

**GEOLOGICAL REPORT ON PRELIMINARY
EXPLORATION (G3-STAGE) FOR COAL**

WEST OF BORDA & GHONSA-PARSODA BLOCK

**WARDHA VALLEY COALFIELD
DISTRICT- YAVATMAL, MAHARASHTRA**

**(Exploration Programme approved by National Mineral Exploration
Trust, Ministry of Mines, Govt. of India, New Delhi)**



cmpdi
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सेन्ट्रल माईन प्लानिंग एण्ड डिजाइन इन्स्टीच्यूट लिमिटेड
(कोयला इण्डिया लिमिटेड की अनुषंगी कम्पनी / भारत सरकार का एक लोक उपक्रम)
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MARCH 2025

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LIST OF PLATES

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**LIST OF ABBREVIATIONS USED IN TEXT, DESCRIPTIVE LITHOLOGY,
ANNEXURES AND PLATES**

AB	Abnormal Thickness
AD	Air Dried basis in coal analysis
AFTR	Ash Fusion Temperature Range
B	Barakars
BIS	Bureau of Indian Standards
C	Carbon
CBM	Coal Bed Methane
Carb	Carbonaceous
CF	Coalfield
CMPDI	Central Mine Planning & Design Institute
GCV	Gross Calorific Value in K. Cal./kg
GK LTC	Gray King Low Thermal Carbonization
DMMF	Dry Mineral Matter Free
DAF	Dry Ash Free
DGM (MS)	Directorate of Geology and Mining (Maharashtra State)
DTW(bgl)	Depth to Water (Below ground level)
E	East
EC	Executive Committee of National Mineral Exploration Trust
ET	Effective Thickness
F	Fault
FC	Fixed Carbon
FRL	Floor Reduced Level
FF	Floor Faulted
FT	Flow Temperature
GSI	Geological Survey of India
GTS	Great Trigonometrical Survey
H	Hydrogen
HGI	Hard Grove Grindability Index
HT	Hemispherical Temperature
HCS	Carbonaceous Shale High
IBM	Indian Bureau of Mines
IDT	Initial Deformation Temperature
ISP	Indian Standard Procedure
i.e.	That is
K	Kamthis
Kms	Kilometers
K. Cal./Kg.	Kilo Calories Per Kilogram
LCS	Carbonaceous Shale Low
m	Metre
M	Moisture

Max	Maximum
Min	Minimum
Mt	Million tonnes
mm	Millimeter
MS	MAHARASHTRA
MSL	Mean Sea Level
N	North
N%	Nitrogen % in Ultimate analysis
NE	North-East
NMET	National Mineral Exploration Trust, Ministry of Mines, Govt. of India
NW	North-West
O	Oxygen
OB	Overburden
PR	Poor Recovery
PT	Part Thickness
Rec. Th.	Recovered thickness (in m.)
RD	Relative Density
R. F.	Representative Fraction
RF	Roof Faulted
RH	Relative Humidity
RI-IV	Regional Institute IV of CMPDI
RL	Reduced Level
RQD	Rock Quality Designation (expressed in %)
S	Sulphur
SC	Sub-crop
SE	South-East
Sol	Survey of India
Sq.km.	Square Kilometre
SS	Shear Strength
SW	South-West
TCC	Technical-Cum-Cost Committee of National Mineral Exploration Trust
TS	Tensile Strength
UCS	Uniaxial Compressive Strength
UHV	Useful Heat Value in K. Cal./Kg
V	Thickness of Coal Seam/Section on Visual Basis
Viz	Namely
VM	Volatile Matter
Vs	Versus
WCL	Western Coalfields Limited

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SALIENT FEATURES

1	Name of the Block	:	West of Borda & Ghonsa -Parsoda Block
2	Area of the Block	:	61.06 Sq. Km.
3	Location of the Block	i	West of Borda & Ghonsa-Parsoda is located in the south western part of Wardha valley CF District Yavatmal. The area is covered in the toposheet 56 I/13
		ii	Area is included in Survey of India toposheet (56I/13 R.F. 1: 50,000).
		iii	Bonding Co-ordinates of West of Borda & Ghonsa-Parsoda Block: Latitude : N – 19° 53' 22 " N to 20° 0' 43.08" N Longitude : E – 78° 44' 36" E to 78° 50' 19.28" E
4	Accessibility	:	The area falls in the Yavatmal district of Maharashtra state. The Wani Township is located at a distance of about 25 kms from this block and is connected by a fair weather Wani–Ghonsa/Borda road. From Nagpur, the block is at a distance of 140 Kms. The nearest railway station is at Wani on Majri–Rajur branch of Central Railway. The area is also well connected with Wani-Yeotmal state highway through Karanwadi Raipur fair weather road. Since, the block is located in the interior part, the suitable communication to the area is by Wani-Ghonsa/Borda road and Wani – Maregaon – Karanwadi – Raipur road.
5	Objectives		The G3 stage of Exploration in the block is proposed to fulfill following objectives- 1. To establish the existence and continuity of coal seams occurring in the block as significant coal resource are present in adjoining Borda & Borda Extn, Ghonsa-Parsoda etc. 2. To establish the lay, disposition and potentiality of coal seams.

			3. To assess the coal resource by G3 stage of exploration in the block.
6	Duration of Field Operation	:	19.10.2023 to 31.01.2025
7	Borehole density	:	Borehole density is 0.26 boreholes/Sq. Km.
8	Quantum of Work	:	The quantum of work carried out by CMPDIL in West of Borda & Ghonsa-Parsoda Block involving various activities are summarized in Table No. I:

Table No.- I
Quantum of work done

Sl. No.	Item of work	Work done																																				
1.	Geological Mapping	61.06 Sq. km																																				
2.	Topographic Surveying																																					
	Boreholes a) Co-ordinates b) R.L's	12 Nos. 12 Nos.																																				
3.	Exploratory Drilling	Total drilling in 12 boreholes 9300.20m .																																				
4.	Geological Core logging	9300.20m																																				
5.	Geophysical Logging	Meterage of Geophysical Logging :1216.05 m Meterage of Sonic Logging: 705.22 m Meterage of Deviation Logging: 6487.92 m No of Boreholes logged (GPL):11 Nos.																																				
6.	Coal Sampling	54.54m, details are as follows: <table border="1"> <thead> <tr> <th>Bh. No.</th><th>Thickness (m)</th><th>Recovery (m)</th></tr> </thead> <tbody> <tr><td>CMWWB01</td><td>7.06</td><td>6.93</td></tr> <tr><td>CMWWB03</td><td>7.31</td><td>7.1</td></tr> <tr><td>CMWWB04</td><td>3.84</td><td>3.67</td></tr> <tr><td>CMWWB05</td><td>4.27</td><td>3.88</td></tr> <tr><td>CMWWB06</td><td>3.98</td><td>3.95</td></tr> <tr><td>CMWWB07</td><td>6.82</td><td>6.8</td></tr> <tr><td>CMWWB08</td><td>5.05</td><td>4.95</td></tr> <tr><td>CMWWB09</td><td>4.9</td><td>4.83</td></tr> <tr><td>CMWWB10</td><td>7.73</td><td>7.52</td></tr> <tr><td>CMWWB12</td><td>4.92</td><td>4.91</td></tr> <tr><td>TOTAL</td><td>55.88</td><td>54.54</td></tr> </tbody> </table>	Bh. No.	Thickness (m)	Recovery (m)	CMWWB01	7.06	6.93	CMWWB03	7.31	7.1	CMWWB04	3.84	3.67	CMWWB05	4.27	3.88	CMWWB06	3.98	3.95	CMWWB07	6.82	6.8	CMWWB08	5.05	4.95	CMWWB09	4.9	4.83	CMWWB10	7.73	7.52	CMWWB12	4.92	4.91	TOTAL	55.88	54.54
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TOTAL	55.88	54.54																																				
7.	Chemical Analysis (CMPDIL Lab)	54.54m.																																				

Table No. II
Details of chemical analysis

Sl. No	Parameters	No. of BHs	No. of determinations BCS/I30	Laboratory Name
1	Moisture	10	23	Coal Characterization Lab, CMPDI HQ, Ranchi (NABL Accredited)
2	Ash	10	23	
3	Proximate Analysis	10	23	
4	GCV	10	23	
5	Ultimate Analysis	5 (CMWWB03, 06, 07,09,10)	15	
6	Total Sulphur	-	-	
7	Sulphur Distribution	-	-	
8	HGI	5 (CMWWB03, 06, 07,09,10)	15	
9	Ash Fusion Temperature Range	5 (CMWWB03, 06, 07,09,10)	15	
10	Ash Analysis	5 (CMWWB03, 06, 07,09,10)	15	
11	Petrography Analysis	1 (CMWWB06, 07)	5	
12	Pellet Preparation	2(CMWWB05,07)	5	
13	Maceral Analysis(with photomicrography)	2(CMWWB05,07)	5	
14	Mean Ro%	2(CMWWB05,07)	5	

9	Mining Activity	:	The Block is a virgin block and has no history of mining. The nearest working mine is Ghonsa Opencast mine of Western Coalfields Limited (WCL), which is located approximately 5 km. east of the block.
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10	Type of Land Cover :		The area is almost entirely covered by thick and hard Deccan Trap and presents a rugged and undulating topography due to differential weathering and erosion. The general slope in southern half of the block is towards south while general slope in northern half of the block is towards north/north-east. The exposures of basalt forms hillock like features in the block at places. The area experiences typical tropical climate. The summer season is from April to June with the maximum temperature reaching up to 42°C during May. Winters are moderate with the minimum temperature dropping up to 5°C. Monsoon generally extends from June to September. The average annual rainfall is around 1125 mm. The major precipitation is experienced between July and September. The area under study is partly forested however occurrence of Thick forests and dense Jungles are found in the area. Out of the Total area 61.06 Sq. km (approx.) under exploration 15.2028Sq. km is Forest area and 45.7418 Sq. km (approx. 75.04%) Non Forest Area. Teak, sal pipal, Kendu and bamboo are the dominant plants in the Forest.
11	Geology of Block	i.	West of Borda & Ghonsa-Parsoda Block is located in the south western part of the Wardha Valley Coalfield. It is represented by deccan traps and formations of Gondwana Group. The area traversed is covered in Deccan Traps and in few areas black cotton soil. The stratigraphic succession encountered in the block is given below in Table No.-III.

Table No. III
STRATIGRAPHIC SUCCESSION IN WEST OF BORDA & GHONSA-PARSODA BLOCK

Age	Formation	Lithology (Thickness)
Recent/Sub-Recent	Detrital Mantle	Black cotton soil/sandy soil with trap fragments. (0.20-6.50m)
Upper Cretaceous	Deccan Trap	Basalts (9.70-105.00m)
-----UNCONFORMITY-----		
Middle Permian	Motur	Medium to fine grained variegated sandstones, variegated clays and shales. (432.60-814.90m)
Lower Permian	Barakar	Light grey to whitish sandstones with grey shale, sandy shale, alternate bands of shale and sandstone and coal seams. (85.50-125.20m: full thickness of this formation not drilled)
Upper Carboniferous to Lower Permian	Talchir	Greenish to grey sandstones, siltstone and shale. (Not intersected in any borehole of the block)

12	Strike & Dip		The general strike of coal horizons in the block is NW-SE, and; approximate general gradient being approximate general gradient being 1 in 15.8 (dip varies from 3.6 degree due SW) to 1 in 12.3 (dip 4.63 degree due SW).
13	Faults		On the basis of Sub-Surface Geological data acquired through drilling in present phase as well as GSI boreholes of Jhamkola and Dhabadi Sector, 07 faults have been interpreted in this block. 07 faults (F1 to F7) lie within the block boundary and 03 faults (F8 to F10) lie outside of boundary. Details of faults are given in Following table.

TABLE NO. – IV
Details of Faults in West of Borda & Ghonsa Parsoda Block, Wardha Valley
Coalfield

Fault No.	Strike of fault	Throw		Evidences
		Amount (m)	Direction	
F1-F1	NWN-SSE	~90m	NEE	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-12 & CMWWB-06.
F2-F2	NWN-SSE	~40m	SWW	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-07,09 & CMWWB-08 and seam I faulted in borehole CMWWB-05
F3-F3	NWN-SSE	~50m	NEE	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-07,09 & CMWWB-08 and seam I faulted in borehole CMWWB-08
F4-F4	NWW-SEE	~160 - 240m	NNE	Delineated on the basis of sub-surface data of boreholes CMWWB-03,06,12 & CMWWB-10.
F5-F5	NW-SE	~290 - 680m	NE	Delineated on the basis of sub-surface data of boreholes CMWWB-10 & CMWWB-04.
F6-F6	SWW-NEE	~>400 m (?)	SSE	Abuts against F5-F5, Delineated on the basis of sub-surface data of boreholes CMWWB-02 as it is closed in Motur formation at depth of 885m.
F7-F7	NW-SE	~50m	NE	Delineated on the basis of sub-surface data of boreholes CMWWB-04 as both seams IIB & I are faulted.

14	Coal Seams	:	G3 Level exploration in West of Borda & Ghonsa-Parsoda Block has revealed the presence of one thick coal seam, composite seam (CS) that splits into Seam I & II. However, Seam II further split into IIA & IIB along with the presence of three local coal seams-local seam L1,L2 & L3 encountered in Barakar Formation. Seam I being the oldest and local seam (L1) being the youngest. Borehole No. CMWWB-02 has been closed in Motur Formation.. All the coal seams are composed mainly of coal, shaly coal, carbonaceous shale (low), carbonaceous shale (high), and shale. Seam sequence has been tabulated in following table.
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SEAM/PARTINGS	DEPTH RANGE(m)		THICKNESS(m)		NO. OF INTERSECTIONS
	MIN	MAX	MIN	MAX	
IIA	591.68 (CMWWB04)	910.62 (CMWWB03)	1.10	3.00	10
PARTING	1.68	12.07			
IIB	664 (CMWWB06)	915.5 (CMWWB03)	1.00	4.00	9
PARTING	7.74	13.24			
I	677.10 (CMWWB06)	929.08 (CMWWB03)	.32	1.31	7

Table No. V
SEQUENCE OF COAL SEAMS INTERSECTED IN WEST OF BORDA BLOCK

15	Quality of coal seams	:	Details of Quality of Coal Seams encountered in WEST OF BORDA & GHONSA-PARSODA Coal Block are given in following table.
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Table No. VI
Quality of Coal Seams encountered in West of Borda Ghonsa -Parsoda Block

BH. NO.	From (m)	TO (m)	THICK.(m)	SEAM	sample Type	M%	ASH%	VM%	FC	RD	GCV (KCal/kg) on 60% RH & 40 degree C	GCV BAND
CMWWB01	815.60	818.45	2.85	IIA	BCS/I30	6.6	24.20	30.10	39.10	1.52	5409.00	G7
CMWWB01	822.75	826.60	3.85	IIB	BCS/I30	6.6	22.10	24.90	46.40	1.50	5515.00	G6
CMWWB03	910.62	911.72	1.10	IIA	BCS/I30	6.5	14.40	32.80	46.30	1.42	6096.00	G5
CMWWB03	915.50	919.50	4.00	IIB	BCS/I30	5.9	30.10	22.80	41.20	1.58	4736.00	G9
CMWWB03	929.08	929.64	0.56	I	BCS/I30	5.1	40.70	22.80	31.40	1.69	3876.00	G12
CMWWB04	591.68	594.30	2.62	II	BCS/I30	6.6	25.40	26.50	41.50	1.53	5033.00	G8
CMWWB05	725.80	727.30	1.50	IIA	BCS/I30	6.4	28.80	23.70	41.10	1.57	4758.00	G9
CMWWB05	738.10	740.32	2.22	IIB	I30	5.2	37.70	22.70	34.40	1.66	4118.00	G11
CMWWB08	827.92	829.15	1.23	IIA	BCS/I30	7.3	17.70	30.00	45.00	1.46	5839.00	G5
CMWWB08	834.64	837.83	3.19	IIB	BCS/I30	5.4	25.10	26.70	42.80	1.53	5359.00	G7
CMWWB09	670.02	672.00	1.98	IIA	BCS/I30	4.8	30.70	26.20	38.30	1.59	4865.00	G9
CMWWB09	682.84	685.26	2.42	IIB	BCS/I30	4.8	21.90	26.20	47.10	1.50	5644.00	G6
CMWWB09	698.50	699.00	0.50	I	BCS/I30	6.9	22.50	26.40	44.20	1.51	5475.00	G7
CMWWB10	754.40	756.96	2.56	IIA	BCS/I30	6.1	29.00	24.40	40.50	1.57	4928.00	G8
CMWWB10	758.64	762.30	3.66	IIB	BCS/I30	6.1	22.50	25.40	46.00	1.51	5576.00	G6
CMWWB10	772.56	773.87	1.31	I	BCS/I30	5.3	28.90	26.00	39.80	1.57	4995.00	G8
CMWWB06	649.51	651.97	2.46	IIA	BCS/I30	7.0	26.6	27.3	39.10	1.55	4917.00	G8

BH. NO.	From (m)	TO (m)	THICK.(m)	SEAM	sample Type	M%	ASH%	VM%	FC	RD	GCV (KCal/kg) on 60% RH & 40 degree C	GCV BAND
CMWWB06	664.00	665.00	1.00	IIB	BCS/I30	5.6	23.5	26.7	44.20	1.52	5386.00	G7
CMWWB06	677.10	677.62	0.52	I	BCS/I30	6.7	15.2	30.7	47.40	1.43	6094.00	G5
CMWWB07	709.20	712.20	3.00	II A	BCS/I30	7.0	22.7	28.6	41.70	1.51	5300.00	G7
CMWWB07	721.70	724.45	2.75	II B	BCS/I30	6.6	22.4	27.9	43.10	1.50	5353.00	G7
CMWWB07	732.19	732.70	0.51	I	BCS/I30	7.8	33.9	26.3	32.00	1.62	4225.00	G11

16	Resource	:	Based on very limited exploration and analytical data, coking property was not observed conclusively, hence the coal seams are taken as non-coking and resource have been calculated accordingly. Resources have been estimated through MINEX and categorized into Sector wise, depth wise, seam wise and thickness wise. A total of 453.09 million tonnes of gross inferred resources have been estimated in the entire block (including thin seams of 0.50-0.90m thickness range), while total inferred resource of the block for thick Seams (>0.90m thickness) is 428.15 MT. Total 24.94 MT resource is estimated for thin seams of 0.50-0.90m thickness range. 88% of total resources falls in G6 to G9 grade. Depth wise, 108.41Mt (24%) resources falls in 300-600m range and 344.68Mt (76%) falls in 600m beyond depth range.
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Table No. VII (A-1)												
SEAM WISE, SECTOR WISE & GRADE-WISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF.												
SEAM/SECTOR	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	Grand Total
I	10.27	7.77	5.57	6.62	7.66	6.96	4.81	3.85	4.34	3.97	0.51	62.32
SEC-1	1.46	0.23	0.00	0	0	0	0	0	0	0	0	1.69
SEC-2	0	0	0.01	0.65	0.75	0.52	0.16	0.2	0.77	0.49	0	3.55
SEC-3	0.1	0.73	0.81	0.7	0.04	0	0	0	0.45	0.1	0	2.93
SEC-4	0	0	0	0.02	0.44	0.59	0.39	0.49	1.37	2.38	0.44	6.11
SEC-5	4.99	0.1	0	0	0	0	0	0	0	0	0	5.09
SEC-6	1.82	2.15	2.84	3.09	3.96	3.32	1.94	1.05	0.89	0.98	0.07	22.11
SEC-7	1.88	0.72	0.64	0.7	1	0.96	0.76	0.69	0.47	0.03	0	7.84
SEC-8	0	0	0	0	0	0	0	0	0	0	0	0
SEC-9	0.03	3.85	1.27	1.46	1.46	1.57	1.55	1.42	0.39	0	0	13
IIA	0	0.87	6.47	11.92	24.13	118.2	31.04	0	0	0	0	192.63
SEC-1	0	0	0	0	0	4.35	10.99	0	0	0	0	15.34
SEC-2	0	0	0.09	2.46	4.32	5.89	2.5	0	0	0	0	15.26
SEC-3	0	0	0	0.92	7.74	10.99	13.29	0	0	0	0	32.95
SEC-4	0	0.55	4.24	6.93	5.84	4.23	0	0	0	0	0	21.8

