

**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)**

**MARCH 2025**

**GEOLOGICAL REPORT ON PRELIMINARY**

**EXPLORATION (G3-STAGE) 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)**

### CONTENTS

|  |  |
| --- | --- |
| TEXT & ANNEXURES | VOLUME- I |
| PLATES | VOLUME- II |

|  |  |  |  |
| --- | --- | --- | --- |
| Sl. No. | CHAPTER No. | PARTICULARS | PAGE NO. |
| i |  | SALIENT FEATURES | 1-9 |
| ii | 1 | INTRODUCTION | 10-15 |
| iii | 2 | REGIONAL GEOLOGY AND EXPLORATION SCHEME | 16-45 |
| iv | 3 | GEOLOGY OF THE BLOCK | 46-49 |
| v | 4 | DESCRIPTION OF COAL SEAMS | 50-56 |
| vi | 5 | RESOURCE | 57-63 |
| vii | 6 | DISCUSSION OF RESULTS AND CONCLUSION | 64-65 |
| viii |  | BIBLOGRAPHY | 66-66 |

**GEOLOGICAL REPORT ON PRELIMINARY**

**EXPLORATION (G3-STAGE) 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)**

**LIST OF ANNEXURES**

| ANNEXURE NO. | ANNEXURE DETAILS | PAGE NO. |
| --- | --- | --- |
| I | CO-ORDINATES, REDUCED LEVEL, DEPTH AND OTHER DETAILS OF BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-1 |
| II A | DESCRIPTIVE LITHOLOGY DATA OF BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK IN PRESENT PHASE OF NMET FUNDED EXPLORATION, WARDHA VALLEY COALFIELD, DISTRICT-YAVATMAL, MAHARASHTRA. | 1-151 |
| IIB | DESCRIPTIVE LITHOLOGY DATA OF BOREHOLES DRILLED BY GSI IN JHAMKOLA, WARDHA VALLEY COALFIELD, DISTRICT-YAVATMAL, MAHARASHTRA. | 1-29 |
| III | STATEMENT SHOWING CORRELATION OF COAL SEAMS ENCOUNTERED IN BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK & BOREHOLES DRILLED BY GSI IN AND OUT OF THE BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA. | 1-1 |
| IV | STATEMENT SHOWING DETAILS OF FORMATIONS ENCOUNTERED IN THE BOREHOLES DRILLED BY CMPDI IN WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-1 |
| VA | DESCRIPTIVE BAND-BY-BAND ANALYTICAL DATA OF BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-23 |
| VB | DESCRIPTIVE BAND-BY-BAND ANALYTICAL DATA OF BOREHOLES DRILLED BY GSI IN JHAMKOLA, WARDHA VALLEY COALFIELD, DISTRICT-YAVATMAL, MAHARASHTRA. | 1 |
| VI | STATEMENT SHOWING DETAILS OF DIRT BANDS WITHIN THE SEAM/SECTIONS IN THE BOREHOLES DRILLED WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-2 |
| VIIA&B | STATEMENT SHOWING PROXIMATE ANALYSIS DATA OF BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-2 |
| VIII A | ULIMATE ANALYSIS TEST RESULTS OF BOREHOLES COAL CORES OF WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA. | 1-1 |
| VIII B | ASH ANALYSIS RESULTS OF BOREHOLES COAL CORES OF WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-1 |
| VIII C | HGI TEST & ASH FUSION TEMPERATUTE TEST RESULTS OF BOREHOLES COAL CORES OF WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA. | 1-1 |
| VIII D | PETROGRAPHIC STUDY RESULT OF BOREHOLES COAL CORES SAMPLES OF WEST OF BORDA GHONSA PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA | 1-25 |
| IX-A | SECTOR WISE,SEAM WISE & GRADEWISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF. | 1-1 |
| IX-B | SECTOR WISE,SEAM WISE & THICKNESS WISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF. | 1-1 |
| IX-C | SECTOR WISE,SEAM WISE & DEPTHWISE GROSS INFERRED RESOURCES IN WEST OF BORDA GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT YAVATMAL (MH) BLOCK, WARDHA VALLEY CF. | 1-1 |
| X | STATEMENT SHOWING WATER LEVEL DATA RECORDED IN BOREHOLES DRILLED IN WEST OF BORDA & GHONSA-PARSODA BLOCK, WARDHA VALLEY COALFIELD, DISTRICT – YAVATMAL, MAHARASHTRA. | 1-9 |
| XI | APPROVAL OF CLOSURE OF BOREHOLE NO. CMWWB11 | 1-3 |
| XII | NMET APPROVED PROPOSAL FOR PRELIMINARY EXPLORATION(G3-STAGE) FOR COAL IN WEST OF BORDA & GHONSA-PARSODA BLOCK | 1-22 |
| XIII | STATEMENT SHOWING COMPLIANCE OF VETTING COMMENTS | 1-4 |

**GEOLOGICAL REPORT ON PRELIMINARY**

**EXPLORATION (G3-STAGE) 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)**

**LIST OF PLATES**

|  |  |  |  |
| --- | --- | --- | --- |
| SL.  NO. | PLATE NO. | DESCRIPTION | SCALE/ R.F. |
| 1 | I | LOCATION MAP OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | Not to Scale |
| 2 | II | TOPOGRAPHICAL MAP OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1: 10000 |
| 3 | III | GEOLOGICAL MAP OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |
| 4 | IV | GRAPHIC LITHOLOG OF BH. Nos. CMWBB01 to 10 OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL, MAHARASHTRA | 1:500 |
| 5 | V | PLAN SHOWING GEOLOGICAL CROSS SECTION AA’, BB’, CC’, WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |
| 6 | VI | PLAN SHOWING AREA FLOOR CONTOUR PLAN OF SEAM II-A OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |
| 7 | VII | PLAN SHOWING AREA FLOOR CONTOUR PLAN OF SEAM II-B OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |
| 8 | VIII | PLAN SHOWING AREA FLOOR CONTOUR PLAN OF SEAM I OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |
| 9 | IX | GEOPHYSICAL LOGS OF BOREHOLES | 1:500 |
| 10 | X | PLAN SHOWING BOREHOLE LOCATIONS AND CARDINAL POINTS OF WEST OF BORDA & GHONSA-PARSODA BLOCK,DIST-YAVATMAL,MAHARASHTRA | 1:10000 |

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 |
| GKLTC | 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 |
| SoI | 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 |

**GEOLOGICAL REPORT ON PRELIMINARY**

**EXPLORATION (G3-STAGE) FOR COAL IN WEST OF BORDA & GHONSA-PARSODA, WARDHA VALLEY COALFIELD, DISTRICT-YAVATMAL, MAHARASHTRA.**

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

**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:   |  |  |  | | --- | --- | --- | | 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** | |
| 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. |
| 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 |  | 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. |

### Table No. V

### SEQUENCE OF COAL SEAMS INTERSECTED IN WEST OF BORDA BLOCK

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | |

|  |  |  |  |
| --- | --- | --- | --- |
| **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. |

### 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 |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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.** | | | | | | | | |
|  | **THICKNESS** | | | | | | | |
| **SEAM/SECTOR** | **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. 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** | | | |
| **300-600** | **600-900** | **>>900** | **Grand Total** |
| **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. **GENERAL**
    2. 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.
    3. Wardha Valley Coalfield is located in the south-eastern part of Maharashtra State and is bounded between Latitude N 190 30’ & N 200 27’ and Longitude E 78050’ & E 79049.’
    4. 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. West of Borda & Ghonsa Parsoda Block forms part of western limb of the plunging anticline in the southwestern part of Wardha Valley Coalfield.
    2. 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).
    3. 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.
    4. 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.

### OBJECTIVES

* + 1. The G3 Level exploration in ‘West of Borda & Ghonsa-Parsoda’ block was taken up with the following objectives:

1. 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.
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.

### 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.

### 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 thorugh 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.

### 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 |

### CARDINAL POINTS

The cardinal points West of Borda & Ghonsa-parsoda Blockare 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. **PREVIOUS WORK**
    2. 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.
    3. 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.
    4. 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.
    5. 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.

### TOPOGRAPHY & DRAINAGE

* + 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.
    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.
    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.
    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.

### FLORA & FAUNA

* + 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.

### CLIMATE

* + 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.
    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.
    3. May is generally the hottest month of the year with the mean daily maximum temperature at about 420 C. December is usually the coldest month of the year with the mean daily minimum temperature at about 130 C. The cold waves over northern India sometimes affect the district and the minimum temperature may drop to about 50 C.

### MINING ACTIVITY

* + 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.

### SCOPE

* + 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.
    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. All the cores of coal were analyzed at Coal Characterization Laboratory at CMPDIL HQ, Ranchi.
    2. 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. 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.
    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 deepend 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.
    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.
    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:

a) Shri Om Dutt Bijani, Senior Manager (Geology) & HoD (Exploration), CMPDI, RI-IV, Nagpur

b) Shri A.P. Singh, Manager (Geology), CMPDI (RI-IV), Nagpur,

c) Shri Gaurav Sharma, Manager(Geology), CMPDI (RI-IV), Nagpur,

d) Ms. Dolly Handique Gawri, Dy. Manager(Geology), CMPDI (RI-IV), Nagpur

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**

### GENERAL

### Wardha Valley Coalfield is located in the south-eastern part of Maharashtra State and is bounded between Latitude N - 190 30’ & 200 27’ and Longitude E -780 50’ & 790 49’ (As per GSI Bulletin Series–A, No.–45, Vol.–II).

### 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.

### 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.

### 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.

### 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.

### STRATIGRAPHY OF WARDHA VALLEY COALFIELD

* + 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. |

* + 1. The Geological formations of Wardha Valley Coalfield are briefly described below**.**
    2. **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.
    3. **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.
    4. **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.
    5. **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.
    6. **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.
    7. **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.
    8. **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.
    9. **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.
    10. **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.

### REGIONAL STRUCTURE

* + 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 Vindhyans. 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. 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.

### PRESENT EXPLORATION ACTIVITY

* + 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. |

### QUANTUM OF WORK

* + 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  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. |
| 7. | Chemical Analysis (CMPDIL Lab) | 54.54m. |

* + 1. 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 |

* + 1. **SURVEYING**
    2. 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.

### GEOLOGICAL MAPPING

* + 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.

### EXPLORATORY DRILLING

* + 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. 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.
    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.

### CORE LOGGING

* + 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. 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.



### SAMPLING & ANALYSIS

* + 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.

* + 1. 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. 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.

### GEOPHYSICAL LOGGING

* 1. INTRODUCTION
     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. 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.
     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**.**

* + 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.

* + 1. **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**

* + 1. Some of the main limitations of Geophysical Logging survey are given below:

1. Electrical logs can only be recorded in open and fluid filled boreholes.
2. Absence of water in borehole drastically changes the response of radiation logs.
3. Only qualitative analysis can be made on radioactive logs if the bore hole is logged through drill rods due to their shielding effect.
4. 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).

