Annexure - 3

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कोल इंडिया Coal India

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BHARAT COKING COAL LIMITED

MODIFIED MINING PLAN

AND

MINE CLOSURE PLAN

FOR

KUYA COLLIERY

(BASTACOLLA AREA)

PEAK CAPACITY : 2.80 Mty

JANUARY – 2023

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

परियोजना पदाधिकारी
Project Officer
कुईयॉ कोलियरी
Kuya Colliery

MODIFIED MINING PLAN AND MINE CLOSURE PLAN

FOR

KUYA COLLIERY

Index of Chapters

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Index for List of Annexure

Sl. No.	Parameters	Details	Annexure No.
1	Copy of the allotment order/Vesting order	Mandatory Document	×
2	Certificate of authorized person/agency	Mandatory Document	×
3	Approval of the Company Board (9 types)	Mandatory Document	×
4	Copy of earlier approval of mining plan	Mandatory Document	I

परियोजना पदाधिकारी
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कुईयाँ कोलियरी
Kuva Colliery

Index of List of Plans

SL No.	Plate no.	Subject
1	I	Location plan
2	II	Surface Plan
3	III	Geological Plan
4	IV	Floor Contour Plan of III Bottom Seam
5	V	Floor Contour Plan of III Top Seam
6	VI	Floor Contour Plan of IV Bottom Seam
7	VII	Floor Contour Plan of IV Top Seam
8	VIII	Final Stage Dump Plan

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List of Abbreviations used in the report

BCCL	-	Bharat Coking Coal Limited
RF	-	Representative Factor
MECL	-	Mineral Exploration Corporation Limited
UVM	-	Unit Volatile Matter
UHV	-	Useful Heat Value
GCV	-	Gross Calorific Value
BH	-	Bore Hole
B&P	-	Bord and Pillar
SDL	-	Side Discharge Loader
DB	-	District Board
SOP	-	Standing on Pillar
OC	-	Open Cast
OB	-	Over Burden
HEMM	-	Heavy Earth Moving Machinery
CMR	-	Coal Mines Regulations
DGMS	-	Directorate General of Mines Safety
UG	-	Underground/Ungraded
GPM	-	Gallon Per Minute
HT/LT	-	High/Low Tension
HP	-	Horse Power
DVC	-	Damodar Valley Corporation
BOD	-	Biological Oxygen Demand
MCP	-	Mine Closure Plan

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आज़ादी का
अमृत महोत्सव

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

पो.का. - कोयला भवन, कोयला नगर, धनबाद -826005
Regd. Off: Koyla Bhawan, Koyla Nagar, Dhanbad - 826005
CIN: U10101JH1972GOI000918
ईमेल: cos.bcclw@coalindia.in वेबसाइट: www.bcclweb.in, दूरभाष: 0326-2230190

बोर्ड सचिवालय/Board Secretariat

पत्रांक : बीसीसीएल / सीएस / एफ– 1(A) / 2023 / 48(H) दिनांक: 03.02.2023

सेवा में,
महाप्रबंधक (परियोजना व योजना),
बीसीसीएल, कोयला भवन

विषय : **Certified copy of Minutes of 396th Board Meeting held on 24.01.2023.**

Dear Sir,

We send herewith certified copy of Minutes of **Item No.396.POT-1 & POT-2** of 396th Meeting of the Board of Directors of Bharat Coking Coal Limited held at Registered Office, Koyla Bhawan, Dhanbad on 24.01.2023 for taking necessary action at your end.

Encl: As above

भवदीय,

बी के पारूई
कंपनी सचिव

(Sanjeev Kuchhap)

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Item No. 396 POT-1

Approval of Mining Plan along with Mine Closure Plan of Bastacolla Colliery.

Background:

Bastacolla Colliery is one of the existing/operating mines of the Cluster-VIII group of mines under the administrative control of Bastacolla Area, BCCL. Bastacolla Colliery is part of OCP-VIII Geological Coal Block of Jharia Coalfield (GR-Feb.1999). It is about 2 to 3 km South-West of Dhanbad Railway Station. Chatkari Jore flows along Eastern boundary of Bastacolla Colliery. Dhanbad-Jharia DB Road passes along the southern (part) and western boundary of the mine. The area under consideration is located in north-eastern part of Jharia coalfield. Presently opencast mining operation has been going on in Bastacolla Colliery from 2020-21. Production from Underground mining system was done up to Oct-2021 and thereafter, underground mining operation stopped.

The proposal was placed in the 30th ESC (T) held on 24.01.23 and after consideration of the proposal, the same has been recommended for approval of Board.

Decision:

After detailed deliberation of the proposal ,the Board passed the following resolution:

Resolved that the revised Mining Plan along with Mine Closure Plan of Bastacolla Colliery having Peak Capacity 2.10 MTPA, Lease hold Area 239.45 Ha , Balance Life 11 Years and the total Mine Closure cost being ₹35.328177Cr. (including the already deposited amount of ₹4.883167 Cr.) as recommended by the Empowered Sub Committee(T) of BCCL be and is hereby approved.

Further Board also directed that entire mining operation should be carried out as per the Statutory provisions under Mines Act 1952, Coal Mines Regulation 2017 and wherever specific permission is required, the management shall approach the concerned authorities.

Item No. 396.POT-2

Approval of Mining Plan along with Mine Closure Plan of Kuya Colliery.

Background:

Kuya Colliery was one of the existing/operating mines under the administrative control of Bastacolla Area, BCCL. Mining activities at Kuya Colliery going on since pre- nationalization. Resource in the present work is estimated after deducting already depleted reserves. Base date of the reserve has been considered as 01.04.2022. Resource in the present work is estimated after deducting already depleted reserves. Base date of the reserve has been considered as 01.04.2022.

PURPOSE & SCOPE OF THE REPORT:

Due to enhancement in coal production and for modification of EC, this mining plan and mine Closure plan has been prepared. The scope of the mining plan is limited to opencast extraction of IV Top, IV Bot, III Top, III Bot seams. The life of the mine will be 04 years.

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

Sanjeev ... Agent ... BCCL.

The proposal was placed in the 30th ESC (T) held on 24.01.23 and after consideration of the proposal, the same has been recommended for approval of the Board.

Decision:

After detailed deliberation of the proposal, the Board passed the following resolution:

Resolved that the revised Mining Plan along with Mine Closure Plan of Kuya Colliery having Peak Capacity 2.80 MTPA ,Lease hold Area 340.50 Ha , Balance Life 04 Years and the total Mine Closure cost being ₹35.4329 Crs, (including the already deposited amount of ₹15.0765 Cr.) as recommended by the Empowered Sub Committee(T) of BCCL be and is hereby approved.

Further Board also directed that entire mining operation should be carried out as per the Statutory provisions under Mines Act 1952, Coal Mines Regulation 2017 and wherever specific permission is required, the management shall approach the concerned authorities.

Certified to be True Copy

B. K. Paru
Company Secretary
Bharat Coking Coal Limited
Koyla Bhawan
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Kuya Colliery

Chapter 1: Project Information

	Parameters	*Details*
1.1	INTRODUCTION	
1.1.1	Name of Coal / Lignite Block	**Mukunda Exploration Block** (Proposed leasehold area is covered under "Geological Report on exploration for coal in Mukunda Open Cast Block" prepared by CMPDIL, RI-2 in July 1981)
1.1.2	Name of the Coalfield/Lignite Field	Jharia Coalfield
1.1.3	Base date of Mining Plan / Mine Closure Plan	April,2022
1.1.4	Linked End Use Plant	**Power Houses & Steel Plants** Coal production of the mine is linked to different power houses (Power plants of DVC and other companies) and washeries (Bhojudih washery & Dugda washery) through CK (West), BNR siding and Burragarh siding and rest quantity is transported through road to MPL, RTPS and E- Auction etc.
1.1.5	Distance of End use plant from the pit head of the project in "km"	The present lead for coal transportation from face to surface is 1 to 2 Km. C. K. West Siding is 3 to 4 KM, Burragarh Siding is 7 to 8 km, GOAL 6 Railway Siding about 2 km and BNR Siding is about 10 KM from the coal dump.
1.1.6	Mode of Coal Transport	Trucks and Railway

1.2 LOCATION, TOPOGRAPHY AND COMMUNICATION

	Parameters	*Details*
1.2.1	Location of coal deposit (District and State)	Dhanbad, Jharkhand.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

1.2.2	Communication: PWD roads, railway lines, Air	I. It is about 6 KM away from Dhanbad Railway Station and connected by Dhanbad Baliapur road. II. The proposed project area is about 5 Km west of Jharia town and can be approached easily by Dhanbad-Jharia-Sindri road.
1.2.3	Availability of power supply, water etc.	**Power Supply Arrangement:** Kuya opencast project is receiving power at 33 KV/11KV from Goluckdih Main Sub-Station. The existing transformers at KOCP are as under: - 1. Transformer: 11 KV/ 3.3 KV -1000KVA 2. Lighting Transformer: 11 KV/ 440V - 100KVA 3. Lighting Transformer: 11 KV/ 440V - 500KVA 4. Lighting Transformer: 3.3KV/ 220V - 10KVA 5. Lighting Transformer: 11 KV/ 440V - 100KVA 6. Lighting Transformer: 11 KV/ 400V - 500KVA 7. Lighting Transformer (2 Nos): 500 KV/ 220V - 10KVA 8. Lighting Transformer: 500 KV/ 440V - 20KVA 9. Lighting Transformer: 11 KV/ 440V - 250KVA 10. Power Transformer: 11 KV/ 3.3V – 2.5KVA 11. Power Transformer: 11 KV/ 550V - 750KVA 12. Lighting Transformer: 500 KV/ 440V - 100KVA 13. Lighting Transformer: 500 KV/ 440V - 250KVA 14. Lighting Transformer: 500 KV/ 440V -

परियोजना पदाधिकारी
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कुईयाँ कोलियरी
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		250KVA Existing arrangement is sufficient to cater proposed mine-operation.
1.2.4	Prominent physiographic features, drainage pattern, natural water courses, rainfall data, highest flood level.	1. **Climate Zone** = Sub-humid region 2. **Maximum Temperature** = 48^0 C during summer (April to middle of June) 3. **Minimum Temperature** = 6^0 C during winter (December to January) 4. **Average Annual Precipitation** = 140 cm (June to September) 5. **Topography** = Undulating with a gentle southward slope. Due to mining activities over 100 years, several small quarries, subsided goaf, OB dump etc. have been shattered the original topography of the area. The highest elevation (214.65 m) has been observed near borehole no. NGK-28 in the northern part, whereas, the lowest ground elevation (184.54 m) has been observed in the southern corner of the block around borehole No NGK-2. 6. **Drainage** = The drainage of the block is mainly controlled by a small nala, Tisra Jore is flowing from north to south.
1.2.5	Land use and ownership / occupancy & involvement of forest land	**PARTICULARS** / **AREA (in Hectare)** BCCL Land — 141.33 Forest Land — 117.51# Govt. Land — 35.06 Tenancy Land — 46.60 **Total Land** — **340.50** # Out of the above forest land, forest Clearance in respect of remaining **16.49** Ha is

Job No. 200221012

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		under process. The land other than BCCL holding has to be transferred to BCCL / to be acquired by BCCL.
1.2.6	Important surface features within the project area and major diversion or shifting involved	**Diversion of Road:** A part of Jharia-Baliapur DB Road, passing through the proposed project area, will be affected due to the operation of the proposed opencast. The affected part of the said road has to be substituted by construction of alternative road.

