaf edge-

Goaf edges are proposed to be supported by erecting a row of cogs as shown below-

A typical support pattern in a SDL panel for pillar size 26m x 26m and 36m x 36m has been shown below in Fig.No.8 & Fig. No.9 respectively -

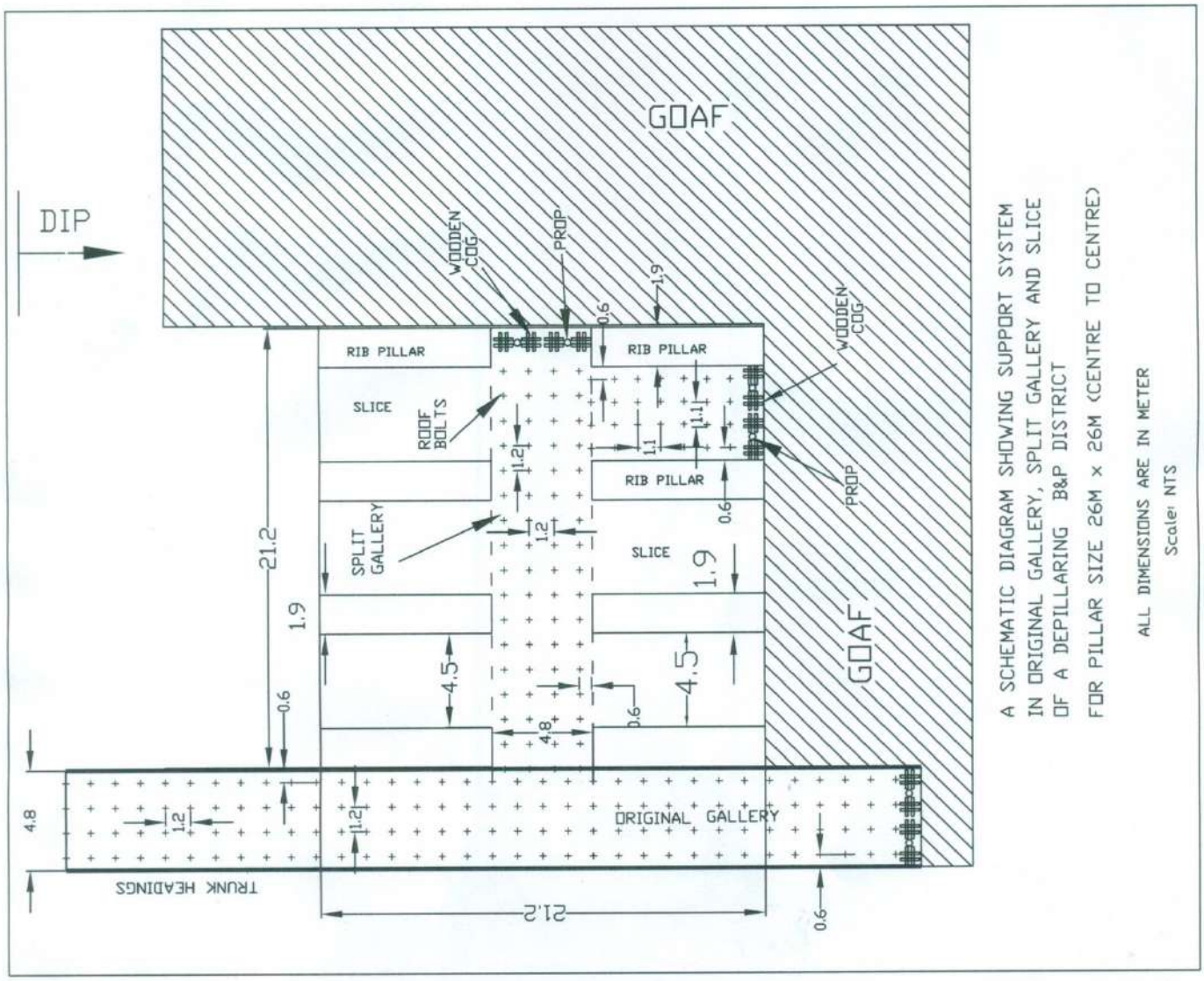
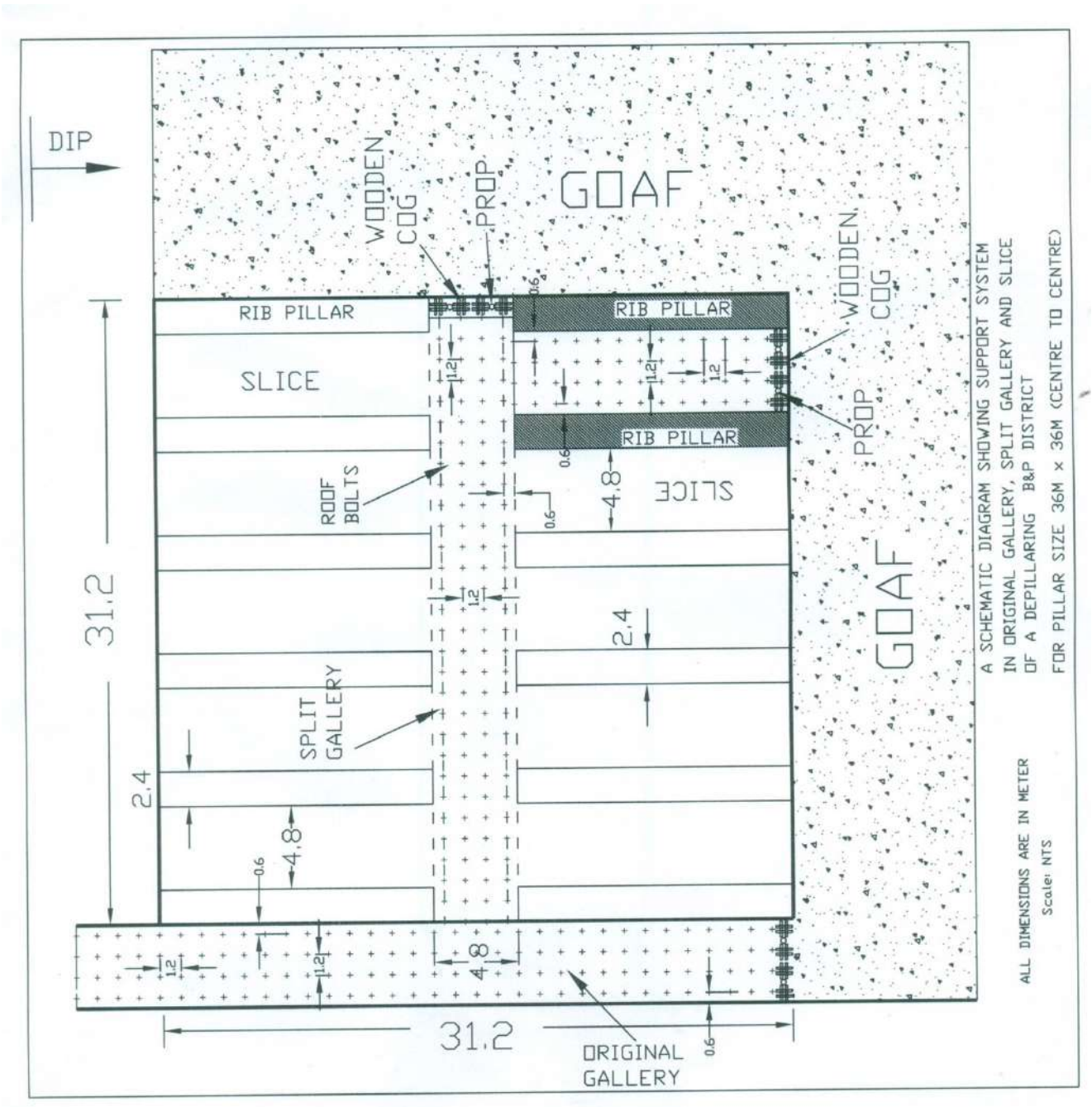


Fig No. 8

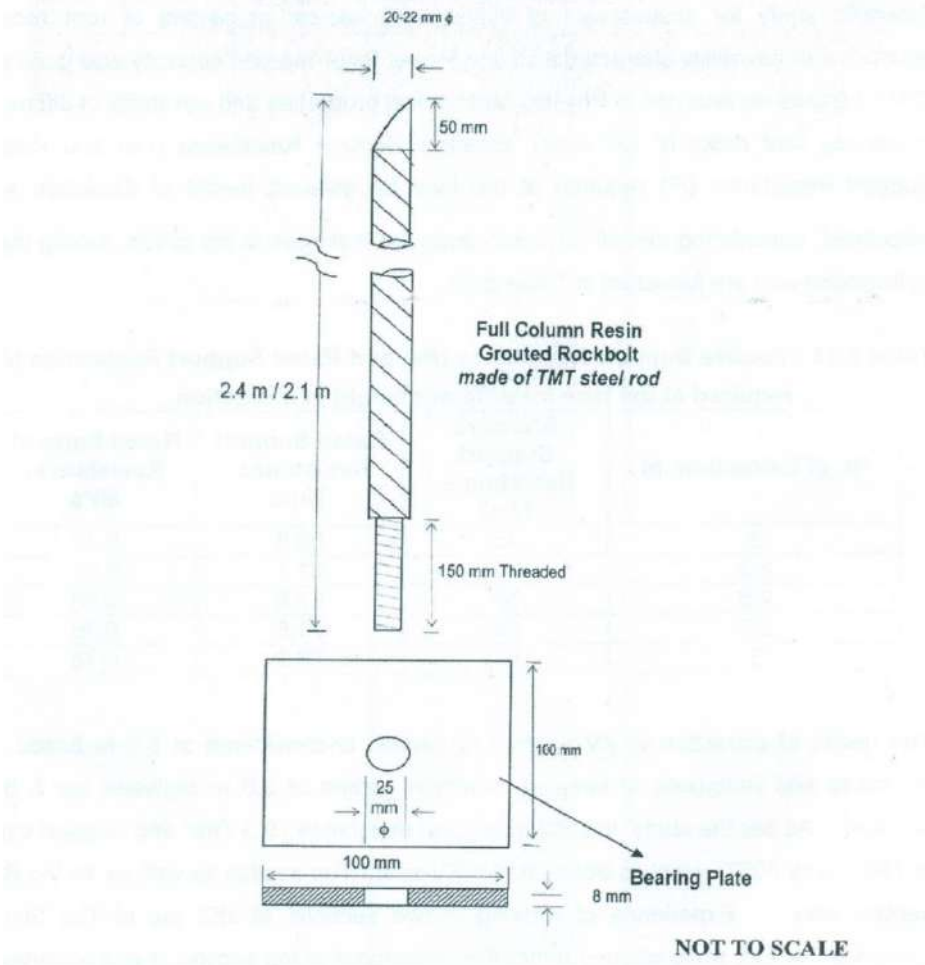


All dimensions are in Meters

Fig No. 9

Continuous Miner District-

Development galleries will be supported by full column resin grouted roof bolts of 2.4m long, 22 mm dia. Roof bolts would be installed at 1.0 m x 1.0 m grid pattern with 4 bolts in a row leaving 0.9 m from each side of coal edges. The roof bolts are made of 22 mm diameter TMT steel of higher strength and are cold rolled threaded.



SUPPORT DURING DEPILLARING-

CM District

a) Support of the Split Galleries-

Split galleries would be supported with full column grouted resin bolts, 1.8 m long, 22 mm diameter at 1.65 m x 1.65 m grid pattern.

b) Support at the mouth of slice (Breaker line Support)-

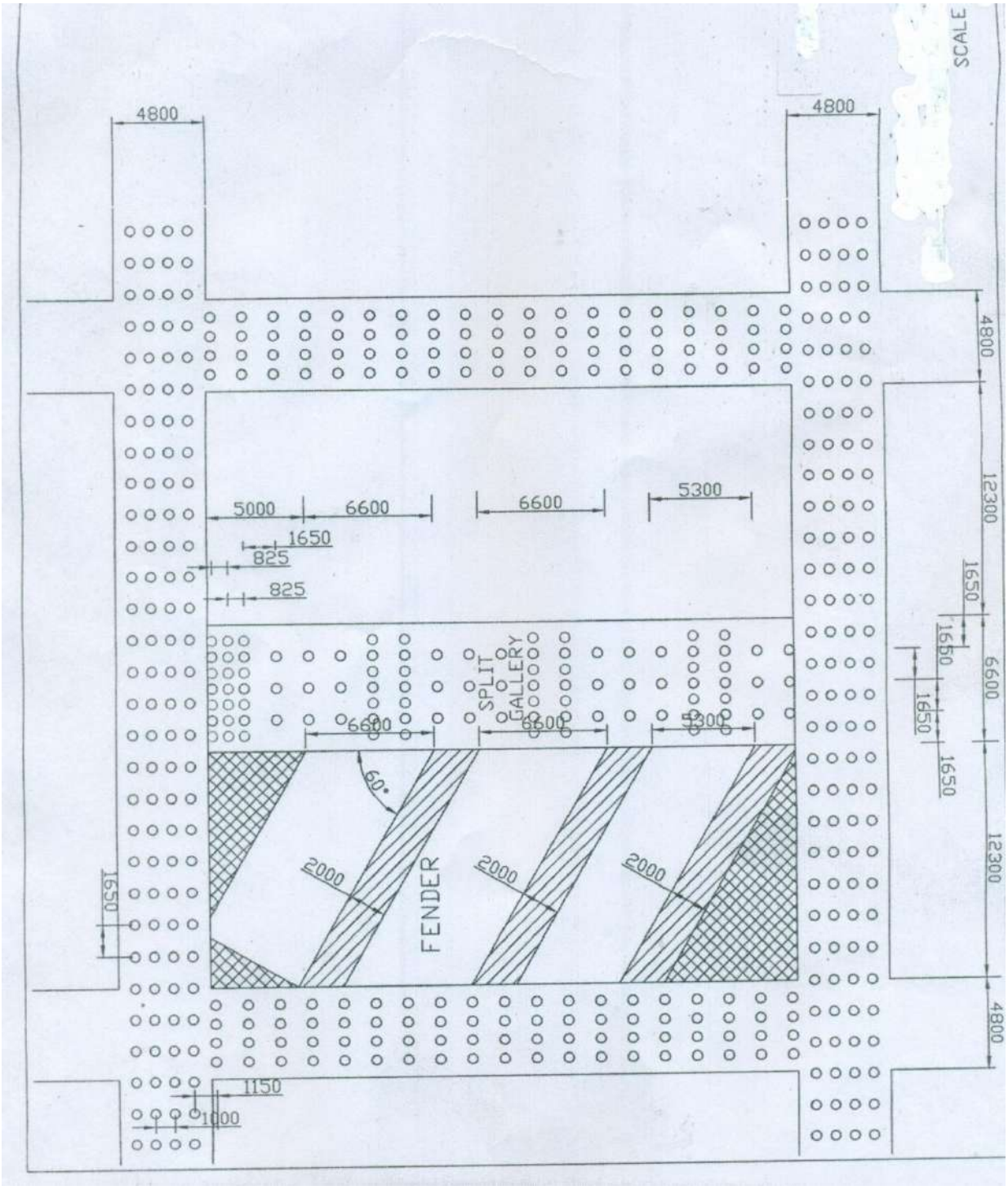
Additional 4 bolts are put in between the bolts already installed in the last row of the split. One more additional row of bolt (7 bolts) is put between the last two rows of prop in the split gallery.

c) Goaf edge Support

Goaf edges are supported in the same manner as support at the mouth of the slice. Additionally a few timber props shall be erected to indicate the convergence visually.

A typical support pattern in a CM panel for pillar size 26m x 26m and 36m x 36m has been shown below in Fig.No.10 -

Diagarm showing showing Support system in depillaring Panel by Continuous Miner



All dimensions are in mm

Fig.no.10

5.22.1 Ventilation System-

Existing Ventilation system-

5.22.1.2 Longwall Project-

For this project, Contactor has constructed two inclines and an Air Shaft at the designated site. Both inclines (Main & Auxiliary) has touched coal of Seam-III whereas Air Shaft has been sunk partly. Fan drift has also been made for installation of Fan. Work at the site has been suspended by the Contractor since 01.06.2016. Both Inclines have proposed to be used for Main Intake airways and Air shaft will be used for Return airway. The Location of Return air shaft has been shifted towards dip side from the earlier location as proposed in the DPR due to constraint of acquisition of private land and safety point of view with respect of Khodo Nala.

As per the Supplementary note, new location of Return air shaft is selected on the old over dump and Contractor has already sunk upto a depth of 11m (approx.) from the top of OB dump. The total depth of the vertical air shaft will be 125m upto the bottom of the coal seam-I. The Return Air shaft has finished diameter of 6.0m and completely lined by concrete. The location of the air shaft has been made in such a manner so that it is above the elevation of high flood level. The location of the inclines has been selected in such a manner to prevent the entry of the polluted air through the main air intake. Sufficient distance will be maintained from the location of the air shaft and the CHP which are the main source of polluted air.

Proposed ventilation system for Longwall Project-

Exhaust type ventilation has been considered as mode of ventilation for ventilating the Longwall workings of Muraidih Colliery because the exhaust ventilation system makes the shaft under negative pressure, and even when the main fan is under break down, the natural ventilating pressure maintains the ventilation flow of air and continues to reduce the gas emission. Thus majority of large coal mines prefers exhaust ventilation mode.

Ventilation will be provided by main mechanical ventilator having a capacity of either 45-80 m3/sec at a pressure of 120-50mm of water gauge or 40-200 m3/sec at a pressure of 131-40mm of water gauge. Another main mechanical ventilator of the same capacity will be installed for use as a stand bye to ensure that ventilation of the mine is not stopped in the event of breakdown of the main

mechanical ventilator. Electric power of the both main mechanical ventilators will be provided from two different or independent sources which will be provided by BCCL.

The main incline (for coal transportation) and auxiliary incline (for material transportation) will be used as main intakes and air shaft will be used as main return for this project. Considering the area of the Muraidih underground mine, the underground working faces have very limited area & the mine will not be extensive. Moreover it has been proposed that there will be one depillaring district with the use of powered support longwall equipment & another development district of gate roadways development by Bolter miner. It is also proposed that one seam will be worked at a time. This will make the ventilation layout plan simpler and easier. Mine resistance of the ventilation system is only related to the distance of the working faces from the main intake roadway and its cross section.

At the beginning of mining operation in coal seam III, the ventilation is easier due to low mine resistance and with the increase of mining operation mine resistance will change.

Air quantity Requirement-

a) **Man power basis -** The total air quantity of the mine shall not be less than 6m3 /min per person engaged in the largest shift. Considering 200 persons in largest shift, quantity assed as 1846 m3/min i.e 30.76 m3/s. Ventilation coefficient of mine, taking into consideration of air leakage inside the mine and uneven distribution etc, 65% (0.65) is selected by the Contractor.

b) **Output basis-** As per the Seam thickness and equipment specification, contractor has considered maximum production on a day from Long wall face may reach upto 10000 tonne. So the quantity of air requirement on output basis will be 25000m3/min or 417m3/Sec considering the stipulation of CMR as 2.5 m3/min. Taking V.E.Q as 65%, the requirement of air quantity will be 641m3/sec. In this mining plan, average production from Longwall face is considered as 6500 tonne per day. So the quantity of air requirement on output basis will be 271 m3/Sec and with V.E.Q as 65%,the quantity will be 416 m3/Sec, which is too high, as considering a cross section of intake air ways for gate roadways and effective cross-section at face are as 20.8 m2 and 16.237 m2 respectively .The air velocity along the gate road and in the face will be 20 m/sec and 26 m/sec respectively. The maximum permissible air velocity in haulage road ways is 8 m /sec and in the conveyor roadways as 4 m/sec. So it is not considered.

From the above, it is concluded that the requirement of ventilation as per the stipulation in the CMR under standard of ventilation, can not be satisfied, either it is too less to diffuse the gas and to maintain physical comfort of workmen or too high which will create not only inconvenience to the workmen working in the underground but also will cause more environmental problem. As such a realistic approach has been taken based on the air velocity which are being commonly considered while designing the most mechanised and high production underground mine all over the world. CMR has also stipulated the requirement of ventilation based on the velocity of air current.

Degree of Gassiness-

The Muraidih Mine is likely to be a degree I mine considering the workings in same seam of adjacent mine and requirement of velocity of air current as per statue is 30 m/min.

If we consider this velocity, it will not satisfy the permissible concentration of Methane in the return. As such Contactor has designed the ventilation parameter which will be realistic and will take care the environmental as well as the physical comfort of the people working in the mine.

Requirement of maximum air quantity of the mine-

Muraidih mine will operate simultaneously one mechanized longwall face, one mechanized roadways development district, main pumps and other auxiliary district like stone drifting. So the maximum air quantity requirement for the longwall mining, gate road ways, pump house and other areas can be calculated as under-

Total Air Quantity Requirement-

Description	Name of the district	Air Quantity(m^3/s)
1. LW Face	Longwall face operating	24.35
	Longwall face installation	12.175
	Sub-total	**36.525**
2. Bolter Miner Face (Gate Road)	Fully-mechanized development face of coal seam	20.8
	Sub-total	**20.8**
3. Pump house	Pump rooms (UG)	**10**
4. Rock drivage	Fault Crossings	**10.4**
5. Others	15% of above total	**11.658**
Total of (1 to5)		**89.38**
Total (at V.E.Q 65%)		**137.5 m^3/s**

According to ventilation design, the air quantity for one underground fully mechanized coal face is 24.35 m^3/s (spare for fully mechanized coal face is the half of working face: 12.175m^3/s), the air quantity for one BM drivage face is 20.8m^3, the air quantity for one rock drivage face is 10.4m^3/s, air quantity for sump is 10m^3/s, air quantity for others is 15% of above air quantity, so as 65% of ventilation efficiency for calculation, the total air quantity = 1.15×(24.35+12.175+20.8+10.4+10)÷65%=137.5m^3/s.

In the initial period of operation, Longwall installation face will not be prepared which is omitted. The air quantity for BM drivage face, rock drivage face,sump and others is =1.15×(24.35+20.8+10.4+10)÷65%
= 116.0m^3/s.

Thus the minimum air quantity of mine is 116.0m m3/s, and the normal air quantity is 137.5 m^3/s.

Determination of the percentage of gas present in the general body of return air as per the stipulation of CMR:-

As per the gas test conducted by MINOP on the additional core coal sample, test sample of coal seam III desorbed gas release during testing period is 0.03ml/g, while residential gas content 0.27ml/g and the test sample of coal seam I desorbed gas release during testing period is 0.007ml/g & residential gas content 0.12ml/g. Thus the absolute gas emission rate for seam III and seam I are 0.3 ml/g (0.3 m^3/tonne) and 0.127 ml/gm (0.127 m^3/tonne) respectively.

The Contractor has considered the gas emission rate as estimated based on the Chinese formula which is generally being considered while designing the requirement of air quantity for mine ventilation. As per Chinese design standard , the estimated absolute gas emission rate from the longwall faces for seam no III and seam no I are 0.275 m^3/tonne and 0.136 m^3/tonne respectively. The gas emission rate from bolter miner district 0.341 m^3/tonne. The gas emission rate for the whole mine is 0.36 m^3/ tonne.

Gas emission rate from coal seams:

		Average gas emission rate (m^3/te)	
Seams		As per laboratory test m^3/te	As per Chinese formula m^3/te
Seam no. III	Longwall	0.30	0.275
	Development heading	0.3	0.341
	Complete mine	**0.3**	**0.36**
Seam no. I	Longwall	0.127	0.136
	Development heading	0.127	

For determining the percentage of gas in the general body of air in the return , the maximum gas emission rate has been considered which is the higher value amongst the two gas emission rate i.e. for longwall 0.3m^3/tonne, for development 0.341 m^3 /tonne and for the whole mine 0.36 m^3/tone.

Gas content in the return of PSLW face when seam III is operated:-

Maximum production from PSLW face per hour 1000 tph i.e.0.27 te/sec
Gas emission per sec 0.27 * 0.36 = 0.097 m^3/sec
Air flow in the PSLW face 24.35m^3/sec
% gas in the free body 0.097 * 100/24.35 = 0.398%

This is well within the specified limit as per CMR i.e. 0.75 % in the district return.

Gas content in the return of the of gate road development:-

Maximum production from Bolter miner face per hour 400 tph i.e.0.11 t/sec
Gas emission per sec 0.341X 0.11 =0.0375 m^3/sec
Air flow in the development face 20.8 m^3/sec
% gas in the free body 0.0375 X 100/20.8 = 0.18%

This is well within the specified limit as per CMR i.e. 0.75 % in the district return.

Gas content in the main return:-

Maximum production from mine per hour 1400 tph i.e.0.38 t/sec
Gas emission per sec 0.36 * 0.38 =0.136 m3/sec
Air flow in the main return 137.5 m3/sec
% gas in the free body 0.136 * 100/ 137.5 = 0.098%

This is well within the specified limit as per CMR i.e. 0.75 % in the district return.
For the purpose of calculation gas percentage in return, BHEC/MINOP has considered the maximum hourly capacity of the equipment to arrive at a realistic value for ensuring the safety.

5.22.1.3 Ventilation system in Continuous Miner/SDL Project at Phularitand Colliery and its annexed part of amalgamated Muraidih Colliery-

Degree of gassiness-

The seam-III & Seam-I has been considered for exploitation in Phularitand and in its annexed property. Seam-III is under development whereas Seam-I/II & Seam-I is virgin. As per the data supplied by area authority, Seam-III is declared as Degree-I gassy mine. Seam-I/II & Seam-I is virgin and the degree of gassiness of this seam is not known. However, this seam was worked in past in adjoining Jogidih Mine (on the east side) and the seam was of Degree-I gassiness. Therefore it is assumed that Seam I/II comb. and I seams are of Degree-I gassiness. As soon as the seam-I/II & Seam-I are touched or advances certain distance from touch point, gas emission test should be carried out and also it should be carried out at regular interval as the mine progresses.

Existing Ventilation System for Seam-III workings-

Out of two existing inclines, presently Incline No.1 as act Main Return airway for development workings of Seam-III and Incline No.2 act as Main Intake airway. An exhaust fan PV-160 is installed at the mouth of the Incline no.1 The total air quantity being circulated by the existing fan is 3000 m3/min at 12mm of Water gauge.

Proposed Ventilation Layout: -

Two Inclines already exist. Two drifts from floor of Seam-III to Seam-I/II combined is proposed to make entries for workings of Seam-I/I combined and Seam-I. An air shaft is also proposed to sunk upto Seam-I/II combined.

As stated earlier that Incline No.1 & No. 2 will also act as Main intake for this seam and Air shaft will act as main return for the workings of both seams i.e Seam-III and Seam-I/II combined & Seam-I.

Out of five headings maindip or mainrise of both seams, three headings will act as intakes and two headings will act as return. Intakes and returns airways will be separated by erection of ventilation stoppings. Air Crossings will be made to separate intakes and returns of maindip/mainrise headings with intakes and returns of panel headings.

In a Panel, out of 5 headings, three headings will act as Intake air way and two headings will act as return. Sufficient number of Air Crossings has to be made to establish adequate ventilation system within the mine.

On northern side property, mainrise of both seams have to cross fault F4F4 to approach other side of the fault. It has been proposed to drive three nos. of drift in both seams to cross the fault F4-F4. Out of three drifts in a seam, two drifts will act as Intake and third one will act as return. Proposed Ventilation Layout Plan has been shown in Plate no. XXV and Plate no. XXVI for workings of Seam-III and Seam-I respectively.

Estimation of Air Quantity Requirement

a) **On the basis of production**

Sl No.	Paramter	Unit	value
1	Maximum daily production from CM district.	TPD	1500
2	Maximum daily production from two SDL panels	TPD	500
2	Air requirement at LVC as per CMR – 1957.	m^3/min/tonne	2.5
5	Total quantity requirement for two districts.	m^3/min	5000
6	Quantity of air requirement for pumping and other services.	m^3/min	750
7	Total quantity requirement in working area	m^3/min	5750
8	VEQ	%	60%
9	Quantity of air in fan drift		9584

b) On the basis of manpower deployed in largest shift considering three panels

Sl No.	Parameter	Unit	value
1	Maximum persons deployed in largest shift.	No.	380
2	Air requirement per as per CMR – 1957.	m^3/min/person	6
3	Total quantity of air requirement working area	m^3/min	2100
4	VEQ	%	60
5	Quantity of air in fan drift	m^3/min	3800

Thus, the maximum quantity of air requirement comes on the basis of the daily production i.e.9584 m^3/min or 160 m^3/sec.

It is, therefore, proposed to install a main mechanical ventilator of suitable capacity (Q=60-280m3/s, WG=125-40mm) that will be able to cater the ventilation requirement of the proposed mining area. It will be prudent that ventilation survey should be conducted considering the existing and proposed mine layout along with development schedule as proposed through a scientific agency.

Auxiliary Ventilation-

For coursing of fresh air in faces beyond the last ventilation connections, auxiliary fans with suitable ducting have been proposed. In Continuous Miner panel, 3 nos. of auxiliary fans with suitable ducting has been proposed to course adequate quantity of air at different faces. For two SDL panels, total 4 nos. of auxiliary fans with suitable ducting has been proposed. For ventilation of drifts during drivage stage, auxiliary fans have been proposed to ventilate the blind headings.

Ventilation System Design-

A main mechanical ventilator of suitable capacity (Q=60-280m3/s, WG=125-40mm has been proposed. However, prior to take any decision, it is advised to undertake a ventilation network study by some expert agency to assess the ultimate ventilation requirement at final stage. Based on the above study, decision for procurement of the Main mechanical Ventilator should be purchased.

5.23 Pumping and drainage-.

5.23.1 Existing-

Longwall Project-

The Contractor has made two Inclines and drift drivages upto the floor of Seam-III whereas Air shaft along has been partly sunk. The fan drift has been made and connected with the existing part of the shaft.

Due to suspension of any type of work by the Contractor at the incline sites, both inclines are presently filled with water upto the inclines mouth. Hence, before commencing of work, these inclines have to be de-watered.

Continuous Miner /SDL Project at Phularitand Colliery-

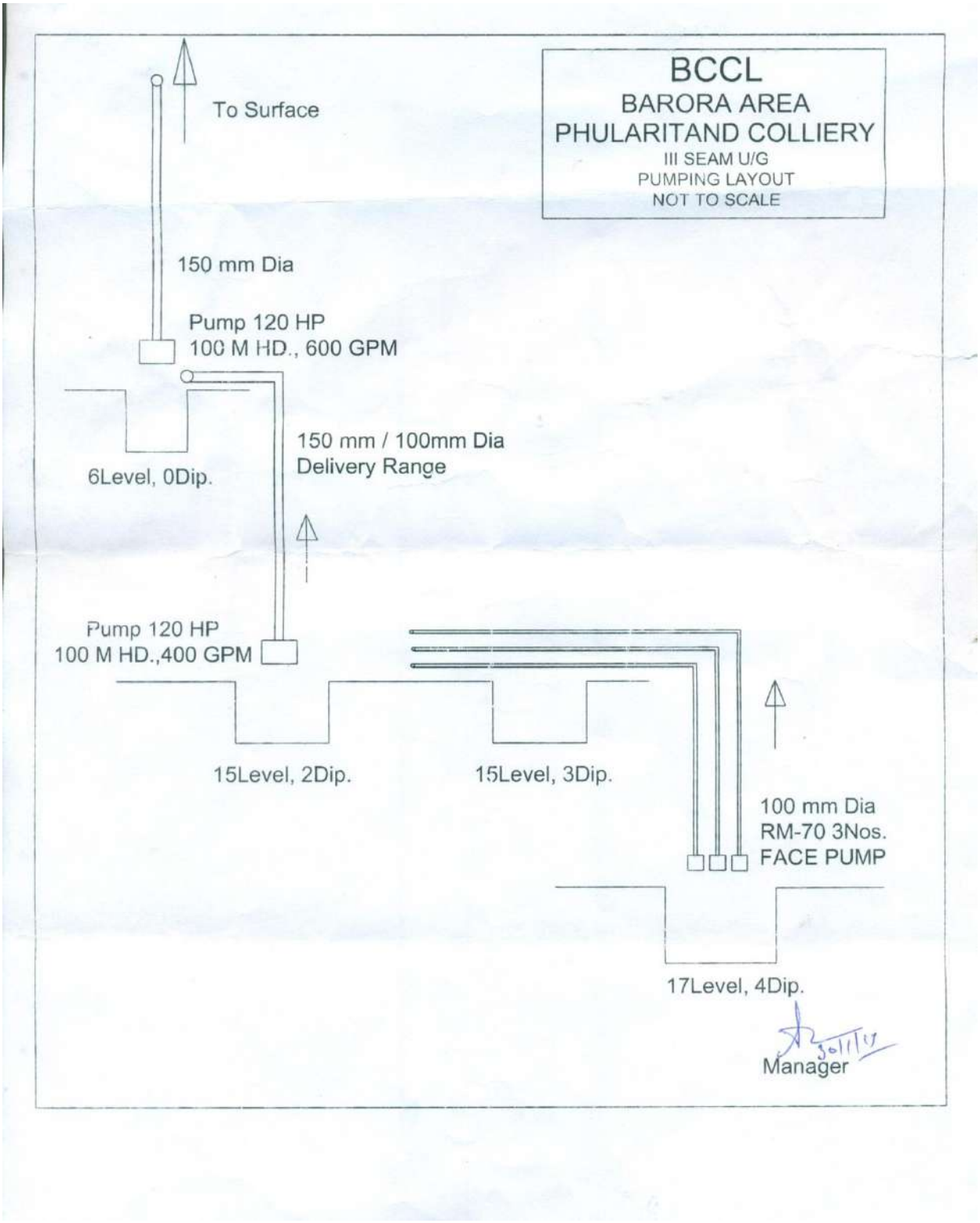
At present, development is going on in 17 level, 4 dip of Seam-III towards southern side. As per the existing pumping layout, 3 nos. of Face Pumps (RM-70) pumps accumulated water to the temporary sump maintained at 15 level,2 dip. From this sump, a Pump (120 HP), 100m head, 400 GPM discharges water in another sump maintained at 6 level, 0 dip. The accumulated water in this sump is being discharged to surface through Incline mouth no.1 by the pump having specification of 120 HP, 100m head, 600 GPM

Accumulated water on dip side is pumped to surface through pipe lines laid along the galleries and level which ultimately discharges in water reservoir / settling tank at surface. ERW/GI pipes of dia. 150mm and 100mm diameter are being in use. The above exiting pumps and pipes will be utilized in future. A single line diagram of existing underground pumping layout has been shown in next page.

