

Mine Plan and Mine Closure Plan
(First Modification/Revision)
For

Sahapur West Coal Mine

SOHAGPUR
(Under Rule 22E of MCR 1960)
Shahdol
Madhya Pradesh

Project area 619.0 ha

Targeted Capacity 0.60 MTPA
Peak Rated Capacity -0.9000MTPA

Prepared By
DMT Consulting Private Limited

Contact No. - 9831964790
Email ID - ajaykumar.singh@dm-group.com

APPLICANT

Sarda Energy and Minerals Limited

Registered Office: 73 A, Central Avenue, Nagpur, Maharashtra 440018, India

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CHECKLIST

Details		Status
Chapter-1	Project Information	<input checked="" type="checkbox"/>
Chapter-2	Exploration,Geology, Seam Sequence, Coal Quality and Reserve	<input checked="" type="checkbox"/>
Chapter-3	Mining	<input checked="" type="checkbox"/>
Chapter-4	Safety Management	<input checked="" type="checkbox"/>
Chapter-5	Infrastructure Facilities proposed and their Location	<input checked="" type="checkbox"/>
Chapter-6	Land Requirement	<input checked="" type="checkbox"/>
Chapter-7	Environment Management	<input checked="" type="checkbox"/>
Chapter-8	Progressive & Final Mine Closure Plan	<input checked="" type="checkbox"/>
Annexure	Copy of allotment order /Vesting order.	<input checked="" type="checkbox"/>
Annexure	<p>Certificate of Qualified person/ Accredited Mining Plan preparing agency (MPPA) if the project area is confined within the vested/allotted block boundary/existing mining lease and</p> <p>Where the project area extends beyond the block boundary, a certificate of Qualified person/ Accredited Mining Plan preparing agency (MPPA) should be supported with a certificate of State Government mines and Geology department must be attached, which should specify</p> <p>(a) intent of the state government for grant of lease beyond the vested geological boundary/existing mining lease</p> <p>(b) non-existence of Coal/ Lignite in the area beyond the vested geological block boundary/existing mining lease to rule out the issue of encroachment and use of coal bearing area beyond the vested/allotted block boundary/existing mining lease) in the mining plan</p>	<input checked="" type="checkbox"/>
Annexure	Approval of the Company Board	<input checked="" type="checkbox"/>
Annexure	Copy of earlier approval of mining plan.	<input checked="" type="checkbox"/>
Annexure	Plan / chart showing schedule of Implementation of Mine closure activities (progressive and final closure) with duration of important activities	<input checked="" type="checkbox"/>
Annexure	Expert-Review Report carried out by an Accredited Mining Plan Preparing Agency (MPPA)	<input checked="" type="checkbox"/>
Annexure	Other document (if any)	<input checked="" type="checkbox"/>
Plates	Location plan	<input checked="" type="checkbox"/>
Plates	<p>Plan certified by Qualified person/ Accredited Mining Plan preparing agency (MPPA) if the project area is confined within the vested/allotted block boundary/existing mining lease and where the project area extends beyond the block boundary, a certificate of Qualified person/ Accredited Mining Plan preparing agency (MPPA) should be supported with a plan with cardinal co-ordinates duly certified by the Mines and Geology Department of the concerned State Government.</p> <p>Plan in support of Annexure - II</p>	<input checked="" type="checkbox"/>
Plates	<p>Printed copy of the KML file superimposed in the recent (not older than one year from the base date) dated satellite Image duly certified by Accredited Agency should also be attached.</p> <p>Note: The soft copy of the KML file shall also be part of the Soft copy of the mining Plan.</p>	<input checked="" type="checkbox"/>
Plates	Cadastral plan showing approved block boundary vis-A-vis proposed/existing mining lease & Mine boundary superimposed over it in distinct color, showing land use and infrastructure etc.	<input checked="" type="checkbox"/>
Plates	Geological plan showing all the boreholes drilled and proposed to be drilled showing allotted block boundary and required lease area.	<input checked="" type="checkbox"/>
Plates	Representative Graphic Litholog	<input checked="" type="checkbox"/>
Plates	Surface Plan showing drainage system, Contour, preferably at 3m interval, location of BH (borehole)	<input checked="" type="checkbox"/>
Plates	Conceptual plan showing infrastructure facilities including colony, boundary of mining area, mine entries, roads including road diversion alignment etc.	<input checked="" type="checkbox"/>

Plates	Tentative land use plan showing land type (Govt., forest and tenancy land) with its data source.	✓
Plates	Floor contour plan and seam folio plan, iso-grade plan	✓
Plates	Cross-section showing coal/lignite seam(s)	✓
Plates	Plan showing existing and proposed surface layout(s)	✓
Plates	Plan showing total coal thickness and overburden thickness and stripping ratio (in case of opencast (OC) Mines)	✗
Plates	Final stage quarry plan showing haul road alignment (in case of OC Mines)	✗
Plates	Plan showing mode and location of entries and surface layouts (in case of underground (UG) Mines)	✓
Plates	Layout of the panel for each system (like Longwall, Continuous Miner, Bord & Pillar, road header etc.) should be given (in case of UG Mines)	✓
Plates	Layout of pillar extraction (in case of UG Mines)	✓
Plates	Support system (in case of UG Mines)	✓
Plates	Haulage and transport system (in case of UG Mines)	✓
Plates	Post mining land use plan	✓
Plates	Progressive mine closure plan/ stage plans	✓
Plates	Reclamation plan	✓

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1.1 Introduction

S.No	Parameters	Details
1.1.1	Name of the Coal/Lignite Block	Sahapur West Coal Mine
1.1.2	Name of the Coalfield/ Lignite Field.	SOHAGPUR
1.1.3	Base date of Mining Plan/ Mine Closure Plan.	01/09/2021
1.1.4	Linked End Use Plant.	Commercial coal sale including sale to affiliates, captive consumption, coal gasification, coal liquefaction and export of coal etc.
1.1.5	Distance of End Use Plant from the pit head of the project in âkmâ.	Not Applicable
1.1.6	Mode of Coal Transport	Rail despatch from Shahdol for Bulk customers and for small customers truck despatch

S.No	Parameters	Details
1.2.1	Location of coal deposit.	Sahapur West Coal Mine is located about 12 km North-West of Shahdol township in Pali Sohagpur Tehsil, Umaria and Shahdol district of Madhya Pradesh. It is bounded by latitudes N23deg14min19sec - 23deg15min33sec and longitudes E81deg17min10sec - 81deg18min49sec. The block is covered in Survey of India toposheet no. 64 E-7 and E-8
	State	Madhya Pradesh
	District	Shahdol
1.2.2	Communication	The block is well connected by Road. Shahdol town located on National Highway No. 43 is about 12 km from the proposed coal mine. A metalled road connecting Shahdol and Ghunghuti passes within 800m of the northwest of the block. Few roads pass across the block and connect with Kusamha Khurd in the south of the block. The nearest railway station is Shahdol located at around 12 km South-East of the block on Anuppur Chirimiri Bilaspur Katnibroad gauge line of South-Eastern Railways. Jabalpur is the nearest Airport located about 178 km from the project site.
1.2.3	Availability of power supply & water etc.	Nearest source of power for this coal block is 5 MVA 33 KV Thadipathar Substation, in Narwar gram panchayat of District Umaria of MPSEB located about 3.5 km from the project site. Ghogra Nallah flows from south to north in the central part of the block. The Ghinachuhia Nallah also passes in South-Eastern part before entering into Sahapur East Block. Water is proposed to be sourced from the Nalla by conducting check dam across the Ghogra nalla and treated for potable utilisation. Industrial requirement is proposed to be met through treating water pumped from the mine.
1.2.4	Prominent physiographic features, drainage pattern, natural water courses, rainfall data, highest flood level.	The block area has a slightly undulating topography and almost covered by cultivated land with altitudes varying between 478 m and 503 m above MSL. General slope in the ground can be observed towards Ghogra Nallah. The lease area forms a part of Sone River catchment area and is drained by Ghogra Nallah which flows northerly draining the storm water from the lease area. These streams have seasonal over flooding during monsoon season. The Ghogra Nallah passes through the central part of the block almost dividing the block into two equal parts. The rainy season starts from mid-June to September. The average rainfall in the area varies from 1000 mm to 1700 mm annually. The HFL of Ghogra Nallah is not known. The nalla enters the block from south at an RL of 503 and exits the block in north at an RL of 482. The nearest river is Sone River located at a distance of 17.23 km in the ENE direction flowing from SE to NW. Bagaiha nallah is located at a distance of 3 km in NE. The above mentioned nalla and river are not posing any danger of inundation as their HFLs are far below the general level of the block (The level of river is 400 m AMSL and that of the nallah is 450m AMSL while the lowest RL at surface of block is 479.45 m AMSL recorded at MSSW 52. Before commencement of mining operation HFL of Ghogra Nallah will be determined and all safety precautions will be observed against it.
1.2.5	Important surface features within the project area and major diversion or shifting involved.	The proposed mining block comprises majorly of private land and small portions of Govt, land and Forest land. There is habitation of three villages namely, Kosmaha, Khamaria Kalan, Khamaria Khurd, lying within the block boundaries. No relocation and rehabilitation of village has been proposed. Ghogra Nallah is a seasonal tributary of Son River flows through central part of the proposed block. Road passing through the western part of the block and another road which connects Shahdol on North-East and Khamaria in South East. No diversion of Nallah and road is proposed in the project area.

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10 KAWAII DR. E.A.
CMT. CONGRESS RD. ARLINGTON
VA 22204-3896

M. K. TÖRÖT

S.No	Parameters	Details
1.3.1	Name of the Allottee	Sarda Energy and Minerals Limited
1.3.2	Details of allotment/vesting Order.	NA-104/2/2020-NA
1.3.2(B)	Allocation/Vesting Order Date	2021-03-03
1.3.3	Name and address of the Applicant	Registered Office: 73 A, Central Avenue, Nagpur, Maharashtra 440018, India
1.3.4	Name of the previous Allottee of the Block.	National Mineral Development Corporation Limited Hyderabad
1.3.5	Starting date of the Mine as per CMDPA/CBDPA	02/09/2025
1.3.6	Rated capacity as per CMDPA/CBDPA	0.60
1.3.7	Production Schedule as per opening permission (meeting provisions of CMDPA if any).	The production schedule envisaged meet the provisions of Schedule I as provided in the CMDPA
1.3.8	End Use of Coal/ Lignite as per allotment order if any	Commercial coal sale including sale to affiliates, captive consumption, coal gasification, coal liquefaction and export of coal
1.3.9	Cardinal points coordinates of the Block Boundary	Cardinal Points files data shown below

Cardinal Points co-ordinates of the Block boundary :

S.NO	Latitude	Longitude
1.0	23°15'32.476"	81°17'10.594"
2.0	23°15'32.593"	81°17'17.447"
3.0	23°15'32.606"	81°17'21.042"
4.0	23°15'32.620"	81°17'24.637"
5.0	23°15'32.633"	81°17'28.232"
6.0	23°15'32.646"	81°17'31.826"
7.0	23°15'32.659"	81°17'35.421"
8.0	23°15'32.672"	81°17'39.016"
9.0	23°15'32.686"	81°17'42.611"
10.0	23°15'32.699"	81°17'46.205"
11.0	23°15'32.712"	81°17'49.800"
12.0	23°15'32.725"	81°17'53.395"
13.0	23°15'32.738"	81°17'56.990"
14.0	23°15'32.751"	81°18'0.584"
15.0	23°15'32.764"	81°18'4.179"
16.0	23°15'32.777"	81°18'7.774"
17.0	23°15'32.790"	81°18'11.369"
18.0	23°15'32.803"	81°18'14.964"
19.0	23°15'32.816"	81°18'18.558"
20.0	23°15'32.829"	81°18'22.153"
21.0	23°15'32.842"	81°18'25.748"
22.0	23°15'32.855"	81°18'29.343"
23.0	23°15'32.868"	81°18'32.937"
24.0	23°15'32.881"	81°18'36.532"
25.0	23°15'32.893"	81°18'40.127"
26.0	23°15'32.906"	81°18'43.722"
27.0	23°15'32.919"	81°18'47.317"
28.0	23°15'29.593"	81°18'47.355"
29.0	23°15'26.267"	81°18'47.393"
30.0	23°15'22.941"	81°18'47.432"
31.0	23°15'19.615"	81°18'47.470"
32.0	23°15'16.289"	81°18'47.509"
33.0	23°15'12.963"	81°18'47.547"
34.0	23°15'9.636"	81°18'47.586"
35.0	23°15'6.310"	81°18'47.624"
36.0	23°15'2.984"	81°18'47.662"
37.0	23°14'59.658"	81°18'47.701"
38.0	23°14'56.332"	81°18'47.739"
39.0	23°14'53.006"	81°18'47.778"
40.0	23°14'49.680"	81°18'47.816"
41.0	23°14'46.354"	81°18'47.855"
42.0	23°14'43.028"	81°18'47.893"
43.0	23°14'43.028"	81°18'47.931"
44.0	23°14'36.376"	81°18'47.970"
45.0	23°14'33.050"	81°18'48.008"
46.0	23°14'29.724"	81°18'48.047"
47.0	23°14'26.397"	81°18'48.085"
	23°14'23.071"	81°18'48.123"

