

**PROPOSAL FOR GENERAL EXPLORATION FOR COAL
(G-2 STAGE)**

**SOUTH OF DAMUDA BLOCK
JHARIA COALFIELD**

NMET FUNDED PROJECT

DISTRICT– DHANBAD, JHARKHAND



cmpdi
A Mini Ratna Company

सेन्ट्रल माईन प्लानिंग एण्ड डिजाइन इन्स्टीच्यूट लिमिटेड
(कोल इण्डिया लिमिटेड की अनुषंगी कम्पनी / भारत सरकार का एक लोक उपक्रम)
गोन्दवाना प्लेस, कान्के रोड, राँची - 834 031, झारखंड (भारत)
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CORPORATE IDENTITY NUMBER - U14292.JH1975GOI001223

JUNE- 2021

**PROPOSAL FOR GENERAL EXPLORATION FOR COAL (G-2 STAGE)
IN SOUTH OF DAMUDA BLOCK
JHARIA COALFIELD
DISTRICT-DHANBAD, JHARKHAND**

1.0 INTRODUCTION

- 1.1 Jharia coalfield is a part of the Damodar valley coal belt occurring roughly in east-west alignment as “outliers” along the Damodar River in the Archaean shield area. The coalfield is named after the chief mining town Jharia which is situated eastern part of the coalfield. Major part of the Jharia Coalfield comes under administrative control of Dhanbad District and another small part within Bokaro District of Jharkhand state.

The coalfield displays a thick sedimentary sequence of about 2900 m of shallow water, fluvial, lacustrine and glacial environment ranging in age from Carboniferous to Permian (Mukhopadhyay, 1986). The sickle shape basin has an aerial extent of about 456 km² with about 38 km long in east-west direction and about 18 km wide in north-south direction (Chandra, 1992). The sedimentary succession, unconformably overlying the Archean gneissic basement, starts with the Talchir Formation followed upward successively by the Barakar, Barren Measures and Raniganj Formation (Fox, 1930: Mehta and Murthy, 1957: Sengupta et al., 1979), deposited within an intracratonic extensional settings (Ghosh and Mukhopadhyay, 1985). A generalized litho-stratigraphic succession of Jharia Coalfield is given in table no. 2.1 (Chandra, 1992: Fox, 1930: Verma et al., 1989)

- 1.2 The coalfield lies between Latitude 23° 27' to 23° 52' N and Longitude 86° 06' to 86° 30' E. The Jharia coalfield is located about 260 Km north-west of Kolkata in the bank of Damodar River.
- 1.3 As per exploration data of the adjoining blocks Damuda and Madhuband the area has as many as 38 coal seams (>0.50m thickness) from seam I/II and above within the Barakar formation. From the boreholes within the proposed block from Damuda block viz. DM-35, 28, 15, 19, 24, 06, 08, 10, 11, 07, 12, 04, 18 & JK-34 and from adjoining boreholes like SD-3 & APMJ-3 in Madhuband block, it is observed that, the seam I/II occurs within the depth range between 450 to 900m. However, towards south of the proposed block this may reach a depth of 1200m. Strike swings from E-W near Damuda Block to NNE-SSW in the Madhuband Block and dip varies from 5° to 30° southerly to south easterly (Dip increases towards south).
- 1.4 Proposed **South of Damuda** block measuring about 2.94 sq.km is located in the south of Damuda block and west of Madhuband block. Detailed exploration in Damuda Block was carried out by MECL (March, 1984) and GR is available. Detailed exploration upto V/VI/VII Seam in Madhuband Block was carried out by MECL (March, 1982) and GR is available. Presently drilling to explore I/II Seam is being

carried out in Madhuband Block. Based upon the available data of boreholes drilled in Damuda and Madhuband block, the exploration proposal of the block has been prepared.

- 1.5 Accordingly CMPDI has prepared proposal for regional exploration (G2) for coal in South of Damuda block, involving **11390 m** of core drilling in **11** proposed boreholes .

2.0 OBJECTIVES

The exploration is proposed for G2 stage coal exploration in the block for assessing the resource, grade and to establish the structure/behavior of coal seams for mining potential.

3.0 LOCATION AND ACCESSIBILITY

- 3.1 The block is located in the south of Damuda block and west of Madhuband block

- 3.2 The block is well connected by road and rail. The block can be approached by Hirak road from Chandrapura and by DB Road from Dhanbad. The block is situated at road distance of about 40 km southwest of Dhanbad town. Dhanbad-Chandrapura Railway line passes through the block.

- 3.3 The block falls in Survey of India Toposheet no. Toposheet no. 73I/5 &I/6 (1:50000)
The geographical co-ordinates of the block defined are as follows:

Latitude : N – 23° 44' 31.205" to 23° 46' 20.378"
Longitude : E – 86° 09' 48.46" to 86° 11' 12.391"

4.0 PHYSIOGRAPHY AND DRAINAGE

The topography of the area is undulating with gentle slope towards south and south-east. The highest ground elevation is about 220 m. above the mean sea level in the western part of the area and the lowest is about 170 m. above MSL on the left bank of Jamunia river. The drainage of the area is controlled by Jamunia River which joins Damodar River towards south. The surface run-off during the monsoon drains in Jamunia through small southeasterly flowing streams. Besides, there are a number of ponds scattered all over the area. The highest flood levels of Jamunia River recorded in the year 1971, is 185.13 m. above MSL.

