

MINE PROFILE OF KHARKHAREE COLLIERY

1.0 GENERAL MINE INFORMATION

1.1 MINE / PROJECT

Kharkharee UG Mine, covering a leasehold area of about 5.84 Sq.Km., is located in west-central part of Jharia Coalfield. It is under administrative control of Govindpur Area of Bharat Coking Coal Ltd. A major fault (throw about 550m) runs east to west and divides mine into two parts i.e. the area on the northern side of the major fault and the area on the southern side of the major fault. All the mining activities of Kharkharee UG Mine are limited to the northern side of the major fault. The mine is situated in Dhanbad District of Jharkhand State.

Out of the total area of 5.84 Sq. Km, only 5.26 Sq. Km area of the Kharkharee Mine lying on the northern side of the major fault (throw about 550m) has been considered for this Global Bid Document (Technical Part) for Kharkharee UG Mine. Due to operational difficulties associated with geological disturbance, likely to come up during mining operation, the area lying on the south side of the major fault (throw about 550m) is proposed to be included/ considered in Kharkharee-Dharmaband Extension Block located on the south side of existing Kharkharee Mine.

Kharkharee UG Mine is included in Survey of India Toposheet No.73 I/1 & I/6 (1:63,360).

For geological assessment, the boundary of the Kharkharee UG Mine is demarcated as follows:

- North - Maheshpur Mine
- South - V/VI/VII seam position of major Fault (F₇-F₇) and associated faults (F₆-F₆ & F₈-F₈)
- East - Dharmaband Mine
- West - Phularitand Mine

The present Kharkharee Mine has been formed by amalgamating the following mines which were working under the private ownership before nationalization:

- Part of New Bansjora Section/Ashakuti Phularitand Mine of erstwhile Karnani.
- Kharkharee Mine of erstwhile BP Jain's Bharat Mining Corporation.
- New Sinidih of erstwhile Karnani.

The above three sections constitute western, central and eastern sections of the present Kharkharee Mine respectively.

In the past, method of work had invariably been manual Bord & Pillar System. Individual seams from L-12 to XVIII seams had been developed/ depillared by caving through series of inclines driven from the incrop region of the respective seams. These seams are at present abandoned and incline mouths are sealed off. The abandoned workings are reported to be waterlogged upto the incline mouths. However, L-10 and XVII seams had been developed/ depillared in small part by caving through pits. These workings are also waterlogged on the dip side.

The extent of workings of the above seams are limited on the rise side and major area in each seam on the dip side, upto the major fault (throw 550m), are lying virgin mainly due to thinning of seams.

At present, Bord & Pillar development (by SDLs) is going on in XIV seam Geological (Mine Nomenclature 16 seam) through No.1 and No. 2 Pit and about 50 TPD production is being obtained from the mine.

1.2 MINE LOCATION

Kharkharee Mine is situated in West-Central part of Jharia Coalfield in Dhanbad district of Jharkhand state. It is located at about 25km from Dhanbad Railway station (E.C. Railway). It is included in Survey of India Toposheet No.73 I /1 & I/6 (1:63,360).

Latitude - 23 ° 45' 39" N to 23 ° 46' 53" N.

Longitude - 86 ° 13' 48" E to 86 ° 15' 34" E.

1.3 ACCESSIBILITY

- Nearest Air port : Ranchi, at a distance of about 200 kms.
- Nearest Railway Station : 1) Dhanbad Railway Station, which is at about 25 kms. away from Dhanbad
2) Kharkharee Railway station of the Adra-

Gomoh section of S.E. Railway located just at the western limit of the Mine.

Approach by road : The Mohuda- Katras (Chandrapura) feeder road, which runs parallel to the western boundary originates from the Dhanbad – Purulia NH- 32 at a point 4 km. from the south western part of the Mine.

Nearest Sea Port : Kolkata (about 270 Kms.)

1.4 COMMUNICATION

The Mohuda-Katras (Chandrapura) feeder road, running parallel to the western boundary originates from the Dhanbad – Purulia. NH-32 passes north to south in the middle of the property.

1.5 MINING BLOCK

Keeping in mind the information & data required to be incorporated in Global Bid Document, a Geological Report named as “Geological Report for Global Bid Document (Technical Part) Kharkharee Mine, Govindpur Area, Jharia Coalfield, BCCL” March -2013, was prepared for extraction of coal seams from L-12 seam and its underlying seams (upto V/VI/VII seam).

The salient features of the geological Report are as below:

1) This Geological Report is based on the data available in the following

Geological Reports:-

- i) Geological Report on exploration for coal, Kharkharee Block, Jharia Coalfield , Dist: Dhanbad , Bihar-Prepared by Mineral Exploration Corporation Limited, on May 1981.
- ii) Geological Report on Exploration for Coal , Dharmaband Block, Jharia Coalfield. Dist: Dhanbad, Bihar Prepared by Mineral Exploration Corporation Limited on May, 1986.
- iii) Geological Report on Coal Exploration Dharmaband – Kharkharee Extension Block- Prepared by Mineral Exploration Corporation Limited on March, 1996.

2) As some of the seams have been worked extensively after preparation of the above mentioned G.Rs., the data generated from the workings have been

incorporated and the plans of different seams have been modified/updated accordingly.

- 3) Almost all the boreholes barring very few have been drilled upto V/VI/VII seam only. So, the scope of this report is restricted from L-12 to V/VI/VII seams only. For delineation of coal seams lower than V/VI/VII seam drilling of further boreholes upto bottom most seam is required.
- 4) Surface features like shafts, inclines roads etc. shown on the plan supplied by Mine do not match well with survey of India toposheet available on 1:4000 R.F. and as such an element of approximation exists in location of boreholes when matched with plans supplied by Mine.
- 5) Net geological reserves have been assessed only up to 0.5m thickness. Area having thickness of coal less than 0.5m has not been considered for reserve estimation.
- 6) Southern boundary of the assessed area has been marked by the major fault F₇-F₇ with more than 500m throw along with its associated faults F₆-F₆ & F₈-F₈. The southern boundary of the project area is marked by the position of these three faults in V/VI/VII seam. And all other seams have been assessed up to the position of these faults in the respective seams.
- 7) One Geological cross-section has been prepared on R.F. 1:4000. The cross section line A-A¹ has been marked on Geological Plan (Plate-IV).
- 8) The GCV of the seams have been calculated from the conversion formula of UHV to GCV. The grade of coal is as per the UHV norms.
- 9) The washability characteristics are as per the borehole sample analysis.

1.6 MINING LEASE

The mining lease has been extended by the Coal India (Regulation of Transfers and Validation) Act 2000.

1.7 STATUS OF PROJECT APPROVAL

Originally, No. 1 and No. 2 Pits were sunk upto XVIC seam and XVII seams respectively. An Advance Action Proposal for sinking of No.1 and No. 2 Pit was approved by BCCL Board in June 1992. The proposal envisaged sinking of these

pits upto XV seam from the existing levels. Subsequently, No. 1 Pit was deepened upto XV seam and No. 2 Pit was sunk upto XVI seam.

The XVIII group of seams (XVIIIID, XVIIIIC, XVIIIA & XVIII) have been extensively worked from incrop region through inclines and worked out area are mostly exhausted. The worked out area in these seams are waterlogged up to incline mouths and dip side area in all these seams are lying virgin. It was decided to exploit dip side virgin reserve of XVIII group of seams after keeping a safe solid barrier of coal against the waterlogged working in each seam.

Keeping this objective in mind, a Project Report for Kharkharee Reverse Incline (Exploitation of XVIII group of seams) was prepared by CMPDI, RI-II and submitted to BCCL in September 1995. The report envisaged a target production of 500 TPD for a capital investment of ` 7.06 Crs. The report could not get approval of BCCL Board.

Subsequently, a project Report for Kharkharee 1&2 Pits (XVI & XV Seam) was prepared by CMPDI, RI-II and submitted to BCCL in September 1996 for an additional capital investment of ` 22.75 Crores. The report envisaged a production target of 900 TPD from development of XVI and XV seams through No. 1 and No.2 Pits. The Project Report could not be approved due to adverse economics.

1.8 STATUS OF ENVIRONMENTAL CLEARANCE

The mine is part of Cluster XIII group of mines of BCCL and the normative production capacity is shown as 0.325 MTPA within leasehold area. EC for Cluster- XIII group of mines has been granted by MOEF, Govt. of India for capacity of 0.423 MTPA (peak) and the current status of Environmental Clearance (EC) for the Kharkharee Colliery is mentioned below:

S. No	Name	Leasehold Area (Ha)	Production Capacity(N) (MTPA)	Production Capacity(P) (MTPA)	Mine life (Yrs)
1	Kharkharee Colliery (UG)	584	0.092	0.12	-

1.9 LAND ACQUISITION/ STATUS

The considered leasehold area of proposed Kharkharee UG Mine is 526 Ha. Category-wise details of type of land are given in Table-1.

Table- 1.1
Details of category-wise land

Sl. No.	Type of Land	Area (Ha.)
1.	BCCL Land	49.75
2.	Forest Land	25.60
3.	Government Land	Nil
4.	Railway Land	1.85
5.	Tenancy Land/ Pvt. Land	448.80
	Total	526.00

Details of the present land-use pattern of the above area are given in Table-2.

Table-1.2
Details of present land-use pattern

Sl. No.	Type of Land Use		Area (Ha.)
1	Running Quarry	Back Filled	Nil
		Not Back Filled	Nil
	Abadoned Quarry	Back Filled	Nil
		Not Back Filled	Nil
3.	External OB Dump		Nil
4.	Service Building/ Mine Infrastructure		12.96
5.	Coal Dump		1.20
6.	Road/ Rail		23.17
7.	Home stead Land	BCCL	27.40
		Private	
8.	Agriculture Land		46.00
9.	Forest Land		25.60
10.	Plantation		10.80
11.	Water Body		18.47
12.	Barren Land		360.40
	Total		526.00

1.10 CLIMATE

The climate of the Jharia Coalfield is of tropical monsoon type. The maximum precipitation occurs in the month of June to September. The maximum temperature of area rises up to 44°C to 48°C in the month of May, while the minimum temperature is around 5 ° C to 7 ° C in December/January. The annual rainfall in Jharia Coalfield and adjacent region varies from 1197mm. to 1380mm.