S.NO	Latitude	Longitude
49.0	23°14'19.745"	81°18'48.162"
50.0	23°14'19.738"	81°18'44.572"
51.0	23°14'19.731"	81°18'40.983"
52.0	23°14'19.723"	81°18'37.393"
53.0	23°14'19.716"	81°18'33.803"
54.0	23°14'19.708"	81°18'30.214"
55.0	23°14'19.701"	81°18'26.624"
56.0	23°14'19.693"	81°18'23.034"
57.0	23°14'19.686"	81°18'19.445"
58.0	23°14'19.678"	81°18'15.855"
59.0	23°14'19.671"	81°18'12.265"
60.0	23°14'19.663"	81°18'8.676"
61.0	23°14'19.656"	81°18'5.086"
62.0	23°14'19.648"	81°18'1.496"
63.0	23°14'19.640"	81°17'57.907"
64.0	23°14'19.633"	81°17'54.317"
65.0	23°14'19.625"	81°17'50.727"
66.0	23°14'19.617"	81°17'47.138"
67.0	23°14'19.609"	81°17'43.548"
68.0	23°14'19.602"	81°17'39.958"
69.0	23°14'21.035"	81°17'37.099"
70.0	23°14'22.47"	81°17'35.131"
71.0	23°14'23.904"	81°17'33.164"
72.0	23°14'25.339"	81°17'31.197"
73.0	23°14'26.774"	81°17'29.229"
74.0	23°14'28.185"	81°17'27.242"
75.0	23°14'30.226"	81°17'24.268"
76.0	23°14'31.61"	81°17'22.253"
77.0	23°14'32.992"	81°17'20.239"
78.0	23°14'34.375"	81°17'18.226"
79.0	23°14'35.757"	81°17'16.212"
80.0	23°14'37.14"	81°17'14.198"
81.0	23°14'38.522"	81°17'12.184"
82.0	23°14'39.357"	81°17'10.968"
83.0	23°14'42.677"	81°17'10.945"
84.0	23°14'45.997"	81°17'10.921"
85.0	23°14'49.317"	81°17'10.898"
86.0	23°14'52.637"	81°17'10.875"
87.0	23°14'55.956"	81°17'10.851"
88.0	23°14'59.276"	81°17'10.828"
89.0	23°15'2.596"	81°17'10.805"
90.0	23°15'5.916"	81°17'10.781"
91.0	23°15'9.236"	81°17'10.758"
92.0	23°15'12.556"	81°17'10.734"
93.0	23°15'15.876"	81°17'10.711"
94.0	23°15'19.196"	81°17'10.688"
95.0	23°15'22.516"	81°17'10.664"
96.0	23°15'25.836"	81°17'10.641"
97.0	23°15'29.156"	81°17'10.618"

1.4 Details of the Previous Approval of Mining Plan:

S.No	Parameters	Details												
1.4.1	Date of approval :	07/02/2012												
	Copy of earlier approval of mining plan Upload document	Annexure 4 : Document shown in annexure section.												
1.4.2	Conditions, if any	<table> <tr> <th>S.No.</th><th>Conditions</th><th>Compliance Status</th></tr> <tr> <td>1</td><td>The mining Company shall take all necessary precautions regarding safety of mine workings, person deployed therein</td><td>-</td></tr> <tr> <td>2</td><td>Mining Lease to be acquired shall not encroach into any other block</td><td>-</td></tr> <tr> <td>3</td><td>The approval is without prejudice to the requirement of approvals from competent/prescribed authority under relevant rules/regulations etc.</td><td>-</td></tr> </table>	S.No.	Conditions	Compliance Status	1	The mining Company shall take all necessary precautions regarding safety of mine workings, person deployed therein	-	2	Mining Lease to be acquired shall not encroach into any other block	-	3	The approval is without prejudice to the requirement of approvals from competent/prescribed authority under relevant rules/regulations etc.	-
S.No.	Conditions	Compliance Status												
1	The mining Company shall take all necessary precautions regarding safety of mine workings, person deployed therein	-												
2	Mining Lease to be acquired shall not encroach into any other block	-												
3	The approval is without prejudice to the requirement of approvals from competent/prescribed authority under relevant rules/regulations etc.	-												

1.4.3	Scheduled year of start of production.	2014-15			
1.4.4	Proposed year of achieving the targeted production	Year-2			
1.4.5	Date of actual commencement of mining operations, if operations already started.				
1.4.6	Likely date of mining operations, if operations not yet started & reasons for non-commencement of operations.	Non Operational Reasons not known			
1.4.8	Statutory obligations vis-à-vis compliance status in a tabular form				
		S.No	Clearance Type (Mining Plan, Mining Lease Environment, Forest, CTO etc)	Conditions	Compliance Status
		1	Approval of Mining Plan and Mine Closure Plan	Mining Plan and Mine Closure Plan approved on 07-February-2012 in name of Prior Allottee Ms NMDC Limited. Operations not commenced by the prior allottee. Conditions stipulated in the referred approval are as below, 1. The mining Company shall take all necessary precautions regarding safety of mine workings, person deployed therein 2. Mining Lease to be acquired shall not encroach into any other block	Mine has not commenced operation and compliance status not known
		2	Environmental Clearance	Environmental Clearance not obtained	Not Applicable
		3	Forest Clearance	Forest Clearance not obtained	Not Applicable
		4	Grant of Mining Lease	MoC granted the prior approval on ML application of Shahpur West Coal Block on 02.08.2012	Not Applicable
1.4.9	Reasons for difference between the planned and actual production levels	Not Applicable			

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

S.No	Block Area	Approved Mining Plan	Proposed Mining Plan
1.5.1	Geological Block Area HA	587.50	619.0000
1.5.2	Geological Block Area Projectised HA	587.50	619.0
1.5.3	Lease area HA	587.50	619.0000
1.5.4	Project area HA	587.50	619.0000
1.5.5	Life of the Project Yrs.	24	19
1.5.6	Minimum and Maximum Depth of working	59m to 144m	72.15m to 141.73m
1.5.7	Geological Block Area yet to be projectised "Ha"	0	0.00
1.5.8	Production Target MTP	0.60	0.6000
1.5.9	Seams Available As per GR	SeamIV, SeamL2, SeamIII A, SeamIII B, SeamIII L, SeamII, SeamI, SeamL1	Seam-IV,Seam-L2,Seam-III A,Seam-III B,Seam-III L,Seam-II,Seam-I,Seam-L1

1.5.10	Seams not considered for Mining with Reasons		S. No	Seams	Reason
			1	Seam-IV	Not considered for UG as this seam is developed in patches and have not attained workable thickness.
			2	Seam-III B	Seam develops to workable thickness in western and south eastern part of the block but parting with III A (0.30 – 2.93 m) does not allow any workings.
			3	Seam-III L	Not considered for UG as this seam is developed in patches and have not attained workable thickness.
			4	Seam-I	Seam I is impersistent within the block and does not attain workable thickness.
			5	Seam-L1	Not considered for UG as this seam is developed in patches and have not attained workable thickness.
1.5.11	Gross Geological Reserve Mte	38.376	38.376		
1.5.12	Net Geological Reserve Mte	30.770	35.7330		
1.5.13	Blocked Reserve Mte	9.491	18.3500		
1.5.14	Minable Reserve Mte	21.279	17.3800		
1.5.15	Extractable Reserve Mte	13.433	10.3800		
1.5.16	% of Extraction/ recovery	43.64%	29.0490%		
1.5.17	Reserve Depleted (till the base date) Reserves Mte	0	0.0000		
1.5.18	Balance Extractable Reserve Mte	13.433	10.3800		
1.5.19	Average Grade	G6 to G7	5450.0000		
1.5.20	OB in MM3	0	0.0000		
1.5.21	SR M3/te	0	0.0000		
1.5.22	Mining Technology	Mechanised bord and pillar underground mining by Continuous Miner with shuttle cars as well as LHDs and SDLs with solid blasting method	Mechanised bord and pillar underground mining by Continuous Miner with shuttle cars as well as LHDs and SDLs with solid blasting method		
1.5.23	Coal Beneficiation envisaged				
1.5.24	Handling of Rejects	Rejects not envisaged	Rejects not envisaged		
1.5.25	Land use pattern “ Ha“				
1	Excavation Area	0	0.0000		
2	Top Soil Dump	0.36	0.0300		
3	External Dump	0.50	0.0000		
4	Safety Zone	0	0.0000		
5	Other Use	6.01	1.3760		
6	Infrastructure area	4.73	14.8750		
7	Green Belt	1.27	8.0180		
8	Undisturbed Area	574.63	594.7010		
Total		587.5000	619.0000		
1.5.26	Reasons for revision		Change in block area with respect to Approved mining plan- Approved MP- 587.50 Ha and Proposed MP-619.0 Ha. Revision in extractable reserves, since seam thickness of 1.5 m and more has been considered for UG mining		

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

2.1 Details of the block

S.No	Parameters	Details	
2.1.1	Particulars of adjacent blocks: North, South, East, West	North	Senduri Coal Block
		East	Sahapur (East) Coal Block
		South	Singhpur North Coal Block
		West	Nil
2.1.2	Location of the Block	Sahapur West coal block is in the Sohagpur Coalfields, in the northern belt of Son-Mahanadi basin. The block occupies an area of about 6.19 sq. km. It is located in between latitudes 23deg14min19sec to 23deg15min33sec and longitudes 81deg17min10sec to 81deg18min49sec within the districts of Shahdol and Umaria in Madhya Pradesh state in the Survey of India Toposheet Nos. 64 E/7 and 64 E/8. The nearest railhead is Shahdol, which is also the district headquarter and is 10 km away from the block. Highway No. 43 also passes through Shahdol.	
	State	Madhya Pradesh	
	District	Shahdol	
2.1.3	Area of the Block "Ha"	619.00	
2.1.4	Area of the geological block projectized in "Ha" (Area of the geological block considered for liquidation of coal reserve)	619.0	
2.1.5	Balance area yet to be projectized "Ha"	Nil	
2.1.6	Likely Reserve in the area yet to be projectized "Mte"	0	
2.1.7	Cardinal Point Co-ordinates of the non-coal/lignite bearing area/existing mining lease outside the allotted Geological Coal/Lignite block	Not Applicable Certified Cardinal Points files data is attached as Annexure II in chapter 9	
	(Duly certified in line with para 1.9 of the Guideline, if fresh minning lease required)	Cardinal Points files data shown below	
2.1.8	Certificate of Qualified person/ Accredited Mining Plan preparing agency (MPPA)if the project area is confined within the vested/allotted block boundary/existing mining lease and Cardinal Points Co-ordinates of the Proposed area outside the non-coal/lignite bearing area outside the allotted Geological Coal/Lignite block	Annexure 2A Annexure 2B The Project area, Lease area and geological block area in Ha shall also be envisaged.	Document shown in annexure section. Document shown in annexure section. The certificate of MPPA for existence of the proposed block boundary within the vested block boundary is provided as Annexure II.
2.1.9	KML file of the Proposed lease area, Project Area and geological block.	File attached in Plates section below.	
2.1.10	Whether the proposed project area is confined within the allotted block boundary/existing mining lease, if not, the reason for deviation from allotted block boundary, may be given.	The proposed project area is confined within the allotted block boundary	
2.1.11	If the project area extends outside the allotted block boundary/existing mining lease, confirmation about non-occurrence of coal/lignite in the area under reference needs to be furnished	Not Applicable	
2.1.12(1)	Year of Starting.	2025	
2.1.12(2)	Type of the Project.	This is a new coal mine project under implementation	