* 1. **DATA INTERPRETATION**
     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

* + 1. 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** | | | | |
|  | 0.00 | 267.98 | No Electrical Log Data available | |
|  | 267.98 | 268.90 | 0.92 | Sand Stone |
|  | 268.90 | 270.00 | 1.10 | Clay Stone |
|  | 270.00 | 270.92 | 0.92 | Sand Stone |
|  | 270.92 | 271.54 | 0.62 | Mud Stone |
|  | 271.54 | 272.18 | 0.64 | Sand Stone |
|  | 272.18 | 273.06 | 0.88 | Mud Stone |
|  | 273.06 | 286.38 | 13.32 | Sand Stone |
|  | 286.38 | 288.04 | 1.66 | Clay Stone |
|  | 288.04 | 295.14 | 7.10 | Sand Stone |
|  | 295.16 | 296.26 | 1.10 | Mud Stone |
|  | 296.28 | 297.64 | 1.36 | Sand Stone |
|  | 297.64 | 298.60 | 0.96 | Mud Stone |
|  | 298.60 | 304.64 | 6.04 | Sand Stone |
|  | 304.64 | 306.18 | 1.54 | Mud Stone |
|  | 306.18 | 307.06 | 0.88 | Sand Stone |
|  | 307.06 | 308.40 | 1.34 | Mud Stone |
|  | 308.40 | 309.42 | 1.02 | Clay Stone |
|  | 309.42 | 312.26 | 2.84 | Sand Stone |
|  | 312.26 | 313.70 | 1.44 | Mud Stone |
|  | 313.70 | 354.08 | 40.38 | Sand Stone |
|  | 354.08 | 355.36 | 1.28 | Mud Stone |
|  | 355.36 | 358.26 | 2.90 | Sand Stone |
|  | 358.26 | 359.48 | 1.22 | Clay Stone |
|  | 359.48 | 648.98 | No Electrical Log Data available | |
|  | 648.98 | 718.18 | 69.20 | Clay Stone |
|  | | | | |
| **CMWWB-02** | | | | |
|  | 0.00 | 6.86 | 6.86 | Basalt |
|  | 6.86 | 11.24 | 4.38 | Clay Stone |
|  | 11.24 | 33.60 | 22.36 | Basalt |
|  | 33.68 | 38.96 | 5.28 | Clay Stone |
|  | 39.04 | 53.44 | 14.40 | Basalt |
|  | 53.44 | 56.82 | 3.38 | Clay Stone |
|  | 56.90 | 69.44 | 12.54 | Basalt |
|  | 69.46 | 72.92 | 3.46 | Clay Stone |
|  | 72.92 | 84.28 | 11.36 | Sand Stone |
|  | 84.34 | 91.24 | 6.90 | Clay Stone |
|  | 91.24 | 96.26 | 5.02 | Sand Stone |
|  | 96.26 | 106.00 | 9.74 | Mud Stone |
|  | 106.06 | 108.38 | 2.32 | Sand Stone |
|  | 108.46 | 110.36 | 1.90 | Clay Stone |
|  | 110.36 | 111.42 | 1.06 | Sand Stone |
|  | 111.42 | 116.14 | 4.72 | Mud Stone |
|  | 116.14 | 118.06 | 1.92 | Sand Stone |
|  | 118.12 | 130.12 | 12.00 | Clay Stone |
|  | 130.12 | 136.40 | 6.28 | Sand Stone |
|  | 136.48 | 141.90 | 5.42 | Clay Stone |
|  | 141.98 | 143.18 | 1.20 | Sand Stone |
|  | 143.18 | 145.08 | 1.90 | Mud Stone |
|  | 145.16 | 148.88 | 3.72 | Sand Stone |
|  | 148.88 | 151.86 | 2.98 | Clay Stone |
|  | 151.86 | 153.90 | 2.04 | Sand Stone |
|  | 153.90 | 155.88 | 1.98 | Mud Stone |
|  | 155.88 | 158.42 | 2.54 | Sand Stone |
|  | 158.42 | 217.96 | 59.54 | Sand Stone |
|  | 217.96 | 219.94 | 1.98 | Clay Stone |
|  | 220.02 | 225.66 | 5.64 | Mud Stone |
|  | 225.74 | 228.14 | 2.40 | Clay Stone |
|  | 228.20 | 230.88 | 2.68 | Sand Stone |
|  | 230.88 | 237.44 | 6.56 | Mud Stone |
|  | 237.50 | 245.90 | 8.40 | Clay Stone |
|  | 245.90 | 250.06 | 4.16 | Sand Stone |
|  | 250.08 | 254.66 | 4.58 | Clay Stone |
|  | 254.74 | 261.94 | 7.20 | Sand Stone |
|  | 261.94 | 263.90 | 1.96 | Mud Stone |
|  | 263.90 | 265.18 | 1.28 | Sand Stone |
|  | 265.18 | 267.08 | 1.90 | Clay Stone |
|  | 267.08 | 267.58 | 0.50 | Sand Stone |
|  | 267.64 | 268.50 | 0.86 | Clay Stone |
|  | 268.50 | 271.10 | 2.60 | Sand Stone |
|  | 271.10 | 272.80 | 1.70 | Clay Stone |
|  | 272.80 | 273.92 | 1.12 | Sand Stone |
|  | 273.92 | 275.54 | 1.62 | Clay Stone |
|  | 275.54 | 275.96 | 0.42 | Sand Stone |
|  | 275.97 | 276.57 | 0.60 | Clay Stone |
|  | 276.57 | 277.36 | 0.79 | Sand Stone |
|  | 277.36 | 278.32 | 0.96 | Mud Stone |
|  | 278.32 | 278.97 | 0.65 | Clay Stone |
|  | 278.97 | 280.04 | 1.07 | Sand Stone |
|  | 280.04 | 284.77 | 4.73 | Mud Stone |
|  | 284.77 | 285.33 | 0.56 | Clay Stone |
|  | 285.33 | 285.65 | 0.32 | Mud Stone |
|  | 285.65 | 286.09 | 0.44 | Clay Stone |
|  | 286.09 | 287.91 | 1.82 | Mud Stone |
|  | 287.91 | 289.12 | 1.21 | Clay Stone |
|  | 289.14 | 290.22 | 1.08 | Mud Stone |
|  | 290.22 | 292.09 | 1.87 | Mud Stone |
|  | 292.09 | 295.46 | 3.37 | Clay Stone |
|  | 295.48 | 295.92 | 0.44 | Mud Stone |
|  | 295.94 | 296.61 | 0.67 | Clay Stone |
|  | 296.61 | 299.00 | 2.39 | Mud Stone |
|  | 299.00 | 299.88 | 0.88 | Clay Stone |
|  | 299.90 | 300.43 | 0.53 | Mud Stone |
|  | 300.45 | 300.80 | 0.35 | Clay Stone |
|  | 300.82 | 301.23 | 0.41 | Mud Stone |
|  | 301.23 | 301.90 | 0.67 | Clay Stone |
|  | 301.90 | 302.62 | 0.72 | Mud Stone |
|  | 302.64 | 303.49 | 0.85 | Clay Stone |
|  | 303.49 | 304.14 | 0.65 | Mud Stone |
|  | 304.14 | 305.07 | 0.93 | Clay Stone |
|  | 305.07 | 305.65 | 0.58 | Mud Stone |
|  | 305.65 | 307.52 | 1.87 | Clay Stone |
|  | 307.54 | 309.29 | 1.75 | Sand Stone |
|  | 309.29 | 309.91 | 0.62 | Clay Stone |
|  | 309.92 | 310.63 | 0.71 | Sand Stone |
|  | 310.63 | 311.74 | 1.11 | Clay Stone |
|  | 311.74 | 312.18 | 0.44 | Mud Stone |
|  | 312.20 | 313.36 | 1.16 | Sand Stone |
|  | 313.36 | 315.23 | 1.87 | Clay Stone |
|  | 315.23 | 315.85 | 0.62 | Sand Stone |
|  | 315.87 | 318.44 | 2.57 | Mud Stone |
|  | 318.44 | 319.82 | 1.38 | Sand Stone |
|  | 319.82 | 320.50 | 0.68 | Mud Stone |
|  | 320.50 | 321.05 | 0.55 | Sand Stone |
|  | 321.05 | 321.67 | 0.62 | Mud Stone |
|  | 321.69 | 322.78 | 1.09 | Sand Stone |
|  | 322.78 | 323.59 | 0.81 | Mud Stone |
|  | 323.59 | 324.31 | 0.72 | Clay Stone |
|  | 324.31 | 324.97 | 0.66 | Sand Stone |
|  | 324.97 | 325.52 | 0.55 | Mud Stone |
|  | 325.54 | 326.33 | 0.79 | Sand Stone |
|  | 326.33 | 328.22 | 1.89 | Mud Stone |
|  | 328.22 | 329.03 | 0.81 | Clay Stone |
|  | 329.03 | 329.73 | 0.70 | Mud Stone |
|  | 329.73 | 331.16 | 1.43 | Sand Stone |
|  | 331.16 | 331.79 | 0.63 | Mud Stone |
|  | 331.81 | 333.12 | 1.31 | Sand Stone |
|  | 333.14 | 335.09 | 1.95 | Clay Stone |
|  | 335.09 | 336.52 | 1.43 | Sand Stone |
|  | 336.52 | 337.12 | 0.60 | Mud Stone |
|  | 337.12 | 338.57 | 1.45 | Sand Stone |
|  | 338.57 | 339.17 | 0.60 | Mud Stone |
|  | 339.17 | 340.02 | 0.85 | Sand Stone |
|  | 340.02 | 341.37 | 1.35 | Clay Stone |
|  | 341.37 | 342.27 | 0.90 | Sand Stone |
|  | 342.27 | 344.04 | 1.77 | Mud Stone |
|  | 344.04 | 345.04 | 1.00 | Sand Stone |
|  | 345.06 | 345.64 | 0.58 | Clay Stone |
|  | 345.67 | 346.73 | 1.06 | Sand Stone |
|  | 346.73 | 347.54 | 0.81 | Mud Stone |
|  | 347.54 | 348.55 | 1.01 | Sand Stone |
|  | 348.55 | 350.53 | 1.98 | Mud Stone |
|  | 350.62 | 352.38 | 1.76 | Sand Stone |
|  | 352.38 | 355.98 | 3.60 | Clay Stone |
|  | 355.98 | 357.46 | 1.48 | Sand Stone |
|  | 357.54 | 358.24 | 0.70 | Clay Stone |
|  | 358.24 | 360.28 | 2.04 | Sand Stone |
|  | 360.28 | 366.56 | 6.28 | Clay Stone |
|  | 366.64 | 367.84 | 1.20 | Mud Stone |
|  | 367.84 | 377.78 | 9.94 | Clay Stone |
|  | 377.78 | 381.02 | 3.24 | Sand Stone |
|  | 381.02 | 382.30 | 1.28 | Clay Stone |
|  | 382.30 | 383.78 | 1.48 | Sand Stone |
|  | 383.78 | 384.90 | 1.12 | Clay Stone |
|  | 384.90 | 386.02 | 1.12 | Sand Stone |
|  | 386.10 | 388.86 | 2.76 | Clay Stone |
|  | 388.92 | 393.64 | 4.72 | Sand Stone |
|  | 393.72 | 394.84 | 1.12 | Clay Stone |
|  | 394.84 | 400.56 | 5.72 | Sand Stone |
|  | 400.58 | 401.92 | 1.34 | Clay Stone |
|  | 401.98 | 403.32 | 1.34 | Sand Stone |
|  | 403.32 | 404.04 | 0.72 | Clay Stone |
|  | 404.10 | 405.22 | 1.12 | Sand Stone |
|  | 405.30 | 407.34 | 2.04 | Mud Stone |
|  | 407.34 | 408.12 | 0.78 | Sand Stone |
