PROPOSAL FOR PRELIMINARY EXPLORATION (G-4 STAGE) FOR COAL

KHAPIA COAL BLOCK

NMET FUNDED PROJECT

NORTH KARANPURA COALFIELD

DISTRICT– HAZARIBAGH, JHARKHAND

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(कोल इण्डिया लिमिटेड की अनुषंगी कम्पनी / भारत सरकार का एक लोक उपक्रम)
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CORPORATE IDENTITY NUMBER - U14292JH1975GOI001223

January - 2023

PROPOSAL FOR RECONAISSANNCE SURVEY (G4 STAGE) FOR COAL IN KHAPIA COAL BLOCK, NORTH KARANPURA COALFIELD, DISTRICT-HAZARIBAGH, JHARKHAND

1.0 INTRODUCTION

1.1 The North Karanpura Coalfield is the Western most member of the east – west chain of Damodar Valley Gondwana coalfields and forms a vast expanse of coal bearing formations spread over Hazaribagh, Ranchi, Chatra & Latehar districts of Jharkhand state. The coalfield is known primarily for its resources of Non-Coking coals which are characterized by a high percentage of Ash and Moisture content and suitable for power generation. This view has also been supported by GSI and IBM in the course of their exploration activities. The latter organization took up exploration work in Pinderkom-Ganeshpur block in the West, Bachra in the South and Chano-Rikba blocks in the Eastern part of the coalfield. During the course of exploration in Chano- Rikba block the existence of coking coals first came to light in 1960-62. Based on these findings by IBM, this part of the coalfield is now known to contain coals with low moisture%, moderate to high ash% and moderate coking propensities.

'Khapia Coal Block' covers an area of **19.1 sq. km**. The Khappia Block is situated in the south central part of the North Karanpura coalfield. Bundu block is located in the South-west of the proposed block. The trend of beds in Bundu Block in the is north west- south east the dip ranges between 6° to 12° towards North-west.

1.2 The history of geological work in the North Karanpura Coalfield dates back to 1848 when D.H.Williams carried out reconnoitary traverses and named it as Haharo Coalfield after the Haharo River which meanders through it. The first geological survey of the field was carried out by T.W.H. Hughes in 1867-68. He named it as the North Karanpura coalfield after the 'pargana' in which it was located. Much of our present state of geological knowledge of this coalfield owes to the classical work of A.Jowett who carried out detailed geological mapping on behalf of M/s Bird & Co., in 1915-18. The Geological Survey of India embarked on a programme of regional drilling in the Bachra Area during 1956-58 which was followed by detailed exploration by I.B.M. in Ganeshpur-Pinderkom (1957-59) and ChanoRikba Area (1960-62).

Detailed Exploration in adjacent Bundu Block, was carried out by CMPDI during 1990 to 1992. Sixteen number independent coal seams and one number combined seam are present within the block. Of the 16 number of seams, 10 number of seams are having thickness above 1 m. The proposed block is the situated in North eastern side

of Bundu Block and the same seams are expected to be encountered in this block as well.

1.3 No borehole has been drilled in the block earlier, whole blocks covered by Geological mapping by GSI on the scale of 1:50000. As per Geological mapping data of GSI block is covered by Lower Gondwana Formations like Raniganj, Barren Measure, Barakar & Talchir.

1.5 CMPDI has prepared a proposal for Reconnaissance Survey for coal in Khapia Block involving **1400 m** of drilling in **4** boreholes. The boreholes proposed are scout boreholes.

2.0 OBJECTIVES

2.1 The G4 stage of Exploration in the block is proposed to fulfil following objectives-

- To establish the existence and continuity of probable coal seams occurring in the block as significant coal resources present in adjoining block.
- 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 Hazaribagh district of Jharkhand. The block is connected to district headquarter Hazaribagh township by all-weather metaled road. The distance of the block from Hazaribagh Township is about 40km.

3.2 The nearest railway station is Hendegir at Khalari- Patratu, Rail Section. The nearest airport is located in Ranchi, the state capital of Jharkhand, at a distance of about 80km from the block.