1.3 DETAILS OF THE ALLOTMENT AGREEMENT

	Parameters	*Details*
1.3.1	Name the Allottee	NA
1.3.2	Status of the Applicant Company	NA
1.3.3	Details of allotment / vesting order	NA
1.3.4	Name and address of the applicant	NA
1.3.5	Relationship between the applicant and allottee company	NA
1.3.6	Name of the previous allottee of the Block	NA
1.3.7	Starting Date of the Mine as per CMDPA	NA
1.3.8	Rated Capacity as per CMDPA	NA
1.3.9	Production Schedule as per opening permission (meeting provisions of	NA

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	CMDPA if any)	
1.3.10	End Use of Coal/Lignite as per allotment order if any	NA

1.4 DETAILS OF THE PREVIOUS APPROVAL OF MINING PLAN

	Parameters	*Details*
1.4.1	Date of Approval	23.03.2022
1.4.2	Conditions, if any	
1.4.3	Scheduled year of start of production	Running mine. Earlier Mining plan was prepared for enhancement in coal production.
1.4.4	Proposed year of achieving the targeted production	NA
1.4.5	Date of actual commencement of mining operations, if operations already started	Running mine. Earlier Mining plan was prepared for reopening and grade declaration of III top seam.
1.4.6	Likely date of mining operations, if operations not yet started & reasons for non-commencement of operations	Not Applicable
1.4.7	Planned production and actual levels achieved in last 3 years (Coal in Mte, OB in MM^3, SR in M^3/te	Planned production for last 3 years as per approved Mining plan of Kuya Colliery and actual production from Kuya Colliery are given below Planned production: 2019-20: 1.84 Mte 2020-21 : 1.41 Mte 2021-22 : 1.15 Mte Actual production : 2019-20: 1.461 Mte 2020-21 : 1.799 Mte 2021-22 : 2.591 Mte
1.4.8	Statutory obligation vis-à-vis compliance status in a	

परियोजना पदाधिकारी
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Kuya Colliery

	tabular form	
1.4.9	Reasons for difference between the planned and actual production levels	Better utilization of HEMM

1.5 PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MININ PLAN

	Parameters	*Details*	
		Approved Mining Plan (2017-18)	Proposed Mining Plan (2022-23)
1.5.1	Block Area in "Ha"	340.50	340.50
1.5.2	Block Area Projectized "Ha"	182.88	182.88
1.5.3	Lease area "Ha"	340.50	340.50
1.5.4	Project Area "Ha"	300.50	300.50
1.5.5	Life of the Project "Yrs"	15	4
1.5.6	Maximum Depth of working "m"	140	140
1.5.7	Net Geological Block "Ha"	340.50	340.50
1.5.8	Production Target "MTPA"	2.60	2.80
1.5.9	Seams Available "As per GR"	IV Top, IV Bot, III Top, III Bot, II Top, II Bottom and I seams	IV Top, IV Bot, III Top, III Bot, II Top, II Bottom and I seams
1.5.10	Seams not considered for Mining with Reasons	II Top, II Bottom and I seams	II Top, II Bottom and I seams
1.5.11	Gross Geological Reserve within leasehold boundary "Mt"	63.82	52.61
1.5.12	Net Geological Reserve within leasehold boundary "Mt"	57.44	47.348
1.5.13	Blocked Reserve "Mt"	38.700	38.700
1.5.14	Net Geological Reserve	18.74	8.648

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	within delineated quarry "Mt"		
1.5.15	Minable Reserve / Extractable Reserve "Mt"	16.87	7.783
1.5.16	% of Extraction/recovery	90%	90%
1.5.17	Reserve Depleted (till the base date) Reserves "Mt"	Mining activities are going on in Kuya colliery since pre-nationalization period. At present, opencast mining is under progress in the colliery. Resource in the present work is estimated after deducting already depleted reserves. Base date of the reserve has been considered as 01.04.2017	Mining activities are going on in Kuya colliery since pre-nationalization period. At present, opencast mining is under progress in the colliery. Resource in the present work is estimated after deducting already depleted reserves. Base date of the reserve has been considered as 01.04.2022
1.5.18	Balance Extractable reserves "Mt"	16.87	7.783
1.5.19	Grade range	G6-G12	G6-G12
1.5.20	OB in MM^3	95.34	59.61
1.5.21	SR MM^3/te	5.65	7.659
1.5.22	Mining Technology	Shovel-Dumper combination	Shovel-Dumper combination
1.5.23	Coal Beneficiation envisaged	NA	NA
1.5.24	Handling of Rejects	NA	NA
1.5.25	Proposed land use / component wise land break up "Ha"		
	Parameters	*Details*	
	Quarry including backfilling,	268.50	268.50

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	haul road etc.		
	External OB Dump	21.11	21.11
	Infrastructures (colony, W/Shop, sub-station office, Road, etc.)	13.89	13.89
	Water body including nalla and embankment	4.12	4.12
	Green belt including already planted area and proposed plantation on vacant land.	24.45	24.45
	Safety Zone	8.34	8.34
	Total	340.50	340.50
1.5.26	Post Mining Land use pattern "Ha"		
	Parameters	*Details*	
1	Excavation Area	195.88	195.88
2	Top Soil Dump		
3	External Dump	7.10	7.10
4	Safety Zone		
5	Other Use	24.00	24.00
6	Infrastructure Area	6.50	6.50
7	Green Belt	77.34	77.34
8	Undisturbed Area	29.68	29.68
	Total	340.50	340.50
1.5.27	Reason for revision	Due to enhancement in coal production	Amendment / Modification in EC

परियोजना पदाधिकारी
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Kuya Colliery

1.6 Component wise break up of forest Land

Component	Forest Land (in ha.)	Non Forest Land (in ha.)	Total (in Ha)
Quarry	15.92	248.69	264.61
Overburden(OB)	0	21.11	21.11
Infrastructure	0	16.43	16.43
Existing Road-1.88Ha, Proposed Road-1.02 Ha	0	2.9	2.9
Embankment	0	2.91	2.91
Water Body	0	1.38	1.38
Green belt	0	22.79	22.79
Safety Zone(Proposed Forest)	0.57	0	.57
Safety Zone (REleased forest-1.74 Ha & Non forest-6	0	7.8	7.8
Total	16.49	324.01	340.50

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Kuya Colliery

Chapter 2 : Exploration, Geology, Seam Sequence, Coal Quality and Reserve

	Parameters	Details
2.1	**DETAILS OF THE BLOCK**	
2.1.1	Particulars of adjacent blocks: North, South, East, West	The present report is confined to the assessment of the part area (northern part) of original block of Mukunda OCP (GR, 1981), it includes Kuya Colliery and part area of Ghanoodih Colliery. Jharia coalfield is located in Dhanbad and Bokaro districts of Jharkhand. After nationalization and formation of Bharat Coking Coal Ltd. (BCCL), a feasibility report for reconstruction and development of the collieries (FR '78) of this coalfield was prepared in collaboration with the Polish consultants, wherein amalgamation of the erstwhile collieries including virgin area was envisaged. In this FR, 9 large opencast blocks and 21 large underground blocks were envisaged. However, this could not be implemented in full due to various constraints. The opencast block VIII (herein after called OCP-VIII) is one of these part of originally envisaged OCP-VIII . North : Dobari Colliery South : North Tisra East : Barren Land West : Ghanoodih Colliery
2.1.2	Location of the Block District/State	The area under consideration is located in Northern part of Mukunda exploration block of Jharia coalfield and constitutes of leasehold boundary of Kuya Colliery, BCCL. The project area lies between Latitude 23º43'30" to 23º43'44" (N) and Longitude 86º25'30" to 86º27'00" (E).
2.1.3	Area of the Block "Ha"	The project area of the proposed quarry under consideration has a total surface area of about 340.50 Ha as per colliery record.

परियोजना पदाधिकारी
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कुईया Job No. 2002210012
Kuya Colliery

2.1.4	Area of the geological block projectised "in Ha" (Area of the geological block considered for liquidation of coal reserve)	As per the surface extent of proposed quarry, area of the colliery proposed to be projectized is about 182.88 Ha.
2.1.5	Balance area yet to be projectised "Ha"	Seams below III bottom/III seam are yet to be projectised and balance area of the leasehold area outside the projectized area is mainly non-coal bearing
2.1.6	Likely Reserve in the area yet to be projectised "Mte"	Available resource within unprojectised seams to be projectized is 19.97 million tons. This resource is blocked in lower seams.
2.1.7	Geo-Reference Co-ordinates of the Block Boundary	Given in attachment
2.1.8	Certificate of authorized person/agency if the project area is confined within the vested/allotted block boundary and Where the project area extends beyond the block boundary, a certificate of authorized person/agency should be supported with a certificate of State Government mines and Geology department must be attached, which should specify (a) intent of the state government for grant of lease beyond	Given in attachment

परियोजना पदाधिकारी
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Kuya Colliery

	the vested geological boundary; (b) non-existence of Coal/Lignite in the area beyond the vested/allotted geological block boundary to rule out the issue of encroachment and use of coal bearing area (beyond the vested/allotted block boundary) in the mining plan. The Project area, Lease area and geological block area in "Ha" shall also be envisaged.	
2.1.9	KML file of the Proposed lease and geological block.	Given in attachment
2.1.10	Whether the proposed project area is confined within the allotted block boundary, if not, the reason for deviation from allotted block boundary, may be given.	Yes
2.1.11	If the project area extends outside the allotted block boundary, confirmation about non-occurrence of coal/lignite in the area under	Not applicable

परियोजना पदाधिकारी
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Kuya Colliery

	reference needs to be furnished	
2.1.12	Type of the Project (Operating/under Implementation) and year of Starting.	Running Opencast mine starting from pre-natiolisation

2.2 EXPLORATION, GEOLOGY AND ASSESSMENT OF RESERVE

	Parameters	*Details*
2.2.1	Regional geological set up of the area, local geology, structure, stratigraphic sequence, characteristics of the litho-logical units (coal seams / partings/overburden).	The Jharia coalfield (453 Km^2) is sickle shaped on plan and occurs in the form of syncline with its axis trending broadly in E-W direction and plunging towards west. The southern flank of this coalfield is truncated by boundary fault having maximum throw about 2.5 Km at Mohuda Basin. The non-coal bearing Talchir formation is mainly exposed along the northern and western portion of the coalfield. The Barakar formation covering an area of 218 Km^2 which is exposed in the northern, eastern and south-eastern part of the coalfield area contains over 40 coal horizons including local and persistent seams, some of which are exclusively store house of metallurgical coal in India. The Barakar formation is successively overlain by Barren Measure formation which is devoid of workable coal seams. This is mainly exposed in the central part of the coalfield. The Barren Measure is overlain by the coal bearing Raniganj formation (54 Km^2). These are exposed within a sub elliptical basin the south-western part of the coalfield. **Stratigraphy** The Regional stratigraphic succession of Jharia coalfield is given in table no. 2.1 **Archeans:** The Archeans, consisting of gneisses and mica schists are exposed all along the periphery of Jharia Coalfield. The metamorphics are profusely intruded by quartz veins. **Talchir:** In an Archean basement, the lower Gondwana

परियोजना पदाधिकारी
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Kuya Colliery

sediments are deposited with a pronounced unconformity. The lowermost Gondwana sediments of Talchir formation are represented by variegated shale and greenish sandstones which at times show laths of unaltered feldspars. They are exposed all along the northern fringe of the coalfield. Near Lutipahar in the north-western part of the coalfield, Talchir formation is comparatively well developed in a large area and boulder bed shows exposures of spheroidal weathering.

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

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

Raniganj: Raniganj formation is deposited in sub

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

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

Igneous Intrusive: Mica peridotite and dolerite are the two most common Post Gondwana intrusives. The mica peridotite occurs as dyke and sill throughout the entire coalfield and has caused widespread devolatilization of the coal seams. The dolerite dykes are mostly confined in the western part of the coalfield and has limited effect on coal seams. The mica peridotite sills have devolatilized the extensive reserve of good quality coal in the coalfield.

As mentioned earlier most of the area is covered by sandy soil and alluvium. The thickness of soil varies from 1.0 m to 9.0 meter.