1.11 TOPOGRAPHY AND DRAINAGE

The area has a general undulating topography with a gentle eastward slope. The maximum ground elevation is observed in the southwestern corner around BH KH-1 (226.00m) while the lowest is recorded near KH-6 (191.00m.) in eastern side. The drainage of the area is controlled by the southerly flowing Khudia Nala, a tributary of Damodar River. There are number of ponds and wells scattered all over the mine area.

2.1 SCOPE AND LIMITATION

A. This Geological Report is based on the data available in the following

Geological Reports:-

- i. Geological Report on exploration for coal, Kharkharee Block, Jharia Coalfield, Dist: Dhanbad, Bihar-Prepared by M/s MAPL, Asansol, September, 2021.
 - ii. Geological Report on exploration for coal, Kharkharee Block, Jharia Coalfield, Dist: Dhanbad, Bihar-Prepared by Mineral Exploration Corporation Limited, on May 1981.
 - iii. Geological Report on Exploration for Coal, Dharmaband Block, Jharia Coalfield. Dist: Dhanbad, Bihar Prepared by Mineral Exploration Corporation Limited on May, 1986.
 - iv. Geological Report on Coal Exploration Dharmaband – Kharkharee Extension Block- Prepared by Mineral Exploration Corporation Limited on March, 1996.
- B. As some of the seams have been worked extensively after preparation of the above mentioned G.Rs. the data generated from the workings have been incorporated and the plans of different seams have been modified accordingly.
- C. Surface features like shafts, inclines roads etc. shown on the plan supplied by colliery do not match well with survey of India toposheet available on 1:4000 R.F. and as such an element of approximation exists in location of boreholes when matched with plans supplied by colliery.
- D. Net geological reserves have been assessed only up to 0.5m thickness. Areas having less than 0.5m thickness have not been considered for reserve estimation.
- E. Southern boundary of the assessed area has been marked by the major fault F7-F7 with more than 500m throw along with its associated faults F6-F6 & F8-F8. The southern boundary of the project area is marked by the position of these three

- faults on V/VI/VII seam. And all other seams have been assessed up to the position of these faults in the respective seams. Traces of only northern (up-thrown) side of these faults have been shown on floor-contour and seam-folio plans.
- F. Since seams below V/VI/VII are explored in Kharkharee block only, net geological reserve has been provided within the block limit of Kharkharee Geological Block.
 - G. Geological cross-section has been prepared on R.F. 1:4000. The Cross-section line A-A¹ has been marked on Geological Plan (Plate-Iv).
 - H. The present winding capacity of Pit No -1 is about 800 tpd.
 - I. The NH-32 which is about 50 m wide passes in the middle of property from north to south.
 - J. In XIII seam, in western part Jhama exists in the bottom part of the seam. The thickness range of Jhama is 0.76 to 1 m. For the calculation of extractable reserve in this seam the jhama portion has not been considered.

2.2 GEOLOGICAL BOUNDARY OF THE MINE / PROJECT

Geographically Kharkharee Mine is bounded as follows:-

North	-	Maheshpur Mine
South	-	V/VI/VII seam position of major Fault (F ₇ -F ₇) and associated faults (F ₆ -F ₆ & F ₈ -F ₈)
East	-	Dharmaband Mine
West	-	Phularitand Mine.

2.3 DRILLING DETAILS

- (a) Total Assessment Area - 5.26 Sq. Km. (As per plan)
- (b) Total No. of boreholes - 60
- (c) Total Meterage drilled - 36420.07 m
- (d) Borehole density - 11 BHs /Km².

2.4 GEOLOGY OF THE COAL FIELD

Jharia Coalfield represents one among the several "outlier" of Permo Carboniferous sediments in an Archean Country is one of the major coalfields of the Damodar Valley Coal belt occurring roughly in an E-W alignment.

Jharia Coalfield (JCF), in which the Kharkharee mine is located, is roughly sickle shaped syncline covering an area of 453 Sq.Km. and the formations

occur in the form of basin with its axis extending broadly in the East-West direction and plunging towards west. The southern flank of the coalfield is truncated by a major fault known as boundary fault. The non-coal bearing Talchir formation have an exposure roughly all along the northern fringes of the basin.

Overlying the Talchir formation are the Barakar formation, which are exposed in the northern, eastern part as well as south eastern part of the basin. Barakar is successively overlain by Barren Measures, which are mostly exposed in the central part of the coalfield and devoid of coal seams. The Barren measures is overlain by coal bearing Raniganj formation. The Gondwana rocks are intruded by the post-Gondwana Intrusives (Mica Peridotite and Dolerite). It may be mentioned here that in this coalfield, the Barakar formation is more extensive than the Raniganj formation, which has a limited development.

The rocks of Jharia Coalfield can be broadly grouped into two prominent units viz. Basement Archean Complex and the permo carboniferous sediments comprising the lower member of the Gondwana super group. The contact between the two is marked by a well-established unconformity.

The geological succession of the strata in Jharia Coalfield is given in Table-1.

TABLE – 2.1
GEOLOGICAL SUCCESSION OF JHARIA COALFIELD

The generalised stratigraphic sequence of rock formation of Jharia Coalfield is as follows:

RECENT / SUB RECENT		SOIL / ALLUVIUM
----- UNCONFORMITY -----		
POST GONDWANA		BASIC INTRUSIVES (Mica Peridotite, Dolerite etc.)
----- UNCONFORMITY -----		
LOWER GONDWANA GROUP	DAMUDA SUB GROUP	RANIGANJ FORMATION BARREN MEASURE FORMATION BARAKAR FORMATION TALCHIR FORMATION
	TALCHIR SUB GROUP	
----- UNCONFORMITY -----		
PRECAMBRIAN	ARCHEANS	

2.5 GEOLOGY OF THE KHARKHAREE COLLIERY

(Coal bearing formations and their general behaviours)

The colliery area is occupied by Barakar formation. The area is mostly covered by thin alluvium and sandy soil and good rock exposures are rare. The complete sequence of coal seams of Barakar formation from I to XVIII-D along with local developments are present here. The Barakar formation is extensively developed in the entire area. The Barakars are broadly represented by pebbly, coarse to fine grained sandstone, grey shale, carbonaceous shale and coal seams. Post Gondwana intrusives of mostly dolerite and mica-peridotites. A very thick (about 20m.) intrusive dyke called Maheshpur Dyke is traversing along the western boundary of the area.

2.5.1 DIP AND STRIKE

The general strike of the formation is WNW-ESE.

The dip direction of the strata is generally SW. The dip of the strata is generally southerly lies less than 12 ° in larger part of the area. However, the dip is steeper in south-western part of the area.

2.5.2 FAULTS

Altogether 8 faults have been deciphered in Kharkharee Colliery on the basis of borehole and mine working data. Details of these faults has been given in Table-2.2.

Table: 2.2

Sl. No.	Fault No.	Extent & Location	Trend/Dip	Max. Throw (m)	Nature & Evidence
1.	F1-F1	Located in the northwest corner of the block	Generally WNW-ESE with dip of 60° towards SSW	15m	<ol style="list-style-type: none"> 1. Curvilinear oblique fault 2. Omission of seams XIV/XV in borehole MK-2 3. Displacement of floor contours.
2.	F2-F2	Located in the northern part of the block	Generally WNW-ESE with dip of 60° towards SSW	20m.	<ol style="list-style-type: none"> 1. Curvilinear oblique fault 2. Encountered in the working of XVII seam
3.	F3-F3	Located in the eastern part of the block	Generally WSW-ENE with dip of 60° towards SSE.	50m	<ol style="list-style-type: none"> 1. Curvilinear oblique fault 2. Reduction of parting between L-3 and XI/XII in DB-32. 3. Omission of seams XI/XII, L-2 and XIII in JM-3. 4. Omission of seams L-4, L-5 and L-6 in DB-27. 5. Omission of seam VIII A in

Sl. No.	Fault No.	Extent & Location	Trend/Dip	Max. Throw (m)	Nature & Evidence
					DB-31. 6. Omission of seams L-3, XIV and XV in DB-33.
4.	F4-F4	Located in the south-eastern part of the block	E-W trending with 60° dip towards south.	25m	1. Curvilinear oblique fault 2. Omission of seams XVI and XVI A in JK-33.
5.	F5-F5	Located in the south-east corner of the block	Generally WSW-ENE with dip of 60° towards NW	40m	1. Curvilinear oblique fault 2. Omission of seams X and IX in DB-36 3. Roof of seam V/VI/VII faulted in DB-21.
6.	F6-F6	Located in the southwest boundary of the block.	Generally WNW-ESE with dip of 60° towards SSW	250m	1. Oblique fault 2. Intersected in borehole KH-1
7.	F7-F7	Entered from adjoining Madhuband block and forming the boundary at South Central part.	E-W trending with 60° dip towards south.	550m	1. Curvilinear oblique fault. 2. Omission of seams between XVIII D and VIII in B.H. No. KEX- 4. 3. Intersected in borehole No.KEX-3 at depth 288m. seams above L-4 faulted. 4. Intersected in JM-7 at the depth of 380m. seams above XVI seam faulted. 5. Encountered in borehole JM-9 at the depth of 656m. Seams between-XVIII A and X faulted.
8.	F8-F8	Located in the southeast boundary of the block	E-W trending with 60° dip towards south	80m	1. Oblique fault. 2. Omission of seams above L-18, in DEX-13. 3. Omission of Seams above L-8 in DEX-15. 4. Omissions of seams above XVIII D in DEX-19.

In addition to these faults, existence of other faults having throws less than 5m cannot be ruled out.

2.5.3 OTHER GEOLOGICAL DISTURBANCES

Igneous Intrusion / Pyrolitisation

There is presence of one prominent dolerite dyke i.e Maheshpur dyke (20m thick) localised in western boundary of the area. The dyke trends N 30° E – S 30° W with 80° dip towards east. Mica-peridotite is the common intrusive encountered and intersected in boreholes and occurs as dykes and sills and many seams are pyrolitised in the area.

2.5.4 COAL SEAM

The detailed exploration of coal in Kharkharee colliery area has revealed the existence of about 40 coal horizons upto I seam at bottom within Barakar formation. Out of these 40 seams, 34 coal seams have been found to be with relatively larger spatial occurrence. Thickness ranges of these seams are shown in Table-2.3. Out of these 34 coal seams, 3(three) seams viz L-11, XVII-A & XVI-C have not been assessed in detail in this report as these seams are either very thin or mostly burnt. The standard Geological nomenclature has been followed in this report which sometimes differs with the nomenclature used by the colliery. Standard Geological Nomenclature vis-à-vis colliery nomenclature is given in the Table- 4. Scope of the report is confined to seams L-12 (above of XVIII-D) to I, I+II, I+II+III seam hence description of these seams is given below:

L-12 Seam:

Seam L-12 is the uppermost co relatable seam which has been described in this report. Seam L-12 is free from pyrolitisation. The seam has been fully intersected in 11 boreholes and it shows thickness variation from 0.49m to 2.40 m and its ash varies from 18.3 to 42.2% (W-V to W-I) and UVM varies from 20.4 to 32.6%.

