

MINE PROFILE

FOR

HIGHWALL MINING AT

RAJAPUR OCP/SJ Colliery,

BASTACOLLA AREA

(BHARAT COKING COAL LIMITED)

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SCHEME FOR HIGHWALL MINING AT RAJAPUR OCP/SJ Colliery of
BASTACOLLA AREA

SUMMARISED DATA

SL. NO.	PARTICULARS	UNIT	Value
1	Grade of Coal (anticipated)		W-V, W-IV, W-I, G7, G8
2	Quantity of land to be acquired	Ha	Nil
3	No. of Employment against land	No.	Nil
4	Requirement of Manpower	No.	12
5	Life of the mine		7 accounting years or life of the mine proposed by the bidder, whichever is shorter

1.0 Background of the Scheme

Rajapur OCP/ SJ Colliery of BCCL comes under the administrative area of Bastacolla. It is located in the eastern part of Jharia Coalfield in Dhanbad district of Jharkhand. Rajapur OCP/ SJ Colliery is a part of OCP-VIII exploration block.

In ROCP/SJ Colliery of Bastacolla Area, one outsourcing patch is running in which the opencast operation is being carried out through contractual means adopting Shovel-Dumper system of mining. The date of commencement of work was 08.05.2018 and its scheduled date of completion of work is 19.07.2024. After completion of the hired patch, coal outside the limit line of the hired patch will be blocked and it will be difficult to extract the remaining coal outside the limit line of the hired patch by opencast method due to the existence of DB road (Dhanbad-Jharia Road) on North-west side of hired patch, whose diversion is also not possible. Main OB Dump No. 1 also exists over this area having an approx. Dumped loose OB of around 250 LCum and re-handling of the same is not possible due to lack of dumping space. There is also a Chatkari Jore in the North-East and South-East side of the hired patch, which has water throughout the year and drains most of the water of Dhanbad during the rainy season. There are also encroachers in South-east side of the patch named as Rajbhar Basti. Even in the south side of the Hired patch, there exists a large number of illegal encroachers in Kukurtopa Basti and ROCP Colony.

As such, Bastacolla Area has proposed for extraction of coal from IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot), which are virgin in the designated area proposed for Highwall mining as shown in the plan. Adoption of Highwall mining for extraction of the above seams will not involve land, employment, diversion of Jore and rehabilitation issues. Highwall Mining enables safe recovery of coal without damaging surface and surface infrastructures.

Subsequently, a Scheme for Highwall Mining at Rajapur OCP/ SJ Colliery has been prepared. Accordingly, this Draft Scheme has been prepared for extraction of seams namely IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot), which are virgin in the designated area, proposed for Highwall Mining.

2.0 Introduction

Rajapur OCP/ SJ Colliery is located in the eastern part of Jharia Coalfield in Dhanbad district of Jharkhand and is under the administrative control of Bastacolla Area of BCCL. The proposed area for Highwall mining lies all along the quarry of Rajapur OCP. The project area is well connected by rail and road. It is situated at about 6-7 km east from Dhanbad Rly. Station. It can be approached by Dhanbad-Jharia-Sindri road. Dhanbad- Jharia state Highway passes adjacent to the Area office of Bastacolla and N.H.32 Road (Dhanbad to Bokaro) is passing at about 5 km away from the mine.

The proposal envisaged extraction of IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot) seams by Highwall Mining method. Initially I (Bot) seam will be extracted by placing the Highwall miner. Thereafter, backfilling will be done up to the floor level of I (Top) seam for extraction of coal. Subsequently, Highwall miner will be positioned on the backfilled floor level of I (Top) seam for extraction of the seam. Similarly, II (Bot), III (Bot), III (Top), IV (Bot) and IV (Top) will be extracted. At last final backfilling will be done up to the height of 3m from the roof of the uppermost extracted seam by Highwall mining. However, the sequence of operation and method & design for Highwall mining will be decided by the successful bidder based on scientific study with due permission of DGMS.

The Commencement of Highwall mining at Rajapur OCP/SJ Colliery of Bastacolla Area is subject to execution of ongoing outsourcing patch in which the opencast operation is being carried out through contractual means adopting Shovel-Dumper system of mining.