SEC-5	0	0	0	0	0	15.45	0	0	0	0	0	15.45
SEC-6	0	0.31	2.11	1.22	1.88	42.92	3.53	0	0	0	0	51.97
SEC-7	0	0	0.02	0.39	1.63	13.27	0.13	0	0	0	0	15.43
SEC-8	0	0	0	0	0	0	0	0	0	0	0	0
SEC-9	0	0	0	0	2.72	21.11	0.61	0	0	0	0	24.44
IIB	0	0	0	97.96	55.32	19.33	15.76	5.46	4.31	0	0	198.14
SEC-1	0	0	0	0.47	1.96	0	0	0	0	0	0	2.43
SEC-2	0	0	0	5.32	9.65	1.22	1.05	1.75	1.27	0	0	20.26
SEC-3	0	0	0	5.37	12.32	5.27	1.46	2.71	3.04	0	0	30.17
SEC-4	0	0	0	6.08	18.36	5.6	9.73	1	0	0	0	40.77
SEC-5	0	0	0	6.06	0	0	0	0	0	0	0	6.06
SEC-6	0	0	0	35.17	10.44	7.18	3.53	0	0	0	0	56.31
SEC-7	0	0	0	14.24	2.04	0.06	0	0	0	0	0	16.34
SEC-8	0	0	0	0	0	0	0	0	0	0	0	0
SEC-9	0	0	0	25.25	0.55	0	0	0	0	0	0	25.79
Grand Total	10.27	8.64	12.04	116.5	87.1	144.49	51.61	9.31	8.65	3.97	0.51	453.09

Table No. VII (A-2)

**SEAM WISE, SECTOR WISE AND THICKNESS WISE GROSS INFERRED RESOURCES IN WEST OF BORDA
GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK,
WARDHA VALLEY CF.**

SEAM/SECTOR	THICKNESS							Grand Total
	0.50-0.9	0.90-1.2	1.20-1.5	1.50-2.0	2.00-3.0	3.00-4.0	4.00-5.0	
I	20.52	14.18	24.37	3.25	0.00	0.00	0.00	62.32
SEC-1	1.68	0.00	0.00	0.00	0.00	0.00	0.00	1.68
SEC-2	3.56	0.00	0.00	0.00	0.00	0.00	0.00	3.55
SEC-3	2.92	0.00	0.00	0.00	0.00	0.00	0.00	2.92
SEC-4	6.03	0.07	0.00	0.00	0.00	0.00	0.00	6.10
SEC-5	0.96	4.07	0.05	0.00	0.00	0.00	0.00	5.09
SEC-6	5.37	9.88	6.88	0.00	0.00	0.00	0.00	22.11
SEC-7	0.00	0.15	7.68	0.00	0.00	0.00	0.00	7.84
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	9.75	3.25	0.00	0.00	0.00	13.00
IIA	0.00	0.62	11.66	18.35	160.79	1.21	0.00	192.63
SEC-1	0.00	0.00	0.00	0.00	15.34	0.00	0.00	15.34
SEC-2	0.00	0.00	1.33	4.91	9.02	0.00	0.00	15.26
SEC-3	0.00	0.00	4.44	6.64	21.87	0.00	0.00	32.95
SEC-4	0.00	0.62	3.68	5.01	12.49	0.00	0.00	21.80
SEC-5	0.00	0.00	0.00	0.00	15.45	0.00	0.00	15.45
SEC-6	0.00	0.00	2.21	1.73	48.03	0.00	0.00	51.97
SEC-7	0.00	0.00	0.00	0.07	14.57	0.79	0.00	15.43
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	0.00	0.00	24.01	0.43	0.00	24.44

IIB	4.42	7.19	7.56	19.35	55.72	68.65	35.25	198.14
SEC-1	2.06	0.29	0.08	0.00	0.00	0.00	0.00	2.43
SEC-2	0.00	0.00	0.00	0.54	13.55	6.17	0.00	20.26
SEC-3	0.23	1.92	1.82	8.74	17.24	0.22	0.00	30.17
SEC-4	0.00	0.00	0.00	0.00	4.91	27.13	8.74	40.77
SEC-5	0.69	3.64	1.67	0.06	0.00	0.00	0.00	6.06
SEC-6	1.45	1.34	1.93	4.68	12.83	22.68	11.40	56.31
SEC-7	0.00	0.00	2.07	1.04	2.67	4.70	5.87	16.34
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	0.00	4.28	4.52	7.74	9.25	25.79
Grand Total	24.94	21.99	43.59	40.95	216.51	69.85	35.25	453.09

Table No. VII (A-3)

**SEAM WISE, SECTOR WISE AND DEPTH-WISE WISE GROSS INFERRED RESOURCES IN WEST OF BORDA
GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK,
WARDHA VALLEY CF.**

SEAM/SECTOR	DEPTH			Grand Total
	300-600	600-900	>>900	
I	20.90	35.26	6.15	62.32
SEC-1	0.00	1.69	0.00	1.69
SEC-2	0.00	3.55	0.00	3.55
SEC-3	0.00	2.93	0.00	2.93
SEC-4	0.00	5.04	1.07	6.11
SEC-5	0.00	0.00	5.09	5.09
SEC-6	0.32	21.79	0.00	22.11
SEC-7	7.71	0.13	0.00	7.84
SEC-8	0.00	0.00	0.00	0.00
SEC-9	12.87	0.13	0.00	13.00
IIA	44.59	131.37	16.67	192.63
SEC-1	0.00	15.34	0.00	15.34
SEC-2	0.00	15.26	0.00	15.26
SEC-3	0.00	32.95	0.00	32.95
SEC-4	0.00	20.57	1.23	21.80
SEC-5	0.00	0.00	15.45	15.45
SEC-6	4.72	47.25	0.00	51.97
SEC-7	15.43	0.00	0.00	15.43
SEC-8	0.00	0.00	0.00	0.00
SEC-9	24.44	0.00	0.00	24.44
IIB	42.91	144.06	11.17	198.14
SEC-1	0.00	2.43	0.00	2.43
SEC-2	0.00	20.26	0.00	20.26
SEC-3	0.00	30.17	0.00	30.17
SEC-4	0.00	35.66	5.11	40.77
SEC-5	0.00	0.00	6.06	6.06
SEC-6	0.78	55.53	0.00	56.31
SEC-7	16.34	0.00	0.00	16.34
SEC-8	0.00	0.00	0.00	0.00
SEC-9	25.79	0.00	0.00	25.79
Grand Total	108.41	310.69	34.00	453.09

GEOLOGICAL REPORT ON G3 LEVEL EXPLORATION FOR COAL IN
WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD,
DISTRICT-YAVATMAL, MAHARASHTRA.

(Exploration Programme approved by National Mineral Exploration Trust, Ministry of
Mines, Govt. of India, New Delhi)

CHAPTER-1

1.0.0 INTRODUCTION

1.1.0 GENERAL

1.1.1 Wardha Valley Coalfield has assumed importance by virtue of its location to meet the increasing coal demand in southern and western part of the country. Wardha Valley Coalfield covers an area of about 4130 Sq. Km. within the districts of Chandrapur and Yavatmal in Maharashtra State. The likely extension of this coalfield due NNW in the Wardha district below the Deccan Traps cannot be ruled out. Furthermore, the Godavari Valley Coalfield in SSE may be the likely extension of Wardha Valley Coalfield in the Adilabad district of Telangana.

1.1.2 Wardha Valley Coalfield is located in the south-eastern part of Maharashtra State and is bounded between Latitude N 19° 30' & N 20° 27' and Longitude E 78°50' & E 79°49'.

1.1.3 The total coal inventory of Wardha Valley Coalfield estimated by GSI as on 01.04.2024 stands as follows:

Depth Range (m)	Type	Measured (331)	Indicated (332)	Inferred (333)	Resource in Million Tonne
0-300m	Non Coking	4625.94	836.31	245.88	5708.13
300-600m		480.54	966.29	1138.22	2585.05
600-1200m		0.54	35.12	26.99	62.65
Total for Wardha Valley Coalfield		5107.02	1837.72	1411.09	8355.83

1.1.4 West of Borda & Ghonsa Parsoda Block forms part of western limb of the plunging anticline in the southwestern part of Wardha Valley Coalfield.

1.1.5 The Geological Survey of India carried out regional exploration in Jhamkola Sector and scout drilling in Dabhabdi sectors, which fall partly in the block area. Adjoining up-dip side blocks viz. Borda, Ghonsa Parsoda were explored by DGM(MS), CMPDI and MECL which established presence of significant coal resource in said blocks. In assumption that similar geological structure occurs in the block in continuation with the blocks mentioned earlier few scout boreholes were drilled by GSI in and around the proposed area (GSI drilled boreholes nos. WJ-1,WJ-2,WJ-3 ,WJ-3A in Jhamkola sector and borehole nos. WDD1A,WDD2 & WDD3 in Dhabadi sector).

1.1.6 In assumption of continuity of geological structure and coal seams coupled with findings of regional exploration/scout drilling by GSI in the part area, CMPDI submitted proposal for regional exploration (G3 stage) in West of Borda & Ghonsa Parsoda Block to National Mineral Exploration Trust (NMET). Technical-cum-cost Committee (TCC), NMET vide its 32nd meeting held on 10.08.2022 & 11.08.2022, recommended the proposal for approval of EC (Executive Committee), NMET. The proposal was approved by EC, NMET vide its 24th meeting held on 18.05.2022.

- 1.1.7** This report of West of Borda & Ghonsa Parsoda Block embodies the findings of the exploration data of 12 boreholes drilled by CMPDI as per NMET sanction order; 4 boreholes of WJ series(WJ-1,2,3,3A) drilled by GSI which falls in present block area coupled with the surface data collected during field traverses and geological mapping. Data of boreholes of WDD series(WDD-1A,2,3) drilled by GSI in Dhabadi sector which fall just outside of western boundary of the block, have also been utilized in this report.

1.2.0 OBJECTIVES

- 1.2.1** The G3 Level exploration in 'West of Borda & Ghonsa-Parsoda' block was taken up with the following objectives:
- To establish the existence and continuity of coal seams occurring in the block as significant coal resource are present in adjoining such as Borda & Borda extn, Ghonsa-parsoda etc block.
 - To establish the lay, disposition and potentiality of coal seams.
 - To assess the coal resource by G3 stage of exploration in the block.

1.3.0 LOCATION

The Block falls in Wani and Zari-Jamani tehsils of Yavatmal district of Maharashtra state. The Wani Township is located at a distance of about 25km east of the block while Pandharkawada township is located at approx. 30km towards west of block area.

1.4.0 ACCESSIBILITY

The block is at a distance of 165km. approx. from Nagpur and is approachable by Nagpur via Jamb (NH47, NH44) -Warora (NH347A)-Wani (NH930) and then by SH233 via Ghonsa. Alternatively, the block can be approached by Nagpur-Hinganghat - Pandharkawada-Kelapur (NH47-NH44) and then thorough SH233 towards Zhamkola to reach block area. The nearby railway stations are Kayar and Wani stations, located at Wani Chanak branch of Central Railway. The area is also well connected with Wani-Yeotmal state highway through Karanwadi Raipur fair weather road. Since, the block is located in the interior part, the suitable communication to the area is by Wani-Ghonsa/Borda road and Wani – Maregaon – Karanwadi – Raipur road.

1.5.0 BLOCK BOUNDARY

West of Borda & Ghonsa-Parsoda is located in the south western part of Wardha Valley CF. The area is covered in the toposheet 56 I/13. The geographical co-ordinates of the block defined are as follows:

Table No. – 1.5.1
Latitudes and Longitudes of West of Borda & Ghonsa-Parsoda Block

Coordinate System/ Datum	Latitude / Northing		Longitude / Easting	
	From	To	From	To
WGS-84	19° 53' 22" N	20° 0' 43.08" N	78° 44' 36" E	78° 50' 19.28" E

1.5.1 CARDINAL POINTS

The cardinal points West of Borda & Ghonsa-parsoda Block are tabulated as follows:

Table No.-1.5.2

CARDINAL POINT OF WEST OF BORDA & GHONSA PARSODA BLOCK, WARDHA VALLEY COALFIELD, CHANDRAPUR DISTRICT, MAHARASHTRA					
Sl. No.	CARDINAL POINT No.	Easting	Northing	Longitude	Latitude
1	A	268834.9942	2208513.0627	78° 47' 27.989" E	19° 57' 33.936" N
2	B	268853.9593	2208495.8633	78° 47' 28.649" E	19° 57' 33.385" N
3	C	269526.8076	2207885.6629	78° 47' 52.057" E	19° 57' 13.836" N
4	D	270569.8143	2206939.7807	78° 48' 28.340" E	19° 56' 43.531" N
5	E	271925.9939	2205709.9089	78° 49' 15.512" E	19° 56' 4.123" N
6	F	272991.2572	2203994.5454	78° 49' 52.892" E	19° 55' 8.807" N
7	G	273743.5048	2202783.249	78° 50' 19.284" E	19° 54' 29.744" N
8	H	270265.6641	2200768.7507	78° 48' 20.653" E	19° 53' 22.791" N
9	I	264136.8645	2205162.3747	78° 44' 48.013" E	19° 55' 42.984" N
10	J	263930.2441	2214397.1722	78° 44' 36.639" E	20° 0' 43.088" N
11	K	264479.4066	2213773.9026	78° 44' 55.814" E	20° 0' 23.068" N
12	L	264906.805	2213804.0463	78° 45' 10.498" E	20° 0' 24.234" N
13	M	265383.574	2213394.9729	78° 45' 27.083" E	20° 0' 11.144" N
14	N	265917.6153	2212936.7627	78° 45' 45.659" E	19° 59' 56.481" N
15	O	266578.9265	2211735.9004	78° 46' 8.950" E	19° 59' 17.731" N
16	P	266937.2263	2211221.1814	78° 46' 21.506" E	19° 59' 1.154" N
17	Q	267247.8824	2210613.3596	78° 46' 32.466" E	19° 58' 41.530" N
18	R	267384.4743	2210346.1094	78° 46' 37.284" E	19° 58' 32.901" N
19	S	268018.7144	2209338.5021	78° 46' 59.550" E	19° 58' 0.419" N
20	T	268430.9295	2208831.6307	78° 47' 13.953" E	19° 57' 44.119" N

1.6.0 PREVIOUS WORK

1.6.1 The Geological Survey of India carried out regional exploration/scout drilling in Jhamkola and Dabhadi Sectors, respectively. Detailed exploration was taken up in adjoining up-dip side blocks Borda, Ghonsa Parsoda block by DGM(MS), CMPDI & MECL.

1.6.2 GSI drilled 4 scout boreholes (WJ-1, 2, 3 & 3A) in Jamkhola area, Wardha Valley Coalfield during the period of 2012-15 involving 1596.80m of drilling and published 'Final Report On Exploration For Coal By Scout Drilling In Jhamkola Area, Wardha Valley Coalfield, Yavatmal District, Maharashtra', in 2015. In adjoining Dabhadi Sector, 3 GSI boreholes (WDD1A, 2, 3) involving 1341.50m drilling were documented by GSI as 'Final Report On Regional Exploration For Coal In Dabhadi Sector, Wardha Valley Coalfield, Yavatmal District, Maharashtra' in 2015. Boreholes of WJ series fall

within present block area while those of WDD series fall just outside of western blounday of present block.

1.6.3 Out of the 7 scout boreholes drilled by GSI, borehole nos. WJ1, 2 & 3 were abandoned in Barakar/Motur Formation and coal seam(s) were encountered in four boreholes.

1.6.4 Findings of earlier regional/detailed exploration carried out by GSI, DGM(MS), CMPDI and MECL have been utilized for reference of seam correlation and structural interpretation at regional level and other geological aspects of this part of coalfield.

1.7.0 TOPOGRAPHY & DRAINAGE

1.7.1 The area is almost entirely covered by thick and hard Deccan Trap and presents a rugged and undulating topography due to differential weathering and erosion. The terrain is highly undulating and the general slope of the block in southern half of the block is towards south while the general slope in northern half of the block is towards north/north-east. The exposures of basalt forms hillock like features in the block at places.

1.7.2 The area under study is partly forested, occurrence of open scrub, moderately dense forest and dense at places are found in the area. Out of the Total area 61.06 Sq. km (approx.) under exploration, 15.2028 Sq. km is Forest area and 45.7418 Sq. km (approx. 75.04%) Non Forest Area. Teak, sal pipal, Kendu and bamboo are the dominant plants in the Forest.

1.7.3 Multiple nalas flow through the block area. These nalas, out of eastern boundary of the block; ultimately join the Vaidarbha River (mentioned as Wardha R in toposheet near Susri village, however, named as Vaidarbha downstream) flowing easterly/south easterly.

1.7.4 Susri, Wadhona, Kolampod, Saonegaon, Nimni, Darara, Isapur, Jhamkola, Dabhadi Khurd, Dabhadi Budrak, Walasa, Junoni, Dhodapod, Lendori, Khadakdoh, Chinchghat, Surdevi, Khekdi and Bopapur (part) villages/localities fall in this block area. Part of Khadakdoh Pond/Dam also falls within south western limits of the block.

1.8.0 FLORA & FAUNA

1.8.1 The block is covered completely with deccan trap basalts, while upper part of the Deccan Trap is found subjected to different stages of weathering and hence produced loose unconsolidated morum at several places. The overlying soil is mainly residual type derived from the weathered part of the basalt having brownish grey and dark grey colour at places. Cotton, pigeon pea (tur), soyabean, maize (corn), and wheat are the main crops being grown in the cultivated area. Hillocks of Deccan traps located in throughout the block and are covered with open scrubs and medium dense to dense forests.

1.9.0 CLIMATE

1.9.1 The climate of the area is in, general hot and dry with moderately cold winters. The year may be divided into four seasons. The hot season begins in March and extends

up to the first week of June. This is followed by the monsoon season which last up till the end of September. October and November constitute the post monsoon season and is followed by the winter season which last up till February.

- 1.9.2** Wani in the eastern part of the district receives 1,125 mm of rain while Yavatmal in the central portion of the district receives 1099.5 mm of rain. In general, the amount of rainfall increase as one proceeds from west to east.
- 1.9.3** May is generally the hottest month of the year with the mean daily maximum temperature at about 42^o C. December is usually the coldest month of the year with the mean daily minimum temperature at about 13^o C. The cold waves over northern India sometimes affect the district and the minimum temperature may drop to about 5^o C.