Geological Succession of Jharia coalfield

Stratigraphic Division	Age	Formation	Lithological characters
	Recent	Alluvium/Soil/Sand	
	Cretaceous to Jurassic	Mica Peridotite/Dolerite Dyke	
---------- ***Unconformity*** ----------			
Lower Gondwana	Upper Permian	Raniganj Formation	Mainly fine to medium grained grey current
	Middle Permian	Barren Measures	Black carbonaceous micaceous

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

					shale with clay, ironstone and sandstone.
			Lower Permian	Barakar Formation	Coarse grained to conglomeratic white
			Lower Permian	Talchir Formation	Coarse grained sandstone, white or slightly variegated at Top, green shale with undecomposed feldspar, boulder bed etc.
			---------- *Unconformity* ----------		
			Archeans		Granites, gneisses and schists.
2.2.2	Local geology, Structure, Stratigraphic sequence, Characteristics of the litho-logical units (coal seams / partings/overburden).	The area under consideration is located in the eastern flank of the Jharia coalfield, and it is primarily covered by the Barakar formation which is overlain by thin layers of sandy soil and clay. The thickness of soil is ranges between 1 m. (NGK-26) to 15.51 m. (NGK-25). The eastern limit of the coal bearing formation is delineated by metamorphic rock of Archean age. The rocks of Barakar formation consist of pebbly sandstone, grits, fine to coarse grained			

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

sandstone, intercalation of sandstone and shale, sandy shale, grey shale, carbonaceous shale, fire clays and number of coal seams. Coal seams IV TOP to III BOT occur within the project area and under the purview of this Geological Report (Plate No. G-III).

Good rock exposures are rather few excepts in old quarries and it has not been possible to precisely delineate the incrop position of the seams because of the extensive goaf, and quarrying which have severely affected the original topography. The incrop position of the coal seams have been extrapolated on the basis of geological data viz. geological cross section, floor contour and quarry/incline positions and are interpretative. Geology and correlation of the seams have been established mainly on the basis of sub-surface data obtained from borehole and mine workings.

Igneous Intrusion:

The project are is free from any igneous intrusion.

Sequence of Coal Seams (within the proposed quarry Limit)

Seam/Parting	Average Seam/Parting Thickness (meter)	Depth Range (approx.) (m)
IV TOP	**1.93**	INCROP-100
P(IV TOP-IV BOT)	17	
IV BOT	**4.37**	INCROP-120
P(IV BOT-III TOP)	13	

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

P(IV BOT-III)	23	
III TOP	**3.78**	INCROP-140
P (III TOP-III BOT)	9	
III BOT	**9.8**	INCROP-160
III	**15.70**	INCROP-100
P (III-II TOP)	6	
II TOP	**0.95**	INCROP-140
P(II TOP-II BOT)	20	
P(III BOT-II BOT)	30	
II BOT	**1.40**	INCROP-190
P (II BOT-I)	13	
I	**4.90**	INCROP-210

Geological Structure of the Block

Strike & Dip

The geological structure of the area is relatively simple. The general strike of the strata is normally NNW-SSE swinging to N-S covering the major part of the area. The beds dip 4° to 12° due WSW, west and north respectively. The relevant details of strike and dip can be seen from the geological cross section and floor contour plans.

Faults

No major fault encountered within the project area.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

2.2.3	Geological Block Area "Ha"	Kuya Colliery falls completely within Mukunda Block of Jharia Coalfield. Total area of Mukunda geological block is about 2200 Ha. As per colliery records total surface area of Kuya colliery is about 340.50 Ha.
2.2.4	Status of Exploration of the block	The entire area under consideration has been covered by detailed exploration and data is available in the "Geological Report on exploration for coal in Mukunda Open Cast Block, Jharia coalfield, Dhanbad (July, 1981)", prepared by CMPDI, Regional Institute-II, Dhanbad.
2.2.5	Area covered by 'detailed' exploration within the block (sq. km)	The entire area under consideration has been covered by detailed exploration. A total of 14 boreholes have been drilled within the project area involving a total meterage of 1818.78 meters within the project area. **Status of Exploration** **Serial** | **Seri** | **Drilling** | **No. of** | **Meterage** 1 | NG | CMPDI | 14 | 1818.78 The density of boreholes comes to 4 BHs/Km^2 within the project area (within Kuya Colliery Boundary)
2.2.6	Whether entire lease area has been covered by 'detailed' exploration.	Yes.
2.2.7	No. of boreholes drilled within the leasehold boindary	14
2.2.8	Whether any further exploration/study is required or suggested and time frame in which it is to be completed.	No.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

2.2.9	Year wise future programme of exploration	Not applicable.
2.2.10	Overall borehole density within the block (no./sq.km) approx.	Within the colliery leasehold, the borehole density is approximately 4 BHs/Km^2.
	No. of Seams available as per GR (Geological Report)	The lay and deposition of coal seams is based primarily on the data available in "Geological Report on exploration for coal in Mukunda Open Cast Block, Jharia coalfield, Dhanbad (July, 1981)", prepared by CMPDI, Regional Institute-II, Dhanbad) and updated mine data provided by colliery authorities. Standard geological name of available coal seams and corresponding colliery nomenclature is given below. **Nomenclature of coal seams Vis-À-Vis Colliery Nomenclature**

Standard Nomenclature (Geological)	Colliery Nomenclature (Kuya Colliery)
IV TOP	IV
IV BOT	IV
III TOP	III
III BOT	II
II TOP	-
II BOT	I
I	ↄ

Seam-wise Description

Seam IV TOP

This seam occurs below V/VI/VII/VIII seam with a parting varies from 30.93 m (NGK-15) to 32.66m (NGK-25).The full coal thickness has been intersected into 8 boreholes within the project

परियोजना पदाधिकारी
Project Officer
कुईया कोलियरी
Kuya Colliery

limit. The In-band thickness of seam varies from 0.65 m (NGK-25) to 5.30 m (NGK-2). The seam has been considered as Non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

TH	ASH	UHV	Grade	GCV	GCV Grade
0.65-5.30	29.1-45.2	1158-4400	D-G	3762-5163	G8-G12

Roof & Floor

Roof and floor both generally composed of carbonaceous shale.

Exploitation

The seam is extensively worked and quarried. In the incrop region the seam is extensively quarried out in the southern part (south eastern part of the Tisra Jore) and another quarry in the northern part is ongoing. A very small patch is quarried out in the northernmost part too.

The west-central part is heavily worked by underground development.

(Ref: GR, Mukunda OC Block, July, 1981).

Seam IV BOT

This seam occurs below IV TOP seam with a parting varies from 10.65 m (NGK-18) to 20.11m

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

(NGK-2).The full coal thickness has been intersected into 10 boreholes within the project limit. The In-band thickness of seam varies from 2.50 m (NGK-15) to 5.43 m (NGK-24). The seam has been considered as Non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

TH	ASH	UHV	Grade	GCV	GCV Grade
2.50-5.43	36.7-46.8	2244-3770	E-G	4297-5151	G8-G11

Roof & Floor

Roof and floor both generally composed of carbonaceous shale.

Exploitation

The seam is extensively worked and quarried. In the incrop region the seam is extensively quarried out in the southern part (south eastern part of the Tisra Jore) and another quarry in the northern part is ongoing.

(Ref: GR, Mukunda OC Block, July, 1981).

Seam III TOP

This seam occurs below IV BOT seam with a parting varies from 10.92 m (NGK-21) to 17.35m (NGK-18).The full coal thickness has been intersected into 10 boreholes within the project limit. The In-band thickness of seam varies from

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलि...
Kuya Colliery

2.45 m (NGK-25) to 5.39 m (NGK-2). The seam has been considered as Non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

TH	ASH	UHV	Grade	GCV	GCV Grade
2.45-5.39	27.01-46.3	1931-4697	D-G	4174-6067	G6-G11

Roof & Floor

Roof and floor both generally composed of carbonaceous shale.

Exploitation

The seam is extensively worked and quarried. In the incrop region the seam is extensively quarried out in the southern part (south eastern part of the Tisra Jore) and another quarry in the northern part is ongoing.

The west-central part is heavily worked by underground development and in the northernmost part two small underground patch is also developed.

(Ref: GR, Mukunda OC Block, July, 1981).

Seam III BOT

This seam occurs below III TOP seam with a parting varies from 1.83 m (NGK-2) to 15m (NGK-30).The full coal thickness has been intersected into 10 boreholes within the project

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

limit. The In-band thickness of seam varies from 6.19 m (NGK-14) to 13.41 m (NGK-2). The seam has been considered as Non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

TH	ASH	UHV	Grade	GCV	GCV Grade
6.19-13.41	33.38-44.9	2280-3970	E-G	4362-5399	G7-G10

Roof & Floor

Roof and floor both generally composed of carbonaceous shale.

Exploitation

The seam is extensively worked and quarried. In the incrop region the seam is extensively quarried out in the southern part (south eastern part of the Tisra Jore) and another quarry in the northern part is ongoing.

The west-central part is heavily worked by underground development and a small underground patch is developed in south central part too.

(Ref: GR, Mukunda OC Block, July, 1981).

Seam III

III TOP and III BOT seam combined in the southernmost part of the project area as III seam.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

This seam occurs below IV BOT seam with a parting varies from 20m (NGK-22) to 28m (NGK-24).The full coal thickness has been intersected into 4 boreholes within the project limit. The In-band thickness of seam varies from 14.38m (NGK-22) to 17.36m (NGK-13). The seam has been considered as Non coking coal within the project area. Detailed quality parameters and net geological resource is given below in table.

Quality Parameters

Proximate Analysis (On air-dried basis)

TH	ASH	UHV	Grade	GCV	GCV Grade
14.38-17.36	38.7-42.6	2760-3449	E-F	4495-4890	G9-G10

Roof & Floor

Roof and floor both generally composed of carbonaceous shale.

Exploitation

The seam is part quarried and also developed by underground working.

(Ref: GR, Mukunda OC Block, July, 1981).

Insitu Coal Quality

The quality of coal seams in this Revised Geological Report is based on "Geological Report, Mukunda Open Cast " Jharia coalfield,

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		Dhanbad (July, 1981, prepared by CMPDI, RI-2, Dhanbad).The non-combustible bands like sandy shale, sand stone, siderite,grey shale (Ash > 75 %) etc. irrespective of their thickness and carb shale(Ash > 50 %) of 1 meter and above in thickness occurring within the seam, have been excluded from the total thickness of the seam for computing the effective thickness (I100) of coal seams for the purpose of quality consideration. Rest of the dirt bands has been included as a part of the coal seams. Faulted, partly faulted, worked seam/part worked seam thickness encountered in the boreholes have not been considered for the purpose of quality assessment. **Seams Considered for Mining** Seams IV Top to III Bottom lie within the proposed area to be projectized.
2.2.12	Seams not considered for Mining with Reasons	Seams II Top, II Bottom and I seams have not been considered for mining. due to various issues like seam thickness, not developed and extensively worked out etc.These seams will be taken for mining in future after amalgamation with adjoining mines.
2.2.13	Dip of the Seam	The geological structure of the area is relatively simple. The general strike of the strata is normally NNW-SSE swinging to N-S covering the major part of the area. The beds dip 4° to 12° due WSW, west and north respectively.
2.2.14	**Seam wise thickness depth and reserve** Seam wise summary of in-band thickness (I-100) based on borehole data, depth range and reserve within Kuya colliery leasehold are given below for their extraction by opencast method. **Seam wise thickness, depth and reserve within colliery leasehold**	

Seam	In-Band Av. Thickness (m)	Depth Range (m)	Net Geological Reserve (Mt)	Blocked Reserve (Mt)

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	IV TOP	**1.93**	INCROP-100	1.063	0.62
	P(IV TOP-IV BOT)	17			
	IV BOT	**4.37**	INCROP-120	4.002	2.92
	P(IV BOT-III TOP)	13			
	P(IV BOT-III)	23			
	III TOP	**3.78**	INCROP-140	4.264	3.26
	P (III TOP-III BOT)	9			
	III BOT	**9.8**	INCROP-160	18.049	11.93
	III	**15.70**	INCROP-100		
	P (III-II TOP)	6			
	II TOP	**0.95**	INCROP-140	1.29	1.29
	P(II TOP-II BOT)	20			
	P(III BOT-II BOT)	30			
	II BOT	**1.40**	INCROP-190	5.20	5.20
	P (II BOT-I)	13			
	I	**4.90**	INCROP-210	13.48	13.48
	Total			**47.348**	**38.700**

2.2.15	Methodology of reserves estimation (also mention if any software package has been used).	**Reserve Estimation Criteria** **A)** The seam wise status of developed, depillared and goaved areas in addition to virgin patches has been identified on the basis of seam working plan provided by the concerned area/colliery officials. These have been clearly marked on the seam folio plans and floor contour plans of all the seams proposed for quarrying in the area. **B) Goaf & Quarries**: These areas have been considered as devoid of coal, however in case of goaf the devoid zone is considered according to the height of the goaf.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

C) **Developed Areas:** In developed areas, where reserves are standing on pillars, seam wise dimension of extraction (height & width) have been decided on the basis of seam working plan made available by area/collieries authorities and after detailed discussion with them. And only after that percentage of extraction factor for each seam has been arrived which ranges from 25 % to 30 %. For standing on pillars an average of 30% extraction of coal have been considered and accordingly Net Geological Reserve has been calculated.

