

MINE PROFILE
FOR
HIGHWALL MINING AT
AMALGAMATED BLOCK II OCP,
BLOCK II AREA

(BHARAT COKING COAL LIMITED)

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**SCHEME FOR HIGHWALL MINING AT ABOCP OF
BLOCK II AREA**

SUMMARISED DATA

SL. NO.	PARTICULARS	UNIT	Value
1	Grade of Coal (anticipated)		W-V
2	Proposed area for HW mining	Ha	23
3	Quantity of land to be acquired	Ha	Nil
4	No. of Employment against land	No.	Nil
5	Requirement of Manpower	No.	10
6	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

- 1.1** Amalgamated Block II OCP has been worked in multiple seams. The mine has reached near the boundary limit and within 300m of surrounding villages and other surface infrastructures, as a result a highwall has been formed, so there is no scope of extension of this OC Patch. Due to this reason, BCCL has proposed to extract the blocked coal near/ below the villages and other surface infrastructures within the mine boundary of ABOCP by Highwall Mining. Highwall Mining enables safe recovery of coal without damaging surface and surface infrastructures.
- 1.2** BCCL has proposed Highwall Mining in the designated area. Subsequently, a Scheme for Highwall Mining at ABOCP has been prepared.
- 1.3** Accordingly, this Draft Scheme has been prepared for extraction of seams V/VI/VII, VIII, VIII B which are virgin in the designated area, proposed for Highwall Mining.

2.0 Introduction

- 2.1** Amalgamated Block-II OCP is located in the Block-II Area of BCCL. The Highwall area lies in the south western side of leasehold Area. The project area is well connected by rail and road. It is about 28 Km from Dhanbad Town. Gomoh Railway Station an important station on Howrah-New Delhi Grand Chord line, is about 7 Km from the Block. Jamunia River flows north to south along the western side of the Amalgamated Block-II OCP. Baghmara- Chandrapura road passes through the central part of the block and is connected to NH-32 near Mahuda More, 6 Km from the Block. Seams V/VI/VII, VIII, VIII B have been considered for extraction of coal using highwall mining method in the proposed Area.

2.2 The proposal envisaged extraction of V/VI/VII, VIII, and VIII B seams by Highwall Mining method. Initially Combined Seam V/VI/VII will be extracted from bottom to top by placing the highwall miner and making a cut of 9m. A parting of at least 10m will be left between the upper and bottom section of the seam. Then again 9m cut will be taken. For this, backfilling will be done first in this seam and thereafter coal will be extracted. Thereafter, backfilling will be done upto the floor level of VIII seam for extraction of coal. Subsequently, highwall miner will be positioned on the backfilled floor level of VIII seam for extraction of the seam. Similarly, VIII B seam will be extracted. At last, final backfilling will be done upto the height of 3m from the roof of uppermost extracted seam. However, 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.

3.0 Justification of the Proposal

- 3.1 Amalgamated Block II OCP has been worked in multiple seams. The mine has reached near the boundary limit and within 300m of surrounding villages and other surface infrastructures, as a result a highwall has been formed, so there is no scope of extension of this OC Patch.
- 3.2 Highwall Mining technology for cutting and loading of coal (without blasting) from highwall of the OCP have been proposed for optimum recovery of coal with due regard to safety and conservation of coal.
- 3.3 Highwall Mining enables safe recovery of coal without damaging surface and surface infrastructures.
- 3.4 Considerable amount of Washery V 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 ABOCP

4.1 General

- 4.1.1 Seam XI/XII is the top most seam in the proposed area at an Avg depth of 13m from the surface. This seam is partly developed and partly virgin in the proposed

area.

- 4.1.2 The seam VIII C/IX/X underlies Seam XI/XII with a parting varying from 26.20m to 41.25m. This seam has been intersected in 26 boreholes. This seam is partly developed and rest virgin in the proposed area.
- 4.1.3 Seam VIII B underlies seam VIII C/IX/X and VIII C with a parting varying from 2.95m to 7.35m. This seam has been intersected completely in 29 boreholes. This seam is virgin in the proposed area.
- 4.1.4 Seam VIII A underlies seam VIII B, with a parting varying from 15.03m to 22.90m, has been completely intersected in 45 boreholes. This seam is partly developed and rest virgin in the proposed area.
- 4.1.5 The area contains rocks of Barakar formation of Damuda Group. Seam VIII underlies seam VIII A with parting varying from 12.10m to 24.45m, which has been intersected in 49 boreholes drilled in the area. Seam is entirely virgin and this seam has been worked out by opencast mining upto the present location.
- 4.1.6 Seam V/VI/VII underlies seam VIII with parting varying from 8.73m to 19.03m. This is the most important and independently, the thickest seam of the block. It has been fully intersected in 41 boreholes drilled in the area intersected this seam. Seam is entirely virgin and this seam has been worked out by opencast mining upto the present location.