3.0 Justification of the Proposal

Rajapur OCP/ SJ Colliery has been worked in multiple seams. In ROCP/SJ Colliery of Bastacolla Area, one outsourcing patch is running in which the opencast operation is being carried out through contractual means adopting Shovel-Dumper system of mining. The date of commencement of work was 08.05.2018 and its scheduled date of completion of work is 19.07.2024. After completion of the hired patch, coal outside the limit line of the hired patch will be blocked and it will be difficult to extract the remaining coal outside the limit line of the hired patch by opencast method due to Dhanbad-Jharia Road, Main OB Dump No. 1, Chatkari Jore

and illegal encroachers. However, continuity in production after the scheduled date of completion of work (19.07.2024) of the ongoing outsourcing patch can be maintained by the adoption of Highwall mining in the designated area proposed for Highwall mining. But, the Commencement of Highwall mining at Rajapur OCP/SJ Colliery of Bastacolla Area is subject to execution of ongoing outsourcing patch in which the opencast operation is being carried out through contractual means adopting Shovel-Dumper system of mining.

Highwall Mining technology for cutting and loading of coal (without blasting) from highwall of the ongoing outsourcing patch of Rajapur OCP/SJ Colliery has been proposed for optimum recovery of coal with due regard to safety and conservation of coal. Highwall Mining enables safe recovery of coal without damaging surface and surface infrastructures. Considerable amount of W-V, W-IV & W-II grade coal may be extracted by proposed Highwall Mining which will in turn enhance the production schedule of BCCL resulting a considerable amount of profit.

4.0 Geology of Rajapur OCP/SJ Colliery

4.1 General

- i. Seam IX/X depth range varies from incrop to 75m and its thickness varies from 11.4 to 15.25m. The seam has been worked in most part of the Rajapur mine by both UG (pre-nationalization) and opencast method. The workings developed on B&P method, have been mostly exhausted by caving and small area SOP (standing on pillars)/on stooks due to low cover and hence not proposed for Highwall mining.
- ii. Seam VIII C underlies seam IX/X with a parting varying from 2.0 to 11.00 m and its thickness varies from 0.16 to 1.03. The seam has been worked in most part of the Rajapur mine by opencast method and hence not proposed for Highwall mining. Fire is reported in the seam on the south west side of the mine
- iii. Seam VIII B underlies seam VIII C at a parting varying from 4.0 to 9.0 m and its thickness varies from 0.52 to 2.45m. The seam has been worked in most part of the Rajapur mine by both UG (pre-nationalization) and opencast method in northern part of the mine area. The workings developed on B&P method, have been mostly exhausted by caving and small area SOP (standing on pillars)/on stooks and hence not proposed for Highwall mining. Fire is reported in the seam on the south west side of the mine.

- iv. Seam VIII A occurs below VIII B seam at a parting of 1 to 21 m and its thickness varies from 0.2 to 4.2m. The seam has been worked in most part of the Rajapur mine by both UG (pre-nationalization) and opencast method. The workings developed on B&P method, have been mostly exhausted by caving and small area SOP (standing on pillars)/on stooks and hence not proposed for Highwall mining. Fire is reported in the seam on the south west side of the mine
- v. Seam V/VI/VII/VIII underlies seam VIII A with a parting varying from 2 to 6 m and its thickness varies from 12.1 to 18.4m. The seam partly incrops in the area. The seam has been worked in most part of the Rajapur mine by both UG (pre-nationalization) and opencast method. The workings developed on B&P method, have been mostly exhausted by caving and small area SOP/on stooks and hence not proposed for Highwall mining. Fire is reported in the seam on the south west side of the mine.
- vi. Seam IV Top underlies combined seam (V/VI/VII/VIII) with a parting varying from 24m to 40m and its thickness varies from 0.12 to 3.59m. This seam is virgin and hence proposed for Highwall mining.
- vii. Seam IV Bottom underlies IV Top seam with a parting varying from 17m to 32m and its thickness varies from 0.2 to 2.42m. This seam is virgin and hence proposed for Highwall mining
- viii. Seam III Top underlies IV Bottom seam with a parting varying from 6m to 13m and its thickness varies from 2.51 to 6.99m. This seam is developed by underground method (pre-nationalization) in small patch in the northern part of the mine area. However, the seam is virgin in the area proposed for Highwall mining.
- ix. Seam III Bottom underlies III Top seam with a parting varying from 9m to 18m and its thickness varies from 5.97 to 9.65m. This seam is developed by underground method (pre-nationalization) in small patch in the northern part of the mine area. However, the seam is virgin in the area proposed for Highwall mining
- x. Seam II Bottom underlies III Bottom seam with a parting varying from 16m to 25m and its thickness varies from 1.65 to 7.15m. This seam is virgin and hence proposed for Highwall mining.
- xi. Seam I Top underlies II Bottom seam with a parting varying from 17m to 25m and its thickness varies from 1.25 to 4.46m. This seam is virgin and hence proposed for Highwall mining.