|  | 408.12 | 411.08 | 2.96 | Mud Stone |
|  | 411.16 | 412.84 | 1.68 | Sand Stone |
|  | 412.92 | 414.12 | 1.20 | Clay Stone |
|  | 414.12 | 415.18 | 1.06 | Sand Stone |
|  | 415.24 | 416.80 | 1.56 | Clay Stone |
|  | 416.80 | 423.58 | 6.78 | Sand Stone |
|  | 423.58 | 425.20 | 1.62 | Clay Stone |
|  | 425.26 | 428.30 | 3.04 | Sand Stone |
|  | 428.30 | 429.84 | 1.54 | Clay Stone |
|  | 429.84 | 438.74 | 8.90 | Mud Stone |
|  | 438.80 | 461.96 | 23.16 | Sand Stone |
|  | 462.02 | 463.94 | 1.92 | Clay Stone |
|  | 463.94 | 468.94 | 5.00 | Sand Stone |
|  | 468.94 | 472.18 | 3.24 | Mud Stone |
|  | 472.24 | 503.86 | 31.62 | Sand Stone |
|  | 503.86 | 505.26 | 1.40 | Mud Stone |
|  | 505.26 | 506.46 | 1.20 | Sand Stone |
|  | 506.46 | 507.88 | 1.42 | Clay Stone |
|  | 507.88 | 517.06 | 9.18 | Clay Stone |
|  | 517.06 | 519.66 | 2.60 | Sand Stone |
|  | 519.74 | 521.58 | 1.84 | Clay Stone |
|  | 521.58 | 572.00 | 50.42 | Mud Stone |
|  | | | | |
| **CMWWB-03** | | | | |
|  | 0.13 | 7.53 | 7.40 | Basalt |
|  | 7.53 | 11.49 | 3.96 | Sand Stone |
|  | 11.49 | 51.91 | 40.42 | Basalt |
|  | 51.93 | 56.29 | 4.36 | Sand Stone |
|  | 56.37 | 74.29 | 17.92 | Basalt |
|  | 74.35 | 81.41 | 7.06 | Sand Stone |
|  | 81.41 | 82.47 | 1.06 | Mud Stone |
|  | 82.47 | 83.45 | 0.98 | Sand Stone |
|  | 83.45 | 85.15 | 1.70 | Clay Stone |
|  | 85.15 | 89.75 | 4.60 | Mud Stone |
|  | 89.75 | 99.53 | 9.78 | Clay Stone |
|  | 99.53 | 119.51 | 19.98 | Mud Stone |
|  | 119.51 | 141.25 | 21.74 | Sand Stone |
|  | 141.31 | 148.23 | 6.92 | Mud Stone |
|  | 148.37 | 151.19 | 2.82 | Sand Stone |
|  | 151.19 | 159.31 | 8.12 | Clay Stone |
|  | 159.31 | 160.43 | 1.12 | Sand Stone |
|  | 160.43 | 161.43 | 1.00 | Shale |
|  | 161.43 | 165.73 | 4.30 | Sand Stone |
|  | 165.73 | 171.09 | 5.36 | Mud Stone |
|  | 171.09 | 172.77 | 1.68 | Clay Stone |
|  | 172.77 | 174.47 | 1.70 | Sand Stone |
|  | 174.47 | 175.45 | 0.98 | Clay Stone |
|  | 175.45 | 202.75 | 27.30 | Mud Stone |
|  | 202.75 | 210.17 | 7.42 | Clay Stone |
|  | 210.17 | 212.23 | 2.06 | Sand Stone |
|  | 212.23 | 237.05 | 24.82 | Mud Stone |
|  | 237.13 | 243.19 | 6.06 | Sand Stone |
|  | 243.19 | 244.03 | 0.84 | Mud Stone |
|  | 244.03 | 246.99 | 2.96 | Sand Stone |
|  | 247.07 | 253.35 | 6.28 | Mud Stone |
|  | 253.35 | 253.91 | 0.56 | Clay Stone |
|  | 253.91 | 254.61 | 0.70 | Sand Stone |
|  | 254.63 | 255.55 | 0.92 | Clay Stone |
|  | 255.61 | 271.21 | 15.60 | Sand Stone |
|  | 271.21 | 271.77 | 0.56 | Mud Stone |
|  | 271.77 | 272.83 | 1.06 | Sand Stone |
|  | 272.83 | 275.09 | 2.26 | Clay Stone |
|  | 275.09 | 283.91 | 8.82 | Sand Stone |
|  | 283.97 | 284.95 | 0.98 | Mud Stone |
|  | 285.03 | 287.49 | 2.46 | Sand Stone |
|  | 287.49 | 288.35 | 0.86 | Mud Stone |
|  | 288.41 | 291.23 | 2.82 | Sand Stone |
|  | 291.23 | 292.09 | 0.86 | Clay Stone |
|  | 292.09 | 293.91 | 1.82 | Sand Stone |
|  | 293.91 | 298.57 | 4.66 | Mud Stone |
|  | 298.57 | 299.29 | 0.72 | Sand Stone |
|  | 299.29 | 300.21 | 0.92 | Clay Stone |
|  | 300.21 | 302.05 | 1.84 | Sand Stone |
|  | 302.05 | 302.89 | 0.84 | Mud Stone |
|  | 302.89 | 305.01 | 2.12 | Sand Stone |
|  | 305.01 | 306.41 | 1.40 | Mud Stone |
|  | 306.41 | 307.83 | 1.42 | Sand Stone |
|  | 307.89 | 311.29 | 3.40 | Clay Stone |
|  | 311.29 | 314.03 | 2.74 | Sand Stone |
|  | 314.03 | 315.65 | 1.62 | Mud Stone |
|  | 315.73 | 316.71 | 0.98 | Sand Stone |
|  | 316.71 | 318.13 | 1.42 | Mud Stone |
|  | 318.19 | 320.11 | 1.92 | Sand Stone |
|  | 320.17 | 321.79 | 1.62 | Clay Stone |
|  | 321.79 | 327.43 | 5.64 | Sand Stone |
|  | 327.51 | 328.63 | 1.12 | Mud Stone |
|  | 328.63 | 329.69 | 1.06 | Sand Stone |
|  | 329.69 | 331.11 | 1.42 | Clay Stone |
|  | 331.17 | 372.89 | 41.72 | Sand Stone |
|  | 372.95 | 376.61 | 3.66 | Clay Stone |
|  | 376.69 | 377.45 | 0.76 | Sand Stone |
|  | 377.45 | 385.43 | 7.98 | Clay Stone |
|  | 385.43 | 391.85 | 6.42 | Mud Stone |
|  | 391.85 | 394.17 | 2.32 | Clay Stone |
|  | 394.17 | 401.79 | 7.62 | Mud Stone |
|  | 401.89 | 407.39 | 5.50 | Clay Stone |
|  | 407.45 | 411.91 | 4.46 | Mud Stone |
|  | 411.91 | 415.57 | 3.66 | Clay Stone |
|  | | | | |
| **CMWWB-04** | | | | |
|  | 0.00 | 19.14 | 19.14 | Basalt |
|  | 19.14 | 21.54 | 2.40 | Mud Stone |
|  | 21.60 | 47.76 | 26.16 | Basalt |
|  | 47.76 | 49.96 | 2.20 | Clay Stone |
|  | 50.04 | 66.12 | 16.08 | Basalt |
|  | 66.12 | 70.28 | 4.16 | Clay Stone |
|  | 70.28 | 79.52 | 9.24 | Basalt |
|  | 79.52 | 81.22 | 1.70 | Mud Stone |
|  | 81.28 | 82.42 | 1.14 | Basalt |
|  | 82.48 | 85.74 | 3.26 | Clay Stone |
|  | 85.74 | 88.76 | 3.02 | Mud Stone |
|  | 88.84 | 92.16 | 3.32 | Basalt |
|  | 92.16 | 93.42 | 1.26 | Clay Stone |
|  | 93.42 | 94.62 | 1.20 | Sand Stone |
|  | 94.62 | 98.64 | 4.02 | Mud Stone |
|  | 98.64 | 104.64 | 6.00 | Basalt |
|  | 104.86 | 106.62 | 1.76 | Mud Stone |
|  | 106.68 | 108.80 | 2.12 | Clay Stone |
|  | 108.88 | 109.58 | 0.70 | Sand Stone |
|  | 109.66 | 110.36 | 0.70 | Clay Stone |
|  | 110.36 | 112.20 | 1.84 | Mud Stone |
|  | 112.26 | 113.60 | 1.34 | Basalt |
|  | 113.60 | 116.50 | 2.90 | Mud Stone |
|  | 116.56 | 117.76 | 1.20 | Sand Stone |
|  | 117.84 | 119.68 | 1.84 | Clay Stone |
|  | 119.76 | 121.30 | 1.54 | Sand Stone |
|  | 121.30 | 122.00 | 0.70 | Clay Stone |
|  | 122.00 | 126.46 | 4.46 | Mud Stone |
|  | 126.52 | 129.34 | 2.82 | Sand Stone |
|  | 129.34 | 137.54 | 8.20 | Mud Stone |
|  | 137.60 | 139.02 | 1.42 | Clay Stone |
|  | 139.02 | 140.64 | 1.62 | Sand Stone |
|  | 140.64 | 144.72 | 4.08 | Clay Stone |
|  | 144.80 | 147.12 | 2.32 | Mud Stone |
|  | 147.18 | 148.38 | 1.20 | Clay Stone |
|  | 148.46 | 149.16 | 0.70 | Sand Stone |
|  | 149.24 | 150.08 | 0.84 | Mud Stone |
|  | 150.16 | 151.00 | 0.84 | Sand Stone |
|  | 151.06 | 157.42 | 6.36 | Clay Stone |
|  | 157.42 | 158.90 | 1.48 | Mud Stone |
|  | 158.90 | 160.26 | 1.36 | Clay Stone |
|  | 160.26 | 165.96 | 5.70 | Sand Stone |
|  | 165.96 | 167.88 | 1.92 | Mud Stone |
|  | 167.94 | 174.44 | 6.50 | Sand Stone |
|  | 174.44 | 176.62 | 2.18 | Mud Stone |
|  | 176.68 | 184.10 | 7.42 | Sand Stone |
|  | 184.10 | 189.88 | 5.78 | Clay Stone |
|  | 189.94 | 196.42 | 6.48 | Sand Stone |
|  | 196.50 | 197.84 | 1.34 | Mud Stone |
|  | 197.84 | 199.46 | 1.62 | Sand Stone |
|  | 199.54 | 200.38 | 0.84 | Clay Stone |
|  | 200.38 | 201.58 | 1.20 | Sand Stone |
|  | 201.66 | 203.84 | 2.18 | Clay Stone |
|  | 203.90 | 213.36 | 9.46 | Sand Stone |
|  | 213.36 | 215.20 | 1.84 | Clay Stone |
|  | 215.20 | 241.94 | 26.74 | Sand Stone |
|  | 241.94 | 245.12 | 3.18 | Clay Stone |
|  | 245.12 | 260.00 | 14.88 | Sand Stone |
|  | 260.08 | 263.88 | 3.80 | Clay Stone |
|  | 263.88 | 269.04 | 5.16 | Mud Stone |
|  | 269.04 | 317.86 | 48.82 | Clay Stone |
|  | | | | |
| **CMWWB-05** | | | | |
|  | 0.15 | 2.61 | 2.46 | Soil |
|  | 2.62 | 17.03 | 14.41 | Basalt |
|  | 17.03 | 19.20 | 2.17 | Clay Stone |
|  | 19.20 | 24.61 | 5.41 | Sand Stone |
|  | 24.61 | 26.08 | 1.47 | Mud Stone |
|  | 26.08 | 46.13 | 20.05 | Sand Stone |
|  | 46.13 | 48.25 | 2.12 | Mud Stone |
|  | 48.27 | 49.26 | 0.99 | Sand Stone |
|  | 49.26 | 50.93 | 1.67 | Mud Stone |
|  | 50.93 | 53.98 | 3.05 | Sand Stone |
|  | 53.98 | 58.51 | 4.53 | Mud Stone |
|  | 58.52 | 63.01 | 4.49 | Sand Stone |