(Duly certified in line with para 1.9 of the Guideline, if fresh minning lease required) :

S.NO	Latitude	Longitude
1.0	23°15'32.476"	81°17'10.594"
2.0	23°15'32.593"	81°17'17.447"
	23°15'32.606"	81°17'21.042"

S.NO	Latitude	Longitude
4.0	23°15'32.620"	81°17'24.637"
5.0	23°15'32.633"	81°17'28.232"
6.0	23°15'32.646"	81°17'31.826"
7.0	23°15'32.659"	81°17'35.421"
8.0	23°15'32.672"	81°17'39.016"
9.0	23°15'32.686"	81°17'42.611"
10.0	23°15'32.699"	81°17'46.205"
11.0	23°15'32.712"	81°17'49.800"
12.0	23°15'32.725"	81°17'53.395"
13.0	23°15'32.738"	81°17'56.990"
14.0	23°15'32.751"	81°18'0.584"
15.0	23°15'32.764"	81°18'4.179"
16.0	23°15'32.777"	81°18'7.774"
17.0	23°15'32.790"	81°18'11.369"
18.0	23°15'32.803"	81°18'14.964"
19.0	23°15'32.816"	81°18'18.558"
20.0	23°15'32.829"	81°18'22.153"
21.0	23°15'32.842"	81°18'25.748"
22.0	23°15'32.855"	81°18'29.343"
23.0	23°15'32.868"	81°18'32.937"
24.0	23°15'32.881"	81°18'36.532"
25.0	23°15'32.893"	81°18'40.127"
26.0	23°15'32.906"	81°18'43.722"
27.0	23°15'32.919"	81°18'47.317"
28.0	23°15'29.593"	81°18'47.355"
29.0	23°15'26.267"	81°18'47.393"
30.0	23°15'22.941"	81°18'47.432"
31.0	23°15'19.615"	81°18'47.470"
32.0	23°15'16.289"	81°18'47.509"
33.0	23°15'12.963"	81°18'47.547"
34.0	23°15'9.636"	81°18'47.586"
35.0	23°15'6.310"	81°18'47.624"
36.0	23°15'2.984"	81°18'47.662"
37.0	23°14'59.658"	81°18'47.701"
38.0	23°14'56.332"	81°18'47.739"
39.0	23°14'53.006"	81°18'47.778"
40.0	23°14'49.680"	81°18'47.816"
41.0	23°14'46.354"	81°18'47.855"
42.0	23°14'43.028"	81°18'47.893"
43.0	23°14'43.028"	81°18' 47.931"
44.0	23°14'36.376"	81°18'47.970"
45.0	23°14'33.050"	81°18'48.008"
46.0	23°14'29.724"	81°18'48.047"
47.0	23°14'26.397"	81°18'48.085"
48.0	23°14'23.071"	81°18'48.123"
49.0	23°14'19.745"	81°18'48.162"
50.0	23°14'19.738"	81°18'44.572"
51.0	23°14'19.731"	81°18'40.983"
52.0	23°14'19.723"	81°18'37.393"
53.0	23°14'19.716"	81°18'33.803"
54.0	23°14'19.708"	81°18'30.214"
55.0	23°14'19.701"	81°18'26.624"
56.0	23°14'19.693"	81°18'23.034"
57.0	23°14'19.686"	81°18'19.445"
58.0	23°14'19.678"	81°18'15.855"
59.0	23°14'19.671"	81°18'12.265"
60.0	23°14'19.663"	81°18'8.676"
61.0	23°14'19.656"	81°18'5.086"
62.0	23°14'19.648"	81°18'1.496"
63.0	23°14'19.640"	81°17'57.907"
64.0	23°14'19.633"	81°17'54.317"
65.0	23°14'19.625"	81°17'50.727"
66.0	23°14'19.617"	81°17'47.138"
67.0	23°14'19.609"	81°17'43.548"
68.0	23°14'19.602"	81°17'39.066"
69.0	23°14'21.035"	81°17'37.099"
70.0	23°14'22.47"	81°17'35.131"
71.0	23°14'23.904"	81°17'33.164"

Regional Geology

The rocks of Sohagpur Coalfield, located within Son Valley, exhibit a general E-W trend with a low northerly dip and is bounded by latitudes 23°05' and 23°30' & longitudes 81°13' and 82°12'. The Sahapur West Block falls in the north-western part of Sohagpur Coalfield. The southern margin of the Sohagpur Coalfield runs close to the junction of Kewai and Tipon rivers with the Son while eastern and north-eastern boundaries imperceptibly merge with the Sonhat-Jhiliimli Coalfields. Towards north, it runs upto the Upper Gondwana formations and in the west, post Barakar sediments are present. In the south-west, the coal measures are separated from the Deccan Traps of Maikal range by narrow outcrops of Lameta beds.

Regional geological succession is given in below table,

Age	Formation	Lithology
Recent		Soil & Alluvium
-----Unconformity-----		
Eocene to Upper Cretaceous	Deccan Trap	Effusive and intrusive rocks, mostly basalt and dolerite
-----Unconformity-----		
Upper Cretaceous	Lameta Beds	Reddish & greenish sandstones & nodular limestones
-----Unconformity-----		
Upper Triassic (Upper Godwana group)	Supra Barakars/ Mahadeva	Pink, buff & red sandstone, red shales etc.
-----Unconformity-----		
Lower Permian	Barakar	Coarse to medium grained sandstone, sub-ordinate shales & coal seams (320m+)
Lower Permian to Upper Carboniferous (Lower Godwana group)	Talchir	Diamictite, sandstone, siltstones & needle shales (430m+)
-----Unconformity-----		
Precambrian	Metamorphosis	Porphyritic granite-gneiss with aplite and pegmatite veins

Description of Geological Formation: -

The formations of Sohagpur Coalfield are briefly described below.

Precambrian Rocks

The Precambrian basement rocks are not exposed in the vicinity of the coalfield but crop out as inliers within the Talchir Formation south of the Son River and also in the Hasdo river section east of Manendragarh. The predominant rock type is pink porphyritic gneiss.

Talchir Formation

The Talchir sediments comprising of tillite, green and chocolate shales, rhythmites and sandstones, are found to the south of the coalfield and cover the large tract between Sohagpur in the west and the Bishrampur-Lakhanpur-Hasdo-Arand basins to the east and south-east.

Barakar Formation

The Barakar Formation shows characteristic vertical variation in the arrangement of litho facies and this permits sub dividing into three distinct litho-stratigraphic units. The strata grouped within the Lower member having thickness 80m to 150m and consisting of greyish white, feldspathic sandstones with minor amounts of shale, conformably overlies the Talchir Formation. It is usually devoid of any workable coal seams. The 200m to 300m thick overlying strata form the upper part includes several workable coal seams. Garnet grains, which are ubiquitous in the lower beds, are present in lesser amounts in the coal-bearing unit. Succeeding this coal-bearing unit is a 200m thick sequence of ferruginous sandstones, shales and laminated siltstones having a sharp lithological contrast with the underlying coal-bearing sequence. A Barren Measures status has been assigned to this lithostratigraphic unit. The Upper member the Raniganj formation shows the re-appearance of coal seams which are however of inferior quality. The thickness of this member is 300m to 500m.

Supra Barakara/Mahadeva Formation

In the northern part of the coalfield, a sequence of very coarse grained, pebbly sandstones and ferruginous sandstones constitute the prominent ridge referred to as 'Mahadeva beds'. These beds occur over a vast area between Sohagpur and Singrauli Coalfields and maintain a more or less similar lithological make up over the entire tract.

Lameta Beds

These rocks consisting of poorly consolidated sandstones occur along the fringes of the trap covered hills in the south west and are well exposed in the neighborhood of Kapildhar, Turri and Ghitouri villages. They are present unconformably over the Gondwana strata.

Basic rocks

The Barakar formation of Sohagpur Coalfield is traversed by a large number of basic dykes and sills. The most prominent sill is noted in the eastern part of the coalfield near Patraundih; it extends over a strike length of about 70 km across the river Son and the outcrop attains a width of over 4 km at places. Another prominent dolerite body occurs to the north of the Sone river and this extends over a length of over 50 km. Dolerite dykes are quite common in the eastern and western parts of the field with varying lengths from a few metres to over 5 km and width from 2m to about 25m. Most of the dykes trend ENE-WSW to east-west. At places, the dykes have been affected by transverse NNW-SSE trending faults.

Regional Structure

The Sohagpur Coalfield constitutes the middle segment of the Rewa Gondwana basin and has a regional east-west elongation in conformity with the alignment of the basin belt. The beds have a general WNW-ESE to East-West trend and dip at very low angles (1° to 4°) towards NNE or North. The Sohagpur basin is composed of three well-defined sub-basinal structures: Jhagrakhand sub-basin to the east, Kotma-Jamuna sub-basin in the middle and the Burhar-Amlai sub-basin to the west. The prominent structural feature of the Sohagpur basin is the system of ENE-WSW to east-west trending sub-parallel faults. The most important of these faults is the Bamni-Chilpa fault, which runs along the middle part of the coalfield having a throw over 400m at places. In addition to this major fault, there are a number of east-west or ENE-WSW trending faults. Two more sets of faults are present trending NW-SE and NE-SW, but the frequency of these faults is low. It can be summarized that the east-west trending faults were active periodically during sedimentation and the fault movement might have taken place over a protracted period of time.

The geological succession established in Sahapur West Block is given in below table.

Age	Formation	Lithology
Recent	Soil	Soil & Alluvium
Mid. Permian	Barren Measures	Pink, buff, red sandstone, red shale etc.
Lower Permian	Barakar	Coarse to medium grained sandstone subordinate shales and coal seams
Lower Permian to Upper Carboniferous	Talchir	Sandstone & Siltstones with pebbles of Granite (intersected only in GSI boreholes)
-----Unconformity-----		
Pre-Cambrian	Metamorphics	Not intersected in any borehole

The thickness ranges of each formation within the block as intersected in the boreholes are given below.

Formation	Thickness Range (m)	
	Minimum	Maximum
Soil/Alluvium	3.00 (MSSW-5)	7.75 (SSH-7)
Weathered Mantle	11.00 (MSSW-42)	28.50 (MSSW-1)
Barren Measures	9.00 (MSSW-23)	76.00 (MSSW-24)
Barakars	99.50 (MSSW-39)	239.00 (SSH-30)
Talchirs	4.05 (SSH-30)	24.30 (SSH-29)
Metamorphics	Not drilled upto basement	

Description of Formations

The different geological formation encountered in the boreholes drilled in Sahapur West Block are summarized below:

a. Talchirs

The Talchir Formation is not exposed in Sahapur West Block; intersected in 5 GSI boreholes (SSH-7, 17, 26, 29 & 30) and is represented by greenish sandstone with pebbles of granite.

b. Barakars

Barakar Formation overlies the Talchirs and comprises dominantly sandstones with sub-ordinate shales, carbonaceous shale, intercalation of shale & sandstone and six regionally persistent coal seams: IV, L2, III, II, I and L1 in descending order. Seam III splits in 3 sections, the top prominent & consistent IIIA and the bottom impersistent IIIB & IIIL seams.

Barakar Formation has been intersected in all boreholes drilled by MECL & GSI (except MSSW-42) but full thickness has been intersected in only GSI 5 boreholes; the thickness varies from 99.50m (MSSW-39) to 239.00m (SSH-30).

c. Barren Measures

Barakar Formation is overlain by ferruginous sandstone and shales of Barren Measures. The horizon is found about 25m to 40m above the youngest coal horizon i.e., Seam IV of Barakar Formation.