4.2 Sequence of coal seams

The sequence of coal seams along with thickness and intervening parting within the proposed zone of work are given below:

Seam/Parting	Avg. Thickness (m)	Avg. Depth(m)	Geological Reserve(MT)	Expected Drivage Length(m)	Remarks
parting	12.07				
XI/XII	4.22	12.07	0.80	208	Partly Developed
Parting	30.88				
VIII C/IX/X	9.72	47.17	1.91	242	Partly Developed
parting	4.64				
VIII B	1.36	61.53	0.35	266.67	Virgin
Parting	21.12				
VIII A	3.88	84.01	1.08	287.50	Partly Developed
parting	15.72				
VIII	1.63	103.61	0.48	300	Virgin
parting	17.1				
V/VI/VII	31.24	122.34	9.14	300	Virgin
Total			13.76		

4.3 Dip and Strike

The direction of the strike of the formation in the proposed highwall mining area is NE-SW and dip direction is S 210 30' E. The average gradient of the seams are 1 in 7.5.

4.4 Faults

The proposed zone of work is free from major faults. A boundary fault F14 having throw of 10m towards south. A minor fault F7, which runs almost through the middle of the proposed demarcated highwall area, has throw of 2m towards west have been deciphered., However, occurrence of other minor faults may not be ruled out.

4.5 Roof & Floor Characteristics

Seam	Roof condition	Floor Condition
VIII B	Shale-sandstone to medium grained sandstone	Shaly sandstone to coarse grained sandstone
VIII	coarse grained sandstone	Shale with sandy shale
V/VI/VII	coarse grained sandstone	Medium to coarse grained sandstone

4.6 Degree of Gassiness

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

5.0 Coal Quality

SI No	Seam	Declared Grade
1	XI/XII	W-IV
2	VIIIC/IX/X	W-IV
3	VIII B	W-IV
4	VIII A	W-IV
5	VIII	W-IV
6	V/VI/VII	W-V

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 Amalgamated Block-II OCP, seams V/VI/VII, VIII and VIII B are virgin in the proposed Area and Seams VIII A, VIII C/IX/X and XI/XII have been worked partially with Bord and Pillar mining method.

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

North: Decoaled area of ABOCP Mine dumped with OB

South: Fault F14

East : Nudkhurkee Basti

West: Sump of ABOCP Mine

The area proposed for Highwall Mining covers approx. 0.23 sq. km.

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 within the proposed zone of work has been given in the following table:

Seam/Parting	Avg. Thickness (m)	Avg.Depth(m)	Drivage Length(m)	Remarks
parting	12.07			
XI/XII	4.22	12.07	208	Partly Developed
Parting	30.88			
VIII C/IX/X	9.72	47.17	242	Partly Developed
parting	4.64			
VIII B	1.36	61.53	266.67	Virgin
Parting	21.12			
VIII A	3.88	84.01	287.50	Partly Developed
parting	15.72			
VIII	1.63	103.61	300	Virgin
parting	17.1			
V/VI/VII	31.24	122.34	300	Virgin

7.2 Boundary of the proposed zone of work/ designated area

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

North : Decoaled area of ABOCP Mine dumped with OB

South : Fault F14
East : Nudkhurkee Basti
West : Sump of ABOCP Mine

The area proposed for Highwall Mining covers approx. 0.23 sq. km

7.3 Extractable Reserves

All seam are being offered to the mine operator from top (XI/XII) to bottom combine seam (V/VI/VII). 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.

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

8. Mine entry, Production Capacity and Life

8.0 The proposal envisaged extraction of V/VI/VII, VIII and VIII B seams by Highwall Mining method. Initially Combined Seam V/VI/VII will be extracted from bottom to top by placing the highwall miner and making a cut of 9m. A parting of at least 10m will be left between the upper and bottom section of the seam. Then again 9m cut will be taken. For this, backfilling will be done first in this seam and thereafter coal will be extracted. Thereafter, backfilling will be done upto the floor level of VIII seam for extraction of coal. Subsequently, highwall miner will be positioned on the backfilled floor level of VIII seam for extraction of the seam.