1.10.0 MINING ACTIVITY

- 1.10.1** The Block is a virgin block and has no history of mining. The nearest working mine is Ghonsa Opencast mine of Western Coalfields Limited (WCL), which is located approximately 5 km. east of the block.

1.11.0 SCOPE

- 1.11.1** The present report incorporates exploration data as obtained from 12 boreholes drilled during present investigation and the data of boreholes drilled by GSI in Jhamkola sector.
- 1.11.2** Total 18 boreholes involving 14500m were approved for drilling in this block by NMET. Subsequently exploration activity was completed vide agenda item no. 73.2.8 NMET 73rd TCC-1 meeting held on 30th and 31st January, 2025. The present phase of drilling operation in West of Borda & Ghonsa Parsoda Block was done for a total of 12 boreholes (as summarized below), involving a total of 9300.20 m. The exploration in West of Borda & Ghonsa-Parsoda Block was carried over an area of 61.06 sq. km.

Table No.-1.11.2
Boreholes Drilled in West of Borda & Ghonsa Parsoda Block during Present Investigation

Sl. No.	Period of drilling	Borehole No.	Proposed point no. of NMET approved proposal	Proposed Depth (m)	Drilled depth (m)	Remarks
1	October 2023- January 2025	CMWWB-01	P-16	850.00	843.00	
2		CMWWB-02	P-2	750.00	885.00	Closed in Moturs
3		CMWWB-03	P-14	900.00	934.50	
4		CMWWB-04	P-4	600.00	628.40	
5		CMWWB-05	P-15	800.00	774.20	
6		CMWWB-06	P-9	700.00	683.60	
7		CMWWB-07	P-18	850.00	739.50	
8		CMWWB-08	P-17	800.00	872.00	
9		CMWWB-09	P-13	850.00	705.00	
10		CMWWB-10	P-11	900.00	780.00	
11		CMWWB-11	P-7	900.00	630.00	Closed in Moturs
12		CMWWB-12	P-5	750.00	825.00	
		Total		9650.00	9300.20	Exploration activity was completed vide agenda item no. 73.2.8 NMET 73rd TCC-1 meeting held on 30th and 31st January, 2025.

1.11.3 All the cores of coal were analyzed at Coal Characterization Laboratory at CMPDIL HQ, Ranchi.

1.11.4 Area of the block is 61.06 Sq. Km. This area has been represented by cardinal points given in text of this report. Borehole density is 0.26 boreholes/Sq. Km. (i.e. total 16 boreholes in 61.06 Sq. Km. of block area involving 12 boreholes of present phase approved by NMET and 4 GSI boreholes of WJ series).

1.12.0 LIMITATIONS

1.12.1. As almost the entire area is concealed under Deccan Trap Basalts, structural interpretation in the block is possible based solely on the sub-surface data obtained from the boreholes. Hence, meagre data generated through only 12 boreholes of present phase, falling in the block area has been used for structure interpretation. In addition to it, data of boreholes drilled by GSI in Jhamkola and Dhabadi sectors have also been utilized for regional level structural interpretation.

1.12.2. Out of 12 CMPDI and 4 GSI boreholes drilled in the block, only 11 boreholes could encounter coal seams, while remaining five boreholes could not be deepened up to coal seam(s). Hence out of 18 approved boreholes, the exploration activity was concluded by 73rd NMET TCC-1 minutes of meeting vide agenda item no. 73.2.8.

1.12.3. Thus, limited borehole data available at present G3 level exploration stage, geological structure has been interpreted. However, as this data not sufficient to decipher the exact structure, hence existence of additional faults in addition to interpreted ones within the area cannot be ruled out.

1.12.4. Due to such limited data available for interpretation iso-chores, iso-grades were not prepared as it would be highly tentative and conjectured.

1.13.0 ACKNOWLEDGEMENTS:

Authors are thankful to entire CMPDI team associated with this report for their support and guidance and valuable suggestions in finalization of report. We are especially grateful to Shri Rajiva Kumar Singh, General Manager (Exploration), CMPDI HQ, Ranchi his constant guidance & inspiration provided during the course of documentation of the Report.

Authors are also grateful to Shri (Dr.) R.P. Singh, Senior Manager (Geology), Shri Bukun Chatterjee, Senior Manager (Geology), Shri Saurabh Singh, Senior Manager (Geology) and Shri B Satish, Manager (Geology), CMPDI HQ, Ranchi for their valuable suggestions and support during the exploration in the block and preparation of this report.

1.14.0 PERSONNEL ASSOCIATED WITH INVESTIGATION

Field Investigation & Report Preparation:

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- e) Shri Prakash Hindoriya, Officer (Survey), CMPDI, RI-IV Nagpur with team
- f) Geophysics Team of CMPDI, RI-IV, Nagpur.

CHAPTER - 2

2.0.0 REGIONAL GEOLOGY AND EXPLORATION SCHEME

2.1.0 GENERAL

2.1.1 Wardha Valley Coalfield is located in the south-eastern part of Maharashtra State and is bounded between Latitude N - 19° 30' & 20° 27' and Longitude E -78° 50' & 79° 49' (As per GSI Bulletin Series-A, No.-45, Vol.-II).

2.1.2 The Ariel extent of this coalfield has been estimated as 4130 sq. km. The NNW-SSE axis (which corresponds to the strike of the coal bearing sedimentary) is around 100 km long with a maximum width of about 80 kms. The likelihood of extension of this coalfield in the north-northwestwards beneath the Deccan Trap cannot be discounted. South-south eastwards continuation of Gondwana sediments of Wardha Valley Coalfield is considered to be extended in Godavari Valley Coalfield in Telangana.

2.1.3 This coalfield has elliptically aligned coal prospects within the Barakar Formation around the core of Talchirs, which occupies the central part of the coalfield. The eastern limit of this anticlinal structure is constituted by Konda / Bhandak blocks towards north and Wirur / Subai / Chincholi blocks towards south. The western limb is constituted by Majri / Kawadi / Kolar-Pimpri blocks toward north and Ghugus / Nakoda, Mugoli / Kolgaon-Sawangi towards south. These limbs have been further affected by numerous NNW-SSE trending faults. Depending upon the alignment of these faults vis-à-vis the strike of coal bearing sedimentaries, numerous isolated coal-prospects have been deciphered e.g. Dhorwasa, Chargaon, Kiloni / Baranj / Manora etc. Eastern limb appears to be less dissected by the faults than the western one.

2.1.4 The Gondwana-sediments-boundary towards the east is delineated by the exposures of Archaeans. The intervening area between the faults outlines of coal bearing sediments towards the north-east, south-west and south-east is occupied by the Vindhyan Formation.

2.1.5 The central part of the coalfield is occupied by the Talchirs. The Deccan Trap covers the Gondwana sediments towards the west and north. Lametas are available in patches towards north. Major part of the coalfield is covered by the Kamthi Formation. The coal bearing Barakar Formation is exposed only in the western part of the coalfield in isolated patches. The Gondwana sediments appear to continue south-southeastwards into the Godavari Valley sediments.

2.2.0 STRATIGRAPHY OF WARDHA VALLEY COALFIELD

2.2.1 The regional geological sequence of Wardha Valley Coalfield is given in following Table.

TABLE NO. – 2.2.1

Regional geological sequence, Wardha Valley Coalfield (after GSI)

Age	Formation	Lithology
Recent/Sub-Recent	Detrital Mantle	Black cotton soil/sandy soil
Upper Cretaceous	Deccan Trap	Basalts
-----UNCONFORMITY-----		
Cretaceous	Lameta	Cherty limestone, chert, brown, yellowish to pale white silicified sandstones, claystone.
-----UNCONFORMITY-----		
Upper Permian to Lower Triassic	Kamthi	Red, brown and variegated clays, ferruginous coarse grained sandstone and shale bands.
-----UNCONFORMITY-----		
Middle Permian	Motur	Medium to fine grained variegated sandstones, variegated clays and shales.
Lower Permian	Barakar	Light grey to whitish sandstones with grey shale, sandy shale, alternate bands of shale and sandstone and coal seams.
Upper Carboniferous to Lower Permian	Talchir	Greenish to grey sandstones, siltstone and shale.
-----UNCONFORMITY-----		
Pre-Cambrian	Vindhyan	Greenish to grey quartzitic sandstone, pinkish limestone and chert.
-----UNCONFORMITY-----		
Archaeans	Metamorphics	Quartzites, granites, gneisses and schist etc.

2.2.2 The Geological formations of Wardha Valley Coalfield are briefly described below.

2.2.3 Talchir Formation: The rocks of Talchir Formation occupy the major part of the area in the central part of Wardha Valley Coalfield. Talchir rocks are represented by greenish to grey sandstones, siltstone and greenish shales.

2.2.4 Barakar Formation: The rocks of Barakar Formation overlie the Talchirs and underlie the Moturs conformably. They are represented by fine, medium and coarse grained sandstone, intercalation of shale and sandstone, sandy shale, grey shale, carbonaceous shale and a thick composite seam. This is the most important formation which contains the potential Composite Seam of Wardha Valley Coalfield.

2.2.5 Motur Formation: The Moturs are underlain conformably by Barakars and overlain unconformably by younger Kamthis. They are represented by thick beds of variegated clays and greenish shales. The clays are highly plastic and have a tendency to swell when they come in contact with water. The sandstones are generally fine to medium grained. Occasionally thin carbonaceous bands/streaks have also been reported.

2.2.6 Kamthi Formation: The Kamthi Formation is the youngest of the Lower Gondwanas in this coalfield and is generally considered equivalent to Raniganj Formation of

Damoder Valley Coalfield. However, they differ from the Raniganj Measures in which Raniganj Formation contains coal seams; the Kamthis of Wardha Valley Coalfield are devoid of coal seams. The Kamthis are generally represented by red, brown and variegated clays, ferruginous coarse grained sandstone and shale bands. The sandstones are generally soft and porous but at places these become very hard, compact and silicified. Kamthis have overlapping nature and occur as a blanket over the Barakars /Moturs. Kamthis are known to be highly water bearing strata because of soft, porous, coarse and gritty nature.

- 2.2.7 Lameta Formation:** Lameta Formation overlies Kamthi Formation with an unconformity. This is mostly represented by claystone, brown, yellowish to pale white silicified sandstones, cherty limestones, chert etc. This formation is mainly confined in the northern and western part of the coalfield in isolated patches.
- 2.2.8 Deccan Traps:** It comprises of massive to vesicular greenish black basalt. The vesicles of the basalt are generally filled with secondary minerals. The occurrence of Deccan Trap is mainly confined to northern part of the basin i.e. Chinora, Majri, Belgaon, Madheri, Mandar, Ghonsa & Borda Blocks etc. The thickness of the basalt is increasing towards western part of the coalfield.
- 2.2.9 Detrital mantle:** The detrital mantle consists of black cotton soil/sandy soil layers of medium and coarse grained sand/alluvium with pebbles and boulders of quartzite, metamorphic rocks and Deccan Trap indicating that they are of transported origin.
- 2.2.10 Intrusives:** The Wardha Valley Coalfield in general is free from any intrusive igneous activity as evidenced from the extensive mining and drilling data of the coalfield.
- 2.2.11 Coal bearing formations and Coal Seams:** Occurrence of coal seams is restricted to the Barakar Formation. The remaining geological formations are devoid of coal seams.

2.3.0 REGIONAL STRUCTURE

- 2.3.1** The regional structure of the Wardha Valley Coalfield is a broad anticline plunging towards NNW. Both the western and eastern limbs of this anticline have been proved to be coal bearing. The Gondwana sedimentation in Wardha Valley Coalfield has taken place in NW-SE trending rift basins separated by Vindhya's. So far, four such coal bearing rift basins have been identified on the basis of regional and detailed exploration. These are, Main Rift Basin, Rajur-Chinchala Rift Basin, Ghonsa-Kumbharkhani Rift Basin and Marki-Mangli Rift Basin, The structure of Main Rift Basin is that of a broad plunging anticline, the axis of which is NW-SE plunging northerly. The western limb dips westerly, whereas, the eastern limb dips easterly. The area west of Pauni Extn. Block is situated in the south-western extremity of eastern limb of Main Rift Basin.
- 2.3.2** Deccan Trap/Lameta Formation/Kamthi Formation unconformably overlies the Motur and coal bearing Barakar Formations, preventing the coal seams to outcrop. NW-SE trending normal faults are major structural features of Wardha Valley Coalfield. These strike faults have caused repetition of strata in the many parts of the coalfield. As a result, the coal seams have occurred at shallow depth in many part of the Wardha Valley Coalfield. These areas have opened additional opencast possibilities in this coalfield.

2.4.0 PRESENT EXPLORATION ACTIVITY

2.4.1 The drilling operation in West of Borda & Ghonsa Parsoda Block has been carried out for a total of 12 boreholes approved by NMET, details of which are as follows:

Sl. No.	Period of drilling	Borehole No.	Proposed Depth (m)	Drilled depth (m)	Remarks
1	October 2023- January 2025	CMWWB-01	850.00	843.00	
2		CMWWB-02	750.00	885.00	Closed in Motur Formation
3		CMWWB-03	900.00	934.50	
4		CMWWB-04	600.00	628.40	
5		CMWWB-05	800.00	774.20	
6		CMWWB-06	700.00	683.60	
7		CMWWB-07	850.00	739.50	
8		CMWWB-08	800.00	872.00	
9		CMWWB-09	850.00	705.00	
10		CMWWB-10	900.00	780.00	
11		CMWWB-11	900.00	630.00	Closed in Motur formation
12		CMWWB-12	750.00	825.00	
		Total	9650.00	9300.20	Exploration activity was completed vide agenda item no. 73.2.8 NMET 73rd TCC-1 meeting held on 30th and 31st January, 2025.

2.5.0 QUANTUM OF WORK

2.5.1 The work programme executed by CMPDIL in West of Borda & Ghonsa Parsoda Block is summarized below in Table No. - 2.5.1.

Table No.- 2.5.1
Quantum of work done

Sl. No.	Item of work	Work done
1.	Geological Mapping	61.06 Sq. Km.
2.	Topographic Surveying	
	Boreholes	
	a) Co-ordinates	12 Nos.
	b) R.L's	12 Nos.
3.	Exploratory Drilling	Total drilling in 12 boreholes 9300.20m,
4.	Geological Core logging	9300.20m
5.	Geophysical Logging	Meterage of Geophysical Logging :1216.05 m Meterage of Sonic Logging: 705.22 m Meterage of Deviation Logging: 6487.92 m No of Boreholes logged (GPL):11 Nos.
6.	Coal Sampling	54.54m.
7.	Chemical Analysis (CMPDIL Lab)	54.54m.

2.5.2 Details of chemical analysis and petrography tests are as follows:

Sl. No	Parameters	No. of BHs	No. of determinations BCS/I30	Laboratory Name
1	Moisture	10	23	Coal Characterization Lab, CMPDI HQ, Ranchi (NABL Accredited)
2	Ash	10	23	
3	Proximate Analysis	10	23	
4	GCV	10	23	
5	Ultimate Analysis	5 (CMWWB03, 06, 07,09,10)	15	
6	Total Sulphur	-	-	
7	Sulphur Distribution	-	-	
8	HGI	5 (CMWWB03, 06, 07,09,10)	15	
9	Ash Fusion Temperature Range	5 (CMWWB03, 06, 07,09,10)	15	
10	Ash Analysis	5 (CMWWB03, 06, 07,09,10)	15	
11	Petrography Analysis	1 (CMWWB06, 07)	5	

2.6.0 SURVEYING

2.6.1 All the boreholes drilled and all other survey works done in West of Borda & Ghonsa Parsoda block were surveyed in respect of their location with the help of DGPS by survey team of CMPDI, RI-IV, Nagpur.

2.7.0 GEOLOGICAL MAPPING

2.7.1 The block is covered completely with deccan trap basalts, while upper part of the Deccan Trap is found subjected to different stages of weathering and hence produced loose unconsolidated morum at several places. The overlying soil is mainly residual type derived from the weathered part of the basalt having brownish grey and dark grey colour at places. Hillocks of Deccan traps are present throughout the block. Geological map has been prepared and presented as Plate III.

2.8.0 EXPLORATORY DRILLING

2.8.1 The drilling operation in West of Borda & Ghonsa Parsoda Block has been carried out for 12 boreholes approved by NMET, details of which have been given at preceding para no. 2.4.1.

2.8.2 During drilling operations controlled speed, adequate pressure, circulation of bentonite mud with other chemicals etc. were resorted to maximize the core recovery in both coal and non-coal portions.

2.8.3 Entire drilling has been carried out in PQ/HQ/NQ/BQ core size & in the top overburden

zone PX/HX/HQ core size has been used. Recovery in the coal seam have been maintained at more than 90% and in the non-coal portion at more than 80% except in the areas of structurally weak and disturbed zones and weathered, friable formations, pebbly zones.

2.9.0 CORE LOGGING

2.9.1 The drill cores of both coal and non-coal strata obtained from the boreholes were systematically logged visually with detailed description of litho-units, grain-size, colour, RQD details etc. Structural features like core dip, bedding, slickenside, fractures, micro- slips etc. were also recorded. Sampling for band by band analysis of coal/carbonaceous horizons was carried out and a broad correlation of coal seams was arrived.

2.9.2 The roof and floor delineation of seams and the thickness of the seams were corrected after the receipt and study of coal quality data on band by band basis in respect of the boreholes for which chemical analysis data was available and for others, such delineation has been done on the basis of visual logging only.



Fig. 2.9.1 Chocolate/reddish brown claystone of Motur Formation as encountered in borehole no. CMWWB01.

The descriptive run-wise lithology of boreholes is given in Annexure-IV and its graphic presentation is given in Plate - IV.

2.10.0 SAMPLING & ANALYSIS

2.10.1 The carbonaceous horizons (coal, shaly coal and carbonaceous shale) of all the coal samples from each borehole were sent for analysis to Chemical Laboratory, CMPDIL HQ, Ranchi.



Fig. 2.9.1 A & B : Seams II A (815.60m-818.45m) encountered in Barakar Formation in borehole no. CMWWB01.



Fig. 2.9.1 C: Seam II B (822.75-826.60m) as encountered in Barakar Formation in borehole no. CMWWB01.

2.10.2 The coal sampling for a length of recovered thickness of 54.54m of core samples from 10 boreholes were carried out for band-by-band analysis. Sampling was done at project sites, for band- by-band analysis (On Air dried basis). The analytical results, thus obtained, are presented in Annexure-V.

2.10.3 Based on the band by band analysis results, the delineation of coal seam/sections were done and samples of each seam/sections were again identified for overall analysis (Proximate and GCV at 60% RH & 40°C) and other special tests as per ISP norms. Results and details of seam overall analysis and special tests viz. Special tests like Ultimate analysis, Sulphur Distribution, Ash analysis, HGI, & AFT are results are given in Annexure – VII to VIII.

2.11.0 GEOPHYSICAL LOGGING

2.12.0 INTRODUCTION

2.12.1 Geophysical logging has been carried out in 11 boreholes (CMWWB-01-10, 12) in West of Borda & Ghonsa-Parsoda Block, Wardha Valley Coalfield. In which Natural Gamma (N Gamma), Resistivity log (SHN, LONG), Single Point Resistivity (SPR), Caliper, SP (Self potential), Deviation, Sonic & dual density logs were recorded.