5.0 BROAD GEOLOGICAL SET UP

5.1 Stratigraphic Sequence

The Jharia coalfield (453 Km²) is sickle shaped on plan and occurs in the form of syncline with its axis trending broadly in E-W direction and plunging towards west. The southern flank of this coalfield is truncated by boundary fault having maximum throw about 2.5 Km at Mohuda Basin. The non-coal bearing Talchir formation is mainly exposed along the northern and western portion of the coalfield. The Barakar formation covering an area of 218 Km² which is exposed in the northern, eastern and south-eastern part of the coalfield area contains over 40 coal horizons including local and persistent seams, some of which are exclusive store house of metallurgical coal in India. The Barakar formation is overlain by Barren Measure formation which is devoid of workable coal seams. This is mainly exposed in the central part of the coalfield. The Barren Measure is overlain by the coal bearing Raniganj formation (54 Km²). Raniganj formation is exposed within a sub elliptical basin the south-western part of the coalfield. The generalized stratigraphic sequence in Jharia Coalfield is given in Table-I.

TABLE-I
STRATIGRAPHIC SUCCESSION OF THE COALFIELD

Stratigraphic Division	Age	Formation	Lithological characters	
Lower Gondwana	Recent	Alluvium/Soil/Sand		
	Cretaceous to Jurassic	Mica Peridotite/Dolerite Dyke		
	----- Unconformity -----			
	Upper Permian	Raniganj Formation	Mainly fine to medium grained grey current bedded sandstone with shale and coal seam	
	Middle Permian	Barren Measures	Black carbonaceous micaceous shale with clay, ironstone and sandstone.	
	Lower Permian	Barakar Formation	Coarse grained to conglomeratic white sandstone with shale and coal seams	
	Lower Permian	Talchir Formation	Coarse grained sandstone, white or slightly variegated at Top, green shale with undecomposed feldspar, boulder bed etc.	
----- Unconformity -----				
	Archeans	Granites, gneisses and schists.		

5.2 Geology of the block

The area under consideration is located in the south western part of the Jharia coalfield mainly exposes the rocks of the Barren Measures Formations of the Gondwana Super Group.

The stratigraphic succession envisaged in the block from the sub-surface exploration data of adjoining blocks is furnished below in Table-III.

Structure of the block has tentatively been established based on the data generated mainly in Damuda block and Madhuband Block. Based on the Floor levels of seam-XI in Damuda block and Madhuband Block Floor contour plan has been drawn and projected to prepare the floor contour plan of Seam-I.

Almost entire area is covered by Barren Measures. The total thickness of Barren measures as evidenced in adjoining boreholes in Damuda Block in the North and Madhuband block in the South is ranges between 200m-400m. Strike swings from E-W near Damuda Block to NNE-SSW in the Madhuband Block and dip varies from 5° to 30° southerly to south easterly (Dip increases towards south).

TABLE-III
STRATIGRAPHIC SUCCESSION OF THE BLOCK

Stratigraphic Division	Age	Formation	Lithological characters	
Lower Gondwana	Recent	Alluvium/Soil/Sand		
	Cretaceous to Jurassic	Mica Peridotite/Dolerite Dyke		
	----- Unconformity -----			
	Middle Permian	Barren Measures	Black carbonaceous micaceous shale with clay, ironstone and sandstone.	
	Lower Permian	Barakar Formation	Coarse grained to conglomeratic white sandstone with shale and coal seams	
	Lower Permian	Talchir Formation	Coarse grained sandstone, white or slightly variegated at Top, green shale with undecomposed feldspar, boulder bed etc.	
	----- Unconformity -----			
	Archeans	Granites, gneisses and schists.		

5.3 Regional Structure

The Jharia coalfield is sickle shaped on plan and occurs in the form of syncline with its axis trending broadly in E-W direction and plunging towards west. The southern flank of this coalfield is truncated by boundary fault having maximum throw about 2.5 Km at Mohuda Basin.

The Barakar formation is overlain by Barren Measure formation which is devoid of workable coal seams. This is mainly exposed in the central and south western part of the coalfield.

Strike swings from E-W near Damuda Block to NNE-SSW in the Madhuband Block and dip varies from 5° to 30° southerly to south easterly (Dip increases towards south).

5.4 Sequence and quality of coal seams:

As per data available in adjoining blocks total 32 regional and 8 local Barakar Seams are likely to occur in the area of investigation.

Sequence of the seams of Damuda block explored by MECL is given below:

TABLE-IV

SEAM/PARTING	SEAM/PARTING THICKNESS (m)	
	MINIMUM	MAXIMUM
L8	0.25 (DM-18)	1.45 (DM-7)
P	6.55 (DM-8)	98.85 (DM-11)
XVIII E	0.55 (DM-14)	1.46 (JK-34)
P	17.24 (JK-34)	31.60 (DM-8)
L7	0.11 (DM-10)	0.60 (DM-14)
P	16.48 (DM-18)	26.25 (DM-10)
XVIII D	0.00 (DM-6)	0.99 (JK-34)
P	18.90 (DM-14)	34.10 (DM-11)
XVIII C Top	0.60 (DM-6)	3.20 (DM-18)
P	0.75 (DM-18)	1.75 (DM-6)
XVIII C Bot	0.43 (DM-24)	2.76 (JK-34)
P	0.75 (DM-7)	17.55 (DM-10)
L6	0.00 (DM-6)	1.30 (DM-19)
P	6.40 (DM-7)	12.34 (DM-11)
XVIII B	0.95 (DM-8)	3.55 (DM-7)
P	2.25 (DM-3)	18.86 (DM-11)
XVIII A	1.65 (DM-10)	2.65 (DM-11)
P	16.70 (DM-8)	29.47 (JK-34)
XVIII/XVIII A	4.09 (DM-19)	7.72 (JK-34)