|  | 63.01 | 63.91 | 0.90 | Clay Stone |
|  | 63.91 | 64.95 | 1.04 | Sand Stone |
|  | 64.95 | 65.80 | 0.85 | Clay Stone |
|  | 65.82 | 73.09 | 7.27 | Sand Stone |
|  | 73.09 | 75.52 | 2.43 | Mud Stone |
|  | 75.52 | 77.21 | 1.69 | Sand Stone |
|  | 77.21 | 80.67 | 3.46 | Mud Stone |
|  | 80.68 | 81.78 | 1.10 | Clay Stone |
|  | 81.80 | 89.52 | 7.72 | Sand Stone |
|  | 89.52 | 91.13 | 1.61 | Clay Stone |
|  | 91.13 | 93.54 | 2.41 | Sand Stone |
|  | 93.54 | 95.18 | 1.64 | Clay Stone |
|  | 95.18 | 100.13 | 4.95 | Sand Stone |
|  | 100.13 | 101.03 | 0.90 | Mud Stone |
|  | 101.03 | 101.57 | 0.54 | Sand Stone |
|  | 101.57 | 104.01 | 2.44 | Clay Stone |
|  | 104.02 | 110.34 | 6.32 | Sand Stone |
|  | 110.34 | 111.66 | 1.32 | Clay Stone |
|  | 111.68 | 114.41 | 2.73 | Sand Stone |
|  | 114.43 | 115.84 | 1.41 | Clay Stone |
|  | 115.84 | 119.67 | 3.83 | Sand Stone |
|  | 119.67 | 120.62 | 0.95 | Mud Stone |
|  | 120.62 | 133.81 | 13.19 | Sand Stone |
|  | 133.82 | 134.63 | 0.81 | Mud Stone |
|  | 134.63 | 135.49 | 0.86 | Sand Stone |
|  | 135.49 | 136.34 | 0.85 | Mud Stone |
|  | 136.34 | 137.45 | 1.11 | Sand Stone |
|  | 137.45 | 138.33 | 0.88 | Mud Stone |
|  | 138.33 | 140.66 | 2.33 | Sand Stone |
|  | 140.66 | 141.79 | 1.13 | Clay Stone |
|  | 141.79 | 151.56 | 9.77 | Sand Stone |
|  | 151.58 | 154.81 | 3.23 | Clay Stone |
|  | 154.82 | 156.41 | 1.59 | Sand Stone |
|  | 156.43 | 157.54 | 1.11 | Clay Stone |
|  | 157.54 | 158.47 | 0.93 | Sand Stone |
|  | 158.47 | 161.54 | 3.07 | Clay Stone |
|  | 161.54 | 163.70 | 2.16 | Sand Stone |
|  | 163.70 | 164.83 | 1.13 | Mud Stone |
|  | 164.85 | 169.82 | 4.97 | Sand Stone |
|  | 169.82 | 171.83 | 2.01 | Mud Stone |
|  | 171.85 | 181.19 | 9.34 | Sand Stone |
|  | 181.19 | 189.61 | 8.42 | Sand Stone |
|  | 189.61 | 190.57 | 0.96 | Mud Stone |
|  | 190.57 | 191.09 | 0.52 | Sand Stone |
|  | 191.09 | 191.73 | 0.64 | Mud Stone |
|  | 191.73 | 194.12 | 2.39 | Sand Stone |
|  | 194.12 | 196.77 | 2.65 | Mud Stone |
|  | 196.77 | 197.62 | 0.85 | Sand Stone |
|  | 197.62 | 200.15 | 2.53 | Mud Stone |
|  | 200.17 | 202.78 | 2.61 | Sand Stone |
|  | 202.78 | 204.30 | 1.52 | Mud Stone |
|  | 204.32 | 208.07 | 3.75 | Sand Stone |
|  | 208.07 | 209.68 | 1.61 | Mud Stone |
|  | 209.68 | 211.03 | 1.35 | Sand Stone |
|  | 211.03 | 213.59 | 2.56 | Mud Stone |
|  | 213.59 | 217.85 | 4.26 | Sand Stone |
|  | 217.85 | 219.37 | 1.52 | Mud Stone |
|  | 219.37 | 223.25 | 3.88 | Sand Stone |
|  | 223.25 | 231.46 | 8.21 | Clay Stone |
|  | 231.46 | 232.41 | 0.95 | Sand Stone |
|  | 232.41 | 238.13 | 5.72 | Clay Stone |
|  | 238.13 | 244.39 | 6.26 | Mud Stone |
|  | 244.39 | 246.15 | 1.76 | Sand Stone |
|  | 246.17 | 247.40 | 1.23 | Mud Stone |
|  | 247.42 | 248.48 | 1.06 | Sand Stone |
|  | 248.48 | 249.88 | 1.40 | Mud Stone |
|  | 249.88 | 250.42 | 0.54 | Sand Stone |
|  | 250.42 | 252.35 | 1.93 | Clay Stone |
|  | 252.35 | 257.66 | 5.31 | Mud Stone |
|  | 257.68 | 258.65 | 0.97 | Sand Stone |
|  | 258.66 | 262.58 | 3.92 | Clay Stone |
|  | 262.58 | 264.29 | 1.71 | Mud Stone |
|  | 264.31 | 266.68 | 2.37 | Clay Stone |
|  | 266.68 | 269.71 | 3.03 | Mud Stone |
|  | 269.71 | 271.10 | 1.39 | Sand Stone |
|  | 271.10 | 272.71 | 1.61 | Mud Stone |
|  | 272.71 | 273.49 | 0.78 | Sand Stone |
|  | 273.50 | 275.72 | 2.22 | Clay Stone |
|  | 275.72 | 276.46 | 0.74 | Sand Stone |
|  | 276.46 | 278.39 | 1.93 | Mud Stone |
|  | 278.39 | 279.59 | 1.20 | Clay Stone |
|  | 279.61 | 280.52 | 0.91 | Sand Stone |
|  | 280.52 | 283.17 | 2.65 | Clay Stone |
|  | 283.17 | 283.72 | 0.55 | Sand Stone |
|  | 283.72 | 285.39 | 1.67 | Mud Stone |
|  | 285.39 | 287.38 | 1.99 | Sand Stone |
|  | 287.38 | 289.20 | 1.82 | Mud Stone |
|  | 289.20 | 290.60 | 1.40 | Sand Stone |
|  | 290.62 | 294.07 | 3.45 | Clay Stone |
|  | 294.07 | 294.75 | 0.68 | Sand Stone |
|  | 294.77 | 296.29 | 1.52 | Mud Stone |
|  | 296.32 | 299.13 | 2.81 | Sand Stone |
|  | 299.15 | 305.39 | 6.24 | Mud Stone |
|  | 305.39 | 306.58 | 1.19 | Sand Stone |
|  | 306.58 | 309.23 | 2.65 | Mud Stone |
|  | 309.23 | 312.15 | 2.92 | Clay Stone |
|  | 312.17 | 314.03 | 1.86 | Mud Stone |
|  | 314.03 | 318.52 | 4.49 | Sand Stone |
|  | 318.52 | 319.37 | 0.85 | Clay Stone |
|  | 319.39 | 320.32 | 0.93 | Mud Stone |
|  | 320.32 | 321.06 | 0.74 | Clay Stone |
|  | 321.08 | 321.97 | 0.89 | Mud Stone |
|  | 321.99 | 322.99 | 1.00 | Clay Stone |
|  | 322.99 | 326.27 | 3.28 | Mud Stone |
|  | 326.27 | 329.29 | 3.02 | Clay Stone |
|  | 329.29 | 332.08 | 2.79 | Mud Stone |
|  | 332.08 | 336.53 | 4.45 | Clay Stone |
|  | 336.53 | 337.78 | 1.25 | Sand Stone |
|  | 337.80 | 342.67 | 4.87 | Mud Stone |
|  | 342.67 | 344.21 | 1.54 | Clay Stone |
|  | 344.23 | 345.88 | 1.65 | Sand Stone |
|  | 345.88 | 347.32 | 1.44 | Clay Stone |
|  | 347.32 | 349.36 | 2.04 | Mud Stone |
|  | 349.36 | 350.90 | 1.54 | Sand Stone |
|  | 350.90 | 352.91 | 2.01 | Mud Stone |
|  | 352.91 | 353.78 | 0.87 | Sand Stone |
|  | 353.80 | 361.84 | 8.04 | Mud Stone |
|  | 361.84 | 363.73 | 1.89 | Clay Stone |
|  | 363.73 | 366.29 | 2.56 | Mud Stone |
|  | 366.29 | 368.56 | 2.27 | Sand Stone |
|  | 368.56 | 395.23 | 26.67 | Mud Stone |
|  | 395.23 | 396.39 | 1.16 | Sand Stone |
|  | 396.39 | 399.10 | 2.71 | Mud Stone |
|  | 399.10 | 400.96 | 1.86 | Clay Stone |
|  | 400.96 | 403.71 | 2.75 | Mud Stone |
|  | 403.71 | 407.56 | 3.85 | Clay Stone |
|  | 407.57 | 408.18 | 0.61 | Sand Stone |
|  | 408.18 | 409.32 | 1.14 | Clay Stone |
|  | 409.32 | 417.49 | 8.17 | Mud Stone |
|  | 417.52 | 418.64 | 1.12 | Sand Stone |
|  | 418.64 | 421.79 | 3.15 | Clay Stone |
|  | 421.81 | 423.63 | 1.82 | Mud Stone |
|  | 423.63 | 424.79 | 1.16 | Sand Stone |
|  | 424.82 | 426.30 | 1.48 | Mud Stone |
|  | 426.30 | 427.23 | 0.93 | Sand Stone |
|  | 427.25 | 431.12 | 3.87 | Mud Stone |
|  | 431.14 | 435.10 | 3.96 | Sand Stone |
|  | 435.12 | 437.20 | 2.08 | Clay Stone |
|  | 437.24 | 439.30 | 2.06 | Sand Stone |
|  | 439.31 | 441.96 | 2.65 | Clay Stone |
|  | 441.96 | 443.53 | 1.57 | Sand Stone |
|  | 443.55 | 445.52 | 1.97 | Mud Stone |
|  | 445.52 | 446.39 | 0.87 | Clay Stone |
|  | 446.39 | 449.14 | 2.75 | Sand Stone |
|  | 449.14 | 452.55 | 3.41 | Mud Stone |
|  | 452.57 | 456.31 | 3.74 | Sand Stone |
|  | 456.31 | 457.35 | 1.04 | Clay Stone |
|  | 457.37 | 458.05 | 0.68 | Mud Stone |
|  | 458.09 | 460.50 | 2.41 | Clay Stone |
|  | 460.50 | 461.39 | 0.89 | Sand Stone |
|  | 461.39 | 463.57 | 2.18 | Clay Stone |
|  | 463.59 | 465.10 | 1.51 | Sand Stone |
|  | 465.10 | 465.73 | 0.63 | Mud Stone |
|  | 465.73 | 466.58 | 0.85 | Sand Stone |
|  | 466.58 | 468.59 | 2.01 | Clay Stone |
|  | 468.61 | 472.74 | 4.13 | Mud Stone |
|  | 472.74 | 475.15 | 2.41 | Sand Stone |
|  | 475.17 | 476.82 | 1.65 | Clay Stone |
|  | 476.84 | 483.01 | 6.17 | Mud Stone |
|  | 483.01 | 484.68 | 1.67 | Sand Stone |
|  | 484.68 | 485.57 | 0.89 | Clay Stone |
|  | 485.59 | 491.79 | 6.20 | Mud Stone |
|  | 491.81 | 493.78 | 1.97 | Sand Stone |
|  | 493.78 | 495.15 | 1.37 | Clay Stone |
|  | 495.15 | 506.22 | 11.07 | Mud Stone |
|  | 506.23 | 506.99 | 0.76 | Sand Stone |
|  | 506.99 | 507.62 | 0.63 | Clay Stone |
|  | 507.64 | 508.11 | 0.47 | Sand Stone |
|  | 508.11 | 508.68 | 0.57 | Clay Stone |
|  | 508.68 | 509.80 | 1.12 | Sand Stone |