2.12.2 Borehole diameter, casing depth /size and clarity of the boreholes plays a major role in deciding the type of parameters to be recorded in particular borehole.

2.12.3 The details of Geophysical logging carried out in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield is as follows:-

a)	Meterage of Geophysical Logging	:1216.05 m
b)	Meterage of Sonic Logging	: 705.22 m
c)	Meterage of Deviation Logging	: 6487.90 m
d)	No of Boreholes logged	:11 Nos.

2.13.0 OBJECTIVE

Geophysical logging has been carried out in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield to verify the depth and thickness of carbonaceous horizons.

2.13.1 EQUIPMENT

The Geophysical Logging has been carried out by deploying logging unit manufactured by M/S Century Geophysical, L.L.C, USA, that possess appropriate probe facility to meet the requirements of coal exploration.

2.13.2 RECORDING

Borehole wise Geophysical Logging details in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield are given in Table-I.

TABLE-I: Details of Geophysical logging carried out in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield:

Sl. No.	Borehole No.	Date of logging	Depth Logged (m)	Accepted Logging meterage (m)	Accepted Sonic Logging (m)	Accepted Deviation Logging (m)	Parameters recorded
1	CMWWB-01	30.11.2024	718.00	159.30	142.00	718.00	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
2	CMWWB-02	16.03.2024	572.00	143.50	29.98	572.00	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
3	CMWWB-03	05.02.2024	415.00	73.00	0.00	415.00	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation
4	CMWWB-04	17.12.2023	318.00	316.16	317.80	317.80	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
5	CMWWB-05	11.04.2024	576.35	37.00	0.00	567.35	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation
6	CMWWB-06	12.05.2024	516.50	80.90	41.48	516.50	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
7	CMWWB-07	03.06.2024	736.00	201.28	49.05	735.90	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
8	CMWWB-08	26.09.2024	522.90	0.00	0.00	522.90	Deviation
9	CMWWB-09	31.07.2024	701.50	67.34	66.31	700.60	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
10	CMWWB-10	18.09.2024	780.00	59.57	58.60	779.87	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation, Sonic
11	CMWWB-12	30.01.2025	643.30	78.00	0.00	642.00	N. Gamma, SP, SPR, SHN, LONG, Caliper, LSD, HRD, Deviation
TOTAL			6499.55	1216.05	705.22	6487.92	

N Gamma =Natural Gamma, SHN=Short Normal Resistivity, LONG= Long Normal Resistivity, LSD=Long Spacing Density, HRD= High Resolution Density, SP=Self Potential, SPR= Single Point Resistivity.

2.14.0 LIMITATIONS

2.12.4 Some of the main limitations of Geophysical Logging survey are given below:

- Electrical logs can only be recorded in open and fluid filled boreholes.
- Absence of water in borehole drastically changes the response of radiation logs.
- Only qualitative analysis can be made on radioactive logs if the bore hole is logged through drill rods due to their shielding effect.
- Changes in borehole diameter affect the response of logs.

2.15.0 PROCESSING

A composite record was prepared by processing, for each borehole using Well CAD software for interpretation of each of the recorded logs. Coal seam depth/ thickness and formational contact along with the recorded logs in each borehole are shown in Plate (Plate-IX).

2.16.0 DATA INTERPRETATION

2.16.1 The Lithology identification is based on known response of physical properties of rocks against Natural Gamma, Density, SPR & Resistivity logs. The response of different logs against Coal, Shaly Coal, Shale, Basalt & Sandstone recorded in boreholes in the block are summarized in Table-II below:

TABLE-II: Response of different Geophysical Log parameters in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield

Sr.no	Lithology	N Gamma (API)	Density (g/cc)	RES 16N (Ohm-m)	RES 64 N (Ohm-m)
1	Coal	25 - 180	1.4-2.2	15-220	7-40
2	Shaly Coal	40 - 185	1.6-2	25-216	9-30
3	Shale	90 - 460	2.2-2.6	25-50	15-30
4	Basalt	19-43	2.6-3	0-3000	0-3000
5	Sandstone	0-170	1.1-2.8	0-82	0-65

N Gamma= Natural Gamma, g/cc=gram per cubic centimeter, RES 16N=Short normal Resistivity, RES 64 N =Long normal Resistivity

2.16.2 The details of the Coal seams inferred from the interpretation of Geophysical Logs are given in Table-III:

TABLE-III: Depth and Thickness of Inferred Coal Seams & other formations in West of Borda & Ghonsa-Parsoda block, Wardha Valley Coalfield.

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
CMWWB-01				
1	0.00	267.98	No Electrical Log Data available	
2	267.98	268.90	0.92	Sand Stone
3	268.90	270.00	1.10	Clay Stone
4	270.00	270.92	0.92	Sand Stone
5	270.92	271.54	0.62	Mud Stone
6	271.54	272.18	0.64	Sand Stone
7	272.18	273.06	0.88	Mud Stone
8	273.06	286.38	13.32	Sand Stone
9	286.38	288.04	1.66	Clay Stone
10	288.04	295.14	7.10	Sand Stone
11	295.16	296.26	1.10	Mud Stone
12	296.28	297.64	1.36	Sand Stone
13	297.64	298.60	0.96	Mud Stone
14	298.60	304.64	6.04	Sand Stone
15	304.64	306.18	1.54	Mud Stone
16	306.18	307.06	0.88	Sand Stone
17	307.06	308.40	1.34	Mud Stone
18	308.40	309.42	1.02	Clay Stone
19	309.42	312.26	2.84	Sand Stone
20	312.26	313.70	1.44	Mud Stone
21	313.70	354.08	40.38	Sand Stone
22	354.08	355.36	1.28	Mud Stone
23	355.36	358.26	2.90	Sand Stone
24	358.26	359.48	1.22	Clay Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
25	359.48	648.98	No Electrical Log Data available	
26	648.98	718.18	69.20	Clay Stone
CMWWB-02				
1	0.00	6.86	6.86	Basalt
2	6.86	11.24	4.38	Clay Stone
3	11.24	33.60	22.36	Basalt
4	33.68	38.96	5.28	Clay Stone
5	39.04	53.44	14.40	Basalt
6	53.44	56.82	3.38	Clay Stone
7	56.90	69.44	12.54	Basalt
8	69.46	72.92	3.46	Clay Stone
9	72.92	84.28	11.36	Sand Stone
10	84.34	91.24	6.90	Clay Stone
11	91.24	96.26	5.02	Sand Stone
12	96.26	106.00	9.74	Mud Stone
13	106.06	108.38	2.32	Sand Stone
14	108.46	110.36	1.90	Clay Stone
15	110.36	111.42	1.06	Sand Stone
16	111.42	116.14	4.72	Mud Stone
17	116.14	118.06	1.92	Sand Stone
18	118.12	130.12	12.00	Clay Stone
19	130.12	136.40	6.28	Sand Stone
20	136.48	141.90	5.42	Clay Stone
21	141.98	143.18	1.20	Sand Stone
22	143.18	145.08	1.90	Mud Stone
23	145.16	148.88	3.72	Sand Stone
24	148.88	151.86	2.98	Clay Stone
25	151.86	153.90	2.04	Sand Stone
26	153.90	155.88	1.98	Mud Stone
27	155.88	158.42	2.54	Sand Stone
28	158.42	217.96	59.54	Sand Stone
29	217.96	219.94	1.98	Clay Stone
30	220.02	225.66	5.64	Mud Stone
31	225.74	228.14	2.40	Clay Stone
32	228.20	230.88	2.68	Sand Stone
33	230.88	237.44	6.56	Mud Stone
34	237.50	245.90	8.40	Clay Stone
35	245.90	250.06	4.16	Sand Stone
36	250.08	254.66	4.58	Clay Stone
37	254.74	261.94	7.20	Sand Stone
38	261.94	263.90	1.96	Mud Stone
39	263.90	265.18	1.28	Sand Stone
40	265.18	267.08	1.90	Clay Stone
41	267.08	267.58	0.50	Sand Stone
42	267.64	268.50	0.86	Clay Stone
43	268.50	271.10	2.60	Sand Stone
44	271.10	272.80	1.70	Clay Stone
45	272.80	273.92	1.12	Sand Stone
46	273.92	275.54	1.62	Clay Stone
47	275.54	275.96	0.42	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
48	275.97	276.57	0.60	Clay Stone
49	276.57	277.36	0.79	Sand Stone
50	277.36	278.32	0.96	Mud Stone
51	278.32	278.97	0.65	Clay Stone
52	278.97	280.04	1.07	Sand Stone
53	280.04	284.77	4.73	Mud Stone
54	284.77	285.33	0.56	Clay Stone
55	285.33	285.65	0.32	Mud Stone
56	285.65	286.09	0.44	Clay Stone
57	286.09	287.91	1.82	Mud Stone
58	287.91	289.12	1.21	Clay Stone
59	289.14	290.22	1.08	Mud Stone
60	290.22	292.09	1.87	Mud Stone
61	292.09	295.46	3.37	Clay Stone
62	295.48	295.92	0.44	Mud Stone
63	295.94	296.61	0.67	Clay Stone
64	296.61	299.00	2.39	Mud Stone
65	299.00	299.88	0.88	Clay Stone
66	299.90	300.43	0.53	Mud Stone
67	300.45	300.80	0.35	Clay Stone
68	300.82	301.23	0.41	Mud Stone
69	301.23	301.90	0.67	Clay Stone
70	301.90	302.62	0.72	Mud Stone
71	302.64	303.49	0.85	Clay Stone
72	303.49	304.14	0.65	Mud Stone
73	304.14	305.07	0.93	Clay Stone
74	305.07	305.65	0.58	Mud Stone
75	305.65	307.52	1.87	Clay Stone
76	307.54	309.29	1.75	Sand Stone
77	309.29	309.91	0.62	Clay Stone
78	309.92	310.63	0.71	Sand Stone
79	310.63	311.74	1.11	Clay Stone
80	311.74	312.18	0.44	Mud Stone
81	312.20	313.36	1.16	Sand Stone
82	313.36	315.23	1.87	Clay Stone
83	315.23	315.85	0.62	Sand Stone
84	315.87	318.44	2.57	Mud Stone
85	318.44	319.82	1.38	Sand Stone
86	319.82	320.50	0.68	Mud Stone
87	320.50	321.05	0.55	Sand Stone
88	321.05	321.67	0.62	Mud Stone
89	321.69	322.78	1.09	Sand Stone
90	322.78	323.59	0.81	Mud Stone
91	323.59	324.31	0.72	Clay Stone
92	324.31	324.97	0.66	Sand Stone
93	324.97	325.52	0.55	Mud Stone
94	325.54	326.33	0.79	Sand Stone
95	326.33	328.22	1.89	Mud Stone
96	328.22	329.03	0.81	Clay Stone
97	329.03	329.73	0.70	Mud Stone
98	329.73	331.16	1.43	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
99	331.16	331.79	0.63	Mud Stone
100	331.81	333.12	1.31	Sand Stone
101	333.14	335.09	1.95	Clay Stone
102	335.09	336.52	1.43	Sand Stone
103	336.52	337.12	0.60	Mud Stone
104	337.12	338.57	1.45	Sand Stone
105	338.57	339.17	0.60	Mud Stone
106	339.17	340.02	0.85	Sand Stone
107	340.02	341.37	1.35	Clay Stone
108	341.37	342.27	0.90	Sand Stone
109	342.27	344.04	1.77	Mud Stone
110	344.04	345.04	1.00	Sand Stone
111	345.06	345.64	0.58	Clay Stone
112	345.67	346.73	1.06	Sand Stone
113	346.73	347.54	0.81	Mud Stone
114	347.54	348.55	1.01	Sand Stone
115	348.55	350.53	1.98	Mud Stone
116	350.62	352.38	1.76	Sand Stone
117	352.38	355.98	3.60	Clay Stone
118	355.98	357.46	1.48	Sand Stone
119	357.54	358.24	0.70	Clay Stone
120	358.24	360.28	2.04	Sand Stone
121	360.28	366.56	6.28	Clay Stone
122	366.64	367.84	1.20	Mud Stone
123	367.84	377.78	9.94	Clay Stone
124	377.78	381.02	3.24	Sand Stone
125	381.02	382.30	1.28	Clay Stone
126	382.30	383.78	1.48	Sand Stone
127	383.78	384.90	1.12	Clay Stone
128	384.90	386.02	1.12	Sand Stone
129	386.10	388.86	2.76	Clay Stone
130	388.92	393.64	4.72	Sand Stone
131	393.72	394.84	1.12	Clay Stone
132	394.84	400.56	5.72	Sand Stone
133	400.58	401.92	1.34	Clay Stone
134	401.98	403.32	1.34	Sand Stone
135	403.32	404.04	0.72	Clay Stone
136	404.10	405.22	1.12	Sand Stone
137	405.30	407.34	2.04	Mud Stone
138	407.34	408.12	0.78	Sand Stone
139	408.12	411.08	2.96	Mud Stone
140	411.16	412.84	1.68	Sand Stone
141	412.92	414.12	1.20	Clay Stone
142	414.12	415.18	1.06	Sand Stone
143	415.24	416.80	1.56	Clay Stone
144	416.80	423.58	6.78	Sand Stone
145	423.58	425.20	1.62	Clay Stone
146	425.26	428.30	3.04	Sand Stone
147	428.30	429.84	1.54	Clay Stone
148	429.84	438.74	8.90	Mud Stone
149	438.80	461.96	23.16	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
150	462.02	463.94	1.92	Clay Stone
151	463.94	468.94	5.00	Sand Stone
152	468.94	472.18	3.24	Mud Stone
153	472.24	503.86	31.62	Sand Stone
154	503.86	505.26	1.40	Mud Stone
155	505.26	506.46	1.20	Sand Stone
156	506.46	507.88	1.42	Clay Stone
157	507.88	517.06	9.18	Clay Stone
158	517.06	519.66	2.60	Sand Stone
159	519.74	521.58	1.84	Clay Stone
160	521.58	572.00	50.42	Mud Stone
CMWWB-03				
1	0.13	7.53	7.40	Basalt
2	7.53	11.49	3.96	Sand Stone
3	11.49	51.91	40.42	Basalt
4	51.93	56.29	4.36	Sand Stone
5	56.37	74.29	17.92	Basalt
6	74.35	81.41	7.06	Sand Stone
7	81.41	82.47	1.06	Mud Stone
8	82.47	83.45	0.98	Sand Stone
9	83.45	85.15	1.70	Clay Stone
10	85.15	89.75	4.60	Mud Stone
11	89.75	99.53	9.78	Clay Stone
12	99.53	119.51	19.98	Mud Stone
13	119.51	141.25	21.74	Sand Stone
14	141.31	148.23	6.92	Mud Stone
15	148.37	151.19	2.82	Sand Stone
16	151.19	159.31	8.12	Clay Stone
17	159.31	160.43	1.12	Sand Stone
18	160.43	161.43	1.00	Shale
19	161.43	165.73	4.30	Sand Stone
20	165.73	171.09	5.36	Mud Stone
21	171.09	172.77	1.68	Clay Stone
22	172.77	174.47	1.70	Sand Stone
23	174.47	175.45	0.98	Clay Stone
24	175.45	202.75	27.30	Mud Stone
25	202.75	210.17	7.42	Clay Stone
26	210.17	212.23	2.06	Sand Stone
27	212.23	237.05	24.82	Mud Stone
28	237.13	243.19	6.06	Sand Stone
29	243.19	244.03	0.84	Mud Stone
30	244.03	246.99	2.96	Sand Stone
31	247.07	253.35	6.28	Mud Stone
32	253.35	253.91	0.56	Clay Stone
33	253.91	254.61	0.70	Sand Stone
34	254.63	255.55	0.92	Clay Stone
35	255.61	271.21	15.60	Sand Stone
36	271.21	271.77	0.56	Mud Stone
37	271.77	272.83	1.06	Sand Stone
38	272.83	275.09	2.26	Clay Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
39	275.09	283.91	8.82	Sand Stone
40	283.97	284.95	0.98	Mud Stone
41	285.03	287.49	2.46	Sand Stone
42	287.49	288.35	0.86	Mud Stone
43	288.41	291.23	2.82	Sand Stone
44	291.23	292.09	0.86	Clay Stone
45	292.09	293.91	1.82	Sand Stone
46	293.91	298.57	4.66	Mud Stone
47	298.57	299.29	0.72	Sand Stone
48	299.29	300.21	0.92	Clay Stone
49	300.21	302.05	1.84	Sand Stone
50	302.05	302.89	0.84	Mud Stone
51	302.89	305.01	2.12	Sand Stone
52	305.01	306.41	1.40	Mud Stone
53	306.41	307.83	1.42	Sand Stone
54	307.89	311.29	3.40	Clay Stone
55	311.29	314.03	2.74	Sand Stone
56	314.03	315.65	1.62	Mud Stone
57	315.73	316.71	0.98	Sand Stone
58	316.71	318.13	1.42	Mud Stone
59	318.19	320.11	1.92	Sand Stone
60	320.17	321.79	1.62	Clay Stone
61	321.79	327.43	5.64	Sand Stone
62	327.51	328.63	1.12	Mud Stone
63	328.63	329.69	1.06	Sand Stone
64	329.69	331.11	1.42	Clay Stone
65	331.17	372.89	41.72	Sand Stone
66	372.95	376.61	3.66	Clay Stone
67	376.69	377.45	0.76	Sand Stone
68	377.45	385.43	7.98	Clay Stone
69	385.43	391.85	6.42	Mud Stone
70	391.85	394.17	2.32	Clay Stone
71	394.17	401.79	7.62	Mud Stone
72	401.89	407.39	5.50	Clay Stone
73	407.45	411.91	4.46	Mud Stone
74	411.91	415.57	3.66	Clay Stone
CMWWB-04				
1	0.00	19.14	19.14	Basalt
2	19.14	21.54	2.40	Mud Stone
3	21.60	47.76	26.16	Basalt
4	47.76	49.96	2.20	Clay Stone
5	50.04	66.12	16.08	Basalt
6	66.12	70.28	4.16	Clay Stone
7	70.28	79.52	9.24	Basalt
8	79.52	81.22	1.70	Mud Stone
9	81.28	82.42	1.14	Basalt
10	82.48	85.74	3.26	Clay Stone
11	85.74	88.76	3.02	Mud Stone
12	88.84	92.16	3.32	Basalt
13	92.16	93.42	1.26	Clay Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
14	93.42	94.62	1.20	Sand Stone
15	94.62	98.64	4.02	Mud Stone
16	98.64	104.64	6.00	Basalt
17	104.86	106.62	1.76	Mud Stone
18	106.68	108.80	2.12	Clay Stone
19	108.88	109.58	0.70	Sand Stone
20	109.66	110.36	0.70	Clay Stone
21	110.36	112.20	1.84	Mud Stone
22	112.26	113.60	1.34	Basalt
23	113.60	116.50	2.90	Mud Stone
24	116.56	117.76	1.20	Sand Stone
25	117.84	119.68	1.84	Clay Stone
26	119.76	121.30	1.54	Sand Stone
27	121.30	122.00	0.70	Clay Stone
28	122.00	126.46	4.46	Mud Stone
29	126.52	129.34	2.82	Sand Stone
30	129.34	137.54	8.20	Mud Stone
31	137.60	139.02	1.42	Clay Stone
32	139.02	140.64	1.62	Sand Stone
33	140.64	144.72	4.08	Clay Stone
34	144.80	147.12	2.32	Mud Stone
35	147.18	148.38	1.20	Clay Stone
36	148.46	149.16	0.70	Sand Stone
37	149.24	150.08	0.84	Mud Stone
38	150.16	151.00	0.84	Sand Stone
39	151.06	157.42	6.36	Clay Stone
40	157.42	158.90	1.48	Mud Stone
41	158.90	160.26	1.36	Clay Stone
42	160.26	165.96	5.70	Sand Stone
43	165.96	167.88	1.92	Mud Stone
44	167.94	174.44	6.50	Sand Stone
45	174.44	176.62	2.18	Mud Stone
46	176.68	184.10	7.42	Sand Stone
47	184.10	189.88	5.78	Clay Stone
48	189.94	196.42	6.48	Sand Stone
49	196.50	197.84	1.34	Mud Stone
50	197.84	199.46	1.62	Sand Stone
51	199.54	200.38	0.84	Clay Stone
52	200.38	201.58	1.20	Sand Stone
53	201.66	203.84	2.18	Clay Stone
54	203.90	213.36	9.46	Sand Stone
55	213.36	215.20	1.84	Clay Stone
56	215.20	241.94	26.74	Sand Stone
57	241.94	245.12	3.18	Clay Stone
58	245.12	260.00	14.88	Sand Stone
59	260.08	263.88	3.80	Clay Stone
60	263.88	269.04	5.16	Mud Stone
61	269.04	317.86	48.82	Clay Stone
CMWWB-05				
1	0.15	2.61	2.46	Soil