Pumping arrangement in existing Phularitand Hired patch-OC-

A hired patch open cast with V/VI/VIII seam as base is in operation within the proposed project boundary. At present, two number of surface pumps are in operation to keep the open cast face free of water.

Existing underground Pumping layout in Phularitand Colliery has been shown in next page-


BCCL
BARORA AREA
PHULARITAND COLLIERY
III SEAM U/G
PUMPING LAYOUT
NOT TO SCALE
To Surface
150 mm Dia
Pump 120 HP
100 M HD., 600 GPM
6Level, 0Dip.
150 mm / 100mm Dia
Delivery Range
Pump 120 HP
100 M HD.,400 GPM
15Level, 2Dip.
15Level, 3Dip.
100 mm Dia
RM-70 3Nos.
FACE PUMP
17Level, 4Dip.
Manager

5.23.2 Proposed Underground Pumping System-

5.23.2.1 Proposed for Longwall Project at amalgamated Muraidih Colliery-

The Seam-III and Seam-I/II & Seam-I is a virgin property excepting a very small portion on the north-eastern side of the property on the incrop edge of Seam-III where B&P working was carried out in past, which is presently discontinued after partial extraction of pillars by opencast method. Considering adjacent mine working, Seam III & below seam have been worked by underground means on the north eastern & eastern side of the boundary by Jogidih mine of "Govindpur" area.

It is proposed to extract coal of Seam-III and Seam-I/II & Seam-I by caving in the designated area of amalgamated Muraidih Colliery by mechanized Longwall as well as by bord & pillar with bolter miner. The proposed area has an undulating topography with a gentle slope towards east to south. The original topography of the area has been severely obliterated due to large scale mining activities both by opencast and underground method.

The drainage of the surface area surrounding the OCPs is controlled by seasonal Khodo nala. The nala flows from north to east in northern part of the property and then changes its course towards south & limits the eastern boundary of the existing amalgamated Muraidih Colliery.

On Surface plan it has been shown that the eastern side quarry edge of existing amalgamated Muraidih Colliery has been extended beyond Khodo Nala, i.e., quarry edge has crossed the Khodo nala. As per Mine Authority, after extraction of coal, the course of the nala has again been restored & maintained by filling of OB, stone pitching, etc to avoid inrush of water into the quarry especially during monsoon season. As per hydrogeological study it has stated the presence of the aquifers and it's likely affect at the time of undertaking the underground mining operations hydrogeological chapter (IIB) of approved DPR.

Source of Water-

Considering the hydrogeological factor of Muraidih mine & status of water make up in the adjoining mines from working in seam III & below, it also presumed that

the source of the underground water will be mainly from rain water, strata percolation & spraying water in this longwall underground workings.

It is also presumed that the following activities during the life of the proposed underground mine is to be done by mines officials of BCCL, as is being done presently.

- Maintenance of surface slope over huge over burden dump towards the nala passing through this property
- Continuations of Pumping installations on the Floor of the combined Seam
- Protection of embankment against inrush of water from the nala which becomes at time violent during monsoon

Rainfall-

For the purpose of calculation of average rainfall to assess the pumping capacity, M/s Minop/ BHEC has considered as 1278 mm.

As per the NIT, the total area within the leasehold boundary is 4.76 km2. The perculation to U/G will depend largely on the surface area, which are broken due to mining activities. The U/G mining operation will be undertaken in two phases. The phase -I will cover the operation of first 5 years and the phase- II will be the ultimate pump capacity. For the purpose of assessing the mining area in phase-I, it has been considered the area where longwall operation will be undertaken and it works out to be around 2.5 km2. For phase-II the mining area has been considered 4.5 km2.

The basic data considered by Contractor-

- Monsoon season (July to October) – 120 days
- Percolation of rain water into the mine through strata – 1/3 of Rain water
- Seepage from strata water 10% of inflow of water due to rain fall
- Hydrogeological co-efficient of water flow: 1.3 m3/Te
- Efficiency of pumping – 90%

Pumping Capacity-

The Contractor has assessed pumping capacity as follows-

For phase-I	=	127 Lps
For phase –II	=	230 Lps

Considering addition of water arriving out of spraying & other use at all the three districts (450 Lpm for Long wall + 250 Lpm for Bolter Miner +250 Lpm for spraying trunk Conveyors) which comes to approximately 16 Lps. In order to provide a

safety cushion of pumping to meet any emergency, a safety factor of 30% more capacity has been provided while assessing the total capacity of the pump.

Pumping capacity for phase-I = 186 Lps
Pumping capacity for phase-II = 319.8 Lps Say 320 Lps

Selected Pumping Equipment-

Total of 6 numbers of pumps including 2 standby having capacity of 80Lps, 180 to 220m head, 220-250 kW power have been proposed for longwall project by the contractor. Since the main sump will be at the main intake, all the electrical of main pump considered as Non-FLP type.

Additional 4 nos. of intermediate pumps of capacity 38Lps, 120-150m head and 100-132 kW FLP motor have been envisaged. There will be 2nos of compressor including 1 standby each having the capacity 500CFT/Min, and pressure 7Kg/cm2 for supplying compressed air to underground. Additional pumps for intermediate sumps as projected above will take care of accumulation of water in the depressions. However some places may not be self-draining and to deal with such situation pneumatically operated face pump has been proposed.

Delivery pipe line-

It has been proposed that there will be 6 no. of main pump each of 80 lps capacity in the final stage. Initially there will be three pumps each of 80 lps and subsequently with the expansion of the mining activity the no. of pumps will be increased to 6 nos. It has been proposed there will be three numbers 8 inch diameter delivery line from the main sump to the surface. The delivery range will be laid along the return airway and ultimately through the ventilation shaft.

The water will be discharged to the nearby Khodo Nala. Two pumps will be connected with each delivery line.

In addition to the main pump it has been proposed to install four numbers of intermediate pumps each having a capacity of 38lps at the final stage of the operation of the mines. There will be two numbers 4 inch delivery for the intermediate sump.

Dewatering of the old working-

A small patch of Seam no III of Muraidih mine was worked in the past by underground mining. This old working is now water logged. The adjacent Jogidih mine has also been worked by Underground Mining and the portion of the old working is water logged.

The pumping operation of Jogidih has to be continued and the water level is maintained at such reduce level (RL) which is beyond the stipulated danger area. However while laying the panels, adequate care has been taken by the contractor to leave barrier as stipulated in CMR.

Old working of seam III at Muraidih is on the rise most side. Seam I exists below the Seam III as such it would be necessary to dewater(if it is not extracted by opencast) the old workings of Seam III of Muraidih before extraction of panel no. 306 of Seam III and panel no. 107 of Seam I. It is proposed that at later stage a submersible pump will be installed in the old workings and the water in water logged area will be dewatered.

In this mining plan, it has been proposed to excavate the underground B&P working of Seam-III by opencast method. It has been proposed to continue opencast working in this area with floor of V/VI/VI seam as base. Hence, BCCL will continue the operation of pumping at the floor of the quarry bed has to be kept free of water logging in this area. Due to the operation of longwall retreating with caving method, the subsidence will come upto the floor of V/VI/VII combined seam while extracting seam III and seam I. It is suggested by the Contractor that BCCL will doze the surface of the OB dump so that the rain water can be guided to the natural course and prevent accumulation of water in the quarry bed in future.

Sump-

It is proposed to establish two main sumps, one at seam III & one at seam I on the dip most point of the mine as shown in the Longwall panel layout plan of Seam-III and Seam-I. However, temporary intermediate sumps will be there till main sumps are developed and establish. It is proposed to establish intermediate sump initially, at B&P Panel No:II in seam III Subsequently after development of B&P Panel No:III anD sma for the Seam-I.

Sump capacity-

Generally 48 Hrs. of water inflow are considered for establishing a Sump when sumps are located in the deep most point and seams are flat. The Contractor has considered the sumps capacity to hold 2 days of water inflow.

Thus, Sump capacity of main Sump will be, 320 lps x (48 x 3600) = 55296 litres (say 56 KL)

5.23.2.2 Proposed for Continuous Miner/SDL Project at Phularitand Colliery-

Proposed Pumping System-

Coal production has been proposed to start from III seam and then from I/II seams and it split section i.e Seam-I. At present seam III is partly developed. Initially accumulated water of this seam will be dewatered through incline mouth. A main dip is proposed in this seam keeping in mind the floor gradient of the seam and located on southern side of drift coal touch point i.e in panel P3-1. In this area, partly development has been made. After development of main dip in seam III, auxiliary/ intermediate sump will be made at the dip most part of the main dip i.e in Panel P3-15. This Intermediate sump has to be maintained till the underlying seam-I is completely extracted from safety point of view. Otherwise, during depillaring of seam I, accumulated water in auxiliary sump of seam III has to be brought down to seam I intermediate sump through bore holes driven from seam I to seam III.

It has been proposed that accumulated water from Auxiliary /Intermediate sump will be pumped to Main sump through pipe lines to be laid along one of the headings of maindip. From Maindip it will be pumped to surface through bore holes.

Seam-III will be extracted first and then underlying Seam-I. Development layout of Seam-I/II & Seam-I will be same as proposed in Seam-III. For construction of strata bunker in parting between Seam-III and Seam-I/II, development of Seam-I/II is to be made at initial period in this seam keeping superimposition of galleries with galleries of Seam-III. To pump accumulated water during this period, a temporary sump will be made on southern side of coal touch point in this seam by drift made from floor of Seam-III ti Seam-I/II combined. This sump will be used as main sump for workings of Seam-I/II & Seam-I. An auxiliary/

intermediate sump has also been proposed in this seam in the dip most point maindip of this seam i.e in panel P1-15.

It is proposed to gravitate seepage & spray water from all the panels / workings into the auxiliary sump in respective seams. The accumulated water from auxiliary sumps are proposed to be taken to the main sump through main trunk heading. Similarly, pumping water from main sump is proposed to be taken to surface through bore hole. During extraction of Seam-I/II & Seam-I, it is proposed to bring down the accumulated water in main sump of Seam-III to main sump of Seam-I/II and pumped to surface through boreholes from this sump.

Sources of Water-

Considering the location and the status of the proposed mining activity, the various possibilities of source of water during rainy season has been estimated as follows:

- Precipitation of direct rainfall into the proposed mining area.
- Seepage from overlying strata.
- Ground water.
- Water accumulation by spraying of water during cutting operation by Continuous Miner in panel and also water used spraying for dust suppression at coal dust generation places and transfer points.

General Considerations-

- Mine water is neither acidic nor basic.
- Pumping capacity for dewatering has been provided to pump out the entire make of water in 1 day with 20 effective hours in a day.
- Annual average rainfall in year : 1400 mm
- Mineable area at Phularitand Colliery and its annexed part : 3.41Sq. km

Make of Water-

Annual percolation of rain water into ground		397833m^3 / year
Maximum inflow of water (Q_1)		6631 m^3 /day i.e. 1013 gpm
Seepage water (Q_2)	:	210 gpm
Ground water (Q_3)		320 gpm
Spraying water for CM (Q_4)	:	150 gpm
Total make of water ($Q_1 + Q_2 + Q_3 + Q_4$)	**:**	**1693 gpm**

Pumping Capacity :-

Total Make of water (Q) = 1693 gpm

Let, Pumping hours per day = 20
Pumping capacity with 10% factor in wear in service -
= 1.1 x (Q x 24 / 20) gpm
= 2300 gpm (Say 2500 gpm)
Stand-bye pumping capacity = 1500 gpm

Selection of Pumps and Pumping System-

As per calculation the total make of water for this project has been estimated at 2300 gpm. To deal with this make to water a pumping capacity of 2500 gpm and stand-bye capacity of 1500 gpm has been proposed.

Proposed Main Pumps-

Total 5 nos. of main pumps (3 working + 2 stand-bye) has been proposed the main sump for dewatering accumulated water in the main sump. Details have been shown in table given below-

Proposed Auxiliary Pumps

Total 5 nos. of auxiliary pumps (3 working + 2 stand-bye) has been proposed in the auxiliary sump for pumping accumulated water in the auxiliary sump to main sump. Details has been shown in table given below-

Proposed Face Pumps

In each district a total of 3 nos. of face pumps will be installed. Thus in three districts, total 9 no. pumps shall be deployed.

The specification of face pumps are as under:

Rated head	-	30 m
Rated discharge	-	200 gpm
Operating power	-	9.3 kW, FLP

The specification of the above pumps is as under:-

Sl. No.	Description of pump	Quantity (wrkg+s-bye)	Cap. in gpm	Location
1	Main pumps 250m head x 280 kW x 3.3kV	2+1 = 3	1000	Main sump
2	Main pumps 250 m head x 150kW x 3.3kV	1+1 = 2	500	Main sump
3	Aux. pumps 150m head x 200 kW x 3.3kV	2+1 = 3	1000	Aux. sump
4	Aux. pumps 150m head x 90 kW x 550V	1+1 = 2	500	Aux. sump
5	Face pumps 30 m head x9.3 kW x 550V	7+2 = 9	200	District

The above pumps are to be replaced with the existing pumps presently being in use in this mine.

Delivery Ranges

Suitable length of delivery ranges of of M.S. black pipe of dia. 200/100/50 mm has been provided for the above pumps.

Proposed Sumps-

Auxiliary sump - Water from auxiliary sumps will be discharged to main sump through auxiliary pumps.

Main Sump- Water of the whole project collected in the main sump will be pumped out to surface through bore hole.

Sump capacity -

Rate of flow in m^3 / min	Capacity of Sump
More than 10	Not less than 7800 m^3

5.23.3 Opencast Mine Pumping Arrangement-

Existing -

The following pumps exist at Muraidih colliery to pump out water from mine.

Summary of existing Pumping

Sl.No.	PUMP	Head (m)	Power (kW)	Year of purchase/Life	Existing place
1	4000 GPM	150	700 KW, 6.6 KV	NA	SOCP Chitahi Patch
2	2000 GPM	120	250 KW, 3.3 KV	NA	SOCP Chitahi Patch
3	2000 GPM	90	220 KW, 3.3 KV	NA	SOCP Coal Face
4	4000 GPM	150	700 KW, 6.6 KV	NA	MOCP Coal Face Sump
5	4000 GPM	150	700 KW, 6.6 KW	NA	Pumping under repairing & motor is idle
6	2000 GPM	150		NA	B/D(Burnt)
7	1000 GPM			NA	B/D(Burnt)

The above exiting pumps will be utilized as on when required or may be transferred to other mines upto their life.

5.23.3.1 Proposed Pumping arrangement-

Following basic data considered for calculating make of water:

Life of the OC shall be 10 years**.**

Total OC area shall be approx. (A) 5.15 sq.km.

Maximum exposed area at any point of time A1 (33% of A): 1.70 sq.km, Area beyond excavation A2 (5% of A): 0.26 sq.km for, Internal dump area A3: 4.39 sq.km, Assumed Run-off co-efficients: For catchment area n1 = 0.60, for area beyond excavation n2 = 0.15, for internal dump area n3 = 0.10.

Seepage / inflow of water into the mine=10% of accumulated water.
Maximum rainfall in a day has been assumed 180 mm.

Pump Capacity-

Peak make of water has been taken as 286904 cum per day which will be dewatered in 5 days at the rate of 20 hours pumping per day. Pumping capacity per day thus worked out as 53 cum per minute i.e. 11600 gallons per minute (Say 12000 gpm). Considering 25% as reserved capacity, pumping requirement has been envisaged as 15000 gpm.

Selection of Pumps-

Provision of 15 nos. (12 working+3 stand-bye) of main pumps of 1000 gpm x 200m x 225 kW x 6.6 kV has been made on the basis of requirement of water accumulation in the quarry.

6 no. of auxiliary/face pumps of 145 gpm x 33 m x 7.5 kW x 440 V has been proposed to pump out accumulated water from faces and from other places of the quarry.

In addition, 1 no. of diesel pumps having capacity of 1000 gpm, 80 m head, 120 kW motor power have been proposed to deliver water directly to main sump. This diesel pump will operate at the quarry floor where power may not be available. Active face as far as possible should be kept dry.

It has been proposed to create main sumps at two different locations within the proposed amalgamated area. |One Main Sump will be located towards south-eastern corner of the proposed area and accumulated water will be discharge in to the Khodo

River flowing north-south direction. Another Main sump will be maintained at the south-western corner of the property as shown in plate no. XXVII. The accumulated water in this sump will also be pumped in to the Khodo River through pipe lines which is proposed to be laid along the southern boundary. It is to be kept in mind that underground mining operations will be carried out below these sump areas and has to be kept dry till the underground mining continues.

5.24 Power Supply –

5.24.1 Opencast-

a) Amalgamated Muraidih Open Cast Project:

I. Power Supply :

At present, the Colliery is receiving power at 11 KV from Madhuband DG Sub-station through one No. 11 KV O/H Line.

II. Existing Power Supply System :

At present, there is 01 No. main Substation for Power Supply to SOCP Patch of Muraidih Colliery. Power supply is being provided by three(3) Main Transformers :

1. Transformer. No. 1 : 1 MVA , 11 KV / 3.3 KV
2. Transformer. No. 2 : 1 MVA , 11 KV / 3.3 KV
3. Transformer.. No. 3 : 2.5 MVA , 11 KV / 6.6 KV

Transformer No.1 is primarily supplying Power to following Equipment :-

1. 2 Nos. Shovels of 3.3 KV, 255 KW Motors each.
2. 10 KVA 3.3 KV / 220 V Transformer for Face Lighting.
3. 500 KVA 3.3 KV / 440 V Transformer for Workshop.

Transformer No. 2 is supplying Power to following Equipment :-

1. 500 KVA 3.3 KV / 440 V Mobile Lighting Transformer for Chitahibasti Colony.
2. 10 KVA 3.3 KV / 220 V Transformer for Face Lighting.

Transformer No. 3 is being used for supplying power to following Machines :

1. 1 No. Shovel of 6.6 KV, 700 KW.
2. 1 No. HT Pump of 6.6 KV, 700 KW.

III. Existing Electrically Operated HEMM Equipment in Muraidih Colliery :

A. SHOVELS :

1. EKG 5.0 Shovels – 5 Cu. m. : 02 Nos.
2. 182 M Shovel – 10 Cu. m. : 01 No.

B. DRILLS :

1. RELC 650 : 01 No.
2. IDM 30 : 01 No.
3. IDM 31 : 01 No.

IV. Proposed Power Supply System :

Power Supply to the above mentioned equipment, may be provided from the existing Feeder Nos. 11, which are coming from Madhuband DG Sub-Station.

b) Phularitand Open Cast (Hired HEMM Patch) Project:

The existing Mine is being operated on Outsource Basis by M/s. Deco. There are no electrical Equipment, presently being used for OB & Coal Extraction. All machineries used in this outsourced patch are diesel operated.

5.24.2 Underground Power Distribution-

i) Muraidih U/G Longwall Project :

The Proposed Longwall arrangement for Muraidih U/G, as given by M/s. Minop Innovative Technologies Pvt. Ltd., includes the following equipment :

i) Surface & Underground Loads at 6.6 KV:

A. Surface Loads :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Main Fan	500	6.6 KV
2.	Compressor	450	
3.	Trunk Belt	800	
4.	Main Surface Haulage	150	
5.	CHP	225	
6.	Workshop	125	
7.	Office / Cap Lamp / Light	100	
8.	Filter Plant	150	

B. Underground Loads :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Longwall Gate Belt	500	**6.6 KV**
2.	Main Pump	1500	
3.	Aux Pump	396	
4.	UG Direct Haulage	150	
5.	Trunk Belt 2	500	

C. Longwall Face :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Shearer	1180	**6.6 KV**
2.	AFC	1050	
3.	BSL	375	
4.	Crusher	250	
5.	Power Pack	750	

D. Surface Loads :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Spray Pump	75	**6.6 KV**
2.	Endless Haulage	75	

ii) There are Surface & Underground Loads at 3.3 KV also :

a) Surface Loads :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Main Fan	500	**3.3 KV**
2.	Compressor	450	
3.	Trunk Belt 1	800	
4.	Main Surface Haulage	150	

b) Underground Loads :

Sl. No.	Equipment Description	Power Rating (KW)	Voltage Rating (KV)
1.	Trunk Belt 2	500	**3.3 KV**
2.	Longwall Gate Belt	500	
3.	Main Pump	1500	
4.	Aux Pump	396	
5.	U/G Direct Haulage	150	

As per the supplementary note submitted by M/s Minop, the layout of trunk headings will be changed from the layout as proposed in the final DPR. Hence in

actual condition, there will be little bit changes regarding transport system including belt conveyors. As per the supplementary note, there will be no changes in longwall panel /Gate road layout, proposed equipment specification, its operation etc except slight increase in length due to change of trunk headings. At present, the work is suspended by the Contractor since 01.06.2016 due to financial dispute with M/s Minop Consortium and BCCL.

Proposed-

Since the present power distribution system will continue to feed power to the existing system & there is no surplus capacity of transformers to cater the need of the proposed Muraidih underground-mechanized global bid project. Hence, to meet the additional requirement of power, it will be necessary to construct new substations for the proposed Muraidih underground mine.

Taking above into consideration, it is planned for a new power supply systems which will meet the requirement of the Muraidih underground mine. This, however, will not take care of the Power Supply to the colony as well as the pumps which will be installed and maintained by BCCL in the open cast mine & power supply to their existing projects.

The total connected load will be substantially high; there will be very high capacity equipment like Shearer, Bolter Miner, AFC, belt conveyor, etc. In order to ensure voltage regulation within the permitted operational limit, it has been planned to provide two (2) independent feeders of 33 KV from Madhuband DG substation or DVC Chandrapura or any other nearby substation of BCCL which will be reliable and meet the stable requirement of power demand of Muraidih underground mine. These two independent feeders will be terminated at the proposed surface substation to be constructed near the changed location “Y” as mentioned in the Supplementary note on approved DPR submitted by Ms/ Minop consortium.

iii) Continuous Miner / SDL project at Phularitand Colliery :

Source of Power Supply-

Power Supply to the following equipment, may be provided from the existing Feeder No.12, which is also coming from Madhuband DG Sub-Station.

There will be three (3) nos. of operating Panels. Out of which one is mechanised Continuous Miner panel and another two is SDL panels.

Equipment proposed in Continuous Miner Panel-

Sl. No.	Description of Equipment	Unit Power Ratings (KW)	Quantity (Nos.)
1	Continuous Miner	621	1
2	Shuttle Car	219	2
3	Load Haul Dumper	48	1
4	Twin Roof Bolter	74	1
5	Feeder Breaker	112	1
6	Auxiliary Fan	22.5	3
7	Face Pump	7.5	3
8	Endless Haulage	22	1

Following equipment are proposed to be installed in Standard height & low height SDL Panels:

Sl. No.	Description of Equipment	Unit Power Ratings (KW)	Quantity (Nos.)
1	SDL , Standard Height	48	3
2	SDL , Extra Low Height	48	2
3	Hand Held Drill Machine	1.1	1
4	Face Pump	7.5	1
5	Aux. Fan	15	1

In addition to the above equipment, following Belt Conveyors are proposed to be installed in underground and surface / Incline drivage:

Sl. No.	Location	Belt Conveyor	Unit Power Ratings (KW)	Voltage (KV)
1	In Maindip/ Mainrise trunk heading of Seam-III and then it will be shifted to Seam-I/II & Seam-I	C-1	2 x 150	3.3
2		C-2	2 x 150	3.3
3		C-3	1 x 55	0.550
4		C-3 A	1 x 75	0.550
5		C-4	1 x 75	0.550
6		C-5	1 x 55	0.550
7		C-6	1 x 55	0.550
8	In incline/drift drivage	C-7	1 x 90	0.550
9		C-8	2 x 150	3.3
10	In Panels of CM and SDLs	GBC -1	2 x 90	0.550
11		GBC-2	1 x 55	0.550
12		GBC-3	1 x 55	0.550
13		GBC-4	1 x 75	0.550
14		GBC-5	1 x 55	0.550
15	Pony Conveyor in SDL Panel		1 x 22	0.550

5.25 Workshop-

5.25.1 Existing-

Longwall Project-

The Contractor has suspended work at the proposed working site identified by them since 01.06.2016. Before suspension of work, they have made a shed near the incline site and presently it is unused. There is no construction activities is going on at the surface.

Longwall Project at amalgamated Muraidih Colliery-

ContinuousMiner/SDL Project at Phularitand Colliery-

At present, the phularitand Colliery is producing coal of about 300 tpd from underground by using SDL and transport of coal by series of haulages. A small workshop in temporary is maintained at the surface near existing inclines of Phularitand Colliery for day to day maintenance. For any major breakdown, repair work is done from area regional workshop.

5.25.2 Proposed-

Longwall Project-

As per the supplementary note on approved DPR, construction of different civil infra-structures will be made at three different locations due to land constraint. This locations are “X”, “Y” and “Z”as per the revised surface plan .MRD/RVSD/SUR/01. It has been proposed to construct the repair cum workshop at “X” location.

Repair cum Workshop:

This facility is envisaged to cater to all repair and working needs for the plants and equipment associated with the mining activity. This will be a steel building of about 33 meter x 17.5 meter plan dimension. Height to eaves will be 9 meter arrived at with due consideration of a 20te crane operation. The crane will be electrically operated with pendent control from floor level. The crane will run over crane girder made at the top. The crane girder will be supported over crane legs.

In this workshop, 6 bays of the shed are ear marked for different distinct activities as listed below starting from the entrance of the shed:-

I) Cleaning
ii) Heavy Machine Dismantling
iii) Welding
iv) Heavy Machine Repair
v) Machine Shop
vi) Electrical Repair
vii) Hydraulic Repair
viii) Hydraulic Testing
ix) Supervisor Bay
x) Store.

ContinuousMiner/SDL Project at Phularitand Colliery-

It has been proposed to enhance underground production by deploying Continuous Miner package equipment in one panel in this Colliery. Moreover, additional two number of SDLs is proposed in this Colliery.

Considering the above mining machineries, one small workshop having adequate maintenance facilities has been proposed for this project which is to be located near the Inclines of this mine.

This workshop will have following shops:

1.	Machine Shop	:	110 m2
2.	Store	:	80 m2
3.	Auto Shop	:	70 m2
4.	Washing Platform	:	30 m2
5.	Structural Shop	:	75 m2
6.	Smithy Shop	:	40 m2
7.	Carpentry	:	30 m2
8.	Electric Repair Shop	:	75 m2
9.	Mechanical Shop	:	75 m2
10.	Machining & Fabrication Shop	:	75 m2
11.	Office	:	60 m2
12	Common road for shops	:	120 m2
	Total	:	840 m2

Besides the above mentioned shops, the entire workshop has been proposed to be fenced with barbed wire covering an area 40 m x 25 m. Provision of security room at the entrance and common toilet have also been proposed as per requirement. This workshop will look after daily maintenance of the machine proposed for this mine. Provision of all tools and tackles are made for taking up the job of minor maintenance/overhauling of equipment proposed in this project. For any major repair work, it can be sent to regional workshop maintained at area level.

CHAPTER - VI

MANPOWER AND SAFETY

6.1 Manpower-

6.2.1 Existing-

Underground-

A) Longwall Project at amalgamated Muraidih Colliery-

At present, no surface as well as underground mining activities are going on within the proposed sites. Hence, no manpower of Contractor exists at the site. Since, inclines, shafts and sheds exist, BCCL manpower is being used for safety and security purpose.

B) Continuous Miner/SDL Project at Phularitand Colliery-

The total existing departmental manpower in Phularitand Colliery is 821 as on 31-11-2018. Out of the total manpower, surface manpower is 124 nos. and underground manpower is 697 nos.

The details of manpower break-up is given below-

Sl. No.	Parameter (Category wise)	BCCL		Total
		Surface	Underground	
1	Officer	02	23	25
2	Supervisory staff	30	38	68
3	Workers (T/R)	92	634	726
4	Workers (P/R)		2	2
	TOTAL	**124**	**697**	**821**

Opencast-

Departmental OC manpower at amalgamated Muraidih Colliery-

Sl. No.	Parameter (Category wise)	BCCL			Total
		Surface	Opencast	Underground	
1	Officer	4	43	Nil	**47**
2	Supervisory staff				**0**
3	Workers (T/R)	300	595		**895**
4	Workers (P/R)		154		**154**
	TOTAL	**304**	**792**		**1096**

Hired/Outsource Patch at Phularitand Colliery-

It has been stated earlier chapter that one opencast/ HEMM patch is in operation in Phularitand Colliery on hired/outsourced basis. As per the data submitted by mine authority, the total manpower engaged in this Hired Patch is 31. Details of manpower is not available with the mine Authority.

6.2.2 Proposed-

Longwall Project-

Details of Manpower proposed to be deployed by the Contractor in longwall project are not available.

Continuous Miner/SDL Project at Phularitand Colliery-

A tentative manpower for this part of workings is proposed as 720 for achieving of target production of 0.6 Mty. Out of this total manpower, underground manpower has been assessed as 495 and surface manpower as 225

Sl. No.	Parameter (Category wise)	BCCL		Total
		Surface	Underground	
1	Officer	18	8	**26**
2	Supervisory staff	61	64	**125**
3	Workers	416	153	**569**
	TOTAL	**495**	**225**	**720**

Opencast-

Proposed-

Presently opencast is being done departmentally in amalgamated Muraidih Colliery and on outsourced basis at Phularitand Colliery.

In amalgamated mining plan for Muraidih-Phularitand(part) Colliery, the opencast work is proposed to be done as a single mine considering the total area after amalgamating of above two separate quarries stated in earlier paragraph. The operation of this opencast may be carried out by outsourced method or by departmental method depending on BCCL. Hence, equipment as well as total manpower is not assessed and also not given in this mining plan.

6.3 SAFETY:-

Mining operation is required to follow statutory mine safety rules administered by the DGMS. Planning, Design & Electrical installation will be taken into account and comply with the existing electricity rules. To create safety awareness and impart education on safe practices, safety weeks will be organised, code of practices will be enforced risk assessment and mitigation measures etc will be adopted.

6.3.1 Underground Safety Provisions-

As stated earlier that, the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery has two separate mining sections /units with different mining methods. One is existing amalgamated Muraidih Colliery on the eastern part where opencast working is going on departmentally with floor of V/VI/VII seam as base. Below this area, a mechanised Longwall project is approved by BCCL Board for extraction of underlying Seam-III and Seam-I on turnkey basis by underground mining method. The area designated for longwall project is not covering the total amalgamated area of existing amalgamated Muraidih Colliery. Hence, rest of the area of existing amalgamated Muraidih Colliery is proposed to be annexed with the part of the property of existing Phularitand Colliery falling in Cluster-III. In this Colliery, Seams upto V/VI/VII combined are being extracted by opencast method on outsource basis and underlying Seam-III and Seam-I/II combined along with Seam-I (split section) is proposed to be extracted by underground mining method. At present, development of Seam-III in this Colliry is going on with SDL-haulage combination.

6.3.1.1 Gassiness of Seams and its workings-

The study for ascertaining of degree of gassiness for Seam-III and Seam-I in amalgamated Muraidih Colliery has not been carried where longwall project is proposed. However, these seams has been worked in adjacent Jogidih Colliery where these seams are categorized as Degree-I gassiness. Considering the same, the seams to be extracted by longwall method is also

considered as Degree-I gassy seam. It has to be ascertained as soon as mine is developed in Seam-III as well as Seam-I and also at frequent interval.

In Phularitand Colliery, the seam-III is under development and it has been categorized as Degree-I gassy mine. For Seam-I/II combined & Seam-I, it has to be ascertained when it will be developed and such study should be carried out at regular interval with the progress of mine workings in both seams.

6.3.1.2 Precautionary Measures to prevent explosions due to firedamp-

- To avoid accumulation of firedamp adequate ventilation must be provided to keep the limit well below the lower limit of explosion.
- Avoid sources of ignition, to avert explosion of accumulated firedamp.
- In addition to the provision of proper and adequate ventilation, regular inspection of all places will be done so as to avoid any accumulation of firedamp.
- Prevention of accumulation of coal dust on all flameproof motors, switchgears and transformers present in development and longwall panels will be done and timely dissemination of the coal dust, if any, accumulated over these structures will be strictly implemented on regular basis.

6.3.1.3 Inundation-

Surface water source-

Longwall Project area-

The eastern and northern boundary of Muraidih Longwall underground Project is bounded by Khodo nala which is a seasonal one but during rainy season, huge water from catchment area of northern side flows through this nala. In the western side of the property there are local nala's which are feeding this khodo nala. The Muraidih project area of 4.76 Sq. Km. has an undulating topography with a gentle slope towards east to south. The original topography of the area has since been severely damaged due to large scale mining activities mainly by open cast and partially by UG method. Drainage of the surface area surrounding the OCP's is controlled by seasonal khodo river/nala. The nala flows from north to east in the

northern part of the property and then changes it course towards south and limits the eastern boundary of the existing amalgamated Muraidih project.

On surface plan, it has been shown that the eastern side quarry edge of this project has been extended beyond Khodo nala i.e. quarry edge has crossed the khodo nala as per mine authority after extraction of coal, course of the nala has been restored and maintained by filling Over Burden, stone pitching, etc. This they have done to avoid inrush of water into the quarry especially during monsoon. This might a vulnerable source of danger towards inundation by surface water as such it will be necessary to keep round the clock vigil during monsoon especially when the water flows near the danger level. The Khodo nala has a past record of 197.43m as highest flood level as shown in surface plan. As per DGMS stipulation, substantial coal to be left as safety barrier if mining to be done below. In order to maximize the coal recovery & ensure higher safety, it has been planned to divert the Khodo nala beyond the Northern boundary. The coal whatever is available within the economic range of open cast mine are to be taken out before the last few panels of Seam III are extracted.

Protective works-

- Mine entries including mouth of Air shaft & Fan drift have already been made considering provision as stipulated in CMR i.e 3m above the highest known flood level in the region to prevent rain water from entering into the mines through the entries.
- Before approaching a bore hole it will be ensured that it has been suitably and effectively cement grouted and does not connect to any UG/surface water body.

Precaution during Extraction-

- In order to avoid any accumulation of water on the floor of already excavated V/VI/VII combined Seam, BCCL will propose a comprehensive back filling Plan and overburden are properly dozed so that all the rain water takes its course to flow to the khodo nala. Earlier as well as at present, over burden is being dumped on the floor.