3.3 Khapia block is located in the south central part of North Karanpura CF District Hazaribagh. The area is covered under the Survey of India Topo-sheet no - 73 E/1 and 73 E/2. The geographical co-ordinates of the block defined are as follows:

Latitude	23° 42' 35" N	23° 45' 22.5" N
Longitude	85° 9' 17" E	85° 12' 31" E

4.0 BLOCK BOUNDARY:

Boundary description of the proposed block is as follows:

North	Arbitrary line
South	Talchir/Metamorphic Contact , Damodar River
East	Talchir/Metamorphic Contact , Haharo River
West	Bundu Block/ Arbitrary line

5.0 PHYSIOGRAPHY, DRAINAGE

5.1 A major part of the block covered by a gently undulating topography having a generalized easterly slope. The area has a rugged topography in the North-East and South West part and is more or less flat in the rest of the block with an easterly slope. Haharo River flows along the eastern boundary of the block & Damodar River flows along southern boundary of the proposed block. The ground elevation is expected to vary between 350m and 626m.

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 40% of the proposed block area is covered by forest as per the FSI plan available.

7.0 BROAD GEOLOGICAL SET UP

7.1 **Stratigraphic Sequence**

The geological succession in this coalfield as per published report of GSI, CMPDI 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
Jurassic	-	Equivalent to Rajmahal Trap	Igneous Intrusive	Dolerite and Mica Peridotite
Triassic	Upper Gondwana	-	Mahadeva	Massive coarse to conglomeratic Feldspathic, ferruginous sandstone with shale intercalations.
Upper Permian to Lower Triassic	Lower Gondwana	-	Panchet	Yellowish to white coarse grained sandstone red, chocolate-colored plastic clays. In the upper part, yellowish friable sandstone whereas lower part is greenish yellow.
Upper Permian	-	Damuda	Raniganj	Fine to medium grained Quartzo-feldspathic and Quartzitic sandstone often Micaceous and matured, inter-banded shale and sandstone, carbonaceous shale and thin coal seams.
			Barren Measures	Dark shale, sandy micaceous shale with sideritic interbanded shale and sandstone.
			Barakar	Sandstone, shale and sandstone intercalation, siltstone and shale, carbonaceous shale, fire clay, coal seams.
			Karharbari	Gritty sandstone occasional shale bands, fireclay, chocolate-coloured clays and coal seams.
Permo-Carboniferous	-	-	Talchir	Rikba plant beds, boulders, conglomerates, varvites, sandstone, tilloids and tillites.
----------**UNCONFORMITY**----------				
Precambrian	-	-	Metamorphic	Granite, Gneisses ,Pegmatite, Phyllites, Mica Schist, Chromite bearing rocks, Amphibolite and Quartzite.

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TABLE - 3

STRATIGRAPHIC SUCCESSION OF THE BLOCK AS EXPECTED TO BE ENCOUNTERED IN WEST OF CHANO RIKBA BLOCK.

Age	Formation	Lithology
Upper Permian	Raniganj	Medium to coarse grained sandstone, shale and coal seams.
Upper Permian	Barren Measure	Grey to dark Grey Shale.
Middle Permian	Barakar	Medium to coarse grained sandstone, argillaceous sandstone, shale, arenaceous shale, Intercalation of shale and sandstone, carbonaceous shale and coal seams.
Lower Permian	Karharbari	Very coarse grained sandstone, silicified sandstones, coal seams and stringers of coal.
Permo-Carboniferous	Talchir	Green to Buff colored Arenaceous shale.
----------**UNCONFORMITY**----------		
Precambrian	Metamorphic	Granitic gneiss and Quartzite.

8.0 REGIONAL STRUCTURE:

The present structural set-up of the coalfield indicates that it has undergone substantial modification mainly due to faulting which took place after sedimentation. The southern boundary of the coalfield is characterized by east west trending major fault between Khalari and Mahuamilan villages. It has brought the Raniganj Formation at places in direct juxtaposition with Metamorphics. The northern boundary of the coalfield is also faulted at places. There are several step faults which cause repetition of the outcrops of Barakar / Karharbari / Talchir Formations. Besides, above there are two more important structural features viz, Karkata-Piparwar anticline in the south-central part and Indertoli - Rohsouth west dome south western Ronhe block in the eastern part of the coalfield. The Karkata - Piparwar anticline is a WNW plunging anticline whose southern limb is steeper (3o to 9odip.) than the northern limb (almost sub horizontal). The Manki Colliery is situated almost on the axis of this anticline. The axial region of this anticline can be seen in the cuttings of Jaindih village where both the limbs are clearly exposed. The Indratoli - Rohne dome in the eastern part of the coalfield exhibits a metamorphic core at the center with qua-qua-versal centrifugal dips of Gondwana rocks, it is dissected by numerous radial faults. In the major western parts of Bundu area all the faults trend NW-SE. The throw is usually in the northeast direction. The southernmost one is a large fault with throw gradually increasing towards north-west. In the east, the southern boundary fault extends well inside the coalfield near Chilandagtoli. There is a wide fault zone here affecting almost all the formations.

