PROPOSAL FOR PRELIMINARY EXPLORATION
FOR COAL (G-3 STAGE)

WEST OF TUBED

NMET FUNDED PROJECT

AURANGA COALFIELD

DISTRICT– LATEHAR,

JHARKHAND

सेन्ट्रल माईन प्लानिंग एण्ड डिजाइन इन्स्टीच्यूट लिमिटेड
(कोल इण्डिया लिमिटेड की अनुषंगी कम्पनी / भारत सरकार का एक लोक उपक्रम)
गोन्दवाना प्लेस, कांके रोड, राँची - 834 031, झारखंड (भारत)
Central Mine Planning & Design Institute Limited
(A Subsidiary of Coal India Limited / Govt. of India Public Sector Undertaking)
Gondwana Place, Kanke Road, Ranchi - 834 031, Jharkhand (INDIA)
CORPORATE IDENTITY NUMBER - U14292JH1975GOI001223

JUNE - 2022

PROPOSAL FOR PRELIMINARY EXPLORATION (G3 STAGE) FOR COAL IN WEST OF TUBED COAL BLOCK, AURANGA COALFIELD, DISTRICT-LATEHAR, JHARKHAND

1.0 INTRODUCTION

1.1 The Auranga Coalfield is the easternmost of the North Koel Valley Gondwana basins. The coalfield was named by Ball (1880) after the Auranga river, which drains through the middle part of the coalfield and joins the North Koel River. The Permo-Triassic sediments of the Auranga Coalfield occur in a topographic low land, which is bounded on the south by the upland of Ranchi plateau and on the north by the hills of Hazaribagh. Highly ferruginous sandstones of Mahadeva formation form small hillocks which are located in the neighbourhood of Sabanu, Jagaldagga and Latehar.

'West of Tubed' Block covers an area of **11.69 sq. km**. The West of Tubed Block is situated in the Northern part of the Auranga coalfield. Tubed block is located in the north east of the proposed block. The trend of beds in Tubed block is N-S to NNE-SSW in the south. The dip of the beds in general varies from 5° to 10° towards east. The expected strike of the beds in West of Tubed block is E-W in the major part of the block to NE-SW in the western part of the block. The expected dip is towards south to south east.

1.2 The pioneering work in the Auranga Coalfield was done by V.Ball (1878) who not only named this coalfield but also mapped the different formations with a fair degree of accuracy. The field was resurveyed by J.A.Dunn (1927-28). Both Ball and Dunn have recognized in this field the same strata as found in Karanpura and Bokaro fields with the exception of iron stone shales. In recent years, Rizvi and Sen (1959) carried out sedimentological studies and examined the different outcrops of the seams. Of late, M.Das (1979-79) conducted a resurvey and made a reappraisal of the coal potentiality of the then virgin coalfield.

1.3 Initially the area was explored by GSI from 1981-82 to 1984-85 and 25 boreholes belonging to the AR series were drilled. Later, detailed Exploration in adjacent Tubed Block, lying to the north east of the proposed block, was carried out by MECL from 14.06.2004 to 07.01.2005. A total of 20 Bhs involving 3011.15m were drilled in the block. Thirteen correlatable coal seams have been established as belonging to the Barakar Formation. The proposed block is the south western extension of Tubed. Tubed is separated from the proposed block by a regional fault as mapped by GSI with the proposed block lying in the downthrown direction. The same seams which are

occurring in Tubed block are expected to be encountered in this block as well. Net Proved Resources amounting to 166.97 MT of non-coking coal has been reported in the Tubed block by MECL with an area of 4.60 sq. km with total Resource of 189.81 MT.

1.4 In the adjacent Tubed Block, a total number of 22 boreholes have been drilled by MECL (20 BHs-3011.15m) and GSI (2 BHs-315.00m) with a total meterage of 3326.15m. Only borehole no AR-25, drilled by GSI, occurs in the proposed area and the borehole was closed at a depth of 189.00m.

Table-1

Details of Boreholes previously drilled in the Block

DRILLING AGENCY	BOREHOLE NO.	METERAGE DRILLED	TOTAL COAL THICKNESS ENCOUNTERED (CORRELATABLE SEAMS)
GSI	AR-25	189.00	0.00

1.5 CMPDI has prepared a proposal for Preliminary Exploration for coal in West of Tubed involving **2700.00 m** of drilling in 5 boreholes for G3 stage. The boreholes have been proposed at 1600m×1600 m grid.

2.0 OBJECTIVES

2.1 The G3 stage of Exploration in the block is proposed to fulfil following objectives-

- To establish the existence and continuity of probable coking coal seams occurring in the block as significant coal resources present in adjoining block such as Tubed.
- To know the whole Gondwana sedimentary column of the said proposed area.
- To establish the lay, disposition of coal seams.
- To assess the coal resource in Inferred category.