P	1.04 (DM-11)	3.40 (DM-10)
XVIII	2.20 (DM-10)	4.95 (DM-3)
P	1.77 (DM-7)	5.90 (DM-3)
L5	0.00 (DM-18)	0.75 (DM-24)
P	8.75 (DM-11)	15.80 (DM-10)
L4	0.45 (DM-7)	2.05 (DM-3)
P	3.00 (DM-24)	29.95 (DM-7)
XVII B	0.00 (JK-34)	3.10 (DM-9)
P	21.45 (DM-18)	35.15 (DM-2)
XVII A Top	0.00 (DM-3)	1.50 (DM-19)
P	0.50 (DM-14)	1.75 (DM-10)
XVII A Bot	2.60 (DM-11)	6.50 (DM-3)
P	22.47 (JK-34)	42.37 (DM-24)
XVII	0.29 (DM-19)	2.74 (DM-18)
P	7.25 (JK-34)	25.55 (DM-8)
L3	0.20 (DM-18)	4.95 (DM-4)
P	5.70 (DM-18)	29.70 (DM-8)
L2	0.00 (DM-19)	1.70 (DM-14)
P	8.92 (DM-18)	22.86 (DM-12)
XVI D	0.35 (DM-10)	1.42 (DM-8)
P	7.50 (DM-11)	25.45 (DM-4)
XVI C	0.00 (JK-34)	1.50 (DM-12)
P	6.85 (DM-4)	26.10 (DM-10)
XVI AB	1.85 (DM-8)	4.99 (JK-34)
P	17.60 (DM-18)	41.70 (DM-8)
XVI	0.36 (DM-7)	1.55 (DM-24)
P	28.65 (DM-10)	63.33 (DM-11)
XV	1.60 (DM-14)	9.90 (DM-12)
P	2.83 (DM-5)	4.24 (DM-7)
XIV Top	1.30 (DM-17)	2.30 (DM-7)
P	0.90 (JK-34)	8.25 (DM-9)
XIV Top/Bot	1.74 (DM-16)	10.95 (JK-34)
P	0.57 (DM-11)	1.50 (DM-17)
XIV Bot	2.90 (DM-17)	5.95 (DM-11)
P	14.26 (DM-7)	30.58 (DM-14)
XIII Top	2.15 (DM-14)	2.70 (DM-18)
P (XIV)	11.70 (DM-10)	51.05 (DM-17)
XIII Top/Bot	2.20 (DM-10)	7.20 (DM-11)
P (XIII Top)	1.60 (DM-14)	2.42 (DM-7)
XIII Bot	1.30 (DM-7)	2.45 (DM-14)
P	19.47 (DM-18)	26.56 (DM-19)
XI/XII	4.99 (DM-31)	7.85 (DM-10)
P	23.80 (DM-24)	51.78 (DM-29)
IX/X	6.12 (DM-10)	15.65 (DM-2)
P	1.03 (DM-34)	12.01 (DM-10)
VIII B	0.00 (DM-5)	3.30 (DM-18)
P	17.76 (DM-20)	27.50 (DM-12)

VIII A	3.86 (DM-31)	7.21 (DM-20)
P	4.20 (DM-15)	28.90 (DM-12)
VIII	0.80 (DM-3)	3.55 (DM-9)
P	6.25 (DM-16)	20.11 (DM-31)
IV/V/VI/VII	24.44 (DM-22)	48.08 (DM-20)
P	25.85 (DM-33)	----
III	0.40 (DM-21)	1.81 (DM-25)
P	1.80 (DM-15)	13.20 (DM-24)
II	1.30 (DM-32)	2.80 (DM-24)
P	0.95 (DM-25)	3.37 (DM-27)
I	0.90 (DM-32)	3.45 (DM-27)
P	11.95 (DM-32)	13.81 (DM-21)
L1	1.00 (DM-25)	2.10 (DM-32)

5.5 Quality of coal seams (as per adjoin GR):

TABLE-V

Seam	Average Thickness coal (m)	Average Thickness Jhama (m)	Average Ash% (Coking)	Average GCV(Kcal/Kg)	Average Grade Range
L8	0.88	0.39	29.5		W-I to W-IV
XVIII E	1.16	0.00	27.97		W-I to W-V
L7	0.55	0.00	39.6		W-V
XVIII D	0.82	0.00	41.02		W-IV to W-VI
XVIII C Top	2.32	0.44	28.92		W-II to W-V
XVIII C Bot	1.58	0.00	22.96		S-II to W-IV
L6	0.94	0.00	21.06		S-I to W-IV
XVIII B	2.58	0.00	22.97		S-I to W-V
XVIII A	1.84	1.80	27.75		S-II to W-V
XVIII/XVIII A	5.85	0.00	28.60		W-II to W-IV
XVIII	3.19	1.10	23.42		W-I to W-III
L5	0.63	0.00	17.26		S-I to W-IV
L4	1.31	0.00	23.88		S-II to W-IV
XVII B	1.68	0.75	35.82		W-II to W-VI
XVII A Top	1.13	0.00	29.78		W-I to W-VI
XVII A Bot	3.61	3.33	27.93		W-I to W-VI
XVII	1.44	0.87	30.71		W-II to W-V
L3	1.09	4.95	27.13		S-I to W-VI
L2	1.16	0.00	24.76		S-I to W-IV
XVI D	0.88	0.00	36.39		W-II to W-VI