- xii. Seam I Bottom underlies I Top seam with a parting varying from 1m to 4m and its thickness varies from 1.24 to 3.04m. This seam is virgin and hence proposed for Highwall mining.

4.2 Dip and Strike

The general strike of the formation is NNW-SSE and the dip of the strata generally varies from 5° to 10° towards SW. However, the average gradient of seam within the proposed zone of highwall mining is 1 in 10.

4.3 Faults

The proposed zone of work is not free from faults. There are fault F2 & F3 passing through the designated area proposed for Highwall mining. However, the faults have not been encountered till now while mining.

4.4 Roof & Floor Characteristics

Seam	Roof condition	Floor Condition
IV TOP	carbonaceous shale with sandstone	sandy shale or carbonaceous shale
IV BOT.	sandstone with carbonaceous shale	sandy shale or carbonaceous shale
III TOP	sandstone or carbonaceous shale	shale or sandstone
III BOT.	sandstone with carbonaceous shale	sandy shale or carbonaceous shale
II BOT.	medium & coarse grained sandstone with carbonaceous shale	medium & coarse grained sandstone with carbonaceous shale
I TOP	carbonaceous shale or shale	sandy shale & medium grained sandstone
I BOT.	carbonaceous shale with sandy shale	sandy shale & shaly sandstone

4.5 Degree of Gassiness

Degree of gassiness of the coal seams have to be determined.

5.0 Coal Quality

Sl. No	Seam	Grade
1	IV TOP	W-V (approved grade for 22-23)
2	IV BOT.	W-V (approved grade for 22-23)
3	III TOP	W-IV (approved grade for 22-23)
4	III BOT.	W-IV (approved grade for 22-23)
5	II BOT.	G8(geological grade)
6	I TOP	W-I(geological grade)
7	I BOT.	G7(geological grade)

However, the actual grade declaration of the seam will be undertaken as soon as the coal seam is extracted.

6.0 Information on the designated area

At Rajapur OCP/SJ Colliery, all the proposed seams namely IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot) are virgin in the designated area proposed for Highwall mining. The designated area for Highwall mining lies along the periphery of ongoing outsourcing patch.

Demarcating limits for the area proposed for Highwall Mining is defined as follows:-

North : OB Dump No-1 & bastacolla Colliery

South : East Bhagadih Colliery & Jharia Town

East : Bera & Dohari Colliery, Chatkari Jore & Coal dump

West : Jharia water Board, D.B Road & East Bhugatdih Colliery

7.0 Mining

7.1 Sequence of coal seam within the proposed zone of work

Sequence of coal seams, thickness of seams and thickness of partings between seams exposed within the proposed zone of work has been given in the following table: -

Seam/ Parting	Avg.Thickness (m)	Avg. Depth (m)	Remarks
Parting	100.38		
IV TOP	1.626	100.38	Virgin within proposed area
Parting	22.92		
IV BOT	1.331	124.92	Virgin within proposed area
Parting	12.93		
III TOP	4.776	139.18	Virgin within proposed area
Parting	12.07		
III BOT.	8.159	156.02	Virgin within proposed area
Parting	19.73		
II BOT.	2.321	183.90	Virgin within proposed area
Parting	22.56		
I TOP	2.781	208.78	Virgin within proposed area
Parting	1.77		
I BOT.	1.470	212.02	Virgin within proposed area