9.0 SEQUENCE OF COAL SEAMS:

9.1 The North Karanpura Coalfield is characterized by the presence of 5 Coal Seams named seam V to I in descending order and their splits belonging to the Barakar Formation, five seams named as K-5 to K-1 belonging to the Karharbari Formation and a few local seams varying in thickness from 0.10m to 2 m. These co-relatable sections 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 11 seams of the Barakar Formation which in descending order are V(Top, Middle and Bottom), IVD, IV, III, II-Top,II-Bottom, I-Top, II-Bot & I Top Comb.,I Middle, I Bottom.

The Karharbari formation shows the presence of Five seams, namely, K-5, K-4, K3, K2 & K-1

TABLE - 4

SEQUENCES OF COAL SEAMS ALONGWITH THICKNESS RANGE AND QUALITY RANGE ENCOUNTERED IN BUNDU BLOCK

SEAM	THICKNESS (in meter)	GRADE RANGE
V-Top	0.34-1.86	G9-G12
V-MIddle	0.17-4.20	G9-G12
V-Bottom	0.60-3.84	G7-G12
IVD	0.15-1.62	G14-G17
IV	0.38-2.04	G6-G12
III	0.90-5.68	G7-G12
II-Top	0.28-2.09	G7-G12
II-Bottom	0.58-2.64	G7-G14
I-Top	0.40-4.63	G7-G12
II-Bot. & I-Top (C)	5.10-5.97	G8-G12
I-Middle	0.48-5.92	G7-G12
I-Bottom	0.57-2.85	G6-G12
K-5	0.16-2.28	G11-G14
K-4	0.20-1.10	G13
K-3	0.19-1.40	G9-G12
K-2	0.18-3.84	G9-UG
K-1	0.10-0.70	UG

10.0 EXPLORATION SCHEME

10.1 Drilling:

A total **4** number of scout boreholes involving a total tentative meterage of **1300 meter** have been proposed for carrying out the entire exploration activity in G4 stage.

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-K1 (In Meter)	REMARKS
P-1	400	150	
P-2 (Pilot)	400	230	Up to Metamorphic/ Talchir
P-3	400	200	
P-4	400	700	
	Total	**1300**	

10.2. Target depth of Exploration:

1 (one) pilot borehole (P20) will be drilled up to Basement rock or Talchir whichever encounters first for having the idea of full sequence of the block. Rest of the boreholes are to be drilled up to the Bottom most seam of Karharbari Formation i.e. Seam K-1 within the proposed block area.

10.3 Core Logging and Coal core Sampling:

Around **1300m**(Tentative) of generated sedimentary units may be required to be 'Geologically Logged' and a total **150.00 meter** of coal cores (expected) are required to be sampled for different analysis before sending the samples to different chemical/mechanical labs.

The details of coal core expected to be generated for different types of boreholes are tabulated below:

Expected no of samples for Band by Band Analysis per borehole is to be around **450 in total.**

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% of above boreholes may be required for Seam Overall Analysis (Proximate Analysis, GCV).
- One boreholes (Grid boreholes) for Ultimate Analysis and Special Test including Petrographic Analysis.

10.5 Geological Mapping:

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

10.7 Borehole Survey, RL Survey:

All the 4 proposed boreholes & 15 boundary cardinal points are required to Surveyed using DGPS.

10.8 Geophysical Logging and Surface Geological Survey:

100% of the coring boreholes i.e 4 in nos, may be taken up for Geophysical Logging that may involve a total meterage of around 1300 meter.