XVI C	0.87	0.00	26.17		W-I to W-IV
XVI AB	3.61	0.00	24.39		W-I to W-IV
XVI	1.07	0.95	26.15		W-I to W-IV
XV	5.97	5.41	23.31		S-II to W-V
XIV Top (CO)	1.30	0.00	22.40		W-IV
XIV Top (NC)	1.8	0.00		7062	G1
XIV Top/Bot (CO)	5.08	2.58	31.04		W-II to W-IV
XIV Top/Bot (NC)	7.03	0.00		6667	G2 to G3
XIV Bot (CO)	3.57	0.00	25.15		W-II to W-IV
XIII Top (NC)	2.19	0.00		5712	G5 to G6
XIII Top/Bot (CO)	4.50	3.90	26.22		W-III
XIII Top/Bot (NC)	3.95	0.00		6680	G2 to G3
XIII Bot (NC)	1.94	0.00		6399	G2 to G5
XI/XII (NC)	7.12	0.73		6578	G3
XI/XII (CO)	5.53	4.45	24.75		W-I to W-IV
IX/X (NC)	12.05	0.00		6357	G3 to G4
IX/X (CO)	10.09	7.39	25.48		W-I to W-III
VIII B (NC)	3.05	0.00		5796	G5 to G6
VIII B (CO)	1.35	1.33	36.97		W-III to W-VI
VIII A (CO)	5.36	5.10	27.22		W-II to W-IV
VIII A (NC)	4.67	0.00	27.35	6183	G3 to G5
VIII (NC)	1.55	0.00		6018	G4 to G5
VIII (CO)	1.53	1.50	31.21		S-I to UG
IV/V/VI/VII (NC)	25.83	2.58		6326	G4
IV/V/VI/VII (CO)	22.13	18.69	32.18		W-IV to UG
III (NC)	1.10	0.94			G8 (Tentative)
II (NC)	2.21	1.98		6786	G1 to G5
I (NC)	2.51	1.49		6787	G2
L1 (NC)	1.51	1.6		6825	G1 to G3

5.6 Coal Core Sample

Cumulative coal core length from XVIII-E to I/II seam is about 100m and total coal core length against 8 boreholes will be around 800m

5.7 Resource

Considering seam XVIII-E to I/II, total tentative resource of the block has been estimated is about 212 million tonne. Out 212 million tonne, coking coal may be around 138 million tonnes.

6.0 EXPLORATION SCHEME

G-2 stage exploration activities are proposed in the block.

- 6.1 **Drilling:** For G2 stage exploration in the block drilling of 11390 m in 11 boreholes (Table V) has been proposed in the South of Damuda block. 8 boreholes (8390m) are proposed in a grid pattern of about 800m X 800m and three boreholes (3000m) are proposed for washability studies, since the coals seams in the proposed block are expected to be coking in nature. All boreholes except boreholes proposed for washability studies are to be drilled up to Talchir/Metamorphic Basement so as to know the entire sedimentary & stratigraphic sequence of the block. The depth of intersection for Talchir/Metamorphic has been estimated in a range from 620 m to 1330 m.

TABLE- VI

Depth of Proposed Boreholes in South of Damuda Block, Jharia Coalfield
(Target: Talchir/Metamorphic Basement)

Sl. No.	Proposed BH No.	Expected Depth(m)
1.	P-1	1330
2.	P-2	1260
3.	P-3	990
4.	P-4	1060
5.	P-5	1000
6.	P-6	1020
7.	P-7	1010
8.	P-8	620
Total: 8 No Boreholes		8390 m
Washability Boreholes (3 Nos.) (3 x1000m)		3000m
Total 11 Boreholes		11390m

6.2 Geophysical Study:

Proposed block for exploration is structurally very complex and many faults are present in the area. From the borehole data of adjacent blocks, presence of igneous intrusive is expected in the block. The western boundary of the block is demarcated by Metamorphic.

In the view of the above observations, following geophysical work has been proposed,

Integrated surface geophysical work, Magnetic and Resistivity Imaging along the profile lines in grid pattern with 200m profile line interval in the entire block.

Quantum of surface geophysical works:

Sl.No.	Geophysical Survey	Quantity
1.	Resistivity Imaging Survey	26 linekm
2.	Magnetic Survey	26 linekm

6.3 Geophysical Logging:

It is proposed to carry out Geophysical Logging in all the boreholes proposed for drilling. Following multi parametric geophysical logging shall be carried out during the exploration - Dual Density, Callipers, Sonic, Natural Gamma Ray, Single Point Resistance, Resistivity logs & deviation survey.

6.4 **Quantum of Work Proposed:** Details of proposed work for detailed exploration for coal in South of Damuda block is given below in Table-VII.

TABLE-VII
QUANTUM OF WORK

S.No.	Activity	Quantity
1.	Geological Mapping	2.94 sq.km
2.	Drilling:	
	i) Boreholes	11 BHs. (8 Grid Boreholes + 3 washability Boreholes)
	ii) Meterage	11390m
3.	Surveying (DGPS Survey)	
	i) Levelling and Triangulation	As per requirement
	ii) RL and Co-ordinates	11 BHs.
	iii) Topographical Survey	2.94 sq.km
	iv) DGPS survey	26 points (11 Bhs & 15 Boundary Cardinal Points)
4.	Surface Geophysical Survey	2.94 sq.km
	i) Resistivity Imaging	26 line km
	ii) Magnetic Survey	26 line km
5.	Drill Core Logging	11390m
6.	Geophysical Logging including Deviation Survey	11 BHs. i.e., 11390 m
7.	Chemical Analysis:	
	i) Band by Band	8 BHs (3000 Samples)

	ii) Overall	8 BHs (640 Samples)
	iii) Calorific Value	8 BHs (640 Samples)
8.	Special Tests: (36 samples)	
	i) LTGK Coke Type	1 BH (All major seams)
	ii) Swelling Index/CSN	1 BH (All major seams)
	iii) Plastometric Test	1 BH (All major seams)
	iv) Ultimate Analysis	1 BH (All major seams)
	v) Petrographic Test	1 BH (All major seams)
	vi) Ash Analysis	1 BH (All major seams)
	vii) Phosphorus and Sulphur Analysis	1 BH (All major seams)
9.	Washability Studies	Seams having thickness more than 5 m (~7 seams)

7.0 LIMITATIONS

- 7.1 Some of the boreholes may require shifting due to non-approachability against hillocks gullies / villages/nalas/ bushes etc.
- 7.2 The structural interpretation of the exploration scheme is highly tentative and the same may need to be revised after acquiring initial subsurface boreholes/geophysical information.