3.0 LOCATION, COMMUNICATION AND ACCESSIBILITY

3.1 The area falls in the Latehar district of Jharkhand. The block is connected to Latehar Township, which is at a distance of 12-14 kms, by an all-weather motor able road. Ranchi-Daltonganj state highway passes through the district headquarter Latehar.

3.2 The nearest railway station is at Latehar. The nearest airport is located in Ranchi.

3.3 West of Tubed block is located in the northern part of Auranga CF District Latehar. The area is covered under the Survey of India Topo-sheet no- 73 A/9. The geographical co-ordinates of the block defined are as follows:

Latitude	**23° 47' 52.437" N**	**23° 49' 38.276" N**
Longitude	**84° 30' 43.56" E**	**84° 34' 40.069" E**

4.0 BLOCK BOUNDARY:

Boundary description of the proposed block is as follows:

North	Metamorphic Basement
South	Metamorphic Basement and Banhardih Block.
East	Tubed Block and unnamed block.
West	Metamorphic Basement.

5.0 PHYSIOGRAPHY, DRAINAGE

5.1 A major part of the block covered by a gently undulating topography having a generalized northerly slope. The area has a rugged topography in the south-east and is more or less flat in the rest of the block with a northerly slope. The block is dissected by Sukri River flowing in the Northern half of the block it. The ground elevation is expected to vary between 370m and 430m.

6.0 CLIMATE AND VEGETATION

6.1 The proposed area falls in the tropical zone and the maximum temperature during summer season (March-May) varies from 40-45°C. The minimum temperature during the same period is around 22°C. The winter (November-February) is normally cold with a minimum recorded of about 1°C. The average rainfall in the region is generally 1200mm and the relative humidity is about 51%.

6.2 32-35% of the proposed block area is covered by forest as per the Topographical plan of SOI available.

7.0 BROAD GEOLOGICAL SET UP

7.1 Stratigraphic Sequence

The geological succession in this coalfield as per published report of GSI and MECL is given below:

TABLE - 2

STRATIGRAPHIC SUCCESSION OF THE COALFIELD

Period	Group	Sub-Group	Formation	Lithology
Recent	-	-	Alluvium	Detrital & alluvial soil & sub-soil
Upper Triassic	Upper Gondwana	-	Mahadeva	Highly cross bedded, medium to coarse grained ferruginous sandstones, pebble bed and red shales. (180m-210m)
----------UNCONFORMITY----------				
Lower Triassic	Lower Gondwana	-	Panchet	Medium to coarse grained feldspathic, greenish to yellowish green purple sandstones with brown and chocolate shales. (130m-150m)
Upper Permian		Damuda	Raniganj	Fine to medium grained sandstone, siltstone, sandy shale and carbonaceous shale. (180m-200m). .
Middle Permian			Barren Measures	Medium to coarse grained sandstones, carbonaceous shales and Ironstone bands. (80m-160m).
Lower Permian			Barakar	Fine to coarse grained sandstones, pebble beds, conglomerates, carbonaceous shales, fireclays, coal seams. (400m-450m)
			Karharbari	Grey, mottled, conglomeratic coarse grained sandstone and shale with dull, clean coal. (40m-85m).
Upper Carboniferous(?) to Lower Permian	-	-	Talchir	Tillites, yellowish sandstones, needle shales, rhythmites, etc. (30m-35m)
.....UNCONFORMITY.....				
Precambrian	-	-	Metamorphic	Granite Gneisses , Mica Schist, Amphibolite and Quartzite.

8.0 REGIONAL STRUCTURE:

The Auranga coalfield is the eastern most coalfield of the North Koel valley Gondwana basin. It is 20 km away from the North Karanpura basin, the western most member of the Damodar valley coalfield. The Auranga coalfield shows close similarity in its stratigraphic and tectonic setting with that of the adjacent Damodar valley basin.

TECTONIC SETUP:

Faulting:

Auranga basin is dissected into several blocks due to complex pattern of faulting. The dips are high, being around 200 – 300 in areas of disturbances. In the areas free from such disturbances dips are gentle being around 50 – 100.

In the western part of coalfield, Gondwana sediment occurs as a narrow wedge due to complex faulting. The boundary faults at places pass though the central part of the basin and develop into intra-basinal faults. The boundary fault running along the Auranga river has truncated the coal measures of Jagaldaga area to south. A major east west trending fault has truncated the coal measures towards north.

In Auranga Coalfiled, the major faults have two regional trends; E-W and NW-SE. The basin by and large is fault bounded on both the sides and southern boundary is much more disturbed by faulting. Some of these faults have throw of more than 200m.

Basin Configuration:

The Auranga coalfield occurs in an east west trending faulted belt which tapers towards the west. The Auranga basin can be differentiated into two distinct sedimentological domains:-

i) The Western Part and

ii) The Eastern Part

The Western Part is located west of Latehar. It has witnessed periodical uplift during sedimentation. The more subsiding part favored the accumulation of coarse clastic material. Such a tectonic setting is unfavorable for accumulation of persistent coal seams.