7.2 Geological Reserves

Total seven seams namely IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot) are being offered to the mine operator. The successful bidder has to do final designing of web/barrier pillars based on the scientific study subject to the condition that bidder shall adhere to coal production schedule given at the time of bid submission. The method of

extraction using Highwall Mining technology shall be such that there shall be no subsidence on the surface. Since the fault has not been encountered till now while mining, the geological reserve has been calculated including the fault in the designated area for Highwall Mining. It will be responsibility of Mine Operator to extract maximum possible coal reserve out of the total geological reserve as per the current national and international standard.

The details of calculation of Geological reserves are as follow:

South side of the patch(V-W)							
SEAM	WIDTH	AV.WIDTH	LENGTH	THICKNEES	VOLUME	S.G	TONNE
IV (TOP)	$(300+182+300)/3$	260.667	609	1.62	257168.520	1.535	394753.678
IV (BOTT)	$(300+216+300)/3$	272.000	550	1.33	198968.000	1.55	308400.400
III (TOP)	$(300+236+300)/3$	278.667	511	4.77	679241.640	1.512	1027013.360
III (BOTT)	$(300+255+300)/3$	285.000	482	8.15	1119565.500	1.523	1705098.257
II (BOTT)	$(257+279+300)/3$	278.667	400	2.32	258602.667	1.500	387904.000
I (TOP)	$(300+300+300)/3$	300.000	338	2.78	281892.000	1.500	422838.000
I (BOTT)	$(300+300+300)/3$	300.000	320	1.47	141120.000	1.500	211680.000
						TOTAL	4457687.694

Western side of the patch(W-X)							
SEAM	WIDTH	WIDTH	LENGTH	THICKNEES	VOLUME	S.G	TONNE
IV (TOP)	$(253+199+140)/3$	197.333	220	1.62	70329.600	1.535	107955.936
IV (BOTT)	$(282+228+174)/3$	228.000	198	1.33	60041.520	1.55	93064.356
III (TOP)	$(300+249+194)/3$	247.667	218	4.77	257538.660	1.512	389398.454
III (BOTT)	$(300+259+213)/3$	257.333	184	8.15	385897.067	1.523	587721.233
II (BOTT)	$(300+293+251)/3$	281.333	213	2.32	139023.680	1.500	208535.520
I (TOP)	$(272+300+300)/3$	290.667	234	2.78	189084.480	1.500	283626.720
I (BOTT)	$(300+300+300)/3$	300.000	236	1.47	104076.000	1.500	156114.000
						TOTAL	1826416.218

Western side of the patch(Y-P)							
SEAM	WIDTH	WIDTH	LENGTH	THICKNEES	VOLUME	S.G	TONNE
IV (TOP)	$(300+300+300)/3$	300.00	289	1.62	140454.000	1.535	215596.890
IV (BOTT)	$(300+300+300)/3$	300.00	270	1.33	107730.000	1.550	166981.500

III (TOP)	$(300+300+300)/3$	300.00	200	4.77	286200.000	1.512	432734.400
III (BOTT)	$(300+300+300)/3$	300.00	195	8.15	476775.000	1.523	726128.325
II (BOTT)	$(300+300+300)/3$	300.00	152	2.32	105792.000	1.500	158688.000
I (TOP)	$(300+300+300)/3$	300.00	119	2.78	99246.000	1.500	148869.000
I (BOTT)	$(300+300+300)/3$	300.00	108	1.47	47628.000	1.500	71442.000
						TOTAL	1920440.115