|  | 509.80 | 521.46 | 11.66 | Mud Stone |
|  | 521.48 | 522.50 | 1.02 | Sand Stone |
|  | 522.50 | 528.41 | 5.91 | Mud Stone |
|  | 528.41 | 529.49 | 1.08 | Clay Stone |
|  | 529.49 | 541.15 | 11.66 | Mud Stone |
|  | 541.15 | 541.80 | 0.65 | Clay Stone |
|  | 541.80 | 542.44 | 0.64 | Mud Stone |
|  | 542.46 | 543.73 | 1.27 | Clay Stone |
|  | 543.73 | 544.72 | 0.99 | Sand Stone |
|  | 544.73 | 545.55 | 0.82 | Clay Stone |
|  | 545.55 | 546.17 | 0.62 | Sand Stone |
|  | 546.19 | 551.63 | 5.44 | Mud Stone |
|  | 551.63 | 553.66 | 2.03 | Clay Stone |
|  | 553.66 | 559.73 | 6.07 | Sand Stone |
|  | 559.73 | 562.55 | 2.82 | Clay Stone |
|  | 562.55 | 563.71 | 1.16 | Sand Stone |
|  | 563.74 | 565.62 | 1.88 | Clay Stone |
|  | 565.64 | 567.40 | 1.76 | Mud Stone |
|  | | | | |
| **CMWWB-06** | | | | |
|  | 0.00 | 456.74 | No Electrical Log Data Available | |
|  | 456.74 | 463.58 | 6.84 | Mud Stone |
|  | 463.58 | 470.92 | 7.34 | Clay Stone |
|  | 470.92 | 471.88 | 0.96 | Sand Stone |
|  | 471.88 | 472.72 | 0.84 | Clay Stone |
|  | 472.72 | 473.56 | 0.84 | Sand Stone |
|  | 473.58 | 474.58 | 1.00 | Clay Stone |
|  | 474.64 | 475.20 | 0.56 | Mud Stone |
|  | 475.26 | 479.78 | 4.52 | Clay Stone |
|  | 479.78 | 483.44 | 3.66 | Mud Stone |
|  | 483.50 | 487.00 | 3.50 | Clay Stone |
|  | 487.00 | 487.74 | 0.74 | Sand Stone |
|  | 487.74 | 488.64 | 0.90 | Clay Stone |
|  | 488.64 | 489.26 | 0.62 | Sand Stone |
|  | 489.26 | 489.78 | 0.52 | Clay Stone |
|  | 489.78 | 490.28 | 0.50 | Mud Stone |
|  | 490.32 | 516.52 | 26.20 | Clay Stone |
|  | | | | |
| **CMWWB-07** | | | | |
|  | 0.20 | 2.98 | 2.78 | Soil |
|  | 3.02 | 36.66 | 33.64 | Basalt |
|  | 36.70 | 38.64 | 1.94 | Clay Stone |
|  | 38.68 | 45.14 | 6.46 | Basalt |
|  | 45.14 | 46.30 | 1.16 | Clay Stone |
|  | 46.30 | 48.42 | 2.12 | Sand Stone |
|  | 48.42 | 50.92 | 2.50 | Clay Stone |
|  | 50.96 | 57.96 | 7.00 | Mud Stone |
|  | 57.96 | 61.64 | 3.68 | Clay Stone |
|  | 61.70 | 67.48 | 5.78 | Mud Stone |
|  | 67.52 | 83.56 | 16.04 | Sand Stone |
|  | 83.60 | 85.54 | 1.94 | Mud Stone |
|  | 85.54 | 90.56 | 5.02 | Sand Stone |
|  | 90.56 | 94.22 | 3.66 | Clayey Sand Stone |
|  | 94.22 | 97.88 | 3.66 | Sand Stone |
|  | 97.88 | 100.90 | 3.02 | Clay Stone |
|  | 100.90 | 103.16 | 2.26 | Sand Stone |
|  | 103.16 | 105.84 | 2.68 | Clayey Sand Stone |
|  | 105.84 | 114.74 | 8.90 | Sand Stone |
|  | 114.74 | 115.58 | 0.84 | Clay Stone |
|  | 115.62 | 134.92 | 19.30 | Sand Stone |
|  | 134.92 | 137.32 | 2.40 | Clayey Sand Stone |
|  | 137.36 | 138.30 | 0.94 | Clay Stone |
|  | 138.30 | 143.66 | 5.36 | Sand Stone |
|  | 143.66 | 149.44 | 5.78 | Clay Stone |
|  | 149.44 | 152.92 | 3.48 | Sand Stone |
|  | 152.92 | 686.96 | No Electrical Log Data available | |
|  | 686.96 | 688.22 | 1.26 | Sand Stone |
|  | 688.22 | 690.58 | 2.36 | Shale |
|  | 690.58 | 695.28 | 4.70 | Shaly Sand Stone |
|  | 695.28 | 696.64 | 1.36 | Sand Stone |
|  | 696.64 | 699.32 | 2.68 | Shaly Sand Stone |
|  | 699.38 | 701.30 | 1.92 | Sand Stone |
|  | 701.36 | 702.72 | 1.36 | Shale |
|  | 702.72 | 703.32 | 0.60 | Sand Stone |
|  | 703.38 | 704.88 | 1.50 | Sandy Shale |
|  | 704.88 | 706.72 | 1.84 | Sand Stone |
|  | 706.74 | 708.54 | 1.80 | Sandy Shale |
|  | 708.54 | 709.38 | 0.84 | Sand Stone |
|  | 709.39 | 712.44 | 3.05 | Coal |
|  | 712.44 | 713.13 | 0.69 | Sand Stone |
|  | 713.14 | 714.38 | 1.24 | Shale |
|  | 714.38 | 716.68 | 2.30 | Shaly Sand Stone |
|  | 716.69 | 717.44 | 0.75 | Sand Stone |
|  | 717.44 | 718.06 | 0.62 | Shaly Sand Stone |
|  | 718.06 | 719.00 | 0.94 | Sand Stone |
|  | 719.01 | 719.94 | 0.93 | Shale |
|  | 719.95 | 721.88 | 1.93 | Sand Stone |
|  | 721.88 | 722.36 | 0.48 | Coal |
|  | 722.36 | 722.62 | 0.26 | Shaly Coal |
|  | 722.62 | 723.51 | 0.89 | Coal |
|  | 723.53 | 723.87 | 0.34 | Shaly Coal |
|  | 723.88 | 724.64 | 0.76 | Coal |
|  | 724.65 | 727.99 | 3.34 | Sandy Shale |
|  | 728.01 | 730.22 | 2.21 | Shaly Sand Stone |
|  | 730.22 | 732.06 | 1.84 | Sand Stone |
|  | 732.07 | 732.49 | 0.42 | Shaly Sand Stone |
|  | 732.49 | 732.91 | 0.42 | Shaly Coal |
|  | 732.92 | 733.50 | 0.58 | Shaly Sand Stone |
|  | 733.51 | 736.06 | 2.55 | Sand Stone |
|  | | | | |
| **CMWWB-08** | | | | |
|  | 0.00 | 491.98 | No Electrical Log Data available | |
|  | 491.98 | 519.96 | 27.98 | Clay Stone |
|  | 519.96 | 521 | 1.04 | Sand Stone |
|  | 521 | 522.88 | 1.88 | Clay Stone |
|  | | | | |
| **CMWWB-09** | | | | |
|  | 0.00 | 0.55 | 0.55 | Soil |
|  | 0.55 | 10.73 | 10.18 | Basalt |
|  | 10.73 | 16.39 | 5.66 | Mud Stone |
|  | 16.39 | 33.01 | 16.62 | Sand Stone |
|  | 33.01 | 34.48 | 1.47 | Mud Stone |
|  | 34.48 | 52.91 | 18.43 | Sand Stone |
|  | 52.91 | 54.75 | 1.84 | Clay Stone |
|  | 54.76 | 59.89 | 5.13 | Sand Stone |
|  | 59.89 | 61.11 | 1.22 | Clay Stone |
|  | 61.11 | 62.27 | 1.16 | Sand Stone |
|  | 62.27 | 63.29 | 1.02 | Clay Stone |
|  | 63.29 | 63.81 | 0.52 | Sand Stone |
|  | 63.81 | 64.45 | 0.64 | Mud Stone |
|  | 64.45 | 68.75 | 4.30 | Sand Stone |
|  | 68.75 | 69.57 | 0.82 | Mud Stone |
|  | 69.57 | 75.61 | 6.04 | Sand Stone |
|  | 75.61 | 76.99 | 1.38 | Clay Stone |
|  | 76.99 | 77.68 | 0.69 | Mud Stone |
|  | 77.68 | 80.17 | 2.49 | Sand Stone |
|  | 80.17 | 81.39 | 1.22 | Clay Stone |
|  | 81.39 | 81.75 | 0.36 | Sand Stone |
|  | 81.75 | 82.63 | 0.88 | Mud Stone |
|  | 82.63 | 92.46 | 9.83 | Sand Stone |
|  | 92.47 | 93.51 | 1.04 | Clay Stone |
|  | 93.51 | 102.60 | 9.09 | Sand Stone |
|  | 102.60 | 103.48 | 0.88 | Clay Stone |
|  | 103.49 | 104.04 | 0.55 | Sand Stone |
|  | 104.04 | 104.95 | 0.91 | Clay Stone |
|  | 104.95 | 111.03 | 6.08 | Sand Stone |
|  | 111.03 | 112.36 | 1.33 | Mud Stone |
|  | 112.37 | 114.46 | 2.09 | Sand Stone |
|  | 114.46 | 115.29 | 0.83 | Mud Stone |
|  | 115.30 | 121.70 | 6.40 | Sand Stone |
|  | 121.71 | 125.88 | 4.17 | Sand Stone |
|  | 125.88 | 127.64 | 1.76 | Clay Stone |
|  | 127.64 | 155.74 | 28.10 | Sand Stone |
|  | 155.74 | 157.53 | 1.79 | Mud Stone |
|  | 157.54 | 186.22 | 28.68 | Sand Stone |
|  | 186.22 | 187.04 | 0.82 | Mud Stone |
|  | 187.04 | 198.18 | 11.14 | Sand Stone |
|  | 198.18 | 204.68 | 6.50 | Mud Stone |
|  | 204.68 | 205.50 | 0.82 | Sand Stone |
|  | 205.51 | 207.39 | 1.88 | Mud Stone |
|  | 207.39 | 208.01 | 0.62 | Clay Stone |
|  | 208.01 | 222.05 | 14.04 | Mud Stone |
|  | 222.06 | 223.05 | 0.99 | Clay Stone |
|  | 223.05 | 226.15 | 3.10 | Mud Stone |
|  | 226.16 | 230.82 | 4.66 | Clay Stone |
|  | 230.83 | 231.37 | 0.54 | Sand Stone |
|  | 231.37 | 233.82 | 2.45 | Mud Stone |
|  | 233.82 | 234.80 | 0.98 | Clay Stone |
|  | 234.80 | 235.09 | 0.29 | Sand Stone |
|  | 235.10 | 237.47 | 2.37 | Mud Stone |
|  | 237.47 | 237.97 | 0.50 | Sand Stone |
|  | 237.97 | 242.91 | 4.94 | Mud Stone |
|  | 242.91 | 243.34 | 0.43 | Clay Stone |
|  | 243.34 | 244.30 | 0.96 | Sand Stone |
|  | 244.30 | 245.90 | 1.60 | Clay Stone |
|  | 245.90 | 247.97 | 2.07 | Mud Stone |
|  | 247.97 | 248.92 | 0.95 | Clay Stone |
|  | 248.92 | 260.02 | 11.10 | Mud Stone |
|  | 260.04 | 260.75 | 0.71 | Clay Stone |
|  | 260.75 | 267.48 | 6.73 | Mud Stone |
|  | 267.48 | 268.57 | 1.09 | Clay Stone |
|  | 268.57 | 292.00 | 23.43 | Mud Stone |
|  | 292.00 | 293.21 | 1.21 | Clay Stone |