10.9 Quantum of Work in brief:

TABLE-7

QUANTUM OF WORK

S. No.	Activity	Quantity
1	Geological Mapping	19.10Sq km. (1:10,000 scale).
2	Drilling	
	i) Boreholes	4 BHs.
	ii) Meterage	1300m.
3.	i) Leveling and Triangulation	As per requirement.
	ii) RL and Co-ordinates	4 BHs.
	iii) DGPS Survey	19 points (4 boreholes and 15 boundary cardinal point)
4.	Drill Core Logging	1300.00m

S. No.	Activity	Quantity
5.	Geophysical Logging	4 boreholes 1300m.
6.	Borehole deviation Survey (boreholes with depth more than 600m)	1 boreholes 700m
7.	Chemical Analysis:	
	Band by Band	4BHs (All seams). (Samples – 450nos)
	Overall Proximate	100% of Band by Band BHs (4 BHs). (Samples – 160 nos)
	Calorific Value	100% of Band by Band BHs (4BHs). (Samples – 160 nos)
8.	Special Tests & Petrographic Study, Coking Analysis.	1 Borehole (17 samples)
11.	Geological Report Preparation	1 No.

10.10 Time Schedule:

Expected time of completion of Project is 12 Months.

11. LIMITATIONS:

1. The proposed block is devoid of any boreholes, thus the FCP drawn with respect to adjacent coal blocks are very much tentative and the expected depth shown may vary during actual course of action. Thus the envisaged meterage may vary in totality.

2. 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 Bundu Coal Block, North Karanpura Coalfield, District: Hazaribagh, Jharkhand, CMPDI, February, 1998.

2. Geological Report Titled “Geology And Coal Resources Of Badam, Rautpara, Ronhe, Rikba, Pakribarwadih, Kerendari, Tandwa, Dhadu-Mahuamilan, Piparwar And Bundu Areas, North Karanpura Coalfield, Hazaribagh And Palamau Districts, Bihar” , Coal Division, GSI, 1972

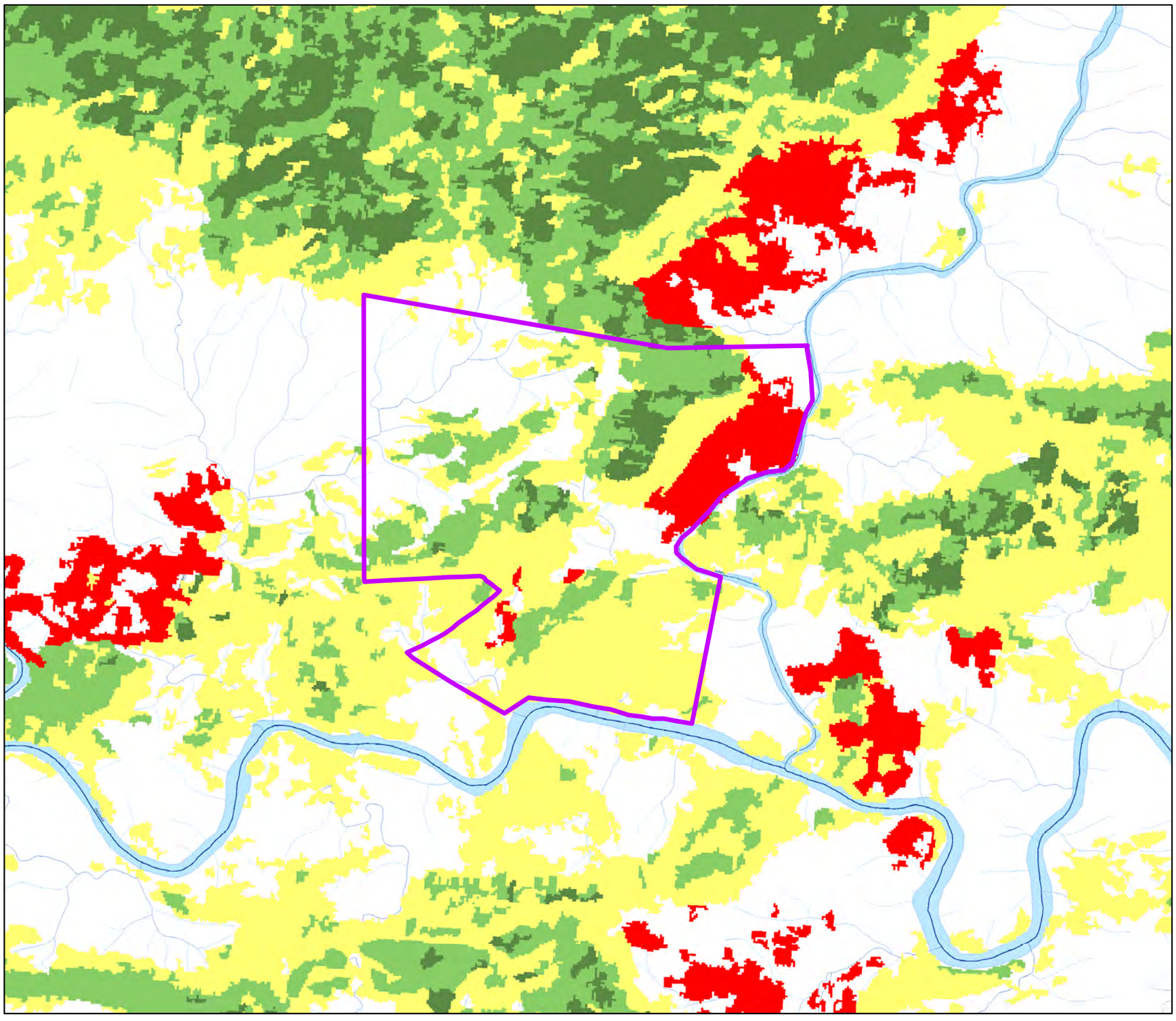
13. LIST OF PLATES:

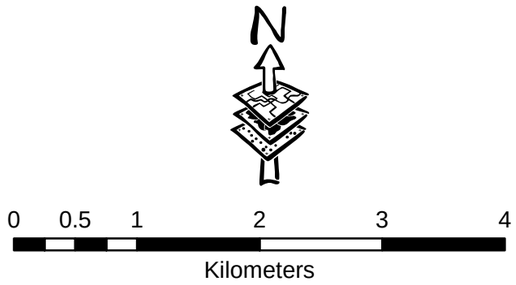
1. Location Map.

2. Geological Map.

3. Forest Cover & Drainage Map.

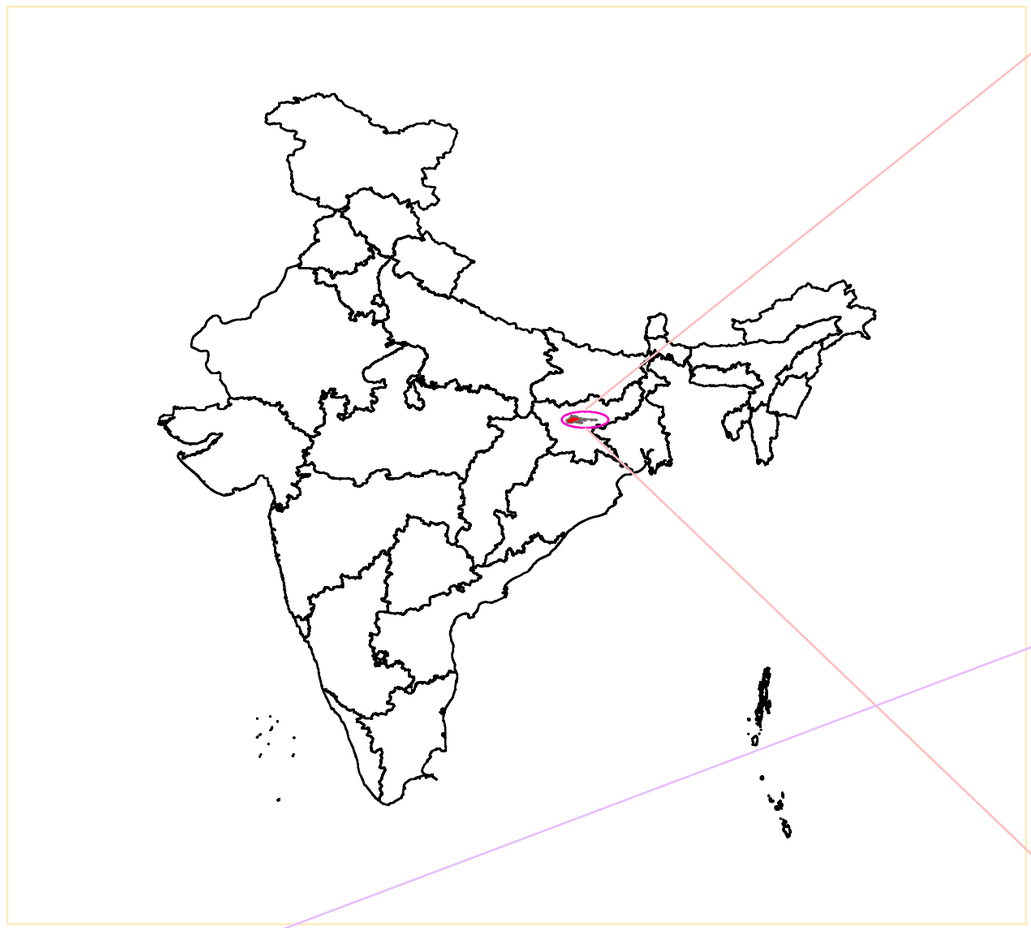
3. Lithologs of boreholes drilled in Adjacent Block.