North side of the patch(P-Q)							
SEAM	WIDTH	WIDTH	LENGTH	THICKNEES	VOLUME	S.G	TONNE
IV (TOP)	$(211+169+176)/3$	185.333	206	1.62	61849.440	1.535	94938.890
IV (BOTT)	$(231+199+201)/3$	210.333	380	1.33	106302.467	1.550	164768.823
III (TOP)	$(253+222+225)/3$	233.333	352	4.77	391776.000	1.512	592365.312
III (BOTT)	$(270+240+244)/3$	251.333	333	8.15	682106.100	1.523	1038847.590
II (BOTT)	$(288+267+281)/3$	278.667	295	2.32	190719.467	1.500	286079.200
I (TOP)	$(300+291+300)/3$	297.000	276	2.78	227882.160	1.500	341823.240
I (BOTT)	$(300+300+300)/3$	300.000	271	1.47	119511.000	1.500	179266.500
						TOTAL	2698089.556

North side of the patch(Q,R,S-T)							
SEAM	WIDTH	WIDTH	LENGTH	THICKNEES	VOLUME	S.G	TONNE
IV (TOP)	$(78+90+141+85+110)/5$	100.800	666	1.62	108755.136	1.535	166939.134
IV (BOTT)	$(106+100+163+137+128)/5$	126.800	598	1.33	100849.112	1.550	156316.124
III (TOP)	$(128+126+184+187+150)/5$	155.000	544	4.77	402206.400	1.512	608136.077
III (BOTT)	$(146+153+207+180+166)/5$	170.400	503	8.15	698546.280	1.523	1063885.984
II (BOTT)	$(172+184+235+232+189)/5$	202.400	446	2.32	209427.328	1.500	314140.992
I (TOP)	$(201+199+260+208)/4$	217.000	394	2.78	237684.440	1.500	356526.660
I (BOTT)	$(195+211+260+262+206)/5$	226.800	385	1.47	128357.460	1.500	192536.190
						TOTAL	2858481.161

G. TOTAL	13761114.744	Te
	13.761	Mill. Te

Expertise of the bidder and its confidence level will matter a lot for optimizing the coal extraction.

Seam wise Grade and Geological Reserves

Seam	Grade	Geological Reserve(Tonne)
IV (Top)	W-V(approved grade for 22-23)	980184.528
IV (Bot)	W-V(approved grade for 22-23)	889531.203
III (Top)	W-IV(approved grade for 22-23)	3049647.602
III (Bot)	W-IV(approved grade for 22-23)	5121681.389
II (Bot)	G8(geological grade)	1355347.712
I (Top)	W-I(geological grade)	1553683.620
I (Bot)	G7(geological grade)	811038.690
	Total	13761114.744

Grade wise Geological Reserve

Grade	Geological Reserve (Tonne)
W-V	1869715.731
W-IV	8171328.991
W-I	1553683.620
G7	811038.690
G8	1355347.712
Total	13761114.744

8.0 Mine entry, Production Capacity and Life

- 8.1** The proposal envisaged extraction of IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot) seams by Highwall Mining method. Initially I (Bot) seam will be extracted by placing the Highwall miner. Thereafter, backfilling will be done up to the floor level of I (Top) seam for extraction of coal. Subsequently, Highwall miner will be positioned on the backfilled floor level of I (Top) seam for extraction of the seam. Similarly, II (Bot), III (Bot), III (Top), IV (Bot) and IV (Top) will be extracted. At last final backfilling will be done up to the height of 3m from the roof of the uppermost extracted seam by Highwall mining.
- 8.2** However, the sequence of operation and method & design for highwall mining will be decided by the successful bidder based on scientific study with due permission of DGMS.
- 8.3** It shall be the responsibility of bidder to load and transport overburden required for preparation of bench/platform for deployment of highwall machine(s) and subsequent backfilling upto 3 metre above the roof of uppermost seam extracted. Mine operator may use Dump no-01 (as shown in the Surface Plan) for OB (overburden) for benching /backfilling at Highwall site.
- 8.4** Stability of highwall and minimizing the risk of falling loose rock from the highwall shall be ensured. If required, suitable technique may be adopted to secure the highwall and its slope. 15m buffer zone shall be kept maintained along the top of highwall to prevent loose material from sliding into the trench/ working zone.
- 8.5** Gradient of the access roadway has been proposed in 1 in 16 and having width of 20m for better maneuverability of HEMM. The base of the working platform has been proposed to be 40m in width to facilitate movement and operation of Highwall Mining machine, and also for safe movement of other HEMM like wheel loader, dumper etc.
- 8.6** Total life of the project will be 7 Accounting Years or life of the mine proposed by bidder, whichever is shorter, proposed by the bidder. Sealing of highwall holes will be done sequentially to prevent inadvertent entry and spontaneous heating.
- 8.7** Year-wise production schedule shall be submitted by the bidder at the time of submission of bid in the following format:

Accounting Year	Production (in lakh Te)
1st	

2nd	
3rd	
7 accounting years or life of the mine proposed by bidder, whichever is shorter.	
Total production	

9.0 Life of the Project

7 Accounting years or life of the mine proposed by the Bidder, whichever is shorter.

10.0 Mine Development Activities

Some major development activities required to be done by the Mine Operator to work the proposed Highwall Mining are as follows:

- a) Dewatering & de-silting of quarry, if required.
- b) Handling of some loose OB, if required.
- c) Construction of access haul road.
- d) Construction of office shed, rest shelter, first-aid station, etc.
- e) Construction of sub-station and re-organization of power supply.
- f) Construction of garland drain.
- g) Scientific Study for pit slope, monitoring of slope stability and others required studies.
- h) Design for method/manner of extraction by Highwall Mining with due consideration of stability of surface structures.

11.0 Method of Working

11.1 Highwall mining is a hybrid mining between surface and underground mining. Basically, Highwall mining is a method to mine coal by making parallel rectangular unsupported drivages using an unmanned continuous miner being remotely controlled from a base unit

positioned outside the drivage, in front of coal seam at surface.

- 11.2** Considering thickness of seams, both high and medium seam cutter module of Highwall miner has been envisaged with an extent of penetration of 300m.
- 11.3** The Highwall miner cuts coal for the full width of the cutter head and height of the coal seam without the need of roof support. Once the cutter head reaches 300m into the drivages of the highwall, the cutter head and coal transporting system are retracted. The Highwall miner then moved to the next position on the face. A small coal pillar, called web pillar, is left in between two drivages to support the overburden and the process is repeated. After 10 to 20 such drivages a wide pillar called barrier pillar is left. However, the size of Web pillars, Barrier pillars and its location will be designed based on scientific study by successful bidder. The purpose of barrier pillar is to separate adjacent panels so that any ground control problems on one panel do not cascade to adjacent panels.
- 11.4** The proposal envisaged extraction of IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot) seams by Highwall Mining method. Initially I (Bot) seam will be extracted by placing the Highwall miner. Thereafter, backfilling will be done up to the floor level of I (Top) seam for extraction of coal. Subsequently, Highwall miner will be positioned on the backfilled floor level of I (Top) seam for extraction of the seam. Similarly, II (Bot), III (Bot), III (Top), IV (Bot) and IV (Top) will be extracted. At last final backfilling will be done up to the height of 3m from the roof of the uppermost extracted seam by Highwall Mining.
- 11.5** Pumping is an integral part of mining and it is to be done by mine operator. Cost of pumping is included in the mining charge of Highwall Mining. Unprecedented dewatering, if required, may also be outsourced at Mine Operator cost.

12.0 Backfilling/Rehandling of OB during Operation

It will be the responsibility of mine operator to handle OB required for platform preparation for deploying highwall miner and its accessories for extraction of coal. It shall also be responsibility of mine operator to backfill OB up to 3m above the roof of the uppermost extracted seam by Highwall Mining. Mine operator may use Dump no-01 (as shown in the Surface Plan) for OB for benching /backfilling at Highwall site.

13.0 Highwall Mining Machine

As the job is proposed to be done by mine operator with Highwall Mining equipment. The procurement of equipment related to Highwall Mining as well as other equipment for environment, safety, monitoring etc. will be the responsibility of mine operator. Both High and medium seam cutter module has been envisaged for optimum extraction of coal reserves from IV (Top), IV (Bot), III (Top), III (Bot), II (Bot), I (Top) and I (Bot). Method/manner of extraction by Highwall mining shall be designed by the successful bidder.

14.0 Drilling and Blasting (if required)

14.1 Highwall Mining is a blasting free technology, drilling and blasting is not required for extraction of coal. As highwall mining is proposed in the quarry, drilling and blasting will not be required.