D) **Thickness:** - Only the In-band (I100) thickness of the seam has been considered for reserve estimation.

Areas having thickness less than 0.5 m have not been considered for reserve estimation.

Methodology of Reserves Calculation

The reserve has been estimated through "MINEX" software.

1. The reserve has been calculated using "Detailed resource reporting" menu of **MINEX 6.1.3** software along with separate template for each individual seam.

2. A deduction of 10% from the 'gross reserves' of coal has been made to account for unidentified geological uncertainties like structural disturbances, washout zones etc. to arrive at the 'net geological reserves.'

3. The seam wise status of developed, depillared areas in addition to virgin patches has been identified on the basis of seam working plan supplied by the concerned area/colliery officials. These have been clearly marked on the seam folio plans and floor contour plans of all the seams.

4. Heave Zone: The areas falling within the heave zone of a fault has been excluded for the purpose of reserve estimation.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		5. Reserve is calculated within the proposed project boundary demarcated by the mining department.
2.2.16	GCV DETAILS	Seam wise quality/GCV parameters of available coal resource within delineated quarry of Kuya colliery are given in below.

Seam	AS PER GEOLOGICAL REPORT				AS PER BCCL DECLARED GRADE NOTIFICATION 2022-23
	Thickness (m)	Ash% (Coking)	GCV (Kcal/ Kg)	Grade Range	
IV Top	0.65-5.30	29.1-45.2	3762-5163	G8-G12	W-VI
IV Bot.	2.50-5.43	36.7-46.8	4297-5151	G8-G11	W-V
III Top	2.45-5.39	27.01-46.3	4174-6067	G6-G11	W-V

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		III Bot	6.19-13.41	33.38-44.9	4362-5399	G7-G10	W-V	
2.2.17	Gross Geological Reserve of the block "Mte"	52.61						
2.2.18	Net Geological Reserve of the block "Mte"	47.348						
2.2.18 A	Net Geological Reserve within delineated quarry "Mte"	8.648						
2.2.19	Mineable Reserve of the block "Mte"							

Seams	**Mineable Reserve (MT) within delineated quarry**	**Grade**
IV Top	1.367	G8-G12
IV Bottom		G8-G11
III Top	0.903	G6-G11
III Bottom & Combined	5.513	G7-G10
Total	**7.783**	

2.2.20	Blocked Reserve "Mte"	38.700
2.2.21	Corresponding extractable reserve of the block "Mte"	For opencast mining extractable reserve is considered same as mineable reserve i.e. 7.783 Mte.
2.2.22	Percentage of Extraction	For opencast mining percent of extraction is considered 90 percent.

परियोजना पदाधिकारी
Project Officer
कुईयॉ कोलियरी
Kuya Colliery

2.2.23	Reserve already depleted (Base date of Mining Plan)	Not applicable. Note- Mining activities are going on in Kuya colliery since pre-nationalization period. At present, opencast mining is under progress in the colliery. Resource in the present work is estimated after deducting already depleted reserves. Base date of the reserve has been considered as 01.04.2022
2.2.24	Balance Reserve (as on Base Date)	Since, depleted resource is already accounted for in resource estimation, Balance reserve in Kuya colliery as on base date (01.04.2022) is considered same as mineable reserve i.e. 7.783 Mte.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Chapter 3: Mining

<table>
<tr><td></td><td>Parameters</td><td>Details</td></tr>
<tr><td>3.1</td><td colspan="2">MINING METHOD</td></tr>
<tr><td>3.1.1</td><td>Existing method of mining if the mine is under operation</td><td>Presently Opencast Mining Operation with Shovel-Dumper combination is going on in Kuya Colliery. The production of coal for last 5 years are given below.
<table>
<tr><th>Year</th><th>Coal Production (M.Tes)</th></tr>
<tr><td>2017-18</td><td>1.487</td></tr>
<tr><td>2018-19</td><td>1.569</td></tr>
<tr><td>2019-20</td><td>1.641</td></tr>
<tr><td>2020-21</td><td>1.799</td></tr>
<tr><td>2021-22</td><td>2.591</td></tr>
</table></td></tr>
<tr><td>3.1.2</td><td>Proposed method of mining with justification on suitability of method of mining</td><td>Seams to be worked on:
Presently opencast mining operation is going on to extract coal from IV Top, IV Bot, III Top & III Bot seams and it is also proposed to extract IV Top, IV Bot, III Top & III Bot seams through opencast operation.

Choice of Mining Method:
Considering the dip of beds and mining of multiple seams separated by multi partings, presently the opencast is being operated with Shovel-Dumper System of mining and same has been proposed in this mining plan.

Justification for Optimization of targeted capacity:
As per the mining parameters of the mine, the peak production of the mine is 2.80 MTY. The peak production from the mine can be achieved by better utilization of resources and favorable geo-mining conditions.

Sequence of mining:</td></tr>
</table>

परियोजना पदाधिकारी
Project Officer
कुईयॉ कोलियरी
Kuya Colliery

The mining shall be carried out in descending order.

Production Scheduling:

The calendar programme of mining operation has been formulated based on the adopted sequence of mine development and optimum condition of mining operation for the entire life of opencast project.

Year	Coal Production (M.Tes)	O.B.Removal (M.Cum)
Proposed		
2022-23	2.80	21.45
2023-24	2.70	20.68
2024-25	1.50	11.49
2025-26	0.783	5.99
TOTAL	**7.783**	**59.61**

SEAMWISE MINEABLE RESERVES

Seams	Mineable Reserve (MT) within delineated quarry
IV Top	1.367
IV Bottom	
III Top	0.903
III Bottom & Combined	5.513
Total	**7.783**

Parting Wise OB to be removed within delineated Quarry

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Partings	Volume M.Cum
Rehandling of loose OB (in terms of solid)	10.753
Top OB	30.821
Parting between IV TOP & IV Bottom	5.802
Parting between III Top & IV Bottom	7.429
Parting between III Top & III bottom	4.805
Total	59.61

Basic Dimensions of the Quarry

S. NO	Description	Unit	Value
1.	Area of Excavation	Ha	182.88
2.	Avg. Strike Length	M	1900
3.	Avg. Dip Rise Width	M	900
4.	Maximum depth	m	140
5.	Base of Quarry		III Bottom

Equipment configuration

Presently the mine operation is done by both departmental and outsourcing means. The details of major machinery deployed in departmental patch and Hired HEMM patch is given below:

Existing HEMM in Departmental HEMM

SL No.	Equipment	Capacity	Number
1	Shovels	EKG 5 Cum	2
		Hydraulic 2.9 Cum (01 Nos.)	5

परियोजना पदाधिकारी
Project
कुईयॉ कोलियरी
Kuya Colliery

		Hydraulic 4.5 Cum (03 Nos.) Hydraulic 5 Cum (01 Nos.)	
2	Dumpers	60 Te	28
3	Drills	160 mm dia	6
4	Dozer	355 HP	6
5	Water Sprinkler	28 KL	2

Existing HEMM in Hired HEMM Patch

SL No.	Equipment	Capacity	Number
1	Shovels	3.6 Cum	12
2	Dumpers	31 Te	80
3	Drills	150 mm dia	6
4	Dozer	300 HP	10
5	Water Sprinkler	12 KL	4
6	Grader	140 HP	3

Drilling & Blasting

O.B. will be excavated in benches after proper drilling & blasting. Drilling in OB benches will be done by 250mm/160mm drills. The blasted OB will be dozed, heaped and loaded on to dumpers for transportation to OB dumps.

Drilling in coal benches will be done by 100 mm/ 160mm drills and after proper drilling & blasting, the blasted coal will be loaded by Shovels on to dumpers for transportation up to the surface stock yard.

The standard practice involving the electric detonators for the initiation of detonating cord, detonating relays

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

to achieve hole-to-hole delays, use of Heavy ANFO, slurry or emulsion explosives as the column charge will be used for blasting.

The pattern of drilling and blasting will be decided during actual operation of the quarry. However, specific consumption of explosives has been envisaged as 0.3 kg/cum for OB and 0.2 kg/cum for Coal.

Transportation

The ROM coal from the OC will be transported by the tipping trucks from the pithead stock up to Feeder Breaker. After crushing the coal to (-) 100 mm coal is transported to different sidings.

Life of Mine

The balance life of mine for opencast project is 4 years at projected level of production.

Mining Operation

Opencast method with Shovel-Dumper System of mining is being used in the mine and same has been proposed in this mining plan. It is assumed that required excavation & transport capacity will be available for opencast mining operation.

Since Kuya Colliery is an existing opencast mine working as III bottom seam floor, the mine is already developed through access trench and box cut which is further fully developed into benches along the strike length above III Bottom seam floor. Surface Plan is shown in Plate no. II. The operation of the existing opencast mines will continue. It is suggested that the present operating mines, should work in such a fashion that the benches become straight and uniform, so that equipment deployment of the proposed

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

<table>
<tr><td></td><td></td><td>individual dump benches will be 37°. Width of berm between two adjacent benches will be about 40 m. Dumping will be done by End-Tipping method.
<u>Yearwise Dump Schedule</u>
<table>
<tr><th>Year</th><th>OB Removal (in M.Cum.)</th><th>Internal Dump (in M.Cum.)</th><th>External Dump (in M.Cum.)</th></tr>
<tr><td>2022-23</td><td>21.45</td><td>9.71</td><td>11.74</td></tr>
<tr><td>2023-24</td><td>20.68</td><td>9.37</td><td>11.31</td></tr>
<tr><td>2024-25</td><td>11.49</td><td>5.2</td><td>6.29</td></tr>
<tr><td>2025-26</td><td>5.99</td><td>2.71</td><td>3.28</td></tr>
</table></td></tr>
<tr><td>3.1.3</td><td>Coal production capacity proposed “Mtpa”</td><td>2.80 MTPA</td></tr>
<tr><td>3.1.4</td><td>Justification for optimization Coal production capacity</td><td>Considering the area available for quarry operation, availability of quantity of coal and OB in proposed quarry area, the coal production capacity as proposed in the report is justified.

As per the current mining parameters of the mine, peak coal production capacity of the proposed opencast operation of Kuya Colliery has been estimated at 2.80 MTY. This will be achieved upto 202-23.</td></tr>
<tr><td>3.1.5</td><td>Calendar year from which the production will start</td><td>It is running mines and production has already been started from Pre-nationalisation area.</td></tr>
<tr><td>3.1.6</td><td>Year of Achieving</td><td>2022-23</td></tr>
</table>

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

opencast can be facilitated better in the later stage. While working, the existing OB dump over the area bearing coal of IV Top, IV Bot, III Top & III Bot seams within delineated quarry area required to be rehandled.

The broad parameters Kuya Colliery (Opencast) are given here

- Mineable/Extractable Coal : 7.783 M.Tes
- Overburden including Loose OB : 59.61 M. Cum
- Av. Stripping Ratio : 7.659 M^3/Te

Floor of III Bottom seam is the base of the quarry.

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

OB Dump

Variation in thickness of OB will make it difficult to maintain uniform bench height in OB horizons. However, it is proposed to have a ceiling on OB bench height from safety reasons. The height of the bench generally shall not exceed the boom height of shovel. The height of the bench is proposed as 10 m. Out of total balance 59.61 M.Cum. of OB, 26.99 M.Cum. of OB will be dumped internally in the decoaled area of the quarry-on-quarry floor, 14.64 M.Cum. of OB will be dumped externally in the non-coal bearing area in eastern side within leasehold boundary and the rest around 17.98 M.Cum. will have to be dumped externally in excavated void area of adjoining Dobari Colliery. Since this is an existing mine, backfilling of OB in mined out area has already been started.