- it is most important to have a proper surface contour survey conducted prior to depillaring operation and the effect of subsidence on surface drainage are to be assessed. This would help to plan effective filling of surface cracks/subsidence trough which may occur due to caving operation.
- Garland drains are to be made prior to start of extraction of panel so that the flow of rain water is kept away from the proposed depillaring area to safe place
- The panels have been laid from rise to dip (i.e. towards trunk road ways) this will ensure self-drainage of the panels and no water would accumulate in goaved out areas.
- It has been proposed to depillar from top to bottom i.e. Seam III will be extracted first and then Seam I will be extracted later, so it is proposed that the panels which will be formed well before start of depillaring operation will be sealed off for better ventilation of the working panels.
- During reopening of sealed off developed panels the procedures stated in the CMR 2017 and DGMS circulars will be strictly followed.
- Overlying quarry will be dewatered. Study of Dump will be made in the context of Fire and sufficient quenching and blanketing will be made.

Underground Pumping-

Although CMPDIL had assessed the relative rate of percolation of water to be in the range of 100 Lps considering that there will be no accumulation of water from the floor of Seam V/VI/VII into underground. Most of the rain water will be suitably guided to take its course to Khodo Nala. Pumping capacity and no. of pumps required for this longwall project have been worked out so as to take care of heavy dewatering required during the monsoon period. Main sump has been proposed of adequate size at the dip most point of both the Seams and sufficient no. of standby pumps have also been envisaged.

Continuous Miner/SDL Project at Phularitand Colliery area-

Source of water from surface-

Within the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery, there is no major source of surface water in western part i.e in Phularitand Colliery except few ponds lying on surface. In this part, earlier

excavated old quarries are filled with OB dumps. The running Hired HEMM quarry is maintaining a sump on the floor of V/VI/VII combined Seam and accumulated water is regularly pumped out from the quarry to the surface. The excavated area is backfilled with the progress of quarry face. Hence, threating of water for underground workings from quarry is less.

It is envisaged that garland drains shall be made on surface around the abandoned quarry so as to carry rain water and surface run off away from the mining area to the nearest drain / Jore. No surface water accumulation shall be allowed on surface/Quarry floor. Suitable monitoring arrangement shall be established and maintained to monitor the water in rainy season to prevent any sudden inrush of rain water from the adjoining area.

All precautionary steps viz. erection and maintenance of retaining wall along the incline mouth, regular de-silting of drain bed should be done to prevent inrush of rain water from the adjoining area to the combined seam abandoned quarry (P.B Section).

Underground source of Water-

Within the proposed area of exploitation, XIII seam is exhausted. XI/XII seam is mostly depillared and partly standing on pillar, mostly waterlogged. IX/X seam is mostly standing on pillars and partly depillared. VIIIC, VIIIB and VIIIA seams are partly worked on the rise side and virgin on the dip side. The developed workings in these seams are waterlogged on the dip side.

Below VIIIA seam, V/VI/VII seam has been worked in three sections by underground method and is partly depillared, partly standing on pillars and mostly virgin on the dip side. The dip side developed working of V/VI/VII seam is partly waterlogged. Though, some part of the old workings are being excavated by opencast working but towards western side of D B Road, B&P workings exist which are unapproachable, waterlogged and also inter connected at places between seams. The stone parting between V/VI/VII and III seam within the proposed area of exploitation varies from 53m to 58m and therefore attracts the provision of CMR 127 pertaining to development of the seam below waterlogged area. Therefore, for development below the

waterlogged working of V/VI/VII seam where seam is not extracted, permission from the DGMS is required to be obtained.

Moreover, some exploratory boreholes exist within the property which are drilled from surface to Seam-I mostly on eastern side of the property and these boreholes are passing through the waterlogged workings of the upper seams Hence, under this circumstance, any inadvertent joining of these boreholes to the development galleries, during Bord & Pillar development of III Seam, may endanger the underground mining operation in III seam. It is, therefore, suggested to take necessary precaution while development is going on in III seam below the waterlogged workings of upper seams and suitably grouted by cement grout. The inclines of Phularitand Colliery are made from the quarry floor of V/VI/VII combined seam.The surface rain water over the catchment area enters into this abandoned quarry (P.B Section) during rainy season. The rainwater takes course to the underground working from this quarry through the inclines mouth. The overburden dumps on the floor of combined seam is not following any pattern. This may lead to formation of depression which may take shape of water body during rainy season. Hence, Garland drains will be made around the quarry so that rain water does not enter the quarry area. Proper care shall be taken so that rain water of the quarry area is accumulated at the dip side of the quarry and from there; it is pumped out to the nearest surface drain.

6.3.1.4 Dust Suppression Measures-

Underground workings-

Stress should be given to suppress the dust at the source of generation to control the air pollutants. All the cutting drum of the shearer & Bolter Miner will have adequate dust suppression.

Effective water spaying arrangement at the face, road ways & all transfer points will also be made, The velocity of air in belt conveyor has been kept not more than 4 m/sec and the belt speed not more than 2.5 m per sec with a view to prevent generation of air borne dust as far as practicable. Sufficient man power has been provided for cleaning of belt conveyors. In

Continuous Miner equipment, dust extractor is interlocked with water supply and spraying arrangement which are inbuilt so to reduce generation of the fine coal dust. All the precautions for suppression of dust as specified under CMR- 1957 will be taken.

In view of dust being airborne, gravimetric dust sampler is provided for determination of concentration of airborne dust in workings. Work persons shall be provided with dust masks and the exposure of persons to the dust is determined regularly at stipulated intervals with personal dust samplers.

Measures to prevent Coal dust explosion -

- Reducing the formation of coal dust at the source i.e in the working faces, haulage roads etc.
- Preventing it to become airborne and its spread.
- Rendering the coal dust harmless by wetting it with water or mixing the same with inert stone dust.
- Making provision of stone dust barriers or water barriers.
- Water spraying at coal transfer points,
- Dust at the transfer points should be collected with use of dust extractors at vulnerable places.

6.3.1.4 Precautionary Measures against Fires and Spontaneous Heating/ combustion-

Sponteneous Heating-

Longwall Panel-

Adequate measure will be taken to seal off the old working and worked out areas. Capacity of the equipment is so selected that the depillaring operation to be completed to extract the coal within the incubation period. Moreover it has been proposed to extract coal full Seam in one lift so that no loose coal is left in the goaf. Proper cleaning of loose coal and stone dusting of the working will also be done regularly to prevent spontaneous heating. Since the parting between V/VI/VII combined seam and Seam-III is less, surface subsidence will reach to the floor of the seam and also at surfaces on the northern side of the property. Surface/ Floor cracks over goaved out areas will be filled properly so that breathing of air into underground workings does not take

place. For this, leveling of overburden dump in the excavated is necessary and to be adopted to make the underground workings safe from spontaneous heating or fire transmission from the floor of excavated seam.

Continuous Miner Panel-

In addition to above precautions, care should be taken against spontaneous heating and outbreak of fire due to friction and operation of machines in underground. For this inbuilt spraying system with cutting head is provided in Continuous miner. Panel system of working has also been proposed. Each panel will be isolated by barrier around it with minimum number of openings required therein for ventilation and transport. The panel size has to be so selected that depillaring could be completed within the incubation period. Additional precaution shall be taken along the conveyor route to check the smooth rolling of idlers. The jammed and broken idlers shall be immediately replaced. Firefighting equipment shall be provided at suitable locations to meet any eventuality of outbreak of fire.

SDL Panel-

In this panel, coal will be extracted by solid blasting at face using permitted explosives. Hence all approved code of blasting practices should be strictly followed and all blasting operation will be carried out under the supervision of Shot Firer, Mining Sirdir and Overman. Explosive and detonators should be kept at deginated place before commencing of blasting operation. All exploder or blasting equipment should be tested at surface before taking into underground and always kept under the supervision of Shot Firer or Mining Sirdir.

Other precautionary measure to be taken as follows-

- Panels are to be worked within incubation period
- Monitoring of CO/CO2 ratio in main return air way of panels as well as the main return of the mine.
- Provision of escape route and marking the same on Plans from accident prone area are to be maintained properly.
- Inflammable materials will not be stored in UG except in permitted/authorized area, Due precaution will be taken in use of welding, repair of FLP electrical etc. of UG apparatus so that no fire does result.

Therefore, precautionary measure as per circular will be observed fully on use of welding in Under Ground.

- Install the electrical cables and equipment with due cares and maintains them properly with regular inspections.
- Use of only approved safety lamps, which should be taken underground in locked condition.
- Sufficient quantity of fresh air should be circulated through the workings to dilute the inflammable and noxious gases within permissible limit to render them harmless. Competent persons with gas testing certificates should be authorized for operation of auxiliary fans in a district. Sufficient number of methanometer and gas detectors has been provided to supervisory officials for checking of gas during inspection of working faces.
- Stone dust barriers are to be provided at required places to guard against propagation of flame and shock front in the event of explosions.
- Provision is to be made for quick/speedy isolation of areas affected by spontaneous heating by using inflatable or other suitable type of stoppings.
- For Longwall panel operation in Muraidih Colliery, the Contarctor has conducted borehole gas emission test through scientific agency and as per the study report Muraidih mine has got gas emission rate as low as 0.36 m^3/t coal under category of degree-I, adequate ventilation has be provided to dilute accumulation of CH4 and action will also be taken, so that the ventilation standards as specified in CMR 2017
- Continuous monitoring of CO, CH4, O2 and other gases by tele-monitoring system which uses underground sensors at strategic locations and provides immediate analysis of the air is contemplated.
- Effective means of transmitting signal and other means of communication have also been envisaged. Intrinsically safe apparatus will be provided where ever needed.
- Sufficient illumination &Lighting at all the place where the persons have to work or pass through will be provided.
- Provision of training of the persons so that they do their work in a safe manner has been provided.
- Permission regarding method of work and use of machineries like Continuous Miner, Bolter Miner, PSLW equipment, etc, will also be taken from DGMS before commencement of work. Permission will also be taken to do blasting to induce caving if required from DGMS.

6.3.1.4 Roof Control –

Trunk headings and road ways within panel have been proposed to be supported by quick setting resin bolts/full column cement grouted bolts, depending on the strata condition as per “rock mass rating” studies. In bad roof condition the above support system would be strengthened by steel channel or W- strap. Roof bolting with resin capsules is proposed as main method of roof support in trunk roads. Powered roof supports are proposed in face during Longwall working and hydraulic Open Circuit hudraulic props in Gate roads up to 30m or more from the retreating face depending on roof behavior. This will improve the safety of persons and equipment in caving district. Bolting density is to be increased at the junctions of interconnections and bad roof areas. In bad patches and near the fault plane, additional supporting with w-straps or rope stitching is proposed to reinforce the strata.

In gate roadways of Longwall panels, side bolting in chain pillars will be made if the pillar size are inadequate or there is any symptoms or indication of danger of crushing of chain pillars However, it is suggested to design and implement the support system after a thorough scientific investigations and study as the workings progress greater depth. Side bolting (like GRP / FRP) bolting may be installed in side of the pillars of board & pillar workings as well as gate roads because huge overburden dumps are being made on the floor of opencast workings. The parting between floor of V/VI/VII combined seam and Seam-III is less which may cause spalling / pre-mature crushing of standing on pillars in Bord & Pillar panel or in Chain pillars of gate roads.

The land use plan shows that majority of the land owned by BCCL and excavated but some portions of the land on the nort-western side within the demarcated Project area of Muraidih-Phularitand (part) Colliery are still to be acquired. On northern part of Phularitand Colliery i.e northern side of V/VI/VII combined seam incrop, acquiring of land is a mjor constraint and it has been decided in the meeting that no depillaring will be made in this area so that subsidence not reaches to surface. The depth of cover for Seam I & III ranges from around 48 m - 200 m approx. The thickness of the coal for Seam I & Seam III are in the working range of 2 to 3 m and 2.5 to 5.8 m respectively. It is evident that the surface subsidence will occur when the coal will be

extracted by longwall mining method in the area of amalgamated Muraidih Colliery. It will therefore be necessary to acquire the surface land above the proposed longwall panels and it is presumed that BCCL will take appropriate actions to acquire those lands in time.

Subsidence Management –

Considering the impact of subsidence on surface topography and surface feature, the following subsidence management aspects are required to be undertaken to overcome or to minimise adverse effects.

- Surface cracks likely to develop due to subsidence over the mining area need to be filled up properly and regularly by clay and stone chips (by dozing and compacting back filled dump areas), and thereafter with about 0.3 m high clay heap over the cracks. It will help in retaining the original /reorganised drainage pattern and run-off water over the mining area, improving the water retention capacity of the soil, minimising top soil erosion and chances of underground inundation and spontaneous heating/fire.
  - A team is to be formed by the mine management which will be responsible for the proper and regular filling of surface cracks developed due to subsidence. The team will also maintain records of the development and filling of surface cracks. Adequate supply of filling materials should be arranged by mine management at the site.
  - Subsidence may result in depressions on the surface with accumulation of water during the rains. Such accumulation of water may be beneficial for vegetation in the area. These water bodies may be retained wherever possible or drained out by cutting drains depending on safety of the underground workings.
  - Surface drains should be made outside of the subsidence influence area to prevent the surface water of adjoining area from coming into active subsidence area.
  - Proper precaution has to be undertaken while depillaring /extraction in the panels below and near surface features, e.g. sufficient coal barrier need to be left against surface feature considering the angle of draw of 30^0 to avoid any damage to the surface structure/feature.

- Water bodies or ponds exist on surface and may fall within the subside area. Hence, these water bodies or pond over the mining area should be filled up and dried up before the commencement of depillaring operation below them and maintain.
- Provision has to be made for plantation over the reclaimed subsidence area. At present plantations are being done over the dumped area in large scale.
- It is recommended that while carrying actual depillaring/extraction in the panels, close subsidence monitoring is to be carried out over some initial panels for caving methods. On the basis of observed data, necessary correction can be made accordingly in subsidence estimation, if required.

6.3.1.5 Escapse route-

All galleries in underground should be clearly marked to use as escape route and also mark on the Emergency plan showing the escape route from underground workings to surface. The Plan should be made available in underground at strategic places and should be in knowledge of every underground worker. A mock rehearsal should be carried out at interval for this purpose.

6.3.2 Opencast Safety Provisions-

Safety-

Safety of men and machine deployed in the mining area should be properly taken care of irrespective of whether the mining activities are performed by departmental or by outsourcing option.

All the regulations & schedules of Coal Mines Regulations 2017 relating to opencast mining and other circulars issued time to time have to be adhered to and implemented in order to maintain day to day safety precautions as per stature. The following precautions should be taken during opencast mining operations.

Surface Features :-

i) Before starting any quarrying operation all structures / dwellings if any located with 100 m distance from the proposed area shall be vacated and rendered uninhabitable and no blasting shall be done within 100 m

of both sides of any High tension line and its trestle, passing through the proposed area, if any.

ii) The management shall indemnify any person who may be affected and owner of any surface structure in case of damage or loss to any life or property arising out of aforesaid mining operation.

iii) Hot overburden excavated during mining operation or any hot material or ash shall not be deposited on any outcrop of coal or in opencast workings or in any ground broken by extraction of coal.

iv) Water pool shall be constructed above entire fire affected area after filling it with mutti / inflammable material and shall be maintained effectively.

v) After completion of operations, excavated area shall be filled with incombustible material and restored to the original ground level within the period not exceeding three months voids formed due to excavation in the quarry shall be back-filled simultaneously with coal extraction.

vi) An embankment 3.0 m above the HFL and 3.0 m wide at top with sides sloping at an angle of 45 degree pitched with slope shall be built along the river and Jore at places where the R.L. of the ground containing the edges of the quarry 3.0 m less than the HFL at the River or Jore.

Opencast Workings :

i) Before starting a mechanised opencast working, method of working, ultimate pit slope, dump slope and monitoring of slope stability, has to be planned, designed and worked as determined by a scientific study and the recommendations made in the report of scientific study should be complied.

ii) The height of the benches in overburden consisting of alluvial soil, morum, gravel, clay, debris or other similar ground shall not exceed 3 meters and the width thereof shall not be less than three times the height of the bench.

The height of benches in coal and overburden of rock formation other than that mentioned in above shall not be more than the digging height

or reach of the excavation machine in use for digging, excavation or removal, and the width thereof shall not be less than -

(a) the width of the widest machine plying on the bench plus two meters; or

(b) if dumpers ply on the bench, three times the width of the dumper; or

(c) the height of the bench, whichever is more.

iii) Adequate precautions shall be taken to ensure dressing of the side. Special care shall be taken, when any slip or other plane of weakness or other geological disturbance exists, so as to prevent danger to the work-persons.

iv) No person shall be engaged to work or allowed to travel close to high sides / benches from which he is likely to fall vertically down, unless he is provided with and uses a safety belt or rope.

v) Final pit layout should be maintained keeping in mind the stability of OB dumps and highwalls

Fencing Around Opencast Workings :

i) The top edge of the opencast working shall be kept fenced with wire rope strands or barbed wire, supported by posts of timber, iron or concrete (movable). The gap between the adjacent rope strand or wires shall not be more than 0.30 m and bottom most rope, strand or wire shall not be more than 0.25 m and the topmost rope, strand or wire shall not be less than 1.0 m from ground level.

ii) At the finishing stage, opencast working shall be fenced with a masonry wall using lime mortar not less than 0.40 m thick and not less than 1.2 m high, with a parapet top.

Spoil Banks :

(1) While removing overburden, the top soil shall be stacked at a separate place, so that, the same is used to cover the reclaimed area.

(2) The slope of a spoil bank shall be determined by the natural angle of repose of the material being deposited but, in any case, shall not exceed 37.5 degrees from the horizontal:

(3) Loose overburden and other such materials from opencast workings or other rejects from washeries or from other sources shall be dumped in such a manner that there is no possibility of dumped material sliding.

(4) Any spoil bank exceeding 30 metre in height shall be benched so that no bench exceeds 30 metre in height and the overall slope shall not exceed 1 vertical to 1.5 horizontal.

(5) The toe of a spoil-bank shall not be extended to any point within 100m of a mine opening, railway or other public works, public road or building or other permanent structure not belonging to the owner.

(6) A suitable fence shall be erected between any railway or public works or road or building or structure not belonging to the owner and the toe of an active spoil bank so as to prevent unauthorised persons from approaching the spoil-bank.

(7) No person shall approach or be permitted to approach the toe of an active spoil bank where he may be endangered from material sliding or rolling down the face.

(8) Adequate precautions shall be taken to prevent failure of slopes of the spoil banks or dumps.

Haul Roads :

i) No road shall be of width less than three times the width of the largest vehicle plying on road plus 5.0 m.

ii) All corners and bends in roads shall be made in such a way that the operators of the vehicle shall have a clear view for a distance of not less than 3.0 times the breaking distance of largest vehicle playing at speed of 40.0 Km/Hour.

iii) Wherever it is not possible to ensure clear visibility of the operator for a distance as specified in Clause (b), there shall be provided two roads of width not less than 2 times the width of the largest vehicle plus 3.0 m with a strong road divider in between having adequate lighting and reflector along the divider.

iv) Where any road is existing above the level of surrounding area, it shall be provided with strong parapet walls / embankment of the following dimensions:

1. Width at top-not less that 1.0 m.
2. Width at Bottom-not less than 2.5 m.
3. The height not less than the diameter of tyre of largest vehicle playing on road.
4. It may be noted that just dumping of mud or overburden shall not treated a strong parapet wall.

v) No road shall have a gradient steeper than 1 in 16.

vi) Ramps with 1 in 10 gradients shall not be more than 50.0 m at one stretch. Ramps shall be used for crawler mounted machines only and not for tyre mounted machines.

vii) Separate haul road shall be provided for light vehicles plying in the mine premises. Where it is not practicable, definite turnouts, crossing points and waiting points shall be designated for use of vehicles.

viii) Pedestrian or two wheelers shall not be allowed to travel on the haul road made for trucks, tippers, dumpers or other mobile machinery.

ix) Road signs with fluorescent paint shall be provided at every turning point for guidance of drivers especially at night times.

x) At every curve, parapet walls or vertical posts with 'Zebra' line shall be provided to help the drivers to keep the transport vehicle on the track especially at night times.

xi) Suitable drainage system shall be provided and maintained on one side of the haul road.

Where special condition exists, the Regional inspector may permit the haul road to be maintained in variance of aforesaid conditions

6.3.2.1 Safety Aspects For Of HEMM / Equipment-

Special precaution should be taken while deploying workers in the mine. Before employing any labour to the mine proper vocational training should be imparted. Some of the major aspects are as follows:-

A) For persons:

i) No persons shall be deployed unless he is initially trained. Records of Vocational training Certificate and driving license of operators shall be kept by competent authority and shall be made readily available for inspection by management.

ii) No person shall be employed unless person holds VTC. A record of it shall be maintained.

iii) Adequate supervision shall be maintained by qualified competent persons only.

B) For Machineries as recommended by DGMS Cir. (Tech.) 1 of 1999:

i) All the machineries to be deployed in mines should be checked before deployment by competent authority.

ii) A proper record of repair and maintenance along with inspection done by competent authority and defect pointed out shall be maintained and signed by authorized person.

iii) All the equipment shall be provided with audio-visual alarms,

iv) When natural light is not sufficient, proper light for use at night

v) An audio-visual alarms for reversing on trucks shall be provided.

vi) Machine manufacturers should be asked to give risk analysis details in respective machines deployed

vii) Suitable type of the fire extinguishers shall be provided in every machine.

C) General:

i) No person/vehicle shall be deployed at any place other than authorized place.

ii) All workers should obey lawful instruction of mine management.

iii) Risk Management Plan of tipper/pay loader shall be made and implemented.

iv) All drivers shall obey systematic traffics rules prepared by management.

v) Before deploying workers they must be trained and briefed about safety aspects in opencast mine. However during course of execution

of the work, if any accident occurs whether major or minor, the matter shall have to be immediately informed to mine management, i.e. Colliery Manager/Agent/GM of Area so that Notices of accidents in a accordance of (Reg.8 of CMR 2017) and Section 23 of The Mines Act 1952 may be given and other necessary steps may be taken in accordance with the Mines Act 1952.

viii) Mine authority shall operate transport system in such a way so as to minimize pollution in the mine.

6.3.2.2 Stability of Benches, Quarry Highwalls and Spoil Dumps:

Before starting a mechanized opencast working, the owner and agent of the mine shall ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability has been planned, designed and worked as determined by scientific study and copy of the report of such study has been kept available in the office of the mine.

Provided that in case of mines where such a study has not been made, it shall be the responsibility of the owner and agent to get the said study made within one year from the date of coming into force of these regulations

In opencast mines, slope failure takes place mainly due to:

i) Shearing effect on rocks
ii) Ground water pressure
iii) Geological disturbance etc.

Shearing effect occurs due to gravity loading, shock & seismic vibration. Shock & seismic vibration can be minimized by adopting control blasting techniques. Gravity loading can be minimized by controlling the kinetic load of dumpers by preventing over speeding while running on the benches.

Since the seams are developed, problem of ground water pressure is not likely to be faced in developed part of the project. Adequate pumping provision has been made which will reduce the ground water pressure.

Bench parameters shall be adopted as mentioned in the report. However, during actual mining operation, the condition of benches & dumps should be closely observed at regular intervals and the dimension is to be modified as and when required. Working benches and spoil dumps shall be kept under constant vigil to mark any development of crack.

During quarry operations, it is necessary to adopt required mining parameters for the stability of benches, high walls and spoil dumps. It is also mandatory to examine systematically the fencing of mine workings, landslides and cracks between benches. It is required to maintain well-graded and wide roads on benches keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment.

During actual mining operation, systematic observations of the condition of benches, high wall slopes and spoil dumps should be carried out and the dimensions be modified if necessary to suit the local conditions.

6.3.2.3 Measures to be taken for Fire Fighting and Fire Prevention:-

The excavation of fire area will be required during quarry operation. Therefore, method of work as discussed in fire dealing measures and other statutory provisions in this respect must be adhered to while working in the fire zone. However, the method may be improved / upgraded after suitable scientific field trials.

During implementation of the fire dealing measures and excavation & dumping of hot materials, monitoring of status of fire, its movement, temperature condition and efficiency of fire dealing measures, is to be done regularly. Even on dump sites, such a monitoring is required so that quenching can be done in time to avoid dump fire.

In addition to statutory provisions, the measures for fire-fighting and prevention of fires are as follows:

1) Organisation of special cell for systematic observations to examine and prevent fire.
2) Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating.

3) Storage of lubricants and cotton waste in enclosed fireproof containers in working places.
4) Provision of fire extinguishers has to be made

6.3.2.4 Precautions against danger of Inundation from Surface Water.

1) A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions should be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rainwater from coming into the mine.
2) Inspections for any accumulation of rainwater, obstruction in normal drainage and weakening in embankment.
3) Standing order for withdrawal of working persons in case of apprehended danger.
4) During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.
5) Nallah or water inlets may be diverted or isolated by embankments if so required.
6) Every year, during the rains constant watch shall be kept on the flood levels on the surface of the mine and if at any time the levels cross the highest levels earlier recorded, such levels shall be marked by permanent posts along the edges of water and the new highest levels thus observed shall be recorded with the date as the highest flood level on the plans by an actual survey.

6.3.2.4 Protection of Equipment deployed at Bottom Horizons from flooding:

During the heavy monsoon period, the mining operation in the lower-most bench may have to be stopped. Therefore, it is proposed to drown the lower-most bench, which would work as a sump. The water will be pumped out and discharged into the nearby khodo River flowing on eastern side.

For ensuring safety of the equipment while working out bottom horizons with no access to surface profile, the following measures should be taken:

1) Drivage of initial trenches if any and coal cutting on bottom benches should be done during the dry period of the year.

2) Ramps should be made for quick shifting of equipment from bottom horizons, liable to be flooded during monsoon period, to the top horizons.

6.3.2.5 Prevention of Electric Shocks:

During mining operations, all the statutory provisions of the CEA Regulation 2010 (Measures relating to Safety and Electric Supply) and Indian Standards for installation and maintenance of electrical equipment etc. should be observed.

1) For protection from electric shocks to persons, all electrical equipment with voltage up to 1000V should be provided with Earth Leakage Relay, which will automatically disconnect electrical circuits.
2) Closed mobile substations and switchgears should be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation.
3) All metal parts of electrical equipment should be properly earthed to avoid failure of insulation.
4) All H.T lines and cables located within the blasting zones should be disconnected during charging & blasting operations.

6.3.2.6 Dust Suppression & Dilution of exhaust fumes :

The following measures should be adopted for dust suppression at all quarry working places, dumps, haul roads, CHP and near other auxiliary mining operations.

1) Spraying with water on all working faces & haul roads, by special spraying machines or water-sprinkler.
2) While drilling holes, it is necessary to use dust extraction devices.
3) Installation of local dust suppression in cabins of excavators and drilling rigs may be considered.
4) Leveling of spoil dump surface.
5) Separate dust suppression arrangement should be provided for CHP.

To prevent collection of harmful mixtures in the atmosphere, from the different sections of quarry workings, it is recommended:-

To spread out the sources of dust formation and omission of harmful gases throughout the working area of the quarry-

1) Drilling & blasting operations should be timed for periods of maximum wind activity during the day.
2) Dumpers may be provided with purifiers for exhaust gases.

6.3.2.7 Measures to be taken while Drilling & Blasting:

Precautions while drilling:

1. The holes shall be drilled in the pattern proposed by the Manager on beginning of that day, in such a way that length of the face shall be more than three times the width of the face having three rows of holes, with spacing and burden as recommended for specific diameter of hole.
2. i) No drilling shall be commenced in an area where shots have been fired, until the shot fire has made a thorough examination at all places, including remaining butts of old deep holes, for unexploded charges that the drill may strike.
   (ii) The position of every deep hole to be drilled shall be distinctly marked by the blasting Overman so as to be readily seen by the drillers.
   (iii) No drill or bore rod or pick shall be inserted in butts of old deep holes even if an examination under Clause (i) has failed to reveal presence of explosives.
3. (i) Drilling operations shall not be carried out simultaneously on two benches at places directly one above the other.
   (ii) Drilling and charging of deep holes shall not be carried out in the same area at the same time.

Precautions while Transport of Explosives:

i) Where explosives are transported in bulk for deep hole blasting the precautions laid down under Regulation 188 of CMR 2017 by general order from Chief Inspector of Mines, shall be strictly complied with.

(ii) All conditions specified by the Chief Inspector of Mines in the documents, if any granting permission to carry a larger quantity of explosives in a single case or canister or for the use at one time in one place of more than one such case or canister, in relaxation of Regulation 186 of the Coal Mines Regulations, 2017, shall be strictly complied with.

(iii) Not withstanding anything contained in the Coal Mines Regulations, 2017, the transportation of explosives, preparation of charges and the charging and stemming of holes shall be carried out under the personal supervision of a competent person who shall himself fire the shots in deep holes.

Precautions while Charging of Holes:

i) Where there is any doubt and particularly where there are cracks and crevices reported in the hole at the time of drilling the bottom 2.0 m length of the hole shall be filled with sand / water ampoule. In crushed / broken ground charging of the hole shall not be done.

ii) Explosives shall be delivered first to the hole farthest from the 'Priming Station' so as to avoid persons walking among piles of explosives.

iii) Not more than one hole shall be in the process of being charged at any one face at any one time.

iv) All charging, stemming and connecting up shall be done while standing on the solid, that is to say, on the side of holes remote from the quarry face.

v) The safe explosives charge for a limiting peak particle velocity shall not exceed the limits recommended at Para 7.2 of D.G.M.S. Circular No. 7 of 1997. The Peak Particle Velocity(PPV) shall be measured once in every quarter and the records of the same shall be maintained in a

bound paged book and a copy of the same shall be submitted to this Directorate.

vi) The cartridges of explosive shall be lowered carefully. After inserting cartridges the length of the remaining hole shall be measured to ascertain that the cartridges are in close contact and there is no air space.

Precautions while Firing of the Shots :

i) A safe code of blasting practice shall be framed by the manager and shall be circulated to all concerned for its strict compliance.

(ii) The Manager shall fix the blasting time and shall circulate it to all concerned and display it on the Notice Board.

(iii) Clear and distinct warning shall be given before commencing charging of hole as well as before firing the shots. Subsequent to blast, after 15.0 minutes all clear signal shall be given. Presently hooters shall be installed for this purpose.

(iv) Adequate number of guards shall be posted to prevent inadvertent entry of any persons in the danger zone during firing of the shots.

(v) Shots shall not be fired except during the hours of day light or until adequate artificial light is provided. All holes charged on any one day shall be fired on the same day. Sleeping of holes shall not be permitted till the time specific permission in this regard is obtained.

(vi) Shots if fired beyond day light hours should be muffled so that, flying fragments from blasting can not project beyond a distance of 10.0 m from the place of firing in this connection, attention is drawn to D.G.(Tech.) Circular No. 8 of 1976 for compliance.

(vii) As far as practicable the shot firing shall be carried out either between shifts or during the rest interval or at the end of work for the day.

(ix) Precautions with regards to taking shelter, etc., as laid down in Regulation 196 of the Coal Mines Regulations, 2017 shall be complied with.

(x) No person other than blasting in-charge and his assistants, if any, shall be permitted to remain within a radius of 20.0m or within 60.0 m

on the same bench where charging of holes with explosives is being carried out.

(xi) A proper record of every blast showing the pattern of shot-holes and particulars of charge and observation regarding fly rock and ground vibration shall be maintained by the blasting in-charge (First class Assistant Manager) and shall be countersigned by the Manager on every entry.

(xii) All works related to drilling, charging and firing of deep holes shall be carried out under supervision of Blasting – Officer / blasting in-charge, who shall having First Class Mine Manager's Certificate of Competency. He shall be assisted by an Overman for all works.

Precautions when provision under regulation 196 (2a) & (2b) are attracted-

(i) No deep hole blasting shall be done within a distance of 100.0 m from any public road, land acquired for railway, any structure not belonging to the owner and those inhabited by any person unless vacated and demolished.

(ii) For carrying out blasting in the quarry when the permanent structures or buildings are located beyond 100 m but within 300 m of the site of blasting, safe charge of explosive that will cause ground vibrations less than the stipulated norms, as suggested by Proj No. Cons/2012/12-13 dated January 2013 studied by the Indian School of Mines, shall be used.

(iii) Efficient signals or other means is given over the entire area falling within a radius of 500 meters from the place of firing (danger zone) and also he has ensured that all persons within such area have taken proper shelter;

(iv) Not more than three rows shall be fired in a round of blast. The blasting patch shall be such that the length of the face is more than three times the width of the face.

(v) Face of the blasting patch shall not be oriented in the strike direction. The initiation of a round shall start from the incrop end.

(vi) For day-to day blast, burden and spacing shall not be less than 2.5 m and 3.0 m respectively.

(vii) To reduce noise and air over-pressure levels, the surface detonating cord shall be covered with at least 15 cm thick sand.

(viii) Before conducting deep hole blasting in the OCP, persons employed in the belowground workings lying within 180 m of the point of blasting measured in any direction, in the same mine or in any adjoining mine, shall be withdrawn and no work-person shall be readmitted into the said underground workings until the same have been inspected by a competent person duly authorized for the purpose and found safe and free from loose roof and sides, any noxious gases and signs of fire etc.

(ix) A system of obtaining written confirmation from the Manager or authorized person of Colliery in a register, the respect to withdrawal of persons from underground shall be recorded and shall be countersigned by Manager of the mine. A code of practice in this regard, duly signed by the Manager of the colliery shall be adopted and submitted to this Directorate.

(x) Danger zone shall be kept marked in the field as well as on the plan maintained under Regulation 65(1)(a) of the Coal Mines Regulations, 2017.

(xi) Competent persons i.e. explosive carrier trained in controlled blasting techniques and duly authorized by manager shall be permitted for charging & firing the shots.

(xii) Blasting shall be conducted in such a way that the underground galleries are completely filled up, failing which no heavy machinery should be brought over those galleries.

(xii) Further dozing/filling shall be done in these galleries before bringing heavy machineries over these galleries:

(a) Where there is any doubt and particularly where there are cracks and crevices the bottom 2 m length of the hole shall be filled with sand.

(b) No person including shot firer shall take shelter within 100 m of the site of blasting in the quarry unless such shelter shall be of approved design.

(xiii) The provisions of Regulation 196 of Coal Mines Regulations, 2017 shall be strictly complied with subject to the conditions as stipulated in the permission letter.

6.3.2.8 Precautions while extracting the Developed Pillars-

(i) No heavy machinery or vehicle except drilling machinery shall be deployed when the thickness of overburden above the underground galleries as proved by advance bore hole or other suitable means is reduced to 6.0 meters unless the underground galleries are completely filled in after blasting.