The roof of seam L-12 is characterized by shale whereas floor of the seam is carbonaceous shale and sandstone. This seam has been developed in a large patch between the in-crop and the fault constituting the southern boundary.

L-11 Seam:

This seam underlies seam L-12 at a parting of 14 to 32 m. The seam has been fully intersected in 10 boreholes and it shows thickness variation from 0.41 m to 1.16m. As this seam is of unworkable thickness in a very large area, this seam has not been studied in detail and no plan has been prepared for this seam.

XVIII D Seam:

This seam underlies seam L-11 at a parting of 13 to 24 m. Seam X-VIII D appears to be free from pyrolitisation. The seam has been fully intersected in all 15 boreholes and it shows thickness variation from 0.10 m to 1.26 m and its ash varies from 19.7 to 44.3% (UG to W-I) and UVM varies from 23.5 to 36.7%.

The roof of seam XVIIIID is characterized by shale whereas floor of the seam is either shale, sandstone or intercalation of shale and sandstone. The seam has been worked in a small patch only near its Incrop region.

XVIII C Seam:

This seam underlies seam XVIIIID at a parting of 9 to 18 m. This seam is free from pyrolitisation but has been deteriorated to carb. Shale in and around the area of borehole KH-4. The seam has been fully intersected in 18 boreholes and it shows thickness variation from 0.40 m to 1.60 m and its ash varies from 26.8 to 55.7% (UG to W-III) and UVM varies from 22.1 to 33.8%.

The roof of seam XVIII C is characterized by shale in central part of the area, however in the eastern part of area it is sandstone, whereas floor of the seam is carbonaceous shale and at places sandstone and intercalation of shale and sandstone. The seam has been worked and goaved in major part of the colliery especially in western and central part of the colliery.

XVIII B Seam:

This seam underlies seam XVIII C at a parting of 9 to 22 m. This seam is free from pyrolitisation. The seam has been fully intersected in 12 boreholes and it show thickness variation from 0.07 m to 1.50 m and it's ash varies from 17.3 to 21.7% (W-II to S-II), whereas UVM varies from 29.8 to 33.2.

The roof of the seam is characterized by shale whereas floor of the seam is Carbonaceous Shale and at places intercalation of shale and sandstone. The seam is virgin.

XVIII A Seam:

This seam underlies seam XVIII B at a parting of 2 to 13 m. This seam is free from pyrolitisation except in the area around borehole KH-6 where the seam is completely burnt. The full seam has been intersected in 20 no. of boreholes and its thickness varies from 0.25 to 2.50 and inband ash varies from 15.5 to 28.6 (W-IV to S-II) and UVM varies from 20.3 to 33.1%.

The roof of the seam is generally shale followed by carbonaceous shale and sandstone whereas floor of seam is shale. The seam has been extensively worked and goaved in major part of the area.

XVIII Seam:

This seam underlies seam XVIIIA at a parting of about 3 to 10 m. This seam is free from pyrolitisation. The seam has been fully intersected in 18 no. of borehole. The in-band thickness of the seam varies from 0.34 m to 1.82 m and its inband ash% varies from 14.1% to 32% and UVM varies from 26 to 37.4%.

The roof of the seam is generally Shale and Carbonaceous shale whereas the floor of the seam is either by sandstone, Shale/intercalation of shale and sandstone. The seam has been worked and goaved except south-eastern part of the colliery.

L-10 Seam:

This seam underlies seam XVIII at a parting of about 22 to 41 m. This seam is free from pyrolitisation. The seam has been fully intersected in 22 no. of boreholes. The in-band thickness of the seam is 0.10 to 2 m and its inband ash% varies from 21.8 to 44.5 (UG to W-II) and UVM varies from 26.1 to 31.6%. The seam has been worked only in a patch near the Incrop region in north central part of the colliery. Roof and floor of the seam is generally shale followed by carbonaceous shale, sandstone or intercalation of shale and sandstone.

XVIIA Seam:

This seam underlies seam L-10 at a parting of about 24 to 44 m. Full seam intersection has been done in 22 no. of boreholes. The thickness of the seam varies from 0.10 to 4.40 m including Jhama and MP. Barring a very small area the seam is totally burnt out. Because of this seam has not been studied in detail and no plan for this seam has been prepared.

XVII Seam:

This seam underlies seam XVII A at a parting of about 33 to 42 m. This seam is free from pyrolitisation except in the southwest corner of the area around borehole KH-1 where the seam is fully burnt. The seam has been fully intersected in 22 no. of boreholes. The thickness of the seam varies from 0.35 to 3.60 m including Jhama and MP and its inband ash% varies from 16 to 40.2 (UG to S-II) and UVM varies from 21.8 to 32.2%.

L-6 Seam:

This seam underlies seam XVII at a parting of about 23 to 38 m. This seam is free from pyrolitisation. The seam has been fully intersected in 25 no. of boreholes. The thickness of the seam varies from 0.15 m to 1.45 m and its in-band ash% varies from 18.4 to 34.4 (W-IV to W-I) and UVM varies from 25.9 to 31.8%. This seam is totally virgin. Both roof and floor are generally composed of usually shale & carbonaceous shale and at places sandstone or intercalations of shale and sandstone.

L-5 Seam:

This seam underlies seam L-6 at a parting of about 10 to 18 m. This seam is free from pyrolitisation except in easternmost area around the boreholes DB-21 and DB-31. The seam has been fully intersected in 25 no. of boreholes. The thickness of the seam varies from 0.13 to 2.03 m including Jhama and MP and its in-band ash percentage varies from 13.1 to 35.4 (UG to S-1) and UVM varies from 26.7 to 30.2%.

This seam is virgin in complete assessed area. The roof of the seam is generally Shale and sandstone whereas the floor of the seam is of either shale, sandstone or intercalation of shale and sandstone.

XVI-E Seam:

This seam underlies seam L5 at a parting of about 23 to 33 m. This seam is free from pyrolitisation except in southeastern part of the area around the boreholes JM-3, DB-32 and DEX-19. The seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 0.38 m to 4.54 m including Jhama and MP and its in-band ash percentage varies from 14.8 to 41.0 (UG to S-1) and UVM varies from 22.9 to 30.1%.

This seam is virgin in complete assessed area. Both roof and floor of the seam are composed of either shale or arenaceous shale however in rest of the area the roof of the seam is made up either of sandstone, shale or intercalation of shale and sandstone whereas the floor is common.

XVI-C Seam:

This seam underlies seam XVI-E at a parting of about 6 to 21 m. The seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from from 0.75 to 5.82 m including Jhama and MP. Baring a very few boreholes in

southern area, the seam is totally burnt out. So this seam has not been assessed in detail and no plan for this seam has been prepared.

XVI-B Seam:

This seam underlies seam XVI-C at a parting of about 1 to 7 m. This seam in very small area is free from pyrolitisation whereas the seam has been burnt out in a large portion. The seam has been fully intersected in 13 no. of boreholes. The thickness of the seam varies from 0.05 to 1.55 m including Jhama and MP.

Roof of the seam is made up of carbonaceous shale and shale whereas floor is composed of shale.

XVI-A Seam:

This seam underlies seam XVI-C at a parting of about 17 to 31 m and seam XVII B (where seam XVI B is developed) with a parting of 16m. to 37m. This seam is free from pyrolitisation except in south-western patch around the boreholes KH-1. The seam has been fully intersected in 22 no. of boreholes. The thickness of the seam varies from 0.05 to 2.15 m including Jhama and MP and it's in-band ash percentage varies from 16.8 to 46.3 (UG to S-II) and UVM varies from 23.0 to 28.4%.

Roof of the seam is made up of shale and sandstone whereas floor is composed of either shale, sandstone or intercalations of shale and sandstone.

XVI SEAM:

This seam underlies seam XVII A at a parting of about 20 to 56 m. This seam is free from pyrolitisation. The seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 0.31 m to 4.20 m and it's in-band ash% varies from 24 to 39.3 (UG to W-II) and UVM varies from 21.6 to 28.5%.

This seam is virgin.

Both roof and floor are generally composed of shale or carbonaceous shale.

XV SEAM:

This seam underlies seam XVI at a parting of about 5 to 22 m. This seam is free from pyrolitisation. The seam has been fully intersected in 28 no. of boreholes.

The thickness of the seam varies from 2.33 m to 6.80 m and it's in-band ash% varies from 14.8 to 39.6 (UG to S-I) and UVM varies from 20.9 to 27.2%.

This seam has been worked in a large patch in northern & central part of the area. Both roof and floor are generally composed of shale or carbonaceous shale except in few patches where these are made up of sandstone.

XIV SEAM:

This seam underlies seam XV at a parting of about 0.80 to 10 m. This seam is free from pyrolitisation. The seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 0.20 m to 1.87 m and it's in-band ash% varies from 14.4 to 50 (UG to S-I) and UVM varies from 20.9 to 32.3%.

This seam has been worked in a large patch in northern & central part of the area. Roof of the seam is generally shale and sandstone whereas the floor is generally composed of shale, sandstone and intercalation of shale and sandstone.

XIII SEAM:

This seam underlies seam XIV at a parting of about 27 to 71 m. This seam has been affected by pyrolitisation and partially burnt in a large area in the western part of the colliery. The seam has been fully intersected in 28 no. of boreholes. The thickness of the seam varies from 0.96 m to 5.31 m. The seam is considered mostly coking or medium coking and found to be non-coking category in north-eastern part of the area and its inband ash% in coking part varies from 16.7 to 27.6 (W-III to S-II) and UVM varies from 19.5 to 26.4%.

This seam is totally virgin. Both roof and floor are generally composed of shale or sandstone.

XII SEAM:

This seam underlies seam XIII at a parting of about 11 to 21 m and occurs only in the eastern part of the area. This seam is free from pyrolitisation and the seam has been fully intersected in 11 no. of boreholes. The thickness of the seam varies from 0.46 m to 3.15 m. The seam is considered mostly coking or medium coking in nature and a patch of non-coking category also occurs around the borehole KH-7 and its inband ash% in coking part varies from 21.0 to 33.8 (W-IV to W-I) and UVM varies from 18.9 to 21.8%.