The Barren Measures have been intersected in 63 boreholes; the thickness varies from 9.00m (MSSW-23) to 76.00m (MSSW-24).

d. Soil/ Alluvium

The soil/alluvium in the block is sandy with thickness ranging from 3.00m (MSSW-5) to 7.75m (SSH-7).

e. Weathered Mantle

The minimum and maximum depth of weathering ranges from 11.00m (MSSW-42) to 28.50m (MSSW-1).

Structure

The whole block is covered by Barren Measures formation and hence devoid of coal seam exposures. In general, the strike of coal seam is NW-SE shifting to EW. The dip is generally very low i.e., 1o to 2o towards north-east in general shifting to south-east in the southern part. The gradient of seams varies from 1 in 23 to 1 in 57. One dolerite dyke which has been intersected in borehole MSSW-42 and its outcrop is interpreted to extend upto 300m length and 8m width along NW-SE direction.

The structure of Sahapur West Block is simple over a major part of the block i.e., in the northern and central parts except in the southern strip where 4 faults have been deciphered (F1 to F4). Due to existence of E-W trending regional faults (Chilpi-Barni) the long anal cracks can be seen and are manifesting in 5 minor slips of very low magnitude of around 2m throw. These have been designated as MS-1 to MS-5.

Description of faults is tabulated below:

Fault no	Location	Strike /Dip	Nature of fault	Throw (m)	Evidences
F1-F1	650m within block in SW corner near BH MSSW-56	N W - S E Dipping in S direction	Dip fault	25-40	i) Intersected in BH SSH 26, resulting in reduction of strata (Lower Barakar by 40m) ii) Intersected in BH MSSW 56 Resulting in contact Reduction of BM/B
F2-F2	300m within the block near BH MSSW-24	E-W Dipping Southerly	Oblique fault	15	Seam IV faulted in BH MSSW -24
F3-F3	1.5 to 2 Km length within the block from BH -MSSW -21 in the NW to BH MSSW -45 in SE.	WNW-ESE	Oblique fault	5	It is not intersected in any BH, but intercepted based on FRL difference
	900m length	Curvilinear	Strike	2 - 5	Seam IV faulted in BH

	within the block from BH MSSW-10 in the NE to BH MSSW-48 in the SW.		fault		MSSW- 48.
MS-1 MS-2 MS-3 MS-4 MS-5	MSSW-49 MSSW-13 MSSW-13 MSSW-19 MSSW-7	-	-	-	Seam IIIA- Faulted Seam IV absent Seam IIIA absent Seam IIIA absent Seam II – reduction in thickness

Detailed exploration of Sahapur West block has revealed the existence of 8 coal horizons. Out of these, four correlatable seams IV, III, II & I in descending order have been established along with a few local coal seams; Seam III is split into 3 sections: IIIA, IIIB & IIIL. Seam II is the thickest and most potential seam whereas seams IIIB, IIIL, I & L1 are thin & partially developed seams in the block.

The sequence of coal seams, their thickness ranges and range of intervening partings are given in below table.

Sequence of Seam / Parting	Range of Seam Thickness (m)		No. of full intersections	Dominant thickness (m)
	Minimum	Maximum		
IV	0.15 (MSSW-21)	1.57 (MSSW-58)	60	0.50 – 1.50
Parting	41.03 (MSSW-56)	51.39 (MSSW-58)	-	-
L2	0.55 (MSSW-21)	3.16 (MSSW-15)	63	0.50 – 2.00
Parting	9.58 (MSSW-14)	23.24 (MSSW-7)	-	-
IIIA	0.35 (MSSW-12)	2.84 (MSSW-11)	60	0.50 – 1.50
Parting	0.30 (MSSW-56)	2.93 (MSSW-25)	-	-
IIIB	0.46 (MSSW-34)	1.78 (MSSW-40)	35	0.50 – 1.20
Parting	0.72 (MSSW-30)	1.32 (MSSW-58)	-	-
IIIL	0.62 (MSSW-29)	1.40 (MSSW-58)	9	0.05 – 0.90
Parting	12.75 (MSSW-58)	20.32 (MSSW-29)	-	-
II	0.92 (MSSW-56)	4.16 (SSH-30)	62	1.50 – 3.00
Parting	23.32 (MSSW-17)	39.38 (MSSW-12)	-	-
I	0.10 (SSH-17)	0.94 (MSSW-17)	29	<0.50-0.90
Parting	10.50 (MSSW-26)	25.76 (MSSW-38)	-	-
L1	0.21 (MSSW-33)	1.66 (SSH-30)	46	<0.50-0.90

Seam Description

Based on the data of 64 boreholes drilled within the block, occurrence of 5 group of seams in eight sections has been established. The brief description of each seam is given below.

Seam IV

Seam IV is the top most & youngest coal seam in Sahapur West Block occurring in the depth range of 24m to 100m. It is present below Barren Measures/Barakar contact with a parting of 10 to 25m and overlies seam L2 with a parting of 41.03 to 51.39m. The full seam thickness has been intersected in 60 boreholes with a thickness range of 0.15m to 1.57m.

The moisture and ash content varies from 1.40% to 10.90% and 11.00% to 40.40% respectively. As per GR, the GCV varies between 5300 to 7020 kcal/kg and the seam grade varies from G1 to G7. The estimated total net proved in-situ resource for Seam IV is 0.124 Mt.

Seam L2

Seam L2 is the second persistent seam in descending order occurring in-depth range of 73-153m from surface and is intersected in all the boreholes except MSSW-42. The seam thickness varies from 0.55m to 3.16m.

The moisture and ash content varies from 2.20% to 11.40% and 12.60% to 42.80% respectively. As per GR, the GCV varies between 4030 to 6390 Kcal/kg and the grade ranges between G4 to G11. The total net proved in-situ resource of this seam is estimated as 2.078 Mt.

Seam IIIA

Seam IIIA occurs in the depth range of 85 - 173m from surface and overlies seam IIIB with a parting range 0.30m to 2.93m. The thickness range varies from 0.35m to 2.84m.

The moisture and ash content varies from 2.00% to 9.80% and 7.30% to 50.50% respectively. As per GR, the GCV varies between 3090 to 6220 Kcal/kg and the grade ranges between G4 to G12. The total net proved in-situ resource of this seam is estimated as 1.652 Mt.

Seam IIIB

Seam IIIB occurs mostly in the depth range of 88m to 130m and overlies seam IIIL with varying parting of 0.72m to 1.32m. The thickness range of the seam is from 0.46m to 1.78m. The seam has attained workable thickness of about 1.20m in 3 patches in the western part.

The moisture content varies from 2.50% to 9.80% and ash varies from 13.10% to 50.40%. As per GR, the GCV varies between 3240 to 6170 Kcal/kg. The seam grade ranges between G4 to G14. The total net proved in-situ resource of this seam is estimated as 0.462 Mt.

Seam IIIL

Seam IIIL is a thin coal seam with thickness range 0.62m to 1.40m and overlies seam II with varying parting of 12.75m to 20.32m. The seam has been intersected only in 9 boreholes. The thickness is less than 1.50m and therefore resources are not considered for this seam.

The moisture and ash content varies from 1.70% to 9.00% and 12.50% to 32.80% respectively. As per GR, the calorific value (GCV) varies between 5660 to 6060 kcal/kg with grade ranges between G5 to G6.

Seam II

Seam II is thick, consistent & main workable coal seam, which overlies seam I with varying parting of 23.32m to 39.38m. The seam has been intersected in 62 boreholes with thickness varying from 0.92m to 4.16m. The seam occurs mostly in the depth range of 109 – 193m over 70% of the area, while about 30% area towards western part it occurs in depth range of 100 – 150m.

The moisture and ash content varies from 2.20% to 9.30% and 11.90% to 37.60% respectively. As per GR, the GCV varies between 4350 to 7060 Kcal/kg and grade ranges between G1 to G10. The total net proved in-situ resource of this seam is estimated as 17.80 Mt.

Seam I

Seam I is a thin seam developed in south-western & central part of the block. Its thickness range is from 0.10m to 0.94m and occurrence depth range of 150m in the southwest part. It overlies seam L1 with parting range of 10.50m to 25.76m.

The moisture and ash content varies from 5.10% to 8.00% and 13.70% to 35.60% respectively. As per GR, the calorific value varies between 4420 to 6040 Kcal/kg and grade ranges between G5 to G10. As the seam has unworkable thickness of <1.50m and therefore not considered for resource estimation.

Seam L1

Seam L1 is the oldest seam of Barakar Formation occurring at depth range of 151 – 230m. It has been intersected in 46 boreholes with thickness varying from 0.21m to 1.66m. The seam is intersected with extractable thickness of more than 1.50m in only two bore holes in north west of the block (MSSW-25 – 1.51m and SSH-30 – 1.66m). Remaining bore holes the seam is intersected with less than 1.50m thickness.

The moisture content varies from 2.00% to 9.50% and ash varies from 8.90% to 42.40%. As per GR, the GCV varies between 2262 to 6457 Kcal/kg. The seam grade ranges between G3 to G17. The total net proved in-situ resource of this seam is estimated as 0.068 Mt.

The quality parameters of the coal seams are given in below table (on 60% RH at 40degC & Equilibrated basis).

Seam	Moisture %		Ash %		GCV (Kcal/kg)
	Minimum	Maximum	Minimum	Maximum	
IV	1.40 (MSSW-45)	10.90 (MSSW-18)	11.00 (MSSW-25)	40.40 (MSSW-53)	(G1-G7) 5300 – 7020
L2	2.20 (MSSW-18)	11.40 (MSSW-30)	12.60 (MSSW-14)	42.80 (MSSW-18)	(G4-G11) 4030 – 6390
IIIA	2.00 (MSSW-20)	9.80 (MSSW-31)	7.30 (MSSW-3)	50.50 (MSSW-5)	(G4-G12) 3090 – 6220
IIIB	2.50 (MSSW-21)	9.80 (MSSW-14)	13.10 (MSSW-45)	50.40 (MSSW-58)	(G4-G14) 3240 – 6170
IIIL	1.70 (MSSW-21)	9.00 (MSSW-30)	12.50 (MSSW-58)	32.80 (MSSW-55)	(G5-G6) 5570 – 6060
II	2.20 (MSSW-35)	9.30 (MSSW-3)	11.90 (MSSW-9)	37.60 (MSSW-19)	(G1-G10) 4350 – 7060
I	5.10 (MSSW-17)	8.00 (MSSW-12)	13.70 (MSSW-12)	35.60 (MSSW-20)	(G5-G10) 4420 – 6040
L1	2.00 (M0053SW-24)	9.50 (MSSW-40)	8.90 (MSSW-31)	42.40 (MSSW-52)	(G3-G17) 2262 – 6457

2.2.3	Geological Block Area "Ha"	587.50
2.2.4	Status of Exploration of the block	

Exploration Summary

MECL commenced exploration in Sahapur West Block during November 2008 and concluded in April 2009. Prior to this GSI also conducted exploration in the block during 2005-06. The exploratory works executed in the block are summarized below.