The Eastern Part of the Auranga basin comprises a few lifted segments within the half graben configuration. The sedimentation style shows alternate period of uplift of the positive areas and intervening period of quiescence. During the period of quiescence, the swamp conditions developed and the flourishing vegetation gave rise to coal seams..

In addition to above, there are many prominent faults trending mostly WNW-ESE. The throw of some of these faults is over 100 meters.

9.0 SEQUENCE OF COAL SEAMS:

9.1 The Auranga Coalfield is characterized by the presence of 7 Coal Seams named seam VII to I in descending order and their splits belonging to the Barakar Formation and are separated by well-defined parting.

9.2 The sequence of coal seams likely to occur in the proposed block on the basis of boreholes drilled in adjoining blocks mainly comprises 13 seams of the Barakar Formation which in descending order are VII(Top and Bottom) or VII Combined, VI, V (Top and Bottom), IV (top and Bottom), III (Top, Middle and Bottom), II, I (Top and Bottom)

TABLE - 4

SEQUENCES OF COAL SEAMS ALONGWITH THICKNESS RANGE AND QUALITY RANGE IN TUBED BLOCK.

SEAM	DEPTH RANGE OF FLOOR		THICKNESS (in meter)	QUALITY	
	FROM	TO			
VII Top	19.30	171.46	7.42-11.97	F	G11-G12
Parting			1.06-3.90		
VII Bottom	7.18	174.54	0.65-1.60	E	G9-G10
Parting with VI			3.15-13.58		
VII Combined	37.02	73.28	9.08-10.14	F	G11-G12
Parting			7.36-9.38		
VI	17.85	183.10	0.10-0.64	F	G11-G12
Parting			4.47-17.23		
V Top	20.12	203.56	4.82-8.37	E-F	G9-G12
Parting			3.74-16.22		
V Bottom	20.12	222.59	5.77-11.22	F	G11-G12
Parting			1.45-10.20		
IV Top	26.05	227.72	0.54-7.64	F	G11-G12
Parting			0.76-5.94		
IV Bottom	29.64	230.24	0.50-5.32	E	G9-G10
Parting			1.36-9.69		
III Top	7.39	240.93	0.58-7.42	E	G9-G10
Parting			1.23-6.97		

SEAM	DEPTH RANGE OF FLOOR		THICKNESS (in meter)	QUALITY	
	FROM	TO			
III Middle	9.42	243.92	0.20-1.94	E-F	G9-G12
Parting			1.57-9.70		
III Bottom	12.37	252.30	0.55-4.05	D-F	G7-G12
Parting			2.38-8.97		
II	9.35	259.54	4.49-15.48	E-F	G9-G12
Parting			1.26-8.00		
I Top	12.40	263.89	0.22-4.73	E-F	G9-G12
Parting			2.01-6.72		
I Bottom	37.05	267.45	0.25-3.42	E-F	G9-G12

The average quality of the coal seams encountered in the adjoining Tubed Block is G9-G10 grade.

10.0 EXPLORATION SCHEME

10.1 Drilling:

2700.00 m of drilling in 5 boreholes for G3 stage are proposed at 1600m×1600 m grid. The details of all the proposed boreholes and their expected depth details with cumulative meterage details are tabulated below.

TABLE-5

PROPOSED BOREHOLES AND EXPECTED DEPTH DETAILS

PROPOSED POINT	EXPECTED RL (M)	EXPECTED DEPTH UP TO SEAM- I Bot (m)	EXPECTED DEPTH(M) UPTO TALCHIR/ METAMORPHIC	REMARKS
P-1	390	430	580	Up to Talchir/Basement
P-2	390	460	-	Up to Seam-I
P-3	390	540	-	Up to Seam-I
P-4	390	450	-	Up to Seam-I
P-5	420	670	-	Up to Seam-I
		Grand Total	**2700m**	

10.2. Target depth of Exploration:

One borehole is to be drilled up to the Talchir formation or Basement Metamorphic rock for establishing the full sequences of Gondwana Sedimentary sequences within he proposed block area.

10.3 Core Logging and Coal core Sampling:

Breakup of Core logging, Sampling and Geophysical Logging are given below:

No of BHs	Type of Bhs	Meterage	Logging required	GPL required	Expected Coal Cores/BH	Total Coal Cores	Analysis
5	Coring	2700	2700	2700	70	350	Prox, SOV, Sp. Test

Expected no of samples for Band by Band Analysis per borehole is around 1100.

10.4 Different types of Analysis:

Following test are required to be carried out:

- All the boreholes may be required to be taken up for Band-By-Band Analysis.
- 100% boreholes of above boreholes may be required for Seam Overall Analysis (Proximate Analysis, GCV).
- 1 boreholes (Grid boreholes) for Ultimate Analysis and Special Test including Coking Properties Analysis and Petrographic Analysis.

10.5 Geological Mapping:

Geological Mapping in 1:10,000 scale needs to be carried out.

10.6 Topographical Survey:

Topographical Survey at 2 meter interval is required to be carried out.