This seam is totally virgin.

Both roof and floor are generally composed of shale or sandstone except in the region KH-7 where the floor is sandstone.

XI/XII SEAM:

This seam underlies seam XIII at a parting of about 16 to 24 m and splits into XI & XII seams towards eastern side of the area & combined seam XI/XII occurs in the western and central part of the area. This seam is pyrolitised in a very small patch in NW corner of the area and the seam has been fully intersected in 18 no. of boreholes. The thickness of the seam varies from 3.40 m to 6.78 m. This seam is considered coking and as well as non-coking and its inband ash% in coking part varies from 25.1 to 35.3 (UG to W-III) and UVM varies from 18.9 to 21.8%. This seam in non-coking part grade ranges from D to C.

This seam is virgin. The roof of seam XI/XII is characterized by shale or carbonaceous shale with sandstone in some places, whereas floor of the seam is sandstone and at places shale.

XI SEAM:

This seam underlies seam XII at a parting of about 0 to 27 m and occurs in the eastern part of the area. This seam is pyrolitised in a very small patch in NW corner and the seam has been fully intersected in 11 no. of boreholes. The thickness of the seam varies from 0.51 m to 6.13 m. The seam is considered coking or medium coking and non-coking category also occurs and its inband ash% in coking part varies from 32.2 to 44.9 (UG to W-IV) and UVM varies from 19.0 to 21.9%.

The roof of seam XI is characterized by shale or carbonaceous shale with sandstone in some places, whereas floor of the seam is sandstone and at places shale.

X SEAM:

This seam underlies seam XI/XII at a parting of about 29 to 41 m and seam XI at a parting of 21 to 43 m. This seam is free from pyrolitisation and the seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 0.66 m to 3.68 m. The seam is considered coking or medium coking and non-coking category also occurs and its in-band ash% in coking part varies from 26.8 to 44.6

(UG to W-III) and UVM varies from 17.1 to 41.5%. This seam in non-coking part grade ranges from F to D.

The roof of seam X is characterized by carbonaceous shale except in some places it is shale whereas floor of the seam is sandstone or intercalation of shale and sandstone.

IX/X SEAM:

This seam splits into X & IX seams towards northern part of the area & combined seam IX/X occurs in only a small elongated patch in northern part within the colliery area. This seam underlies seam XI/XII at a parting of about 42 m. This seam is free from pyrolitisation and the seam has been fully intersected in only 1 no. of borehole. The thickness of the seam is 7.75 m. and its inband ash% is 42.5% and UVM is 21.6%. This seam is virgin.

Both roof and floor of the seam are generally composed of either by carbonaceous shale or shale however in some places the roof is sandstone.

IX SEAM:

This seam underlies seam X at a parting of about 1 to 26 m. This seam is free from pyrolitisation. The seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 3.29 m to 5.32 m. The seam is considered coking and non-coking based on UVM data and it's in-band ash% varies from 21 to 42.5 (UG to W-I) and UVM varies from 17.7 to 23.3%. This seam in non-coking part grade ranges from D to C. This seam is virgin.

Both roof and floor of the seam are generally composed of either by carbonaceous shale or shale however in some places the roof is sandstone.

VIII C SEAM:

This seam underlies seam IX/X at a parting of 18 m and seam IX at a parting of 8 to 25 m. This seam is free from pyrolitisation and the seam has been fully intersected in 27 no. of boreholes. The thickness of the seam varies from 0.31 m to 3.05 m. The seam is considered non-coking in major part of the area and medium coking in a very small patch based on UVM data. It's in-band ash% in coking part varies from 22.0 to 46.5 (UG to W-II) and UVM varies from 15.9 to

22.4%. This seam in non-coking part grade ranges from G to D. This seam is totally virgin.

The roof of the seam is generally Shale followed by carbonaceous shale, sandstone or intercalations of shale and sandstone whereas the floor of the seam is either by sandstone, Shale, carbonaceous shale/intercalation of shale and sandstone.

VIIIB SEAM:

This seam underlies seam VIII C at a parting of 2 to 15 m This seam is free from pyrolitisation and the seam has been fully intersected in 29 no. of boreholes. The thickness of the seam varies from 1.96 m to 5.83 m. The seam is considered mostly non-coking and medium coking in a very small patch based on UVM data. It's in-band ash% in coking part varies from 21.5 to 39.5 (UG to W-IV) and UVM varies from 15.9 to 22.4%. This seam in non-coking part grade ranges from F to C. This seam is virgin.

The roof of the seam is generally Shale or carbonaceous shale except at places sandstone or intercalations of shale and sandstone whereas the floor of the seam is either by sandstone, Shale, carbonaceous shale.

VIIIA SEAM:

This seam underlies seam VIII B at a parting of about 1 to 13 m. This seam has been affected by pyrolitisation and burnt out in a patch at southern part around borehole JM-9 of the colliery. The seam has been fully intersected in 26 no. of boreholes. The thickness of the seam varies from 0.50 m to 4.83 m. The seam is considered mostly coking and also non-coking in part area based on UVM data and its inband ash% in coking part varies from 22.5 to 41.8 (UG to W-II) and UVM varies from 19.5 to 26.4%. This seam in non-coking part grade ranges from E to B. This seam is virgin.

The roof of the seam is mostly Shale or carbonaceous shale except at places sandstone in patches whereas the floor of the seam is generally shale.

VIII SEAM:

This seam underlies seam VIII A at a parting of about 16 to 29 m. This seam is free from pyrolitisation. The seam has been fully intersected in 20 no. of boreholes. The thickness of the seam varies from 0.18 m to 1.80 m. The seam is considered coking and non-coking in part area based on UVM data and it's in-band ash% in coking part varies from 22.8 to 41.5 (UG to W-II) and UVM varies from 15.1 to 23.4%. This seam in non-coking part grade ranges from F to D. This seam is virgin.

The roof of the seam is sandstone except in northern part where it is shale whereas the floor of the seam is usually shale or carbonaceous shale.

V/VI/VII SEAM:

This seam underlies seam VIII at a parting of about 4 to 16 m. This seam is free from pyrolitisation. The seam has been fully intersected in 25 no. of boreholes. The thickness of the seam varies from 11.41 m to 30.35 m. The seam is mostly non-coking though some medium coking coal is also present in patches and it's in-band ash% varies from 23.3 to 41.2 (UG to W-IV) and UVM varies from 16.9 to 21.6%. This seam in non-coking part grade ranges from E to C. This seam is totally virgin.

The roof of the seam is characterised either by Shale or carbonaceous shale with sandstone in some patches whereas the floor of the seam is generally shale or arenaceous shale except in some areas where it is carbonaceous shale.

IV TOP SEAM:

This seam underlies below seam V/VI/VII at a parting of about 2m, to 14 m. This seam is free from pyrolitisation. The seam has been fully intersected in 15 no. of boreholes. The thickness of the seam varies from 0.52 m to 4.44 m. The seam is non-coking and it's in-band ash% varies from 42.6 to 49.6 and UVM varies from 14.6 to 19.0%. This seam in non-coking and average grade is G12. This seam is totally virgin.

The roof of the seam is characterised either by shale, medium grained sandstone, carbonaceous whereas the floor of the seam is generally shale or carbonaceous shale, sandy shale, shaly sandstone, fine grained sandstone.

IV BOT SEAM:

This seam underlies below seam IV Top at a parting of about 19.0m, to 52 m. The seam has been fully intersected in 8 no. of boreholes. The thickness of the seam varies from 0.54 m to 3.54 m. The seam is non-coking and it's in-band ash% varies from 45.2 to 47.0 and UVM varies from 13.2 to 19.6%. This seam is non-coking and grade ranges from G11 to G10. This seam is totally virgin.

The roof of the seam is characterised by shale, medium to coarse grained sandstone, carbonaceous whereas the floor of the seam is generally shale, carbonaceous shale, sandy shale, shaly sandstone, fine to medium grained sandstone.

III SEAM

This seam underlies below seam IV Bot at a parting of about 10.0m, to 15.0 m. The seam has been fully intersected in 19 no. of boreholes. The thickness of the seam varies from 0.50 m to 5.05 m. The seam is non-coking and it's in-band average ash% is 39.50 and average UVM is 16.6%. This seam is non-coking and average grade is G9. This seam is totally virgin.

The roof of the seam is characterised by shale, medium to coarse grained sandstone, carbonaceous whereas the floor of the seam is generally shale, carbonaceous shale, very coarse to medium grained sandstone.

II SEAM

This seam underlies below seam III at a parting of about 7.0m, to 16.0 m. The seam has been fully intersected in 15 no. of boreholes. The thickness of the seam varies from 0.78 m to 2.86 m. The seam is non-coking and it's in-band ash% varies from 17.9 to 41.9 and UVM varies from 15.6 to 19.1%. This seam is non-coking and grade ranges from G9 to G1. This seam is totally virgin.

The roof of the seam is fine, medium and coarse-grained sandstone, shaly sandstone whereas the floor of the seam is generally shale, sandy shale, shaly sandstone, fine grained sandstone.

I, I/II & I/II/III SEAM

This seam occurring below seam II at a parting of about 1.0m, to 11.0 m. The seam has been fully intersected in 14 no. of boreholes. The thickness of the seam varies from 1.50 m to 3.89 m. The seam is non-coking and it's in-band ash%

varies from 33.9 to 46.6 and UVM varies from 8.2 to 25.2%. This seam is non-coking and grade ranges from G11 to G7. This seam is totally virgin.

The roof of the seam is shale, medium grained sandstone, shaly sandstone, sandy shale, carbonaceous shale whereas the floor of the seam is generally shale, carbonaceous shale, sandy shale, fine, medium and coarse grained sandstone.

The generalised sequence of coal seams and intervening parting is given below (For Kharkharee Colliery area only).