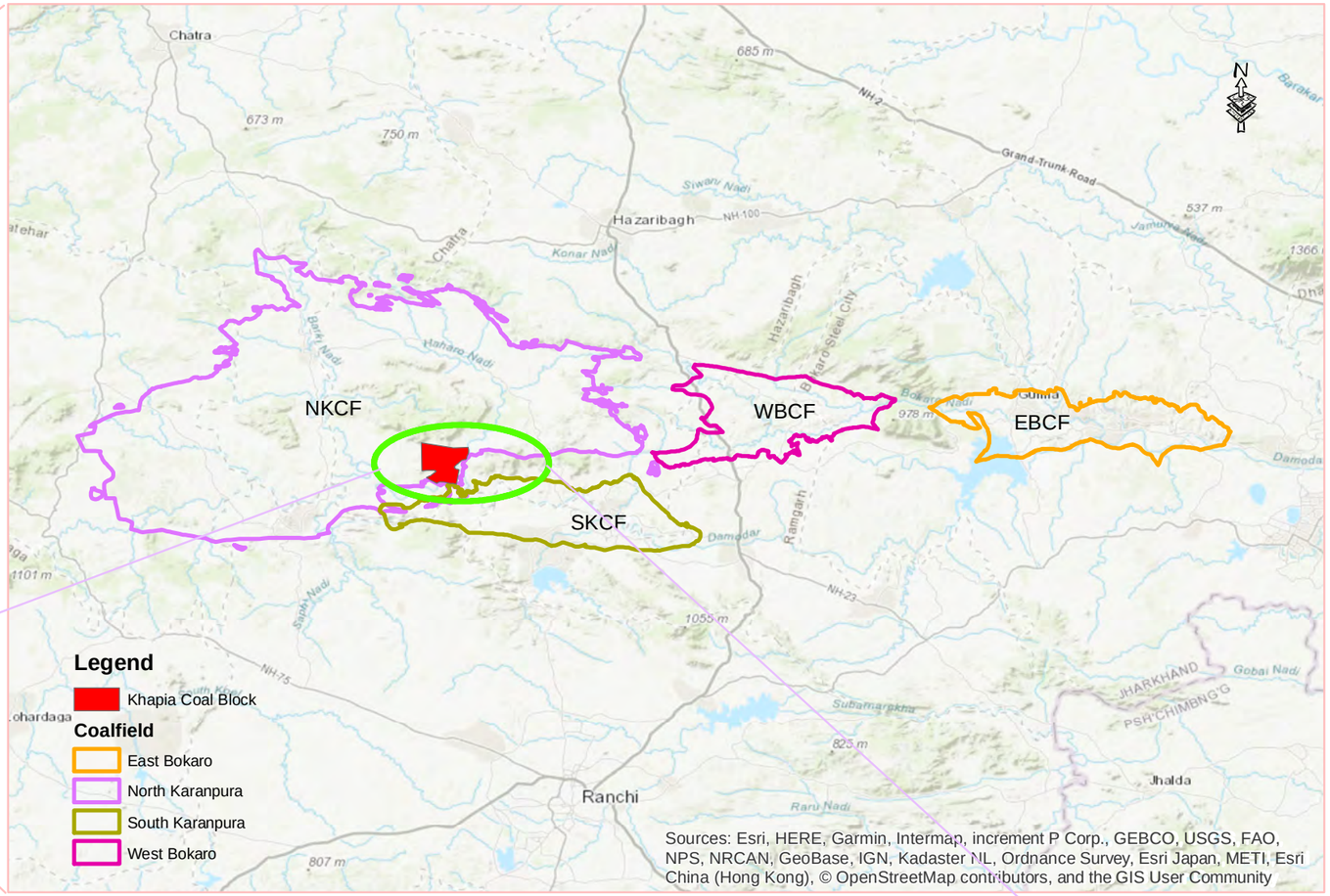


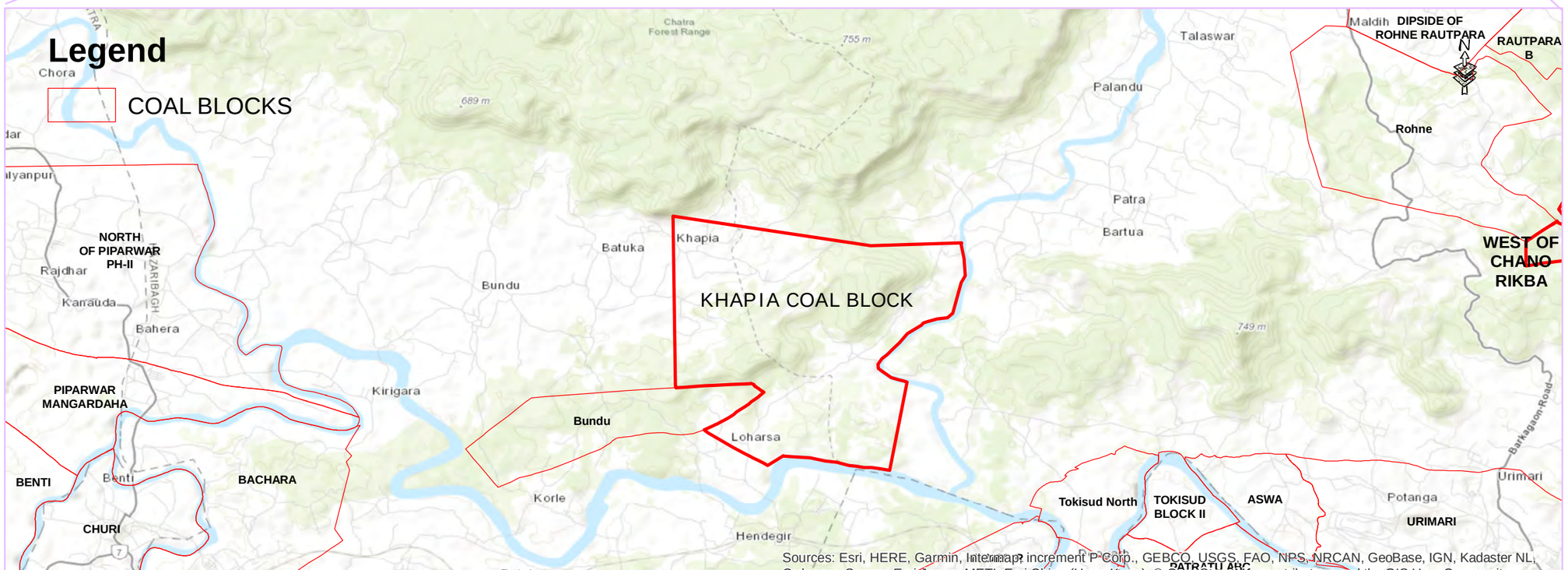


Forest Cover Map(FSI) & Drainage Map of Khapia Coal Block,NKCF
Dist : Hazaribagh, Jharkhand