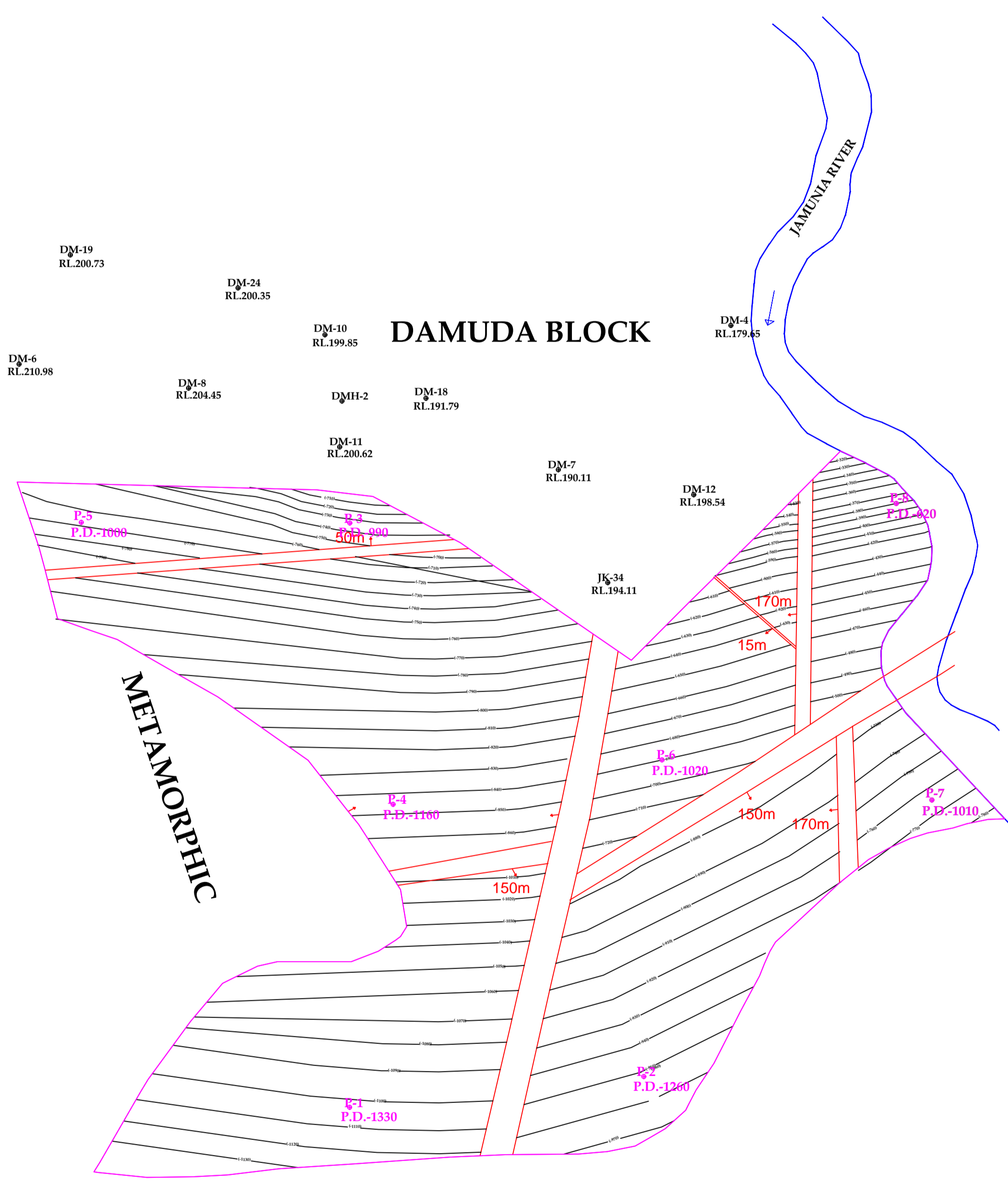
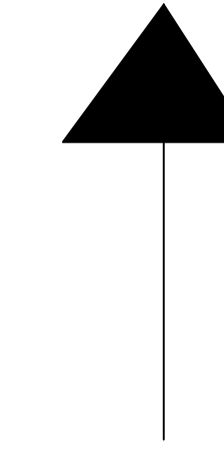
8.0 LIST OF PLATES

8.1 Following plates are enclosed with the proposal:


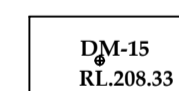
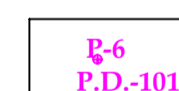
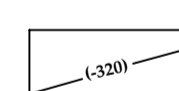

- I. Block Location Map
- II. Borehole Location Plan on RF 1:10,000 along with Floor contour plan (tentative) of Seam-I in South of Damuda block, Jharia coalfield.
- III. Graphic logs of boreholes drilled by MECL in Damuda Block on RF 1:1000.
- IV. Geological Map of the block
- V. Plan Showing Surface Geophysical survey Grids.