(ii) Where the workings are accessible the same shall be surveyed and cleaned of all the coal dust and thickly stone dusted before commencement of extraction of pillar.

(iii) The spacing of the holes in overburden bench lying immediately above the coal seam shall be so adjusted that the holes do not lie immediately above the galleries as for as possible in under to ensure that the holes do not directly fire into the underground workings.

(iv) Blasting shall be done in such manner so that the underground galleries are completely filled up. Otherwise mutti / overburden shall be dozed to fill up the galleries completely.

(v) No person shall be allowed at any place in opencast workings where thickness of overburden and / or coal over any gallery has been reduced to 1.5 m or less.

(vi) Each coal pillar shall be exposed completely by removing the overburden overlying the pillar and the adjoining galleries on all side.

(vii) The quarrying operations shall be done from rise to the dip.

(viii) Entrances to the wide underground galleries in an opencast shall be kept effectively fenced off.

(ix) D.G.M.S.(Tech.) Circular No. 3 and Circular No. 4 of 1980 regarding precautions against the danger of coal dust explosion while extracting pillars by opencast method shall be complied with.

6.4 Disaster Management Plan-

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. The project report has been drawn in conformity with the prevailing statutory provisions as per Mines Act, 1952 & CMR 2017 applicable for safety in mines. A detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks.

Safety Audit is an integrated component of Risk Assessment and Safety Management, which is required to be undertaken on regular basis by System Study and Safety Audit (SYSSA). Such System Study and Safety Audit (SYSSA) should be conducted at least once in every year, after every major accident or disaster or dangerous occurrence, before implementation of any new technology or use of any new system or machinery in the mine. Such Study may be subject wise as well as an integrated report of the mine incorporating all subjects such as mining, mechanical, , electrical, personal, occupational Health & Hygiene, and any other subject applicable to the mine and the system prevailing or to be used therein.

Risk Assessment & Management is prescribed to guard against and mitigate the consequences of major accidents. The essence of disaster management lies upon its prevention. A Disaster Management Plan (DMP) has been drawn up by BCCL for Shaft and Incline mine to meet the emergent situation:

Duty of Persons	- Any person who see/observe any emergency like spontaneous heating, fire, inundation /irruption of water, explosion, major roof fall etc. which may cause disaster. He will take immediate steps by shouting & calling to his fellow /coworkers to report to M/S, O/M, Asst. Manager, Supervisory official available in the mine by fastest possible means.
Duty of mine Officials	- Mining Sirdar, Overman, Supervisory officials, Asst. Manager after confirmation will withdraw all persons from other parts of mine also, to be safe place in case of minor emergency. - Give warning to other parts of mine by fastest possible means and with draw all people to the surface keeping in view of type of emergency. Simultaneously send message to haulage operator by sounding 10 (Ten) raps. - Will warn on-setter by special messenger.
Duty of on-setter, U/G haulage operator	- On-setter will telephone to surface banks-man without leaving the duty place. - On-setter will give10 raps on the shaft signals. - Confirm through special messenger. - Underground haulage operator wills sound10 raps to surface haulage operator in case of incline mines. - Give warning to other parts of the mine (haulage operator, pump operator). - On-setter will not leave his duty place at any rate.
Duty of Banks man/ Surface haulage operator	- Banks man without leaving his duty place gives warning to attendance clerk /rescue team. - Give warning to Mine Manager/Principal official's present if any & Doctor. Person responsible for sounding colliery whistle. Inform to Colliery Engineer. - Will not leave his duty place at any rate.
Duty of Attendance clerk	- Attendance clerk will sound siren of 10 blasts. - Send message to colliery control room via wireless/ phones or special messenger. - Will inform to rescue team members, Doctors, Ambulance driver, PSC, WI of colliery. - Send message to manager, agent &other officials. - Will inform to other units attendance clerk/wireless room of other units. Will count and take attendance of all persons who have gone U/G and will report the same to the manager that every person has come out or not?

Reduction Programme (RRP) is an ongoing process to achieve Zero **Risk** Harm Status of Safety in any mine and should be incorporated in the Disaster Management Programme.

6.5 Safety Management Plan-

Ensuring the safety of a mining operation is a complex task requiring the continued commitment of all personnel associated with the mine, as well as compliance with all safety legislation, guidelines and circulars.

The Safety Management System established by a mine must ensure all risks are identified and critical risks are controlled to ensure long-term health and safety. A Safety Management System should set the culture, framework and actions necessary to ensure that mining operations are carried out safely.

The owner, agent and manager of every mine shall prepare a document called “Safety Management Plan” and implement the SMP under Regulation 104 of the Coal Mines Regulations, 2017

(1) The owner, agent and manager of every mine shall-

(a) Identify the hazards to health and safety of the persons employed at the mine to which they may be exposed while at work;

(b) Assess the risks to health and safety to which employees may be exposed while they are at work;

(c) Record the significant hazards identified and risks assessed;

(d) Make those records available for inspection by the employees; and

(e) Follow an appropriate process for identification of the hazards and assessment of risks.

(2) The owner, agent and manager of every mine, after consulting the safety committee of the mine and Internal Safety Organisation, shall determine all measures necessary to-

(a) Eliminate any recorded risk;

(b) Control the risk at source;

(c) Minimise the risk; and

(d) In so far as the risk remains,

(i) Provide for personal protective equipment; and

(ii) Institute a program to monitor the risk to which employees may be exposed.

(3) Based on the identified hazards and risks, the owner, agent and manager of every mine shall prepare an auditable document called “Safety Management Plan”, that forms part of the overall management and includes organisational structure, planning, activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining a safety and health policy of a company.

(4) It shall be the duty of the owner, agent and manager to implement the measures determined necessary and contained in the Safety Management Plan for achieving the objectives set out in subregulation (2) in the order in which the measures are listed in the said sub-regulation.

(5) **The Safety Management Plan shall contain-**

(a) defined mine safety and health policy of the company;

(b) a plan to implement the policy;

(c) how the mine or mines intend to develop capabilities to achieve the policy;

(d) principal hazard management plans;

(e) standard operating procedures;

(f) ways to measure, monitor and evaluate performance of the safety management plan and to correct matters that do not conform with the safety management plan;

(g) a plan to regularly review and continually improve the safety management plan;

(h) a plan to review the safety management plan if significant changes occur; and

(i) details of involvement of mine workers in its development and application.

(6) The owner, agent and manager of every mine shall periodically review the hazards identified and risks assessed, to determine whether further elimination, control and minimisation of risk is possible and consult with the safety committee on review.

(7) The owner, agent or manager of every mine shall submit a copy of the Safety Management Plan to the Regional Inspector who may, at any time by

an order in writing, require such modifications in the plan as he may specify therein.

(8) The owner, agent and manager of every mine shall be responsible for effective implementation of the Safety Management Plan.

6.6 Conservation-

For conservation of precious coal resource during mining operation, following measures are suggested :

i) OB dump should be so planned so that no extractable coal is buried below OB dumps which may result in sterilisation of coal reserves.

ii) No OB dumping should be done within the coal bearing area.

iii) Adequate precaution should be taken to eliminate loss of coal while mining the developed coal seams.

iv) Coal in "Coal+Jhama Zone" should be identified and mined selectively and separably from Jhama.

vi) While working in zone affected by fire, measures as suggested in ‘Fire Dealing Measures’ should be adhered to religiously to maximise recovery of coal in fire zone.

vii) Practice of selective mining of dirt bands must be adhered to by sub-benching whenever bench > 1.0 m thickness is encountered.

viii) Extractable local seams (> 0.50 m thickness) whenever encountered must be exploited by sub-benching.

CHAPTER- VII

COAL HANDLING ARRANGEMENT

7.1 Surface Coal Handling Arrangement-

7.1.1 Existing

There are 5 nos. departmental feeder breaker of 400 TPH each and 1 no. Outsourced feeder breaker of 400 TPH is in operation within the proposed amalgamated Muraidih-Phularitand Colliery.

Phularitand Colliery-

At present there are two nos. of Feeder breaker is in operation at Phularitand Colliery near the inclines/drifts and these are being operated departmentally.

As per the mine authority, there is another Crusher/feeder breaker which is being operated by the Contractor for coal produced from Hired HEMM patch.

Transportation of Coal Produced from Opencast (Hired HEMM patch)-

- Coal from the face is transported to coal dump and then coal dump to Crusher/Feeder breaker to crush coal of (-) 100mm size. Then coal is send to KKC Railway Siding through truck transport system. From KKC Railway siding, coal is send to different Power Stations as per linkage.
- Certain amount of coal from the coal dump is also sent to private cookeries and Mithon Power Limited (MPL) by road from the KKC Railway Sidings.

Transportation of Coal Produced from Underground-

- Coal produced in underground is brought to surface through direct haulage. Coal tubs are unloaded by tippler into Tipper truck through chutes. From there it is send to coal dump and then as per linkage, coal is send to the Mithon Power Limited (MPL) by road.

Amalgamated Muraidih Opencast Colliery-

In this Colliery, an opencast is in operation departmentally. Three nos. of Feeder breaker (-100mm) each of 400 TPH is in operation departmentally at Muraidih Colliery.

Coal produced from coal benches are send to coal dumps. From coal dumps, it is send to three numbers of departmental crusher to size coal into (-) 100mm. From Crusher, coal is send to KKC Railway Siding through truck transport system. From KKC Railway siding, coal is despatched to different Power Stations through railway wagons. Certain amount of coal from the coal dump is also sent to private cookeries and Mithon Power Limited (MPL) by road from the KKC Railway Sidings.

The above departmental feeder breakers will be utilized as on when required or may be transferred to other mines upto their life.

Proposed –

There are 6 nos. (4 working + 2 stand-by) feeder breaker of 400 TPH each have been proposed for crushing of 7.3 Mt per year ROM coal to (-) 100 mm. After crushing, coal will be transported to existing KKC link siding through contractual or departmental transport system as decided by BCCL Management.

CHAPTER - VIII

INFRASTRUCTURE FACILITIES PROPOSED AND THEIR LOCATION

8.0 General-

The Amalgamated Muradih Phularitand (Part) Colliery is located in the western part of Jharia Coalfields. It is situated at 40KM from Dhanbad Rly. Station. The mine is operating both opencast and underground mine. At present in existing Muraidih Colliery, opencast operation is being carried out departmentally in the VIIIC, VIIIB, VIIIA, V/VI/VII(combined) seam. The underground operation is proposed to be operated through outsourcing and work has been awarded to M/s Minop/BHEC Consortium which will be carried out in I, II,& III Seam by Longwall Method mining method. In Phularitand Colliery, opencast working is being carried out by outsourcing in XI/XII, IX/X, VIIIC, VIIIB, VIIIA, V/VI/VII(Combined) and the underground working is being carried out departmentally in III seam using board and pillar method. As per the mine record, the leasehold of the total project is 1118.71 hectares.

8.1 Present Linkage of Coal-

The present production (OC & UG) of the mine is linked to Power sectors through KKC Link Siding and transported partly Contractually and partly departmentally through rail and partly by road.

8.2 Water Supply arrangements-

8.2.1. Sump Capacities and pumping Capacities:

Presently, 300 Million gallon water exists on the floor of excavated V/VI/VII seam of main sump of Amalgamated Muraidih Colliery. The Operational Capacity of the sump required in Amalgamated Muraidih OCP is 100 million gallon and the capacity of the sedimentation tank is 25 Million Gallon. Present Capacity of the Phularitand Colliery sump is 30 Million Gallon.

8.2.2. Existing Water Consumption and usage

The demand of the present water supply arrangement is met only by Mine water. Present water consumption and usage in Amalgamated Muraidih Colliery is 434 KLD (kilo liter per day) for Industrial purpose and 100 KLD (kilo liter per day) for domestic purpose and in Phularitand Colliery it is 149 KLD (kilo liter per day) for Industrial purpose and 35 KLD (Kilo liter per day) for domestic purpose.

8.2.3. Proposed Water requirement in the mines & Colony-

(Water required in MLD)

Particulars	Opencast	Underground
Water Required for Dust Suppression in industrial Premises	0.17	-
Water required for road watering	0.5	-
Water required for Fire fighting	0.33	-
Water required for floor washing of workshop	0.05	-
Industrial water required in the U/G for dust suppression	-	0.7
Water Required in U/G machineries	-	0.34
Water Required for domestic use		0.20
Total	**1.0**	**1.24**

8.2.4. Effluent Treatment plant and Sewage Treatment Plant.

At present there is no ETP & STP facility available in the mines. As per the proposed water requirement of the mines an Effluent treatment plant of 0.2 MLD is to be constructed for the treatment and reuse of effluent water recovered after washing of workshop and HEMMs used in opencast.

As per the existing domestic and proposed domestic usage a Sewage Treatment Plant (STP) of 1.0MLD is also to be constructed.

8.2.5. Existing Water Treatment plants:

Area	Unit/ Colony	No.of Qtrs. with Type	Water Supply Arrangement			Treatment System			Capacity	Present Status	Nearby villages being served		
			MADA	Treated Water	Mine Water	RGF	SSF	PF			Village	Population	Type of Water
Barora Area	Existing Muraidih	1200	Nil	Yes	No	Nil	Nil	02 Nos	10000 GPH/ each	Running	3 Nos	2500	Mine Water
		300	Nil	Yes	No	Nil	Nil	01 Nos	10000 GPH/ each	Running	4 Nos.	2000	Mine Water
	Existing Phularitand (Part)	310	Nil	Yes	Nil	Nil	Nil	01 Nos	10000 GPH/ each	Not Running	1 No.	200	Treated Water

An additional Water Treatment plant of 0.8 MLD is to be constructed for the use of water in the machineries in longwall and continuous miner of the proposed UG mines.

8.2.6. Present pumping arrangement in Phularitand UG and Muraidih UG

There is no pumping system in the proposed muaridih UG mine and there are two main pumps and one intermediate pump of capacities 200Gpm each in the Phularitand UG.

8.3. Workshops-

At present there are three workshops maintained in Mine level, two of which are in Amalgamated Muraidih Colliery and one is maintained at Incline Site of Phularitand Colliery. There is a central workshop in Senidih which is located at 6-8 Kms distance from the Project.

As per the information from the field the present workshops would be used and is sufficient for the proposed Project.

8.4. Stores-

One regional store is available at the area level.

8.5. Magazine-

One Magazine with licence no. E/HQ/JH/22/138(E12274) is available at the area level (At Block-II Area) in NUDKHURKEE at a distance of 10 Km from Amalgamated Muraidih Colliery and 08 Km from Phularitand Colliery.

Presently the stock of Magazine consists of 2500Kg Nitrate mixture, 9150m Fuse and 25000 nos. of Detonators.

8.6. Coal Handling arrangement-

Existing Coal Crushing/ Feeder Breaker -

There are 5 nos. departmental feeder breaker of 400 TPH each and 1 no. outsourced feeder breaker of 400 TPH are in operation within the proposed amalgamated Muraidih-Phularitand Colliery. Out of 5 nos. of Feeder breakers, presently there are three nos. of Feeder breaker (-100mm) is in operation departmentally at existing Muraidih Colliery and two nos. of Feeder breaker is in operation departmentally at existing Phularitand Colliery.

The above feeder breakers will be utilized as on when required or may be transferred to other mines upto their life.

Proposed –

There are 6 nos. (4 working + 2 stand-by) feeder breaker of 400 TPH each have been proposed to crushing of 7.3 Mt per year ROM coal to (-) 100 mm. After crushing, coal will be transported to existing KKC link siding through contractual or departmental transport system as decided by BCCL Management .

8.7. Infrastructure facilities available (Road, Rail etc.)-

A) Road-

a) D.B.Road – Located within 0.8 Km from the mine and 0.57 Km from KKC Link Siding.

b) Hirak Road is about 1.44 Km from the open cast quarry and isconnecting Muraidih Village to Chandrapura.

c) Village Road – Network of colliery roads exist in the leasehold of the Mine.

B) Rail-

There exist a 34.98 Ha in the lease hold boundary of the Amalgamated Muaridih-Phularitand Project which includes KKC Siding and a part of Dhanbad Chandrapura Line.

C) Coal Stock Yard and its Locations-

Presently coal dumps are maintained within the Opencast area and dumps area made over the floor of excavated V/VI/VII Seam. Location of existingCoal dumps are shown in Surface Plan (Refer Plate No.II)

D) Other Infrastructure Requirement –

Based on the guidelines of BCCL, the Global Bidder proposed a revised surface layout plan showing the mining complex in three isolated locations Marking as X", Y" & Z" accommodating all the infrastructural facilities at drawing no. MRD/RVSD/SUR/01, Dated 27.01.2015 (This drawing is not available with the Area Authority. Hence, not incorporated in this mining plan). As per the revised surface Plan of Bidder (enclosed with the Supplementary Note on Approved DPR) are as follows-

Location X-

Will contain inclines, CHP, office complex, store, workshop, cycle shed, weigh bridge, Lamp room, etc.

Location Y-

Will accommodate fan house, vertical shaft, substation and water reservoir.

Location Z-

It has been proposed to build a 30 bed experts Hostel.

(As per the area authority, the Surface Plan showing the above locations which is mentioned in the Supplementary note is not available with them)

E) Existing effluent treatment plant & sewage treatment plant (Mine & Colony) –

At present there is no ETP & STP available in the mine. Sewage water discharged through septic tank and soak pit.

8.8. Tree Plantation Areas-

Tree plantation was done in past in the colonies as well as at filter plants and near incline office. Plantation has also been done on different OB Dumps within proposed amalgamated area.

CHAPTER – IX

LAND REQUIREMENT

9.1 Acquisition of mining lease & All Rights-

According to the official record, the total lease hold area of Amalgamated Muraidih Phularitand (part) Colliery is 1118.71Ha. Within the leased hold area of Colliery, there are two Open cast workings and two Underground workings in Amalgamated Muradih Colliery (OC/UG) and Phularitand (part) Colliery (OC/UG) the details are as given below:-

SNo.	Name of the mines	Type of Operation
1.	Amalgamated Muraidih Colliery	
	i) Opencast	Departmental Operation
	ii) Underground	Global bid Project (at present no work is carried out)
2.	Phularitand Colliery	
	i) Opencast	Outsourced
	ii) Undergraound	Departmental Operation

9.2 Types of Land:

The types of land in different heads exists within the lease hold area are given below-

Particulars	Land Area in Ha				
	Phularitand (Northern side DC line)		Amalgamated Muraidih Colliery		
	Area		Area		Remarks
	Acres	Ha	Acres	Ha	
Private/Tenant	298.12	120.65	331.17	134.02	
BCCL Land	417.91	169.13	937.55	379.42	
Govt Land	188.37	76.23	390.68	158.11	
Forest Land	0	0	114.07	46.16	18.77 acres /7.599 Ha of settled forest land included in BCCL Land
Railway Acquired Land	86.48	35.00	0	0	7.516 acres/3.043 Ha of Railway lease land is included in BCCL land
Total	**990.88**	**401.00**	**1773.47**	**717.71**	
Grand Total	**1118.71**				

The above data are provided by Mine Authority

9.3 Forest Land

The total area of land considered in this mining plan of Amalgamated Muraidih Phularitand(Part) Colliery is 1118.71 Ha. A land of 7.599 Ha exists as settled forest land within this area and another 46.16 Ha of forest land for which application for regularization and diversion has been submitted to DFO Dhanbad.

In the year 2010, application for 29.75 Ha of forest land of Baromessia Mouza was applied through offline application. Later-on in the year of 2017, another application for 16.42 Ha of forest land of Barora Mouza was applied through online application. Details of forest land have been shown in Plate no.XXXIII.

Out of 29.75 Ha of forest land exists in Baromessia Mouza, 10.47 Ha forest land has been used prior to year 1980 and 15.54 Ha of forest land was used after year 1980. In Barora Mouza, out of total 16.42 Ha of Forest land, 10.62 Ha has already been used (Refer Annexure-XV). Therefore, there exists a balance forest Land of 9.54 Ha within the Project area, out of which 3.74 Ha is in Baromessia Mouza and 5.80 Ha in Barora Mouza. Mouza Plan has been shown in Plate no. XXXI and XXXII.

Details of status of Forest Land in proposed Amalgamated area is given below:

Particular	Land in Phase-I (Baromessia Mouza)(in Ha)	Land in Phase-II (Barora Mouza) (in Ha)
Forest Land used prior to the year 1980	**10.47**	-
Forest Land used after the year 1980	**15.54**	**10.62**
Balance Forest land	**3.74**	**5.80**
Total	**29.75**	**16.42**

9.4 Land Use Pattern-

9.4.1. The details of Colliery-wise existing Land use pattern within amalgamated area of **1118.71** Ha is given below-

Sl. No.	Particulars	Phularitand	Amalgamated Muraidih/Shatabdi
		Existing Area (in Ha)	Existing Area (in Ha)
1	**Running Quarry**		
	a) Backfilled	**7.00**	**56.00**
	i) Plantation		
	b) Not Backfilled	**35.29**	**82.55**
2	**Abandoned**		
	a) Backfilled	**39.00**	**61.00**
	b) Not Backfilled	**1.35**	
3	**External OB Dump**	**10.42**	
4	**Service Building/ Mine**	**0.71**	**15.00**
5	**Coal Dump**	**3.28**	**7.00**
6	**Homestead Land**	**80.00**	**64.25**
7	**Agricultural Land**	**133.00**	**103.00**
8	**Plantation**	**17.50**	**135.60**
9	**Water Body**	**7.20**	**29.40**
10	**Barren Land**	**5.20**	**125.00**
11.	**Fire Area**	**12.00**	**17.50**
12	**Road & Rail**		
	a) Hirak Road	**0.6**	**5.7**
	b) D.B. Road	**6.35**	**2.94**
	c) Village Road	**1.42**	**1.54**
	d) Haul Road	**5.7**	**11.23**
	e) Rail	**34.98**	
	TOTAL	**401.00**	**717.71**

9.4.2. Proposed Land use pattern in Post Mining area:

Sl. No.	Particulars	Amalgamated Post Mining Area (in Ha)
1	**Running Quarry**	**542.91**
	a) Backfilled	491.1
	i) Plantation	208.10
	b) Not Backfilled	51.19
2	**Abandoned**	-
	a) Backfilled	-
	b) Not Backfilled	-
3	**External OB Dump**	**25.28**

Sl. No.	Particulars	Amalgamated Post Mining Area (in Ha)
4	**Service Building / Mine**	**9.21**
5	**Coal Dump**	
6	**Homestead Land**	**114.00**
7	**Agricultural Land**	**236.00**
8	**Plantation (other than OB Dump)**	**44.90**
9	**Water Body**	**18.20**
10	**Barren Land**	**50.30**
11.	**Fire Area**	**7.45**
12	**Road & Rail:-**	
	a) Hirak Road	**6.30**
	b) D.B. Road	**9.29**
	c) Village Road	**2.96**
	d) Haul Road	**16.93**
	e) Rail	**34.98**
	TOTAL	**1118.71**

CHAPTER - X

ENVIRONMENT MANAGEMENT

10.0 ENVIRONMENTAL IMPACT ASSESSMENT

10.1 INTRODUCTION

The impacts (both beneficial and adverse) of mining and its allied activities of the project have been assessed and presented in respect of biophysical & socio-economic environment.

Environmental Impact assessment has been carried out by studying the likely impacts on existing ambient air, water and noise conditions etc. of the area due to mining activities at the site under consideration. For this, the latest data generated from the mine / adjacent existing mine has been taken into consideration as this will give a practical status of the impact of existing mining activities in the area.

10.2 AIR POLLUTION IMPACT ASSESSMENT

The impact assessment has been carried out dealing with the following points:

(a) Phase-wise inventory of air pollution emission sources
(b) Impact assessment

a. Phase-wise inventory of air pollution emission sources

The pollution sources are obvious and to assess the impact, the project life is divided into following time frames:

I) Operation phase

II) Post-operational stage

The activities associated with these time frames and having impact on the ambient air quality along with the pollutants are enumerated in the following sections:

Operational phase-

During this phase, activities necessary for mining of coal, its handling and transport are taken up. Such activities having impact on ambient air quality are detailed below:

(i)	Drilling & Blasting	:	Noise, Dust and SOx NOx
(ii)	Handling of coal	:	Noise, Dust and SOx NOx
(iii)	Movement of vehicles	:	Noise, Dust and SOx NOx

Post-operational stage-

During this stage of the project, the activities related to the closure of mine are to be carried out. Preparation of final mine closure plan shall be carried out during the period four to five years before the closure of the mine. Some of the activities for the closure are:

- Modifications in physical and biological reclamation of subsided area, if any
- Salvaging and shifting operation of Machineries and other equipment
- Clearing of coal and other materials, restoration of infrastructure area & colony area to the extent possible and necessary if not useful for other projects
- Management of hydrology and hydrogeology.
- Redeployment of workforce, etc.
- Arrangement & implementation of post-operation monitoring mainly keeping watch, vigil, etc.

The activities having impact on the ambient air quality are enumerated below:

(i) Movement of dozers for physical reclamation : Noise, Dust and SOx NOx

(ii) Movement of vehicles for shifting and salvaging operation of Machineries and other equipment : Noise, Dust and SOx NOx

(iii) Movement of vehicles for clearing of coal and other materials : Noise, Dust and SOx NOx

b. Impact assessment

The mining and its related activities create ambient air pollution. The impact of mining on ambient air quality is highlighted in the following paragraphs:

The ambient air quality is influenced due to the presence of PM_{10}, $PM_{2.5}$, SO_2, NOx, etc., which are generated due to various activities like drilling, blasting and coal & material handling related to the project. Further, the ambient air quality is affected to a varying degree due to the mining activities of other nearby opencast and underground coalmines of the same coalfield. The concentration of pollutants may vary depending upon the various micro-meteorological parameters and the seasons of a year along with on the existing control measures.

In order to assess the ambient air quality in the area surrounding the site where mining activities are continuing since beginning of the 20^{th} century vis a vis the present scenario monitoring has been carried out at different locations based on the wind pattern and topography. The results of the regular environmental monitoring by CMPDIL (Refer Chapter XI) shows that, in spite of continuous mining activity in the area environment has not been affected to any significant extent as the recorded data are all below the permissible limits.

The present assessment as validated through monitoring data as explained above, also proves that, mining activities in the area have not affected the ambient air quality to any significant extent which has become possible because

of various Pollution Control Measures are continuously being taken and augmented whenever necessary.

Moreover, fortnightly monitoring of ambient air quality at all the operating mines helps in identifying mining source generating the pollution for which appropriate control measures are then planned for implementation, which can be validated in the subsequent monitoring.

The Air Pollution control measures will be further strengthened to keep the air pollutants well within the permissible limit in the mine under consideration.

10.3 IMPACT ASSESSMENT ON WATER

I. Identification of the sources of water pollution

Likely sources of water pollution from this project along with the type of pollutants are as follows:

(i) Sanitary (domestic) wastewater : Suspended solids and BOD.

(ii) Water pumped out from mine : Suspended solids of coal and clay

(iii) Surface run-off passing through coal stockpiles : Suspended solids.

(iv) Storm water from leasehold area and built-up area : Suspended solids.

(v) Waste Water from workshop : Suspended solids, Oil and grease

II. Impact Assessment

Mining and its related activities may create water quality problems. The impact of mining at the project on both surface and ground water sources are given subsequently.

(a) Surface water sources

If the mine effluent is discharged without proper treatment it will lead to deterioration of water quality and pollution of water bodies. Change in relief pattern due to mining may cause flooding, siltation, choking and pollution. Mitigation measures would involve provision of the following depending on the site condition and actual requirement statutory or otherwise.

(i) Garland drains for surface runoff.
(ii) Sedimentation ponds/settling tank for reducing the pollution of surface water bodies.
(iii) Workshop effluent treatment plant

However, due care will be taken to treat the mine water discharge by sedimentation if need arise for the mine under consideration.

III. Groundwater resource

In coal mines, the different aquifers overlying the working coal seam would be contributing groundwater to the mine by gravity drainage which need to be pumped out for safe operation of the mines.

Generally steep draw down cone would be formed in poor potential aquifers thereby influence the area to a small distance and reverse is established in respect of aquifers with high hydraulic conductivity. The Impact of mining activities is likely to be pronounced in the dipside which are estimated by utilising aquifer and mine parameters at final mine depth. It may be appropriate to mention here that the presence of prominent boundaries/water bodies, faults and also interfringing of sandstone and shale beds may restrict the propagation of draw down cone.

Further, the ground water level decline is more in the close vicinity of the pit. The effect will be pronounced in the down – dip side and milder in the up – dip side.

But this effect will be temporary in nature and once the project is over, after 2-3 rains, the regime will regain its almost original status.

Any shortage of water in the affected villages during the temporary period will be supplemented through supply of treated water pumped out from the mine.

IV. Impact on noise level

In order to assess the existing ambient noise level in the surrounding of the mine site corresponding to existing scenario, ambient noise level data has been generated at different locations and it is seen that existing quality of ambient noise is quite satisfactory.

The noise level monitoring data are given in chapter - XI

The likely source of noise are given below

- Drilling and Blasting operations
- Operations of HEMM
- Operation of Equipment CHP, Workshop etc.

ACCEPTABLE INDUSTRIAL NOISE LEVEL

As per Env. (Protection) Amendment Rules, 2000 the ambient air quality standards in respect of noise in industrial, commercial, residential and silence zones area as follows:

Sl. No.	Category of area	Limits [dB (A)]	
		Day time (6.00 AM to 10.00 PM)	Night time (10.00 PM to 6.00 AM)
1.	Industrial	75	70
2.	Commercial	65	55
3.	Residential	55	45
4.	Silence zone	50	40

Assessment of the degree of noise, to which a workplace noise is harmful, is done by comparing the values measured at workplace to the permissible TLV adopted by statutory bodies like DGMS.

The Director General of Mines Safety vide their circular no. DG (Tech.)/18 of 1975 has prescribed the TLV for noise level as 90 dB (A), for the workers engaged in mining occupation likely to be exposed to in an 8 hour shift period with unprotected ear. Whereas, the following table shows the maximum permissible noise exposure levels, as per American Standards, for the industrial workers.

Exposure time (Hrs./day)	**Noise level [dB (A)]**
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	108
0.25 or less	115
EXPOSURE TO PULSE OR IMPACT NOISE SHOULD NOT EXCEED 140 dB (A)	

It is observed that noise level recorded in mine activity area (details given in Chapter XI) is well within the permissible limit for the mine under consideration.

The present assessment as validated through monitoring data as explained above, also proves that, mining activities in the area have not affected the ambient noise to any significant extent which has become possible because of various Pollution Control Measures are continuously being taken and augmented whenever necessary.

Moreover, fortnightly monitoring of ambient noise quality at all the operating mines helps in identifying mining source generating the pollution for which appropriate control measures are then planned for implementation which can be validated in the subsequent monitoring.

The above paragraphs clearly bring out the fact that, impact of mining activities on ambient noise is insignificant and the mine under consideration will be no exception.

V. Socio- economic Impact

There would be some obvious changes in various socio economic parameter due to mining activities eg. Increased economic activities & creation of new employment opportunities, infrastructural development, better educational and health care facilities etc.

The socio –economic impacts of the project is given below.

A) **Population Growth and Migration**

Mining activities in this coalfield is continuing since beginning of 20th century. The development of the area is totally indebted to coal mining as well as the entire economy of the area is sustaining due to coal mines. In addition to creating adequate direct employment in the coalmine large opportunities of indirect employment have also been created. Numbers of people from outside the state have migrated in this region, which has resulted in through mixing of different culture and customs as per the tradition of our country “Unity in diversity”.

B) **Resettlement & Rehabilitation**.

The village/ basti which are to be rehabilitated as per as per Master Plan of JCF (March' 08) is given below.

Phase-I

Colliery	Affacted Area	BCCL	PVT.	ENCHR	OTHERS	TOTAL
Muraidih	Barora Village No. 2/ O5	71	73	11	6	161
Muraidih	Central Kenduadih Village/O7	35	29	0	0	64
Muraidih	Kenduadih Village/ O6	140	21	8	1	170
Phularitand	Akashkinaree Gwala Patti/O8	2	0	21	1	24
Phularitand(S)	Akashkinaree Gwala Patti/O8	0	0	6	0	6
Phularitand	Ashakhuti Qtrs./O9	17	0	21	0	38
Phularitand(S)	Ashakhuti Qtrs./O9	0	0	10	0	10
Phularitand	Badora/13	18	3	0	0	21
Phularitand	Birajpur/10	0	50	0	0	50
Phularitand	Mandra,Ganheshpur& Barwabera/O5	29	47	0	0	76
Phularitand(S)	Mandra,Ganheshpur& Barwabera/O5	0	0	96	0	96
Phularitand	Manjura near Phularitand station/O6	73	103	51	1	228
Phularitand(S)	Manjura near Phularitand station/O6	0	0	40	0	40
Phularitand	Mohalpatti Eastern Rly. Quarters/O7	35	0	93	2	130
Phularitand(S)	Mohalpatti Eastern Rly Quarters/O7	0	0	4	0	4
Phularitand	Nawagarh & Part of Muchikuli/16	0	67	0	0	67

Phase-II

Colliery	Affacted Area	BCCL	PVT.	ENCHR	OTHERS	TOTAL
Phularitand	Nawagarh Bastee (Part)/12	0	110	0	3	113
Phularitand	Phularitand Bazar / Hatia/11	0	65	25	5	95
Phularitand	West Side of Punduvita Village/14	6	0	9	0	15

* Survey is in process. Data may be changed/updated after final survey.

C) **Transport and Communication**

The present network of metalled approach road to the place of work and other places of public interests like shopping, education, medical services etc. is going to improve with continuation of mining operation.

D) **Health**

The facilities created in the area are extended for neighbouring population also.

E) **Literacy**

With continuation of mining activities in the area, educational facilities developed in the area will continue to improve the literacy of the rural areas also.

F) **Economic Impacts**

With the continuation of mining activities the occupational structure of the area is going to improve further and many people are likely to be involved in the job of mining and allied activities. Hence, income level of these people is likely to improve to significant level.

Employment opportunities both direct & indirect in this project are likely to cause migration from outside. Amenities like medical educational, recreational etc. are available to local people and their quality of life has definitely improved.

VI. Land Use Pattern during Mining

Land in case of coal mining activity, gets degraded by way of actual excavation for coal winning operation and dumping of waste material on the surface especially in the open cast mining. Present land use is given in Chapter- IX.

VII. Impact on flora & fauna:

There is no endangered and endemic species in core and buffer zone.

By developing plantation of native species efforts are being made to improve the green cover in and around the immediate vicinity of the mine area.