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
2	2.62	17.03	14.41	Basalt
3	17.03	19.20	2.17	Clay Stone
4	19.20	24.61	5.41	Sand Stone
5	24.61	26.08	1.47	Mud Stone
6	26.08	46.13	20.05	Sand Stone
7	46.13	48.25	2.12	Mud Stone
8	48.27	49.26	0.99	Sand Stone
9	49.26	50.93	1.67	Mud Stone
10	50.93	53.98	3.05	Sand Stone
11	53.98	58.51	4.53	Mud Stone
12	58.52	63.01	4.49	Sand Stone
13	63.01	63.91	0.90	Clay Stone
14	63.91	64.95	1.04	Sand Stone
15	64.95	65.80	0.85	Clay Stone
16	65.82	73.09	7.27	Sand Stone
17	73.09	75.52	2.43	Mud Stone
18	75.52	77.21	1.69	Sand Stone
19	77.21	80.67	3.46	Mud Stone
20	80.68	81.78	1.10	Clay Stone
21	81.80	89.52	7.72	Sand Stone
22	89.52	91.13	1.61	Clay Stone
23	91.13	93.54	2.41	Sand Stone
24	93.54	95.18	1.64	Clay Stone
25	95.18	100.13	4.95	Sand Stone
26	100.13	101.03	0.90	Mud Stone
27	101.03	101.57	0.54	Sand Stone
28	101.57	104.01	2.44	Clay Stone
29	104.02	110.34	6.32	Sand Stone
30	110.34	111.66	1.32	Clay Stone
31	111.68	114.41	2.73	Sand Stone
32	114.43	115.84	1.41	Clay Stone
33	115.84	119.67	3.83	Sand Stone
34	119.67	120.62	0.95	Mud Stone
35	120.62	133.81	13.19	Sand Stone
36	133.82	134.63	0.81	Mud Stone
37	134.63	135.49	0.86	Sand Stone
38	135.49	136.34	0.85	Mud Stone
39	136.34	137.45	1.11	Sand Stone
40	137.45	138.33	0.88	Mud Stone
41	138.33	140.66	2.33	Sand Stone
42	140.66	141.79	1.13	Clay Stone
43	141.79	151.56	9.77	Sand Stone
44	151.58	154.81	3.23	Clay Stone
45	154.82	156.41	1.59	Sand Stone
46	156.43	157.54	1.11	Clay Stone
47	157.54	158.47	0.93	Sand Stone
48	158.47	161.54	3.07	Clay Stone
49	161.54	163.70	2.16	Sand Stone
50	163.70	164.83	1.13	Mud Stone
51	164.85	169.82	4.97	Sand Stone
52	169.82	171.83	2.01	Mud Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
53	171.85	181.19	9.34	Sand Stone
54	181.19	189.61	8.42	Sand Stone
55	189.61	190.57	0.96	Mud Stone
56	190.57	191.09	0.52	Sand Stone
57	191.09	191.73	0.64	Mud Stone
58	191.73	194.12	2.39	Sand Stone
59	194.12	196.77	2.65	Mud Stone
60	196.77	197.62	0.85	Sand Stone
61	197.62	200.15	2.53	Mud Stone
62	200.17	202.78	2.61	Sand Stone
63	202.78	204.30	1.52	Mud Stone
64	204.32	208.07	3.75	Sand Stone
65	208.07	209.68	1.61	Mud Stone
66	209.68	211.03	1.35	Sand Stone
67	211.03	213.59	2.56	Mud Stone
68	213.59	217.85	4.26	Sand Stone
69	217.85	219.37	1.52	Mud Stone
70	219.37	223.25	3.88	Sand Stone
71	223.25	231.46	8.21	Clay Stone
72	231.46	232.41	0.95	Sand Stone
73	232.41	238.13	5.72	Clay Stone
74	238.13	244.39	6.26	Mud Stone
75	244.39	246.15	1.76	Sand Stone
76	246.17	247.40	1.23	Mud Stone
77	247.42	248.48	1.06	Sand Stone
78	248.48	249.88	1.40	Mud Stone
79	249.88	250.42	0.54	Sand Stone
80	250.42	252.35	1.93	Clay Stone
81	252.35	257.66	5.31	Mud Stone
82	257.68	258.65	0.97	Sand Stone
83	258.66	262.58	3.92	Clay Stone
84	262.58	264.29	1.71	Mud Stone
85	264.31	266.68	2.37	Clay Stone
86	266.68	269.71	3.03	Mud Stone
87	269.71	271.10	1.39	Sand Stone
88	271.10	272.71	1.61	Mud Stone
89	272.71	273.49	0.78	Sand Stone
90	273.50	275.72	2.22	Clay Stone
91	275.72	276.46	0.74	Sand Stone
92	276.46	278.39	1.93	Mud Stone
93	278.39	279.59	1.20	Clay Stone
94	279.61	280.52	0.91	Sand Stone
95	280.52	283.17	2.65	Clay Stone
96	283.17	283.72	0.55	Sand Stone
97	283.72	285.39	1.67	Mud Stone
98	285.39	287.38	1.99	Sand Stone
99	287.38	289.20	1.82	Mud Stone
100	289.20	290.60	1.40	Sand Stone
101	290.62	294.07	3.45	Clay Stone
102	294.07	294.75	0.68	Sand Stone
103	294.77	296.29	1.52	Mud Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
104	296.32	299.13	2.81	Sand Stone
105	299.15	305.39	6.24	Mud Stone
106	305.39	306.58	1.19	Sand Stone
107	306.58	309.23	2.65	Mud Stone
108	309.23	312.15	2.92	Clay Stone
109	312.17	314.03	1.86	Mud Stone
110	314.03	318.52	4.49	Sand Stone
111	318.52	319.37	0.85	Clay Stone
112	319.39	320.32	0.93	Mud Stone
113	320.32	321.06	0.74	Clay Stone
114	321.08	321.97	0.89	Mud Stone
115	321.99	322.99	1.00	Clay Stone
116	322.99	326.27	3.28	Mud Stone
117	326.27	329.29	3.02	Clay Stone
118	329.29	332.08	2.79	Mud Stone
119	332.08	336.53	4.45	Clay Stone
120	336.53	337.78	1.25	Sand Stone
121	337.80	342.67	4.87	Mud Stone
122	342.67	344.21	1.54	Clay Stone
123	344.23	345.88	1.65	Sand Stone
124	345.88	347.32	1.44	Clay Stone
125	347.32	349.36	2.04	Mud Stone
126	349.36	350.90	1.54	Sand Stone
127	350.90	352.91	2.01	Mud Stone
128	352.91	353.78	0.87	Sand Stone
129	353.80	361.84	8.04	Mud Stone
130	361.84	363.73	1.89	Clay Stone
131	363.73	366.29	2.56	Mud Stone
132	366.29	368.56	2.27	Sand Stone
133	368.56	395.23	26.67	Mud Stone
134	395.23	396.39	1.16	Sand Stone
135	396.39	399.10	2.71	Mud Stone
136	399.10	400.96	1.86	Clay Stone
137	400.96	403.71	2.75	Mud Stone
138	403.71	407.56	3.85	Clay Stone
139	407.57	408.18	0.61	Sand Stone
140	408.18	409.32	1.14	Clay Stone
141	409.32	417.49	8.17	Mud Stone
142	417.52	418.64	1.12	Sand Stone
143	418.64	421.79	3.15	Clay Stone
144	421.81	423.63	1.82	Mud Stone
145	423.63	424.79	1.16	Sand Stone
146	424.82	426.30	1.48	Mud Stone
147	426.30	427.23	0.93	Sand Stone
148	427.25	431.12	3.87	Mud Stone
149	431.14	435.10	3.96	Sand Stone
150	435.12	437.20	2.08	Clay Stone
151	437.24	439.30	2.06	Sand Stone
152	439.31	441.96	2.65	Clay Stone
153	441.96	443.53	1.57	Sand Stone
154	443.55	445.52	1.97	Mud Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
155	445.52	446.39	0.87	Clay Stone
156	446.39	449.14	2.75	Sand Stone
157	449.14	452.55	3.41	Mud Stone
158	452.57	456.31	3.74	Sand Stone
159	456.31	457.35	1.04	Clay Stone
160	457.37	458.05	0.68	Mud Stone
161	458.09	460.50	2.41	Clay Stone
162	460.50	461.39	0.89	Sand Stone
163	461.39	463.57	2.18	Clay Stone
164	463.59	465.10	1.51	Sand Stone
165	465.10	465.73	0.63	Mud Stone
166	465.73	466.58	0.85	Sand Stone
167	466.58	468.59	2.01	Clay Stone
168	468.61	472.74	4.13	Mud Stone
169	472.74	475.15	2.41	Sand Stone
170	475.17	476.82	1.65	Clay Stone
171	476.84	483.01	6.17	Mud Stone
172	483.01	484.68	1.67	Sand Stone
173	484.68	485.57	0.89	Clay Stone
174	485.59	491.79	6.20	Mud Stone
175	491.81	493.78	1.97	Sand Stone
176	493.78	495.15	1.37	Clay Stone
177	495.15	506.22	11.07	Mud Stone
178	506.23	506.99	0.76	Sand Stone
179	506.99	507.62	0.63	Clay Stone
180	507.64	508.11	0.47	Sand Stone
181	508.11	508.68	0.57	Clay Stone
182	508.68	509.80	1.12	Sand Stone
183	509.80	521.46	11.66	Mud Stone
184	521.48	522.50	1.02	Sand Stone
185	522.50	528.41	5.91	Mud Stone
186	528.41	529.49	1.08	Clay Stone
187	529.49	541.15	11.66	Mud Stone
188	541.15	541.80	0.65	Clay Stone
189	541.80	542.44	0.64	Mud Stone
190	542.46	543.73	1.27	Clay Stone
191	543.73	544.72	0.99	Sand Stone
192	544.73	545.55	0.82	Clay Stone
193	545.55	546.17	0.62	Sand Stone
194	546.19	551.63	5.44	Mud Stone
195	551.63	553.66	2.03	Clay Stone
196	553.66	559.73	6.07	Sand Stone
197	559.73	562.55	2.82	Clay Stone
198	562.55	563.71	1.16	Sand Stone
199	563.74	565.62	1.88	Clay Stone
200	565.64	567.40	1.76	Mud Stone
CMWWB-06				
1	0.00	456.74	No Electrical Log Data Available	
2	456.74	463.58	6.84	Mud Stone
3	463.58	470.92	7.34	Clay Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
4	470.92	471.88	0.96	Sand Stone
5	471.88	472.72	0.84	Clay Stone
6	472.72	473.56	0.84	Sand Stone
7	473.58	474.58	1.00	Clay Stone
8	474.64	475.20	0.56	Mud Stone
9	475.26	479.78	4.52	Clay Stone
10	479.78	483.44	3.66	Mud Stone
11	483.50	487.00	3.50	Clay Stone
12	487.00	487.74	0.74	Sand Stone
13	487.74	488.64	0.90	Clay Stone
14	488.64	489.26	0.62	Sand Stone
15	489.26	489.78	0.52	Clay Stone
16	489.78	490.28	0.50	Mud Stone
17	490.32	516.52	26.20	Clay Stone
CMWWB-07				
1	0.20	2.98	2.78	Soil
2	3.02	36.66	33.64	Basalt
3	36.70	38.64	1.94	Clay Stone
4	38.68	45.14	6.46	Basalt
5	45.14	46.30	1.16	Clay Stone
6	46.30	48.42	2.12	Sand Stone
7	48.42	50.92	2.50	Clay Stone
8	50.96	57.96	7.00	Mud Stone
9	57.96	61.64	3.68	Clay Stone
10	61.70	67.48	5.78	Mud Stone
11	67.52	83.56	16.04	Sand Stone
12	83.60	85.54	1.94	Mud Stone
13	85.54	90.56	5.02	Sand Stone
14	90.56	94.22	3.66	Clayey Sand Stone
15	94.22	97.88	3.66	Sand Stone
16	97.88	100.90	3.02	Clay Stone
17	100.90	103.16	2.26	Sand Stone
18	103.16	105.84	2.68	Clayey Sand Stone
19	105.84	114.74	8.90	Sand Stone
20	114.74	115.58	0.84	Clay Stone
21	115.62	134.92	19.30	Sand Stone
22	134.92	137.32	2.40	Clayey Sand Stone
23	137.36	138.30	0.94	Clay Stone
24	138.30	143.66	5.36	Sand Stone
25	143.66	149.44	5.78	Clay Stone
26	149.44	152.92	3.48	Sand Stone
27	152.92	686.96	No Electrical Log Data available	
28	686.96	688.22	1.26	Sand Stone
29	688.22	690.58	2.36	Shale
30	690.58	695.28	4.70	Shaly Sand Stone
31	695.28	696.64	1.36	Sand Stone
32	696.64	699.32	2.68	Shaly Sand Stone
33	699.38	701.30	1.92	Sand Stone
34	701.36	702.72	1.36	Shale
35	702.72	703.32	0.60	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
36	703.38	704.88	1.50	Sandy Shale
37	704.88	706.72	1.84	Sand Stone
38	706.74	708.54	1.80	Sandy Shale
39	708.54	709.38	0.84	Sand Stone
40	709.39	712.44	3.05	Coal
41	712.44	713.13	0.69	Sand Stone
42	713.14	714.38	1.24	Shale
43	714.38	716.68	2.30	Shaly Sand Stone
44	716.69	717.44	0.75	Sand Stone
45	717.44	718.06	0.62	Shaly Sand Stone
46	718.06	719.00	0.94	Sand Stone
47	719.01	719.94	0.93	Shale
48	719.95	721.88	1.93	Sand Stone
49	721.88	722.36	0.48	Coal
50	722.36	722.62	0.26	Shaly Coal
51	722.62	723.51	0.89	Coal
52	723.53	723.87	0.34	Shaly Coal
53	723.88	724.64	0.76	Coal
54	724.65	727.99	3.34	Sandy Shale
55	728.01	730.22	2.21	Shaly Sand Stone
56	730.22	732.06	1.84	Sand Stone
57	732.07	732.49	0.42	Shaly Sand Stone
58	732.49	732.91	0.42	Shaly Coal
59	732.92	733.50	0.58	Shaly Sand Stone
60	733.51	736.06	2.55	Sand Stone
CMWWB-08				
1	0.00	491.98	No Electrical Log Data available	
2	491.98	519.96	27.98	Clay Stone
3	519.96	521	1.04	Sand Stone
4	521	522.88	1.88	Clay Stone
CMWWB-09				
1	0.00	0.55	0.55	Soil
2	0.55	10.73	10.18	Basalt
3	10.73	16.39	5.66	Mud Stone
4	16.39	33.01	16.62	Sand Stone
5	33.01	34.48	1.47	Mud Stone
6	34.48	52.91	18.43	Sand Stone
7	52.91	54.75	1.84	Clay Stone
8	54.76	59.89	5.13	Sand Stone
9	59.89	61.11	1.22	Clay Stone
10	61.11	62.27	1.16	Sand Stone
11	62.27	63.29	1.02	Clay Stone
12	63.29	63.81	0.52	Sand Stone
13	63.81	64.45	0.64	Mud Stone
14	64.45	68.75	4.30	Sand Stone
15	68.75	69.57	0.82	Mud Stone
16	69.57	75.61	6.04	Sand Stone
17	75.61	76.99	1.38	Clay Stone
18	76.99	77.68	0.69	Mud Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
19	77.68	80.17	2.49	Sand Stone
20	80.17	81.39	1.22	Clay Stone
21	81.39	81.75	0.36	Sand Stone
22	81.75	82.63	0.88	Mud Stone
23	82.63	92.46	9.83	Sand Stone
24	92.47	93.51	1.04	Clay Stone
25	93.51	102.60	9.09	Sand Stone
26	102.60	103.48	0.88	Clay Stone
27	103.49	104.04	0.55	Sand Stone
28	104.04	104.95	0.91	Clay Stone
29	104.95	111.03	6.08	Sand Stone
30	111.03	112.36	1.33	Mud Stone
31	112.37	114.46	2.09	Sand Stone
32	114.46	115.29	0.83	Mud Stone
33	115.30	121.70	6.40	Sand Stone
34	121.71	125.88	4.17	Sand Stone
35	125.88	127.64	1.76	Clay Stone
36	127.64	155.74	28.10	Sand Stone
37	155.74	157.53	1.79	Mud Stone
38	157.54	186.22	28.68	Sand Stone
39	186.22	187.04	0.82	Mud Stone
40	187.04	198.18	11.14	Sand Stone
41	198.18	204.68	6.50	Mud Stone
42	204.68	205.50	0.82	Sand Stone
43	205.51	207.39	1.88	Mud Stone
44	207.39	208.01	0.62	Clay Stone
45	208.01	222.05	14.04	Mud Stone
46	222.06	223.05	0.99	Clay Stone
47	223.05	226.15	3.10	Mud Stone
48	226.16	230.82	4.66	Clay Stone
49	230.83	231.37	0.54	Sand Stone
50	231.37	233.82	2.45	Mud Stone
51	233.82	234.80	0.98	Clay Stone
52	234.80	235.09	0.29	Sand Stone
53	235.10	237.47	2.37	Mud Stone
54	237.47	237.97	0.50	Sand Stone
55	237.97	242.91	4.94	Mud Stone
56	242.91	243.34	0.43	Clay Stone
57	243.34	244.30	0.96	Sand Stone
58	244.30	245.90	1.60	Clay Stone
59	245.90	247.97	2.07	Mud Stone
60	247.97	248.92	0.95	Clay Stone
61	248.92	260.02	11.10	Mud Stone
62	260.04	260.75	0.71	Clay Stone
63	260.75	267.48	6.73	Mud Stone
64	267.48	268.57	1.09	Clay Stone
65	268.57	292.00	23.43	Mud Stone
66	292.00	293.21	1.21	Clay Stone
67	293.22	293.74	0.52	Mud Stone
68	293.74	294.61	0.87	Clay Stone
69	294.61	295.54	0.93	Mud Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
70	295.54	299.81	4.27	Clay Stone
71	299.82	300.32	0.50	Sand Stone
72	300.32	300.85	0.53	Clay Stone
73	300.85	304.59	3.74	Mud Stone
74	304.59	305.12	0.53	Sand Stone
75	305.12	306.60	1.48	Clay Stone
76	306.60	309.92	3.32	Mud Stone
77	309.93	310.39	0.46	Sand Stone
78	310.39	312.52	2.13	Mud Stone
79	312.53	314.33	1.80	Clay Stone
80	314.33	315.03	0.70	Sand Stone
81	315.03	315.61	0.58	Clay Stone
82	315.61	316.53	0.92	Mud Stone
83	316.53	317.61	1.08	Clay Stone
84	317.61	318.36	0.75	Mud Stone
85	318.36	319.22	0.86	Clay Stone
86	319.23	319.91	0.68	Mud Stone
87	319.91	320.48	0.57	Clay Stone
88	320.48	321.51	1.03	Mud Stone
89	321.52	323.27	1.75	Clay Stone
90	323.28	324.23	0.95	Mud Stone
91	324.23	326.25	2.02	Mud Stone
92	326.25	327.13	0.88	Sand Stone
93	327.14	327.89	0.75	Clay Stone
94	327.89	329.78	1.89	Mud Stone
95	329.78	332.13	2.35	Mud Stone
96	332.13	333.99	1.86	Clay Stone
97	333.99	334.35	0.36	Mud Stone
98	334.35	334.87	0.52	Clay Stone
99	334.87	335.42	0.55	Sand Stone
100	335.43	336.80	1.37	Mud Stone
101	336.80	338.72	1.92	Shale
102	338.72	341.83	3.11	Mud Stone
103	341.83	342.99	1.16	Clay Stone
104	342.99	343.68	0.69	Sand Stone
105	343.68	346.13	2.45	Mud Stone
106	346.13	346.94	0.81	Clay Stone
107	346.95	351.68	4.73	Mud Stone
108	351.70	352.31	0.61	Sand Stone
109	352.32	357.57	5.25	Mud Stone
110	357.57	358.06	0.49	Sand Stone
111	358.07	363.24	5.17	Clay Stone
112	363.24	364.99	1.75	Mud Stone
113	364.99	366.51	1.52	Clay Stone
114	366.52	368.46	1.94	Mud Stone
115	368.46	370.95	2.49	Clay Stone
116	370.95	371.40	0.45	Mud Stone
117	371.40	374.51	3.11	Clay Stone
118	374.51	375.13	0.62	Mud Stone
119	375.13	376.55	1.42	Clay Stone
120	376.55	376.99	0.44	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
121	376.99	380.27	3.28	Mud Stone
122	380.27	381.00	0.73	Clay Stone
123	381.00	381.68	0.68	Mud Stone
124	381.68	382.29	0.61	Clay Stone
125	382.29	384.01	1.72	Mud Stone
126	384.01	384.65	0.64	Clay Stone
127	384.65	385.23	0.58	Mud Stone
128	385.23	386.34	1.11	Clay Stone
129	386.35	387.42	1.07	Mud Stone
130	387.42	388.55	1.13	Clay Stone
131	388.55	396.54	7.99	Mud Stone
132	396.54	396.99	0.45	Sand Stone
133	397.00	401.08	4.08	Mud Stone
134	401.08	402.40	1.32	Clay Stone
135	402.40	403.06	0.66	Sand Stone
136	403.07	404.23	1.16	Clay Stone
137	404.24	406.99	2.75	Sand Stone
138	406.99	408.59	1.60	Clay Stone
139	408.59	410.50	1.91	Mud Stone
140	410.51	411.19	0.68	Clay Stone
141	411.19	411.60	0.41	Mud Stone
142	411.60	412.15	0.55	Clay Stone
143	412.16	416.68	4.52	Mud Stone
144	416.68	417.74	1.06	Clay Stone
145	417.74	422.04	4.30	Mud Stone
146	422.05	422.74	0.69	Sand Stone
147	422.74	423.56	0.82	Clay Stone
148	423.56	424.11	0.55	Sand Stone
149	424.11	426.95	2.84	Clay Stone
150	426.95	427.64	0.69	Mud Stone
151	427.65	428.35	0.70	Clay Stone
152	428.35	429.79	1.44	Mud Stone
153	429.79	432.37	2.58	Clay Stone
154	432.38	433.32	0.94	Mud Stone
155	433.32	434.18	0.86	Clay Stone
156	434.18	434.62	0.44	Mud Stone
157	434.62	435.33	0.71	Clay Stone
158	435.34	439.15	3.81	Mud Stone
159	439.15	439.98	0.83	Clay Stone
160	439.99	440.68	0.69	Sand Stone
161	440.68	442.83	2.15	Clay Stone
162	442.83	443.49	0.66	Sand Stone
163	443.49	444.38	0.89	Clay Stone
164	444.38	447.37	2.99	Mud Stone
165	447.37	449.02	1.65	Clay Stone
166	449.04	452.14	3.10	Mud Stone
167	452.14	456.09	3.95	Clay Stone
168	456.09	456.83	0.74	Mud Stone
169	456.83	458.27	1.44	Sand Stone
170	458.27	459.80	1.53	Mud Stone
171	459.80	460.38	0.58	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
172	460.38	460.89	0.51	Mud Stone
173	460.89	461.26	0.37	Sand Stone
174	461.26	462.06	0.80	Mud Stone
175	462.07	462.66	0.59	Sand Stone
176	462.67	468.66	5.99	Clay Stone
177	468.66	469.33	0.67	Mud Stone
178	469.33	476.89	7.56	Clay Stone
179	476.89	477.40	0.51	Mud Stone
180	477.40	483.10	5.70	Clay Stone
181	483.10	483.69	0.59	Mud Stone
182	483.71	484.35	0.64	Clay Stone
183	484.35	484.76	0.41	Mud Stone
184	484.77	485.71	0.94	Clay Stone
185	485.71	486.29	0.58	Mud Stone
186	486.29	486.63	0.34	Clay Stone
187	486.63	487.14	0.51	Mud Stone
188	487.14	488.28	1.14	Clay Stone
189	488.28	488.86	0.58	Mud Stone
190	488.86	491.61	2.75	Mud Stone
191	491.63	492.47	0.84	Sand Stone
192	492.48	493.88	1.40	Clay Stone
193	493.88	495.68	1.80	Mud Stone
194	495.70	496.90	1.20	Clay Stone
195	496.90	497.27	0.37	Mud Stone
196	497.27	499.01	1.74	Clay Stone
197	499.02	499.69	0.67	Mud Stone
198	499.70	501.74	2.04	Clay Stone
199	501.74	502.35	0.61	Mud Stone
200	502.35	509.10	6.75	Mud Stone
201	509.10	509.67	0.57	Clay Stone
202	509.67	510.26	0.59	Sand Stone
203	510.26	510.88	0.62	Clay Stone
204	510.88	511.41	0.53	Mud Stone
205	511.41	512.19	0.78	Clay Stone
206	512.19	512.88	0.69	Mud Stone
207	512.88	513.65	0.77	Clay Stone
208	513.65	514.20	0.55	Mud Stone
209	514.20	515.28	1.08	Clay Stone
210	515.28	515.73	0.45	Mud Stone
211	515.73	517.67	1.94	Clay Stone
212	517.67	518.07	0.40	Mud Stone
213	518.07	519.33	1.26	Clay Stone
214	519.34	519.95	0.61	Mud Stone
215	519.95	520.95	1.00	Clay Stone
216	520.95	522.71	1.76	Mud Stone
217	522.71	524.99	2.28	Clay Stone
218	524.99	525.54	0.55	Mud Stone
219	525.54	527.63	2.09	Clay Stone
220	527.63	528.33	0.70	Mud Stone
221	528.34	529.97	1.63	Clay Stone
222	529.97	530.57	0.60	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
223	530.58	538.78	8.20	Mud Stone
224	538.78	539.57	0.79	Clay Stone
225	539.58	540.17	0.59	Mud Stone
226	540.18	541.25	1.07	Clay Stone
227	541.25	542.41	1.16	Mud Stone
228	542.41	544.06	1.65	Clay Stone
229	544.06	547.27	3.21	Mud Stone
230	547.27	547.86	0.59	Clay Stone
231	547.86	549.65	1.79	Mud Stone
232	549.65	550.87	1.22	Clay Stone
233	550.88	554.91	4.03	Mud Stone
234	554.91	555.98	1.07	Clay Stone
235	555.98	556.58	0.60	Mud Stone
236	556.58	557.30	0.72	Clay Stone
237	557.30	560.23	2.93	Mud Stone
238	560.23	561.03	0.80	Clay Stone
239	561.04	562.31	1.27	Mud Stone
240	562.31	563.10	0.79	Clay Stone
241	563.10	563.73	0.63	Sand Stone
242	563.73	567.21	3.48	Mud Stone
243	567.21	568.84	1.63	Clay Stone
244	568.84	584.70	15.86	Mud Stone
245	584.71	585.84	1.13	Clay Stone
246	585.84	586.27	0.43	Mud Stone
247	586.27	586.82	0.55	Clay Stone
248	586.82	587.34	0.52	Mud Stone
249	587.34	589.39	2.05	Clay Stone
250	589.39	590.70	1.31	Sand Stone
251	590.70	591.40	0.70	Sandy Shale
252	591.40	596.60	5.20	Sand Stone
253	596.60	597.64	1.04	Shaly Sand Stone
254	597.64	600.57	2.93	Sand Stone
255	600.57	601.41	0.84	Shaly Sand Stone
256	601.41	602.71	1.30	Sand Stone
257	602.72	603.43	0.71	Shaly Sand Stone
258	603.43	604.64	1.21	Shale
259	604.64	614.03	9.39	Sand Stone
260	614.04	615.81	1.77	Clay Stone
261	615.81	616.66	0.85	Mud Stone
262	616.66	617.91	1.25	Clay Stone
263	617.91	618.52	0.61	Sand Stone
264	618.53	619.33	0.80	Mud Stone
265	619.33	622.95	3.62	Sand Stone
266	622.95	623.70	0.75	Shaly Sand Stone
267	623.70	625.53	1.83	Sand Stone
268	625.53	626.60	1.07	Shale
269	626.60	627.11	0.51	Sand Stone
270	627.11	628.58	1.47	Sandy Shale
271	628.58	631.17	2.59	Sand Stone
272	631.17	632.29	1.12	Clayey Sand Stone
273	632.29	633.45	1.16	Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
274	633.46	634.68	1.22	Shale
275	634.68	636.09	1.41	Sandy Shale
276	636.10	636.62	0.52	Sand Stone
277	636.63	637.35	0.72	Shale
278	637.35	640.14	2.79	Sand Stone
279	640.14	641.66	1.52	Shale
280	641.66	643.38	1.72	Shaly Sand Stone
281	643.38	644.28	0.90	Sand Stone
282	644.28	646.31	2.03	Shale
283	646.33	647.13	0.80	Sand Stone
284	647.13	648.10	0.97	Shale
285	648.10	649.50	1.40	Shaly Sand Stone
286	649.50	650.74	1.24	Shale
287	650.74	651.28	0.54	Sand Stone
288	651.29	653.34	2.05	Shaly Sand Stone
289	653.34	654.22	0.88	Sand Stone
290	654.23	655.09	0.86	Shale
291	655.09	655.71	0.62	Sand Stone
292	655.72	656.42	0.70	Shale
293	656.42	657.42	1.00	Sand Stone
294	657.42	658.35	0.93	Shaly Sand Stone
295	658.35	658.88	0.53	Sand Stone
296	658.88	659.40	0.52	Sandy Shale
297	659.41	659.97	0.56	Sand Stone
298	659.97	660.66	0.69	Shale
299	660.66	661.34	0.68	Sand Stone
300	661.35	662.18	0.83	Shale
301	662.19	663.88	1.69	Sand Stone
302	663.89	664.47	0.58	Shale
303	664.47	664.93	0.46	Sand Stone
304	664.94	665.87	0.93	Shale
305	665.87	667.76	1.89	Sand Stone
306	667.76	669.01	1.25	Shaly Sand Stone
307	669.01	669.88	0.87	Shale
308	669.88	670.26	0.38	Coal
309	670.26	670.51	0.25	Shaly Coal
310	670.52	672.28	1.76	Coal
311	672.28	673.80	1.52	Shaly Sand Stone
312	673.82	674.68	0.86	Shale
313	674.68	676.59	1.91	Sandy Shale
314	676.59	677.84	1.25	Sand Stone
315	677.85	678.52	0.67	Sandy Shale
316	678.52	679.01	0.49	Sand Stone
317	679.02	680.43	1.41	Shaly Sand Stone
318	680.43	682.89	2.46	Sand Stone
319	682.89	684.83	1.94	Coal
320	684.84	685.29	0.45	Shaly Coal
321	685.29	686.28	0.99	Shale
322	686.28	688.46	2.18	Sandy Shale
323	688.46	689.84	1.38	Sand Stone
324	689.84	690.39	0.55	Shaly Sand Stone