Similarly, VIIB seam will be extracted. At last final backfilling will be done upto the height of 3m from the roof of the uppermost extracted seam.

8.1 However, 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.

8.2 OB for benching/backfilling will be provided by the BCCL within the range of 1 km from the highwall site.

8.3 Drivage length in meter has been mentioned below;

Seam/Parting	Avg. Thickness (m)	Drivage Length(m)	Remarks
VIII B	1.36	266.67	Virgin
VIII	1.63	300	Virgin
V/VI/VII	31.24	300	Virgin

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 tonne)
1st	
2nd	
3rd	
7 accounting years or life of the mine proposed by bidder, whichever is shorter.	
Total production	

8.8 Life of the Project

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

9.0 Mine Development Activities

Some major development activities required to be done 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-organisation 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.

10.0 Method of Working

10.1 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.

- 10.2** Considering thickness of seams, high seam cutter module of Highwall miner has been envisaged. This module cuts 0.8-4.5m height drivages with a extent of penetration of 300m.
- 10.3** 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. 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.
- 10.4** The proposal envisaged extraction of V/VI/VII, VIII and VIII B seams by Highwall Mining method. Initially Combined Seam V/VI/VII will be extracted from bottom to top by placing the highwall miner and making a cut of 9m. A parting of at least 10m will be left between the upper and bottom section of the seam. Then again 9m cut will be taken. For this, backfilling will be done first in this seam and thereafter coal will be extracted. Thereafter, backfilling will be done upto the floor level of VIII seam for extraction of coal. Subsequently, highwall miner will be positioned on the backfilled floor level of VIII seam for extraction of the seam. Similarly, VIII B seam will be extracted. However, actual method of mining and manner of extraction will be designed by the successful bidder based on scientific study with due permission of DGMS.
- 10.5** 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.

11.0 Backfilling/Rehandling of OB during Operation

11.1 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 upto 3m above the roof of the uppermost extracted seam. OB required for Backfilling and Rehandling during operation will be provided by the authority within the range of 1km from the highwall site.

12.0 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. High seam cutter module has been envisaged for optimum extraction of coal reserves in V/VI/VII seam. However, mid seam cutter module may be deployed in VIII, VIIIB seams if bidder thinks deemed fit for optimization of coal recovery. Method/manner of extraction by highwall mining shall be designed by the successful bidder.

13.0 Drilling and Blasting

13.1 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.

13.2 If drilling and blasting will require 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.

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

14.0 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.

15.0 Manpower of Authority

Total requirement of manpower for statutory supervision and other job has been estimated as 10. As the proposed highwall mining site is lying within the leasehold area of existing mine working of ABOCP. 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	3
2	Overman	GRADE -A1	3
3	Mining Sirdar	GRADE -A	4
Total Manpower			10

16.0 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 and 5.0 MTPA Madhuband washery).

17.0 Land

The proposed Highwall Mining area is within ABOCP leasehold area. Land required for making access to the highwall mining area and other surface infrastructures 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.

18.0 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.

19.0 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 is 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.
- 11) During mining operation fencing has to be made around the quarry edge to prevent unauthorized entry into mine area.
- 12) 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.
- 13) 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.
- 14) The supervisory staffs and officers shall be adequately trained for supervision of operations of hgiwall mining.
- 15) Extraction of coal by highwall mining technology shall be kept under the overall supervision of competent Manager.
- 16) Emergency Plan shall be made for dealing the situation in the event of any abnormality.

- 17) 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.
- 18) The precautions as specified by the Safety Deptt. (ISO) of BCCL should also be strictly adhered to.
- 19) All statutory plans shall be prepared along with Mine Plan execution report and shall be submitted to the Authority.

20.0 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.

21 Environmental Clearance Status

The environmental clearance is valid from 06/02/2013 and the table of the same has been given below:

S. no	Name of Mine		Status	Prod. Capacity (MTPA)		ML (ha)	Life of Mine (years)
				Normative	Peak		
1	Block II Colliery	UG Section	Proposed	0.45	0.585	852	30
		OCP Section	Operating	4.0	5.2		26
2	Jamunia	OCP	Operating	1.20	1.56	55.0	6

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