10.7 Borehole Survey, RL Survey:

All the proposed boreholes & boundary cardinal points are required to Surveyed using DGPS.

10.8 Geophysical Logging:

100% of the coring boreholes i.e. six numbers, may be taken up for Geophysical Logging that may involve a total meterage of around **2700.00 meter**.

10.10 Quantum of Work in brief:

TABLE-7

QUANTUM OF WORK

S. No.	Activity	Quantity
1	Geological Mapping	11.69 Sq km. (1:10,000 scale).
2	Drilling	
	i) Boreholes	5 Boreholes.
	ii) Meterage	2700.00 meter (5 BHs)
3.	i) Leveling and Triangulation	As per requirement.
	ii) RL and Co-ordinates	5 Boreholes.
	iii) DGPS Survey	23 points (5 boreholes and 18 boundary cardinal point)
4.	Drill Core Logging	2700.00 meter (5 BHs)

S. No.	Activity	Quantity
5.	Geophysical Logging With standard set of parameters	5 Boreholes (2700m)
7.	Chemical Analysis:	
	Band by Band	5 BHs – 1100 nos,
	Overall Proximate	Five Boreholes All seams (BCS & I) (Samples – 80 nos).
	Gross Calorific Value	Five Boreholes All seams (BCS & I) (Samples – 80 nos).
8.	Special Tests (AFT, HGI, Ash analyses, Total sulfur, Distribution of sulfur) & Ultimate Analysis	One borehole all seams (15 samples for each test)
9.	Petrographic	1 BH - 15 Nos samples.
10.	Geological Report Preparation	1 No.

10.13 Time Schedule:

Expected time of completion of Project is 14 Months.

11. LIMITATIONS:

1. Only one borehole (AR-25), drilled by GSI is in the present block but that too was closed at 189.00m depth before encountering any coal seam. The throw of the fault separating Tubed and the proposed block is highly tentative. Thus the envisaged meterage may vary in totality.

2. The Proposed block area are bounded by Metamorphic Basement rock in North, West and South. Thus boreholes falling around the boundary area may be taken up with utmost care and it is thus proposed to take up the Surface Geophysical Survey for delineation of the boundary at very initial phase of exploration i.e before commencement of drilling work.

3. Some of the boreholes may require shifting due to non-approachability due to presence of hills /gullies/villages/forest cover/agriculture land etc.

12. REFERENCES:

1. Geological Report on Exploration for Coal, Tubed Block, Auranga Coalfield, District: Latehar, Jharkhand, MECL, March, 2006.

2. Final Report on the Regional Exploration for Coal in the Rajbar Sector, Auranga Coalfield, Palamau District, Bihar, GSI, 1988 by M.Das.

13. LIST OF PLATES:

1. Location Map (Plate I)

2. Geological Map. (Plate II)

3. Lithologs of boreholes. (Plate-III)

4. Proposed Borehole locations Plan. (Plate-IV)

Summary of proposal for Preliminary Exploration (G-3 stage) in West of Chano-Rikba, North Karanpura Coalfield

The West of Tubed Block is situated in the Northern part of the Auranga coalfield. The area falls in the Survey of India Toposheet Nos. 73 A/9 (RF 1:50,000) and is within the geographical co-ordinates mentioned underneath

Latitude	**23° 47' 52.437" N**	**23° 49' 38.276" N**
Longitude	**84° 30' 43.56" E**	**84° 34' 40.069" E**

The block is proposed on the basis of positive results in earlier boreholes by MECL in Tubed Block which is in the eastern and north eastern part of the proposed block.

The generalized stratigraphic succession in the block is as follow-

Period	Group	Sub-Group	Formation	Lithology
Recent	-	-	Alluvium	Detrital & alluvial soil & sub-soil
Upper Triassic	Upper Gondwana	-	Mahadeva	Highly cross bedded, medium to coarse grained ferruginous sandstones, pebble bed and red shales. (180m-210m)
----------UNCONFORMITY----------				
Lower Triassic	Lower Gondwana	-	Panchet	Medium to coarse grained feldspathic, greenish to yellowish green purple sandstones with brown and chocolate shales. (130m-150m)
Upper Permian		Damuda	Raniganj	Fine to medium grained sandstone, siltstone, sandy shale and carbonaceous shale. (180m-200m). .
Middle Permian			Barren Measures	Medium to coarse grained sandstones, carbonaceous shales and Ironstone bands. (80m-160m).
Lower Permian			Barakar	Fine to coarse grained sandstones, pebble beds, conglomerates, carbonaceous shales, fireclays, coal seams. (400m-450m)
			Karharbari	Grey, mottled, conglomeratic coarse grained sandstone and shale with dull, clean coal. (40m-85m).

Upper Carboniferous(?) to Lower Permian	-	-	Talchir	Tillites, yellowish sandstones, needle shales, rhythmites, etc. (30m-35m)
UNCONFORMITY				
Precambrian	-	-	Metamorphic	Granite Gneisses , Mica Schist, Amphibolite and Quartzite.