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
325	690.39	690.71	0.32	Sand Stone
326	690.71	691.92	1.21	Shale
327	691.92	692.27	0.35	Sandy Shale
328	692.28	692.98	0.70	Shale
329	692.99	694.67	1.68	Sand Stone
330	694.67	695.44	0.77	Shale
331	695.44	696.17	0.73	Sand Stone
332	696.17	697.08	0.91	Sandy Shale
333	697.08	698.06	0.98	Sand Stone
334	698.06	698.73	0.67	Shale
335	698.73	699.24	0.51	Shaly Coal
336	699.24	699.71	0.47	Shale
337	699.72	701.58	1.86	Sand Stone
CMWWB-10				
1	0.00	720.23	No Electrical Log Data available	
2	720.23	720.94	0.71	Shale
3	720.94	721.38	0.44	Sand Stone
4	721.38	721.84	0.46	Shale
5	721.84	723.13	1.29	Sandy Shale
6	723.13	724.03	0.90	Sand Stone
7	724.04	727.28	3.24	Shaly Sand Stone
8	727.28	729.21	1.93	Sand Stone
9	729.22	729.82	0.60	Shaly Sand Stone
10	729.82	731.50	1.68	Sand Stone
11	731.51	733.47	1.96	Sandy Shale
12	733.47	734.83	1.36	Sand Stone
13	734.84	735.74	0.90	Shale
14	735.74	736.59	0.85	Sand Stone
15	736.59	739.63	3.04	Shale
16	739.63	741.88	2.25	Shaly Sand Stone
17	741.90	744.70	2.80	Sand Stone
18	744.72	746.39	1.67	Shale
19	746.39	748.88	2.49	Sandy Shale
20	748.89	749.61	0.72	Sand Stone
21	749.61	751.68	2.07	Shale
22	751.68	754.36	2.68	Sand Stone
23	754.37	754.81	0.44	Shale
24	754.81	755.53	0.72	Shaly Coal
25	755.53	755.83	0.30	Coal
26	755.83	756.18	0.35	Shaly Coal
27	756.18	756.62	0.44	Coal
28	756.63	757.34	0.71	Shaly Coal
29	757.34	759.00	1.66	Shale
30	759.00	759.59	0.59	Coal
31	759.59	759.89	0.30	Shaly Coal
32	759.89	760.30	0.41	Coal
33	760.30	761.17	0.87	Shaly Coal
34	761.17	762.80	1.63	Coal
35	762.81	764.60	1.79	Shale
36	764.60	765.45	0.85	Sandy Shale

Sl. No.	Depth range (m)		Thickness (m)	Lithology
	From	To		
37	765.45	767.28	1.83	Shale
38	767.30	771.76	4.46	Sand Stone
39	771.76	772.84	1.08	Shale
40	772.84	773.92	1.08	Coal
41	773.92	774.87	0.95	Shale
42	774.89	775.54	0.65	Sand Stone
43	775.54	777.41	1.87	Shale
44	777.42	780.00	2.58	Sand Stone
CMWWB-12				
1	0.00	320.99	No Electrical Log Data available	
2	320.99	321.37	0.38	Clay Stone
3	321.37	335.71	14.34	Mud Stone
4	335.71	336.33	0.62	Clay Stone
5	336.33	337.51	1.18	Sand Stone
6	337.51	342.03	4.52	Clay Stone
7	342.07	347.15	5.08	Sand Stone
8	347.17	347.85	0.68	Shale
9	347.85	348.35	0.5	Sand Stone
10	348.35	351.45	3.1	Shale
11	351.45	353.03	1.58	Mud Stone
12	353.03	389.05	36.02	Clay Stone
13	389.05	629.95	No Electrical Log Data available	
14	629.95	630.91	0.96	Mud Stone
15	630.91	631.81	0.9	Clay Stone
16	631.83	632.31	0.48	Mud Stone
17	632.31	633.57	1.26	Clay Stone
18	633.57	635.17	1.6	Mud Stone
19	635.17	635.89	0.72	Clay Stone
20	635.89	636.35	0.46	Mud Stone
21	636.35	637.15	0.8	Clay Stone
22	637.15	637.81	0.66	Mud Stone
23	637.81	643.27	5.46	Clay Stone

2.17.0 RESULTS & DISCUSSIONS

2.17.1 The depth, thickness and qualitative description of carbonaceous & other horizons were inferred from the interpretation of Geophysical logs of the boreholes and are provided in the table-III. The processed logs for each boreholes and its interpretation are presented in Plate IX.

2.17.2 The coal seams inferred from visual logging correlates well with the findings of the Geophysical logs in depth, thickness and parting.

2.17.3 Coal seams are encountered only in borehole no. CMWWB-07, 09 and 10 and No coal seams are encountered in other geophysically logged boreholes.

CHAPTER – 3

3.0.0 GEOLOGY OF THE BLOCK

3.1.0 GENERAL

3.1.1 West of Borda & Ghonsa Parsoda Block is located in the south western part of the Wardha Valley Coalfield. It is represented by Deccan traps and formations of Gondwana Group. Almost the entire area of investigation is covered with black cotton top soil/sandy soil/Hillocks of Deccan traps are present throughout the block area. Geological map has been prepared and presented as Plate III.

3.1.2 The stratigraphic succession established in West of Borda & Ghonsa Parsoda Block from the subsurface exploration drilling carried out in 12 NMET approved boreholes is furnished below -

Table No. 3.1.2
Stratigraphic Succession In West of Borda & Ghonsa Parsoda Block

Age	Formation	Lithology (Thickness)
Recent/Sub-Recent	Detrital Mantle	Black cotton soil/sandy soil with trap fragments. (0.20-6.50m)
Upper Cretaceous	Deccan Trap	Basalts (4.25-110.62m)
-----UNCONFORMITY-----		
Middle Permian	Motur	Medium to fine grained variegated sandstones, variegated clays and shales. (147.00-814.90m)
Lower Permian	Barakar	Light grey to whitish sandstones with grey shale, sandy shale, alternate bands of shale and sandstone and coal seams. (85.50-125.20m: full thickness of this formation not drilled)

3.2.0 DESCRIPTION OF FORMATIONS ENCOUNTERED WITHIN THE BLOCK

3.2.1 Soil & Alluvium: The overlying soil is mainly black cotton soil residual type derived from the weathered part of the basalt having brownish grey and dark grey colour at places. The weathering has affected all the strata below soil to a varying extent and this depth has been marked as weathered mantle in all boreholes.