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

The final pit slope of the quarry has been planned at 43^0 for the final depth of the quarry (140 m).

Bench height for OB dumps will be 30 m and slope of

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	rated production	
3.1.7	Coal production Plan "MT"	

Year		Coal Production Schedule		
Year of Operation	Calendar Year	UG	OC	Total
Y-1	2022-23	0.00	2.80	2.80
Y-2	2023-24	0.00	2.70	2.70
Y-3	2024-25	0.00	1.50	1.50
Y-4	2025-26	0.00	0.783	0.783

Note: Calendar Plan/Production Plan for the entire life of the mine.

3.1.8	Peak/Rated Capacity - By OC - By UG - Overall	By OC-2.80 Mtpa By UG- Nil Overall- 2.80 Mtpa
3.1.9	Life of the mine: - By OC - By UG - Overall	By OC-4 years By UG- Nil Overall- 4 years
3.1.10	Whether the proposed external OB dump site is coal/lignite bearing: If so, whether coal/lignite below waste disposal area is extractable.	Proposed External dump site is Non Coal Bearing Area
3.1.11	Whether negative proving for coal / lignite in the proposed site for OB dump/infrastructure	Proposed External dump site is Non Coal Bearing Area

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

<table>
<tr><td></td><td>has been done.</td><td></td></tr>
<tr><td>3.1.12</td><td>Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment; future proposals.</td><td>Not Available</td></tr>
<tr><td>3.1.13</td><td>Type of Equipment/HEMM proposed</td><td>Presently the mine operation is done by both departmental and outsourcing means. For future operation same has been proposed.
<u>Existing HEMM in Departmental HEMM</u>
<table>
<tr><th>SL No.</th><th>Equipment</th><th>Capacity</th><th>Number</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Shovels</td><td>EKG 5 Cum</td><td>2</td></tr>
<tr><td>Hydraulic 2.9 Cum (01 Nos.)
Hydraulic 4.5 Cum (03 Nos.)
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<tr><td></td></tr>
<tr><td>2</td><td>Dumpers</td><td>60 Te</td><td>28</td></tr>
<tr><td>3</td><td>Drills</td><td>160 mm dia</td><td>6</td></tr>
<tr><td>4</td><td>Dozer</td><td>355 HP</td><td>6</td></tr>
<tr><td>5</td><td>Water Sprinkler</td><td>28 KL</td><td>2</td></tr>
</table>
<u>Existing HEMM in Hired HEMM Patch</u>
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परियोजना पदाधिकारी
Project Officer
कुईयॉ कोलियरी
Kuya Colliery

			1	Shovels	3.6 Cum	12
			2	Dumpers	31 Te	80
			3	Drills	150 mm dia	6
			4	Dozer	300 HP	10
			5	Water Sprinkler	12 KL	4
			6	Grader	140 HP	3

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Chapter 4 : Safety Management

	Parameters	Details
4.1	**MINING METHOD**	Elaborate safety measures have been laid out as per statute concerning safety in mines. In addition to existing provisions, reference has been made here to some special precautionary measures which have been considered important and require special attention for the safety of men and machinery. Safety of men and machine deployed in the mining area should be properly taken care of irrespective of whether the mining activities are performed by departmental or by outsourcing option. All the provisions and precautionary measures as stipulated in CMR 2017, (especially Reg. 106 to 110) and orders made there under shall be strictly complied with. The important safety aspects have been deliberated subsequently. In addition to those relevant clauses as stipulated in Act & Regulation, all clauses and sub clauses as mentioned in the permission granted by DGMS, Min. of Labour and Employment, GOI for working of Kuya colliery (OC) shall be followed strictly. The other rules / regulation applicable to mining industry shall be comply with like CEA Regulation 2010, Explosive Act etc.
4.1.1	**Important safety aspects:** Major Risks and uncertainties to the project viz. Proximity to river,	**a) Adjacent working** The neighboring mines have old underground working. **b) Geo-mining disturbances** The area under consideration is traversed by very few

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	rated production	
3.1.7	Coal production Plan "MT"	

Year		Coal Production Schedule		
Year of Operation	Calendar Year	UG	OC	Total
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Note: Calendar Plan/Production Plan for the entire life of the mine.

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परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

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<u>Existing HEMM in Hired HEMM Patch</u>
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परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

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परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Chapter 4 : Safety Management

	Parameters	Details
4.1	**MINING METHOD**	Elaborate safety measures have been laid out as per statute concerning safety in mines. In addition to existing provisions, reference has been made here to some special precautionary measures which have been considered important and require special attention for the safety of men and machinery. Safety of men and machine deployed in the mining area should be properly taken care of irrespective of whether the mining activities are performed by departmental or by outsourcing option. All the provisions and precautionary measures as stipulated in CMR 2017, (especially Reg. 106 to 110) and orders made there under shall be strictly complied with. The important safety aspects have been deliberated subsequently. In addition to those relevant clauses as stipulated in Act & Regulation, all clauses and sub clauses as mentioned in the permission granted by DGMS, Min. of Labour and Employment, GOI for working of Kuya colliery (OC) shall be followed strictly. The other rules / regulation applicable to mining industry shall be comply with like CEA Regulation 2010, Explosive Act etc.
4.1.1	**Important safety aspects:** Major Risks and uncertainties to the project viz. Proximity to river,	**a) Adjacent working** The neighboring mines have old underground working. **b) Geo-mining disturbances** The area under consideration is traversed by very few

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	adjacent working, geo-mining disturbances, slope stability and remedial measures suggested. It should also include proposed overall slope of the quarry and OB dump, dump height, strata control, fire and spontaneous heating, gas monitoring, disaster management, danger from inrush of water etc.	faults. The seams are free from igneous intrusions in the block. **c) Slope stability and remedial measures suggested** The slopes of the quarry and dumps have been proposed on the basis of experience in the adjoining areas. However, to ascertain optimum slope angles for stability of quarry batter and OB dumps a scientific study needs to be carried out (Ref. Regulation 106(2) of CMR 2017). Recommendation of this study report should be followed strictly to avert any slope failure in the mine. DGMS (Tech.) circular No. 03 of 2020 dated 16.01.2020 and other circular issued by DGMS from time to time for slope stability should be adhered to in letter and spirit. Monitoring being the most effective mitigation measures against any impending slope failure, a constant vigil in this regard should be maintained during active mine operation. **d) Disaster management** Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. The mining plan has been drawn in conformity with the prevailing statutory provisions as per Mines Act, 1952 & CMR 2017 applicable for safety in mines. A detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks. Safety Audit is an integrated component of Risk Assessment and Safety Management, which is required

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		f) Existing underground mine fire In addition to statutory provisions, the general measures for fire fighting and its prevention are as follows: 1) Organisation of special cell for systematic observations to examine and prevent fire. 2) Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating. 3) Storage of lubricants and cotton waste in enclosed fireproof containers in working places. 4) Provision of fire extinguishers The recommendation made in the DGMS (Approval) Circular No. 02, 2013 should strictly be followed in the mine to prevent fire in HEMM. It says that "all types of fire fighting and fire suppression system including automatic fire detection and suppression systems to be used in HEMMs, materials and chemicals to be used in fire fighting or suppression system in mines both on surface and below ground including oil and gas mines/fields shall conform to the following minimum requirement"; a) All types of fire fighting and fire suppression systems including automatic fire detection and suppression systems to be used in HEMMs, materials and chemicals to be used in fire fighting or suppression systems shall have valid test certificate(s) from any Government or Government approved Laboratory in compliance with relevant Indian Standards. b) All material used in the fire fighting/ fire suppressant

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		systems shall be non-toxic and in no manner harmful to human beings during handling and use. The high pressure storage vessels and hoses, if used with fire-fighting and fire suppressant systems, shall conform to the requirements stipulated in the relevant Indian Standards.
4.1.2	A Commitment from the Company Board that entire mining operation will be carried out as per the Statutory provision given under Mines Act 1952, Coal Mine Regulation 2017 and wherever specific permission will be required the company will approach the concerned authorities.	A Commitment from the Company Board that entire mining operation will be carried out as per the Statutory provision given under Mines Act 1952, Coal Mine Regulation 2017 and wherever specific permission will be required and the company will approach the concerned authorities for the same. The same will be furnished as a part of Annexure during the approval of the Mining Plan.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Chapter 5 : Infrastructure Facilities

	Parameters	*Details*
5.1	Mine infrastructure required e.g. Equipment maintenance planning, Office buildings, Workshop, Power supply arrangement, Water supply etc.	1. **Magazine**: There is no magazine at Kuya colliery. The explosive and detonators for consumption of the mine is brought from Central Magazine located at Bera about 4 KM away from the mine. Licence No. E/HQ/JH/22/294(E43380) Used By:- Bera, Dobari and Kuya Colliery. 2. **Workshop**: HEMM workshop at Kuya colliery situated in South –West side in mine- boundary. 3. **Central Workshop**: at Area Level situated at Chandmari. Pumps and motors are repaired here. 4. **Regional Store**: at Area Level situated at Bera Colliery 5. **Water Supply**: Drinking water is supplied from MADA. For other miscellaneous domestic work Pit water is supplied. 6. **Company's Road:** Network of colliery roads exist in the leasehold of the Mine and connected with Dhanbad to Baliapur road near Joyrampur More. 7. **Others**: Dispensary, Company's Quarters, Office, Hutments, and encroacher Existing arrangement is sufficient to cater proposed mine operation
5.2	Power supply & illumination.	**Power Supply Arrangement:** Kuya opencast project is receiving power at 33 KV/11KV from Goluckdih Main Sub-Station. The existing transformers at Kuya colliery (OC) are as under: -

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		1. Transformer: 11 KV/ 3.3 KV -1000KVA 2. Lighting Transformer: 11 KV/ 440V - 100KVA 3. Lighting Transformer: 11 KV/ 440V - 500KVA 4. Lighting Transformer: 3.3KV/ 220V - 10KVA 5. Lighting Transformer: 11 KV/ 440V - 100KVA 6. Lighting Transformer: 11 KV/ 400V - 500KVA 7. Lighting Transformer (2 Nos): 500 KV/ 220V - 10KVA 8. Lighting Transformer: 500 KV/ 440V - 20KVA 9. Lighting Transformer: 11 KV/ 440V - 250KVA 10. Power Transformer: 11 KV/ 3.3V – 2.5KVA 11. Power Transformer: 11 KV/ 550V - 750KVA 12. Lighting Transformer: 500 KV/ 440V - 100KVA 13. Lighting Transformer: 500 KV/ 440V - 250KVA 14. Lighting Transformer: 500 KV/ 440V - 250KVA Existing arrangement is sufficient to cater proposed mine-operation.
5.3	Coal Handling Arrangement: Brief detail of the CHP/Mode of Dispatch, Coal handling arrangement	• Coal production of the mine is linked to different power houses (Power plants of DVC and other companies) and washeries (Bhojudih washery & Dugda washery) through CK (West), BNR siding and Burragarh siding and rest quantity is transported through road to

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

		MPL, RTPS and E- Auction etc. The present lead for coal transportation from face to surface is 1 to 2 Km. C. K. West Siding is 3 to 4 KM and BNR Siding is about 10 KM from the coal dump. • Feeder breaker exists in KOCP and 3 Nos. of feeder breaker in C. K. West Siding. The coal has been crushed in Feeder Breaker. The crushed coal is stored in hopper. The standing tipping trucks below the hopper receive the crushed coal and spread it on the wharf. The contractual pay loader loads the coal into the railway wagons for further transport.
5.4	Coal washing and the proposed handling/disposal of rejects.	Coal washing facilities are not existing in Kuya colliery.
5.5	Existing Pumping Details	**0 - seam** **Sl. no** | **Capacity (GPM)** | **Pipe dia (Inch)** | **Head (m)** | **Remarks** 1 | 600 | 6 | 120 | Running 2 | 600 | 6 | 120 | Running 3 | 600 | 6 | 100 | Pipe line available **NC-Patch** **Sl. no** | **Capacity (GPM)** | **Pipe dia (Inch)** | **Head (m)** | **Remarks** 1 | 800 | 6 | 100 | Diesel Pump 2 | 800 | 6 | 100 | Diesel Pump 3 | 800 | 6 | 100 | Diesel Pump 4 | 800 | 6 | 100 | Diesel Pump 5 | 2000 | 8 | | Pipe line Available 6 | 2000 | 8 | | Pipe line Available 7 | 4000 | 10 | | Pipe line Available 8 | 4000 | 10 | | Pipe line Available