Proposed Borehole Location Plan on Tentative Floor Contour Plan of Seam I in South of Damuda Block

NORTH



INDEX

-  Proposed Block Boundary
-  Old Boreholes
-  Proposed Boreholes with depth (m)
-  Floor Contour Lines of I Seam
-  Fault with Throw Direction

WEST MOHUDA BLOCK

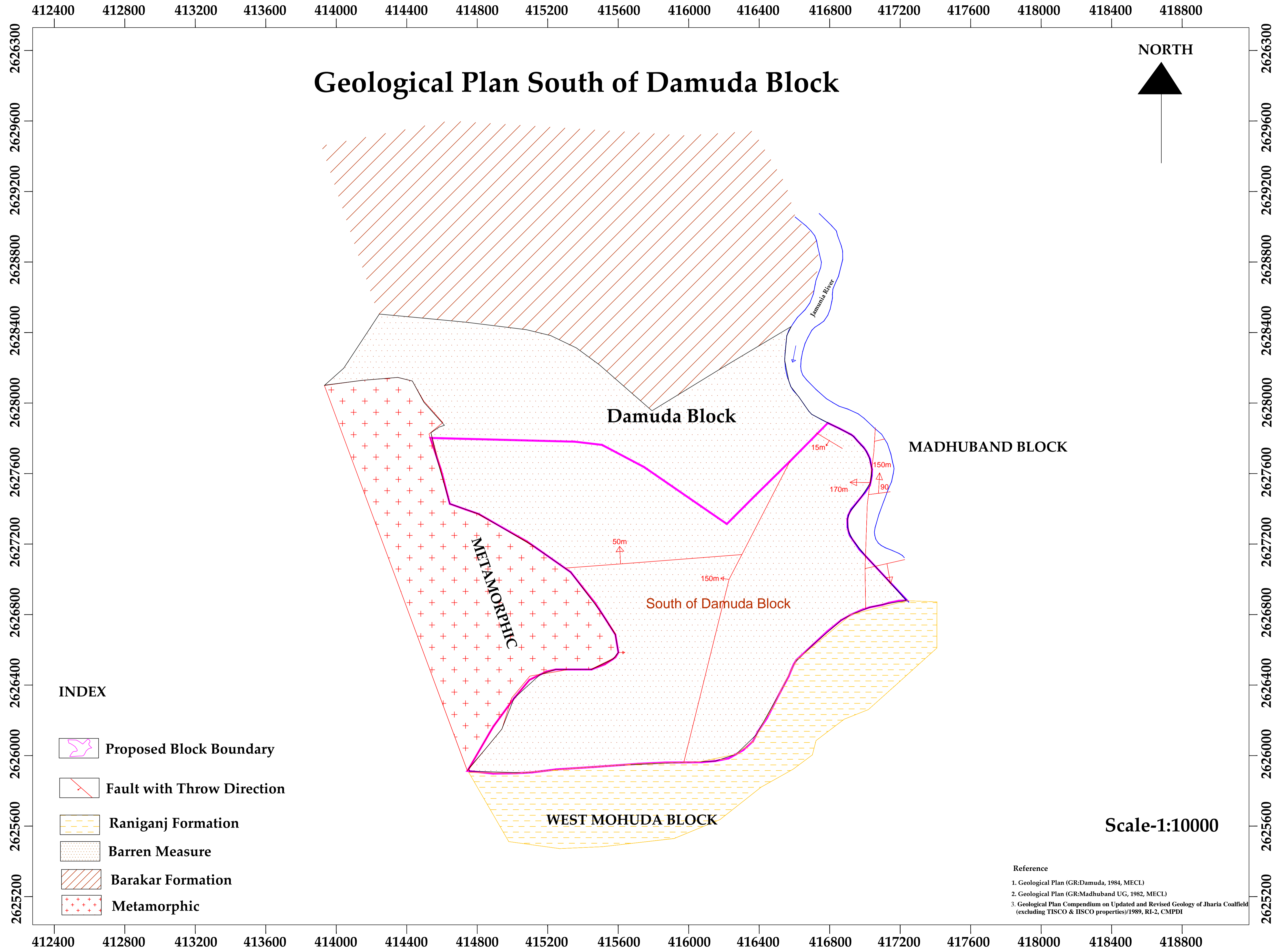
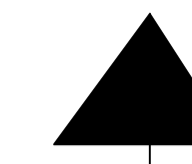
MADHUBAND BLOCK

DAMUDA BLOCK






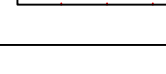
Scale-1:10000

Geological Plan South of Damuda Block

NORTH



INDEX

-  Proposed Block Boundary
-  Fault with Throw Direction
-  Raniganj Formation
-  Barren Measure
-  Barakar Formation
-  Metamorphic

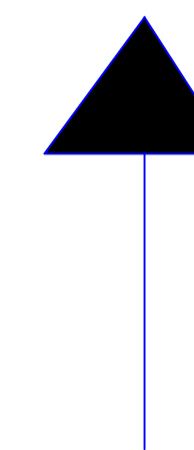
Scale-1:10000

Reference

1. Geological Plan (GR:Damuda, 1984, MECL)
2. Geological Plan (GR:Madhuband UG, 1982, MECL)
3. Geological Plan Compendium on Updated and Revised Geology of Jharia Coalfield (excluding TISCO & IISCO properties)/1989, RI-2, CMPDI

Proposed Surface Geophysical Survey (Resistivity Imaging & Magnetic) Grid Plan South of Damuda Block