BCCL in association with local people will make all efforts to conserve the flora & fauna in the immediate surroundings of the mine area.

10.2.1 ENVIRONMENTAL MANAGEMENT PLAN

I. Environmental Pollution Control Measures:

i) Air, Noise Pollution Control Measures:

a) To reduce air pollution due to dust produced during various mining and allied activities, adequate water spraying is being done at strategic points so that dust do not get air-borne. 4 Movable water tanker are used for sprinkling at haul roads and coal transportation, coal face, OB dump in mines for dust suppression. 3 Drills mounted with wet drilling arrangement and other 3 is under process for wet drilling arrangement in Muraidih colliery. To control the concentration of dust in ambient air fixed type water sprinklers will be installed along coal transportation road, coal stock yard and other dust prone areas. Additional Mobile Sprinklers may be required as per extent of mining.

b) Proper blasting techniques by designing a suitable blasting pattern after actual field observation would be followed to minimize adverse effects of ground vibration and noise if required.

c) Black topping of roads.

d) Biological reclamation of subsided areas, development of green belt around infrastructure, colony, along roads and in vacant land around villages are being undertaken for arresting dust and noise propagation.

e) Proper maintenance of all Machines etc. are being undertaken so as to reduce harmful exhaust and noise.

f) Regular cleaning of transportation roads are being carried out.

g) Coal are being transported using covered trucks. No overloading of trucks are being allowed.

h) Personal protective gears are given to workmen exposed to dusty and noisy work environment.

PLANTATION / GREEN BELT AS A MITIGATIVE MEASURES AGAINST ENVIRONMENTAL POLLUTION:

Plantation is an important tool to combat air pollution, noise pollution and soil erosion. In addition to these it gives an aesthetic look to the area.

For plantation purpose following areas can be considered:
Area where ornamental trees viz. Semal, Arjun, Palas and fruit trees like Mango, Guava, Jamun and medicinal plant like Neem etc. can be provided like colony area, schools, dispensary, community buildings, play-ground etc.
Areas where different rows of trees including tall and fast growing varieties along with ornamental shady trees shall be planted e.g. around colony, along roads, haul roads, and around industrial buildings, etc.

Plantation of these trees will also take off some pressure on the nearby forests as far as firewood is concerned. Grass carpeting may be done in batter region.

PLANTATION PROGRAMME / GREEN BELT:

The plantation would be taken up with the help of suitable agency. Thereafter, this process would continue concurrently with the mining activities.

WIDTH OF GREEN BELT:

a) Along the roads 1000 saplings per road km; two rows on both sides of the road; width – 3 m.
b) Around colony & infrastructure – 2500 saplings per ha; width – 5 m; 3 rows of plantation all around.
c) Vacant land – 2500 saplings per ha.

Density of plantation will be as mentioned earlier. Plantation activity will be carried out throughout the life of the mine in and around the quarry and in safety zone.

Phase wise Plantation activities to be carried out are as mentioned under:

	Year	PLANTATION		Total Plantation
		Area (ha)	Trees/ saplings	
Existing Plantation	0	153.1	382750	382750
During active mining	1	2	5000	5000
	2	2	5000	5000
	3	2	5000	5000
	4	2	5000	5000
	5	2	5000	5000
	6	2	5000	5000
	7	2	5000	5000
	8	2	5000	5000
	9	2	5000	5000
	10	2	5000	5000
	11	5	12500	12500
	12	5	12500	12500
	13	5	12500	12500
	14	5	12500	12500
	15	5	12500	12500
	16	10	25000	25000
	17	10	25000	25000
	18	10	25000	25000
	19	10	25000	25000
	20	10	25000	25000
	21	10	25000	25000
Post Mining	PM1	10	25000	25000
	PM2	15	37500	37500
	PM3	16.58	41450	41450
	TOTAL	**299.68**	**749200**	**749200**

i) Water Pollution Control Measures:

a) Domestic Effluent:

Residential quarters are provided with conventional soak pit system.

b) Mine Discharge:

Water collected in the workings are first allowed to settle in sumps. Sufficiently large sumpage has been provided to eliminate the discharge of un-dissolved suspended solids to the surface along with mine water. The quality of mine pumped out water as being monitored in all the operating mines also establishes the fact that, the untreated mine pumped out water does not contain any significant pollution load.

However, it is proposed to carry out the monitoring of quality of mine discharge and if any undesirable element is found in the sample it will be treated properly before it is re-used.

c) The final treated discharge then be utilized for various purposes e.g. water spraying, watering of plants, etc. Balance quantity if any, will be supplied for irrigation, if required otherwise discharged in natural watercourses.

d) Surface run-off & Storm Water: A Network of catch drains will be constructed around the OB dump. The runoff through these catch drains will be directed to mine sump. Water so collected can be used for dust suppression in the mine area, roads, green belt development, etc. Garland drain will be made all along the periphery of the mine.

e) Retaining/Toe Wall: Retaining wall at the toe of the dumps and OB benches within the mine will be provided to check run-off and siltation.

iii) Remedial measures to control ground water depletion

The following methodology and remedial measures will be taken to minimize the mine-induced impact on ground water levels and also adverse effects in the area.

(a) The decoaled voids will be used for water harvesting structures.

(b) The back filling will arrest the mine seepage resulting in restoration of ground water level in the immediate vicinity of the area.

(c) The unlined garland drain and sedimentation pond will enhance the runoff recharge.

(d) The water shortage in the villages, if any, in the influence area can be supplemented by supply of water from outside source or from the mine water after treatment.

(e) To improve the environment and greenery in the area, BCCL has taken up plantation on a larger scale in the coal mining area. The improvement in vegetation cover has a direct bearing on augmentation of ground water recharge.

(f) Artificial recharge shall be done for more use of ground water for irrigation augmentation in the project area when the source of water is easily available for recharging.

(g) water recharge, under community development, tanks/ponds/dugwells will be constructed in the nearby villages

(h) On analyzing the field data if any area receiving the maximum impact, suitable controls measures will be adopted by the project authorities.

(i) The mine discharge after passing through sedimentation pond / tank will be discharged onto land/natural drains with earthen check dam at suitable locations so that the groundwater gets additional recharge by the return flow.

(j) The water shortage in the villages, if any, in the influence area can be supplemented by supply of water from outside source or from the mine water after treatment.
Regular well water monitoring in nearby villages is being carried out quarterly as per MOEF's guidelines.

II. Disaster Management Plan

Details of Disaster Management Plan Given in Chapter VI

III. MONITORING & MANAGEMENT ORGANISATION

Close monitoring of the environment and implementation of various protective measures discussed in the report forms an important part of Environment Management Plan (EMP). In the earlier paragraphs the causes of various pollutions along with the preventive and mitigative measures have been discussed. In the subsequent paragraph, monitoring organization is being discussed.

MONITORING ORGANISATION

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

a) BCCL (HQ) acts as an apex body, which monitors the activities relating to environment at project level through the General Manager.

b) General Manager of the area co-ordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project. Nodal Officer (Environment) of the area monitors all aspects of environment on behalf of the General Manager.
He also takes suitable steps for generation of environmental data for its analysis and interpretations. Plantation is being done on a large area. A Supervisor shall monitor and guide the agency for selection of site, treatment of soil and selection of species.

c) Project Officer is primarily responsible for reclamation of the mined out area. He shall also be responsible for biological reclamation with the assistance of GM's office.

ORGANISATION CHART

Sl. No.	Measures/Actions		Agency
1.	**Environmental Pollution Control**	1	General Manager, Barora Area
		2	Nodal Officer, (Environment), Barora Area
		3	Project Officer, Amalgamated Muraidih-Phularitand Colliery
		4	Area Manager (Civil), Barora Area
		5	Environment Cell (BCCL H.Q.)
2.	**Environmental Monitoring**	1	General Manager, Barora Area
		2	Area Manager (Civil), Barora Area
		3	Nodal Officer, (Environment), Barora Area
		4	Project Officer, Amalgamated Muraidih Phularitand Colliery
		5	Environment Cell of BCCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-II, Dhanbad
3.	**Reclamation**	1	Project Officer, Amalgamated Muraidih Phularitand Colliery
		2	Nodal Officer (Environment), Barora Area

CHAPTER - XI

ENVIRONMENTAL MONITORING REPORT

11.1 ROUTINE ENVIRONMENTAL MONITORING OF CLUSTER II

The Amalgamated Muraidih Phularitand Colliery in Barora Area falls in Cluster II group of mines of BCCL for the purpose of EMP. The Environmental Clearance to the various mines of the Cluster –II vide letter No. J-11015/35/2011-IA.II (M) dated 06.02.2013 requires the monitoring of Environmental Components on a regular basis. The Routine Environmental Monitoring work for all the mines of BCCL has also been undertaken by Environmental Division RI-II, Dhanbad CMPDIL. The following stations have been enlisted under Cluster II for monitoring various Environmental components & parameters, the frequency along with the location of the station have been given below in Table 11.1

The location of the monitoring stations has been decided in consultation with JSPCB & BCCL officials.

Table 11.1 Locations for Regular Environmental Monitoring for Cluster II

S. No	Components	Locations (Station Code)	Frequency	Number of Parameters Covered
1	Air Quality	**(Core Zone)** **1. Block II OCP (A4): Industrial Area** **2. Muraidih OCP (A5): Industrial Area**	Each Fortnight	Four (PM10, PM2.5, SO_x, NO_x)
		(Buffer Zone) **1. Madhuband Washery (A3) : Industrial area** **2. Madhuband UGP (A33) : Industrial area**	Each Fortnight	Four (PM10, PM2.5, SO_x, NO_x)
2	Noise Levels	**1. Block II OCP (N4)** **2. Muraidih OCP (N5)** **3. Madhuband Washery (N3)** **4. Madhuband UGP (N33**	Each Fortnight	-NA-
3	Mine Water:	**Mine Discharge of Block II (MW2)**	Each Fortnight	Four(pH, TDS, TSS, O&G)

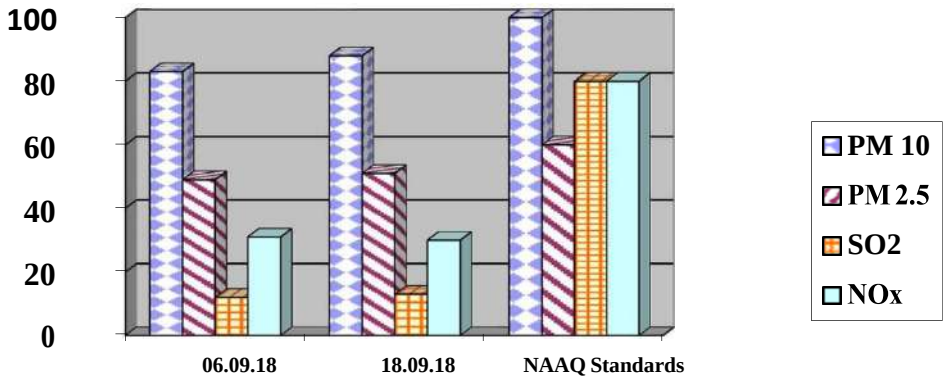
11.2.1 Ambient Air & Noise Quality Report for Core & Buffer Zones:

In order to assess the Ambient Air Quality Status, monitoring stations were identified on the basis of the objectives, the particular method or instrument used for sampling, resources available, physical access and security against loss and tampering. Based on above mentioned considerations, the activities of the project site and by consultation between BCCL & JSPCB officials, air quality monitoring stations were selected to ensure the collection of representative samples as per condition prevailing in the environment at the time of monitoring. As per guidelines, norms and practices, 4 four numbers of locations were selected for monitoring ambient air quality in and around the Cluster. The following stations have been enlisted under Cluster II for monitoring various Environmental components & parameters, the frequency along with the location of the station have been given below in Table 11.1

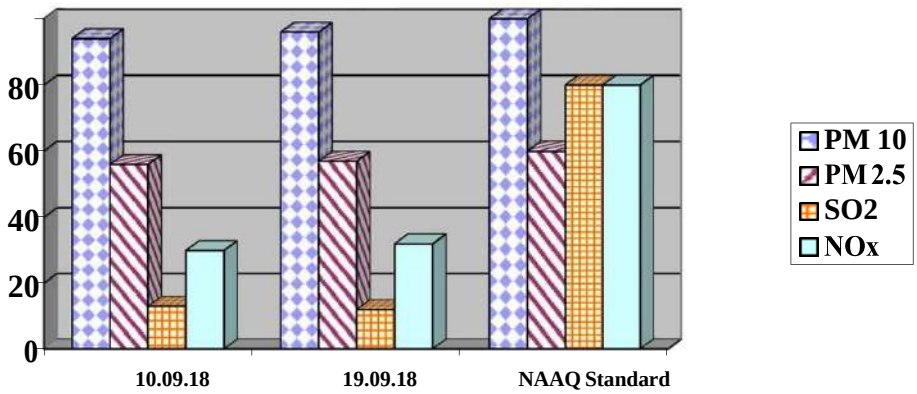
AMBIENT AIR QUALITY DATA

Cluster – II, Bharat Coking Coal limited **Month: SEP. 2018** Year : **2018-19.**

Station Name: A4 – Block II OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	06.09.18	83	49	12	31
2	18.09.18	88	51	13	30
	NAAQ Standards	100	60	80	80



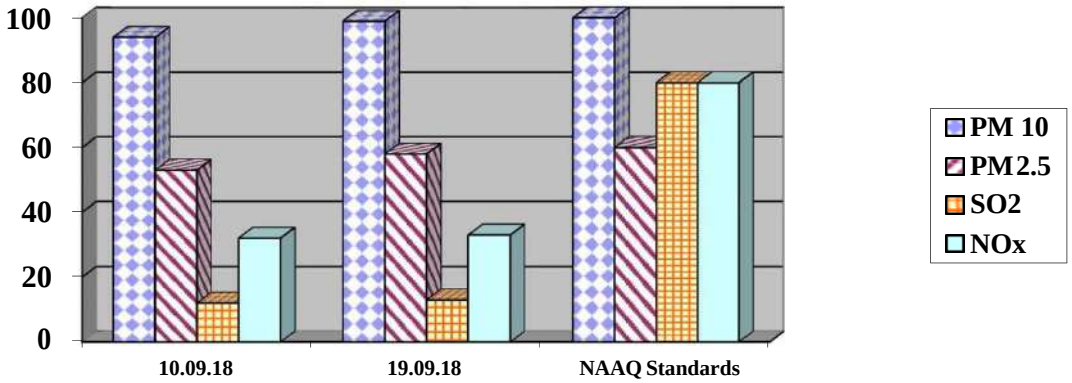
Station Name: A5, Muraidih OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO_2	NO_X
1	10.09.18	94	56	13	30
2	19.09.18	96	57	12	32
	NAAQ Standard	100	60	80	80



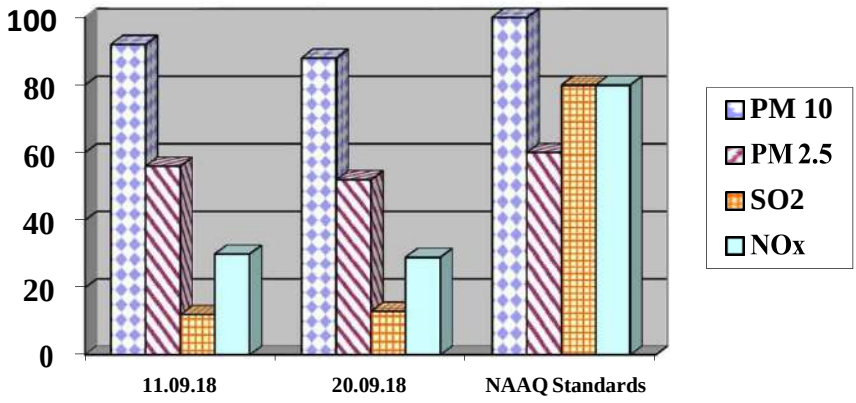
Note:

- *All values are expressed in microgram per cubic meter.*
- *24 hours duration*

Station Name: A3 Madhuband Washery		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	10.09.18	94	53	12	32
2	19.09.18	99	58	13	33
	NAAQ Standards	100	60	80	80



Station Name: A33 Madhuband UGP		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	11.09.18	92	56	12	30
2	20.09.18	88	52	13	29
	NAAQ Standards	100	60	80	80



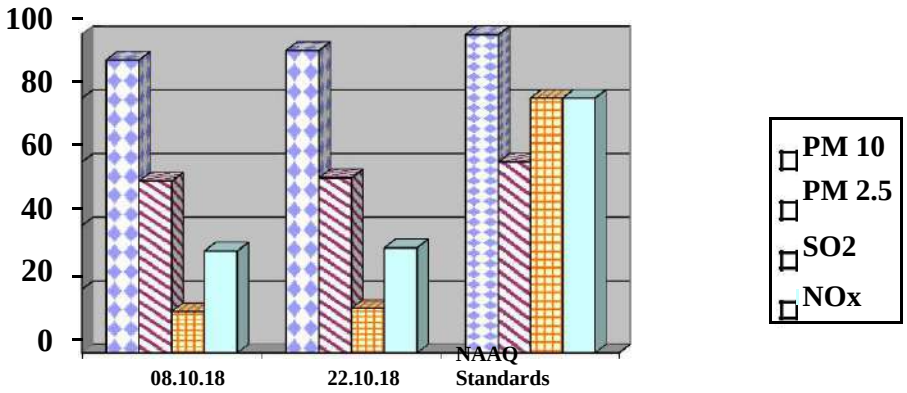
Note:

- *All values are expressed in microgram per cubic meter.*
- *24 hours duration*

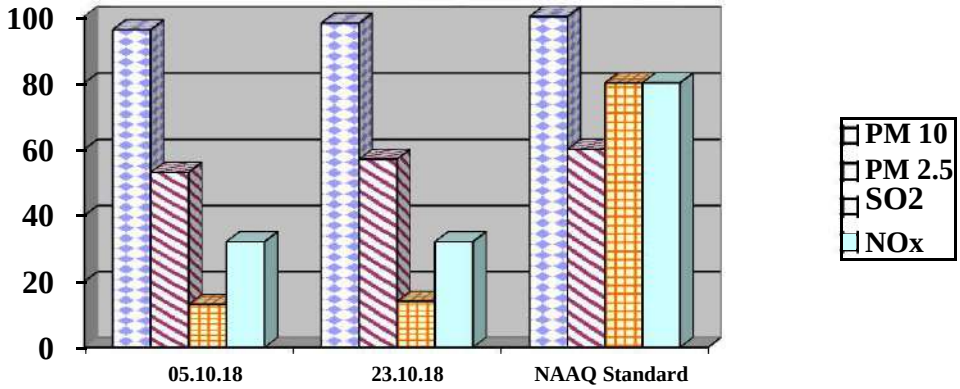
AMBIENT AIR QUALITY DATA

Cluster – II, Bharat Coking Coal limited **Month: OCT, 2018** Year : **2018-19.**

Station Name: A4 – Block II OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	08.10.18	92	54	13	32
2	22.10.18	95	55	14	33
	NAAQ Standards	100	60	80	80



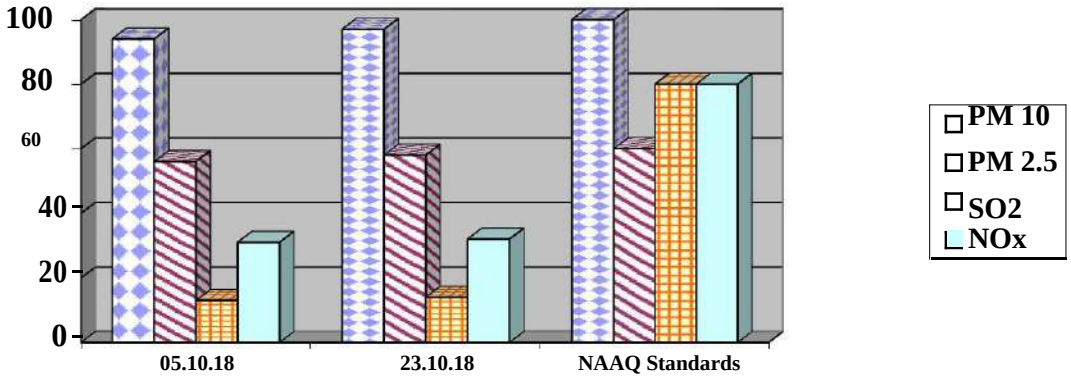
Station Name: A5, Muraidih OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO_2	NO_x
1	05.10.18	96	53	13	32
2	23.10.18	98	57	14	32
	NAAQ Standard	100	60	80	80



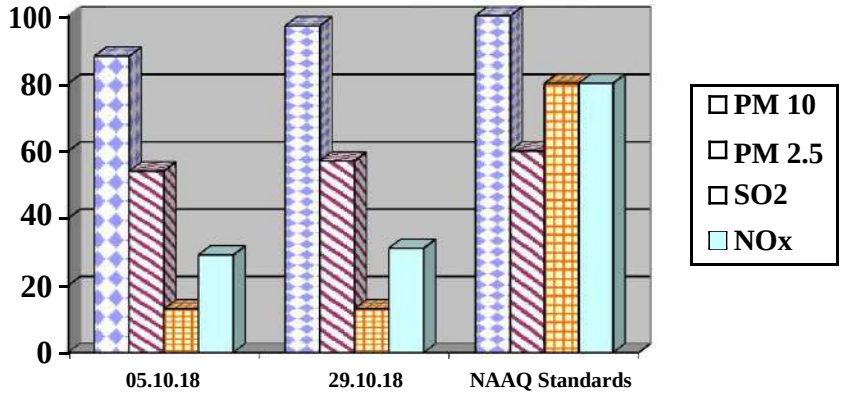
Note:

- *All values are expressed in microgram per cubic meter.*
- *24 hours duration*

Station Name: A3 Madhuband Washery		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	05.10.18	94	56	13	31
2	23.10.18	97	58	14	32
	NAAQ Standards	100	60	80	80



Station Name: A33 Madhuband UGP		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	05.10.18	88	54	13	29
2	29.10.18	97	57	13	31
	NAAQ Standards	100	60	80	80



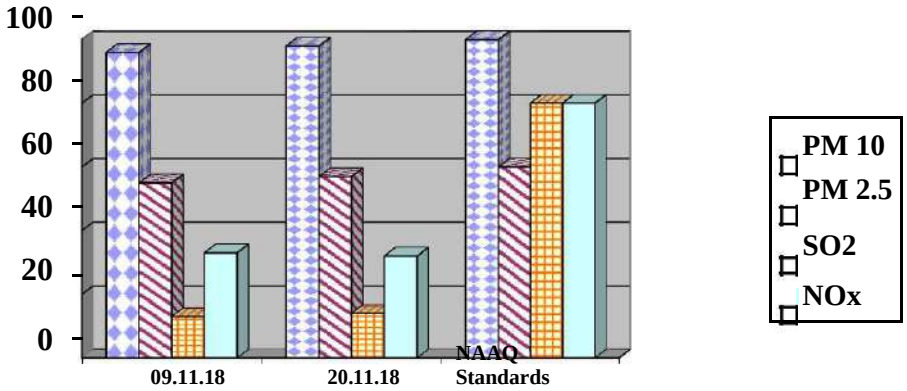
Note:

- *All values are expressed in microgram per cubic meter.*
- *24 hours duration*

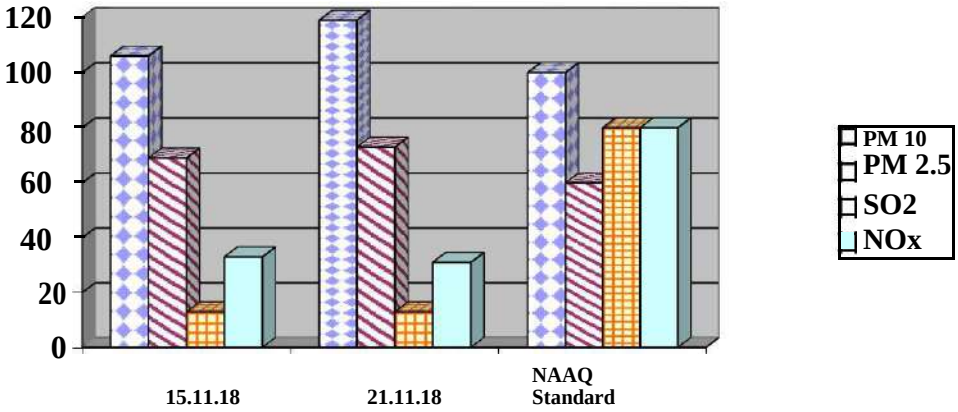
AMBIENT AIR QUALITY DATA

Cluster – II, Bharat Coking Coal limited **Month: NOV, 2018** Year : **2018-19.**

Station Name: A4 – Block II OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	09.11.18	96	55	13	33
2	20.11.18	98	57	14	32
	NAAQ Standards	100	60	80	80

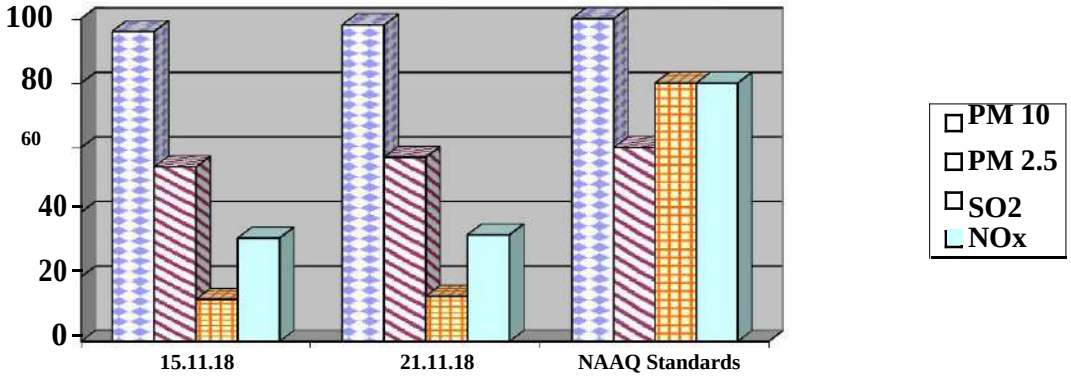


Station Name: A5, Muraidih OCP		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO_2	NO_X
1	15.11.18	106	69	13	33
2	21.11.18	119	73	13	31
	NAAQ Standard	100	60	80	80



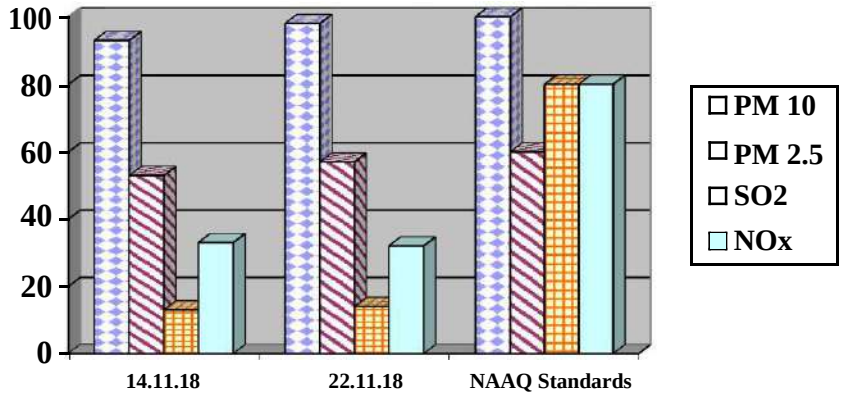
➢ **Note:** *All values are expressed in microgram per cubic meter. 24 hours duration*

Station Name: A3 Madhuband Washery		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	15.11.18	96	54	13	32
2	21.11.18	98	57	14	33
	NAAQ Standards	100	60	80	80



Station Name: A33 Madhuband UGP **Zone: Buffer** **Category: Industrial**

Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	14.11.18	93	53	13	33
2	22.11.18	98	57	14	32
	NAAQ Standards	100	60	80	80



Note:

- *All values are expressed in microgram per cubic meter.*
  24 hours duration

NOISE LEVEL DATA

Name of the Project : **Cluster -II**			Month: **SEP. 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Madhuband Washery**	**Industrial area**	10.09.18	54.5	*75*
2	**Madhuband Washery**	**Industrial area**	19.09.18	62.4	*75*
3	**Block-II**	**Industrial area**	06.09.18	60.1	*75*
4	**Block-II**	**Industrial area**	18.09.18	64.3	*75*
5	**Muraidih**	**Industrial area**	10.09.18	62.3	*75*
6	**Muraidih**	**Industrial area**	19.09.18	71.2	*75*
7	**Madhuband UGP**	**Industrial area**	11.09.18	62.8	*75*
8	**Madhuband UGP**	**Industrial area**	20.09.18	57.9	*75*

Name of the Project : **Cluster -II**			Month: **OCT, 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Madhuband Washery (N3)**	**Industrial area**	05.10.18	57.2	*75*
2	**Madhuband Washery**	**Industrial area**	23.10.18	58.4	*75*
3	**Block-II(N4)**	**Industrial area**	08.10.18	61.8	*75*
4	**Block-II**	**Industrial area**	22.10.18	59.3	*75*
5	**Muraidih(N5)**	**Industrial area**	05.10.18	65.2	*75*
6	**Muraidih**	**Industrial area**	23.10.18	67.7	*75*
7	**Madhuband UGP (N33)**	**Industrial area**	05.10.18	57.2	*75*
8	**Madhuband UGP**	**Industrial area**	29.10.18	58.1	*75*

Name of the Project : **Cluster -II**			Month: **NOV, 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Madhuband Washery (N3)**	**Industrial area**	15.11.18	58.2	*75*
2	**Madhuband Washery**	**Industrial area**	21.11.18	60.1	*75*
3	**Block-II(N4)**	**Industrial area**	09.11.18	56.2	*75*
4	**Block-II**	**Industrial area**	20.11.18	60.9	*75*
5	**Muraidih(N5)**	**Industrial area**	15.11.18	56.2	*75*
6	**Muraidih**	**Industrial area**	21.11.18	62.2	*75*
7	**Madhuband UGP (N33)**	**Industrial area**	14.11.18	52.8	*75*
8	**Madhuband UGP**	**Industrial area**	22.11.18	60.3	*75*

Permissible limits of Noise Level as per MOEF Gazette Notification No. GSR 742(E) dt. 25.09.2000 Standards for Coal Mines and Noise Pollution (Regulation and Control) Rules, 2000.
*** Day Time: 6.00 AM to 10.00 PM,**

11.3.1 Water Quality Report:

Any adverse impact or pollution consequence of water will have serious effect on the environment. Hence, it becomes important to assess the water quality periodically in the mining area. Thus, to assess the water quality, samples were collected from Two (02) different locations (mine water) and analyzed for physio-chemical characteristics and heavy metals.

The water sampling points were selected by consultation between BCCL & JSPCB officials. The different sources of water were identified for water quality characterization depending on their use for potable/industrial purposes and considering likely impact on these sources due to project activities. Based on these considerations, it was thought necessary to assess the existing quality of different water sources in the study area including both up & down stream of surface water body, ground water and mine water.

11.3.2. MINE EFFLUENT REPORT

WATER QUALITY DATA

(EFFLUENT WATER- FOUR PARAMETERS)

Name of the Cluster: **Cluster -II**		Month: **SEP. 2018**	Name of the Station: **Mine Discharge of Block II OCP**	
Sl. No.	**Parameters**	**MW2** First Fortnight	**MW2** Second Fortnight	**As per MOEF General Standards for schedule VI**
		06/09/2018	19/09/2018	
1	Total Suspended Solids	32	28	*100 (Max)*
2	pH	8.12	7.97	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	24	24	*250 (Max)*

Name of the Cluster: **Cluster -II**		Month: **OCT, 2018**	Name of the Station: **Mine Discharge of Block II OCP**	
Sl. No.	**Parameters**	**MW2** First Fortnight	**MW2** Second Fortnight	**As per MOEF General Standards for schedule VI**
		09-10-218	20-10-2018	
1	Total Suspended Solids	18	24	*100 (Max)*
2	pH	8.37	7.9	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	28	20	*250 (Max)*

Name of the Cluster: **Cluster -II**		Month: **NOV, 2018**	Name of the Station: **Mine Discharge of Block II OCP**	
Sl. No.	**Parameters**	**MW2** First Fortnight	**MW2** Second Fortnight	**As per MOEF General Standards for schedule VI**
		10-11-2018	20-11-2018	
1	Total Suspended Solids	26	24	*100 (Max)*
2	pH	8.66	8.07	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	24	28	*250 (Max)*

All values are expressed in mg/lit unless specified.

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- To protect public health and safety;
- To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects:

The following technical aspects would be reviewed in the final mine closure planning.

- **Safety hazards including management of fire and subsidence**:

  In the mine closure plan, action will be taken to cover all the safety aspects including management of fire & subsidence and mine inundation. Due to underground depillaring operation, surface cracks may reach to surface or subsidence may occur in the area because depth of workings is low. Adequate thickness of soil/alluvium will be spread over the subsided area, if any. Fire areas which will not proposed to be excavated shall be dealt with non-combustible material and other suitable fire-fighting measures.

❖ **Management of Pit Slopes:**

During operation of the mine, overall slope will be maintained at an angle not exceeding 22^0-28^0. Vegetation cover will also be provided along the slopes to arrest any failure.

As regards stability of back-filled dumps, the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will serve as a lagoon which may be utilised as water reservoir for the locality.

During operation, the external and internal OB dump will be developed with 40m berm width and maximum height of 90m in case of external OB dump and the overall dump slope shall not exceed 22 to 28 degrees. The waste dumps will be provided with toe wall and garland drains. The dump will be technically reclaimed and vegetation will be grown after spreading the top soil. The above measures will prevent slope failure and improve the aesthetic value.