SI No	Item of Work	Work Done
1.	Geological Mapping	5.875 sqkm
2.	Topographic Survey a. Traverse Stations i. Coordinates ii. Reduced Level (m) b. Boreholes i. Coordinates: MECL : GSI ii. Reduced Level: MECL : GSI	5.875 sqkm 29 Nos 29 Nos 59 Bhs (MSSW-1 to 59) 5 Bhs (SSH-7, 17, 26, 29, 30) Total 64 Bhs 59 Nos 5 Nos
3.	Exploratory Drilling Meterage MECL GSI	10,107m (59 Bhs) 1,387m (5 Bhs) Total 11,494m
4.	Geological Core Logging	10,107m (59 Bhs)
5.	Geophysical Logging	7,397m (43 Bhs)
6.	Coal Sampling (Nos)	532 (56 Bhs)
7.	Analytical Studies i. Band by band (m) ii. Overall Analysis (Nos)	403.95m (56 Bhs) 219 (43 Bhs)
8.	Special Tests (No of Samples) a. Calorific Value b. Ultimate Analysis c. Ash Fusion Temp. d. Ash Analysis e. HGI f. Total Sulphur g. Distribution of Sulphur h. Swelling Index	219 (43 Bhs) 36 (10 Bhs) 18 (5 Bhs) 18 (5 Bhs) 18 (6 Bhs) 18 (6 Bhs) 18 (6 Bhs) 30 (10 Bhs)
9.	Physico-Mechanical Test	334.00m (2 Bhs: MSSW-27 & 33)
10.	Dove Tailing of GSI Bh's data i. Analytical Results	15.02m (2 Bhs: SSH-7 & 17)

2.2.5	Area covered by "detailed" exploration within the block (sq. km)	5.875
2.2.6	Whether entire area has been covered by a detailed exploration.	Yes
2.2.7	No. of boreholes drilled within the block	64
2.2.8	Whether any further exploration/study is required or suggested and time frame in which it is to be completed	No further exploration is envisaged for the coal block
2.2.9	Year wise future programme of exploration	NA
2.2.10	Overall borehole density within the block (no./ sq. km) approx	Approx.11 boreholes per sq.km
2.2.11	No of Seams available as per GR (Geological Report)	Seam-IV,Seam-L2,Seam-III A,Seam-III B,Seam-III L,Seam-II,Seam-I,Seam-L1
2.2.12	Seams not considered for Mining with Reasons	Seam IV- Seam has not developed to extractable thickness in most part of the block. Seam-IIIB- Seam has developed to workable thickness in the western and south eastern part of the block but parting with III A (0.30 2.93 m) does not allow any workings. Seam-IIIL- Not considered for UG as this seam is developed in patches and have not attained workable thickness. Seam-I- Seam I is impersistent within the block and does not attain workable thickness. Seam-L1- Seam developed in patches and not attained workable thickness.
2.2.13	Dip of the Seam	The dip of the coal seam is between 1deg to 2deg towards north-east and shifting to south-east in the southern part. The gradient of seams varies from 1 in 23 to 1 in 57.

2.2.14 Seam wise thickness, depth and reserve

Seam	Thickness Range 'm'	Depth Range 'm'	Net Geological Res "Mte"	Block Reserve Below "Mte"					Min Res "Mte"		Mining Losses	Ext Res "Mte"			As on base date "Mte"								Reason (For seams not considered for mining)
				High wall/ Barrier	Nala/ River/ Road	Barrier	Un- economic	Total Blocked	UG	OC		UG	OC	High wall	Depletion of Reserve			Balance Reserve					
															UG	OC	High wall	UG	OC	High wall	Total		
Seam-IV	0.15- 1.57	24.0 4- 64.9 0	5.85 2	0	0.06	0.01	5.78	5.85 00	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	Not considered for UG as this seam is developed in patches and have not attained workable thickness.	
Parting	41.0 3- 51.3 9							0.00 00										0.00	0.00				
Seam-L2	0.55- 3.16	72.7 5- 113. 52	5.43 3	0	0.59	0.03	3.35	3.97 00	1.46	0	0.53	0.93	0	0	0	0	0	0.93	0.00	0	0		
Parting	9.58- 23.2 4							0.00 00										0.00	0.00				
Seam-III A	0.35- 2.84	89.3 3- 129. 24	4.13 3	0	0.41	0.02	2.49	2.92 00	1.22	0	0.46	0.76	0	0	0	0	0	0.76	0.00	0	0		
Parting	0.30- 2.93							0.00 00										0.00	0.00				
Seam-III B	0.46- 1.78	92.9 7- 130. 83	1.07 0	0	0.12	0.01	0.94	1.07 00	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	Seam develops to workable thickness in western and southeastern part of the block but parting with III A (0.30 - 2.93 m) does not allow any workings.	
Parting	0.72- 1.32							0.00 00										0.00	0.00				

Sea m-III L	0.62- 1.40	95.6 1- 106. 15	0.12 0	0	0	0	0.12	0.12 00	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	Not consi dere d for UG as this seam is devel oped in patch es and have not attain ed work able thick ness.
Parti ng	12.7 5- 20.3 2							0.00 00										0.00	0.00			
Sea m-II	0.92- 4.16	108. 77- 151. 08	17.8 00	0	2.25	0.43	0.42	3.10 00	14.7 0	0	6.01	8.69	0	0	0	0	0	8.69	0.00	0	0	
Parti ng	23.3 2- 39.3 8							0.00 00										0.00	0.00			
Sea m-I	0.10- 0.94	135. 70- 178. 24	0	0	0	0	0	0.00 00	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	Sea m I is impe risiste nt withi n the block and does not attain work able thick ness.
Parti ng	10.5 0- 25.7 6							0.00 00										0.00	0.00			
Sea m-L1	0.21- 1.66	151. 10- 195. 98	1.32 5	0	0	0	1.32	1.32 00	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	Not consi dere d for UG as this seam is devel oped in patch es and have not attain ed work able thick ness.
Total			35.7 330		3.43 00	0.50 00	14.4 200	18.3 500		17.3 800	7.00 00	10.3 800						10.3 800			10.3 800	

S.No	Parameters	Details
2.2.15	Methodology of reserves estimation (also mention if any software package has been used).	

The detailed exploration for coal in Sahapur West Block revealed the existence of 8 seams i.e., Seam IV, L2, IIIA, IIIB, IIIL, II, I & L1. Out of which resources have been assessed for 7 seams excluding Seam I as it has not attained workable thickness in the block. Three seams viz. Seam L2, IIIA & II are the prominent seams in the block, whereas Seam IV, IIIB, IIIL & L1 are less prominent developed over limited area of the block.

Basic Assumptions:

The following basic assumptions have been considered for resource estimation.

- The isochores have been drawn by MINEX Software, which create segments/cells on the principle of gradual and uniform change over the area.
- The coal in Sahapur West Block is non-coking, the workable thickness considered for the estimation of reserves are as per UNFC norms. The resources are grouped as per underground norms.
- Topography: For arriving at quantities, the topography data from the recent drone survey was used.
- Collar: The UTM coordinates of borehole collars were not provided in the geological report. The plates from GR were georeferenced with surface features. The borehole X & Y were digitized in global mapper software.
- Elevation: The collar elevations as provided in the geological report were used.
- Seam picks: seam picks from the geological report were used.
- BH data Total boreholes drilled: 64 Boreholes considered for Minex model: 56 (Band-by-Band analysis data) Boreholes falling inside the boundary out of 64 BHs: 64 Boreholes falling outside the boundary out of 64 BHs: Nil
- The limits of non-development zones of seams have been marked by taking half of the influence of the borehole with positive seam intersection. These limits have also been considered to be the line of zero seam thickness.

In Sahapur West Block, 'net proved' underground resource is estimated by MINEX Software. For this purpose, isochores of 0.90m, 1.20m, 1.50m, 3.00m, 5.00m and >5.00m (for superior grade) and 1.20m, 1.50m, 3.00m, 5.00m & >5.00m (for inferior grade) on I-30 basis along with isogrades lines, have been drawn on folio plans for the seam workability. The area of seam non-development and the workability have been demarcated. The 50m, 100m, 150m, 200m & 250m depth lines have also been marked on the seam folios of different seams. The resource is by MINEX Computer Software.

Each MINEX cell having area (sq.m) x Isochore thickness (m) Value x Specific gravity by grade gives the resource tonnage.

The resource of coal in Sahapur West Block have been estimated by using standard formula as given below:

$$R = A \times Th. \times Sp. Gr.$$

R - Resource in million tonnes,
A - Area in sq.m.
Th.- Thickness in metres.
Sp.Gr.- Specific Gravity of coal grade wise as per below table

Reserve locked up under Nalla, Pond, Village, Roads, fault barrier and Block boundary barrier were estimated separately to arrive at Mineable reserve.

10% deduction has been made from gross resource to arrive at net in-situ resource available in the block.

Resource locked up under Nallah, Pond, Village, Roads and Block boundary barrier was estimated separately to arrive at Mineable reserve. Seam-wise (for >1.2m thickness) resource is provided in the table below.

2.2.16Average GCV "KCal/kg"

The estimated quality of the seams from the Minex model is tabulated below.

Coal Seam	Moisture %	Ash %	GCV (Kcal/kg)	Grade
IV	7.17	16.19	5989.77	G5
L2	7.69	21.99	5362.62	G7
IIIA	6.81	29.81	4761.45	G9
IIIB	7.41	24.71	5154.55	G8
IIIL	7.81	15.98	5917.80	G5
II	6.84	23.92	5308.54	G7
I	5.14	24.01	5549.28	G7
L1	7.40	21.53	5462.88	G7

2.2.17Gross Geological Reserve of the block "Mte"

2.2.18Net Geological Reserve of the block "Mte"35.7330

2.2.19Minable Reserve of the block "Mte"17.38

2.2.20Blocked Reserve "Mte"18.3500

2.2.21Corresponding extractable reserve of the block "Mte"10.38

2.2.22Percentage of Extraction29.049

2.2.23Reserve already depleted (Base date of Mining Plan)0

2.2.24Balance Reserve (as on Base Date))10.3800

3.1 Mining Method

S.No	Parameters	Details
3.1.1	Existing method of mining if the mine is under operation	Not Applicable
3.1.2	Proposed method of mining with justification on suitability of method of mining	

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M. K. Thapar

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The proposed method of working is same as that of the Approved Mining Plan i.e., by Underground Bord and Pillar method. Vertical stripping ratio of this block is assessed, and it is from 10 to 30 cum/tonne and so opencast mining will not be economical. Long wall method is not considered as the depth of cover varies from 72m to 141m. Seams with more than 1.5m thickness are proposed for extraction. Production capacity of 0.6Mtpa could be achieved by deployment of mass production technology. Skill and equipment to operate 1.2m seams with mass production technology are scarce in India. Seams are not uniformly 1.2m and in patches and such formation require semi mechanised bord and pillar workings and by semi mechanised equipment the number of faces for achieving targeted production will be more. Also, the seams which are not considered are patchy and require lengthy drive in stone for reaching the part to be extracted which will restrict the production capacity of the mine even by 50% of the proposed capacity.

Entire seam II, part of seam L2 and IIIA are considered for reserves. Seams IV, IIIB, IIIL, L1 & I are not considered for mining as these seams are not fully developed in this block. The extractable reserves by underground Bord and Pillar method are estimated as 10.38Mt from three workable seams, out of which Seam-II contributes to around 84%.

Mode of entry to the seams is by a pair of inclines from the surface namely Incline 1 & Incline 2. These inclines are planned at around 100m northwest of borehole MSSW-39 and are proposed to be driven at a gradient of 1 in 5 with a width of 5.2 m and height of 3.2 m. The inclines are proposed to be driven in such a way that a distance of 35m centre to centre is maintained throughout. Inclines will be driven first to Seam-L2 and will be continued till Seam-II. A shaft of 6.0m dia. is proposed near borehole MSSW-12 for ventilation with a total depth of 135m.

The length of the Inclines and Shaft planned are given below:

Entry	Start RL	End RL	Gradient	Dimension	Length	Depth
Incline-1	488	354	1 in 5	5.2m x 3.2m	670	134
Incline-2	488	355	1 in 5	5.2m x 3.2m	666	133
Shaft	488	353	Vertical	6.0m dia.	-	135

Development of incline and establishing ventilation connections are key for safe working and therefore two years are considered for scientific planning, obtaining relevant approvals, drive of inclines, shafts, deployment of equipment and commencement of extraction.

Bord and Pillar workings are planned with uniform pillar size of 35m (centre to centre) while the pillar size suggested in 111 of CMR 2017 is 25.5 for 4.8m wide galleries. Scientific study is proposed for the following:

1. Degree of gassiness of the seams and study of explosives to be used in seams L2, III A and II.
2. Design of extraction of pillars in the seams without disturbing the surface
3. Deployment of Continuous Miner in Seam II
4. Support system for the seams
5. Subsidence study including stability of parting for the seams and their cavability
6. The mining method will be revised, if required, based on these studies.

Incline will be driven upto seam L2 first and seams will be developed by SDLs. During such development, initially before establishing connections with the shaft, Intake and Return will be through Incline 1 and Incline 2 respectively. In the meantime, incline drive will be continued till seam II while shaft sinking would also progress till Seam II. After completion of shaft sinking till seam II, ventilation connection in Seam L2 will be established and the extraction will commence. The production from Seam L2 will be restricted during this period as there will be restrictions in ventilation because of single intake and return. SDL is proposed to be deployed during development, depillaring will be done based on the recommendations of scientific study and approval by DGMS. Parallely, seam development and establishment of ventilation connection in seam IIIA and seam II will commence.