14.2 If drilling and blasting will be required for securing the slope of highwall; drilling, blasting and shot-firing would be done under the supervision of Overman to avoid any danger due to blasting.

14.3 Drilling and blasting will be under the scope of mine operator (if required). Explosives, if required, will be supplied on chargeable basis to the mine operator.

15.0 Power Supply

Power supply will be made available by BCCL on chargeable basis at a fixed point on the surface near the highwall site, from where the Bidder will make arrangement of power supply to the requisite place for its use. Alternative source of power supply will be arranged by the Bidder for uninterrupted power supply for operation and other related works.

16.0 Manpower of Authority

Total requirement of manpower for statutory supervision and other job has been estimated as 12. As the area proposed for Highwall Mining is lying within the leasehold area of existing mine working of Rajapur OCP/SJ Colliery. Therefore, provision for the required manpower has been made accordingly. Detail of manpower has been shown below;

Sl. No.	Particulars	Grade	Requirement (Nos)
1	Safety Officer / Manager	E-5/E-6	3
2	Assistant Manager	E-3	3
3	Overman	GRADE - A1	3
4	Mining Sirdar	GRADE - A	3
	Total Manpower		12

17.0 Coal Handling and Delivery

Size of the ROM coal as produced by Highwall Mining will be ensured to (-) 100 mm. Coal will be transported to the Delivery Point i.e. designated Coal Depot.

18.0 Land

The designated area proposed for Highwall mining is within the leasehold boundary of ROCP/SJ Colliery. Land required for making access to the highwall mining area is under the possession of BCCL. Therefore, acquisition of additional land is not required for the purpose. Highwall Mining advocates, safe recovery of coal without damaging surface and surface structures. Moreover, manner of extraction by Highwall Mining will be so designed that there will be no subsidence at surface leading to the danger to the safety of surface structure. The Land over the proposed working have BCCL, Railway and Private Land.

SL NO	Type of Land	Area(Acres)

1	BCCL LAND	124.48
2	RAILWAY LAND	21.0
3	PRIVATE LAND	10.08
	TOTAL	155.56

19.0 Rehabilitation

Design of web pillars and barrier pillars will be made in such a manner that it will not cause any harmful subsidence on the surface leading to the danger to the safety of surface structures. Therefore, rehabilitation has not been proposed.

20.0 Safety Measures

- 1) Scientific study for pit slope, monitoring of slope stability and others required studies have to be undertaken accordingly.
- 2) Scientific study for manner of extraction, design of web pillars, panel barriers, degree of gassiness, surface subsidence and other required studies shall be undertaken, so as to protect the surface features above the highwall drivages. Regular subsidence monitoring as per statutes shall be undertaken by the Mine Operator and report shall be submitted to the Authority.
- 3) To prevent rainwater flowing into working place and highwall drivages, garland drain will be provided around the Highwall area.
- 4) Highwall mining is analogous to underground mining, precautionary measures against methane gas shall be taken. Continuous monitoring of methane gas in the drivages shall be ensured and precaution will be taken accordingly.
- 5) All electrical devices of Highwall mining equipment, required to be in operation inside the underground drivage, shall be either flame proof or intrinsically safe. Uninterrupted power supply with an alternative source of power supply shall be ensured.

- 6) Size of panel shall be so designed that extraction of the coal within the panel could be completed within the incubation period of the seam to prevent spontaneous heating or fire. After extraction of coal of one panel, the entry of the drivages will be sealed off by non-combustible overburden. This will effectively prevent possibility of fire/spontaneous heating.
- 7) All the related precaution prescribed by DGMS should be followed during operation of Highwall mining. Close and constant supervision is very much essential. Benches should be formed in such a fashion that stability of slope of the highwall as well as access roadway should not be in-danger. Slope monitoring should be undertaken regularly.
- 8) Exposed coal faces are to be excavated as early as possible to avoid the risk of fire. After excavation the faces would be blanketed by non-combustible overburden.
- 9) Proper haul roads should be maintained for plying of dumpers.
- 10) Care should be taken to clean garland rain at regular interval, specially, before monsoon season, to prevent inrush of water into the trench/drivages. During mining operation fencing has to be made around the quarry edge to prevent unauthorized entry into mine area.
- 11) Risk assessment exercise shall be carried out in the mine for assessing the risk from the hazards associated with Highwall mining and identifying the control mechanism with specific responsibility for implementation coal producing company should take steps to impart structured training to officials, supervisors and work personnel.
- 12) Controlled blasting technique shall be adopted if required, for securing the highwall and to reduce vibration for the safety of the public works and infrastructures in the neighborhood.
- 13) The supervisory staffs and officers shall be adequately trained for supervision of operations of highwall mining.
- 14) Extraction of coal by highwall mining technology shall be kept under the overall supervision of competent Manager.