TABLE – 2.3

SEAM / PARTING	SEAM THICKNESS(M)	
	Min.	Max.
L-12	0.49	2.40
P	14	32
L-11	0.41	1.16
P	13	24
XVIII D	0.10	1.26
P	9	18
XVIII C	0.40	1.60
P	9	22
XVIII B	0.07	1.50
P	2	13
XVIII A	0.25	2.50
p	3	10
XVIII	0.34	1.82
1	2	3
P	22	41
L-10	0.10	2.00
p	24	44
XVII A	0.10	4.40 (Jh+MP)
P	33	42
XVII	0.35	3.60
P	23	38
L-6	0.15	1.45
P	10	18
L-5	0.13	2.03 (Jh+MP)
P	23	33
XVII E	0.38	4.54(Jh+MP)
P	6	21
XVII C	0.75 (Jh+MP)	5.82(Jh+MP)
P(WITH XVII B)	1	7
P(WITH XVII A)	17	31
XVI B	0.05	1.55 (Jh+MP)
P	16	37
XVI A	0.05	2.15 (Jh+MP)
1	2	3
P	20	56

XVI	0.31	4.20
P	5	22
XV	2.33	6.80
P	0.80	10
XIV	0.20	1.87
P	27	71
XIII	0.96	5.31
P(WITH XII)	11	21
P(WITH XI/XII)	16	24
XII	0.46	3.15
XI/XII	3.40	6.78
P(XII WITH XI)	0	27
XI	0.51	6.13
P(XI/XII WITH X)	29	41
1	2	3
P(XI/XIWITH IX/X)	42	-
P(XI WITH X)	21	43
X	0.66	3.68
IX/X	7.75	-
P(X with IX)	0	26
IX	3.29	5.32
P(IX/X WITH VIII-C)	18	-
P(IX WITH VIII-C)	8	25
VIII-C	0.31	3.05
P	2	15
VIII-B	1.96	5.83
P	1	13
P	16	29
VIII	0.18	1.80
P	4	16
V/VI/VII	11.41	30.35
P	2	14
IV TOP	0.52	4.44
P	19.0	52.0
IV BOT	0.54	3.54
P	10.0	15.0
III	0.50	5.04
P	7.0	16.0
II	0.78	2.86
P	1.50	4.00
I, I+II & I+II+II	1.50	14.00

Table- 2.4

(Standard Geological Nomenclature vis-a-vis Colliery Nomenclature)

Standard Geological Nomenclature	Colliery Nomenclature
L-12	L-12
XVIII D	XVIII Top
XVIII C	XVIII B
XVIII A	XVII Top

XVIII	XVII Bot
L-10	XVI Top
XVII	XVI Bot
XVI E	XVI A
XVI C	XV B
XVI	XIV
XV	XIII

TABLE – 2.5

QUALITY AND BRIEF DESCRIPTION OF COAL SEAMS IN THE AREA

S/N	Seams	In-band Thickness Range (m)	Ash Range (%)	Grade Range (Coking)	Average Grade (Coking)	GCV Range	Grade Range (Non-Coking)	Average Grade (Non-Coking)	Remarks
1	L-12	0.49-1.67	18.3-42.20	W-VI to W-I	W-V				
2	L-11	0.41-1.16		-					Thin Seam
3	XVIII D	0.10-1.26	19.7-44.30	W-VI to W-I	W-IV				
4	XVIII C	0.40-1.60	26.8-50.0	W-VI to W-III	W-IV				
5	XVIII B	0.07-1.50	17.3-21.7	W-II to S-II	W-I				
6	XVIII A	0.25-2.50	15.5-28.6	W-IV to S-II	W-I				Seam completely burnt in 1 borehole
7	XVIII	0.34-1.82	14.10-32.0	W-IV to S-I	W-II				
8	L-10	0.10-2.00	21.8-44.50	W-VI to W-II	W-VI				
9	XVIIA	0.10-1.23		-					Thin Seam
10	XVII	0.35-2.24	16.0-40.20	W-VI to S-II	W-IV				Seam completely burnt in 1 borehole
11	L6	0.15-1.45	18.4-34.4	W-IV to W-I	W-IV				
12	L5	0.13-1.77	13.10-35.40	W-V to S-I	W-III				Seam completely burnt in 2 borehole
13	XVI E	0.38-1.84	14.80-41.10	W-V to S-I	W-III				Seam completely burnt in 3 borehole
14	XVI C	-		-					Thin Seam. Highly pyrolitised
15	XVI B	0.05-1.32	18.1-39.40	W-V to W-I	W-III				
16	XVI A	0.05-1.40	16.80-46.30	W-V to S-II	W-IV				Seam fully pyrolitised in 1 borehole
17	XVI	0.31-4.20	24.0-39.30	W-V to W-II	W-IV				
18	XV	2.33-6.80	14.80-39.60	W-V to S-I	W-III				
19	XIV	0.20-1.87	14.40-50.50	W-VI to S-I	W-III				Seam partially pyrolitised in 1 borehole.
20	XIII	0.96-5.31	16.70-27.60	W-III to S-II	W-III	5774-6605	G6-G3	G4	Seam partially pyrolitised in 1 borehole.

21	XII	0.46-3.15	21.0-33.80	W-IV to W-I	W-IV	5457	G7	G7	
22	XI/XII	3.40-6.67	25.10-35.30	W-V to W-III	W-IV	5376-6130	G7-G4	G5	Seam partially pyrolitised in NW corner.
23	XI	0.50-6.13	32.20-44.90	W-VI to W-IV	W-IV	4750-5104	G9-G8	G8	Seam partially pyrolitised in NW corner.
24	X	0.66-3.68	26.80-44.60	W-V to W-III	W-IV	4244-6040	G11-G5	G9	
25	IX/X	7.75	42.5		W-VI				
26	IX	3.29-5.32	21.0-42.50	W-VI to W-I	W-IV	5320-6225	G7-G4	G5	
27	VIIIC	0.31-3.05	22.00-46.50	W-VI to W-II	W-IV	3829-5657	G12-G6	G9	
28	VIIIB	1.96-5.83	21.50-39.50	W-V to W-II	W-IV	4500-6206	G10-G4	G8	
29	VIIIA	0.50-4.13	22.50-41.80	W-V to W-II	W-IV	4510-6260	G10-G4	G8	Seam partially pyrolitised in 1 borehole.
30	VIII	0.18-1.80	22.80-41.50	W-V to W-II	W-V	4131-5650	G11-G6	G9	
31	V/VI/VII	11.41-25.28	23.3-41.20	W-V to W-II	W-IV	4582-5929	G10-G5	G8	
32	IV TOP	0.52-4.44	43.5-49.70			3921	G12		
33	IV BOT	0.54-3.54	45.20-47.0			4024-4437	G11-G10	G10	
34	III	0.5-5.07	39.5			3874-4814	G9-G8	G8	
35	II	0.78-2.86	17.9-41.9			4684-7010	G9-G1	G5	
36	I,I+II,I+II+III	1.5-14.00	29.4-46.6			4078-5863	G11-G5	G7	

Tentative Average Grade of the Mine:

Coking Coal: W-IV

Non- Coking Coal: G8

TABLE – 2.6

CLEANING POSSIBILITIES OF COAL SEAM AND WASHABILITY RESULT OF B.H. NO. DB-21

SEAM	B.H. No.	Ash% of raw coal	Cleans (at 1.50 sp.gr.)		Middlings (1.50 to 1.80 sp.gr.)		Rejects (> 1.80 sp.gr.)	
			Wt%	Ash%	Wt%	Ash%	Wt%	Ash%
XVIII-D	DB-21	22.4	69.5	14.8	26	40.3	4.5	52.3
XVIII-C	DB-21	40.4	27.7	19.4	42.8	38.3	29.5	65.6
XVIII-A	DB-21	17.9	83.5	14.5	12.5	32.2	4	61.6
XVIII	DB-31	19.6	72.7	14.2	25.1	30.4	2.2	61.1
XIV	DB-31	38.5	22.7	13.8	36.6	27.6	40.7	61.2
XII	DB-31	30.4	47.8	17.6	38.6	34.7	13.6	60.5
XI	DB-31	36.8	31	19.2	40.1	35.9	28.9	58.3

TABLE – 2.7
COKING PROPERTIES RESULTS OF SEAM ON CLEAN COAL
(Sp. gr. 1.50)

SEAM	CI		CT		SI	
	Min.	Max.	Min.	Max.	Min.	Max.
XVIII-D	24	-	-	-	-	-
XVIII-C	23	-	-	-	-	-
XVIII-B	24		G2			
XVIII-A	24	26	G1	G5	6	6 ½
XVIII	22	26	G1	G2/G4	6	6 ½
L-10	23	26	G7	-	3	-
XVII	20	23	F	F/G	5	-
L-6	23	25	F	G9	7 ½	-
L-5	21	23	G	G2	4 ½	6
XVI-E	18	23	E	F	-	-
XVI-A	20	-	-	-	-	-
XVI	17	23	G	G7	3	5 ½
XV	13	26	G1	G5	3	6
XIV	23	25	F	G3/G4	6 ½	-
XIII	13	25	G	G2	4 ½	6
XII	15	-	-	-	-	-
XI/XII	15	25	F	G2	4	5
XI	13	17	-	-	-	-
X	13	22	F	D	3	6 ½
IX	10	22	D	F/G	2 ½	4 ½
VIII-C	10	22	D	F/G	2 ½	4 ½
VIII-B	15	-	F	-	2	-
VIII-A	14	18	D	F/G	2 ½	-
VIII	17	-	F	-	2	-

2.5.5 Depth:

The depth range (Approx.) in which the seams occur at Kharkharee Colliery are as follows:

Table: 2.8

S/N	Seam	Depth Range (M)
1	L-12	Incrop-130
2	XVIII D	Incrop-155
3	XVIII C	Incrop-180
4	XVIII B	Incrop-195
5	XVIII A	Incrop-200
6	XVIII	Incrop-220
7	L-10	Incrop-250
8	XVII	Incrop-330
9	L-6	20-350
10	L-5	30-360
11	XVII E	60-400
12	XVII B	200-420
13	XVII A	115-440
14	XVI	140-500
15	XV	170-510
16	XIV	180-520
17	XIII	220-600
18	XII	250-570
19	XI	255-580
20	XI/XII	250-610
21	X	315-700
22	IX & IX/X	320-720
23	VIII C	325-730
24	VIII B	330-740
25	VIII A	340-760
26	VIII	360-790
27	V/VI/VII	400-825
28	IV TOP	410-720
29	IV BOT	440-750
30	III	460-760
31	II	465-680
32	I, I+II, I+II+III	470-790

2.5.6 IMMEDIATE ROOF AND FLOOR OF COAL SEAM(S)

Immediate Roof & floor of Coal Seams:

The nature of rocks of immediate roof and floor of different seams are as follows:

Table: 2.9

Seam	Roof Rock	Floor Rock
L-12	The roof of the seam is generally Shale except in some places where carbonaceous shale and sandstone forms the roof.	The floor of the seam is generally Shale except in some places where carbonaceous shale and sandstone forms the roof.
XVIII-D	The roof of the seam is generally Shale.	The floor is made up either shale, sandstone or intercalation of Shale and sandstone.
XVIII-C	The roof of the seam consists of shale or carbonaceous shale in the central part whereas in eastern part sandstone forms the roof. In the region of KH-7 and KH-11 Carbonaceous shale and fine grained sandstone forms the roof.	The floor of the seam consists of shale or carbonaceous shale in the central part whereas in eastern part sandstone or intercalations of shale and sandstone forms the floor. In the region of KH-7 and KH-11 Carbonaceous shale and fine grained sandstone forms the floor.
XVIII-B	The roof of seam usually consists of shale or carbonaceous shale.	floor of the seam is shale or carbonaceous shale except in some patches where intercalations of shale and sandstone forms the
XVIII-A	The roof of the seam is generally shale, carbonaceous shale or sandstone.	floor of the seam is generally consists of shale.
XVIII	The roof of the seam is generally shale or Carbonaceous shale	The floor of the seam is represented by sandstone, Shale or intercalation of shale and sandstone.
L-10	The roof of the seam consists of Shale or Carbonaceous shale, sandstone or intercalation of shale and sandstone.	Floor of the seam consists of Shale or carbonaceous shale, sandstone or intercalation of shale and sandstone.