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Chapter 6 : Land Requirement

	Parameters	Details
6.1	**LAND REQUIREMENT**	
6.1.1	Total Land requirement for the mine in "Ha"	The breakup of ownership wise land within leasehold boundary of Kuya Colliery as furnished by Colliery Authority is given below:
6.1.2	During mining Land use details:	

PARTICULARS	AREA (in Hectare)
BCCL Land	141.33
Forest Land	117.51#
Govt. Land	35.06
Tenancy Land	46.60
Total Land	**340.50**

Out of the above forest land, forest Clearance in respect of remaining **16.49** Ha is under process. The land other than BCCL holding has to be transferred to BCCL / to be acquired by BCCL.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Kuya

Unit: Ha

Type	Existing Land use (Plan & data as furnished by Colliery Authority)	Post Mining Land use
Excavation Area including Excavation void	62.60	52.25
Backfilled Area	72.22	143.63
External OB Dump	36.68	7.10
Peripheral Haul Road	-	7.50
Road & Infrastructure area	3.00	6.50
Top Soil Dump	1.20	
Green Belt/Plantation	16.49	77.34
UG Entry	0.01	
Undisturbed/ Mining right for UG/Barren Land	119.81	29.68
Homestead land	15.00	15.00
Agriculture Land	4.86	
Water Body	-	1.50
Rationalization Area	8.09	
Embankment	0.530	
Garland Drain	0.01	
Total	**340.50**	340.50

6.1.3	Surface features over the block area	Important surface features and major diversion or shifting involved in the mine is given below: **Road:** Jharia Baliapur DB Road
6.1.4	No. of villages/Houses to be shifted	Nil. However, as per JMP 226 families from identified endangered area will be shifted.
6.1.5	Population to be affected by the project	Nil. However, 904 affected populations from identified endangered area will be shifted

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

6.1.6	Proposed Rehabilitation programme	To be shifted as per JMP (Govt. of India approved master plan for dealing with fire, subsidence and rehabilitation within leasehold of BCCL)

	Parameters	*Details*
6.2	**DETAILS OF LEASE**	
6.2.1	Status of Lease	Lease available under provision of Mineral Concession Rules 1960
6.2.2	Existing Lease Area "Ha"	340.50 Ha as per Colliery Record
6.2.3	Period for which Mining Lease has been granted/is to be renewed/is to be applied for.	Mining lease has been granted by nationalisation. Valid upto 7th December 2030
6.2.4	Date of expiry of earlier Mining Lease, if any	Not applicable
6.2.5	Whether the lease boundary/required boundary is same as mentioned in the allotment order	Mining lease has been granted by nationalisation. The applied lease area includes the existing lease area.
6.2.6	Lease Area (applied/required) as per the Mining Plan under consideration (Ha)	Lease Area is 340.50 Ha as per Colliery Record.
6.2.7	Whether the applied lease area falls within the allotted block	Applied lease area is falling inside the allotted block (BCCL)
6.2.8	Area (Ha) of lease which falls outside the delineated block/sub-block	
6.2.9	Details of outside area:	No outside block area has been considered for project area of this mine
	▪ Whether forms part of any other coal block	Not Applicable
	▪ Whether it contains any coal/lignite reserves	Not Applicable
	▪ Purpose for which it is required, e.g. roads/OB dumps/service	Not Applicable

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Kuya

	buildings/colony/safety zone/others(specify)	
6.2.10	Whether some part(s) of the allotted block has not been applied for mining lease.	The whole area in the existing lease area has been proposed for mining lease
	- Total area in Ha of such part(s).	Not Applicable
	- Total reserves in such part(s). (Mt)	Not Applicable
	- Brief reasoning for leaving such part(s)	Not Applicable

परियोजना पदाधिकारी
Project Officer
कुईयॉ कोलियरी
Kuya Colliery

Chapter 7: Environmental Management

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<tr><td>16</td><td colspan="2">ENVIRONMENTAL MANAGEMENT</td></tr>
<tr><td>a.</td><td>Commitment from the project proponent that the company will comply Environment and Forest Condition stipulated in the respective clearances</td><td>
Kuya Colliery (OC) is situated in the Cluster VIII group of mines of BCCL under the administrative control of Bastacolla Area.
The impacts (both beneficial and adverse) of mining and its allied activities of the project have been assessed and presented in respect of biophysical & socio-economic environment.

<u>Air Quality Management:</u>
The impact assessment has been carried out dealing with the following points:
(a) Phase-wise inventory of air pollution emission sources
(b) Impact assessment
Sources
i. During Operational Phase
<table>
<tr><td>(i)</td><td>Drilling & Blasting</td><td>:</td><td>Noise & Dust and SO_2 ,NO_2</td></tr>
<tr><td>(ii)</td><td>Handling of coal</td><td>:</td><td>Noise, Dust and SO_2 ,NO_2</td></tr>
<tr><td>(iii)</td><td>Movement of vehicles</td><td>:</td><td>Noise, Dust and SO_2 ,NO_2</td></tr>
</table>
ii. During Post Operational Stage
<table>
<tr><td>(i)</td><td>Movement of dozers for physical reclamation of subsided area</td><td>:</td><td>Noise, Dust and SO_2 ,NO_2</td></tr>
<tr><td>(ii)</td><td>Movement of vehicles for shifting and salvaging operation of OC Machineries and other equipment</td><td>:</td><td>Noise, Dust and SO_2 ,NO_2</td></tr>
<tr><td>(iii)</td><td>Movement of vehicles for clearing of coal and other materials</td><td>:</td><td>Noise, Dust and SO_2 ,NO_2</td></tr>
</table>
</td></tr>
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परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Impact Assessment

The ambient air quality is influenced due to the presence of PM_{10}, $PM_{2.5}$, SO_2, NO_2, etc., which are generated from above sources in operational and post operational stages of coal mining.

Further, the ambient air quality is affected to a varying degree due to the mining activities of other nearby opencast and underground coalmines of the same coalfield. The concentration of pollutants may vary depending upon the various micro-meteorological parameters and the seasons of a year.

Fortnightly Ambient Air Quality Monitoring of Cluster –VIII consisting of Kuya colliery (OC) is being carried out at following stations as part of routine Environmental Monitoring by CMPDI RI-II, Dhanbad:

CORE ZONE Monitoring Location

i) Dobari UGP (A11) : Industrial Area

BUFFER ZONE Monitoring Location

i) Jeenagora (A13) : Industrial Area
ii) Hurriladih UGP (A28) : Industrial Area
iii) Kusmatand Village (A12): Industrial Area

Air quality monitoring data at above stations for the period August 2022 to October 2022 is as given in the following tables.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Dobari UGP (A11)

Sl. No.	Parameter	Observed Values (in µg/m3)					
		1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
		01.08.22	26.08.22	09-09-2022	22-09-2022	03.10.2022	21.10.2022
1	PM_{10}	73	74	89	120	92	124
2	$PM_{2.5}$	55	36	43	68	54	68
3	SO_2	11	<10	11	12	10	11
4	NO_2	24	26	22	25	22	23

Jeenagora (A13)

Sl. No.	Parameter	Observed Values (in µg/m3)					
		1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
		02.08.22	22.08.22	08-09-2022	23-09-2022	09.10.2022	20.10.2022
1	PM_{10}	116	87	113	92	98	96
2	$PM_{2.5}$	65	53	70	62	58	53
3	SO_2	10	11	<10	10	12	<10
4	NO_2	8	12	16	20	30	26

Hurriladih UGP (A28)

Sl. No.	Parameter	Observed Values (in µg/m3)					
		1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
		11.08.22	19.08.22	14-09-2022	27-09-2022	13.10.2022	28.10.2022
1	PM_{10}	66	111	98	124	96	129
2	$PM_{2.5}$	29	36	53	68	53	70

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

3	SO_2	10	<10	<10	11	<10	11
4	NO_2	15	16	22	24	21	20

Kusmatand Village (A12):

Sl. No.	Parameter	Observed Values (in µg/m3)					
		1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
		02.08.22	29.08.22	08-09-2022	23-09-2022	09.10.2022	20.10.2022
1	PM_{10}	94	98	84	94	87	117
2	$PM_{2.5}$	53	57	50	52	53	67
3	SO_2	10	<10	12	<10	<10	11
4	NO_2	26	25	24	20	22	20

Keeping in view the above data it is evident that the air pollution in and nearby Cluster –VIII mines is generally within the GSR 742(E) Standards for Coal Mines of Jharia Coalfield but occasionally exceed the NAAQS standards. Following measures will be adopted to mitigate Air pollution from Kuya Colliery (OC):

i. At the points of dust generation, Fog Cannon/Mist Sprinklers shall be installed along with water sprinkling / spraying.

ii. Development of Greenbelt around quarry.

iii. Plantation will be done on external dump and reclaimed area.

iv. Regular maintanence of HEMM.

v. Controlled blasting will usually be done in daytime during the shift change over

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

period.

vi. Appropriate design of the geometry of blast holes.

vii. Coal transportation will be done through covered trucks/conveyor belt to washery and also to the siding.

viii. Wet Drilling.

Water Quality Management:

Sources

(i)	Sanitary (domestic) wastewater	:	Suspended solids and BOD.
(ii)	Water pumped out from Mine	:	Suspended solids of coal, clay and oil.
(iii)	Surface run-off passing through coal stockpiles	:	Suspended solids.
(iv)	Storm water from leasehold area and built-up area	:	Suspended solids.

Water Quality Report

Any adverse impact or pollution consequence of water will have serious effect on the environment. Hence, it becomes important to assess the water quality periodically in the mining area. Thus, to assess the water quality, samples were collected from one (01) location (for mine water) and analysed for physico-chemical characteristics. The water

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

sampling points were selected by consultation between BCCL & JSPCB officials. The different sources of water were identified for water quality characterization depending on their use for potable/industrial purposes and considering likely impact on these sources due to project activities. Based on these considerations, it was thought necessary to assess the existing quality of different water sources in the study area including both up & down stream of surface water body, ground water and mine water.

Mine Water Quality at Dobari OC:-

Sl. No.	Parameter	Observed Values					
		1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
		08.08.2022	22.08.2022	12.09.2022	26.09.22	03.10.22	31.10.22
1	Total Suspended Solids	41	58	39	36	52	45
2	pH	8.17	8.08	8.12	8.13	8.08	7.69
3	Oil & Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4	COD	36	32	32	36	28	24

Water pollution control measures:

i. Garland drains will be made around the periphery of the quarry and OB dump to collect and carry the contaminated water to treatment/settling pond shall be provided.

ii. Oil & Grease trap to treat effluent from Workshop.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

iii. Entire domestic effluent will be treated in septic tanks and soaked into soak pits.

iv. Industrial water will be put into a closed circuit.

v. Properly designed system to collect and divert the storm water shall be provided.

Ground water resources

In coal mines, the different aquifers overlying the working coal seam would be contributing groundwater to the mine by gravity drainage which need to be pumped out for safe operation of the mines.

Generally steep draw down cone would be formed in poor potential aquifers thereby the influence area is to small distance and reverse is established in respect of aquifers with high hydraulic conductivity. The Impact of mining activities is likely to be pronounced in the dip side which are estimated by utilising aquifer and mine parameters at final mine depth. It may be appropriate to mention here that the presence of prominent boundaries/water bodies, faults and also interfringing of sandstone and shale beds may restrict the propagation of draw down cone.

Further, the ground water level decline is more in the close vicinity of the pit. The effect will be pronounced in the down – dip side and milder in the up – dip side. But this effect will be temporary in nature and once the project is over, after 2-3 rains, the regime will regain its almost original status.

Water conservation measures

i. Provision of Rain water Harvesting system has been made for conservation of water.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

ii. Settling pond for surface run-off with drainage system shall be provided.

iii. Closed water circuit will be provided.