The trend of beds in Tubed block is N-S to NNE-SSW in the south. The dip of the beds in general varies from 5° to 10° towards east. The expected strike of the beds in West of Tubed block is E-W in the major part of the block to NE-SW in the western part of the block. The expected dip is towards south to south east.

The sequence of coal seams likely to occur in the proposed block on the basis of boreholes drilled in adjoining blocks mainly comprises 13 seams of the Barakar Formation which in descending order are VII(Top and Bottom) or VII Combined, VI, V (Top and Bottom), IV (top and Bottom), III (Top, Middle and Bottom), II, I (Top and Bottom). The coals are non-coking in nature.

Seam wise Thickness range, Grade of seams encountered in Tubed Block is mentioned below:

SEAM	DEPTH RANGE OF FLOOR		THICKNESS (in meter)	QUALITY	
	FROM	TO			
VII Top	19.30	171.46	7.42-11.97	F	G11-G12
Parting			1.06-3.90		
VII Bottom	7.18	174.54	0.65-1.60	E	G9-G10
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Parting			1.45-10.20		
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Parting			0.76-5.94		
IV Bottom	29.64	230.24	0.50-5.32	E	G9-G10
Parting			1.36-9.69		

SEAM	DEPTH RANGE OF FLOOR		THICKNESS (in meter)	QUALITY	
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III Top	7.39	240.93	0.58-7.42	E	G9-G10
Parting			1.23-6.97		
III Middle	9.42	243.92	0.20-1.94	E-F	G9-G12
Parting			1.57-9.70		
III Bottom	12.37	252.30	0.55-4.05	D-F	G7-G12
Parting			2.38-8.97		
II	9.35	259.54	4.49-15.48	E-F	G9-G12
Parting			1.26-8.00		
I Top	12.40	263.89	0.22-4.73	E-F	G9-G12
Parting			2.01-6.72		
I Bottom	37.05	267.45	0.25-3.42	E-F	G9-G12

The average quality of the coal seams encountered in the adjoining Tubed Block is G9-G10 grade.

The total proposed area for G3 Stage of exploration is 11.69 sq.

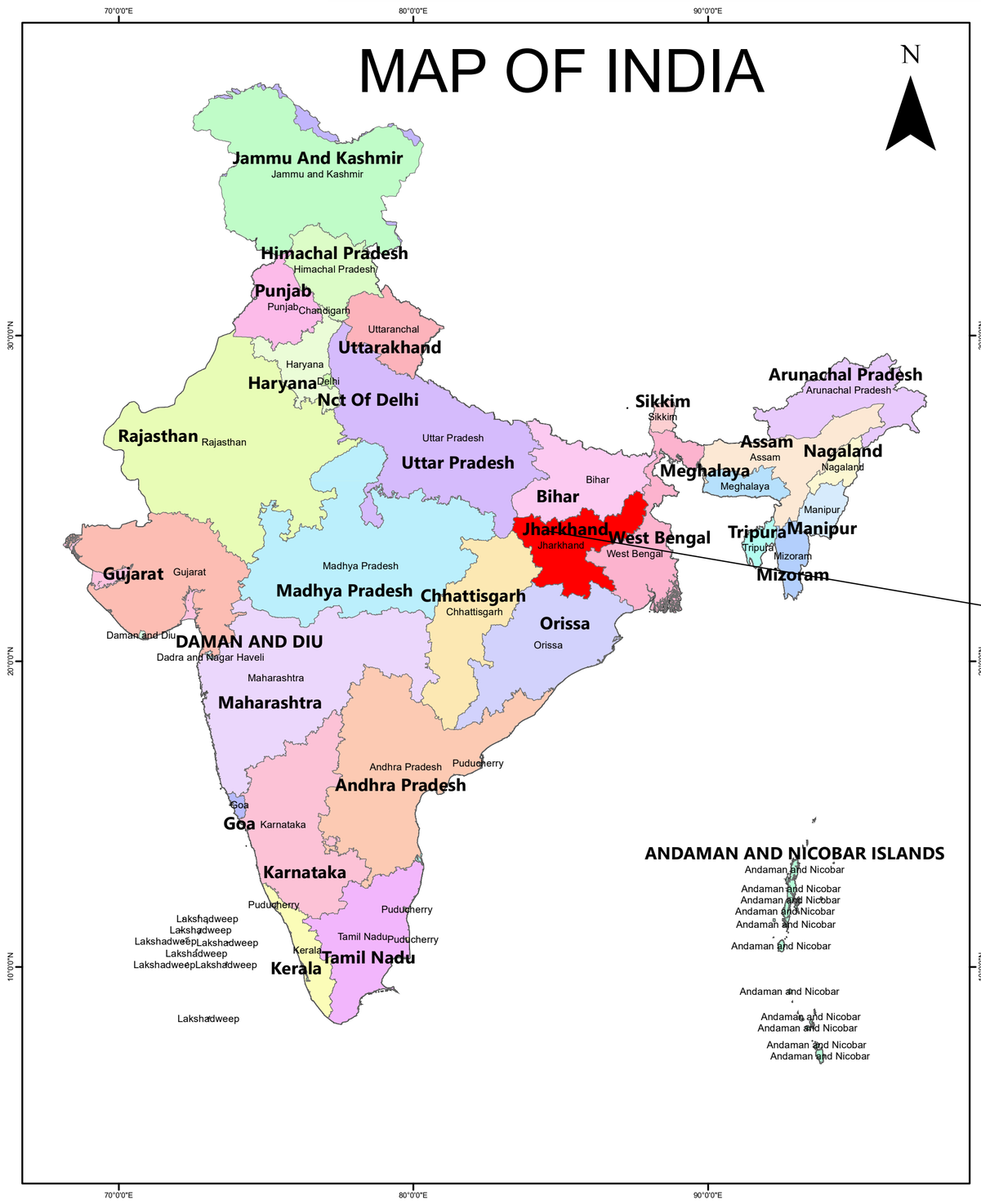
The quantum of work proposed for G3 stage of exploration is as follow:

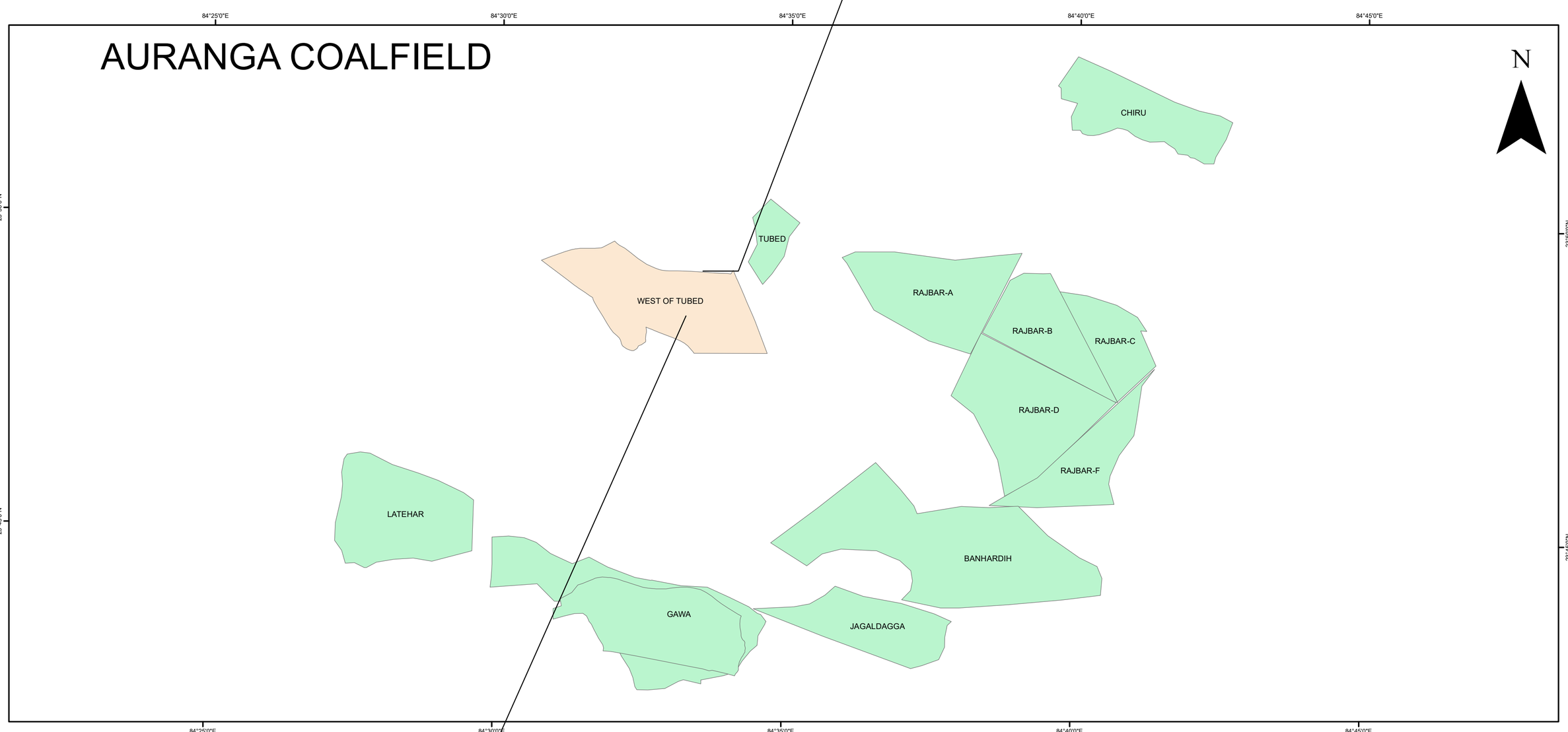
Quantum of Work

S.No.	Activity	Quantity
1.	Geological Mapping	11.69 sq.km
2.	Drilling:	
	i) Boreholes	5 BHs.
	ii) Meterage	2700m
3.	Surveying (DGPS Survey)	
	i) Levelling and Triangulation	As per requirement
5.	Drill Core Logging	2700m
6.	Geophysical Logging including Deviation Survey	5 BHs. i.e., 2700 m (100% of the boreholes)
7.	Chemical Analysis:	
	i) Band by Band	5 BHs (All seams)
	ii) Seam Overall	5 BHs (All seams)
	iii) Calorific Value	5 BHs (All seams)
8.	Special Tests:	
	i) LTGK Coke Type	1 BH (All major seams)
	ii) Swelling Index/CSN	1 BH (All major seams)
	iii) Ultimate Analysis	1 BH (All major seams)
	iv) Petrographic Test	1 BH (All major seams)
	v) Ash Analysis	1 BH (All major seams)
	vi) Phosphorus and Sulphur Analysis	1 BH (All major seams)

Time Schedule of Project – 14 months from sanction of Project.