Seam	Roof Rock	Floor Rock
XVI	Roof of the seam consists of either shale or intercalation of shale and sandstone in major part except near area around boreholes KH-1 where it is of carbonaceous shale.	Floor of the seam consists of either shale or intercalation of shale and sandstone in major part except near area around boreholes KH-1 where it is of carbonaceous shale.
L-6	Roof of the seam is generally composed of either shale and carbonaceous shale and at places sandstone or intercalations of shale and sandstone.	Floor of the seam is generally consists of usually shale and carbonaceous shale and at places sandstone or intercalations of shale and sandstone.
L-5	Roof of the seam is composed of either Shale or sandstone.	The floor is composed of either Shale sandstone or intercalation of shale and sandstone.
XVI-E	Roof of the seam consists of either shale or arenaceous shale in north-eastern part whereas in rest of the area it is of either of sandstone, shale or intercalations of shale and sandstone.	Floor of the seam consists of either shale or arenaceous shale in north-eastern part whereas in rest of the area it is of either of shale or intercalations of shale and sandstone.
XVIB	Roof of the seam is made up of carbonaceous shale and shale	The floor is generally composed of shale.
XVIA	Roof of the seam is made up of shale and sandstone	Floor is composed of either shale, sandstone or intercalations of shale and sandstone.
XVI	Roof of the seam is generally made up of shale or carbonaceous shale.	Floor of the seam is generally made up of shale or carbonaceous shale.
XV	Roof is generally consist of shale or carbonaceous shale except in few patches where these are made up of sandstone.	Floor is generally consist of shale or carbonaceous shale except in few patches where these are made up of sandstone
XIII	Roof of the seam is composed of either Shale or sandstone.	Floor of the seam is composed of either Shale sandstone.
XII	Roof of the seam is generally made up of shale or carbonaceous shale.	Floor of the seam is generally made up of shale or carbonaceous shale except in the region where the floor is sandstone.
XI/XII	Roof of the seam is generally composed of shale or carbonaceous shale with sandstone in some places.	Floor of the seam is generally composed of sandstone and at places shale.
XI	Roof of the seam is generally composed	Floor of the seam is generally composed of

Seam	Roof Rock	Floor Rock
	of shale or carbonaceous shale with sandstone in some places.	sandstone and at places shale.
X	The roof of seam X is characterized by carbonaceous shale except in some places it is shale	Floor of the seam is sandstone or intercalation of shale and sandstone.
IX/X	Roof of the seam are generally composed of either by carbonaceous shale or shale however in some places the roof is sandstone.	Floor of the seam are generally composed of either by carbonaceous shale or shale.
IX	Roof of the seam are generally composed of either by carbonaceous shale or shale however in some places the roof is sandstone.	Floor of the seam are generally composed of either by carbonaceous shale or shale.
VIII-C	The roof of the seam is generally Shale followed by carbonaceous shale, sandstone or intercalations of shale and sandstone.	Floor of the seam is either by sandstone, Shale, carbonaceous shale/intercalation of shale and sandstone.
VIII-B	The roof of the seam is generally Shale or carbonaceous shale except at places sandstone or intercalations of shale and sandstone.	Floor of the seam is composed of either by sandstone, Shale or carbonaceous shale.
VIII-A	The roof of the seam is mostly Shale or carbonaceous shale but in patches it is represented by sandstone also.	Floor of the seam is generally shale.
VIII	The roof of the seam is sandstone except in northern part where it is shale	Floor of the seam is composed of either by Shale or carbonaceous shale.
V/VI/VII	The roof of the seam is characterised either by Shale or carbonaceous shale with sandstone in some patches	Floor of the seam is generally shale or arenaceous shale except in some areas where it is carbonaceous shale

Seam	Roof Rock	Floor Rock
IV TOP	The roof of the seam is characterised either by shale, medium grained sandstone, carbonaceous.	The floor of the seam is generally shale or carbonaceous shale, sandy shale, shaly sandstone, fine grained sandstone.
IV BOT	The roof of the seam is characterised by shale, medium to coarse grained sandstone, carbonaceous.	The floor of the seam is generally shale, carbonaceous shale, sandy shale, shaly sandstone, fine to medium grained sandstone.
III	The roof of the seam is characterised by shale, medium to coarse grained sandstone, carbonaceous.	The floor of the seam is generally shale, carbonaceous shale, very coarse to medium grained sandstone.
II	The roof of the seam is fine, medium and coarse-grained sandstone, shaly sandstone.	The floor of the seam is generally shale, sandy shale, shaly sandstone, fine grained sandstone.
I, I/II & I/II/III	The roof of the seam is shale, medium grained sandstone, shaly sandstone, sandy shale, carbonaceous shale	The floor of the seam is generally shale, carbonaceous shale, sandy shale, fine, medium and coarse-grained sandstone.

2.5.7 PHYSICO-MECHANICAL PROPERTIES

Cores of borehole no. DB-27 have been studied for physic-mechanical properties within the leasehold area of Kharkharee colliery, by Bihar college of Engineering, Patna. The results of the test are available.

2.5.8 GASSINESS STATUS

All the worked /developed seams under the Kharkharee UG Mine are categorised as Degree-I gassy seams.

“Gassy seam of first degree“means a coal seam or part thereof lying within the precincts of a mine not being an opencast working whether or not inflammable gas is actually detected in the general body of air at any place in the workings below ground or when the percentage of inflammable gas if and when detected in

such general body of air does not exceed 0.1 and the rate of emission of such does not exceeds one cubic metre per tonne of coal produced.

2.5.9 Incubation period of coal seam(s)

The incubation period of the seams is not actually known but it is generally accepted to be 9 to 12 months in case of Jharia coalfield. There is no history of spontaneous heating/ mine fire at Kharkharee Mine.

2.6 RESERVES OF COAL

2.6.1 IN-SITU COAL QUALITY

The quality of coal seams in this Geological Note is primarily based on GR listed in 2.1 (A)

In case of coking coal, Iso-ash lines have been drawn, while in non-coking coal area, Iso-GCV lines have been drawn.

Only the in-band thickness has been considered in coal area for reserve estimation.

Baked coal/Jhama, irrespective of their thickness has been excluded from the seam thickness.

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

Due to unavailability of Gross Calorific Values (GCV) that have been determined in the laboratory, it has been calculated by the following formula (Majumder's formula for low moisture coal).

$$GCV = \frac{165F+136(VM-0.1A)-108M}{1.8} \dots\dots\dots (i)$$

Where:

F = Fixed carbon %, VM = Volatile Matter %

A = Ash %, M = Moisture %

In case of seams, which are pyrolitised in part of the area, the "Full Jhama", "Part coal-part Jhama" areas have been delineated seam wise tentatively.

2.6.2 RESERVES ESTIMATION CRITERIA

- a) The seam wise status of developed, depillared and quarried out areas in addition to virgin patches have 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 under consideration, if worked.
- b) Goaf & Quarries: These areas have been considered as devoid of coal reserves.
- c) Developed Areas: In developed areas, where reserves are standing on pillars & stooks, seam wise dimension of extraction have been decided on the basis of seam working plan made available by Area/Colliery authorities and after detailed discussion with them. The percentage of extraction has been taken as 30 % in standing on pillar and 70 % in stooks.

In case of part coal/part Jhama zone which is a demarcated zone, reserves in this zone may change, if additional data is generated.

The Reserves of Jhama in pyrolitisation zone have not been assessed separately.

The Gross Geological Reserves of coal have been calculated as follows:

Gross Geological Reserves = Area (Sq.Km) x Thickness (m) x Sp.Gr. (in million tonnes)

The specific gravity of coal has been arrived at by adding 1% of average ash% to 1.28.

2.6.3 GEOLOGICAL RESOURCE

Total of 415.46 million tonne of net geological resource of coal has been estimated from seam L-12 to I, I+II, I+II+III in Kharkharee Colliery. The details of which is furnished in the following Table. Seams below of seam V/VI/VII are partly fall in indicated category.

Table 2.10

KHARKHAREE COLLIERY NET GEOLOGICAL RESOURCE (IN MILLION TONNE)						
S/N	Seam	Coking	Non-coking	Coal in coal + Jhama zone	Indicated	Total
1	L-12	2.00				2.00
2	XVIIIID	2.74				2.74

3	XVIII C	2.64				2.64
4	XVIII B	0.96				0.96
5	XVIII A	3.10		0.80		3.90
6	XVIII	2.76				2.76
7	L-10	4.17				4.17
8	XVII	5.47		0.11		5.58
9	L-6	4.01				4.01
10	L-5	4.92		0.11		5.03
11	XVII E	5.20		0.28		5.48
12	XVII B	0.51		0.16		0.67
13	XVII A	2.58		0.13		2.71
14	XVI	15.72				15.72
15	XV	23.55				23.55
16	XIV	4.86		0.01		4.87
17	XIII	14.43	2.13	6.21		22.77
18	XII	3.80	0.88			4.68
19	XI	2.37	4.71	0.01		7.09
20	XI/XII	12.87	6.12	0.06		19.05
22	X	9.21	7.48			16.69
23	IX	19.70	9.13			28.83
24	IX/X	1.32				1.32
25	VIII C	1.43	14.08			15.51
26	VIII B	2.85	26.94			29.79
27	VIII A	8.52	10.26	0.31		19.09
28	VIII	1.03	7.58			8.61
29	V/VI/VII	19.11	116.83			135.94
30	IV TOP		1.55		0.52	2.07
31	IV BOT		0.51		0.09	0.60
32	III		0.52			0.52
33	II		2.19			2.19
34	I,I+II, I+II+III		9.06		4.84	13.90
	Total	181.84	219.98	8.19	5.44	415.46

2.6. EXTRACTABLE RESERVE (TENTATIVE)

The extractable reserve will depend on the method of work, technology adopted for extraction of seams, height of extraction. As the technology and extraction parameters are not yet decided, it is difficult to ascertain the mineable/extractable reserve of the seams.