|  | 293.22 | 293.74 | 0.52 | Mud Stone |
|  | 293.74 | 294.61 | 0.87 | Clay Stone |
|  | 294.61 | 295.54 | 0.93 | Mud Stone |
|  | 295.54 | 299.81 | 4.27 | Clay Stone |
|  | 299.82 | 300.32 | 0.50 | Sand Stone |
|  | 300.32 | 300.85 | 0.53 | Clay Stone |
|  | 300.85 | 304.59 | 3.74 | Mud Stone |
|  | 304.59 | 305.12 | 0.53 | Sand Stone |
|  | 305.12 | 306.60 | 1.48 | Clay Stone |
|  | 306.60 | 309.92 | 3.32 | Mud Stone |
|  | 309.93 | 310.39 | 0.46 | Sand Stone |
|  | 310.39 | 312.52 | 2.13 | Mud Stone |
|  | 312.53 | 314.33 | 1.80 | Clay Stone |
|  | 314.33 | 315.03 | 0.70 | Sand Stone |
|  | 315.03 | 315.61 | 0.58 | Clay Stone |
|  | 315.61 | 316.53 | 0.92 | Mud Stone |
|  | 316.53 | 317.61 | 1.08 | Clay Stone |
|  | 317.61 | 318.36 | 0.75 | Mud Stone |
|  | 318.36 | 319.22 | 0.86 | Clay Stone |
|  | 319.23 | 319.91 | 0.68 | Mud Stone |
|  | 319.91 | 320.48 | 0.57 | Clay Stone |
|  | 320.48 | 321.51 | 1.03 | Mud Stone |
|  | 321.52 | 323.27 | 1.75 | Clay Stone |
|  | 323.28 | 324.23 | 0.95 | Mud Stone |
|  | 324.23 | 326.25 | 2.02 | Mud Stone |
|  | 326.25 | 327.13 | 0.88 | Sand Stone |
|  | 327.14 | 327.89 | 0.75 | Clay Stone |
|  | 327.89 | 329.78 | 1.89 | Mud Stone |
|  | 329.78 | 332.13 | 2.35 | Mud Stone |
|  | 332.13 | 333.99 | 1.86 | Clay Stone |
|  | 333.99 | 334.35 | 0.36 | Mud Stone |
|  | 334.35 | 334.87 | 0.52 | Clay Stone |
|  | 334.87 | 335.42 | 0.55 | Sand Stone |
|  | 335.43 | 336.80 | 1.37 | Mud Stone |
|  | 336.80 | 338.72 | 1.92 | Shale |
|  | 338.72 | 341.83 | 3.11 | Mud Stone |
|  | 341.83 | 342.99 | 1.16 | Clay Stone |
|  | 342.99 | 343.68 | 0.69 | Sand Stone |
|  | 343.68 | 346.13 | 2.45 | Mud Stone |
|  | 346.13 | 346.94 | 0.81 | Clay Stone |
|  | 346.95 | 351.68 | 4.73 | Mud Stone |
|  | 351.70 | 352.31 | 0.61 | Sand Stone |
|  | 352.32 | 357.57 | 5.25 | Mud Stone |
|  | 357.57 | 358.06 | 0.49 | Sand Stone |
|  | 358.07 | 363.24 | 5.17 | Clay Stone |
|  | 363.24 | 364.99 | 1.75 | Mud Stone |
|  | 364.99 | 366.51 | 1.52 | Clay Stone |
|  | 366.52 | 368.46 | 1.94 | Mud Stone |
|  | 368.46 | 370.95 | 2.49 | Clay Stone |
|  | 370.95 | 371.40 | 0.45 | Mud Stone |
|  | 371.40 | 374.51 | 3.11 | Clay Stone |
|  | 374.51 | 375.13 | 0.62 | Mud Stone |
|  | 375.13 | 376.55 | 1.42 | Clay Stone |
|  | 376.55 | 376.99 | 0.44 | Sand Stone |
|  | 376.99 | 380.27 | 3.28 | Mud Stone |
|  | 380.27 | 381.00 | 0.73 | Clay Stone |
|  | 381.00 | 381.68 | 0.68 | Mud Stone |
|  | 381.68 | 382.29 | 0.61 | Clay Stone |
|  | 382.29 | 384.01 | 1.72 | Mud Stone |
|  | 384.01 | 384.65 | 0.64 | Clay Stone |
|  | 384.65 | 385.23 | 0.58 | Mud Stone |
|  | 385.23 | 386.34 | 1.11 | Clay Stone |
|  | 386.35 | 387.42 | 1.07 | Mud Stone |
|  | 387.42 | 388.55 | 1.13 | Clay Stone |
|  | 388.55 | 396.54 | 7.99 | Mud Stone |
|  | 396.54 | 396.99 | 0.45 | Sand Stone |
|  | 397.00 | 401.08 | 4.08 | Mud Stone |
|  | 401.08 | 402.40 | 1.32 | Clay Stone |
|  | 402.40 | 403.06 | 0.66 | Sand Stone |
|  | 403.07 | 404.23 | 1.16 | Clay Stone |
|  | 404.24 | 406.99 | 2.75 | Sand Stone |
|  | 406.99 | 408.59 | 1.60 | Clay Stone |
|  | 408.59 | 410.50 | 1.91 | Mud Stone |
|  | 410.51 | 411.19 | 0.68 | Clay Stone |
|  | 411.19 | 411.60 | 0.41 | Mud Stone |
|  | 411.60 | 412.15 | 0.55 | Clay Stone |
|  | 412.16 | 416.68 | 4.52 | Mud Stone |
|  | 416.68 | 417.74 | 1.06 | Clay Stone |
|  | 417.74 | 422.04 | 4.30 | Mud Stone |
|  | 422.05 | 422.74 | 0.69 | Sand Stone |
|  | 422.74 | 423.56 | 0.82 | Clay Stone |
|  | 423.56 | 424.11 | 0.55 | Sand Stone |
|  | 424.11 | 426.95 | 2.84 | Clay Stone |
|  | 426.95 | 427.64 | 0.69 | Mud Stone |
|  | 427.65 | 428.35 | 0.70 | Clay Stone |
|  | 428.35 | 429.79 | 1.44 | Mud Stone |
|  | 429.79 | 432.37 | 2.58 | Clay Stone |
|  | 432.38 | 433.32 | 0.94 | Mud Stone |
|  | 433.32 | 434.18 | 0.86 | Clay Stone |
|  | 434.18 | 434.62 | 0.44 | Mud Stone |
|  | 434.62 | 435.33 | 0.71 | Clay Stone |
|  | 435.34 | 439.15 | 3.81 | Mud Stone |
|  | 439.15 | 439.98 | 0.83 | Clay Stone |
|  | 439.99 | 440.68 | 0.69 | Sand Stone |
|  | 440.68 | 442.83 | 2.15 | Clay Stone |
|  | 442.83 | 443.49 | 0.66 | Sand Stone |
|  | 443.49 | 444.38 | 0.89 | Clay Stone |
|  | 444.38 | 447.37 | 2.99 | Mud Stone |
|  | 447.37 | 449.02 | 1.65 | Clay Stone |
|  | 449.04 | 452.14 | 3.10 | Mud Stone |
|  | 452.14 | 456.09 | 3.95 | Clay Stone |
|  | 456.09 | 456.83 | 0.74 | Mud Stone |
|  | 456.83 | 458.27 | 1.44 | Sand Stone |
|  | 458.27 | 459.80 | 1.53 | Mud Stone |
|  | 459.80 | 460.38 | 0.58 | Sand Stone |
|  | 460.38 | 460.89 | 0.51 | Mud Stone |
|  | 460.89 | 461.26 | 0.37 | Sand Stone |
|  | 461.26 | 462.06 | 0.80 | Mud Stone |
|  | 462.07 | 462.66 | 0.59 | Sand Stone |
|  | 462.67 | 468.66 | 5.99 | Clay Stone |
|  | 468.66 | 469.33 | 0.67 | Mud Stone |
|  | 469.33 | 476.89 | 7.56 | Clay Stone |
|  | 476.89 | 477.40 | 0.51 | Mud Stone |
|  | 477.40 | 483.10 | 5.70 | Clay Stone |
|  | 483.10 | 483.69 | 0.59 | Mud Stone |
|  | 483.71 | 484.35 | 0.64 | Clay Stone |
|  | 484.35 | 484.76 | 0.41 | Mud Stone |
|  | 484.77 | 485.71 | 0.94 | Clay Stone |
|  | 485.71 | 486.29 | 0.58 | Mud Stone |
|  | 486.29 | 486.63 | 0.34 | Clay Stone |
|  | 486.63 | 487.14 | 0.51 | Mud Stone |
|  | 487.14 | 488.28 | 1.14 | Clay Stone |
|  | 488.28 | 488.86 | 0.58 | Mud Stone |
|  | 488.86 | 491.61 | 2.75 | Mud Stone |
|  | 491.63 | 492.47 | 0.84 | Sand Stone |
|  | 492.48 | 493.88 | 1.40 | Clay Stone |
|  | 493.88 | 495.68 | 1.80 | Mud Stone |
|  | 495.70 | 496.90 | 1.20 | Clay Stone |
|  | 496.90 | 497.27 | 0.37 | Mud Stone |
|  | 497.27 | 499.01 | 1.74 | Clay Stone |
|  | 499.02 | 499.69 | 0.67 | Mud Stone |
|  | 499.70 | 501.74 | 2.04 | Clay Stone |
|  | 501.74 | 502.35 | 0.61 | Mud Stone |
|  | 502.35 | 509.10 | 6.75 | Mud Stone |
|  | 509.10 | 509.67 | 0.57 | Clay Stone |
|  | 509.67 | 510.26 | 0.59 | Sand Stone |
|  | 510.26 | 510.88 | 0.62 | Clay Stone |
|  | 510.88 | 511.41 | 0.53 | Mud Stone |
|  | 511.41 | 512.19 | 0.78 | Clay Stone |
|  | 512.19 | 512.88 | 0.69 | Mud Stone |
|  | 512.88 | 513.65 | 0.77 | Clay Stone |
|  | 513.65 | 514.20 | 0.55 | Mud Stone |
|  | 514.20 | 515.28 | 1.08 | Clay Stone |
|  | 515.28 | 515.73 | 0.45 | Mud Stone |
|  | 515.73 | 517.67 | 1.94 | Clay Stone |
|  | 517.67 | 518.07 | 0.40 | Mud Stone |
|  | 518.07 | 519.33 | 1.26 | Clay Stone |
|  | 519.34 | 519.95 | 0.61 | Mud Stone |
|  | 519.95 | 520.95 | 1.00 | Clay Stone |
|  | 520.95 | 522.71 | 1.76 | Mud Stone |
|  | 522.71 | 524.99 | 2.28 | Clay Stone |
|  | 524.99 | 525.54 | 0.55 | Mud Stone |
|  | 525.54 | 527.63 | 2.09 | Clay Stone |
|  | 527.63 | 528.33 | 0.70 | Mud Stone |
|  | 528.34 | 529.97 | 1.63 | Clay Stone |
|  | 529.97 | 530.57 | 0.60 | Sand Stone |
|  | 530.58 | 538.78 | 8.20 | Mud Stone |
|  | 538.78 | 539.57 | 0.79 | Clay Stone |
|  | 539.58 | 540.17 | 0.59 | Mud Stone |
|  | 540.18 | 541.25 | 1.07 | Clay Stone |
|  | 541.25 | 542.41 | 1.16 | Mud Stone |
|  | 542.41 | 544.06 | 1.65 | Clay Stone |
|  | 544.06 | 547.27 | 3.21 | Mud Stone |
|  | 547.27 | 547.86 | 0.59 | Clay Stone |
|  | 547.86 | 549.65 | 1.79 | Mud Stone |
|  | 549.65 | 550.87 | 1.22 | Clay Stone |
|  | 550.88 | 554.91 | 4.03 | Mud Stone |
|  | 554.91 | 555.98 | 1.07 | Clay Stone |
|  | 555.98 | 556.58 | 0.60 | Mud Stone |
|  | 556.58 | 557.30 | 0.72 | Clay Stone |