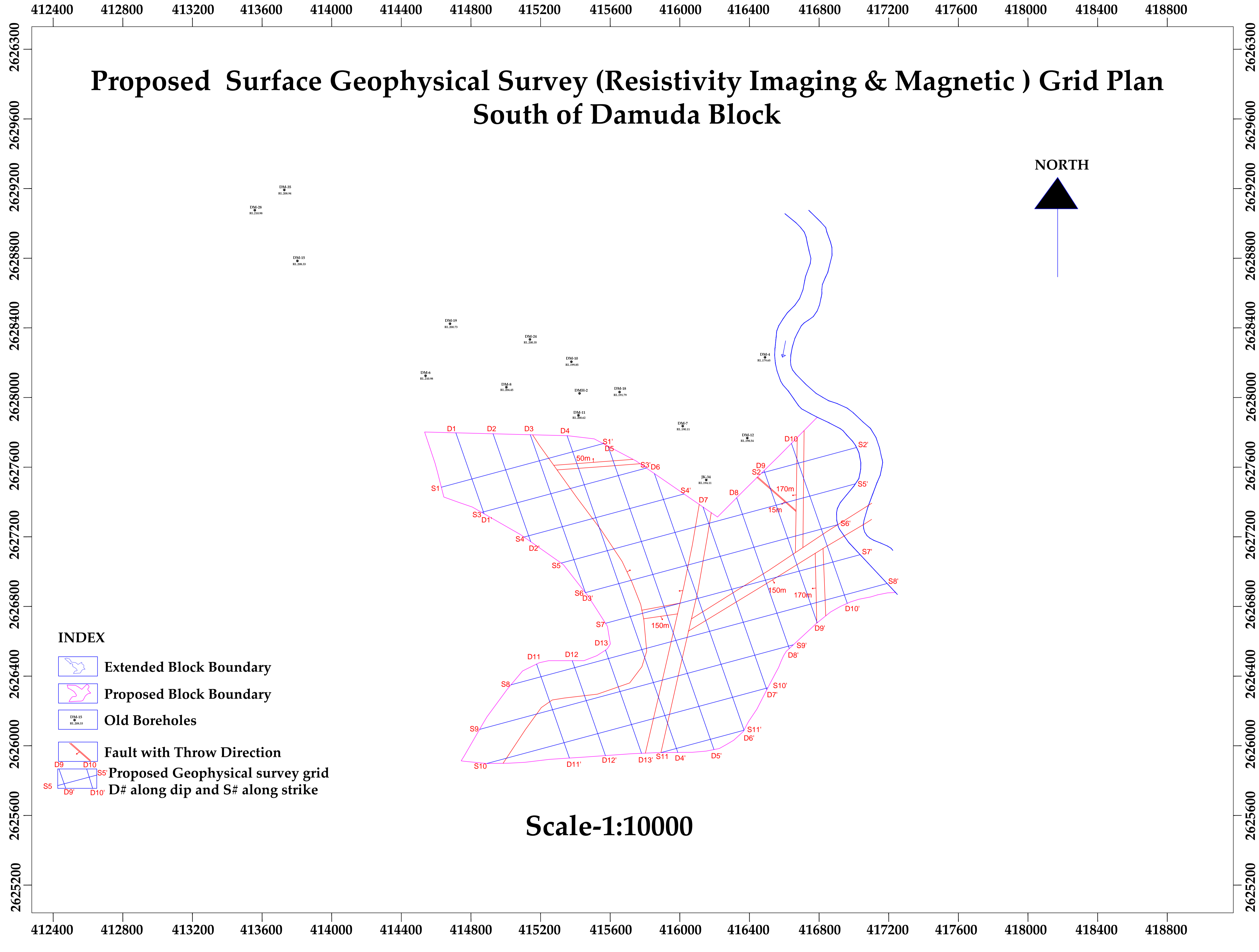
NORTH



INDEX

- Extended Block Boundary
- Proposed Block Boundary
- Old Boreholes
- Fault with Throw Direction
- Proposed Geophysical survey grid
D# along dip and S# along strike

Scale-1:10000



Project Cost Estimate for General Exploration (G2 Stage) of Coal in South of Damuda Block, Jharia Coalfield (Area-2.94 sq.km)