- 15) Emergency Plan shall be made for dealing the situation in the event of any abnormality.
- 16) Before adopting Highwall Mining in this mine necessary permission has to be taken from DGMS and conditions as stipulated in the DGMS permission should be strictly followed. All other statutory provisions shall be strictly adhered to.
- 17) The precautions as specified by the Safety Deptt. (ISO) of BCCL should also be strictly adhered to.
- 18) All statutory plans shall be prepared along with Mine Plan execution report and shall be submitted to the Authority.

21.0 Environmental Control Measures

- 1) The mine operator will have to ensure the protection of environment by the necessary environment control measures.
- 2) Proper/sufficient water sprinkling arrangement has to be made on haul roads, coal transport road, dump and other vulnerable places to minimize air-borne dust.
- 3) To restrict the noise pollution within permissible limit – The following precautions will have to be taken:
 - a) I/C engine of HEMM have to be maintained properly and regularly.
- 4) All pumped out water from the mine should be discharged into the settling tank before releasing to natural drainage system to reduce water pollution.

22.0 Environmental Clearance Status

The approved peak capacity of Rajapur/S-Jharia OCP as per EC granted by MoEFCC vide F. No. J-11015/238/2010-IA.II (M) Pt dated 20th August' 2020 is 2.56 MTPA with life of mine-10 years for mining through Open Cast Method. The details of which are given below:

S.No	Name of Mine	Type of Mine	Leasehold Area (in Ha)	Balance Life of Mine (in years)	Peak Production on Capacity	Production Schedule(As per Peak Capacity)				
					(in MTPA)	Year-I	Year-II	Year-III	Year-IV	Year-V
1	Rajapur/S -Jharia OCP	OC	207.48	10	2.56	2.56	2.56	2.30	1.50	1.50

The Consent to operate (CTO) has also been granted based on the EC granted by MoEFCC by Jharkhand State Pollution Control Board (JSPCB) vide CTO Ref. No. JSPCB/HO/RNC/CTO-10836744/2021/1275 dated 12.10.2021 and valid upto 31.03.2023

➤ **List of Plates**

Sl. No.	Plate	Scale
01	Location plan	1:50000
02	Geological plan	1:4000
03	Surface plan	1:4000
04	Seam working plans of V/VI/VII/VIII, IX,X	1:4000,1:3960, 1:3960
05	Seam folio plan of IV (Top) seam	1:4000
06	Seam folio plan of IV(Bot) seam	1:4000
07	Seam folio plan of III (Top) seam	1:4000
08	Seam folio plan of III (Bot) seam	1:4000
09	Seam folio plan of II (Bot) seam	1:4000
10	Seam folio plan of I (Top)seam	1:4000
11	Seam folio plan of I (Bot)seam	1:4000
12	Floor contour plan of IV (Top) seam	1:4000
13	Floor contour plan of IV(Bot) seam	1:4000
14	Floor contour plan of III (Top) seam	1:4000
15	Floor contour plan of III (Bot) seam	1:4000
16	Floor contour plan of II (Bot) seam	1:4000
17	Floor contour plan of I (Top) seam	1:4000
18	Floor contour plan of I (Bot) seam	1:4000
19	Litholog of BH NO BKS 30, BKS 25, BKS 40, BKS 46, BKS 49, BKS 52, BKS 59.	
20	Cross-Section Plan	
21	Notified price of coal	
22	Mouza Plan	