|  | 557.30 | 560.23 | 2.93 | Mud Stone |
|  | 560.23 | 561.03 | 0.80 | Clay Stone |
|  | 561.04 | 562.31 | 1.27 | Mud Stone |
|  | 562.31 | 563.10 | 0.79 | Clay Stone |
|  | 563.10 | 563.73 | 0.63 | Sand Stone |
|  | 563.73 | 567.21 | 3.48 | Mud Stone |
|  | 567.21 | 568.84 | 1.63 | Clay Stone |
|  | 568.84 | 584.70 | 15.86 | Mud Stone |
|  | 584.71 | 585.84 | 1.13 | Clay Stone |
|  | 585.84 | 586.27 | 0.43 | Mud Stone |
|  | 586.27 | 586.82 | 0.55 | Clay Stone |
|  | 586.82 | 587.34 | 0.52 | Mud Stone |
|  | 587.34 | 589.39 | 2.05 | Clay Stone |
|  | 589.39 | 590.70 | 1.31 | Sand Stone |
|  | 590.70 | 591.40 | 0.70 | Sandy Shale |
|  | 591.40 | 596.60 | 5.20 | Sand Stone |
|  | 596.60 | 597.64 | 1.04 | Shaly Sand Stone |
|  | 597.64 | 600.57 | 2.93 | Sand Stone |
|  | 600.57 | 601.41 | 0.84 | Shaly Sand Stone |
|  | 601.41 | 602.71 | 1.30 | Sand Stone |
|  | 602.72 | 603.43 | 0.71 | Shaly Sand Stone |
|  | 603.43 | 604.64 | 1.21 | Shale |
|  | 604.64 | 614.03 | 9.39 | Sand Stone |
|  | 614.04 | 615.81 | 1.77 | Clay Stone |
|  | 615.81 | 616.66 | 0.85 | Mud Stone |
|  | 616.66 | 617.91 | 1.25 | Clay Stone |
|  | 617.91 | 618.52 | 0.61 | Sand Stone |
|  | 618.53 | 619.33 | 0.80 | Mud Stone |
|  | 619.33 | 622.95 | 3.62 | Sand Stone |
|  | 622.95 | 623.70 | 0.75 | Shaly Sand Stone |
|  | 623.70 | 625.53 | 1.83 | Sand Stone |
|  | 625.53 | 626.60 | 1.07 | Shale |
|  | 626.60 | 627.11 | 0.51 | Sand Stone |
|  | 627.11 | 628.58 | 1.47 | Sandy Shale |
|  | 628.58 | 631.17 | 2.59 | Sand Stone |
|  | 631.17 | 632.29 | 1.12 | Clayey Sand Stone |
|  | 632.29 | 633.45 | 1.16 | Sand Stone |
|  | 633.46 | 634.68 | 1.22 | Shale |
|  | 634.68 | 636.09 | 1.41 | Sandy Shale |
|  | 636.10 | 636.62 | 0.52 | Sand Stone |
|  | 636.63 | 637.35 | 0.72 | Shale |
|  | 637.35 | 640.14 | 2.79 | Sand Stone |
|  | 640.14 | 641.66 | 1.52 | Shale |
|  | 641.66 | 643.38 | 1.72 | Shaly Sand Stone |
|  | 643.38 | 644.28 | 0.90 | Sand Stone |
|  | 644.28 | 646.31 | 2.03 | Shale |
|  | 646.33 | 647.13 | 0.80 | Sand Stone |
|  | 647.13 | 648.10 | 0.97 | Shale |
|  | 648.10 | 649.50 | 1.40 | Shaly Sand Stone |
|  | 649.50 | 650.74 | 1.24 | Shale |
|  | 650.74 | 651.28 | 0.54 | Sand Stone |
|  | 651.29 | 653.34 | 2.05 | Shaly Sand Stone |
|  | 653.34 | 654.22 | 0.88 | Sand Stone |
|  | 654.23 | 655.09 | 0.86 | Shale |
|  | 655.09 | 655.71 | 0.62 | Sand Stone |
|  | 655.72 | 656.42 | 0.70 | Shale |
|  | 656.42 | 657.42 | 1.00 | Sand Stone |
|  | 657.42 | 658.35 | 0.93 | Shaly Sand Stone |
|  | 658.35 | 658.88 | 0.53 | Sand Stone |
|  | 658.88 | 659.40 | 0.52 | Sandy Shale |
|  | 659.41 | 659.97 | 0.56 | Sand Stone |
|  | 659.97 | 660.66 | 0.69 | Shale |
|  | 660.66 | 661.34 | 0.68 | Sand Stone |
|  | 661.35 | 662.18 | 0.83 | Shale |
|  | 662.19 | 663.88 | 1.69 | Sand Stone |
|  | 663.89 | 664.47 | 0.58 | Shale |
|  | 664.47 | 664.93 | 0.46 | Sand Stone |
|  | 664.94 | 665.87 | 0.93 | Shale |
|  | 665.87 | 667.76 | 1.89 | Sand Stone |
|  | 667.76 | 669.01 | 1.25 | Shaly Sand Stone |
|  | 669.01 | 669.88 | 0.87 | Shale |
|  | 669.88 | 670.26 | 0.38 | Coal |
|  | 670.26 | 670.51 | 0.25 | Shaly Coal |
|  | 670.52 | 672.28 | 1.76 | Coal |
|  | 672.28 | 673.80 | 1.52 | Shaly Sand Stone |
|  | 673.82 | 674.68 | 0.86 | Shale |
|  | 674.68 | 676.59 | 1.91 | Sandy Shale |
|  | 676.59 | 677.84 | 1.25 | Sand Stone |
|  | 677.85 | 678.52 | 0.67 | Sandy Shale |
|  | 678.52 | 679.01 | 0.49 | Sand Stone |
|  | 679.02 | 680.43 | 1.41 | Shaly Sand Stone |
|  | 680.43 | 682.89 | 2.46 | Sand Stone |
|  | 682.89 | 684.83 | 1.94 | Coal |
|  | 684.84 | 685.29 | 0.45 | Shaly Coal |
|  | 685.29 | 686.28 | 0.99 | Shale |
|  | 686.28 | 688.46 | 2.18 | Sandy Shale |
|  | 688.46 | 689.84 | 1.38 | Sand Stone |
|  | 689.84 | 690.39 | 0.55 | Shaly Sand Stone |
|  | 690.39 | 690.71 | 0.32 | Sand Stone |
|  | 690.71 | 691.92 | 1.21 | Shale |
|  | 691.92 | 692.27 | 0.35 | Sandy Shale |
|  | 692.28 | 692.98 | 0.70 | Shale |
|  | 692.99 | 694.67 | 1.68 | Sand Stone |
|  | 694.67 | 695.44 | 0.77 | Shale |
|  | 695.44 | 696.17 | 0.73 | Sand Stone |
|  | 696.17 | 697.08 | 0.91 | Sandy Shale |
|  | 697.08 | 698.06 | 0.98 | Sand Stone |
|  | 698.06 | 698.73 | 0.67 | Shale |
|  | 698.73 | 699.24 | 0.51 | Shaly Coal |
|  | 699.24 | 699.71 | 0.47 | Shale |
|  | 699.72 | 701.58 | 1.86 | Sand Stone |
|  | | | | |
| **CMWWB-10** | | | | |
|  | 0.00 | 720.23 | No Electrical Log Data available | |
|  | 720.23 | 720.94 | 0.71 | Shale |
|  | 720.94 | 721.38 | 0.44 | Sand Stone |
|  | 721.38 | 721.84 | 0.46 | Shale |
|  | 721.84 | 723.13 | 1.29 | Sandy Shale |
|  | 723.13 | 724.03 | 0.90 | Sand Stone |
|  | 724.04 | 727.28 | 3.24 | Shaly Sand Stone |
|  | 727.28 | 729.21 | 1.93 | Sand Stone |
|  | 729.22 | 729.82 | 0.60 | Shaly Sand Stone |
|  | 729.82 | 731.50 | 1.68 | Sand Stone |
|  | 731.51 | 733.47 | 1.96 | Sandy Shale |
|  | 733.47 | 734.83 | 1.36 | Sand Stone |
|  | 734.84 | 735.74 | 0.90 | Shale |
|  | 735.74 | 736.59 | 0.85 | Sand Stone |
|  | 736.59 | 739.63 | 3.04 | Shale |
|  | 739.63 | 741.88 | 2.25 | Shaly Sand Stone |
|  | 741.90 | 744.70 | 2.80 | Sand Stone |
|  | 744.72 | 746.39 | 1.67 | Shale |
|  | 746.39 | 748.88 | 2.49 | Sandy Shale |
|  | 748.89 | 749.61 | 0.72 | Sand Stone |
|  | 749.61 | 751.68 | 2.07 | Shale |
|  | 751.68 | 754.36 | 2.68 | Sand Stone |
|  | 754.37 | 754.81 | 0.44 | Shale |
|  | 754.81 | 755.53 | 0.72 | Shaly Coal |
|  | 755.53 | 755.83 | 0.30 | Coal |
|  | 755.83 | 756.18 | 0.35 | Shaly Coal |
|  | 756.18 | 756.62 | 0.44 | Coal |
|  | 756.63 | 757.34 | 0.71 | Shaly Coal |
|  | 757.34 | 759.00 | 1.66 | Shale |
|  | 759.00 | 759.59 | 0.59 | Coal |
|  | 759.59 | 759.89 | 0.30 | Shaly Coal |
|  | 759.89 | 760.30 | 0.41 | Coal |
|  | 760.30 | 761.17 | 0.87 | Shaly Coal |
|  | 761.17 | 762.80 | 1.63 | Coal |
|  | 762.81 | 764.60 | 1.79 | Shale |
|  | 764.60 | 765.45 | 0.85 | Sandy Shale |
|  | 765.45 | 767.28 | 1.83 | Shale |
|  | 767.30 | 771.76 | 4.46 | Sand Stone |
|  | 771.76 | 772.84 | 1.08 | Shale |
|  | 772.84 | 773.92 | 1.08 | Coal |
|  | 773.92 | 774.87 | 0.95 | Shale |
|  | 774.89 | 775.54 | 0.65 | Sand Stone |
|  | 775.54 | 777.41 | 1.87 | Shale |
|  | 777.42 | 780.00 | 2.58 | Sand Stone |
|  | | | | |
| **CMWWB-12** | | | | |
|  | 0.00 | 320.99 | No Electrical Log Data available | |
|  | 320.99 | 321.37 | 0.38 | Clay Stone |
|  | 321.37 | 335.71 | 14.34 | Mud Stone |
|  | 335.71 | 336.33 | 0.62 | Clay Stone |
|  | 336.33 | 337.51 | 1.18 | Sand Stone |
|  | 337.51 | 342.03 | 4.52 | Clay Stone |
|  | 342.07 | 347.15 | 5.08 | Sand Stone |
|  | 347.17 | 347.85 | 0.68 | Shale |
|  | 347.85 | 348.35 | 0.5 | Sand Stone |
|  | 348.35 | 351.45 | 3.1 | Shale |
|  | 351.45 | 353.03 | 1.58 | Mud Stone |
|  | 353.03 | 389.05 | 36.02 | Clay Stone |
|  | 389.05 | 629.95 | No Electrical Log Data available | |
|  | 629.95 | 630.91 | 0.96 | Mud Stone |
|  | 630.91 | 631.81 | 0.9 | Clay Stone |
|  | 631.83 | 632.31 | 0.48 | Mud Stone |
|  | 632.31 | 633.57 | 1.26 | Clay Stone |
|  | 633.57 | 635.17 | 1.6 | Mud Stone |
|  | 635.17 | 635.89 | 0.72 | Clay Stone |
|  | 635.89 | 636.35 | 0.46 | Mud Stone |
|  | 636.35 | 637.15 | 0.8 | Clay Stone |
|  | 637.15 | 637.81 | 0.66 | Mud Stone |
|  | 637.81 | 643.27 | 5.46 | Clay Stone |