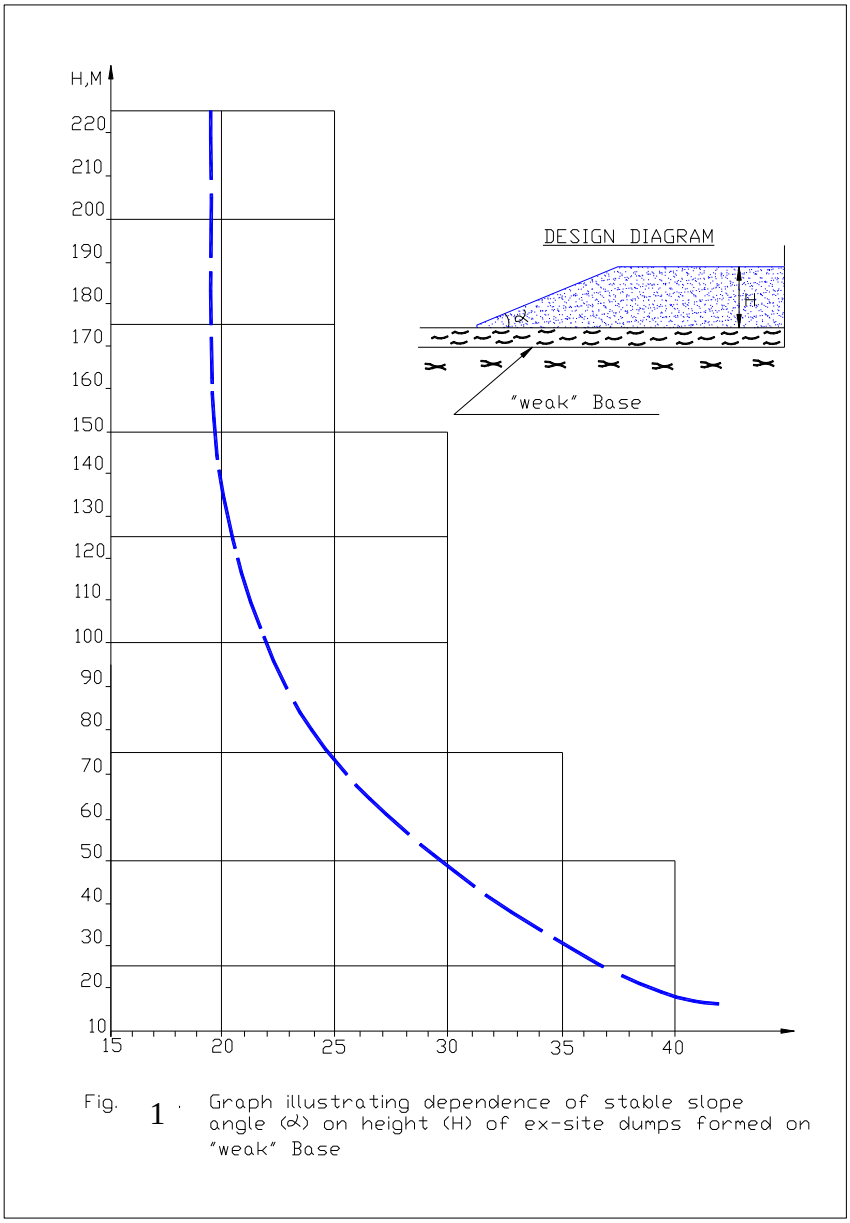


Fig. 1 . Graph illustrating dependence of stable slope angle (α) on height (H) of ex-site dumps formed on "weak" Base

The final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will also serve as a lagoon which may be utilised as water reservoir for the locality. Most of the back filled area shall be vegetated by selecting proper plant species in consultation with State Forest Department.

❖ **Management of hydrology and hydro-geology**:

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine vegetation will be grown on the entire vacant area.

- **Details of decommissioning of the infrastructures:**

  The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and power transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.

- **Closure of entry to the open-cast and underground mines :**

  At the end of the mine life, end pit slope within the seam and every exposed mouths of development gallery along the length of the bench / box-cut should be closed with non-combustible material (OB rock & mutti), compacted properly and sprayed with Thermoseal (a mica based sealant).

  All the incline mouths and air shafts presently being used and proposed to be made in future will be sealed adequately with non-combustible material for safety point of view.

(b) Environmental aspects

This would include the following:

- **Management of final voids**:

  In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.

- **Channelisation of available water:**

  If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing.

- **Management of Recharge Areas**:

  The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.

- **Acceptable Surface and Ground Water Flows**:

  In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects

The social aspects of land use planning relating to mine closure would include the following:

- **Re-deployment of Workforce:**

  The company employees will be gainfully engaged in the neighboring projects after cessation of mining activities.

- **Management of Community Facilities:**

  In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects:

Mine Closure activities would be a constant exercise for the mine which would begin with the commencement of mining operations and continue till post closure. The mine closure activities would naturally entail certain expenditures, which will have to be borne by the mine

operator. There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure. This would cover the activities which are being executed along with normal mining operation and would continue to be executed in course of execution of the project.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

e) Maintenance of records pertaining to Progressive Mine Closure

The Mine management shall maintain following 2 Nos. of Progressive mine closure plans for every 5 year period.

A Progressive mine closure plan for surface activities

This plan shall be maintained at a scale of 1: 4000 showing the entire progressive mine closure activities (surface) carried out on yearly basis. The plan shall be updated on annual basis and shall be signed by appropriate authorities from the Project and the Area. After every annual renewal, the plan shall be placed before HOD (Env.)/ GM (Env.) of the Company for scrutiny and approval.

Progressive mine closure plan for UG activities

Similar to PMCP for surface activities, a progressive mine closure plan showing the UG activities shall be maintained. This plan shall also be updated on annual basis and signed by all the above mentioned officials.

Execution of progressive mine closure activities and 5 yearly monitoring

Besides the above plan, a progressive mine closure register shall also be maintained by the mine management. This register shall carry

details of the progressive mine closure activities carried out on yearly basis. The details to be maintained in the said register shall cover inter alia the name of activity, place, period of execution, executing agency, expenditure incurred, proof of expenditure incurred, final status of the area where activity was executed, plan on which such activity has been shown etc.

The entries into the said register shall be signed by the appropriate authorities from the Project and the Area. At the end of the year the said register (along with two plans) shall be placed before HOD (Env.)/ GM (Env.) of the Company for scrutiny and approval.

After observing the necessary administrative/financial formalities, the mine authorities shall execute the identified progressive mine closure activities, whenever and wherever required. The executed activities shall be shown on the above said plans and recorded in the said registers.

The executed progressive mine closure activities shall be monitored on 5-yearly basis by 3rd party (ISM, CMPDI, NEERI etc.) as stated in Govt. Guidelines.

The 5 yearly return from escrow fund would be equal to expenditure incurred on progressive mine closure activities during last 5 years or 80 % of total deposited amount in the escrow account (including interest) whichever is less. The said return would be subject to above said monitoring of progressive MCP by a third party (ISM/CMPDI/NEERI etc.).

As the 5 yearly return from escrow fund is linked with the expenditure incurred on progressive mine closure activities during last 5 years, it is very important that progressive mine closure records, plans, expenditure details along with proof are properly maintained.

At this juncture it is important to note that some of the progressive mine closure activities, enumerated in the preceding paragraphs, are legal obligations specified in Project reports, EMP, permissions obtained from statutory bodies such as CPCB, SPCB, DGMS etc. The Project authorities are bound to comply with these obligations.

12.3 MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows:

(a) **Health & Safety**: Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;

(b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000; DGMS Directives on Noise & Ground Vibration;

(c) **Forest:** Forest (Conservation) Act, 1980.

(d) **Rehabilitation:** CIL's policy, however, applicable for land oustees only.

(e) **Decommissioning/asset disposal, etc.**

In addition documents like EIA/EMP submitted to MoEF&CC and the commitments made therein also have legal status

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of mine in order to assess corrective measures to be implemented to sustain

pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows:

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

- Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers,

prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.

- In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.
- Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.
- As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following:

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste;
- The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

Earlier, there were three separate Collieries namely Muraidih, Shatabdi and Phularitand Colliery having separate lease boundaries. All these Collieries are under the administrative control of Barora area, BCCL. In past, these Collieries were worked in large scale by opencast as well as underground Board & Pillar mining method upto V/VI/VII combined seam.

Earlier large scale of underground mining by Bord & Pillar method has been done in three to four sections in thick V/VI/VII combined seam in all these collieries. Seams lying above this combined seam were also partly developed /parlty depillared by underground mining method.

Later-on separate opencasts mines were made in Muraidih Colliery, Shatabdi Colliery as well as Phularitand Colliery to extract this V/VI/VII combined seam keeping the floor of this seam as base for the opencast. Thus, all the underground working of V/VI/VII combined seam along with B&P workings of overlying seams have been extracted and still extraction is in progress in these areas.

Due to large scale of opencast mining in Muraidih Colliery and Shatabdi Colliery, the common boundaries between these two mines have been excavated and merged and becomes a single mine. Subsequently, these two Collieries are amalgamated intone single Colliery after obtaining permission from DGMS and it is presently known as Muraidih Colliery.

In Phularitand Colliery, a quarry named as Pure Benedih Section (P B Quarry)) was worked in past with floor of V/VI/VII seam as base on north-western part of Phularitand Colliery. At present, an quarry is running on outsourced basis (i.e hired HEMM patch) with floor of V/VI/VII combined seam as base which is located almost southern part of the Phularitand property and located on northern side of Dhanbad-Chandrapura (DC) Railway line.

To extract seams lying below V/VI/VII seam in Phularitand Colliery, Mine Officials initiated a proposal to drive Inclines from the floor of abandoned V/VI/VII seam quarry (P B Section) to Seam-III. The Incline sites are selected by the Colliery Officials. Subsequently, two Inclines/drift drivages were made upto the floor of Seam-III. Presently, coal is being extracted from Seam-III by Bord & Pillar method of mining.

Considering the present scenario of mining operation of opencast as well as underground workings in these Collieries, BCCL management wants to amalgamate the area of existing Muraidih Colliery with the part area of Phularitand Colliery falling in Cluster-II (i.e northern side of D C Railway

Line). This mining plan is prepared considering this amalgamated area which is named as Amalgamated Muraidih-Phularitand(Part) Colliery.

Mine Closure activities would be a constant exercise for the mine which would begin with the commencement of mining operations and continue till post closure. The mine closure activities would naturally entail certain expenditures, which will have to be borne by the mine operator. There would be two types of expenditures on account of mine closure activities in respect of Amalgamated Muraidih Phularitand (Part) Colliery.

- **Revenue expenditures**

This would cover the activities which are being executed along with normal mining operation and would continue to be executed in course of execution of the project.

- **Expenditures to be incurred just prior to actual mine closure and in the post closure period**

As per MOC guidelines, a corpus escrow account @ ₹ 1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ ₹ 6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of final mine closure.

The current Guidelines read as:

"It has been estimated that typically closure cost for an opencast mine will come around ₹ 6.00 lakh per Hectare of the project area and it would be ₹ 1.00 lakh per Hectare for underground mine project area at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time".

Erstwhile, two mine closure plans has already been approved by Board of Director, BCCL namely Muraidih-Shatabdi Group of mines & Phularitand Mixed Mine (Cluster-II).

Details of aforesaid mine closure plans are given in subsequent table:

Sl. No.	Name of Mine	Board details	Date of Board meeting	Escrow Account opened at Bank of Baroda, Dhanbad Branch	Amount deposited upto March 2019
01.	**Muraidih - Shatabdi Group of mines**	300th Board of BCCL	21.09.2013	00150100008816	**₹ 1841.91 Lakhs**
02.	**Phularitand Mixed mines (Cluster-II)**	305th Board of BCCL	12.03.2014	00150100009052	**₹ 1254.82 Lakhs**

As there is no guideline of MoEF/MoC/any other regulatory authority regarding procedures to be followed for merger/transfer of Escrow accounts of already approved Mine Closure Plans, BCCL management may take decision in consultation with competent authority regarding merger of existing Escrow accounts or opening a new Escrow account for Amalgamated Muraidih-Phularitand(Part) Colliery.

A revised mine closure plan is being prepared incorporating all the major current and proposed changes in the mining activities. As per the data furnished by the mine/area, the project area and leasehold area in respect of Amalgamated Muraidih Phularitand (Part) Colliery differs and is given below and the closure cost is calculated accordingly. The mine closure cost for the revised mine closure plan is calculated in following way:

As per Colliery record, the total area of existing Muraidih Colliery is 717.71Ha (after merger of earlier Muraidih & Shatabdih Collieries). Though total area of Phularitand Colliery is 741.88Ha but a part this area i.e 401.0 Ha is falling in Cluster-II. The amalgamate area of Muraidih Colliery and part of Phularitand Colliery is 1118.71 Ha (i.e 717.71 Ha +401 Ha). **Within this proposed amalgamate area, Project area is measured as 887.75 Ha considering opencast as well as underground mining operation.**

Out of 887.75 Ha of project area, an area of 591.10 Ha is required for opencast operations and 343.80 Ha for underground operations. Thus, 591.10Ha area has been considered for the calculation of closure cost as per Opencast norms and 343.80 Ha have been considered for the calculation of closure cost of the area as per Underground norms.

The overlapping area (where UG & OC operations have been done in different vertical levels) has been considered for calculation of closure cost as per opencast norms.

The money deposited in the Escrow Account has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure

It is difficult to conclusively predict the mining parameters on a long term basis owing to rapidly changing mining technology, developments in the field of clean coal technologies and R&D activities in development of alternative energy sources.

As per the latest Guidelines issued by the MoC, GoI(dt. 07.01.2013) the *"annual closure cost is to be computed considering the total project area at the above mentioned rates and dividing the same by the entire life of the mine in years for new projects and balance life of mine in years for operating/existing mines."*

Jharia Coalfield is characterized by occurrence of a number of working coal horizons, giving a leverage of extended working life of the mines. Some more seams can come in the lap of workable horizons due to improvement in mining technology in times to come. The underground mines in leasehold of JCF are generally small capacity mines, giving a false impression of very long lives due to small level of current production level. There may be a

strategy in future to amalgamate the mines for higher production level to attain the economics of scale. In such a situation, the life of the mine arrived at with current level of production for the balance reserve may not be workable in the long run.

In view of the above, for the purpose of mine closure cost calculations, the life of the mine has been calculated based on the reserve available in the identified workable seams. The life of Amalgamated Muraidih Phularitand (Part) Colliery for opencast reserves will be 10 years and life of underground unit will be 21 years in the present perspective.

	UG Section	**OC Section**
Project area (Ha)	343.80	591.10
Life (years)	21	10
Notified rate (As on Aug 2009)	Rs.1.0 Lakh/Ha	Rs.6.0 Lakh/Ha

As per the guidelines *"these rates will stand modified based on Whole Price Index as notified by Government of India from time to time".*

Thus, an escalation factor has been calculated based on WPI of December 2018 (120.1) vis-à-vis WPI of August 2009(129.6). However, as per the directives of Office of the Economic adviser, WPI series has been revised. In the revised series, base year has been changed to 2011-12 from 2004 -05. To account for the aforesaid change WPI Linking Factor has been taken as 1.561. Considering this linking factor, current WPI of December 2018 is converted to WPI for Base year 2004-05 which comes out to be 187.48.

Based on the WPI of December 2018 (187.48) and Aug 2009(129.6), Escalation factor comes out to be 1.446575.

	UG Section	**OC Section**	**Remarks**
Notified rate (in base year)	₹ 1 Lakh/Ha	₹ 6 Lakh/Ha	Escalation factor X Notified Rate
Escalation Factor	1.446575	1.446575	
Escalated Rate of mine closure per Ha	**₹1.446675 lakhs**	**₹ 8.679449 lakhs**	

As per Mine Closure guidelines, the total expenditure to be incurred at the escalated rate may be calculated in subsequent manner:

	UG Section	OC Section	Remarks
Area (Ha)	**343.80**	**591.10**	Area x Escalated rate of mine closure
Escalated Rate of mine closure	₹1 .446575 lakhs	₹ 8.679449 lakhs	
Total Escalated Amount	₹ **497.332** lakhs	₹ **5130.422** lakhs	

Details of amount already deposited in the escrow account of Phularitand mixed mines & Muraidih - Shatabdi Group of mines upto 31st March 2019:

Year	Phularitand Mixed mines		Muraidih Shatabdi Group of Mines	
	Amount (in ₹ lakhs)		Amount (in ₹ lakhs)	
	UG Section	OC Section	UG Section	OC Section
2013-14	8.227	176.253	18.87	251.92
2014-15	8.638	185.066	19.82	264.51
2015-16	9.070	194.319	20.81	277.74
2016-17	9.524	204.035	21.85	291.63
2017-18	10.000	214.237	22.94	306.21
2018-19	10.500	224.949	24.09	321.52
Total	**55.96**	**1198.86**	**128.38**	**1713.53**
Total amount already deposited for OC unit	**₹ 2912.39 lakhs**			
Total amount already deposited for UG unit	**₹ 184.34 lakhs**			

The amount given in above table shall be adjusted against the current escalated amount as provision has already been made in the approved mine closure plans of **Phularitand Mixed mines (Cluster-II)** and **Muraidih Shatabdi Group of** Mines with respect to the same.

To account for the deposited amount, the total amount is deducted from the escalated amount to arrive at the balance escalated amount.

	UG Section	OC Section	Remarks
Escalated Amount(in ₹ lakhs)	497.332	5130.422	
Amount already deposited in escrow account (in ₹ lakhs)	184.339	2912.389	
Balance Escalated Amount (in ₹ lakhs)	**312.993**	**2218.033**	

To arrive at the annual cost to be deposited in each year in an escrow account, the escalated amount shall be divided by the life of the section.

	UG Section	OC Section	Remarks
Balance Escalated Amount(in ₹ lakhs)	312.993	2218.033	Balance Escalated Amount / Life
Life (in Years)	21	10	
Amount per year(in ₹ lakhs)	**14.904**	**221.803**	

As per the guidelines, the arrived annual cost has to be escalated by 5% every year for the remaining life of the mine. The amount to be deposited every year after 5% escalation is given below:

Table No. 12.1 Break-Up cost of Mine Closure of Amalgamated Muraidih Phularitand (Part) Colliery

(In ₹ lakhs)

Year	UG Section	OC Section	Total
1	14.904	221.803	236.708
2	15.650	232.894	248.543
3	16.432	244.538	260.970
4	17.254	256.765	274.019
5	18.116	269.603	287.720
6	19.022	283.084	302.106
7	19.973	297.238	317.211
8	20.972	312.100	333.072
9	22.021	327.705	349.725
10	23.122	344.090	367.211
11	24.278		24.278
12	25.492		25.492
13	26.766		26.766
14	28.105		28.105
15	29.510		29.510
16	30.985		30.985
17	32.535		32.535
18	34.161		34.161
19	35.869		35.869
20	37.663		37.663
21	39.546		39.546
	532.376	**2789.819**	**3322.194**

Thus, total amount that shall be further deposited for final mine closure activities of Amalgamated Muraidih Phularitand (Part) Colliery in case of underground workings during the considered period of 21 years stands out to be **₹ 532.376 lakhs** and in case of opencast workings during the considered period of 10 years stands out to be **₹ 2789.819** as per the present status of the mine.

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for Mine Closure Activities.

	Amount (in ₹ lakhs)	
	UG Section	**OC Section**
Amount Already Deposited in Escrow Account	184.339	2912.389
Amount to be Deposited in the Escrow Account in the Future	532.376	2789.819
Total Amount available for Mine Closure Activities	**716.715**	**5702.208**

Based on the existing mine closure planning norms, the above calculated cost at Final WPI of December 2018 on mine closure may be tentatively grouped under different heads as given in Table No. 12.2 A and 12.2 B for underground and opencast respectively, as per guidelines of CMPDI(HQ).

Table 12.2 A) Break up costs of Mine Closure Activities for Amalgamated Muraidih-Phularitand(Part) Colliery (Underground)

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	**Dismantling of Structures**	
	Service Buildings	25.085
	Residential Buildings	75.828
	Industrial Structures like CHP, Workshop, field sub-station, cap lamp room, haulage, fan installation etc.	45.368
B	**Permanent Sealing of mine entries(incline mouth and air shaft)**	
	Sealing of incline mouths and air shafts	38.129
C	***Subsidence Management**	34.044
D	**LANDSCAPING**	
	Landscaping of the cleared land for improving its esthetic	63.071
E	***Plantation**	
	Plantation over the cleared area obtained after dismantling and on other barren spaces	93.173
F	**Monitoring/Testing of parameters for three years**	
	Air Quality	48.952
	Water Quality	45.440
G	***Enterpreneuship Development(Vocational/skill development training for sustainable income of affected people**	54.829
H	***Miscellaneous and other mitigative measures**	104.640
I	**Manpower Cost for Supervision**	88.156
	TOTAL	**716.715**

Note: * : To be covered under Progressive Mine Closure activities also

Table 12.2 B) Break up costs of Mine Closure Activities for Amalgamated Muraidih Phularitand (Part) Colliery (OC)

Sl. No.	Activity	Mine Closure Cost (` in Lakhs)
A	**Dismantling of Structures**	
	Service Buildings	11.404
	Residential Buildings	152.249
	Industrial Structures like CHP, Workshop, field sub-station, etc.	17.107
B	**Permanent Fencing of Mine Void and other dangerous area**	
	Random Ruble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	85.533
C	**Grading of Highwall slopes**	
	Levelling and grading of highwall slopes	100.929
D	***OB Dump Reclamation**	
	Handling/Dozing of external OB Dump into mine void	5055.578
	Bio-Reclamation including soil spreading, plantation and maintenance	22.809
E	**LANDSCAPING**	
	Landscaping of the cleared land for improving its esthetic	17.107
F	***Plantation**	
	Plantation over area obtained after dismantling	28.511
	Plantation around fencing	11.404
	Plantation over the cleared external OB Dump	1.140
G	**Monitoring/Testing of parameters for three years**	
	Air Quality	12.545
	Water Quality	11.404
H	***Enterpreneuship Development(Vocational/skill development training for sustainable income of affected people**	14.826
I	***Miscellaneous and other mitigative measures**	114.044
J	**Manpower Cost for Supervision**	45.618
	Total	**5702.208**

Note: * : To be covered under Progressive Mine Closure activities also

Thus, total amount that shall be deposited for final mine closure activities of Amalgamated Muraidih Phularitand (Part) Colliery has been estimated as **₹ 6418.923 lakhs**, out of which **₹ 5702.208 lakhs** is for opencast based on OC norms at WPI of December 2018 and **₹ 716.715 lakhs** is for underground based on UG norms at WPI of December 2018.

Mining is to be carried out in a phased manner initiating afforestation/reclamation work in the mined out area of the first phase while commencing the mining in the second phase i.e. continuation of mining activities from one phase to other indicating the sequence of operations depending on the geo-mining conditions of the mine. Up to 80% of the total deposited amount including interest accrued in the ESCROW account may be released after every five years in line with the periodic examination of the Closure Plan as per Clause 3.1 of the Annexure of the Guidelines. The amount released should be equal to expenditure incurred on the Progressive mine closure in past five years or 80% whichever is less. The balance amount shall be released to mine owner/leaseholder at the end of the final Mine Closure on compliance of all provisions of Closure Plan. This compliance report should be duly signed by the lessee and certify that said closure of mine complied all statutory rules, regulations, orders made by the Central or State Government, statutory organisations, court etc. and certified by the Coal Controller.

Table 12.3 Break up costs of Mine Closure Activities (earlier approved) and Expenditure incurred during Progressive Closure Activities

Break up Cost of Mine Closure of Muraidh-Shatabdi OCP

Activities	Mine closure Cost as per plan(₹ lakhs)	Claimed Mine closure Cost (lakhs)				Total Claimed (in ₹ lakhs)
		2014-15	2015-16	2016-17	2017-18	
OB Dump Reclamation						
Handling/Dozing of external OB Dump into mine void	**3956.22**	964.21	338.14	303.64	374.33	1980.32
Bio-Reclamation including soil spreading, plantation and maintenance	**17.85**		1.65	274.68	518.96	795.29
Plantation						
*Plantation around fencing	**8.92**					
Plantation over the cleared external OB Dump	**0.89**					
Total	**3983.88**	964.21	339.79	578.32	893.29	**2775.61 ****

Break up Cost of Mine Closure of Phularitand OCP

Activities	Mine closure Cost as per plan(₹ lakhs)	Claimed Mine closure Cost (₹ lakhs)		Total Claimed (₹ lakhs)
		2016-17	2017-18	
OB Dump Reclamation				
Handling/Dozing of external OB Dump into mine void	**2220.042**	1943.50	2832.59	4776.09
Total	**2220.042**	1943.50	2832.59	**4776.09 ****

**Above data is provided by Env. Dept. Barora Area

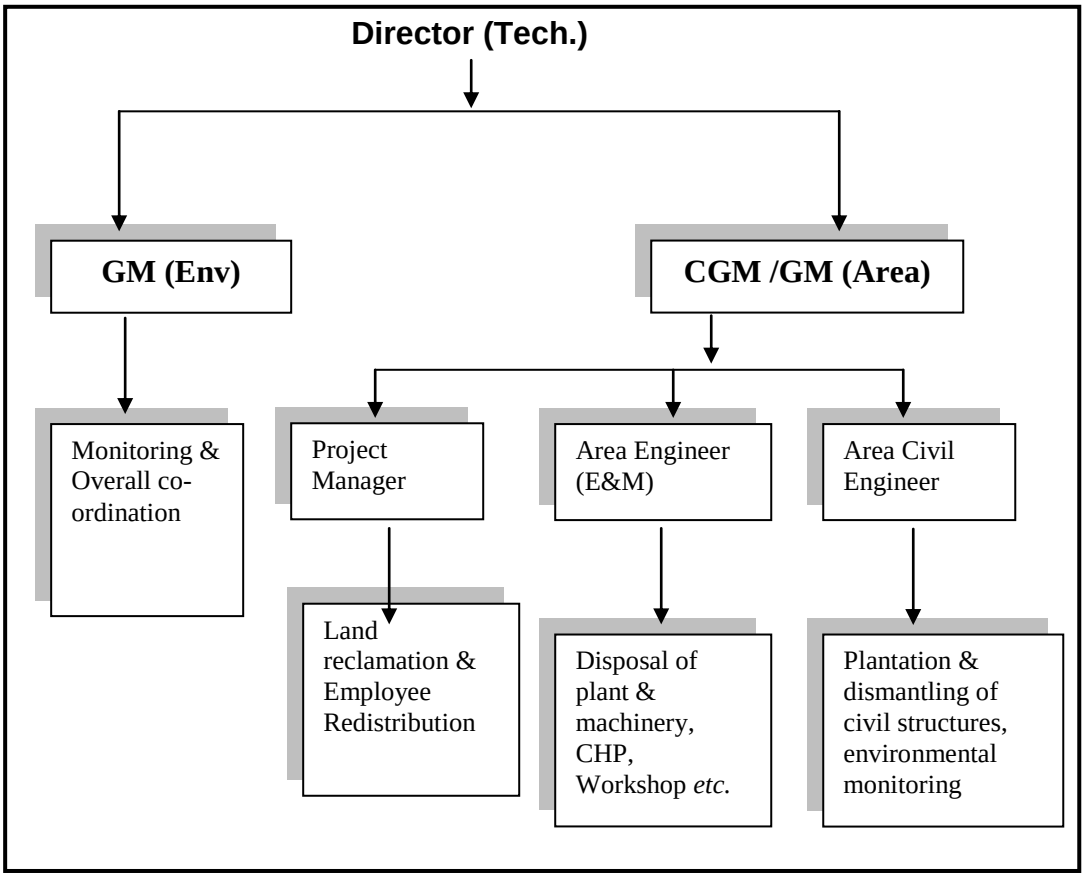
However, the additional amount beyond the escrow account, if any estimated later on, will be provided by the mine operator after estimating the final mine closure cost five years prior to mine closure (as per the mine closure guideline)**.**

12.9 IMPLEMENTATION PROTOCOL

As the mine closure activities would continue even after cessation of mining activities, an organization consisting of different discipline would be formed to undertake the implementation of mine closure activities as well as monitoring of the same**.** Such activity shall continue for a period of three

years after the closure of mining activity in the mine. Once the closed mine becomes stabilized in respect of safety, environmental and social aspects, the monitoring team would be withdrawn.

For implementing the mine closure activities and monitoring thereof, the following organisational structure at corporate level has been proposed:



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If need be, proper mitigation measures will be taken up after evaluating the environmental quality. Before closure of the mine, Area GM will prepare survey and disposal report and the same will be submitted to DGMS for acceptance.

When the mine closure activities would take final shape and the entire area under influence is brought to an acceptable shape, BCCL would 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 for surrendering the reclaimed land to the State Government concerned.

IMPLEMENTATION SCHEDULE FOR MINE CLOSURE IN AMALGAMATED MURAIDIH PHULARITAND (PART) COLLIERY

S.N	Activity	Time Frame	Year							
			1st Phase	2nd Phase	3rd Phase	4th Phase	Final Phase	Post Closure Phase		
			1st - 5th Year	6th - 10th Year	11th - 15th Year	16th - 20th Year	21st Year	PC1	PC2	PC3
A	**Dismantling of Structures**									
	Service Buildings	2 years								
	Residential Buildings	2 & ½ years								
	Industrial structures like CHP, Workshop, field sub-station, etc.	2 & ½ years								
B	**Permanent Fencing of mine void and other dangerous area**									
	Random rubble masonry of height 1.2 metre including leveling up in cement concrete 1:6:12 in mud mortar	2 years								
C	**Grading of highwall slopes**									
	Levelling and grading of highwall slopes	2 years								
D	***OB Dump Reclamation**									
	Handling/Dozing of OB Dump and backfilling	Throughout the life of the mine including 3 years after cessation of mining operation								

S.N	Activity	Time Frame	Year							
			1st Phase	2nd Phase	3rd Phase	4th Phase	Final Phase	Post Closure Phase		
			1st - 5th Year	6th - 10th Year	11th - 15th Year	16th - 20th Year	21st Year	PC1	PC2	PC3
	Technical and Bio-reclamation including plantation and post care	Throughout the life of the mine including 3 years after cessation of mining operation								
E	**Permanent sealing of mine entries (incline mouth and air shaft)**									
	Sealing of incline mouths and air shafts	2 years								
F	***Subsidence Management**	Throughout the life of the mine, if required including 3 years after cessation of mining operation								
G	***Landscaping**									
	Landscaping of the open space in the leasehold area for improving its esthetics and eco value	Throughout the life of the mine including 3 years after cessation of mining operation								
H	***Plantation**									
	Plantation over cleared area obtained after dismantling	2 years								
	Plantation around the quarry area and in safety zone	Throughout the life of the mine including 3 years after cessation of mining operation								
	Plantation over the external OB Dump	Throughout the life of the mine								

S.N	Activity	Time Frame	Year							
			1st Phase	2nd Phase	3rd Phase	4th Phase	Final Phase	Post Closure Phase		
			1st - 5th Year	6th - 10th Year	11th - 15th Year	16th - 20th Year	21st Year	PC1	PC2	PC3
I	**Post Closure Env Monitoring / testing of parameters for three years**									
	Air Quality	3 years								
	Water Quality	3 years								
J	***Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people**	Throughout the life of the mine								
K	***Miscellaneous and other mitigative measures**	Throughout the life of the mine including 3 years after cessation of mining operation								
L	**Post Closure Manpower cost for supervision**	3 years								

ANNEXURE-I

Minutes of the meeting for "Preparation of Amalgamated Mining Plan and or Muraidih/Shatabdih-Philaritand Mine of Barora area and also Mining Plan & Mine Closure Plan for Block-II OCP of Block-II area falling in Cluster-II of BCCL"

A meeting was held on the above subject in presence of GM(P&P),Dy.GM(Env), GMs/ Officials from respective Areas/Mines of BCCL and RD/Officials from RI-II,CMPDIL at the conference Hall of RI-2, CMPDIL on 17-12-2018. The planner has explained the status of the existing Mines and following strategies have been decided to prepare the mining Plan and Mine Closure Plan–

Muraidih-Shatabdih-Phularitand

1. It has been decided that Mining Plan & Mine Closure Plan should be prepared as mixed mine (both OC and underground) after amalgamating Muraidih Mine and Phularitand Mine falling in Cluster-II.

2. According to GM of Barora area, Muraidih & Shatabdih Mines have already been amalgamated to a single mine and presently it has been named as Muraidih Mine.

3. It has been decided that the Mining Plan & Mine Closure Plan for Muraidih/Shatabdih-Philaritand Mine will be named as "**Amalgamated Mining Plan and Mine Closure Plan for Muraidih-Phularitand(Part) Colliery, Barora Area, BCCL"**

4. The lease hold area of Phularitand Mine is partly falling in Cluster-II and partly in Cluster-XV. Amalgamated Mining plan is to be prepared for mines falling within Cluster-II. Hence, it has been decided to consider the northern part area of lease hold of Phularitand Colliery lying above D C Railway line falling in Cluster-II alongwith lease hold area of Muraidih Mine for the preparation of above mentioned amalgamated mining plan.

5. In the format of Mining Plan, it has been decided to write within bracket "Amalgamated boundary of Muraidih-Phularitand Mines falling in Cluster II" and mentioned the total measured area against the head of Lease hold area as stated above in the item no.4.

6. The virgin area of coal seams available on northern side of incrop of V/VI/VII seam in Phularitand Mine will be considered for underground mining with B&P development method only due to land acquisition constraint and in rest part of the area by development /depillaring method in Seam-III & below seams if technically feasible. Seam-IV is thin seam and impersistent within the amalgamated area, hence not considered for UG mining. From V/VI/VII seam and seams lying above is to be considered for Opencast mining.

7. In Muraidih Mine, a Global Bid Project has been approved by BCCL Board for extraction of Seam-III,I with deployment of PSLW set which are lying below V/VI/VII combined seam of Muraidih Mine and work order has already been awarded to Contractor. Hence, same proposal of the Contractor for underground mining of these seams shall be considered in preparation of amalgamated Mining Plan of Muraidih Mine and Phularitand Mines.

8. In the amalgamated Mining Plan, the existing Muraidih OC and Phularitand OC will be combined to a single OC towards northern part of the amalgamated Muraidh-Phularitand area considering the availability of resources.

9. The Amalgamated Mining Plan should be prepared considering the diversion of D B Road (running North-South) towards western side keeping almost along the boundary of Railway property of Adra-Gomoh Rly Line.

10. Area authority has to take DGMS permission before commencement of mining operation in amalgamated Muraidih-Phularitand mine falling in Cluster-II property as stated in item no.4.

11. As per the Area Survey Officer, **Forest land** exists within the Muraidih Mine. It should be marked (mentioning area in Ha) by respective surveyor on the Surface Plan along with **coal edges** presently being extracted in existing quarries/ P B quarry(old), existing **Fire area**, line of **water logging** in different seam workings of both mines and should be submitted to CMPDIL at the earliest.

12. As per Mine Authority, some part of forest land has been extracted by OC operation in past. It has been decided to mention in text of this mining plan as "This is a broken forest land for which regularization for forest clearance has been applied by BCCL". A copy of the application letter will be provided by Environment department, HQ,BCCL to incorporate as annexure in the report.