LOCATION MAP OF WEST OF TUBED BLOCK, AURANGA COALFIELD





GEOLOGICAL MAP OF A PART OF AURANGA COALFIELD SHOWING WEST OF TUBED COAL BLOCK, JHARKHAND

0 0.5 1 2 3 4 Kilometers

1:31,680

84°31'11"E 84°32'12"E 84°33'13"E 84°34'14"E 84°35'15"E 84°36'16"E

23°50'0"N 23°49'0"N 23°48'0"N

N

P-1 P-2 P-3 P-4 P-5

AR-11 AR-7 AR-18 AR-10 AR-12 AR-9 AR-25

5 25 2

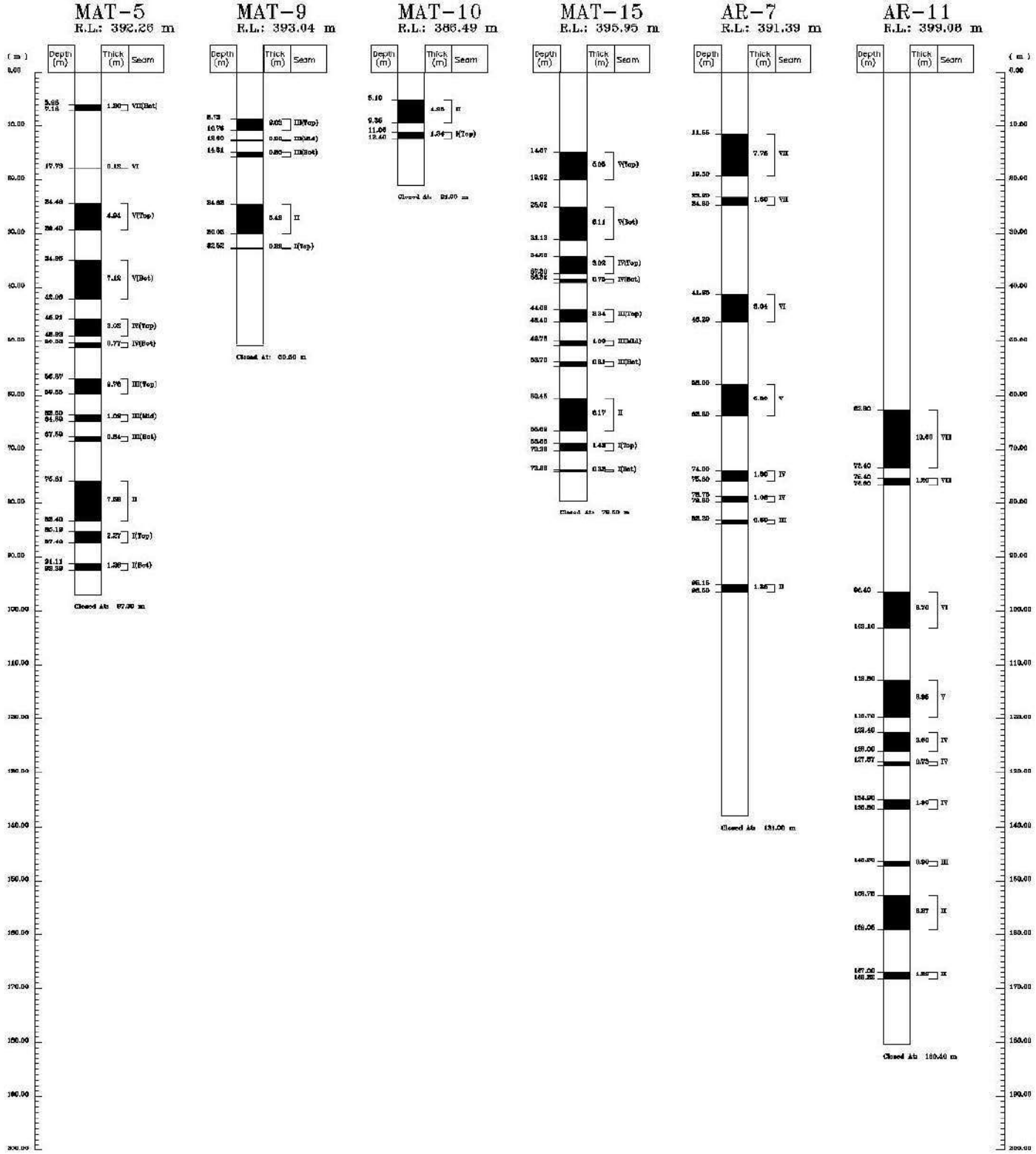
Legend

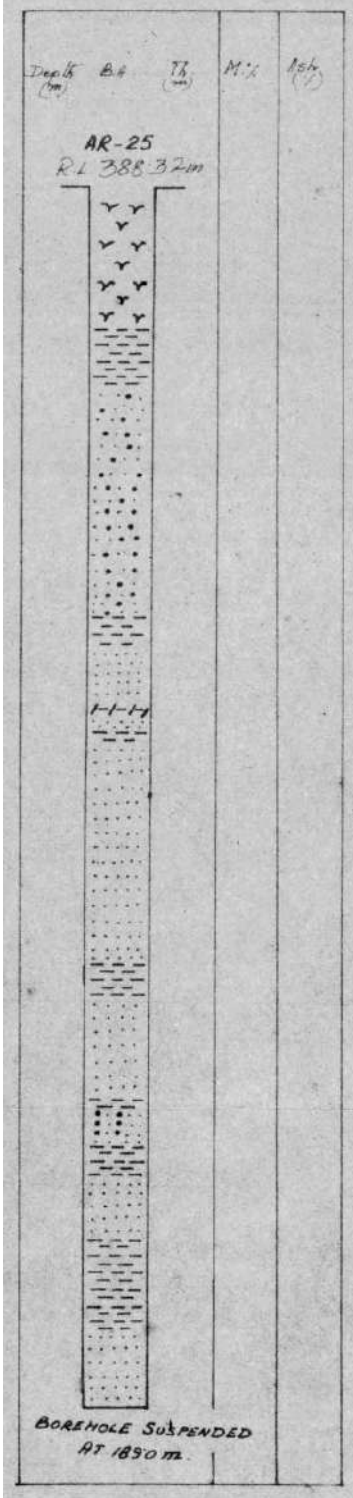
Proposed_BHs | GSI_BH | Faults | West of Tubed_Modified | Seam Incrop

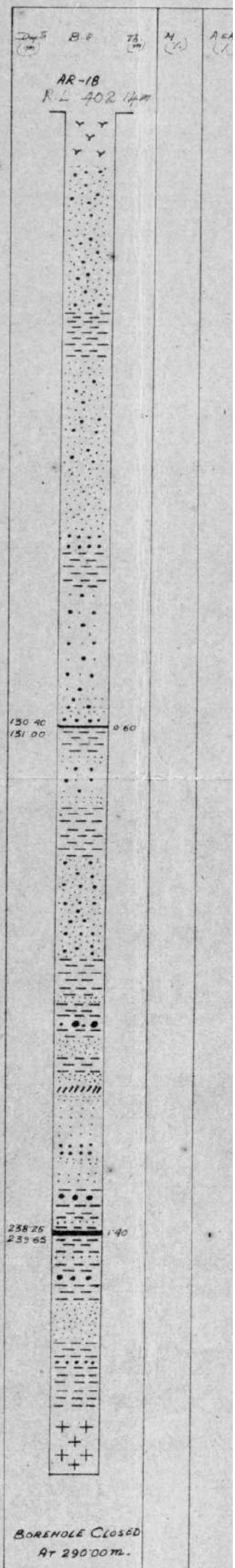
Formations

- Mahadeva
- Panchet
- Raniganj
- Barren Measure
- Barakar
- Metamorphics

Mapped By :
S. N. Das , GSI (1976-79)
Modified By:
M. Das , GSI (1982-85)


MAT-5
R.L.: 392.26 m
MAT-9
R.L.: 393.04 m
MAT-10
R.L.: 386.49 m
MAT-15
R.L.: 395.95 m
AR-7
R.L.: 391.39 m
AR-11
R.L.: 399.08 m
Depth (m)
Thick (m)
Seam
(m)
Closed At: 97.90 m
Closed At: 80.50 m
Closed At: 93.00 m
Closed At: 78.50 m
Closed At: 131.00 m
Closed At: 180.40 m


Depth (m)
B.H
TR (mm)
M.%
Ash (%)
AR-25
R.L 388.32m
BOREHOLE SUSPENDED
AT 189.0 m.


Depth (m)
B.H
TR (mm)
M (%)
AR-1B
R.L 402.14m
130.40
131.00
0.60
238.25
239.65
1.40
BOREHOLE CLOSED
AT 290.00m.

Proposed Borehole Location Plan, West of Tubed Coal Block