Development and extraction in Seam II is planned with continuous miner. Continuous miner with range of 1.5m to 4.6m for accommodating the thickness range of Seam II is proposed to be deployed. Thickness of 4.16m is observed in one bore hole SSH-30.

The width of the galleries will be 4.8m for Seam L2 and IIIA while it will be 5.8 m for seam II as continuous miner is proposed to be deployed in Seam II

In all the seams the main heading is oriented in the diagonal direction northeast southwest to have uniform length of panel on both sides. Extraction will be done from top seam to bottom seam. However, development and extraction is proposed in seam II in the area where the other seams are not developed.

Barriers considered against nalla, major surface roads, villages etc.

The barriers considered are as per Regulations 121, 122 and 149 of CMR 2017 which are explained as below:

No working shall be made in any mine vertically below-

- a. any part of any river, canal, lake, tank or other surface reservoir; or
- b. any spot lying within a horizontal distance of 15 meters from either bank of a river or canal or from the boundary of a lake, tank or other surface reservoir, in this case 30m barrier is maintained from Nalla as the Nalla course is meandering
- c. In the boundary, no working shall be made within a distance equal to half the distance as specified in column (5) of table under sub-regulation (4) of regulation 111 of CMR 2017, corresponding to the depth of the seam being worked,
- d. Provided that, where work is done in more than one seam, the barrier kept at the boundary shall, as far as practicable, be vertically coincident and of the same dimensions

Details of barriers are provided below:

The barrier considered while developing the workings is as follows;

- a. Boundary safety barrier is left for a distance equal to half the distance as specified in column (5) of table under sub-regulation (4) of regulation 111, corresponding to the depth of the seam being worked.
- b. Fault barrier of 10 m is left on either side of fault F3 and F4. Both faults have 5m throw.
- c. Barrier of 30 m is left on both the sides of Nallah
- d. Barrier of 15 m is left for ponds.
- e. Barrier left around villages and roads are 50 m and 45 m respectively. No development and depillaring will be carried out beneath villages and road in Seam L2 and IIIA.

A scientific study is proposed to be conducted based on which the possibility of reduction in the barriers proposed will be reviewed, and requisite permissions will be sought based on the study results as provisioned in the CMR 2017.

Developing with splitting as final operation for the coal blocked below villages is considered for Seam II and 0.77Mt Reserves are planned to be extracted. With respect to other barriers, the extraction will be planned after scientific study.

The minimum and maximum parting between the seams considered for extraction is provided below,

Seam	Depth (m)
------	-----------

Working	Min	Max
L2	75.12	107.65
III A	92.58	129.24
II	108.77	141.73

Thus the minimum parting is more than 9m. Reg 2 of 118 of CMR 2017 viz "No working shall be made in more than one section in any seam, nor shall workings be made in any two seams lying within nine meters of each other, without the prior permission in writing of the Chief Inspector and subject to such conditions as he may specify therein" will be strictly complied. In case if such working are to be made prior permission will be sought from Chief Inspector as mentioned in the regulation.

Roof bolting is proposed with 4 bolts per row for 4.8m wide gallery and 1.2m between rows. Hydraulic rotary roof bolting machine for drilling vertical holes of 27mm to 43mm diameter are proposed for panels to be operated with SDL. Twin roof bolters are proposed in Seam II along with continuous miners. In Seam II bolting is proposed with 1.2mX1.4m grid. Resin encapsulated bolting is proposed. Wherever required side bolting, girder support and sidewall support will be done. Depillaring is proposed by caving in both semi mechanised and mechanised CM panels. In semi mechanised panels level splitting and dip slicing method will be adopted. In CM panels split and fender method is proposed for depillaring. Schematic pillar extraction is depicted in Plate 17. However, Scientific study will be carried out for finalising the methodology and subject to approval by DGMS.

a. Adequacy of ventilation

Ventilation requirement has been assessed and included as detailed hereafter:

The adequacy of the entries provided for ventilation is assessed as below:

Detail	Unit	Value
Annual output	tonne	0.60
No of days considered		330
Average daily output	tonne	1,818.18
Maximum daily output (125% of average)	tonne	2,272.73
Quantity of air required per tonne at face	cum/min	2.50
Air requirement at face	cum/min	5,681.82
Ventilation efficiency	50%	
Air requirement for mine	cum/min	11,363.64
	cum/sec	189.39
Allowed air velocity	m/sec	4
Cross section for two intakes- Req'd.	sqm	23.67
Cross section of inclines planned		
Width	m	5.20
Height	m	3.20
Cross section for one incline	sqm	16.64
Upcast shaft 1		
Detail	Unit	Value
Allowances for expansion		10%
Air volume to be handled	cum/min	12,500.00
	cum/sec	208.33
Planned air velocity in shaft	m/sec	9
Area required	sqm	23.15
Dia of shaft- Required	m	5.4
Planned diameter of Shaft 1	m	6.0

b. Planning for ventilation

Three seams are proposed for working. While operation in Seam L2 will commence initially, operations in Seam III A and Seam II will be done subsequently. It is proposed to complete the development and depillaring operation in ~Y5 and after that the entire operation will be limited to Seam II.

The following criteria have been used for planning of mine ventilation system,

- 6 cum/min. of air per person employed in the district in the largest shift.
- 2.5 cum/min of air per tonne of daily production
- Quantity of air which will dilute the inflammable gas to such extent that % of inflammable gas does not exceed 0.75 in the general body of the return air of any ventilation district and 1.25 in any place in the mine.
- The wet bulb temperature in any working place should not exceed 33.5°C and where the wet bulb temperature exceeds 30.5°C, arrangements are to be made to ventilate the workings with a current of air moving at a speed of not less than 1 m/s.

Therefore, on the basis enumerated, the total estimated air requirement is estimated for the mine as below,

The estimated fan capacity for two parallel circuit work out to ~140cum/sec.

Particulars	Unit	Semi mechanised working	Mechanised working
Yearly Production- Peak Capacity	Mtpa	0.30	0.30
No. of working days	#	330.00	330.00
Average Daily Production	tpd	909.09	909.09
Total manpower proposed	#	550.00	380.00
Manpower in a largest shift	#	325.00	180.00
As per CMR, minimum quantity of air w.r.t per daily tonne output	m³/min	2.50	2.50
As per CMR, minimum quantity of air w.r.t per person employed in a district	m³/min	6.00	6.00
Air quantity required w.r.t daily tonne output	m³/s	37.88	37.88
Air quantity required w.r.t per person employed	m³/s	32.50	18.00
Total air quantity required for	m³/s	11.36	11.36

service areas			
Total air quantity required (rounded)	m³/s	49.24	49.24
VEQ	%	75%	75%
Maximum air quantity requirement (rounded)	m³/s	65.66	65.66
Pressure			
Pressure P = RQ²	Pa		
Mine Resistance (R)	gaul	0.04	
Quantity	m³/s	131.31	
Pressure	Pa	690	
Water gauge	mm	70.38	
Fan proposed		140cum/sec, 80mm water gauge	

c. Blasting requirement and requirement of explosives

The semi mechanised panel with deployment of SDL require drilling and blasting. Solid blasting with permitted explosives (P5) and delay detonators are proposed, as Seam L2 and IIIA are considered Degree I. Degree of gassiness will be studied before deciding on the explosives and the maximum charge per hole. Coal drills of ~38mm dia will be used to drill at faces for loading explosives.

Gallery width is assumed to be 4.8m and height of extraction is assumed to be of 1.6m average. For a depth of 1.2 m hole with 10 holes per face, a pull of ~0.8m is possible. The powder factor during development is assessed as 2.0 (with 555m of explosives per hole). The peak production from SDL panel is 0.3Mtpa, average of ~900tonne per day. The average explosive requirement will be 0.5 tonne/day. Considering this requirement 3 tonne magazine is proposed.

Man riding – In main incline FSV or Chair lift man riding system is proposed for transport of men and material. Chair lift system is proposed in Seam L2 and III A. In Seam II, FSV or Chair lift man riding system will be used for transportation of men and material.

3.1.3	Coal production capacity proposed MTPA	0.6000
3.1.4	Justification for optimization Coal production capacity	
Seam L2 and seam III A has developed to a thickness of 1.5m in few parts. Bord and Pillar method of working is proposed as the stripping ratio in the entire lease area is between 10 to 30. SDL is proposed to be deployed as this is proven technology in thin and patchy seams where mass production technology are not considered effective. Seam II has been observed to be extensively present with more than 1.5m extractable thickness. Continuous Miner package with Shuttle car, roof bolter and feeder breaker system are proposed as the average seam thickness is ~2.2m. The method and technology proposed are in line with the approved mining plan. Rated production capacity is proposed after study of the limitation of working in multiple thin seams and sequencing the operations to comply with the statutory and technical requirements.		
3.1.5	Calendar year from which the production will start	2025-26
3.1.6	Year of Achieving rated production	2026-27

3.1.7 Tentative Coal production Plan MT

Year		Coal Production Schedule			OB MM3	SR
Year of Operation	Calendar Year	UG	OC	Total		
1	2025-26	0.10	0	0.1000	0	0
2	2026-27	0.60	0	0.6000	0	0
3	2027-28	0.60	0	0.6000	0	0
4	2028-29	0.60	0	0.6000	0	0
5	2029-30	0.60	0	0.6000	0	0
6	2030-31	0.60	0	0.6000	0	0
7	2031-32	0.60	0	0.6000	0	0
8	2032-33	0.60	0	0.6000	0	0
9	2033-34	0.60	0	0.6000	0	0
10	2034-35	0.60	0	0.6000	0	0
11	2035-36	0.60	0	0.6000	0	0
12	2036-37	0.60	0	0.6000	0	0
13	2037-38	0.60	0	0.6000	0	0
14	2038-39	0.60	0	0.6000	0	0
15	2039-40	0.60	0	0.6000	0	0
16	2040-41	0.60	0	0.6000	0	0
17	2041-42	0.60	0	0.6000	0	0
18	2042-43	0.60	0	0.6000	0	0
19	2043-44	0.08	0	0.0800	0	0
Note: Calendar Plan/Production Plan for the entire life of the mine.						