Fig. 3.2.1 Spheroidal weathering in Deccan Trap and subsequent soil formation.
 ANNEXURE

3.2.2 Deccan Trap : Block area is covered with Deccan trap basalts. Deccan traps have been encountered in the all drilled boreholes. It is hard, compact massive to vesicular and amygdaloidal basalt having intertrappean beds (red/green bole beds) and secondary fillings of quartz/calcite at places. Deccan trap excavation at a few places could be outside eastern boundary of the block. Deccan Trap exploitation for building stone, road lying etc. in present block area may also be studied along with requisite hydrogeological and environmental aspects.

3.2.3 Motur Formation : Motur formation is represented mainly by brown to variegated clays with yellowish brown, medium to coarse grained sandstone. The litho profile of Motur Formation of Wardha Valley with significant clay component is comparable to that of Motur Formation of Satpura Gondwana Basin. In the block area, the Moturs are represented by an interbanded sandstone siltstone-mudstone-claystone sequence, although the argillaceous unit is dominant. The Motur sandstone is greenish grey to greyish white, very fine to very coarse, poorly sorted and feldspathic at places. Granitic and quartzitic rock-fragments are also observed at places. Both minerlogically and texturally Motur sandstone is more immature, as compared to the underlying Barakar

Formation.

3.2.4 Barakar Formation:

It comprises interbanded sequence of dirty white to light grey, medium to coarse grained moderately sorted and sub-mature, feldspathic sandstone with grey shale and coal horizons. Study of borehole core samples for Sedimentary structure revealed that Barakar sandstone is cross laminated with grey argillaceous material & mica. Coarser fractions are cross laminated with granules of quartz and feldspar that are arranged along the foreset of a cross bedded sandstone. Fine grained sandstone are ripple laminated, cross laminated, sometimes low height wave ripple also preserved particularly in siltstone and very fine grained sandstone. At places pene-contemporaneous deformation structures such as convolute laminations are observed. The litho-facies of Barakar Formation comprises of multiple fining upward sequences represented by complete or interrupted cycles. A complete single sequence starts with coarse to very coarse grained sandstone with erosional lower contact. At places, this coarse portion is normally graded. This is usually followed upward by medium to fine grained, feldspathic sandstone, which are often cross-laminated with mica or opaque rich laminae.

3.3.0 STRUCTURE OF THE BLOCK

3.3.1. Primary sedimentary structures in drill cores:

Depositional sedimentary structures like parallel and cross-laminations lenticular and flaser bedding, pene-contemporaneous deformation structures like convolute lamination and biogenic sedimentary structures like burrows have been observed in drill cores of Barakar Formation, Motur Formation.

3.3.2 Secondary structures:

3.3.3. Geological structure & faults: As almost the entire area is concealed under soil, Deccan Trap Basalts, structural interpretation in the block is possible based solely on the sub-surface data obtained from the boreholes.

3.3.4 As almost the entire area is concealed under Deccan Trap Basalts, structural interpretation in the block is possible based solely on the sub-surface data obtained from the boreholes. So, meagre data generated through only 12 CMPDI boreholes of present phase, 4 boreholes of WJ series drilled by GSI in Jhamkola Sector which are falling in the block area have been used for structure interpretation.

In addition to it, boreholes of WDD Series drilled by GSI in Dabhadi Sector which fall outside of western boundary of the block have also been utilized for regional level structural interpretation. Out of 12 CMPDI boreholes drilled in the block, 10 boreholes could encounter coal seams. Remaining 02 boreholes could not be deepened up to coal seam(s). Hence out of 18 approved boreholes, the exploration activity was concluded by 73rd Technical-cum-Cost Committee-1 (TCC-1) meeting held on 30th and 31st January, 2025 vide Agenda Item no. 73.2.8.

The general strike of coal horizons in the block is NW-SE, and; approximate general gradient being approximate general gradient being 1 in 15.8 (dip varies from 3.6 degree due SW) to 1 in 12.3 (dip 4.63 degree due SW). Limited borehole data available at present G3

level exploration stage, has been interpreted to delineate the structure of the block..

.3.3.5. Seven macroscopic faults have been interpreted in the block on basis of subsurface data of the boreholes drilled in the block and, details of the same are given in following table:

Table 3.3.5
Details of Faults in West of Borda & Ghonsa Parsoda block, Wardha Valley Coalfield

Fault No.	Strike of fault	Throw		Evidences
		Amount (m)	Direction	
F1-F1	NWN-SSE	~90m	NEE	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-12 & CMWWB-06.
F2-F2	NWN-SSE	~40m	SWW	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-07,09 & CMWWB-08 and seam I faulted in borehole CMWWB-05
F3-F3	NWN-SSE	~50m	NEE	Abuts against F4-F4, delineated on the basis of sub-surface data of boreholes CMWWB-07,09 & CMWWB-08 and seam I faulted in borehole CMWWB-08
F4-F4	NWW-SEE	~160 - 240m	NNE	Delineated on the basis of sub-surface data of boreholes CMWWB-03,06,12 & CMWWB-10.
F5-F5	NW-SE	~290 - 680m	NE	Delineated on the basis of sub-surface data of boreholes CMWWB-10 & CMWWB-04.
F6-F6	SWW-NEE	~>400 m (?)	SSE	Abuts against F5-F5, Delineated on the basis of sub-surface data of boreholes CMWWB-02 as it is closed in Motur formation at depth of 885m.
F7-F7	NW-SE	~50m	NE	Delineated on the basis of sub-surface data of boreholes CMWWB-04 as both seams IIB & I are faulted.

CHAPTER-4

4.0.0 DESCRIPTION OF COAL SEAMS

4.1.0 GENERAL

4.1.1 In Wardha Valley Coalfield, one thick composite seam occurs almost in the middle of Barakar Formation comprising sandstone and shale. However, in Ghonsa-Kumbharkhani rift of this coalfield, two coal seams, Seam II and Seam I which are separated by 9 m to 28 m (approx.) intervening parting of sandstone, shale and intercalations (at places) occur in Barakars. This have been noticed across Ghonsa, Parsoda and Borda block. G3 Level exploration in West of Borda & Ghonsa Prasoda Block has revealed the presence these two splits (namely Seam II & Seam I) of composite seam; however seam II have been found to be further splitted in two sections (named as II A and II B) in this block area.

4.1.2 Correlation of seams is based on ten CMPDI boreholes – CMWWB01,03,04,05,06,07,08,09,10,12 and one GSI borehole WJ3A, in which seams were encountered.

4.1.3 All the coal seams are composed mainly of coal, shaly coal, carbonaceous shale (high), carbonaceous shale (low) and shale.

4.2.0 DELINEATION OF COAL SEAMS

4.2.1 To delineate the seam precisely, detailed studies have been carried out, taking into consideration, the thickness, stratigraphic position of seams, nature, & thickness of dirt bands, quality, etc.

4.2.2 The roof and floor of the seams have been delineated on the basis of band by band analysis received from Coal Characterization Laboratory, CMPDIL, (HQ) Ranchi.

4.2.3 The coal seams are mainly composed of coal and shaly coal with bands of carbonaceous shale (Low & High) and obvious dirt bands at places. The terms used to define coal, shaly coal, carbonaceous shale low and carbonaceous shale high etc. are based as per ISP: 2022 norms. For delineation of coal seams, the standard norms applicable to Non- Coking coal have been followed. In brief they are as under:

Name of Litho-Unit	For high moisture coals (M%>2)
Coal	Ash + Moisture up to 40%
Shaly Coal	Ash + Moisture >40.1 to 55.0%
Carbonaceous Shale Low	Ash + Moisture >55.1 to 65.0%
Carbonaceous Shale High(Combustible dirt band)	Ash + Moisture >65.1 to 75.0%
Shale, Sandstone, Intercalation etc. (non-combustible dirt band)	Ash + Moisture >75.0%

4.2.4 Coal, Shaly coal & Carbonaceous shale (Low) are grouped together to form coal

seam/horizon. Thus, while demarcating the coal seam, carbonaceous shale (Low) occurring at the roof and floor has been included in the seam.

4.2.5 Carbonaceous shale (High) has been considered as combustible dirt band, while shale with its varieties and sandstone has been treated as obvious band.

4.2.6 While delineating the roof and floor of the seam, both combustible and obvious dirt bands, occurring near the roof and floor has been included in seam only if the thickness of dirt band is less than that of the coal band overlying and underlying it. Hence, the carbonaceous shale (High) occurring at the exact roof or floor of a coal band is excluded from the seam.

4.3.0 NOMENCLATURE AND CORRELATION OF COAL SEAMS

4.3.1 The correlation of coal seams has been attempted following criteria stated below.

- i) Persistency of coal seams/bands.
- ii) Thickness of individual seams/bands.
- iii) Thickness and nature of parting between seams.
- iv) Presence of index horizon.
- v) Roof and floor characteristics of seams.
- vi) Presence of marker non-combustible band within a seam.

4.4.0 SEQUENCE OF COAL SEAMS

4.4.1 Sequence and details of coal seams intersected in borehole drilled in West of Borda & Ghonsa Parsoda Block is given as follows:

TABLE NO.- 4.4.1.
Sequence Showing Details of Seams encountered in West of Borda & Ghonsa Parsoda Block

SEAM/ PARTINGS	DEPTH RANGE(m)		THICKNESS(m)		NO. OF INTERSECTIONS
	MIN	MAX	MIN	MAX	
IIA	591.68	910.62	0.76	3.00	10
PARTING	1.68	12.07			
IIB	664	915.5	1.00	4.00	9
PARTING	7.74	13.24			
I	677.10	929.08	0.32	1.31	7

4.5.0 QUALITY OF COAL SEAMS

4.5.1 To assess the quality of coal seams, coal core samples of all the boreholes were sent to Coal Characterization Laboratory, CMPDIL, (HQ) Ranch for band-by-band analysis to determine their ash and moisture contents. Seam overall analysis at 60% RH and 40°C, air dried Basis are furnished in Annexure-VII A1, VII A2.

4.5.2 The Petrographic analysis of coal core samples of borehole no. CMWWB06,09, were carried out on a total of 5 samples at Coal Petrography Laboratory, CMPDI(HQ), Ranchi, and the results are included in Annexure no. VIII D.

4.6.0 DESCRIPTION OF COAL SEAMS

4.6.1 Detail descriptions of following seams have been discussed in this chapter and rest all data are furnished in Annexures.

Sl. No.	Seam Name	Remarks
1	Seam II A	Data presented in following paragraphs and annexures also.
2	Seam II B	
3	Seam IIA+IIB combined	
4	Seam I	

The seams are described in details in the subsequent paragraphs.

4.7.0 SEAM II A

4.7.1 Occurrence: Seam IIA found in Barakar Formation and it is the topmost seam.

4.7.2 Borehole Intersections: The seam is fully intersected in 10 boreholes.

4.7.3 Parting: The parting from underlying IIB seam ranges from 1.68m to 12.07m.

4.7.4 Thickness: The stratigraphic thickness of the seam encountered in borehole ranges from 0.76m to 3.00m.

4.7.5 Dirt Bands: No. of dirt bands in Seam IIA varies from nil to 1, having thickness of 0.00m to 0.60m, details are given in Annexure VI.

4.7.6 Roof & Floor: Details are given in following table.

4.7.7 The Salient Features of the seam are given in following table:

SALIENT FEATURES OF SEAM IIA	
Borehole intersection	10(CMWWB01,03,04,05,06,07,08,09,10,12)
Full seam intersection	
Depth range (floor) (m)	
Shallowest	591.68
Deepest	910.62
Stratigraphic thickness (m)	
Min	1.1
Max	3.00
Effective thickness (I-30)	
Min	1.10
Max	3.00
Roof characteristics	
Immediate	Sandstone very fine grains to medium grained
3.0 m column dominant	Sandstone very fine grained ,Carbshale high,Sandstone medium to coarse grained.

SALIENT FEATURES OF SEAM IIA		
Floor characteristics		
Immediate		Sandstone very fine grained ,Sandstone fine to medium grained
1.0 m column dominant		Sandstone very fine grained ,Sandstone fine to medium grained
Analytical report brief of Seam		
Proximate Analysis		
Parameters		Range/Values
Sample Type		I30
Thickness Range (m)		1.10 to 3.00
ET Range (m)		1.10 to 3.00
BH Considered		10
Moisture %		4.8 to 7.3
Ash%		14.4 to 30.7
VM%		23.7 to 32.80
GCV (KCal/kg)		4758(G9) to 6096 (G5)
Ultimate Analysis-BH considered 05		
Air dried basis		Dry Basis
C%	47.13-62.38	51.17-65.8
H%	3.94-4.87	3.5-4.52
N%	.9-1.09	.98-1.15
S%	3.15-5.26	3.34-5.71

4.7.8 Quality : Seam is comprising of non –coking coal. Details of GCV, seam overall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2.

4.7.9 Special Test Analysis:

Special tests results are incorporated in Annexures VIII A (Ultimate Analysis), VIII B (Ash Analysis), VIII C (HGI, Ash Fusion Temperature range), VIII D (Petrographic study).

4.8.0 SEAM II B

4.8.1 Occurrence: Seam II B is found in Barakar Formation and it underlies Seam II A.

4.8.2 Borehole Intersections: The seam is fully intersected in 09 boreholes .

4.8.3 Parting: Seam II B overlies Seam I (parting range 7.74m-13.24m).

4.8.4 Thickness: The stratigraphic thickness of the seam encountered in boreholes ranges from 1.00m to 4.00m.

4.8.5 Dirt Bands: No. of dirt bands in Seam I B varies from nil to 1, having thickness of 0.00m to 0.97m, details are given in Annexure VI.

4.8.6 Roof & Floor: Details are given in following table.

4.8.7 The Salient Features of the seam is given in following table:

SALIENT FEATURES OF SEAM IIB		
Borehole intersection		09(CMWWB01,03,05,06,07,08,09,10,12)
Full seam intersection		
Depth range (floor) (m)		
Shallowest		664
Deepest		915.5
Stratigraphic thickness (m)		
Min		1.00
Max		4.00
Effective thickness (i-30)		
Min		1.00
Max		4.00
Roof characteristics		
Immediate		Sandstone medium to coarse grained,Sandys shale,intercalations
3.0 m column dominant		Sandstone medium to coarse grained,sandys shale,intercalation
Floor characteristics		
Immediate		Sandyshale,Sandstone fine to medium grained
1.0 m column dominant		Sandyshale,Sandstoe fine to medium grained
Analytical report brief of Seam.....		
Proximate Analysis		
Parameters		Range/Values
Sample Type		I30
Thickness Range (m)		1.00 to 4.00
ET Range (m)		1.00 to 4.00
BH Considered		9
Moisture %		4.8 to 7.50
Ash%		21.9 to 30.10
VM%		22.8 to 27.9
GCV (KCal/kg)		4736(G9) to 5644(G6)
Ultimate Analysis-BH considered 05		
Air dried basis		Dry Basis
C%	50.67-57.93	53.34-62.36
H%	3.66-4.55	3.26-3.87
N%	0.9-1.06	.95-1.14
S%	1.64-3.84	1.81-4.03

4.8.8 Quality : Seam is comprising of non –coking coal. Details of GCV, seam overall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2.

4.8.9 Special Test Analysis:

Special tests results are incorporated in Annexures VIII A (Ultimate Analysis), VIII B (Ash Analysis), VIII C (HGI, Ash Fusion Temperature range), VIII D (Petrographic study).

4.9.0 SEAM I

4.9.1 Occurrence: Seam I Combined is bottom most seam found in Barakar Formation.

4.9.2 Borehole Intersections: The seam is fully intersected in 7 boreholes in the block.

4.9.3 Parting: The parting from overlying seam IIB ranges from 7.74m to 13.24m.

4.9.4 Thickness: The stratigraphic thickness of the seam encountered in borehole ranges from 0.32m to 1.31m.

4.9.5 Dirt Bands: No. of dirt bands in Seam I has been noted as 1, having thickness range of 0.28m to 0.65m.

4.9.6 Roof & Floor: Details are given in following table.

4.9.7 The Salient Features of the seam are given in following table:

SALIENT FEATURES OF SEAM I		
Borehole intersection		7(CMWWB01,03,06,07,09,10,12)
Full seam intersection		
Depth range (floor) (m)		
Shallowest		677.1
Deepest		929.08
Stratigraphic thickness (m)		
Min		0.32
Max		1.31
Effective thickness (i-30)		
Min		0.5
Max		1.31
Roof characteristics		
Immediate		Sandstone fine to medium grained
3.0 m column dominant		Sandstone fine to medium grained
Floor characteristics		
Immediate		Shale, Sandstone fine to medium grained
1.0 m column dominant		Shale, Sandstone fine to medium grained
Analytical report brief of Seam.....		
Proximate Analysis		
Parameters		Range/Values
Sample Type		I30
Thickness Range (m)		0.36 to 1.31
ET Range (m)		0.36 to 1.31
BH Considered		06
Moisture %		5.10 to 7.8
Ash%		15.20 to 40.70
VM%		22.80 to 30.70
GCV (KCal/kg)		3876(G12) to 6094(G5)
Ultimate Analysis-BH considered 05		
Air dried basis		Dry Basis
C%	41.87-64.73	43.61-68.28
H%	3.54-4.83	3-4.4.48
N%	0.75-1.07	.78-1.13

SALIENT FEATURES OF SEAM I

S%	0.64-2.08	.67-2.19
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4.9.8 Quality : Seam is comprising of non –coking coal. Details of GCV, seam overall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2

4.9.9 Special Test Analysis:

Special tests results are incorporated in Annexures VIII A (Ultimate Analysis), VIII B (Ash Analysis), VIII C (HGI, Ash Fusion Temperature range), VIII D (Petrographic study).

CHAPTER-5

RESOURCE

5.1 GENERAL

G3 Level exploration in West of Borda & Ghonsa Prasoda Block has revealed the presence these two splits (namely Seam II & Seam I) of composite seam; however seam II have been found to be further splitted in two sections (named as II A and II B) in this block area. Seams are non-coking in nature. The resource assessment has been done as per ISP-2022 norms.

5.2 BASIC ASSUMPTIONS AND NORMS

5.2.1 DEFINITIONS

For calculation of resources assumption of following parameters has been made:

- i. Resources estimation of seams IIA, IIB and I has been done.
- ii. Continuity of the coal seams from the control points such as boreholes/outcrop section, to the peripheral part up to the geological or block boundaries, as the cases may be.
- iii. Resources are calculated through MINEX software.
- iv. For estimation of the resource, the minimum thickness considered as 0.90 m for thick seam resource and for thin seam resources the seam thickness range 0.50m to <0.90m have been considered. Seams having Effective Thickness<0.50m have not been considered for resource estimation.
- v. Effective thickness of seams (I30 basis), including all types of dirt bands up to 0.30m of their thickness and excluding obvious dirt bands irrespective of their thickness has been considered for estimation of resource.
- vi. Resource have been estimated separately for each seam, depth-wise. The Resource have been categorized depth-wise, i.e. 300-600m & 600m-900m and 900m and above depth zone.
- vii. All the unworkable coal bands/coal sections occurring above the delineated roof of the seams and also occurring within the seam partings have been added to the overburden.