13. Normative & Peak Production for Amalgamated Mining Plan and Mine Closure Plan for Muraidih-Phularitand Colliery should be maintained as considered in EC letter no.J-11015/35/2011-IA.II(M) dated 06-02-2013

14. Presently a separate Escrow Account is maintained for Muraidih Mine and Phularitand Mine. It has been decided that a single escrow account will be maintained for this amalgamated mine after merging the existing Escrow Accounts of both mines.

Block-II

1. The Mining Plan for Block-II will be prepared for the area excluding of forest land (179 Ha)

The following executives were present in the above meeting-

Name	Designation	Name	Designation
BCCL			
1. Sri N K Martand	GM(P&P)	2. Sri Chitranjan Kumar	GM(Barora Area)
3. Sri B K Sinha	GM(Block II)	4. Dr. EVR Raju	Dy.GM(HOD,Env.)
5. Sri Kumar Ranjeev	Sr.Mgr(Min),Env.	6. Sri S N Shamme	AM(Plng),Barora Area
7. Sri S K Mifizuddin	Area Survey Officer(Barora)	8. Sri Amrendra Kumar,	Assit. Mgr. (CD)
9. Sri Amit Kumar Mishra	Assit. Mgr(Env)	10. Sri Uttam Kr. Jha	MT(Env)
15. Sri Pravesh Yadav	Assit. Mgr(Env)		
CMPDIL			
1. Sri A K Ball	RD, RI-2	2. Sri R K Sinha	GM(HoD), Mining/Env
3. Sri S Mohanta	Chief Mgr.(Mining)	4. Sri N K Das	Dy. Mgr(Mining)
5. Sri Sumit Dutta	Manager(Mining)	6. Sri Jai Prakash	Dy. Mgr(Mining)
7. Sri A S Lakra	AM (Geology)	8. Sri Avijit Ganguly	AM (Geology)

ANNEXURE-II

भारत कोकिंग कोल लिमिटेड
(एक मिनी रत्न कंपनी)
योजना एवं परियोजना विभाग
कोयला भवन कोयला नगर
धनबाद- 826005
दूरभाष-0326-2230276
ईमेल: gmpp@bccl.gov.in
CIN: U10101JH1972GO1000918

Bharat Coking Coal Limited
(A Mini Ratna Company)
Planning & Project Division
Koyla Bhawan, Koyla Nagar
Dhanbad- 826 005
Telephone-0326-2230276
Email- gmpp@bccl.gov.in
CIN. U10101JH1972GO1000918

पत्रांक : बी.सी.सी.एल/महाप्रबंधक(P&P)/फ-76/19/ 27 (H) Dated-14.03.2019

विषय: Minutes of the meeting held on 12.03.2019 in the chamber of GM(P&P).

महोदय,

A meeting was convened with the officials of CMPDI, Environment Department and Block-II in the Office of the undersigned on 12.03.2019 for Draft Mining Plan and Mine Closure Plan for Amalgamated Block II OC Mine" of Block II Area falling in Cluster-II of BCCL.

The minutes of the said meeting is enclosed.

भवदीय

महाप्रबंधक (योजना एवं परियोजना)

संलग्नक: यथोपरि

Distribution:
1. RD, RI-II, CMPDI, Koyla Bhawan Compex.
2. GM(Block-II), BCCL.
3. Dy.GM(Env.), BCCL.
4. TS to CMD, BCCL.
5. TS to D(T)P&P, BCCL.

Minutes of the meeting held on 12.03.2019 for "Draft Mining Plan and Mine Closure Plan for Amalgamated Block II OC Mine" of Block II Area falling in Cluster-II of BCCL in the chamber of GM (P&P)

1. Final Mining Plan and Mine Closure Plan for Amalgamated Block II OC Mine and Amalgamated Muraidih/Shatabdi –Phularitand Mine will be prepared including forest area for mining operations.

2. Amalgamated Block II OC Mine will be renamed as Amalgamated Block II Mine as there exists a proposed Block II (I/II Seam) UG project.

LIST OF PARTICIPANTS

Sl. No.	Name	Desgnation	Organisation
1.	Sri N.K. Martand	GM(P&P)	BCCL.
2.	Sri A.K.Bal	RD, RI-II	CMPDI
3.	Sri R.K. Sinha	HOD Mining/Env	CMPDI
4.	Sri EVR Raju	Dy.GM(Env.)	BCCL.
5.	Sri S.K.Barik	Area Survey Officer, Block-II	BCCL
6.	Sri A.Kumar	Area Manager(Estate), Block-II	BCCL
7.	Sri Jai Prakash	Dy.Manager, RI-II	CMPDI
8.	Sri A.K.Mishra	Dy.Manager, RI-II	CMPDI
9.	Sri U.K.Jha	MT(Env.), Block-II	BCCL.

ANNEXURE-III

भारत कोकिंग कोल लिमिटेड
एक मिनीरत्न कंपनी
(कोल इंडिया लिमिटेड का एक अंग)
महाप्रबंधक का कार्यालय, बरोरा क्षेत्र
पत्रालय: नवागढ़, जिला: धनबाद (828306)
पंजीकृत कार्यालय: कोयला भवन, कोयला नगर, धनबाद (826005)
सीआईएन: U10101JH1972GOI000918

Bharat Coking Coal Limited
A Miniratna Company
(A subsidiary of Coal India Limited)
Office of the General Manager, Barora Area
PO: Nawagarh, Dist: Dhanbad (828306)
Registered Office: Koyla Bhawan, Koyla Nagar, Dhanbad (826005)
CIN No: U10101JH1972GOI000918

Ref No: BCCL/GM/AR-1/2019/03 Date: 17.01.2019

2711
19/01/2019

To,
The Regional Director,
CMPDI, RI - 2,
Dhanbad

Sub: Diversion of DB Road (Dumra-Nawagarh) passing through Phularitand property, Barora Area, BCCL.

Dear Sir,

With reference to item no. 9 of the minutes of the meeting (vide letter no: RD:PS:048:3721-26, Dated 21.12.2018 and RD:PS:048:3800-05 Dated: 29.12.2018) held at CMPDI, RI- 2, HQ on 17.12.2018 for preparation of Amalgamated Mining Plan of Muraidih - Phularitand Mines of Barora Area falling in Cluster - II of BCCL and after all deliberations made with Area Officials of Barora Area, it has been decided that in present scenario it is very difficult to divert the DB Road in western side laying along the Railway property of Adra-Gomoh railway line due to presence of three densely populated villages (Mandra, Ganeshpur and Barwabeda) beside this road.

So it is requested to consider the above mentioned facts during preparation of Amalgamated Mining Plan of Muraidih-Phularitand Colliery, BCCL.

Yours faithfully
17/1/19
General Manager
Barora Area, BCCL

Copy to:
1. GM(P&P), BCCL - for kind information.
2. HOD(Envt.), BCCL - for kind information

CHRONOLOGY OF MURAIDIH UG GLOBAL BID PROJECT

- The Project was approved in 265th CIL Board Meeting held on 14.02.2011 for an estimated capital cost of Rs 339.875 Crore. The approved cost includes service and freight. Taxes & duties to be reimbursed on actual.
- Agreement between BCCL & M/s Minop Innovative Technologies (P) Ltd signed on 25.03.2011.
- Amendment of this contract executed on 22.06.2012
- The Consortium submitted its DPR which was accepted by BCCL on 29.01.2013. This DPR was further modified and Supplementary DPR was accepted by BCCL on 24.12.2015.
- Incline drivage at proposed site has been started in Jan'14 and both the drifts have touched the coal seam.
- Air Shaft Excavation started around 23.01.2015.
- Shaft sinking suspended since Dec'2015 as DGMS imposed violation due water logging in working of adjacent Jogidih Colliery. DGMS permission, dated 25.10.2016, has received at colliery office on 07.11.2016 for amalgamation of Jogidih Colliery and Muraidih Colliery and commencement of work for Muraidih UGP.
- Due to non-availability of encumbrance free land, M/s Minop has prepared a "Supplementary note on approved DPR , January 2015" and submitted to DT(P&P) BCCL on 10.02.2015 mentioning new location of Incline and air shaft.
- The same Supplementary note on approved DPR was sent to CMPDI, RI-II vide letter no. BCCL GM(P&P)/F-1A/2015/153 dated 18.04.2015
- CMPDIL, HQ, Ranchi has technically examined the proposal and submitted observation on 20.05.2015 which was sent to M/s Minop for further comments vide letter no. BCCL/D(T)P&P/F-114/2015/33 dated 21/22.05.2015
- Ms/ Minop Innovative Technologies Pvt Ltd submitted their detailed remarks against the observations on technical points which was further examined by CMPDIL
- Regional Director, RI-II vide diary no. 3466 dated 23.12.2015, CMPDIL has technically vetted the Supplementary report subject to compliance of the suggestions given to M/s Minop Innovative Technologies Pvt Ltd
- Regarding the supplementary note, M/s Minop vide letter no. MINOP/BCCL/MRD/15(11)-004 dated 20.11.2015 has clarified that there will not be any change in 1) Method of mining and technology 2) Equipment Specifications and cost of equipment, 3) Rate of progress schedule in terms of mine development and production and 4 Ventilation , pumping, power supply, billing schedules and other financial terms and conditions. The have also confirmed that there will not be any additional cost towards the changes in Incline length and sinking depth of vertical shaft.
- BCCL has approved the "Supplementary note on approved DPR" vide letter no. BCCL/D(T) P&P/F-114/2015/297 dated 24.12.2015.
- Based on the above approved Supplementary note, M/s Minop has constructed auxiliary incline and air shaft at shifted location. Drift drivages have been made upto the coal of Seam-III. Sinking of return Air Shaft with concrete lining (finished Dia 6.0m) has been sunk upto 11m from top of OB dump. A Fan drift of 20m length has also been made upto surface. Near the Incline site, they have constructed two Sheds only. No other infra-structure has been made at the site.

- Opening of LC for procurement of Equipment is delayed as M/S MINOP has asked for modification in terms of payment as contained in the agreement. Work has been suspended by the contractor, M/S MINOP, since 01.06.2016.

- A committee was set up to look into the representation submitted by M/S MINOP. The Committee did not agree with the amendment sought by M/S MINOP in the agreement.
  - The Committee agreed for part shipment of the equipment but affirmed that payment would be made only after receipt of complete set of all equipment.
  - Similarly, the committee also affirmed that there would be no change in payment terms for civil structure and payment would be made only after completion of construction of all civil structure.
  - It was observed that the party has quoted for two complete separate sets of power supports for the two seams of the project but subsequently it has stated in DPR to use the same set of power support in both the seams with the help of conversion kits.

- Subsequently, Representation of M/S MINOP was referred to M/S SBI Capitals, which has submitted its report on 20.12.2016. M/S SBI Capital advised to permit multiple LC facilitating part shipment & payment for imported equipment but did not agree to other demands of M/s MINOP.

- The Report was then referred to M/S Fox & Mandal, Kolkata for legal vetting. Final Report has been received on 26.06.2017. M/S Fox & Mandal while concurring with the recommendation of M/s SBI capital and have also stated that the M/s MINOP should adhere to the list submitted with the price bid. However, in case of any deviation there should be sufficient justification for the same else, BCCL would have the discretion to negate the same.

- The report has been examined by the committee and final report has been submitted. It did not agree for deviation from the equipment list submitted with the price bid.

- MINOP has been asked, vide letter no. BCCL/GM (CMC)/F-Global-Muraidih/2017/516 DT 19.12.2017, to confirm supply of imported P&M as per Price BID including separate set of Power Supports for the two seams. Its reply is under examination.

- M/s. MINOP has been suspended for six months, in a separate case, vide letter No. GM(MM):000030C:2016:4839 dated 13.02.2017.

- M/S MINOP has been banned in BCCL for a period of 3 years vide letter no. GM(MM):000030(C) :2018:2899-2951 dated 18/19.01.2018. Its legal implication on the present contract is under examination.
- Proposal for management decision regarding termination of contact has been initiated in the light of inordinate delay in completion of activities and business ban for three years from 18/19.01.2018. After legal vetting, the proposal is under examination for further needful action.
- Honurable High Court of Jharkhand vide letter no.10 dated 28/08/18 has quashed the “Banning of Buiness Order” issued to M/s Minop Innovative Technologies Pvt Ltd.

- GM, Barora Area, BCCL has send letter to M/s Minop to commence the work without delay vide letter no. Mur/PO/UG/MINOP/2018/1687 dated 15/12/18 and Mur/PO/UG/MINOP/2019/356 dated 01/03/19

- It is expected that the Contractor is likely to re-start/commence the suspended project work soon.

ANNEXURE-V

Under jurisdiction of Dhanbad Court
and Jharkhand High Court
Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Limited-
A Maharatna Company)
Regt. Off:**Koyla Bhawan, Koyla Nagar**
Dhanbad-826005
CIN :U10101JH1972GOI000918

Office of the General Manager
Materials Management Department
Level-III, Commercial Block,
KoylaBhawan, Dhanbad-826005
Phone: 0326-2230181
Fax No.: 0326-2230183
Website: www.bcclweb.in

QUASHING OF BANNING OF BUSINESS ORDER

संदर्भ: GM (MM):000030(C):2019: 366 – 434. दिनांक: - 14.12.2018

सेवा मे,

All HoDs, Koyla Bhawan, BCCL HQ

विषय: Quashing of Banning order of M/s Minop Innovative Technologies Pvt. Ltd.

Dear Sir,

Business dealings with M/s Minop Innovative Technologies Pvt Ltd were banned by BCCL vide letter ref. no. 2899-2951 dated 18/19.01.18 for a period of 3 (three) years.

However the Honorable High Court of Jharkhand vide order No. 10 dated 28/08/18 has quashed the "Banning of Business Order" issued to M/s Minop Innovative Technologies Pvt Ltd.

This is for your kind information.

Yours faithfully,

14/12/18

(N S Saini)
GM (MM), BCCL

Copy to:
1. TS to CMD/ TS to D (Fin.)/ TS to D (T) (P&P)/ TS to D (T) OP for kind information
2. CVO, BCCL for kind information
3. GM (MM)/HOD, CIL
4. GM (MM) ECL/CCL/MCL/NCL/SECL/WCL/NEC
6. All Area GMs, BCCL
7. AM (MM) All Areas
8. Office Copy

ANNEXURE-VI

Under jurisdiction of Dhanbad Court and Jharkhand High Court
Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Limited-A Maharatna Company)
Regt. Off:**Koyla Bhawan, Koyla Nagar**
Dhanbad-826005
CIN :U10101JH1972GOI000918

Office of the General Manager
Materials Management Department
Level-III, Commercial Block,
KoylaBhawan, Dhanbad-826005
Phone: 0326-2230181
Fax No.: 0326-2230183
Website: www.bcclweb.in

BANNING OF BUSINESS DEALING FOR THREE YEARS

Ref. No. GM (MM):000030(C):2018: 2846-98 Dated: - 18.01.2018
19

To,
M/s. Jaimusi Coal Mining Machinery Co. Limited
3rd floor, Aimer Tower A,
Wanging Development Zone
Beijing-100102
China (Fax No. 86-10-6439-2990

Sub: Banning of business dealing

Ref: Supply Order No. BCCL/PUR/610278/Road Header/07-08/09-10/68 Dt. 24.07.2009

Dear Sir,

The above supply order was placed on you for supply of 02 Nos. Road Header against our Tender Enquiry No, BCCL/PUR/610278/Road Header/Global /06/07-08/167 opened on 28.07.2008 for use at Moonidih as per technical specification mentioned in the NIT.

It has been found that you have willfully suppressed facts and violated the contract on the following points:

(A) As per terms of supply order, the Road Headers were to be dispatched only after obtaining approval from BCCL for the machine drawing with hydraulic roof bolt attachment, but you dispatched the Road Headers without obtaining the said approval, **thus violating the terms of supply order.**

(B) LC for 80% value of each equipment and the accessories (FOB value) was to be opened after receipt of authenticated copy of ' field trial permission ' accorded by DGMS, India for its use as per duty requirement indicated in the NIT and presentation of following shipping document:

1. Non-negotiable copies of bill of lading
2. Commercial invoices duly signed indicating FOB value
3. Packing List
4. Certificate of origin issued by the manufacturer
5. Price Certificate indicating that the price charged are same as applicable to other customers worldwide.
6. Copies of warranty certificate
7. Copies of freight certificate from the Freight Forwarder.
8. Copies of Work inspection
9. Authenticated copy of field trial permission issued by DGMS, India.

For compliance of "Works inspection", indicated above at sl. no. 8, you submitted "Inspection Report "wherein under the head "Basic Parameter " the overall height of both the Road Headers was indicated as 1.65 Mtrs.
Also , actual measurement in respect of " Overall Height (exclusive of tooth's height of pedrail) " , mentioned in the Inspection Report submitted by you , has been indicated as 1650 & 1660 mm for Road Header Sl. No. 1 & 2 respectively against the requirement of 1650 +/- 10 mm .
However, on receipt of both the Road Headers , it was found that overall height of both the Road Headers were higher than the height mentioned in supply order as well as in the Inspection report submitted by you. **This is an act of "willful suppression of facts or furnishing of wrong information ".**

(C) As the height of the machine was different from the specification of supply order, the machine was not accepted and after joint inspection you were asked to take suitable action immediately for rectification.
But instead of rectification of the machine, you submitted a letter dated 16/04/2012 citing various excuses for the increased height of machine and finally proposed that if BCCL is unable to accept the machine then it may be sent back to your workshop at China at the cost of BCCL and then you will make suitable modification with respect to the height but therein you put a condition that you would not be held responsible for obtaining any DGMS approval further and it would the sole responsibility of BCCL towards DGMS approval.

This is breach of terms of contract concluded with you vide above said supply order

However, your above proposal was not accepted by BCCL and you were asked to submit written affidavit on the following points vide our letter no. 688 Dt. 17/21.05.2012:

(a) The cost of installation, erection, commissioning & training charges in US$ 24,334.43 and in Indian Rs. 2,26,12,581.00 may be released within 30 days of successful drivage of 600 Mtr. For each machine, testing of equipment ,DGMS field trial approval and final acceptance of equipment along with accessories by Project Officer and Technical Head of the area against an additional BG of Rs. 2,29,39,021.00 i.e. equivalent to earlier BG submitted by the firm.

(b) Balance 20% of equipment cost may be released after 03 months of final acceptance subject to achieving guaranteed availability of 85%.

(c) Payment towards domestic supply of spares and balance agency commission may be released half yearly on pro-rata basis subject to achieving the guaranteed availability. These half yearly period will be counted from the date of final acceptance of the equipment.

(d) The BG shall be released after successful completion period of 36 months.

Accordingly, you submitted written affidavit dt. 14/07/2012 on the acceptance of the conditions indicated above.

However it was observed that you failed to comply with your written 'Affidavit' on the following points despite several persuasions by the concerned area officials:

1. Rectification of problem of Road Header no. 1 had not been done since Nov 15 as a result the machine is idle since then.
2. DGMS field trial approval had not been obtained by your firm since 03/02/16.
3. Both the Road Headers failed to achieve the guaranteed availability of 85%.

The above act on your part is not only tantamount to be against the ethics of business but also a case of forgery.

This was viewed very seriously by BCCL management and invites penal action in line with clause 4.7 "Penal Action against Suppliers" of the CIL Purchase Manual. In view of above, Show Cause Notice was issued to you in order to explain as to why, you should not be banned for submission of forged/false documents and breach of contact with an advice to furnish your written statement of defense. The reply to show-cause notice was submitted by M/s Joy Global (Jiamusi) Mining Machinery Co. Ltd (who stated to have acquired Jiamusi Coal Mining Machinery Co. Ltd), wherein no satisfactory/ specific statement of defense has been submitted.

In view of the above, the competent authority of BCCL has decided to impose banning of business dealing with your organization for a minimum period of three years from the date of issue of this banning letter as per provisions of Purchase Manual of Coal India Limited under para 4.7.7(iv, vi, ix & xiii) and 4.7.10

Accordingly, all the business dealings with your organization are hereby banned in BCCL for a period of 3 years from the date of issue of this letter.

This issues with the approval of competent authority.

Yours faithfully,

(U Kumar)
GM (MM), BCCL

Copy to:
1. CMD/D (Fin.)/D (T) (P&P)/ D (T) OP for kind information
2. CVO, BCCL for kind information
3. GM (MM)/HOD, CIL
4. GM (MM) ECL/CCL/MCL/NCL/SECL/WCL/NEC
5. All HODs, BCCL
6. All Area GMs, BCCL
7. AM (MM) All Areas
8. Office Copy
9. JoyGlobal(UK) Ltd, 4 Swanwick Court, Alferton, Derbyshire, DE557AS

– **By Airmail**

भारत कोकिंग कोल लिमिटेड पं.का.: कोयला भवन,कोयलानगर,धनबाद (झारखंड) – 826005
Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Ltd.)
Reg.Off: Koyla Bhawan, Koyla Nagar,
Dhanbad (Jharkhand) – 826005
CIN: U10101JH1972GOI000918
Phone:0326-2230159 / Fax: 0326- 2230161
E mail: dirpp@bccl.gov.in

डी(टी)पी&पी / D(T)P&P

Ref: BCCL/D (T) P&P/F-114 /2015/ 2491 Dated: 18.11.2015

To
M/S MINOP
3F,Gajraj Chambers,86B/2 Topsia Rd.
Kolkata-700046 (WB)

9988
18-11-15

Sub: Approval of the Supplementary Report on approved Detailed Project Report for development of seam no. I & II by Mass Production Technology package.

Dear Sir,

Subsequent to our acceptance of DPR submitted by you there was some problem in handing over the land at the proposed site of incline and shaft. The matter was discussed with you and it was decided to marginally shift the location of the shaft and incline.

Accordingly, a Supplementary Report on approved DPR was submitted by you. The Supplementary Report was forwarded to CMPDIL who has examined the report and submitted their comments. Subsequently the detailed remarks on the comments was also submitted by you and which was further examined by CMPDIL and now they have submitted their final comments in this regard.

The comments are enclosed herewith for your acceptance. In case the comments / suggestions of CMPDIL are accepted for implementation, the Supplementary Report will be considered for approval.

Further, other than the shifting of locations of the shaft and incline as submitted in Supplementary Report, no other changes will be allowed. The method of work, machineries & its technical specifications, ventilation, pumping, electric supply and others will remain the same as per the original approved DPR.

In addition, there will not be any change in production, phasing of production, cost of the project, billing schedules and other financial terms & conditions as per contract agreement.

You are requested to accept the above conditions and submit your acceptance letter which will enable us to approve the Supplementary Report.

Yours faithfully

(Ashok Sarkar)
Director (Tech) I/c P&P

F-1A

भारत कोकिंग कोल लिमिटेड
Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Ltd.)

प.का.: कोयला भवन,कोयलानगर,धनबाद (झारखंड) – 826005
Reg.Off: Koyla Bhawan, Koyla Nagar,
Dhanbad (Jharkhand) – 826005
(CIN: U10101JH1972GOI000918
Phone:0326-2230159 / Fax: 0326- 2230161
E mail: dirpp@bccl.gov.in

निदेशक तकनीकी यो. एवं परि. का कार्यालय / **Office of Director (Tech) P&P**

Ref: BCCL/D (T) P&P/F-1A /2015/297 Dated: 24.12.2015

To

M/S Minop Innovative Technologies Pvt Ltd.
3 F,"Gajraj Chambers"
86 B/2 Topsia Road,
Kolkata- 700046 (WB)

Sub: Development of Muradih Underground mines and extraction of coal from Muradih Seam no.III by Mass Production Technology Package

Dear Sir,

We have received a supplementary report on approved DPR vide your letter no. MINOP/BCCL/MRD/15(02)-002 dt.10.02.2015 for Development of Muradih Underground mines and extraction of coal from Muradih Seam no.III by Mass Production Technology Package with relocating the site of incline and shaft. The same supplementary report on approved DPR was sent to RD,CMPDIL,RI-II for their comments vide letter no. BCCLGM(P&P)/F-1A/2015/ 153 dt.18.04.2015

CMPDIL,Ranchi has technically examined the proposal and submitted their observation vide e-mail sent to RD,RI-II on 20.05.15.The observation as submitted by CMPDIL,Ranchi was sent to M/S Minop Innovative Technologies Pvt Ltd for further comments vide letter no. BCCL/D(T) P&P /F-114/2015/33 dt. 21/22.05.2015.

M/S Minop Innovative Technologies Pvt Ltd vide letter no. MINOP/BCCL/MRD/15(05)-009 dt.25.08.2015 submitted their detailed remarks against the observations on technical points which was further examined by CMPDIL.

Regional Director,RI-II vide diary no.3466 dt.23.12.2015.CMPDIL has technically vetted the supplementary report subject to compliance of the suggestions given to M/S Minop Innovative Technologies Pvt Ltd.

Regarding the supplementary note M/s MINOP vide Letter No.MINOP/BCCL/MRD/ 15(11)-004 dt. 20.11.15 has clarified that there will not be any change in:

1) Method of mining and technology
2) Equipment specifications and cost of equipment
3) Rate of progress schedule in terms of mine development and production.
4) Ventilation, Pumping, power supply, billing schedules and other financial terms & conditions.

Further, MINOP has confirmed that there will not be any additional cost towards the changes in incline length and sinking depth of the vertical shaft and MINOP is agreeable to absorb the cost.

Copy to
(1) A. S. Agrawal

As per Clause No. 7.1.4(e) of the part-II (Price Bid) of the Bid document, CMPDIL is the authorized agency for vetting of DPR. As CMPDIL has technically vetted the supplementary report on DPR subject to compliance of suggestions therein, BCCL do not have any objection to accept the supplementary report on DPR submitted by you subject to compliance of the following :

1) There will not be any change in :
   i) Method of mining and technology
   ii) Equipment specifications and cost of equipment
   iii) Rate of progress schedule in terms of mine development and production.
   iv) Ventilation, Pumping, power supply, billing schedules and other financial terms & conditions.

2) No additional cost over the cost indicated in the work order / agreement would be admissible for any increase in the length of incline or allied works.

3) The exact width of the barrier should be ascertained and suitable precautionary measures should be taken and maintained for avoidance of danger.

4) As proposed by you the incline should be realigned in lower part of auxiliary incline(beyond 250 meter below the incline mouth) at a deviation of $0^0 56' 00''$ S - W direction leading to the increase in centre to centre distance up to 25m/33m between two inclines at a depth of cover of about 90m/150m respectively. Necessary permission should be taken from DGMS before increasing width of the galleries/inclines.

5) Due precaution should be taken during drivage and operational stage of the air shaft and long term stability of the same as the same will be passing through consolidated OB dump.

6) The support design and drivage parameters for drivage of fan drift should be approved by DGMS/Agent/Manager for ensuring the stability of fan drift.

Yours faithfully

(Ashok Sarkar)
Director (Tech.) P&P

Copy to :

1. CMD, BCCL
2. GM(Barora)
3. GM(U/G)
4. R.D,CMPDIL,RI-II
5. GM(P&P)
6. GM(CMC)

MINOP
MINE OPERATORS
Minop Innovative Technologies Pvt Ltd

Address: 3 F, "Gajraj Chambers", 86 B/2 Topsia Road, Kolkata – 700 046 (W.B.) Tel: +91 33 4004 9558 Fax: +91 33 4004 9559 E-Mail: info.minop@gmail.com

SUPLEMENTARY

REPORT ON APPROVED D.P.R.

FOR

Development of Muraidih Underground mines and extraction of coal from Muraidih Seam no. III and Seam no. I by Mass Production Technology Package

For

BHARAT COKING COAL LIMITED

Under The Service Agreement Dated 25th March, 2011

Prepared By

SCIEG BEIJING HUAYU ENGINEERING CO. LTD, CHINA

&

MINOP INNOVATIVE TECHNOLOGIES (P) LTD

JANUARY, 2015

MINOP
MINE OPERATORS **Minop Innovative Technologies Pvt Ltd**

Address: 3 F, "Gajraj Chambers", 86 B/2 Topsia Road, Kolkata – 700 046 (W.B.) Tel: +91 33 4004 9558 Fax: +91 33 4004 9559 E-Mail: info.minop@gmail.com

Ref: MINOP/BCCL/MRD/15(02)-002 **Date:** 10.02.2015

To,
The Director Technical (P&P)
Bharat Coking Coal Limited
Koyla Bhawan, Koyla Nagar
Dhanbad- 826005

Dear Sir,

Subject: SUPLEMENTARY REPORT ON APPROVED "Detailed Project Report" For Development of Muraidih Seam no. I and Seam no. III by Mass Production Technology Package

As per clause no. 2 of our service agreement dated 25th, March, 2011 we submitted our draft D.P.R. on 26/12/2011 and BCCL communicated their approval of D.P.R. vide letter Ref. no. D(T)PP/F-78/2013/34, Dated; 29.01.2013.

Immediately we approached BCCL for handing over encumbrance free project site as per approved DPR and as per advice of BCCL we put continued effort to demarcate project site till June'2013, but it was futile due to tremendous land dispute by private owners whose land was falling within approved project site.

Finally BCCL handed over a part of the land; vide letter no. GM/AR-I/AGM/MINOP/2014/5207, dated: 10/11.02.2014, to relocate the position of Inclines and all other surface Infrastructures so as to reduce requirement of private land to a bare minimum which necessitating shifting of Inclines towards the northern side of the newly constructed metalled village road.

Address: 3 F, "Gajraj Chambers", 86 B/2 Topsia Road, Kolkata – 700 046 (W.B.) Tel: +91 33 4004 9558 Fax: +91 33 4004 9559 E-Mail: info.minop@gmail.com

In view of above we are submitting herewith supplementary report on approved D.P.R.

Supplementary report on approved D.P.R. has been prepared by SIEG BEIJING HUAYU ENGINEERING CO. LTD. known as B.H.E.C., China in active association with MINOP INNOVATIVE TECHNOLOGIES (P) LTD.

We are thankful to BCCL for extending help in necessary surveying and relocating all infrastructures keeping in view the constraints that was faced earlier as mentioned in the enclosed revised report.

We hope that this Final Revised D.P.R. will meet all your expectations.

We will remain thankful if you kindly communicate your approval at the earliest. Meanwhile we continue to work as per the revised DPR to avoid any further delay in implementation of the project.

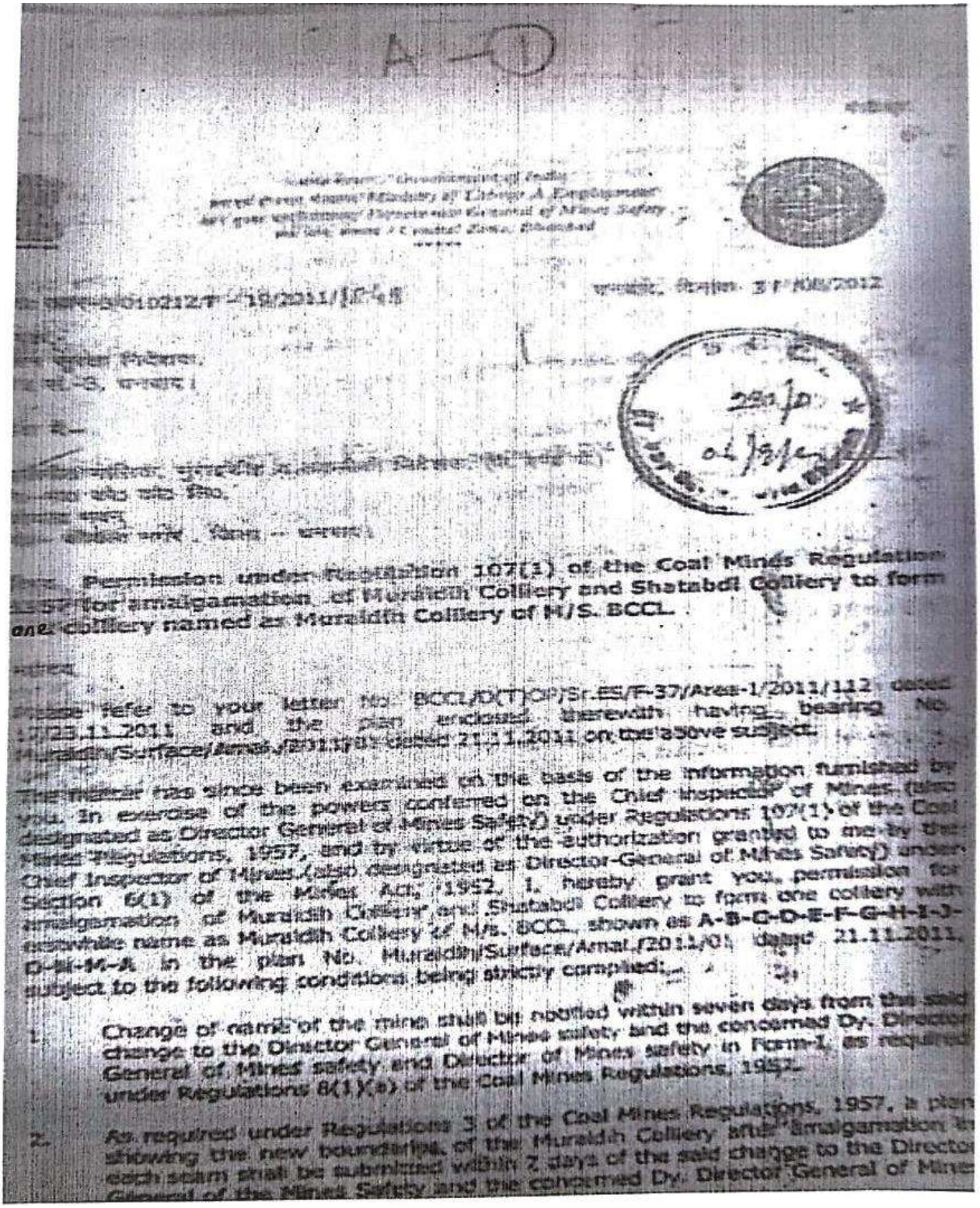
Thanking you,
Yours faithfully

For, Minop Innovative Technologies Pvt. Ltd.

(Authorized Signatory)

Copy:

- Chairman cum Managing Director, B.C.C.L.
- General Manager, Area – I
- Project Officer (Muraidih)
- Manager in charge of Muraidih Underground Project



Permission under Regulation 107(1) of the Coal Mines Regulations for amalgamation of Muraidih Colliery and Shatabdi Colliery to form one colliery named as Muraidih Colliery of M/S. BCCL.