3.1.8	Rated Capacity Mtpa	By OC : 0 By UG : 0.60 Overall : 0.6000
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3.1.9	Life of the mine: Years	By OC : 0 By UG : 19 Overall : 19				
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	NA				
3.1.11	Whether the proposed external OB dump site is coal/ lignite bearing: If so, whether coal/lignite below waste disposal area is extractable	NA				
3.1.12	Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment; future proposals	Investigations are planned				
3.1.13	Type of Equipment/ HEMM proposed	S.No.	Type of Equipment	Capacity	Unit	Population
		1	Standard height Continuous Miner	655	KW	1
		2	Shuttle Car (Electric) Coal Hauler	14	Tonnes	2
		3	Feeder Breaker	650	TPH	1
		4	Twin Roof Bolter	37	KW	2
		5	Power Winch (2 Sets)	20	Tonnes	1
		6	Battery Operated MUV	168	KW	1
		7	Battery Operated FSV	75	Horsepower (HP)	2
		8	Pumps, Pipes & Fittings	27	LPS	1
		9	Remote Controlled LHD with Trailing Cable & Electrical Starter	50	Horsepower (HP)	2
		10	Side Discharge Loader standard height 65HP 1.1 cum bucket	65	Horsepower (HP)	13
		11	LDCC 100 tph, 100 m long, 0.8 m/sec, double chain conveyor 2 x 15 kW FLP electricals, 550 V	100	TPH	14
		12	UDM Standard height drill hole	65	mm	6
3.1.14	Upload Require Document	OC : NA UG : UG files data shown below				

UG Document :

SAHAPUR WEST MINING PLAN AND MINE CLOSURE PLAN

Major equipment Proposed for UG working in Seam-II

Capacity of UG equipment for Seam-II is provided as below:

Sl. No.	Particulars	Capacity	Unit	Quantity
1	Standard height Continuous Miner	Installed power 655kW, cutting drum width 3.65m, Max cutting height 4.6m, Loading rate 30t/min	Nos.	1
2	Shuttle Car (Electric) Coal Hauler	Shuttle car for standard height continuous miner, machine rated capacity 14tonne 115HP	Nos.	2
3	Feeder Breaker	Feeder Breaker 650 TPH Capacity Operating Voltage 1100V, 3 Phase, 50 Hz complete with all Accessories. Size of the crushing shall be ~.100 mm 3D	Nos.	1
4	Twin Roof Bolter	Electrohydraulic roof bolter 37kW, operating height 1.8m to 5.2m	Nos.	2
5	Set of Electrical Equipment	Electrical and Signaling Equipment complete with Transwitch unit, Gate end boxes, Cables, etc	LS	1
6	Power Winch (2 Sets)	20 tonne	Nos.	1
7	Battery Operated MUV	168kW, 10 tonne capacity, 2.3m height	Nos.	1
8	Battery Operated FSV	Machine Rated capacity 12.5 tonne 75HP	Nos.	2
9	Dust Collection Fan	Standard equipment along with CM	Nos.	1
B	Additional Face Equipment			
1	Pumps, Pipes & Fittings	27 LPS, 30m Head ,20 KW	Nos.	1
2	Remote Controlled LHD with Trailing Cable & Electrical Starter	50HP 1.5cum bucket	Nos.	2
3	Equipment for Strata Control & Monitoring	Load cells, Instrumented bolt, extensometer, convergence indicator AWTT etc.,	LS	
4	Auxiliary Fan with Accessories	15 Cum/S, 170-250mm WG, 45KW Complete with electrical.	LS	
5	Communication System	Leaky feeder system with Modern sensor-based tracking system	LS	




Equipment Proposed for UG working in Seams L2 & IIIA

Capacity of UG equipment for Seams L2 & IIIA is provided as below:

Sl. No.	Particulars	Unit	Peak Quantity
1	Side Discharge Loader standard height 65HP 1.1 cum bucket	Nos.	12+1 Stand By
2	LDCC 100 tph, 100 m long, 0.8 m/sec, double chain conveyor 2 x 15 kW FLP electricals, 550 V	Nos.	14
3	UDM Standard height drill hole: 25mm to 65mm	Nos.	6
4	Hydraulic roof bolter with power pack	Nos	5
5	Man riding car	Nos	1
6	Equipment for Strata control and Monitoring	set	4
7	Auxiliary fan with accessories	set	14
8	Communication System	LS	2

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4.1 Safety Management

11.05.2019
 11.05.2019
 11.05.2019

Chapter-5: Infrastructure Facilities proposed and their Location

5. Infrastructure Facilities

S.No	Parameters	Details		
5.1	Mine infrastructure required	S.No	Infrastructure to be retain to be public use	Infrastructure to be dismantle/reclaimed
		1	Roads	Project Office & Admin Office, Cap Lamp room, Workshop and Store, Substation and DG, Magazine, Pit head bath & Rest Shelter, Weigh Bridge & Dispatch office, Rescue room and Dispensary, Canteen, VTC, Settling Ponds, Diesel Bunk, WTP, Loading station & Coal stock area, Ventilation shaft, Flood Protection Embankment and Top Soil stack

5.2 Power supply & illumination

MPSETCL is the authorized power supply agency in the area. The proposed source of power for this project is MPSETCL's Thadipathar 5 MVA 33 KV substation in Narwar gram panchayat in Umaria Distt. The project is proposed to receive power at 33KV by means of overhead line (AAAC, WOLF equivalent) from MPSETCL's substation.

According to Proposed Mining Plan, power requirement will be to the tune of about 4.2MVA with 33KV incoming power supply arrangement for the project. It is also mentioned that emergency power supply has been arranged with 500 kVA DG sets.

The table showing the details of power is given below mentioned that emergency

Sl. No.	Description	Underground Operation (0.6Mtpa)
1	Connected load (KW)	6789
2	Load in operation (KW)	6543
3	Maximum power demand (kVA)	4132
4	Annual Energy Consumption (MkWh)	17.88
5	Energy consumption per tonne of coal production (kWh/te)	29.8

Illumination:

1.1 kV overhead line feeders originating from the Surface substation are proposed to be drawn up to a convenient location in the quarry for feeding power to the lighting transformers installed at the different location of the mine

5.3 Drainage & Pumping : Assessment of Volume of Water for Pumping, Pumping Capacity and Pump Selection

It is described in the approved mining plan that "No pump test has been done in the core zone to evaluate the aquifer parameters. Based on the general experience of the area, 1000GPM water make has been adopted to be available for pumping from underground. Average annual rainfall as per the project report of nearby Bicharpur coal mine is 1050mm out of which 963mm is concentrated during the monsoon season from June to October. The actual make of water will be considered later after systematic hydrogeological study".

The breakup of water output from underground and the total estimated water requirement for the mine is provided in the tables below,

Parameter	Unit	Value
Make of water considered	lps	63.0
Hours of pumping	hrs	18.0
Make of water	cum/day	4,082.4
Additional considered (20%)	cum/day	816.5
Total	cum/day	4,898.9
	cum/hr	272.2
Pumping Capacity	LPS	75.6
Pumping Efficiency	%	50
Required Pumping Capacity	LPS	151.2 (160)

Two 80LPS pumps of 150m head are proposed for meeting the peak pumping requirement. Two more 80LPS pumps of 150m head will be provided as standby. In the workings, two 35LPS 100m head pumps are proposed in each seam.

5.4 Coal Handling Arrangement: Brief detail of the CHP/ Mode of Dispatch, Coal quality and Coal staking and handling arrangement

The coal from the mine is proposed to be evacuated by conveyor belts, which will discharge into 3x150 tonner bunker to be installed at surface. Coal from this bunker will be loaded on to the trucks and transported to the nearest siding. The nearest siding is in Shahdol Road is proposed from the coal handling facility at incline mouth to Shahdol. A road of around 14 km is planned for evacuation of coal, this road will be suitably black topped with suitable suppression arrangements. Tree plantation all along the sides are proposed.

5.5	Coal washing and the proposed handling/ disposal of rejects	Washing of coal is not proposed
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6.1 Land requirement

6.1.2 During mining Land use details:

[illegible]

Haul Road between quarries	0	0	0	0	0	0	0	0	
Road diversion	0	0	0	0	0	0	0	0	
Diversion Or Below River Or Nala Or Canal	0	0	0	0	0	0	0	0	
Settling Pond	0.200	0.200	0	0.200	0	0	0	0	0.2000
Road And Infrastructure Area	14.875	14.905	0	10.230	0	4.675	0	0	14.9050
Rationalization Area	0	0	0	0	0	0	0	0	
Garland Drains	0	0	0	0	0	0	0	0	
Embankment	0.876	0.876	0	0.876	0	0	0	0	0.8760
Green Belt	8.018	8.018	0	8.018	0	0	0	0	8.0180
Water Reservoir Near Pit	0	0	0	0	0	0	0	0	
UG Entry	0.300	0.300	0	0.300	0	0	0	0	0.3000
Undisturbed OR Mining Right For UG	594.701	594.701	0	0	0	0	0	594.701	594.7010
Resettlement	0	0	0	0	0	0	0	0	
Pit Head Power Plant	0	0	0	0	0	0	0	0	
Water Harvesting	0	0	0	0	0	0	0	0	
Agricultural Land, Undisturbed OR Mining Right For UG	0	0	0	0	0	0	0	0	
Total	619.00	619.00	0.00	19.62	0.00	4.67	0.00	594.70	619.00

S.No	Parameters	Details
6.1.3	Surface features over the block area	The proposed mining block comprises majority of private land and small portions of Govt, land and Forest land. There is habitation of three villages namely, Kosmaha, Khamaria Kalan, and Khamaria Khurd lying within the block boundaries. No relocation and rehabilitation of village has been proposed. Ghogra Nallah is a seasonal tributary of Sone River flows through central part of the proposed block. Road passing through the western part of the block and another road which connects Shahdol on North-East and Khamaria in South East. No diversion of Nallah and road is proposed in the project area.
6.1.4	No. of villages/Houses to be shifted	No shifting of villages/ houses is envisaged
6.1.5	Population to be affected by the project	The mining and allied activities will provide job opportunities for eligible persons in the nearby villages and with the CSR activities proposed, the area will be developed and there will be growth opportunities for self-employed and cultivators. To this extent, the impact will be significantly beneficial since un-employment and under employment is the main socio-economic problem faced by the people in this area. The mining operations will be carried out in such a manner that no surface subsidence will take place. Agriculture land will therefore not be impacted and the traditional source of livelihood of the local population will therefore not get affected.
6.1.6	Proposed Rehabilitation programme	No relocation and rehabilitation of village has been proposed.

6.2 DETAILS OF LEASE

S.No	Parameters	Details
6.2.1	Status of Lease	
Fresh lease will be applied in due course for a period of 30 years		
6.2.2	Existing Lease Area "Ha"	No Lease exists
6.2.3	Period for which Mining Lease has been granted/is to be renewed/ is to be applied. for.	30 years

6.2.4	Date of expiry of earlier Mining Lease, if any .	Lease not available
6.2.5	Whether the lease boundary/ required boundary is same as mentioned in the allotment order.	Yes
6.2.6	Lease Area (applied/ required) as per the Mining Plan under consideration (Ha)	619.00
6.2.7	Whether the applied lease area falls within the allotted block.	Yes
6.2.8	Area (Ha) of lease which falls outside the delineated Block Boundary/Existing Mining Lease.	Not Applicable
6.2.8	Area (Ha) of lease which falls outside the delineated Block Boundary/Existing Mining Lease.	Not Applicable
6.2.9	Details of outside area	Not Applicable
	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 buildings/ colony/ safety zone/ others (specify).	Not Applicable
6.2.10	Whether some part(s) of the allotted block has not been applied for mining lease	Not Applicable
	Total area in Ha of such part(s).	NA
	Total reserves in such part(s). (Mt).	NA
	Brief reasoning for leaving such part(s).	NA

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Chapter-7: Environment Mangement

7. Environment Mangement

S.No	Parameters	Details
7.1	Commitment from the project proponent that the company will comply Environment and Forest Condition stipulated in the respective clearances	Sarada Energy and Minerals Limited agrees and is committed to comply with the conditions to be stipulated in Environmental Clearance.

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Chapter-8: Progressive & Final Mine Closure Plan

8.1.1 Land Degradation and restoration Schedule

Tentative Land Degradation and Technical Reclamation (Commutative Area Ha)									
Year/Stage		Land Degraded				Technically Reclaimed Area			
(Life of the mine plus post closure period)		Excav	Dump (Extn + Top Soil)	Infra/others	Total	Backfill	Dump (Extn + Top Soil)	Others	Total
Up to Base year	2025								
Y-1	2025-26	0	0.03	12.25	12.2800	0	0	0	0.0000
Y-3	2027-28	0	0.03	16.25	16.2800	0	0	0	0.0000
Y-5	2029-30	0	0.03	16.25	16.2800	0	0	0	0.0000
Y-10	2034-35	0	0.03	16.25	16.2800	0	0	0	0.0000
Y-15	2039-40	0	0.03	16.25	16.2800	0	0	0	0.0000
Y-20	2044-45	0	0.03	16.25	16.2800	0	0	0	0.0000
					0.0000				0.0000
Post Closure									
Y-22	2046-47	0	0.03	16.25	16.28	0	0.03	11.575	11.61

8.1.2 Tentative Biological Reclamation (Cumulative in "Ha")

Year/Stage		Biologically Reclaimed Area					Forest land (Return)	Un Disturbed/ To be left for Public/com Use	Total
(Life of the mine plus post closure period)		Agriculture	Plantation	Water Body	Public/ Company Use	Total			
Up to Base year	2025								
Y-1	2025-26	0	1.20	0	0	1.2000	0	605.52	606.7200
Y-3	2027-28	0	3.44	0	0	3.4400	0	600.48	603.9200
Y-5	2029-30	0	8.02	0	0	8.0200	0	594.70	602.7200
Y-10	2034-35	0	8.02	0	0	8.0200	0	594.70	602.7200
Y-15	2039-40	0	8.02	0	0	8.0200	0	594.70	602.7200
Y-20	2044-45	0	8.02	0	0	8.0200	0	594.70	602.7200
						0.0000			0.0000
Post Closure									
Y-22	2046-47	0	19.63	0	0	19.63	0	599.37	619.00

S.No	Parameters	Details
8.2	Post Closure Water Quality management (Existing water bodies available in the lease hold area; Measures to be taken for protection of the same including control of erosion, sedimentation, siltation, water.	After completion of the Mining activity, after construction of suitable protective measures, pumping is proposed to be carried out during the closure period with competent supervision and the water will be let out into nearby nallah through a settling pond. Quality of the water let out will be monitored, adequate arrangements will be made to comply with the standards stipulated by the authorities. The monitoring of quality of water is proposed to be continued for 3 years after closure. The shaft will be sealed in third year after closure after removing the pipelines and pump.
8.3	Post Closure Air Quality management.	After completion of the Mining activity certain points are earmarked for collection of samples and regular monitoring as per permissions. Post closure monitoring will continue for 3 years.