Table- 2.11

Seam	Average Thickness	Grade	Total Reserve (Geological)	Tentative minimum Extractable Reserve (MT)	Remarks
L12	1.5	W IV	0.7	Exhausted	Seam worked out and filled with water.
XVIII TOP	1.15	Inferior	0.62		
XVIII BOT	1.37	W IV	0.75		
XVII TOP	2.43	W IV	1.396		
XVII BOT	1.22	W IV	0.65		
XVI TOP	2.01	W IV	1.53		
XVI BOT	1.5	W IV	0.988		
XV TOP	1.13	W IV	6.6		
XV BOT	1.2	WIV	4.6		
XIV	4.16	W II	4.276	1.71	Development work in progress.
XIII	2.74	WIII to SII	21.22	8.49	Virgin
XII	1.2	WI	3.5	0.00	Thin seam not considered for working
XI	1.2	WI	2.52	0.00	
XI/XII	5	WIV/G8	19	7.60	Virgin
X	2.01	WIV	6.5	2.60	
IX	2.74	W IV	6.4	2.56	
VIIIB	1.98	WIV	4.62	1.85	
VIIIA	3.3	W IV	7.2	2.88	
Combined (V/VI/VII)	22	W IV	50.1	12.02	Virgin to be worked in three sections, parting between each is 3m.
IV	1.04	D	2.41	0.00	Thin seam not considered for working
III	4.8	D	11.1	4.44	Virgin
I	2.1	W IV	5.8	2.32	Virgin
TOTAL			162.48	46.47	

Based on Area/ Colliery Geological Reserve Data

2.7 Water regime

2.7.1 Hydrology [Brief description of the hydrology of the area]

2.7.2 Hydro-geology [Brief description of the hydro-geology of the.]

No Hydrology and Hydro-geological assessment has been mentioned in the Geological Report for Kharkharee Block.

3.0 PRESENT MINING STATUS

3.1 MINE ENTRIES

In past upper seams (Colliery nomenclature L-12, XVIIIIT, XVIIIIB, XVIIT and XVIIB seams) have been worked by underground method through inseam inclines driven along the incrops of respective seams. At present these inclines are not in use and the incline mouths have been filled/ sealed off.

At present, two number of pits namely No. 1 Pit and No. 2 Pit are in use and production is obtained through these pits.

The details of pit parameters are given in Table-3.1.

Table-3.1

Details Pit Parameters

Name	From	To	Landing at	Dimension	Purpose
No.-1 Pit	Surface	XIII (Colliery nomenclature)	XIV (Colliery nomenclature)	Depth- 308.39m Dia- 6.1m	Works as production pit and Intake. Fitted with 315 KW electric winder with tandem cages. The hoisting capacity of the winder is 500 TPD.
No.-2 Pit	Surface	XIV (Colliery nomenclature)	XIV (Colliery nomenclature)	Depth- 273.03m Dia- 5.03m	Works for man/material winding and as ventilation return. Fitted with 55KW electric winder with single cage. An exhaust fan (PV-200) is installed in fan drift connected to this pit.

3.2 MINING METHOD

In past (Before Nationalization), Upper seams (Colliery nomenclature L-12, XVIII, XVIIIIB, XVIIT and XVIIB seams) have been extensively worked by Bord & Pillar (B&P) Method of Mining through a series of inclines driven along the incrop of the respective seams. The seams have either been goaved out or standing on pillars/small stooks at places. The workings are fully waterlogged and abandoned prior to nationalisation. The incline mouths are at present filled/sealed off and there is no possibility of entering these workings through these inclines due to poor condition and uncertainty of these abandoned workings.

At present, XIV seam (Geological XV seam) is being worked by underground method and Bord & Pillar development (by SDLs) is going on in this seam. The seam thickness is about 4.16m and development is being done along the roof of the seam. The pillar size varies from 45mX45m (Centre to centre) upto 11TH Level to 48mX48m(Centre to centre) below 11TH level. The development gallery is 4.8m wide and 3.0m high. The immediate roof (upto 2m) is fine grained sand stone. The RMR value of the roof rock is 76.6.

The seam-wise, grade-wise, outlet-wise, method-wise production of the mine is given in Table 3.2.

TABLE-3.2

Seam-wise, grade-wise, Method-wise, Outlet-wise Production

Seam	Grade	Production Outlet	Method of Work	Technology	Production (TPD)
XIV (Geo- XV)	W-II	No.1 Pit	B&P (Dev)	SDL (4 Nos.)	200
		Total			200

Support System: The immediate roof of XIV seam (upto 2m) is fine grained sand stone. The roof rock condition is good (RMR- 76.6). Roof bolts with cement capsules are generally used as method of support in the developed workings. The spacing between the two bolts in a row is 1.3m and between the two rows the spacing is 1.4m. The spacing from the gallery edge to the first bolt is 1.1m.

3.3 STATUS OF MINING (SEAM WISE)

The status of workings of different seams of Kharkharee Mine is given in Table-3.3.

Table-3.3

STATUS OF WORKING OF DIFFERENT SEAMS

Seam	Av. Thick. (m)	Status of working
L-12 (Geological- L-12)	1.5	The seam has been worked in small area on the eastern part of the property through a pair of inclines. In remaining part the seam is virgin due to thinness. The developed workings are fully waterlogged (17.3 million gallons) and incline mouths sealed off.
XVIIT (Geological- XVIID)	1.2	The seam has been extensively worked in central part of the property through series of inclines driven from incrop region. In remaining part the seam is virgin due to thinness. The workings are mostly depillared with caving and partly standing on pillars/stooks. The abandoned workings are fully waterlogged (3.9 million gallons) and incline mouths sealed off.
XVIIB (Geological- XVIIC)	1.2	The seam has been extensively worked in western and central part of the property through series of inclines driven from incrop region. In remaining part the seam is virgin due to thinness. The workings are mostly depillared with caving, partly by split and stow below the surface constraint and partly standing on pillars/stooks. The abandoned workings are fully waterlogged (87.2 million gallons) and incline mouths sealed off.
XVIIT (Geological- XVIIA)	1.35	The seam has been extensively worked on the rise side of the property through series of inclines driven from incrop region. In remaining part i.e on the dip side, the seam is virgin. The workings are mostly depillared with caving, partly by split and stow below the surface constraint and partly standing on pillars/stooks. The abandoned workings are fully waterlogged (143 million gallons) and incline mouths sealed off.
XVIIB (Geological- XVIIB)	1.20	The seam has been extensively worked on the rise side of the property through series of inclines driven from incrop region. In remaining part i.e on the dip side, the seam is virgin. The workings are mostly depillared with caving, partly by split and stow below the surface constraint and partly standing on pillars/stooks. The abandoned workings are fully waterlogged (96 million gallons) and incline mouths sealed off.
XVIT (Geological- L-10)	1.6-2.4	The seam has been approached by No.1 & No.2 Pit and has been developed in small patch on the rise side of the property. In remaining part i.e on the dip side, the seam is virgin. The development of the seam discontinued due to poor roof condition and thinning of the seam. The developed workings are waterlogged (19 million gallons) on the dip side.
XVIB (Geological- XVII)	2.5	The seam has been approached by No.1 & No.2 Pit and has been worked on the eastern/rise side of the property. The

Seam	Av. Thick. (m)	Status of working
		developed workings are partly depillared with caving and mostly standing on pillars. In remaining part of the property, the seam is virgin. The developed workings are waterlogged (49 million gallons) on the dip side.
XVA (Geological- XVID)	1.5	Virgin (Jhama)
XVB (Geological- XVIC)	1.8	Virgin (Jhama)
XIV (Geological- XV)	4.16	At present, Bord&Pillar Development is going on through No.1 & No.2 Pit by 4 Nos of SDLs. Development has been done in small area and in major part of the property, the seam is virgin.
XIII and lower seams are virgin.		

The production and productivity of the Mine during the last five years is given in Table-3.4.

Table-3.4

Production and Productivity during last five years

Year	Production (Te.)	OMS (Te.)
2007-08	57745	0.47
2008-09	58010	0.37
2009-10	54271	0.37
2010-11	49330	0.38
2011-12	63200	0.41
2012-13	54706	0.42
2013-14	58420	
2013-14 (Upto April 14)	2750	

3.4 TRANSPORT SYSTEM:

Vertical Transport:

At present, Bord & Pillar Development is going on in XIV seam (Geological XV seam) by SDLs through No. 1&2 Pits. No. 1 Pit acts as production outlet and No.2 Pit acts for man and material winding mining. The details of winding installation are given in Table-3.5.

Table-3.5

Details of winding installations

Sl. No.	Particulars	Pit No.-1	Pit No.-2
1.	Depth (M)	287	273
2.	Shaft Dia. (M)	6.1	5.03
3.	Purpose	i) Production shaft ii)Downcast shaft	i) Man winding shaft ii)Upcast shaft
4.	Name of Manufacturer	Bharat West Folia,Germany	Metro Polita Vikers Ltd.
5.	Power of prime mover	Electric	Electric
6.	Power	315 KW	55 KW
7.	No. of Break Path (no.)	2	2
8.	Dia. of Winding rope(mm)	25, FLC	25, FLC
9.	Length of Winding rope(M)	450	400
10.	Initial factor of safety	13	13
11.	Automatic contrivance	provided	provided
12.	Depth indicator	provided	provided
13.	Automatic speed recorder	Not in function	Not in function
14.	No. & type of drum	Double	Single
15.	Pulley dia. (mm)	2900	2500
16.	Drum dia. (mm)	3210	2435

Underground Transport:

Blasted off coal at face is loaded onto the coal tubs by SDLs. The train of loaded coal tubs at face are hauled by tigger haulage and the same is fed to the Endless Haulage installed at 12L East. This endless haulage feeds loaded coal tubs to a Direct haulage installed in main dip. The Direct Haulage hauls up the loaded coal tubs and feeds them to cage along the shaft level at No.1 Pit. A 315 KW winder installed at No.1 Pit hauls up the loaded coal tubs upto the surface.