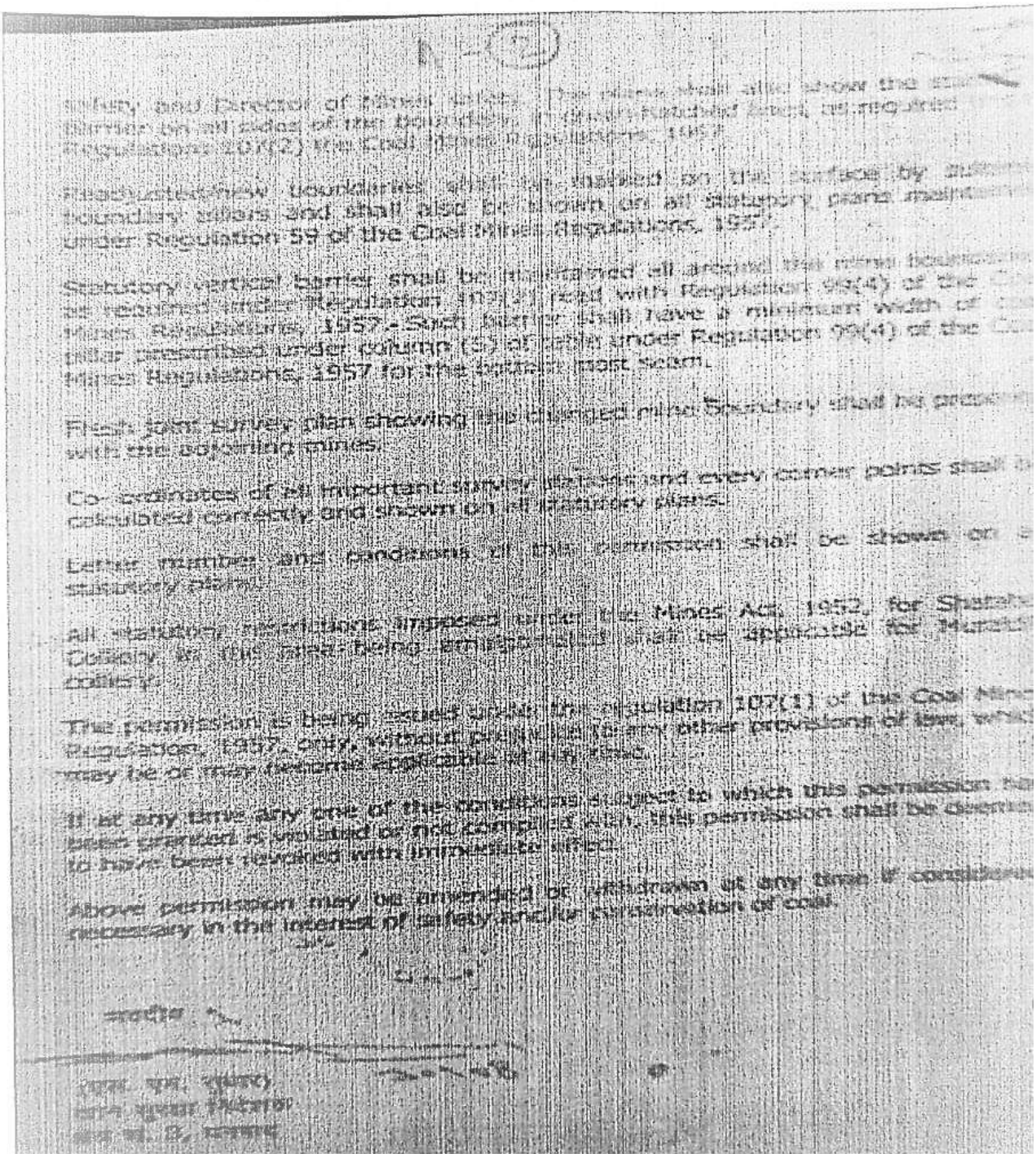
Sir,

Please refer to your letter No. BCCL/DC(T)OP/Sr.ES/F-37/Area-1/2011/112 dated 23.11.2011 and the plan enclosed therewith having bearing No. Muraidih/Surface/Amal./2011/01 dated 21.11.2011 on the above subject.

The matter has since been examined on the basis of the information furnished by you. In exercise of the powers conferred on the Chief Inspector of Mines (also designated as Director General of Mines Safety) under Regulations 107(1) of the Coal Mines Regulations, 1957, and by virtue of the authorization granted to me by the Chief Inspector of Mines (also designated as Director-General of Mines Safety) under Section 6(1) of the Mines Act, 1952, I hereby grant you permission for amalgamation of Muraidih Colliery and Shatabdi Colliery to form one colliery with erstwhile name as Muraidih Colliery of M/s. BCCL shown as A-B-C-D-E-F-G-H-I-J-D-M-L-A in the plan No. Muraidih/Surface/Amal./2011/01 dated 21.11.2011, subject to the following conditions being strictly complied:-

1. Change of name of the mine shall be notified within seven days from the said change to the Director General of Mines safety and the concerned Dy. Director General of Mines safety and Director of Mines safety in Form-I, as required under Regulations 8(1)(a) of the Coal Mines Regulations, 1957.

2. As required under Regulations 3 of the Coal Mines Regulations, 1957, a plan showing the new boundaries of the Muraidih Colliery after amalgamation in each seam shall be submitted within 2 days of the said change to the Director General of the Mines Safety and the concerned Dy. Director General of Mines



A-3

By [illegible]

3453
3/8/2000

3313
05/8/2000

Bharat Sarkar/Govt. of India
Shram Mantralaya/Ministry of Labour
Khan Suraksha Mahanideshalaya
Directorate-General of Mines Safety

No.SHQ/107/41/99 Dhanbad, dated the July,2000.

From :
The Director-General of Mines Safety,
Dhanbad.

To
Shri R.K.Lal,
Director(Tech) Operation &
Nominated Owner
M/s Bharat Coking Coal Ltd.
Koyla Bhavan, P.O.Koyla Nagar,
Dist. Dhanbad.

Sub: Permission under Regulation 107 of the Coal Mines Regulations,1957 for change of mine boundary of Muraidih Colliery to demarcate Shatabdi Mine.

Dear Sir,

Please refer to your letter No.BCCL/D (T) OP/DGMS/F 37/2000/196 dated the 7th February,2000 on the above subject along with the plans submitted therewith.

By virtue of the powers conferred on Chief Inspector of Mines (also designated as Director-General of Mines Safety) under Regulation 107 of the Coal Mines Regulations, 1957, I hereby permit you to change the mine boundary, shown in plan No.B.C.C.L/M.C/BGH/BARORA/SHATABDI PROJECT/P-107 (1)99A enclosed with the application and demarcate boundary of Shatabdi mine out of the lease hold of Muraidih Colliery, subject to following conditions :-

1. New mine boundary shall be marked on the surface and shall also be shown on all the statutory plans maintained under Regulation 59 of the Coal Mines Regulations, 1957.

2. A plan showing the new boundary shall be submitted within seven days of the said change as required under Regulation 3 of the Coal Mines Regulations, 1957.

3. Both Muraidih Colliery and Shatabdi mine shall be under one Agent.

4. Water level in both the mines shall be maintained at the same level. The water level shall be of [illegible] below the level of the coalface in both mines.

A-(A)

- 2 -

5. A barrier of thickness as per Regulation [illegible] of the Coal Mines Regulations, 1957 shall be maintained between workings of the two mine in all seams.

6. Verticality of the [illegible] boundary shall be maintained in all the seams.

7. This permission may be [illegible] at any time if considered necessary in the interest of safety.

8. The permission [illegible] without any prejudice to any other provisions of law, which [illegible] applicable at any time.

9. If at any time any [illegible] of the condition subject to which this permission has been granted is [illegible] or not complied with, this permission shall be deemed to have been [illegible] with immediate effect.

Yours faithfully,
Sd/-
[illegible] General of Mines Safety

Memo No.SHQ/[illegible]/1999 Dhanbad, dated the 1.8. July,200[illegible]

Copy forwarded for information & necessary action to :-

1. The Agent, [illegible] Colliery, M/s Bharat Coking Coal Ltd. P.O.Nawagarh, Dist. Dhanbad.
2. 2. The Manager, [illegible] Colliery, M/s Bharat Coking Coal Ltd. P.O.Nawagarh, Dist. Dhanbad.
3. The Chief General Manager, [illegible] Area, M/s BCCL, P.O. Nawagarh (Dhanbad).

Deputy General of Mines Safety

May be sent to Agent.

ANNEXURE-X

BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Ltd.)
BARORA AREA
OFFICE OF THE GENERAL MANAGER
P.O. NAWAGARH, DIST.DHANBAD

Ref: GM/AREA-I/SURVEY /ENV/ 5039 /2010 16th Dec., 2010

The Divisional Forest Officer,
Forest Division, Combined Building,
DHANBAD

Dear Sir,

Kindly refer to our letter No. BCCL/GM/AR-I/ED/10/318 dated 25/27-10-2010.

Earlier we had submitted to your office alongwith aforesaid letter 7 (seven) sets of application in prescribed format for obtaining forest clearance in respect of "Protected forest" under mouza Barmasia.

As desired by you, seven sets of mining plans and reclamation plan of Muraidih OCP alongwith related technical data are being sent herewith for further action at your end.

Thanking you,

Yours faithfully,

(SUBIR DAS)
GENERAL MANAGER
BARORA AREA
GENERAL MANAGER
B.C.C.L. BARORA AREA

Copy to :-

1) Director(Tech)Operations, BCCL, Koyla Bhawan
2) CGM(Co-ordination), BCCL, Koyla Bhawan
3) GM(Environment), BCCL, Koyla Bhawan
4) General Manager(Estate), BCCL, Koyla Bhawan
5) H.O.D(Legal), BCCL, Koyla Bhawan
6) Addl.General Manager, Barora Area
7) Project Officer, Muraidih OCP

(75)

Government of Bihar
Department of Forest and Environment

Notification

Patna 15,

No. Van [illegible] Adhi (2)17/97- 805 -F [illegible], Dated 17 -7.1997

In exercise of power conferred by section 29 of the Indian Forest Act 1927 (XVI th of 1927), the State Government hereby make the provisions of chapter IV of the said Act applicable from the date of issue of the notification on the waste land situated in the district of Dhanbad as specified in the schedule annexed hereto excluding "Idgah land".

The land comprised in this notification shall be called "Protected Forest".

The said land has been made available and transferred to the Department of Forest and Environment, Government of Bihar by Bharat Coking Coal limited (a Government of India Undertaking) in lieu of diversion of 13.70 acres of forest land for [illegible] Opencast Project of Bharat Coking Coal Limited for compensatory afforestation under the provisions of the Forest (Conservation) Act 1980. As a result of this transfer the ownership of this land (whose Khatiani Raiyat is Bharat Coking Coal Limited) now belongs to the State Government. The possession of the said land has been taken over by Department of Forest and Environment (Dhanbad Forest Division) and it is free from encroachment. Therefore, the said land is free from rights of any private person or community and hence the proceedings with regard to (enquiry and recording of rights of private persons and community as prescribed in sub-section (3) of section 29 of Indian Forest Act 1927, is not required.

...2/-

F - 1

- 2 -

Schedule

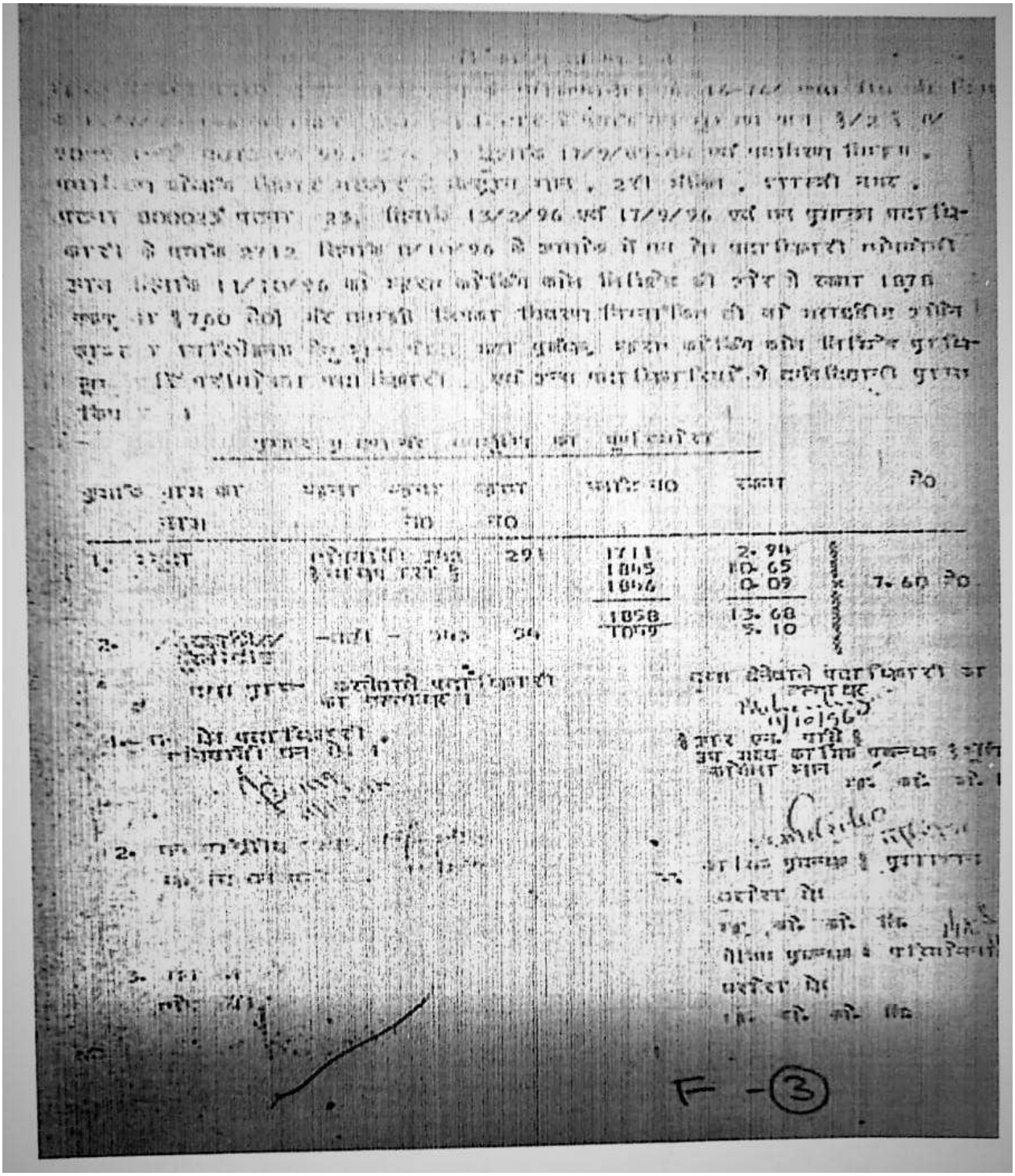
Dist	Village	Thana	Thana Nos.	Khata No.	Khesra No.	Rakaba (Area) in Acre	
Dhanbad Mohuda	Topchanchi		342	291	1711	2.94	Govern-ment of Bihar.
					1845	10.65	
					1846	0.69	
					1938	13.28	
Dhanbad Nurlidhi	Topchanchi		343	56	1049	5.10	
						18.78	

By order of Governor Bihar

(Janki Sharan Prasad)
Additional Secretary to Government.

Ashok/

F - (2)



F-(3)

ANNEXURE-XII

Present Status of Forest Clearance of Muraidih Colliery

Status of 29.75 Ha of Forest Land :-

(1st Application) Area falling in Baromessia Mouza:-

- Offline application for 29.75 Ha, Muraidih Colliery made on 27.10.2010.
- Query raised by Chief Conservator of Forest, Ranchi cum Executive Director on 28.02.2011.
- Letter sent to DC, Dhanbad requesting for the issuance of NOC on 14.06.2011.
- Gram Sabha was conducted by CO, Baghmara on 16.12.2011 and report was sent to DC, Dhanbad on 30.07.2012.
- Reply of the query submitted on 25.02.2013 except NOC from DC, Dhanbad.
- Query raised by DFO, Dhanbad on 16.07.2013 based on the query raised by PCCF, Ranchi. Reminder of the same on 16.09.2015 vide letter no. 1582 from DFO, Dhanbad. (Query : JJ land and mine lease detail).
- NOC under FRA issued by DC, Dhanbad on 12.02.2015.
- Online application is to be made as suggested in the meeting with PCCF on 09.10.2017 and with RCCF, Bokaro on 02.05.2018.
- Proposal no. FP/JH/MIN/32161/2010 has been generated for online application of 29.75 Ha by DFO on May 2018. However the matter is pending with DFO, Dhanbad.
- Meeting with DFO regarding completion of online application which is pending at DFO Dhanbad on 14.08.18. DFO siadi that ther is some technical issues which is faced dring uploading of application.
- Again, meeting with DFO on 31.08.18 and they said that the same problem of technical issues. They said that to sort out the technical problem, we are in regular touch with Nodal officer, Ranchi and even in Delhi Head office.
- DFO, Dhanbad submitted the proposal for next level on 22.09.18 with one query of certified land schedule.
- Meeting with DFO on 05.10.18 regarding query for certified copy of land schedule from circle officer, and he agree for the submission of same with undertaking.
- Query closed on 11.10.18 and same was forwarded to next levelfrom DFO office.
- Visit of DFO Dhanbad on 19.12.2018 regarding inspection and recommendation asked by CF, Bokaro for further progress in work.

Status of 16.42 Ha of Forest Land

(2nd Application) Area falling in Barora Mouza**:-**

- Online application submitted on 21.01.2017 vide proposal no. FP/JH/MIN/23580/2017.
- Query raised on 25.01.2017 and replied on Feb. 2017.
- Since then, the proposal in FC website is being seen as “Proposal under Examination” at Nodal Officer.
- Matter was discussed with Nodal Officer on 20.05.2018.
- Letter has been written to the Member Secretary, MoEFCC on 25.05.2018 regarding the issue faced in the online application.
- Letter has been sent to the APCCF, MoEFCC from Under Secretary to the Government of India on 25.05.2018 regarding the same, in which it is suggested that Regional Office (East Central Zone), Ranchi will take necessary action in this matter.
- Query raised on 11.07.2018 (Query : JJ land details)
- Discussion of query raised on DFO office on regularly basis and finally submission of query 07.08.18.
- Finally, the proposal accepted online on 30.08.18 and acknowledgement slip is generated for the final submission in Hard copy.
- The hard copy of proposal was prepared and proceed for the finally submission at DFO office on 12.09.18, but DFO directed for Major changes in Hard copy line further breakup of land component wise, Latest authorization letter, undertaking for various documents, documentation of file, etc.
- After changes of various details, further approach the DFO office for final submission in hard copy on 05.10.18 and they suggested few changes.
- A letter is sent to DC Office with letter no. GM/AR1/ENV/2018/1019 Dtd. 15.10.18 for FRA certificate.
- 7 Copy of forest clearance has submitted in DFO office on 2010.18 and the receiving of same uploaded online.
- A letter is received on 23.11.2018 with various query from DFO Office.
- A letter with ref. no. 1449 dtd. 3011.18 with land schedule is submitted to CO, Baghmara.
- Visit of DFO Dhanbad with RFO on 19.12.2018 regarding inspection and tree enumeration list.
- A reminder letter with ref. no. 1595 dts. 20.12.18 with land schedule is submitted to CO, Baghmara for authentication of land details.
- A letter is sent to DC Dhanbad for NOC of GM Land with vie letter no. GM/AR1/estate/2018/1617 dtd. 22/24.12.2018.

- A reminder letter is sent to DC Office with letter no. GM/AR1/estate/2018/1618 Dtd. 24.12.18 for FRA certificate.
- A letter is replied against letter no. dated 23.11.2018 from the DFO Dhanbad with vide letter no. GM/AR1/estate/2018 dtd. 24.12.2018.
- Tree counting of 16.42 Ha of Forest land in Barora Mouza was done 16-.01.2019 and sent to RFO Topchachi for further needful action.
- A signed copy of tree enumeration list received from RFO office vide letter no.78 dated 12.02.2019. (Annexure-XV)

BHARAT COKING COAL LIMITED
(A Mini Ratna Company)
(A Subsidiary of coal India Limited)
OFFICE OF THE DIRECTOR (Technical) P&P
Regd. off: KoylaBhawan, KoylaNagar,
Dhanbad - 826006
CIN: U10101JH1972GOI000918
Telephone :- 0326-2230159
Fax :- 0326-2230161

Ref. No.:-BCCL/D (T) P&P/F -12(i)/2019/20 **Dated: -25.01.2019**
31

To,
The Director General of Mines Safety,
Dhanbad.

Sub: - Application for Permission under Regulation 122 of Coal Mines Regulation, 2017 for Amalgamation of Common Boundary between Muraidih Colliery and Phularitand Colliery under Barora Area of M/S Bharat Coking Coal Limited to form one mine named as *"AMALGAMATED MURAIDIH PHULARITAND COLLIERY (AMPC)"*.

Dear Sir,

Muraidih Colliery and Phularitand Colliery are two neighbouring mines of Barora Area under M/s. Bharat Coking Coal Limited. Phularitand Colliery is situated at the South - West side of Muraidih Colliery. Muraidih Colliery is being operated by open cast method where as in Phularitand Colliery by opencast as well as UG method but near the common boundary both the mines are being worked by open cast method up to V/VI/VII (comb.) seam at present. There is a common boundary of about 4 kms. between the two mines and about more than 20 millions Te. of coal available under common boundary which will be lost forever. It is intended to excavate the above locked coal under the common boundary by amalgamating both the mines for conservation point of view. The financial impact of the above locked coal is more than of Rs. 4000 Crores which can be conserved by this amalgamation for the benefit of M/s. Bharat Coking Coal Limited as well as Nation as a whole.

In view of the above circumstances, we intend to amalgamate Muraidih Colliery and Phularitand Colliery with the name of ***"AMALGAMATED MURAIDIH PHULARITAND COLLIERY (AMPC)"*** under Reg. 122 of CMR 2017.

Up to date surface plan (Scale= 1:4000), Seam wise Underground plans (Scale= 1:2000), Mouza plan showing status of land and surface plan (Scale= 1:8000) showing existing and proposed Lease Hold boundary in different colours is enclosed in Annexure-I (List of Plans) for ready reference.

1) **Detail Status of workings of Muraidih Colliery and Phularitand Colliery.**

Name Of Seam	Muraidih Colliery	Phularitand Colliery
III SEAM , (1:2000)	In Muraidih Section Partially worked out through underground working along outcrop side and a small part of this seam has been worked out through OCP. The seam is unapproachable and waterlogged.	Presently underground working in III seam is being done by Board & Pillar method at P.B. Section through Incline No. 1&2
V/VI/VII SEAM (1:2000) 1 st SECTION	At present Open Cast working is being done. No Underground working but worked through opencast in the entire lease hold area except near south eastern boundary, in the centre of the property named as C.K. Patch (Active fire also exists in C.K. Patch) and in the south western part of the lease hold. The galleries are likely to be waterlogged.	Developed, Partially quarried out and partially goaved out. NO water, no fire in this seam. At present open cast working is being done.
V/VI/VII SEAM (1:2000) 2 nd SECTION	At present Open Cast working is being done. Entire area has been quarried out except a small part standing on pillar near south eastern boundary , in the centre of the property named C.K. Patch (Active fire also exists in C.K. Patch) and in the south western part of the lease hold. The galleries are likely to be waterlogged.	No Underground working but worked through opencast.
V/VI/VII SEAM (1:2000) 3 rd SECTION	At present Open Cast working is being done. Entire area has been quarried out except a small part standing on pillar near south eastern boundary , in the centre of the property named C.K. Patch (Active fire also exists in C.K. Patch) and in the south western part of the lease hold. The galleries are likely to be waterlogged.	Developed, Partially quarried out and partially goaved out. NO water, no fire in this seam. At present open cast working is being done.

V/VI/VII SEAM (1:2000) 4th SECTION	At present Open Cast working is being done. Entire area has been quarried out except a small part standing on pillar near south eastern boundary , in the centre of the property named C.K. Patch (Active fire also exists in C.K. Patch) and in the south western part of the lease hold. The galleries are likely to be waterlogged.	Developed, Partially quarried out and partially goaved out, no water, no fire in this seam. At present open cast working is being done.
VIII SEAM BOTT. (VIIIA), (1:2000)	A small area has been quarried out in the out crop region and remaining area is developed and virgin. Unapproachable and likely to be waterlogged.	Open cast working is being done in this seam. Developed in the south side of E.C Rly. Development done through1K pit & 4 K Pit. Partly developed & standing on pillar and likely to be water logged. Fire exists in western part of rise side near outcrop area working.
VIII SEAM TOP (VIIIB), (1:2000)	A small area has been quarried out in the out crop region and remaining area is developed and virgin. Unapproachable and likely to be waterlogged.	Partly developed and depillared in the outcrop area. Seam is not approachable. Open cast working is being done.
VIII C	A small area has been quarried out in the out crop region and remaining area is developed and virgin. Unapproachable and likely to be waterlogged.	Developed, quarried out in the outcropped area, partially goved out. Open cast working is being done.
IX/X	Quarried out in small area near southern boundary.	Presently open cast working is being done. Partialy developed. Dip side working water logged. On the rise side Phularitand Workings joined with Muraidih Colliery workings. Developed in the south side of E.C Rly. Development done through 1 K pit, 2K Pit, 3 K Pit , No.1 plT, nO.2 Pit & 4 K Pit. Partly developed & standing on pillar.
XI/XII	No Seam exists.	This seam outcropped in dip most side of Hired HEMM OCP left out patch B and Presently open cast working is being done .Development done through 1 K pit & 4 K Pit. Partly developed & Standing on pillar, partly caved.

XIII	No Seam exists.	Developed in the south side of E.C Rly. Development done through 1 K pit & 4 K Pit. Partly developed & Standing on pillar, partly caved.
XIV	No Seam exists.	Developed in the south side of E.C Rly. Development done through 1/ 14 & 2/14 inclines.
XV	No Seam exists.	Developed in the south side of E.C Rly. Development done through 1/15 and 2/15 inclines.
XVI	No Seam exists.	Developed in the south side of E.C Rly. Partly developed & Standing on pillar, partly caved.
XVIII	No Seam exists.	Developed in the south side of E.C Rly. . Partly developed & Standing on pillar, partly caved.
XVIII A	No Seam exists.	Developed in the south side of E.C Rly. Partly developed & Standing on pillar, partly caved.

The Proposed amalgamated mine boundary is demarcated on Surface Plan No.:- **AMPC/SUR/AMAL./01 Dated: 28.08.2018**. Details are as under-

Existing Mine Boundary of Muraidih Colliery.	A, A1, A2, B, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C, C1, C2, C3, C4, C5, C6, C7, C8, C9, D, D1, D2, D3, E, E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, F, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, J11, J12, J13, J13a, J13b, J13c, J13d ,J13e , J13f, J13g, H, H1, J, J1 ,J2,J3, J4, J5, J6, J7, J8, J9, J10, J11, O, O1, O2, O3, O4, O5, N, N1, N2, N3, N4, N5, N6, M, M1, M2, M3, M4 & A
Existing Mine Boundary of Phularitand Colliery.	P84, B, A2, A1, A, M4, M3, M2, M1, M, N6, N5, N4, N3, O5, O4, O3, O2, O1, P97, P98, P99, P100, P101, P102, P103, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20 P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P31A, P31B, P32, P33, P34, P35, P36, P37, P38, P39, P40, P41, P42, P43, P44, P45, P46, P47, P48, P49, P50, P51, P52, P53, P54, P55, P56, P57, P58, P59, P60, P61, P62, P63, P64, P65, P66, P67, P68, P69, P70, P71, P72, P73, P74, P75, P76, P77, P78, P79, P80, P81, P82, P83 & P84

Proposed mine boundary of *Amalgamated Muraidih Phularitand Colliery.*	D, D1, D2, D3, E, E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, F, F1,F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, J11, J12, J13, J13a, J13bzJ13c, J13d, J13e, J13f, J13g, H, H1, J, J1, J2, J3, J4, J5, J6, J7,J 8,J9,J10,J11, O, O1, P97, P98, P99, P100, P101, P102, P103, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P31A, P31B P32, P33, P34, P35, P36, P37, P38, P39, P40, P41, P42, P43, P44, P45, P46, P47, P48, P49, P50, P51, P52, P53, P54, P55, P56, P57, P58, P59, P60, P61, P62, P63, P64, P65, P66, P67, P68, P69, P70, P71, P72, P73, P74, P75, P76, P77, P78, P79, P80, P81, P82, P83, P84, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C, C1, C2, C3, C4, C5, C6, C7, C8, C9, D

Major violations, notices and orders imposed in both the mines are as listed in Annexure- II and it will remain applicable for proposed new mines (**AMALGAMATED MURAIDIH PHULARITAND COLLIERY**) also.

Therefore, it is requested that the Permission for amalgamation of common boundary between Muraidih Colliery and Phularitand Colliery as proposed may be granted under Reg. 122 of CMR 2017.

Thanking You.

Yours Faithfully

25.1.19

(N. K. TRIPATHI)
Nominated owner /Director (Tech.) P&P
BCCL

Encl: -

3. As above
4. ISO clearance.

CC To:-

- Dy. Director General of Mines Safety, Region 3, CZ, DGMS,Dhanbad.
- Director of Mines Safety, Region 3, CZ, DGMS,Dhanbad.
- Dy. Director of Mines Safety, Region 3, CZ, DGMS,Dhanbad.

Distribution:-

- General Manager, Barora Area.
- Agent, Muraidih Colliery/ Phularitand Colliery
- Area Safety Officer, Barora Area.
- Manager, Muraidih Colliery
- Manager, Phularitand Colliery
- Office Copy

BY Registered Post

BHARAT COKING COAL LIMITED

(A Mini Ratna Company)
(A Subsidiary of coal India Limited)
Regd. off: Koyla Bhawan, Koyla Nagar, Dhanbad-826005
CIN: U10101JH1972GOI000918

Office of the Project Officer, Muraidih Colliery,
Barora Area, PO: Nawagarh Dist: Dhanbad

Ref No Mur/PO/UG/Minop/2019/ 356 Date: 1/3/19

To
The M/s Minop Innovative Technologies Pvt Ltd.
3F, Gajraj Chambers
86 B/2 Topsia Road, (South)
Kolkata – 700046
E-Mail : info.minop@gmail.com

Sub:- To start the work of Muraidih underground project awarded to MINOP

Ref. :

1. NIT No. BCCL/GM(CMC)/F-Global/Muraidih/2010/408 Date: 26.03.10
2. Agreement dated : 25.03.2011
3. Amendment of Agreement dated: 22.06.2012
4. Detailed Project Report (DPR) for the above work as prepared by M/S Mino Innovative Technologies Pvt. Ltd. and duly vetted by CMPDI and accepted by BCC on dated 29.01.2013.
5. Letter no- AMC/PO/2016/3713A Dated-05.06.2016
6. Letter no-MUR/PO/UG/MINOP/2018/1687 Dated-15.12.2018

Dear Sir,

With reference to above it is to apprise that you have stopped the execution of th contract w.e.f 01.06.2016 without valid reasons and till date there is no resumption of wor even after communication with you in this regard vide under reference (5 and 6) as above. It known to you that, you had participated in the tender for the above mentioned work acceptin all the terms and conditions of NIT/Tender document and subsequently entered into agreement amendment agreement with BCCL vide under reference (2 and 3) as above. After signing agreement you didn't continue with execution of the contract as per terms and condition NIT/Tender document and agreement/ amended agreement, instead you have bee continuously asking irrelevant queries and demanding subsequent amendments in th agreement.

Your above act is construed as inordinate delay in completion of activities as per claus 4.1.6 of NIT. As such you are once again advised to resume the work immediately.

This is for your kind information.

Thanking You.

Yours faithfully
01.03.19
Engineer Incharge/ Project Officer
Muraidih Colliery

Copy to,

1. TS to CMD, BCCL, Koyla Bhawan
2. Director (P & P), BCCL, Koyla Bhawan
3. Director (Operation), BCCL, Koyla Bhawan
4. Director (Finance), BCCL, Koyla Bhawan
5. Director (Personnel), BCCL, Koyla Bhawan
6. General Manager(CMC), BCCL, Koyla Bhawan
7. General Manager(P & P), BCCL, Koyla Bhawan
8. General Manager, Barora Area

ANNEXURE-XV

वन, पर्यावरण एवं जलवायु परिवर्तन विभाग, झारखण्ड

कार्यालय : वन क्षेत्र पदाधिकारी, तोपचाँची (राजगंज) वन प्रक्षेत्र
धनबाद वन प्रमण्डल।
पत्रांक :– 78 दिनांक :–12/02/2019

सेवा में,

वन प्रमण्डल पदाधिकारी,
धनबाद वन प्रमण्डल।

विषयः– बी0सी0सी0एल0 के मुराईडीह कोलियरी के मौजा– बरोरा में 16.42 हे0 वन भूमि अपयोजन के संबंध में।

प्रसंगः– आपका पत्रांक– 1813 दिनांक– 30.11.18

महाशय,

उपर्युक्त विषयक प्रस्ताव की संयुक्त रूप से स्थलीय जांच की गई जांचोपरांत बिन्दुवार वांछित प्रतिवेदन निम्नवत हैः–

1. प्रस्तावित वन भूमि का प्लॉट सं0– 10, 168, 169, 942 एवं 946 का कुल रकवा 16.42 हे0 पाया गया।
2. प्रस्तावित वन भूमि का मिलान नक्शे से कर लिया गया है।
3. प्रस्तावित कुल रकवा 16.42 हे0 वन भूमि है जिसमें जंगल झाड़ी शामिल नहीं है।
4. स्थलीय जांच पाया गया कि वर्तमान समय में प्लॉट सं0– 10 के रकवा 5.80 हे0 वन भूमि को छोड़कर शेष प्लॉटों की कुल रकबा 10.62 हे0 बी0सी0सी0एल0 द्वारा उपयोग में लाया जा चूका है।
5. वन भूमि पर स्थित विभिन्न प्रजाति के कुल – 44 वृक्ष अवस्थित पाये गये।

वृक्षों की मापी सूचि एवं वन भूमि का प्लॉटवार रकवा तथा उसकी वर्तमान स्थिति से संबंधित संयुक्त जांच प्रतिवेदन मूल रूप में इस पत्र से संलग्न कर समर्पित की जा रही है।

अनु0यथोक्त।

विश्वासभाजन

12/02/2019

वन क्षेत्र पदाधिकारी,
तोपचांची वन प्रक्षेत्र