8.4 Waste Management (Figures in MM3) (Tentative)

Year/Stage		OB Removal			External Dump		Internal Backfilling		Embankment	
(Life of the mine plus post closure period)		(Cumulative)			(Cumulative)		(Cumulative)		(Cumulative)	
		Top Soil	OB	Total	Top Soil	OB	Top Soil	OB	Top Soil	OB
Up to Base year	2025									
Y-1	2025-26									
Y-3	2027-28									
Y-5	2029-30									
Y-10	2034-35									
Y-15	2039-40									
Y-20	2044-45									
Post Closure										
Y-22	2046-47									

8.5 Top Soil Management – (Including Action plan for Top Soil management) (Tentative)

Year/Stage		Top Soil Removal Plan	Top Soil Used				
(Life of the mine plus post closure period)			Spreading Over Embankment	Spreading Over Backfill area	Spreading Over External OB Dump area	Used in Green Belt area	Total Utilised
Up to Base year	2025						
Y-1	2025-26	0.009	0.009	0	0	0	0.009
Y-3	2027-28	0.009	0.009	0	0	0	0.009
Y-5	2029-30	0.009	0.009	0	0	0	0.009
Y-10	2034-35	0.009	0.009	0	0	0	0.009
Y-15	2039-40	0.009	0.009	0	0	0	0.009
Y-20	2044-45	0.009	0.009	0	0	0	0.009
Post Closure							
Y-22	2046-47	0.009	0.009	0	0	0	0.009

S.No	Parameters	Details
8.6	Management of Coal Rejects.	No coal reject generation is envisaged
8.7	Restoration of Land used for Infrastructure.	Entire infrastructure is proposed to be demolished and the land is to be rehabilitated. Inclines are proposed to be sealed and the area of infrastructure is to be rehabilitated. Topsoil is proposed to be scraped and kept in separate area within the infrastructure area. it will be spread out within the infra-area and vegetated to maintain its fertility. This will be used as and when required
8.8	Disposal of Mining Machinery.	Most of the equipment are to be outsourced by deploying contractors and will be demobilised after the closure. The equipment to be procured departmentally will be surveyed off and disposed as scrap. However, if any machine has balance life, it will be transferred to other projects of the company or scraped.
8.9	Safety & Security.	1. Shafts are proposed to be properly closed and fenced to prevent local public entering into the area. Shaft as well as the fan gallery will be sealed so effectively that the seals cannot be broken with normal human effort. 2. Incline will be securely closed by explosion proof stopping and the entry will also be sealed. 3. Local public will be suitably deliberated about the dangers of venturing into abandoned working area. 4. Instruction board in local language will be placed in these locations warning not to trespass in these restricted locations. 5. Local public will be educated on the potential hazards associated with the mining activities emphasis will be laid on local education for bringing in awareness about mining. 6. Before abandonment, the nearby public will be again briefed about the measures taken for stabilization and likely dangers. 7. Security personnel will be deployed for round the clock monitoring of protective works and key risk zones identified both during operation and during rehabilitation period.

8.10 Abandonment Cost and Financial Assurance.

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

Head	Activities	Unit	Quantity	Rate RS/Unit	Amount RS Cr
Progressive Closure	Water quality management	Ls			1.80
	Air quality management	Ls			1.20
	Waste Management	M CUM			
	Barbed wire fencing around dump	m	0	0	0
	Barbed wire fencing around the pit	m	0	0	0

	Filling of Void - Rehanding of Crown dump	MM3	0	0	0
	Top Soil Management	MM3	0	0	0
	Technical And Biological Reclamation of Mined out of land and OB Dump	Ha	0	0	0
	Plantation over virgin area including green belt	Ha	0	0	0
	Manpower Cost and Supervision				1.50
	Total wall around the dump	m	0	0	0
	Garland drain	m	0	0	0
	Garland drain around the dump	m	0	0	0
	Any other Activity				
	Any other Activity - 2				
Dismantaling of infrastrucure & Disposal/ rehabilitation of mining Machinery	Dismantaling of workshop	Ls			0.25
	Rehabilitation of the dismentaled fascilities	Ls			0.35
	Dismantaling of pump and pipes/ other fascilities.	Ls			0.20
	Dismantaling of stowing bunker, provisioning of pumps for borewell pumping arrangement.				
	Dismantaling of UG equipment				1.60
	Rearranging water pipeline to dump top park/Agriculture land	Ls			0.30
	Dismantaling of power lines.				0.30
	Any other Activity				
Safety and Security	Barbed wire fencing around dump				
	Barbed wire fencing around the pit	m	0	0	0
	Barbed wire fencing with Masonalry piller				
	Concrete wall with Masonalry pillars around the pit	m			
	Securing air shaft and installation of borewall pump				0.50
	Securing of incline				0.50
	Concrete wall fencing around the water body				
	Boundary wall around the water body				
	Stabilisation (viz benching, pitching etc) of side walls of the water body				
	Toe wall around the dump				
	Garland Drain				
	Garland Drain around the dump				
	Drainage channel from main Ob dump				
	Any other Activity				
Technical and Biological Reclamation of mined out of land and OB Dump	Filling of Void	Ha	0	0	0
	Top soil management	MM3	0	0	0
	OB Rehandling for backfilling	MM3	0	0	0
	Terracing, blanketing with soil and vegetation of External OB Dump	Ha	0	0	0
	Paripharel road, gates, view point, cemented steps on bank				
	Expenditure on development of Agriculture land				
	Landscaping and Plantation	Ls			0
	Any other Activity				
Post Closure management and supervision	Power Cost	Ls			0.45
	Post mining water quality management	Ls			0.6~

	Post mining air quality management	Ls			0.45
	Subsidence monitoring for 5 years	Ls			2.50
	Waste management	Ls			2.00
	Manpower Cost and supervision	Ls			1.80
	Manpower Cost and supervision				
Others	Enterprenuership development(vocational/skill development training for sustainable income of affected people)				1.20
	Golden Handshake/Retrenchment benefits to 100 employees of OC				0
	Golden Handshake/Retrenchment benefits to 200 employees of UG				0
	Onetime financial grant to societies/ institutions/ organisations which is dependent upon the project				1.20
	Provide Jobs in other mines of company				
	Continuation of other services like running of school etc.				1.00
	Any other Activity				
Total					19.70

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

WPI as on	Apr-19	121.10
WPI as on base date	Sep2021	136.0
Escalation rate of Closure cost		1.123
	UG	OC
Base Cost "Rs. Crs/Ha	0.015	0
Closure Cost "Rs. Crs/Ha"	0.017	0
Project Area "Ha"	619.0	0
Amount to be deposited into Escrow Account "Rs. in Crs	10.523	0
Amount already deposited into Escrow Account "Rs. in Crs	0	0
Net Amount to be deposited into Escrow Account "Rs. in Crs	10.523	0
Rate of compounding of Annual Closure Cost		5.00%
Balance Life of the project "in Yrs	19	0
Annual Closure Cost "Rs. in Crs"	0.554	0
Amount to be deposited into Escrow Account after compounding @ of 5% "Rs. in Crs"		16.919

Amount to be deposited into Escrow

Year	OC	Year	UG	Total
		1	0.554	0.554
		2	0.582	0.582
		3	0.611	0.611
		4	0.641	0.641
		5	0.673	0.673
		6	0.707	0.707
		7	0.742	0.742
		8	0.78	0.78
		9	0.819	0.819
		10	0.859	0.859
		11	0.902	0.902
		12	0.948	0.948
		13	0.995	0.995
		14	1.045	1.045
		15	1.097	1.097

		16	1.152	1.152
		17	1.209	1.209
		18	1.27	1.27
		19	1.333	1.333
Total	0.000		16.919	16.919



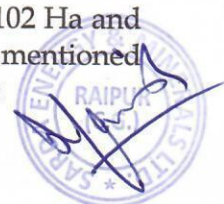
CERTIFIED TRUE COPY of the resolution passed by the Board of Directors of the Company in its meeting held on 27th May 2023

“RESOLVED that subsequent to the approval of Modified Mine Plan for Sahapur West Coal Mine for 0.6 Million Tonne Per Annum by the Ministry of Coal, Govt of India, the consent of the Board be and is hereby accorded to modify the surface layout and use bare minimum land for surface infrastructure by shifting the Mine Infrastructure (excluding Road) from Revenue Forest Land to Private Land.

RESOLVED FURTHER that due to change in location of proposed Mine Infrastructure (excluding Road) from Revenue Forest Land to Private Land & further modifications in the layout, the table 1.5.25 of the approved Modified Mine Plan be and is hereby revised as under:

1.5.25	Land use pattern “Ha”			
S.No	Component	As per approved Modified Mining Plan dated 21.04.2022	As proposed	Remarks
1	Excavation Area	0.0000	0.0000	
2	Topsoil Dump	0.0300	0.0300	
3	External Dump	0.0000	0.0000	
4	Safety Zone	0.0000	0.0000	
5	Other Use	1.3760	0.5000	Components viz Embankment, Settling Ponds and UG entry were included in Other Use in Modified Mining Plan, whereas components viz Settling Ponds and UG entry are included in Other Uses in proposed changes. Embankment has been considered along with Green Belt.
6	Infrastructure Area	14.8750	8.159	Including Roads
7	Green Belt	8.0180	8.0200	
8	Undisturbed Area	594.7010	602.2910	
Total		619.000	619.000	

RESOLVED FURTHER that as certified by the Revenue Authorities of Shahdol and Umaria, the total Revenue Forest involved in Sahapur West Coal Block be changed to 34.102 Ha and the total Forest Land in Sahapur West Coal Block be taken as 80.590 Ha. The table mentioned under Clause 6.1 of the modified mining plan be and is hereby modified as under:



Industrial Growth Center, Siltara
Raipur (CG) 493111, India
Tel: +91 771 2216100
Fax : +91 771 2216198/99
PAN No.: AAACR6149L
CIN : L27100MH1973PLC 016617
www.seml.co.in
info@seml.co.in

An ISO 9001, ISO 14001 & ISO 45001
Certified Company



Land Type		Area in Ha.
Tenancy	Agriculture (Includes few residential houses)	511.220
	Township	-
	Grazing	-
	Barren	-
	Water Bodies	-
	Road	-
	Community/Other	-
Govt. Non-Forest	Agriculture	2.191
	Township	-
	Road	3.583
	River/Nallah	10.112
	Water Bodies	9.100
	Grazing	-
	Community/Other	2.898
Forest	Barren	-
	Revenue Forest	34.102
	Reserve	34.240
	Protected	12.248
Free Hold		-
Total		619.000

Break up of pre-mining land type (indicative) and source of data.	S.No	Land Type	Existing/Pre- Mining Use	Area
	1	Total	Total (Ha)	619.000
	2	Private	Agriculture (Includes few residential houses) (Includes few residential houses)	510.930
	3	Government	Surface Water Bodies	18.518
	4	Government	Other (Ha)	8.672
	5	Forest	Revenue, Reserved, Protected (Ha)	80.590

For Sarda Energy & Minerals Ltd.

Company Secretary