The details of haulages are given in Table-3.6.

Table-3.6

Details of haulages below ground

Sl No	Type of haulage	Location	Power (KW)	Approx. haul length (m)	Tentative Gradient	Status
1	Direct haulage	Main Dip	110	1000	1 in 5	Running
2	Endless haulage	12 Level (East)	37	1500	Level	Running
3	Tigger haulage	13 Dip (East)	37	100	1 in 5	Running

The layout of the existing transport system is shown in Drg. No. RI-2/E&M/300110 (Plate No.-LX).

Surface Transport:

At surface, the loaded coal tub is manually brought out of the cage and it is tipped onto the one of steel hopper (14 Te capacity) through gravity tippler, installed near pit top. The tipping trucks receive coal from the hopper, transport and stack it on the coal dump located near the pits. From the coal dump, coal is sold through e-auction and local sale to the consumers. Some part of the coal production is linked to the BCCL coal washeries (Moonidih, Mohuda & Dudda).

The existing surface handling of coal is shown in Drg. No. RI-2/E&M/200112 (Plate No.-LXI)

3.5 PUMPING

At present, Main Sump is located in XIV Seam near 2ND Level/1Dip West. Three number of main pumps are installed in the main sump. Out of the three main pumps, 2 pumps deliver water at surface and the third pump delivers water at XVI Bot seam main sumps located on the dip side of the pit. One main pump is also installed in XVI Bot seam that delivers water at surface.

The details of pumping are given in Table-3.7.

Table-3.7
Details of pumping

Sl. No.	Pump Specification			Type	Location	Delivery to
	KW	Head(m)	GPM			
XIV Seam (Mine nomenclature)						
1	315	350	800	Main	2L/1D (West)	Surface through Boreholes
2	315	350	800	Main		Main Sump (XVI Bot. Seam)
3	110	180	500	Main		
4	75	100	500	Auxiliary	9L/3Dip	Main Sump 2L/3D (West)
5	75	100	500	Auxiliary	12L/1Dip	Main Sump 2L/3D (West)
6	45	60	400	Auxiliary	16L/1Dip	Aux. Sump Maidip (12L)
XVI Bot. Seam (Mine nomenclature)						
1	90	160	500	Main	Near Pit Bottom	Surface through Pit

3.6 OTHER INFRASTRUCTURES AVAILABLE:**Cap lamp room:**

A cap lamp room exists in the Mine premises. The details of caplamp room are given in Table-3.8.

Table-3.8
Details of Caplamp room

Sl. No.	Particulars	:	No.
1.	No. of caplamps	:	650
2.	No of caplamps in working order	:	600
3.	No. of racks	:	6
4.	No. of charger	:	6
5.	Distilled water Plant	:	1
6.	No. of Nursery charger	:	1

Store:

For meeting day to day requirement of consumables, a site store is there which is located near the office. The store consists of two shed and an office.

Site workshop:

A small workshop is present in the Mine premises of Kharkharee Mine. The site workshop caters day to day requirement of maintenance of equipments of the mine. The details of workshop equipments are given in Table-3.9.

Table-3.9
Details of workshop equipment

SL. No.	Item	No.
1	Lathe Machine	2 (1 working)
2	Drill Machine	1
3	Grinder Machine	1
4	Welding Machine	2

Coal Tub repairing shed:

For maintenance & repairing of coal tubs (1 Te coal Tub) there is a repairing shed in the Mine premises.

Magazine

At present there is no magazine available in mine. The explosive and detonator requirement of the mine are met from the magazine of New Akashkinaree Mine of Govindpur Area.

Water Filter Plant

A water filter plant exists in the mine which is located near the coal dump yard.

Generator

One generator (300KVA, 400V, 3-Phase, Kirloskar make) is installed near 2 Pit for lifting of workmen working below ground in emergency arising out of power failure.

Air Compressor

Two number of compressors are being used below ground for feeding compressed air to the pneumatic roof bolting machine. The details of the compressor are as below:

Sl No	Compressor details	Type	Make	Motor Details	
				Power (KW)	RPM
1	Compressor No- 1	BT- 4	Atlas Copco	37	1465
2	Compressor No- 2	BT- 4	Allied Mining	30	1465

3.7 Mine Ventilation System:

Out of two Pits, No 1 Pit is used as Main Intake airway and No.2 Pit is used as Main Return for the mine. An exhaust fan (PV-200) is installed in the fan drift located near No. 2 Pit.

Intake air enters to the mine through No. 1 Pit and split into XVI Bot. and XIV seams at respective shaft insets. In XVI Bot. seam, the intake air ventilates the pumping area and takes return route to No 2 Pit. In XIV seam, the intake air ventilates the production district and takes return route to No 2 Pit. Thus the return air from both the seams comes out from the mine through No. 2 Pit.

The Fan Specifications are as Follows:

Particulars	
Type	: Exhaust (Axial Flow)

Model	:	PV-200
Capacity	:	5500m ³ /min
Fan Dia.	:	2.00 m
No. of blades	:	8
Power	:	160 KW/550V
RPM	:	1485
Water Gauge	:	25 mm

In addition to the above, 4 Nos. of auxiliary fans (each of 15KW, Q-6.2m³/s, 2.6mm WG) are also available.

3.8 POWER SUPPLY AND DISTRIBUTION

3.8.1 Source of Power supply

Kharkharee Mine receives power at 11 kV through No 14 feeder and No 16 feeder of Wolf conductor from Madhuband D.G. Sub-station of BCCL situated around 4 Km away.

Kharkharee sub-station has also been built up in the project exclusively for the Kharkharee Mine to cater both the surface and underground loads of the Mine.

The installed transformer capacity of this sub-station is as follows:

- | | | |
|--------------------------|---|--------|
| 1. 2.5 MVA, 11/3.3 kV | - | 1No. |
| 2. 1 MVA, 11/3.3 kV | - | 1 No. |
| 3. 500 KVA, 11 kV/ 550 V | - | 2 Nos. |
| 4. 630 KVA, 11 kV/440V | - | 1 No. |
| 5. 500 KVA, 11KV/440V | - | 1 No. |

A Schematic single line electrical layout of existing loads of this Mine is enclosed in drawing Plate No.-LXII.

3.8.2 Existing Surface and Underground Power Consumers :

The transformer-wise distribution of surface and underground loads are as below:

A) 1 MVA, 11/3.3kV Transformer & 2.5 MVA,11KV/500/440V Transformer :

This transformers feed power to the surface 1 Pit winder of 315 kW and also feeds to underground H.T pumps and Two nos. of 315 kVA, 3.3/0.55 kV FLP Tran switch units to feed the power at 550V to the underground loads of SDL,

Drill machines, Aux. fan, Haulages of working districts in XIV seam through two nos 120Sq mm PVC copper cable.

B) 1 no. 500 kVA, 11/0.55 kV Transformer :

This feeds power to the underground loads of LT pumps and Haulages directly at 550V through 120Sq mm PVC copper cable.

C) 1 no. 500 kVA, 11/0.55 kV Transformer:

This transformer feeds power to surface Winder of 2 Pit, Ventilation fan of 160 kW, Cap lamp charger and surface pumps.

D) 1 no. 630 kVA, 11/0.44 kV Transformer:

This transformer feeds power to surface lighting and colony lighting.

Apart from the above transformers, there are one number of generator and two numbers of air compressors available at mine to cater the requirement of roof bolters. The details of the same are as below:

Generator : One generator is installed at 2 pit Top to feed the power to man winder(2 pit) for lifting of workers from underground to surface on emergency (i.e. during failure of power supply).

Specification - 300KVA, 400V, 3 phase, make- kirloskar

Air-compressor: 2 Nos. of air compressors are being used in underground for pneumatic roof bolting machine.

Specification - Make- Altas copo, BT-4, KW/HP- 40/50
Its motor- KW/HP-40/50, RPM-1465, A-41.

3.8.3 Power factor correction :

The average power factor of this sub-station may be assumed at 0.90.

3.8.4 Earthing:

Solidly earthed neutral system is being used for different voltages in this Mine.

3.8.5 Illumination :

On the surface HPSV lamps, Fluorescent lamps, ordinary incandescent lamps are being used for lighting open area, pit top area, coal dump area, office building, workshop etc.

In the underground FLP light fittings are being used at pit bottom, transfer points, pump house and other strategic points. 5 kVA 550 / 110 volts FLP lighting transformers are being used in the underground for feeding power to the FLP light fittings.

3.8.6 Telecommunication :

Underground communication is being done through sound powered telephones and surface communication is done through P&T and RAX phones.

3.12 COAL HANDLING PLANT:

At surface, gravity tippler with steel bunker is available. The coal tubs filled with coal are hauled from coal face by a series of haulage and finally to surface by winder installed at No. 1 Pit. The coal tubs are then tipped on the bunker through a gravity tippler. The coal from the bunker is then discharged on the tipping truck and transported to nearby coal dumps from where part of the coal is sold to consumer through e-auction and local sale and part of the coal production is linked to the BCCL coal washeries (Moonidih, Mohuda & Dudda).

3.13 CIVIL AMENITIES FOR MINING:

The details of civil amenities available in the Mine are given in Table-3.10.

Table- 3.10

Details of Civil Amenities at Kharkharee UG Mine

Sl. No.	Particulars
2	Office Complex
3	Primary School
4	Park
5	Post Office
6	Water treatment Plant (570KLD)
7	Network of Mine Roads

The details of residential quarters available at Kharkharee UG Mine are given in Table-3.11.

Table-3.11
Details of Company Quarters at Kharkharee UG Mine

Sl. No.	Type of Quarters	Nos.
1	Officers Quarters	5
2	NHS Type	300
3	Hutments	111
	Total	416

Apart from the above quarters, some private villages/basti are also present within the surface limit of the proposed project. The details of the private villages/basti are as below:

Sl. No.	Name of the village/ Basti	Nos. of houses (approx.)
1	Part of Nawagarh village	15
2	Lalabari Village	30
3	Kharkharee Village	500
4	Mahatatand Village	50
5	Babudih Bast	250

3.14 Status of Fire

Presently there is no sign of fire in any seam of the Kharkharee Colliery.