* 1. **RESULTS & DISCUSSIONS** 
     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. The coal seams inferred from visual logging correlates well with the findings of the Geophysical logs in depth, thickness and parting.
     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**

### GENERAL

* + 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.
    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) |

### DESCRIPTION OF FORMATIONS ENCOUNETERED WITHIN THE BLOCK

* + 1. **Soil & Alluvium:** The overlying soil is mainly balck 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

* + 1. **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.
    2. **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. **Barakar Formation:**

It comprises interbanded sequence of dirty white to light grey, medium to coarse grained moderately sorted and sub-mature, felspathic 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**

### GENERAL

* + 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.
    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.
    3. All the coal seams are composed mainly of coal, shaly coal, carbonaceous shale (high),carbonaceous sshale (low) and shale.

### DELINEATION OF COAL SEAMS

* + 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.
    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.
    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% |

* + 1. 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.
    2. Carbonaceous shale (High) has been considered as combustible dirt band, while shale with its varieties and sandstone has been treated as obvious band.
    3. 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.

### NOMENCLATURE AND CORRELATION OF COAL SEAMS

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

* + - 1. Persistency of coal seams/bands.
      2. Thickness of individual seams/bands.
      3. Thickness and nature of parting between seams.
      4. Presence of index horizon.
      5. Roof and floor characteristics of seams.
      6. Presence of marker non-combustible band within a seam.

### SEQUENCE OF COAL SEAMS

### 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 |

* + 1. **QUALITY OF COAL SEAMS**
    2. 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.
    3. 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.

### DESCRIPTION OF COAL SEAMS

* + 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.

### SEAM II A

* + 1. **Occurrence:** Seam IIA found in Barakar Formation and it is the topmost seam.
    2. **Borehole Intersections:** The seam is fully intersected in 10 boreholes.
    3. **Parting:** The parting from underlying IIB seam ranges from 1.68m to 12.07m.
    4. **Thickness:** The stratigraphic thickness of the seam encountered in borehole ranges from 0.76m to 3.00m.
    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.
    6. **Roof & Floor:** Details are given in following table.
    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. |
| 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 | |

* + 1. **Quality :** Seam is comprising of non –coking coal**.** Details of GCV, seamoverall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2.

### 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).

* + 1. **SEAM II B**
    2. **Occurrence:** Seam II B is found in Barakar Formation and it underlies Seam II A.
    3. **Borehole Intersections:** The seam is fully intersected in 09 boreholes .
    4. **Parting:** Seam II B overlies Seam I (parting range 7.74m-13.24m).
    5. **Thickness:** The stratigraphic thickness of the seam encountered in boreholes ranges from 1.00m to 4.00m.
    6. **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.
    7. **Roof & Floor:** Details are given in following table.
    8. 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,Sandyshale,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 | |

* + 1. **Quality :** Seam is comprising of non –coking coal.Details of GCV, seamoverall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2.

### 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).

* + 1. **SEAM I**
    2. **Occurrence:** Seam ICombined is bottom most seam found in Barakar Formation.
    3. **Borehole Intersections:** The seam is fully intersected in 7 boreholes in the block.
    4. **Parting:** The parting from overlying seam IIB ranges from 7.74m to 13.24m.
    5. **Thickness:** The stratigraphic thickness of the seam encountered in borehole ranges from 0.32m to 1.31m.
    6. **Dirt Bands:** No. of dirt bands in Seam I has been noted as 1, having thickness range of 0.28m to 0.65m.
    7. **Roof & Floor:** Details are given in following table.
    8. 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 | |
| **S%** | 0.64-2.08 | .67-2.19 | |

* + 1. **Quality :** Seam is comprising of non –coking coal.Details of GCV, seamoverall analysis has been given in preceding paragraphs and in Annexures VII A1, VII A2

### 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**

# 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.

# BASIC ASSUMPTIONS AND NORMS

### DEFINITIONS

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

* + - 1. Resources estimation of seams IIA, IIB and I has been done.
      2. 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.
      3. Resources are calculated through MINEX software.
      4. 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.
      5. 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.
      6. 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.
      7. 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.

### SEAMS AFFECTED BY INTRUSIVES

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

### 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.

### 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 Charecterization Laboratory, CMPDI HQ, Ranchi.

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

154 x {100 - (1.1 x A + M)} - 108 x M

Gross CV in kcal/kg = ………………………………………………..

1.8

Where A = Ash% and M = Moisture % on equilibrated basis, determined as per IS 1350, 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 |

# PROCEDURE

### BLOCK BOUNDARY

Area of the block is 61.06 Sq. Km.

### BARRIERS

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

### SECTOR

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

### MINE DATA CONSIDERED

No mine exists within the block.

### 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):

1. Coal Seam with maximum ash + moisture content up to 65%
2. Combustible Dirt band with ash + moisture content ranges from > 65% to ≤ 75%
3. 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 ≤0.30m and (ash+moisture) content ranges from >65% and ≤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 ≥ 0.90m 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).

# DESCRIPTION OF RESOURCE

### 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** | | | | | | | | | | | |
| **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 | 0.00 | 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** | | | |
| **300-600** | **600-900** | **>>900** | **Grand Total** |
| **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** |

# 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 ParsodaBlock is **333**.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### CHAPTER-6

**6.0.0 DISCUSSION OF RESULTS AND CONCLUSION**

### DISCUSSION OF RESULTS

* + 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).
    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.
    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 Sectorhave 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.
    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.
    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.

* + 1. 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.
    2. 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.

# RECOMMENDATION

# 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.

# 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.

# 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.

# 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.

# 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.

# \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### BIBLOGRAPHY

* + - 1. Geological report on exploration for coal in Ghonsa Dip Extn. Block, Wardha Valley Coalfield, Dist. Yavatmal, Maharashtra (MECL), 1992.
      2. Geological report on exploration for coal in Parsoda Block, Wardha Valley Coalfield, Dist. Yavatmal, Maharashtra, MECL, 1994.
      3. Geological Report on Borda & Borda Extension Block, Wardha Valley Coalfield, Dist. Yavatmal, Maharashtra, CMPDI (2011).
      4. Khangar, R.G. et. al., Final Report On Exploration For Coal By Scout Drilling In Jhamkola Area, Wardha Valley Coalfield, Yavatmal District, Maharashtra’, GSI (2015).
      5. Khangar, R.G. et. al., Final Report On Regional Exploration For Coal In Dabhadi Sector, Wardha Valley Coalfield, Yavatmal District, Maharashtra, GSi (2015).
      6. Rainfall and weather, Yavatmal District, (MH)– accessed on 02.02.2025 through https://yavatmal.gov.in/rainfall-and-weather/.