5.2.2 SEAMS AFFECTED BY INTRUSIVES

No intrusive have been encountered in the block, block area is covered with Deccan Trap Basalts:

5.2.3 CATEGORISATION OF RESOURCE

The resource have been placed under 'Inferred' category (333) as per Indian Standard Procedure (ISP 2022). To obtain net in-situ geological reserves, no deduction of have been made and the estimated gross resource have been presented in the chapter.

5.2.4 GRADE ESTIMATION

Coal quality of the non-coking coal of all the seams has been categorised into various grades on the basis of its Gross Calorific Value (GCV), which has been determined by Coal Characterization Laboratory, CMPDI HQ, Ranchi.

Mazumder's formula for high moisture coal for calculation of Gross Calorific Value as described below:

$$\text{Gross CV in kcal/kg} = \frac{154 \times \{100 - (1.1 \times A + M)\} - 108 \times M}{1.8}$$

Where A = Ash% and M = Moisture % on equilibrated basis, determined as per IS1350, Part I, 1984.

The range of Gross Calorific Value for the different GCV Grades and corresponding density (gm/cc) is as follows:

Table 5.2.4
The range of GCV Value and average density (gm/cc) for the different grades

Sl. No.	Grade	GCV Kcal/kg		Density(gm/cc)
		Lower	Higher	
1	G1	>7000		1.36
2	G2	6701	7000	1.40
3	G3	6401	6700	1.43
4	G4	6101	6400	1.44
5	G5	5801	6100	1.47
6	G6	5501	5800	1.50
7	G7	5201	5500	1.53
8	G8	4901	5200	1.56
9	G9	4601	4900	1.58
10	G10	4301	4600	1.61
11	G11	4001	4300	1.65
12	G12	3701	4000	1.69
13	G13	3401	3700	1.73
14	G14	3101	3400	1.78
15	G15	2801	3100	1.81
16	G16	2501	2800	1.84
17	G17	2201	2500	1.87

5.3 PROCEDURE

5.3.1 BLOCK BOUNDARY

Area of the block is 61.06 Sq. Km.

5.3.2 BARRIERS

No barriers have been considered for resource estimation in the block.

5.3.3 SECTOR

Sector	North	South	East	West
S-1	Block Boundary	Fault F4– F4	Block Boundary	Fault F1– F1

Sector	North	South	East	West
S-2	Fault F2– F2	Fault F3– F3	Fault F2– F2	Block Boundary
S-3	Block Boundary	Fault F4– F4	Block Boundary and fault F1– F1	Fault F2– F2
S-4	Fault F3– F3	Fault F4– F4	Fault F3– F3	Block Boundary
S-5	Fault F6– F6	Block Boundary	Block Boundary	Fault F5– F5
S-6	Fault F4– F4	Block Boundary and fault F5– F5	Fault F4– F4	Fault F6– F6
S-7	Fault F5– F5	Fault F7– F7	Fault F5– F5	Block Boundary and fault F7– F7
S-8	Outside block boundary			
S-9	Fault F7– F7	Block Boundary	Fault F7– F7	Block Boundary
S-10	Outside block boundary			
S-11	Outside block boundary			

5.3.4 MINE DATA CONSIDERED

No mine exists within the block.

5.3.5 METHODOLOGY

Resource of Coal in West of Borda & Ghonsa Parsoda block has been estimated according to Gross Calorific Value (GCV) specifications as per Indian Standard Procedure (ISP) 2022. The area of influence has been considered up to a maximum of 2000m from the point of observation, subject to geological evidence of continuity. Resource quality, quantity and depth range are tentative as these are based on limited data of G3 level exploration, and are likely to change significantly upon further exploration. The resource of this block is classified as 'Inferred Resource' category.

The resources are estimated and categorized on the basis of depth range, seam-wise, and GCV band wise (Annexure-IX). Coal resource has been estimated based on I 30 norm and following boundary conditions for arriving at effective thickness of coal seams (Details of dirt bands, effective thickness given in Annexure VI):

- a) Coal Seam with maximum ash + moisture content up to 65%
- b) Combustible Dirt band with ash + moisture content ranges from > 65% to ≤ 75%
- c) Non-combustible band with ash + moisture content > 75%

In evaluation of resource from regional exploration, 'In-band' thickness of coal seams has been taken into account for preparation of overall coal samples for which Gross Caloric Value (GCV) have been determined at CC Lab, CMPDI (HQ), Ranchi. Each coal section is separated by overlying/underlying coal section with a parting of either dirt band having a thickness of ≥ 1.00m or non-combustible bands having a thickness of ≥ 0.50m.

The 'Inband' thickness is computed by excluding non-combustible bands (with

ash+moisture content more than 75% of >0.05m), and dirt bands, above 0.30m (with (ash+moisture) content exceeding 65%) and iii) dirt bands with thickness ≤ 0.30 m and (ash+moisture) content ranges from >65% and $\leq 75\%$, provided thickness of enveloping coal section is less than the thickness of dirt band, from the total thickness of the coal seams/sections.

Resource are estimated for coal seams/sections having 'In-band' thickness ≥ 0.90 m in case of thick seam (Annexure-VI). Additional coal resource are estimated for thin seam, considering coal seams/sections thickness 0.50m to <0.90m (Annexure-VI).

5.4 DESCRIPTION OF RESOURCE

5.4.1 SUMMARY

Based on analytical data coal seams of the block of non-coking category and resources have been estimated through MINEX and categorized into Sector wise, depth wise, seam wise and thickness wise. A total of 453.09 million tonnes of gross inferred resources have been estimated in the entire block (including thin seams of 0.50-0.90m thickness range), while total inferred resource of the block for thick Seams (>0.90m thickness) is 428.15 MT. Total 24.94 MT resource is estimated for thin seams of 0.50-0.90m thickness range. 88% of total resources falls in G6 to G9 grade. Depth wise, 108.41Mt (24%) resources falls in 300-600m range and 344.68Mt (76%) falls in 600m beyond depth range. Details of the inferred resource worked out for different seams are given in Annexure-IX and in following table:

Table No. 5.4.1(A-1)
SEAM WISE , SECTOR WISE AND GRADEWISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF.

SEAM/SECTOR	GRADE											Grand Total
	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	
I	10.27	7.77	5.57	6.62	7.66	6.96	4.81	3.85	4.34	3.97	0.51	62.32
SEC-1	1.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69
SEC-2	0.00	0.00	0.01	0.65	0.75	0.52	0.16	0.20	0.77	0.49	0.00	3.55
SEC-3	0.10	0.73	0.81	0.70	0.04	0.00	0.00	0.00	0.45	0.10	0.00	2.93
SEC-4	0.00	0.00	0.00	0.02	0.44	0.59	0.39	0.49	1.37	2.38	0.44	6.11
SEC-5	4.99	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.09
SEC-6	1.82	2.15	2.84	3.09	3.96	3.32	1.94	1.05	0.89	0.98	0.07	22.11
SEC-7	1.88	0.72	0.64	0.70	1.00	0.96	0.76	0.69	0.47	0.03	0.00	7.84
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.03	3.85	1.27	1.46	1.46	1.57	1.55	1.42	0.39	0.00	0.00	13.00
IIA	0.00	0.87	6.47	11.92	24.13	118.20	31.04	0.00	0.00	0.00	0.00	192.63
SEC-1	0.00	0.00	0.00	0.00	0.00	4.35	10.99	0.00	0.00	0.00	0.00	15.34
SEC-2	0.00	0.00	0.09	2.46	4.32	5.89	2.50	0.00	0.00	0.00	0.00	15.26
SEC-3	0.00	0.00	0.00	0.92	7.74	10.99	13.29	0.00	0.00	0.00	0.00	32.95
SEC-4	0.00	0.55	4.24	6.93	5.84	4.23	0.00	0.00	0.00	0.00	0.00	21.80
SEC-5	0.00	0.00	0.00	0.00	0.00	15.45	0.00	0.00	0.00	0.00	0.00	15.45
SEC-6	0.00	0.31	2.11	1.22	1.88	42.92	3.53	0.00	0.00	0.00	0.00	51.97
SEC-7	0.00	0.00	0.02	0.39	1.63	13.27	0.13	0.00	0.00	0.00	0.00	15.43
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SEC-9	0.00	0.00	0.00	0.00	2.72	21.11	0.61	0.00	0.00	0.00	0.00	24.44
IIB	0.00	0.00	0.00	97.96	55.32	19.33	15.76	5.46	4.31	0.00	0.00	198.14
SEC-1	0.00	0.00	0.00	0.47	1.96	0.00	0.00	0.00	0.00	0.00	0.00	2.43
SEC-2	0.00	0.00	0.00	5.32	9.65	1.22	1.05	1.75	1.27	0.00	0.00	20.26
SEC-3	0.00	0.00	0.00	5.37	12.32	5.27	1.46	2.71	3.04	0.00	0.00	30.17
SEC-4	0.00	0.00	0.00	6.08	18.36	5.60	9.73	1.00	0.00	0.00	0.00	40.77
SEC-5	0.00	0.00	0.00	6.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.06
SEC-6	0.00	0.00	0.00	35.17	10.44	7.18	3.53	0.00	0.00	0.00	0.00	56.31
SEC-7	0.00	0.00	0.00	14.24	2.04	0.06	0.00	0.00	0.00	0.00	0.00	16.34
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	0.00	25.25	0.55	0.00	0.00	0.00	0.00	0.00	0.00	25.79
Grand Total	10.27	8.64	12.04	116.50	87.10	144.49	51.61	9.31	8.65	3.97	0.51	453.09

Table No. . 5.4.1(A-2)

SEAM WISE , SECTOR WISE AND THICKNESS-WISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF.

SEAM/SECTOR	THICKNESS							
	0.50-0.9	0.90-1.2	1.20-1.5	1.50-2.0	2.00-3.0	3.00-4.0	4.00-5.0	Grand Total
I	20.52	14.18	24.37	3.25	0.00	0.00	0.00	62.32
SEC-1	1.68	0.00	0.00	0.00	0.00	0.00	0.00	1.68
SEC-2	3.56	0.00	0.00	0.00	0.00	0.00	0.00	3.55
SEC-3	2.92	0.00	0.00	0.00	0.00	0.00	0.00	2.92
SEC-4	6.03	0.07	0.00	0.00	0.00	0.00	0.00	6.10
SEC-5	0.96	4.07	0.05	0.00	0.00	0.00	0.00	5.09
SEC-6	5.37	9.88	6.88	0.00	0.00	0.00	0.00	22.11
SEC-7	0.00	0.15	7.68	0.00	0.00	0.00	0.00	7.84
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	9.75	3.25	0.00	0.00	0.00	13.00
IIA	0.00	0.62	11.66	18.35	160.79	1.21	0.00	192.63
SEC-1	0.00	0.00	0.00	0.00	15.34	0.00	0.00	15.34
SEC-2	0.00	0.00	1.33	4.91	9.02	0.00	0.00	15.26
SEC-3	0.00	0.00	4.44	6.64	21.87	0.00	0.00	32.95
SEC-4	0.00	0.62	3.68	5.01	12.49	0.00	0.00	21.80
SEC-5	0.00	0.00	0.00	0.00	15.45	0.00	0.00	15.45
SEC-6	0.00	0.00	2.21	1.73	48.03	0.00	0.00	51.97
SEC-7	0.00	0.00	0.00	0.07	14.57	0.79	0.00	15.43
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	0.00	0.00	24.01	0.43	0.00	24.44
IIB	4.42	7.19	7.56	19.35	55.72	68.65	35.25	198.14
SEC-1	2.06	0.29	0.08	0.00	0.00	0.00	0.00	2.43
SEC-2	0.00	0.00	0.00	0.54	13.55	6.17	0.00	20.26
SEC-3	0.23	1.92	1.82	8.74	17.24	0.22	0.00	30.17
SEC-4	0.00	0.00	0.00	0.00	4.91	27.13	8.74	40.77
SEC-5	0.69	3.64	1.67	0.06	0.00	0.00	0.00	6.06

SEC-6	1.45	1.34	1.93	4.68	12.83	22.68	11.40	56.31
SEC-7	0.00	0.00	2.07	1.04	2.67	4.70	5.87	16.34
SEC-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEC-9	0.00	0.00	0.00	4.28	4.52	7.74	9.25	25.79
Grand Total	24.94	21.99	43.59	40.95	216.51	69.85	35.25	453.09

Table No. . 5.4.1(A-3)

**SEAM WISE , SECTOR WISE AND DEPTH-WISE GROSS INFERRED RESOURCES IN WEST OF BORDA
GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK,
WARDHA VALLEY CF.**

SEAM/SECTOR	DEPTH			Grand Total
	300-600	600-900	>>900	
I	20.90	35.26	6.15	62.32
SEC-1	0.00	1.69	0.00	1.69
SEC-2	0.00	3.55	0.00	3.55
SEC-3	0.00	2.93	0.00	2.93
SEC-4	0.00	5.04	1.07	6.11
SEC-5	0.00	0.00	5.09	5.09
SEC-6	0.32	21.79	0.00	22.11
SEC-7	7.71	0.13	0.00	7.84
SEC-8	0.00	0.00	0.00	0.00
SEC-9	12.87	0.13	0.00	13.00
IIA	44.59	131.37	16.67	192.63
SEC-1	0.00	15.34	0.00	15.34
SEC-2	0.00	15.26	0.00	15.26
SEC-3	0.00	32.95	0.00	32.95
SEC-4	0.00	20.57	1.23	21.80
SEC-5	0.00	0.00	15.45	15.45
SEC-6	4.72	47.25	0.00	51.97
SEC-7	15.43	0.00	0.00	15.43
SEC-8	0.00	0.00	0.00	0.00
SEC-9	24.44	0.00	0.00	24.44
IIB	42.91	144.06	11.17	198.14
SEC-1	0.00	2.43	0.00	2.43
SEC-2	0.00	20.26	0.00	20.26
SEC-3	0.00	30.17	0.00	30.17
SEC-4	0.00	35.66	5.11	40.77
SEC-5	0.00	0.00	6.06	6.06
SEC-6	0.78	55.53	0.00	56.31
SEC-7	16.34	0.00	0.00	16.34
SEC-8	0.00	0.00	0.00	0.00
SEC-9	25.79	0.00	0.00	25.79
Grand Total	108.41	310.69	34.00	453.09

5.5 UNITED NATIONS FRAMEWORK CLASSIFICATION

The UNFC consists of three dimensional system for assessing the reliability and degree of assurance, which is measured in terms of codes, viz, 1,2 and 3. The digit '1'

indicates highest degree of assurance whereas the digit '3' indicates lowest degree of assurance. The reliability and degree of assurance of these codes are assessed with respect to three criteria. They are Economic viability, Feasibility Assessment like project report and Geological Assessment. With respect to the current report the economic viability and feasibility assessments for the block are yet to be undertaken. Hence both these criteria are given least degree of assurance i.e. the digit '3'. This report has dealt with the geological aspect only. Thus the code '3' is given for Geological Assessment. Thus the UNFC Code given for the resource 453.09 MT of West of Borda & Ghonsa Parsoda Block is **333**.

CHAPTER-6

6.0.0 DISCUSSION OF RESULTS AND CONCLUSION

6.1.0 DISCUSSION OF RESULTS

- 6.1.1** The drilling operation in West of Borda & Ghonsa-Parsoda Block has been carried out for a total of 12 boreholes approved by NMET, involving a total drilled meterage of 9300.20m. Area of the block is 61.06 Sq. Km. Borehole density is 0.26 boreholes/Sq. Km. (i.e. total 16 boreholes in 61.06 Sq. Km. of block area involving 12 boreholes of present phase approved by NMET and 4 GSI boreholes of WJ series).
- 6.1.2** The block area is completely covered with Deccan traps of thickness ranging from 10m to 105m. Occurrence of only three coal seams (Seam IIA, IIB and I from top to bottom) have been interpreted in the block. Coal seams are generally thin and occur at great depth. The shallowest occurrence of top coal horizon seam-IIA is at a depth of 523m (BH WJ-3A drilled by GSI in Jhamkola Sector) and at a depth of 591m (BH CMWWB-04 drilled by CMPDI in present exploration). Seam IIB is the only potential seam with thickness varying from 2.5m to 4m in the block. Altogether seven number of faults have been interpreted based on sub-surface data generated during exploration in the block.
- 6.1.3** Subsurface data generated through only 12 boreholes drilled in present phase, and 4 GSI boreholes of WJ series falling in the block area has been used for structure interpretation. In addition to it, data of boreholes drilled by GSI in Dabhadi Sector have also been utilized for regional level structural interpretation. Out of 12 boreholes drilled in the block during present phase, only 10 boreholes could encounter coal seams.
- 6.1.4** The general strike of coal horizons in the block is NW-SE, and; approximate general gradient being approximate general gradient being 1 in 15.8 (dip varies from 3.6 degree due SW) to 1 in 12.3 (dip 4.63 degree due SW). Altogether ten number of faults have been interpreted in this block. 07 faults (F1 to F7) lie within the block boundary and 03 faults (F8 to F10) lie outside of boundary. Details of faults are given in Following table. have been interpreted in the block based on borehole data. Due to limited borehole data available at present G3 level exploration stage, geological structure interpreted is tentative.
- 6.1.5** Out of the 12 boreholes drilled in the block in present phase sanctioned by NMET, 11 boreholes have been geophysically logged to supplement the geological information using multi-parameter probes involving meterage of Geophysical Logging : 1216.05m, meterage of Sonic Logging: 705.22 m, meterage of Deviation Logging: 6487.92 m.
- 6.1.6** Resource quality, quantity and depth range are tentative as these are based on limited data of G3 level exploration, and are likely to change significantly upon further exploration.
- 6.1.7** It is worth mentioning that about 75% of resource (347MT), out of the total Gross Inferred Resource of 453 MT as assessed in the block are good quality non-coking coal having grade G6 to G8.

6.2.0 RECOMMENDATION

- 6.2.1** The objective of the present investigation (G3 stage of exploration) is primarily to assess the existence and continuity of coal seams of Barakar Formation occurring in this block as well as to decipher the lay, disposition & potentiality of coal seams. Out of all 16 boreholes drilled in the block, borehole nos. CMWWB02, 11 and WJ01, 02,03 could not be deepened up to coal seam(s). The total thickness of Motur Formation in CMWWB02, 11, WJ02, 03 could not be ascertained. It is also indicative that coal seams may be encountered at deeper depths around these boreholes.
- 6.2.2** There is possibility of occurrence of coal seams at relatively shallower depth in the South Western part of the block, i.e. in the up thrown part of fault F5 where further investigation may be carried out.
- 6.2.3** Based on the findings in the present exploration, it is recommended that further exploration at G2 level may be planned in the South Western part of the block in the up thrown area of fault F5 for more precisely delineating the lay and disposition of coal seam, stitching the structural fabric in this area and to bring the resource of good quality Non-coking coal from Inferred to Indicated category.
- 6.2.4** Occurrence of deep seated and good quality Non-coking coal seam (Grade G6 to G8) attracts the area to be potential for Underground Coal Gasification.
- 6.2.5** Deccan Trap exploitation in West of Borda & Ghonsa Parsoda block area for building stone, road lying etc. may also be studied along with requisite hydrogeological and environmental aspects.

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