Impact on Noise level

Fortnightly Noise Level Monitoring in of Cluster –VIII consisting of covering the Kuya Colliery (OC) is being carried out at following stations as part of Routine Environmental Monitoring by CMPDI RI-II, Dhanbad:

Core Zone:

Dobari OCP Industrial Area

Noise level data at the aforementioned stations is as given below:

Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))					
			1st FN	2nd FN	1st FN	2nd FN	1st FN	2nd FN
			01.08.22	26.08.22	09-09-2022	22-09-2022	03.10.2022	21.10.2022
1	Noise Level dB(A) Leq - Day	06:00 - 07:00	50.8	48.3	48.7	49.9	50.8	48.3
2		07:00 - 08:00	53.4	51.6	52.0	52.1	53.4	51.6
3		08:00 - 09:00	55.6	54.1	55.1	54.6	55.6	54.1
4		09:00 – 10:00	62.2	59.4	61.7	62.5	62.2	59.4
5		10:00 - 11:00	63.7	61.5	63.0	62.8	63.7	61.5
6		11:00 - 12:00	62.2	60.1	60.8	61.2	62.2	60.1
7		12:00 - 13:00	66.7	63.0	63.5	63.0	66.7	63.0

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

8		13:00 - 14:00	62.5	64.3	63.9	64.3	62.5	64.3
9		14:00 - 15:00	60.7	65.2	63.0	65.2	60.7	65.2
10		15:00 - 16:00	59.7	57.7	58.1	57.7	59.7	57.7
11		16:00 - 17:00	59.1	57.2	49.3	48.7	49.3	48.7
12		17:00 - 18:00	58.7	56.7	49.3	50.1	49.3	50.1
13		18:00 - 19:00	57.8	55.9	47.7	46.5	47.7	46.5
14		19:00 - 20:00	56.5	54.8	45.5	44.9	45.5	44.9
15		20:00 - 21:00	55.3	54.1	45.6	44.1	45.6	44.1
16		21:00 - 22:00	52.4	51.6	45.7	42.9	45.7	42.9
		Leq DAY	**60.5**	**59.6**	**59.1**	**59.6**	**59.8**	**59.0**
1	Noise Level dB(A) Leq -Night	22:00-23:00	45.5	44.2	45.0	44.2	44.5	44.8
2		23:00- 00:00	43.8	43.9	47.1	46.8	43.9	46.8
3		00:00- 01:00	44.2	43.2	46.5	45.2	43.2	42.5
4		01.00-02.00	43.5	42.9	46.9	46.8	42.9	42.2
5		02.00-03.00	42.1	42.3	44.0	44.2	42.3	41.5
6		03.00-04.00	42.5	41.2	50.5	50.2	49.8	50.2
7		04.00-05.00	40.7	41.6	44.1	43.9	41.5	45.6
8		05:00-06:00	40.0	40.1	40.0	40.1	42.0	44.1
		Leq NIGHT	**43.1**	**42.6**	**46.4**	**46.0**	**44.7**	**45.6**

Noise pollution control measures

i. Adequate and regular maintenance of plants and machineries will be carried out.

ii. The noise absorbing pads at foundations will be provided.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

iii. Green belt has been proposed to prevent the propagation of sound and also to dampening its intensity.

iv. Proper blasting techniques by designing a suitable blasting pattern after actual field observation would be followed to minimize adverse effects of ground vibration and noise if required.

v. Personal protective gears are given to workmen exposed to dusty and noise work environment.

Hazardous Waste:

Details of Hazardous waste generated and their method of disposal:

Sl.No.	Waste description	Method of disposal
1.	Used oil	Will be stored in drums safely in store for disposal through auction to the authorized re-processors
2.	Oil and grease	
3.	Used batteries	To be stored safely for auction to the authorized re-processors.
4.	Oily sludge	To be disposed in impervious layer lined pits.
5.	Filters & filter materials containing oil during maintenance of vehicles	

- Door to door Municipal Solid Waste will be collected and subsequently this waste will be disposed by Municipal Corporation as per existing Rules.
- Sewage will be treated in Septic Tank cum Soak Pit prior to disposal.

परियोजना अधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Socio-Economic Issues:

The project is likely to give a boost to the economy of the area by providing primary and secondary employment to local people . The infra-structural facilities including healthcare facilities provided by the project will benefit local villagers. The progressive mine closure activity is likely to significantly reduce the impact of mining activity on the land apart from increasing the green cover and surface water availability. The yearly CSR expenditure as per existing CIL Policy ie 2% of average net profit of the company for the immediate three preceeding years or 2.00 per tonne of coal production of previous year whichever is higher, which is proposed to be spent in vicinity of Kuya Colliery (OC) will help in bringing about better socio-economic benefits to the local population.

Top Soil Management

a) Topsoil storage and preservation:

i) Following three zones are developed in the topsoil mound during storage:

- Aerobic zones: Soil is active in this zone
- Transition zone: Fluctuates between predominantly aerobic and anaerobic status.
- This zone is inactive and low in biological activity as well as organic content.

➢ Stripping of Top Soil: Standard method of stripping will be used. The operation must be planned to mininmise the movement of machines and vehicles to avoid compaction and damage of soil structure. Further careful control of operation is necessary to ensure planned stripping depths of the topsoil and sub-soil. These soils should be stripped and

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

stored separately. Intermingling of these soils during stripping is not a good practice.

➢ It is essential that topsoil stripping should be carried out when it is dry as far as possible to reduce the risk of compaction and damage to the soil structure by smearing and remoulding. Prolonged rainfall is unsuitable. The best part of the year is when evapo-transportation exceeds precipitation i.e during the months of March-September.

➢ Geometry of Topsoil Heap: The heap should be constructed to facilitate the following:

- To provide the maximum surface area for mantaining greater level of Biological activity.
- To have slopes capable of sustaining vegetation to avoid erosion and gully formation.

Space constraints imposed by the site factors and soil texture would generally dictate the overll size and shape of the heap.

As a rule of the thumb, the following stack geometry may be mantained as far as possible to preserve the topsoil and increase the shelf life.

- Height:

i) 4.0m (Max) for sand soil

ii) 2.0 to 3.0 for loamy soil

- Slope:

i) Wide slope of 1 in 3 (i.e 18.5^0 to the horizontal)

It is advisable to avoid the topsoil storage, specifically the longterm one.

However if storage is unavoidable upon completion of the surface of the heap, the

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

following steps are to be followed to keep the soil in good health and to increase its shelf life :

- Surface ripping with suitable sub-soiling machine for the purpose of aeration and relieving surface compaction.
- Immediate cultivation of suitable low maintanance species like dwarf grasses to prevent erosion and guily formation.
- Maintenance of surface vegetation actively by seeding, mowing, and weed control operation.

b) Topsoil redistribution: -

After the final grading, the topsoil would be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the post mining land uses, contours, and surface water drainage system.

Biological reclamation

For successful biological reclamation of the reclaimed area, preference will be given to endemic species and mixed culture. The species will be selected carefully from the following groups for quick reclamation :

- Nitrogen fixing tree species for fuel wood, timber and fodder
- Fruit bearing tree species
- Tree species with dense foliage for shade
- Flowering and ornamental tree species

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

***Plantation detail as per plantation plan**

Plantation Details	Year	PLANTATION		Total Plantation (cumulative)	Remarks
		Area (ha)	Trees/ saplings		
During Post Mining Period	01-04	0	0	0	-
	PC-1	23.36	58,400	58,400	-
	PC-2	15.72	39,300	97,700	-
	PC-3	17.78	44,450	1,42,150	-
	TOTAL	**56.86**	**1,42,150.00**		

Monitoring & Management Organisation:

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

ORGANISATION CHART

Sl. No.	Measures/Actions		Agency
1.	Environmental Pollution Control	1	General Manager, Bastacolla Area
		2	Nodal Officer, (Environment), Bastacolla Area
		3	Project Officer, Kuya Colliery (OC)
		4	Area Manager (Civil), Bastacolla Area
		5	Environment Cell (BCCL H.Q.)
2.	Environmental Monitoring	1	General Manager, Bastacolla Area
		2	Area Manager (Civil), Bastacolla Area

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

					3	Nodal Officer, (Environment), Bastacolla Area
					4	Project Officer, Kuya Colliery (OC)
					5	Environment Cell of BCCL Headquarters
					6	Environmental Laboratory of CMPDI, RI-II, Dhanbad
			3.	Reclamation	1	Project Officer, Kuya Colliery (OC)
					2	Nodal Officer (Environment), Bastacolla Area

परियोजना पदाधिकारी
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कुईयाँ कोलियरी
Kuya Colliery

Chapter 8: Progressive and Final Mine Closure Plan

- Mine Closure Plans will have two components viz. i) Progressive or Concurrent Mine Closure Plan, and ii) Final Mine Closure Plan. Progressive mine Closure Plan would include various land use activities to be done continuously and sequentially during the entire period of the mining operations, whereas the Final mine Closure activities would start towards the end of mine life, and may continue even after the reserves are exhausted and/or mining is discontinued till the mining area is restored to an acceptable level. The Mine Closure details of the Mining Plan should be oriented towards the restoration of land back to its original condition as far as practicable.
- Mining is to be carried out in a phased manner along with reclamation and afforestation work in the mined out area.
- Progressive mine closure plans shall be prepared for a period of every five years from the beginning of the mining operations. These plans would be examined periodically in every five years period and to be subjected to the third party monitoring by the agencies approved by the Central Government, like Central Mine Planning and Design Institute Ltd. (CMPDIL), National Environmental Engineering Research Institute (NEERI), Indian Institute of technology (IIT-ISM) or any other institutes/organizations/agencies specified from time to time for the purpose.
- Various project specific activities viz. mined-out land details & their technical and biological restoration plan, water quality management, infrastructure to be retained and demolished, disposal of mining machinery, etc. has been furnished in the relevant paras. As the backfilling of the mine void is not being carried out as part of regular mining operation, it shall not be included in the list of progressive mine closure activities. However, in case, if the backfilling of mine void is being carried out specifically for closure of the mine in future due any reason, the same shall be included in the list of activities to be taken up for mine closure.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	Parameters	Details
8.1	**Land Degradation and restoration Schedule**	

8.1.1 Land Degradation and Technical Reclamation (Cumulative Areas in "Ha")

Stage/Year		Land Degraded				Technically Reclaimed Area			
		Excav	Dump (Extn+Top Soil)	Infra/others*	Total	Backfill	Dump (Extn+Top Soil)	Batter/Infra/others	Total
Up to Base year*		146.31			146.31	71.6			71.6
Y-1	22-23	17.84			17.84				0
Y-2	23-24	17.2	12.92		30.12				0
Y-3	24-25	9.55	16.02		25.57				0
Y-4	25-26	4.98	8.36		13.34	41.42			41.42
Post Closure					0				0
Y=5	26-27				0	82.86	37.3		120.16
Total		**195.88**	**37.3**	**0**	**233.18**	**195.88**	**37.3**	**0**	**233.18**

Note: *All calculations are cumulative upto the year.

8.1.2 Biological Reclamation (Cumulative in "Ha")

Stage/Year	Biologically Reclaimed Area					Forest land (Return)	Un Disturbed/ To be left for Public/com Use	Total
	Agriculture	Plantation	Water Body	Public Company Use	Total			
Up to Base year*	0	0	0	0	0			
Y-1	0	0	0	0	0			
Y-2	0	0	0	0	0			
Y-3	0	0	0	0	0			
Y-4	0	0	0	0	0			
Post Closure								
Y-5	0	23.36	0	0	23.36			
Y-6	0	15.72	0	0	39.08			
Y-7	0	17.78	0	0	56.86			
		56.86						

8.2	**Post Closure Water Quality management**:	Routine Environmental Monitoring will be carried out for water quality analysis of following samples for Five years post closure period:

S. No.	Sample	Frequency

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		1 Mine Water — Fortnightly Half Yearly 2. Surface Water — Quarterly 3. Ground Water — Quarterly If any discrepancy from statutory standards is observed, necessary corrective measures will be undertaken by the management.
8.3	**Post Closure Air Quality management**:	A total Plantation of area **56.86 Ha** is being proposed at the proposed external overburden dump of the Kuya Colliery (OC). This has been phased entirely during the post mining closure phase. Plantation during mining period will be undertaken after 4 years of mine life, only after the completion & stabilization of the Dump will the plantation be undertaken on the Internal Dump. (Yearly Plan shown in 8.1.2) Fortnightly Air Quality Monitoring will be carried out at 03 Air Quality monitoring Stations during five years post closure period.