Sl. No	Item Work	Item no in Soc	Unit	Rates as per SoC of NMET	Rate (Rs)	Qty.	Amount (Rs)
I- Field operations (Outsourcing)							
A	DRILLING						
1	Drilling (As per MoC Rate 2020-21)	2.2.1.1b	m	5619	5619	11390	64000410
B	GEOPHYSICAL STUDIES						
1	Borehole Geophysical logging (As per MoC Rate 2020-21)	3.11	m	656	697	11390	7938830
Field operations Total (A+B)							71939240
II- Field Operations (In House)							
A	GEOLOGICAL WORK						
1	Survey Work-1 surveyor	1.6.1b	Day	8300	8300	90	747000
2a	Geological Party days-Field (Mapping, Field work, monitoring)- 1 Geologist	1.5.1b	Day	11000	11000	180	1980000
2b	Geological Party days-HQ, 1 Geologist	1.5.1b	Day	9000	9000	60	540000
Sub Total A							3267000
B	GEOPHYSICAL STUDIES						
1a	Resistivity Imaging	3.6c	line km	34759	34759	26	903734
1b	Magnetic Survey	3.2a	Linekm	72000	38200	26	993200
2a	Geophysicist Party days-Field - (Resistivity+ Magnetic+ Monitoring)- 1 Geophysicist	3.19	Day	11000	11000	70	770000
2b	Geophysicist Party days-HQ - 1 Geophysicist	3.19	Day	9000	9000	30	270000
Sub Total B							2936934
Field Work Total (A+B)							6203934
III-Laboratory Studies (In House)							
1	Band By Band Analysis						
a	Ash+Moisture	4.2.6	per sample	700	700	3000	2100000
b	House Keeping	4.2.1	per sample	115	115	3000	345000
2	Overall analysis						
a	Proximate analysis	4.2.7	per sample	935	935	640	598400
b	Moisture at 60% RH & 40C	4.2.8	per sample	1010	1010	640	646400
c	GCV	4.2.11	per sample	1505	1505	640	963200
d	Sample preparation & House Keeping	4.2.3	per sample	795	795	640	508800
3	Special Test						
a	Ultimate analysis	4.2.17	per sample	9945	9945	64	636480
b	Total Sulphur	4.2.14	per sample	1900	1900	64	121600
c	Distribution of Sulphur	4.2.15	per sample	3695	3695	64	236480
d	Phosphorus	4.2.21	per sample	2480	2480	64	158720
e	HGI including sample preparation	4.2.18	per sample	3805	3805	64	243520
f	AFT (Ash Fusion Temperature)	4.2.20	per sample	2745	2745	64	175680
g	Ash analysis	4.2.25	per sample	325	325	64	20800
h	Ash sample preparation 800°C from coke for analysis	4.2.5	per sample	875	875	36	31500
i	Roga Index(Instead of caking Index)	4.2.22	per sample	5365	5365	36	193140
j	Swelling Index	4.2.23	per sample	2745	2745	36	98820
k	LTGK coke type	4.2.24	per sample	4550	4550	36	163800
4	Petrographic analysis						
a	Pellet preparation	4.3.14a	per sample	1160	1160	36	41760
b	Quantification of Maceral composition	4.3.14b	per sample	10060	10060	36	362160
c	Quantification of Microlithotype composition	4.3.14c	per sample	20000	20000	36	720000
d	Maceral Analysis (with photomicrography)	4.3.14e	per sample	25000	25000	36	900000
e	Microlithotype Analysis (with photomicrography)	4.3.14g	per sample	25000	25000	36	900000
f	Determination of Rank (VRO random %)	4.3.14i	per sample	16345	16345	36	588420
g	Determination of Rank (VRO Min % and Max)	4.3.14h	per sample	21025	21025	36	756900
5	Washability Studies (Seam having thickness of more than 5m i.e 7 seam in 1 bh)	4.13	per sample	127775	127775	7	894425
Laboratory Studies Total							12406005
IV. Miscellaneous Charges (In House)							
a	Preparation of Exploration Proposal	5.1	lump sum	380000	380000		380000
b	Outsourcing process cost	2.3	lump sum	500000	500000		500000
c	Operational charges for CMPDI	Point 3 (iii)of SOC		1500000	1500000		1500000
d	Core Preservation (1 borehole)	5.3	Per m	1590	1590	1230	1955700
e	Geological Report preparation (3% of work value or Max 20 Lakhs)	5.2					2000000
f	Land crop compensation	5.6	Per bh	20000	20000	11	220000
g	DGPS Survey of bundary, borehole points (11 boreholes & 15 boundary point)	1.6.2	per point	19200	19200	26	499200
h	3 D ore body modelling using Minex software	5.4		2500000	2500000		2500000
i	Peer review			10000	10000		10000
Miscellaneous Charges Total							9564900
Total (I- Field op +II .Foeld work+III Lab+ IV Misc)							100114079
GST (@18%)							18020534.22
Grand Total							118134613

11.81346132

Note- 1) Above rate of drilling, GPL, Chemical are budgeted rates.

2) There are numerous items in chemical analysis.The CIMFR rates will be applied for actual payment.

3) For Drilling & Geophysical the approved rates of MoC for FY 2020-21 has been taken other rates are as per approved SoC rates.

4) GPL rates is Rs 697/- per meter of minimum 8 parameters, the break up is as follow

Probe	SoC Item No	Rate 2020-21 (in Rs)
1 Base Log	3.11a	162
2 Dual Density	3.11d	110
3 Natural Gamma	3.11h	96
4 Caliper	3.11g	20
5 SPR	3.11i	41
6 Sonic	3.11k	131
7 Deviation	3.11m	96
8 Resistivity	3.11c	41
Total		697

5) Lumpsum rate of Rs. 25.00 Lakh has been considered for 3D Ore Body Modeling.

6) Lumpsum amount of Rs. 10,000 has been considered for Peer Review.

7) Rate of Magnetic Survey- 100 points in a line km , 382 per station , Hence 382x 100 i. e. Rs.38,200 per line km

Time Schedule/Action Plan for South of Damuda Block, Jharia Coalfield																									
S. No	Activities	Units	Months																						Remarks
			1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
1	Outsourcing	Months	<----->																					3 Months	
2	Mobilising	Months		←																				1 months	
3	Surface Geophysical Investigation (Gravity+Mag+Resistivity)	Months			<----->																			2 months	
4	Geophysical Report Preparation	Months				↔																		1 months	
5	Drilling (Nos of rigs-3 rigs)	Months					<----->																	11390 in 11 Bh	
6	Borehole Geophysical logging	Days					<----->																	11390 in 11 Bh	
7	Survey Party days (1 Party)	Days					<----->																	90 Days	
8	Geologist Party days, Field (1 Party)	Days					<----->																	180 Days	
9	Geophysicist Party days, Field (1 Party)	Days					<----->																	70 Days	
10	Laboratory Studies (Band By Band)	Nos.					<----->																	640 sample	
11	Laboratory Studies (Overall)	Nos.						<----->																64 Sample	
12	Laboratory Studies (Special)	Nos.							<----->															36 Sample	
13	Laboratory Studies (Petrography & Wshability)	Nos.																						36 & 7 sample	
14	Geologist Party days, HQ (1 Party)	Days																						60 Days	
15	Geophysicist Party days, HQ (1 Party)	Days																						30 Days	
16	3 D Modelling	Months																						4 Months	
17	Report Writing & Peer Review	Months																						6 Months	

Note: Please add activities accordingly and timeline (months)

Total Time Period of Completion of Project-

22 months from Sanction of Project