8.4 **Waste Management** (Figures in Mm^3)

Stage/Year		OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top Soil	OB	Total	Top Soil	OB	Top Soil	OB	Top Soil	OB
Y-1	22-23	0.016	21.434	21.45	0.016	11.724		9.71		
Y-2	23-24	0.015	20.665	20.68	0.015	11.295		9.37		
Y-3	24-25	0.008	11.482	11.49	0.008	6.282		5.2		
Y-4	25-26	0.004	5.986	5.99	0.004	3.276		2.71		
Total		**0.043**	**59.567**	**59.61**	**0.043**	**32.577**	**0**	**26.99**		

8.5 Top Soil Management – (Including Action Plan for Top Soil Management)

(All Figures are in MM^3)

Stage/Year		Top Soil Removal Plan	Top Soil Used				
			Spreading Over Embankment	Spreading Over Backfill area	Spreading over External OB Dump area	Used in Green Belt Area	Total Utilised
Y-1	22-23	0.016					
Y-2	23-24	0.015					
Y-3	24-25	0.008					
Y-4	25-26	0.004					

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

	Post Closure							
	Y-5	26-27				0.07	0.07	0.14
	Y-6	27-28				0.07	0.07	0.14
	Y-7	28-29				0.07	0.08	0.15
	Total		**0.043**			**0.21**	**0.22**	**0.43**
8.6	Management of Coal Rejects.		There is no existing or proposed washery in the Colliery.					

8.7 Restoration of Land used for Infrastructure

All the other infrastructure related to both the opencast & underground coal mining operation will be dismantled, after end of the reserve/ mine life. The list of infrastructure to be dismantled at the end of the mine life is given in the following table:

Sl. No.	Particulars
1.	Office
2.	Workshop – if not used for other projects
3.	UG machinery – if present will be shifted to other collieries for use.

8.8 Disposal of Mining Machinery

After end of life of proposed KUYA Colliery (OC), all mining machinery will be shifted to other mines of BCCL.

8.9 Safety & Security

Fencing around Opencast Workings:

i) The top edge of the opencast working shall be kept fenced with wire rope strands or barbed wire, supported by posts of timber, iron or concrete (movable). The gap between the adjacent rope strand or wires shall not be more than 0.30 m and bottom most rope, strand or wire shall not be more than 0.25 m and the topmost rope, strand or wire shall not be less than 1.0 m from ground level.

8.10 Abandonment Cost and Financial Assurance

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

8.10.1 Abandonment Cost: Cost of Activities to be taken up for closure of the mine**

Activity Cost for Mine Closure Plan of KUYA Colliery

	Head	Parameters	Unit	Quantity	Rate Rs/Unit apr 2020)**	Escalated Amount in Crs.
Progressive Closure	Progressive Closure	Water Quality Management	LS	1	10,00,000.00	0.1078
		Air Quality Management	LS	1	40,00,000.00	0.4310
		Waste Management	MM3			-
		Barbed wire fencing around dump	m	0	2,500.00	-
		Barbed wire fencing around the pit	m	0	2,500.00	-
		Filling of Void- Rehandling of Crown Dump	MM3			-
		Top Soil Management	MM3	0.50	2,50,00,000.00	1.3469
		Technical and biological Reclamation of Mined cut of land and OB Dump	Ha	143.63	15,00,000.00	23.2149
		Plantation over virgin area including green belt	Ha	0	4,00,000.00	-
		Manpower Cost and supervision	Years	4	13,00,000.00	0.5603
		Toe wall around the dump	m	0	10,000.00	-
		Garland Drain	m	1000	2,100.00	0.2263
		Garland Drain around the dump	m	1000	2,100.00	0.2263
		Any other Activity(Subsidence management)	Ha	1	2,00,000.00	0.0216
Post Closure	Dismantling of Infrastructure & Disposal / rehabilitation of Mining Machinery	*Dismantling of workshop (half of the area considered)*	sq m	2500	550.00	0.1482
		Rehabilitation of the Dismantled facilities	LS	1	10,00,000.00	0.1078
		Dismantling of pumps /other facilities (Assumed Data)	No.	5	1,00,000.00	0.0539
		Dismantling of pipes/other facilities	Km	4	2,50,000.00	0.1078
		Dismantling of Stowing Bunker, provisioning of pumps for bore well pumping arrangement	CUM	0	3,000.00	-
		Dismantling of UG equipment	L.S.	0	4,50,000.00	-
		Rearranging water pipeline to dump top park / Agriculture land (Assumed Data)	Km	2.0	1,50,000.00	0.0323
		Dismantling of power lines (33KV H.T. Line) (Assumed Data)	*km*	*1*	2,00,000.00	0.0216
	Safety and Security	Barbed wire fencing around dump	m	3500	2,500.00	0.9428
		Barbed wire fencing around the pit	m	1300	2,500.00	0.3502
		Barbed wire fencing with masonry pillar	m	0	3,000.00	-
		Concrete wall with Masonry pillars around the pit	m		6,112.74	-

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Activity Cost for Mine Closure Plan of KUYA Colliery

Head	Parameters	Unit	Quantity	Rate Rs/Unit apr 2020)**	Escalated Amount in Crs.
	Securing air shaft and installation of bore well pump	sqm	0	2,400.00	-
	Securing incline	sqm	0	15,000.00	-
	Concrete wall fencing around water body	m	0	8,354.53	-
	Boundary wall around the water body	m	250	6,471.28	0.1743
	Stabilization (viz benching, pitching etc.) of side walls of the water body	sqm	1000	2,550.00	0.2748
	Toe wall around the dump	m	0	9,000.00	-
	Garland Drain	m	0	2,100.00	-
	Garland Drain around the dump	m	3500	2,100.00	0.7922
	Drainage Channel from main OB Dump (Assumed Data)	m	300	2,100.00	0.0679
Technical and Biological Reclamation of Mined Out of land and OB Dump	Filling of Void				-
	Top Soil Management	MM3		2,50,00,000.00	-
	OB Rehandling for backfilling	Ha	0	17,00,000.00	-
	Terracing, Blanketing with soil and vegetation of External OB Dump	sqm		600.00	-
	Peripheral road, gates, view point cemented steps on bank	m	1600	5,000.00	0.8620
	Expenditure on development of Agricultural land	Ha			-
	Landscaping and Plantation	Ha	56.86	4,00,000.00	2.4507
Post Closure management and supervision	Power Cost	LS	1	10,00,000.00	0.1078
	Post Mining Water quality management	samples	38	9,265.00	0.0700
	Post Mining Air quality management		216	28,781.00	0.7004
	Subsidence monitoring for 5 years	LS	1	4,50,000.00	0.0485
	Waste Management		0		-
	Manpower Cost and supervision	Years	3	15,00,000.00	0.4849
Others	Entrepreneurship development (Vocational/ Skill development training for sustainable income of affected people)	To be decided by BCCL Management			1.5000
	Golden Handshake/ Retrenching benefits to 100 employees of OC	To be decided by BCCL Management			
	Golden Handshake/ Retrenching benefits to 200 employees of UG	To be decided by BCCL Management			
	Onetime financial grant to societies/institutions/organizations which is dependent upon the project	To be decided by BCCL Management			
	Provide jobs in other mines of the Company	To be decided by BCCL Management			

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

Activity Cost for Mine Closure Plan of KUYA Colliery					
Head	**Parameters**	**Unit**	**Quantity**	**Rate Rs/Unit apr 2020)****	**Escalated Amount in Crs.**
	Continuation of other services like running of Schools etc.	To be decided by BCCL Management			
Total					**35.4329**

Note: ** The costs & rates shown in the table above are only estimated and the exact cost for these activities can be established at the time of execution only. If the total cost at the time of execution of above mentioned activities exceed the total estimated cost, the shortfall shall be borne by the company.

परियोजना पदाधिकारी
Project Officer
कुईया कोलियरी
Kuya Colliery

8.10.2 Financial Assurance: Amount to be deposited in Escrow account as a security against the mine activities to be carried out of the closure of the mine

Mine Closure Cost Calculation for KUYA Colliery			
WPI as on	Apr-19	121.1	
WPI as on base date	Nov-22	152.1	
Escalation rate of Closure cost-		1.255987	
	UG	OC	
Base Rate of Closure Cost "Rs . Crs/Ha"	0.015	0.09000	
Closure Cost "Rs. Crs/Ha"	0.01884	0.11304	
Project Area	0	300.50000	
Amount to be deposited into Escrow Account "Rs. in Crs.	0.00000	33.9682	
Amount already deposited into Escrow Account "Rs. in Crs.	0	15.07650	
Net Amount to be deposited into Escrow Account "Rs. in Crs.	0.00000	18.8917	
Rate of compounding of Annual Closure Cost		5.00%	
Balance Life of the project "in yrs"	0	4	
Annual Closure Cost	0.0000000	4.7229	
Amount to be deposited into Escrow Account after compounding @ of 5% "Rs. in Crs"		**20.35636**	
Life of the mine considered is 4 years Project area taken is 300.50 Ha.			

Amount to be deposited into escrow account annually				
Year	**UG**	**Year**	**OC**	**Total**
1	0.00	1	4.7229	4.7229
2	0.00	2	4.9591	4.9591
3	0.00	3	5.2070	5.2070
4	0.00	4	5.4674	5.4674
Total	**0.00**	Total	**20.3564**	***20.3564***

The amount calculated above shall be deposited every year by BCCL in the Escrow Account in the name of Kuya Colliery (OC). Thus, total amount that shall be further

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

deposited for final mine closure activities of Kuya Colliery (OC) during the life of 4 years stands out to be **Rs. 20.3564 Crs.** as per the present status of the mine.

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for mine closure activities **Rs. 35.4329 Crs.**

Particulars	Amount (Rs. in Crs)
Amount Already Deposited in Escrow Account	**15.0765**
Amount to be Deposited in the Escrow Account in the Future	**20.3564**
Total Amount available for Mine Closure Activities	**35.4329**

The money deposited in the Escrow Account has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for final mine closure

Sl. No.	Name of Mine	Account No.
1	KUYA GROUP OF MINES	00150100008874

- ***A Mine Closure Plan of the Kuya group of mines above have already been approved by 340th BCCL Board held on 23.03.2018 along with corresponding escrow account numbers have already been opened with Bank of Baroda as mentioned in table above. The same escrow account may be continued for this revised mine plan.***
- ***Subsequently, after the completion of 1st Five year period after approval of the MCP in 2013, an amount of Rs. 88,88,907 was released as a part of 50% component of claimed amount Rs. 1,77,77,813 by Office of Coal Controller Office vide Order No. CC/MCPS/Policy/2013-14/328 (Pt-II) dated 24/06/2020.***
- **Implementation of the approved Mine Closure Plan shall be sole responsibility of the mine owner**. Mining is to be carried out in a phase manner i.e. continuation of mining activities from one phase to another indicating the

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery

sequence of operations depending on the geo-mining conditions of the mine. Up to 50% of the total deposited amount including interest accrued in the escrow account may be released after every five years in line with the periodic examinations of the closure plan. The amount released should be equal to expenditure incurred on the progressive mine closure in past five years or 50% whichever is less. The balance amount shall be released to the mine owner//leaseholder at the end of the final mine closure on compliance of all provisions of Closure Plan. This compliance report should be duly signed by the lessee and certify that said closure of mine complied all statutory rules, regulations order made by the central or state government, statutory organizations, court etc. and certified by the coal controller.

Final Mine Closure would be considered to be completed only after acceptance of the third party audit report by the coal controller on the compliance of all provisions on Mine Closure Plan. Any institute/ Organization/ Agency as may be notified by the Government for this purpose may be engaged for third party audit.

परियोजना पदाधिकारी
Project Officer
कुईयाँ कोलियरी
Kuya Colliery