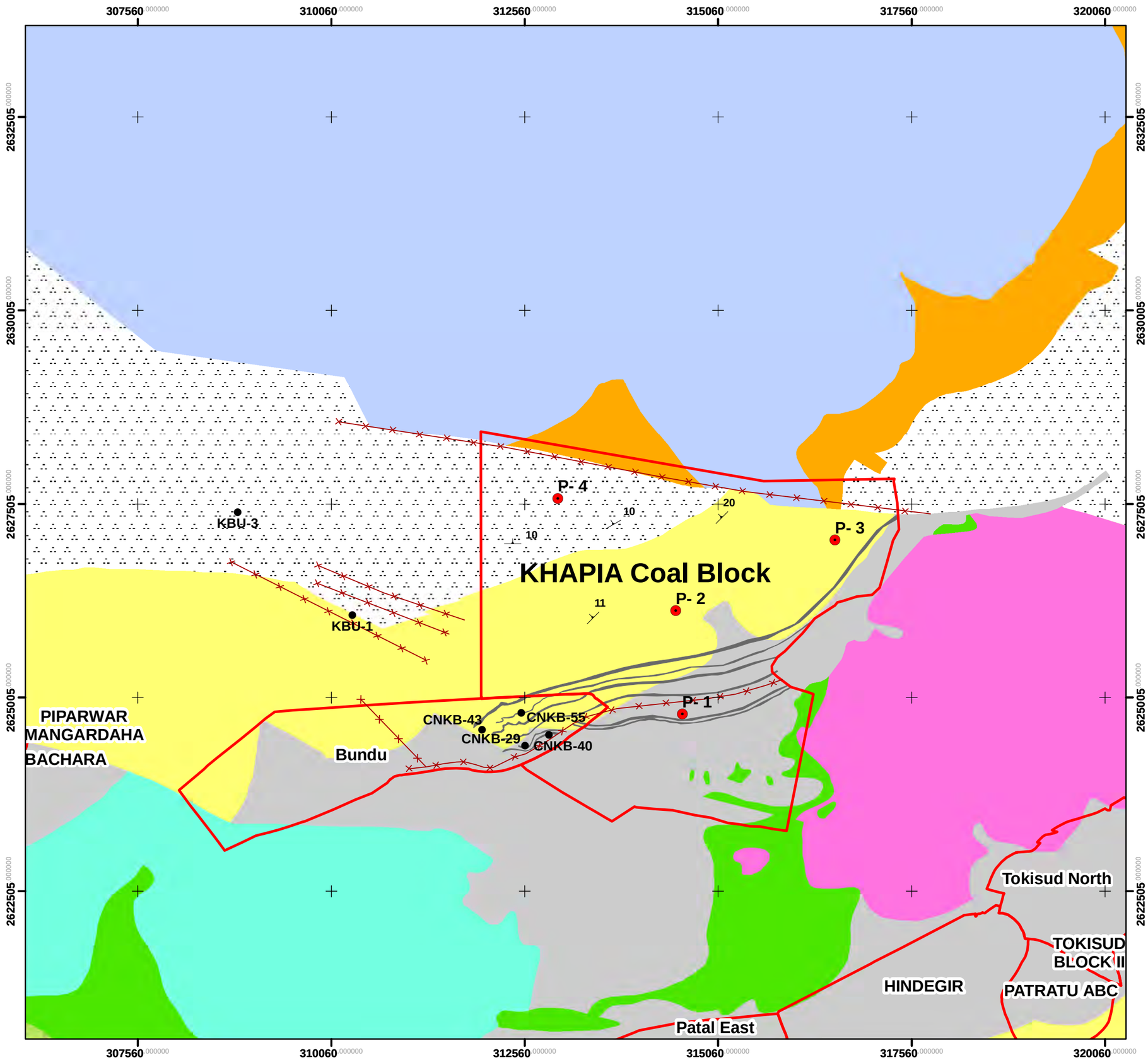
LOCATION MAP KHAPIA COAL BLOCK, NORTH KARANPURA COALFIELD, JHARKHAND, INDIA

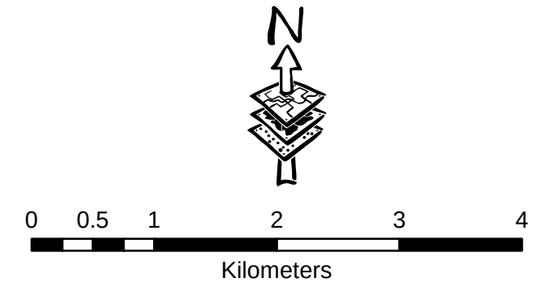






ALL MAPS NOT TO SCALE





Scale- 1:50000

Geological Map of Khapia Coal Block,NKCF Dist : Hazaribagh, Jharkhand

Source : BHUKOSH(GSI)

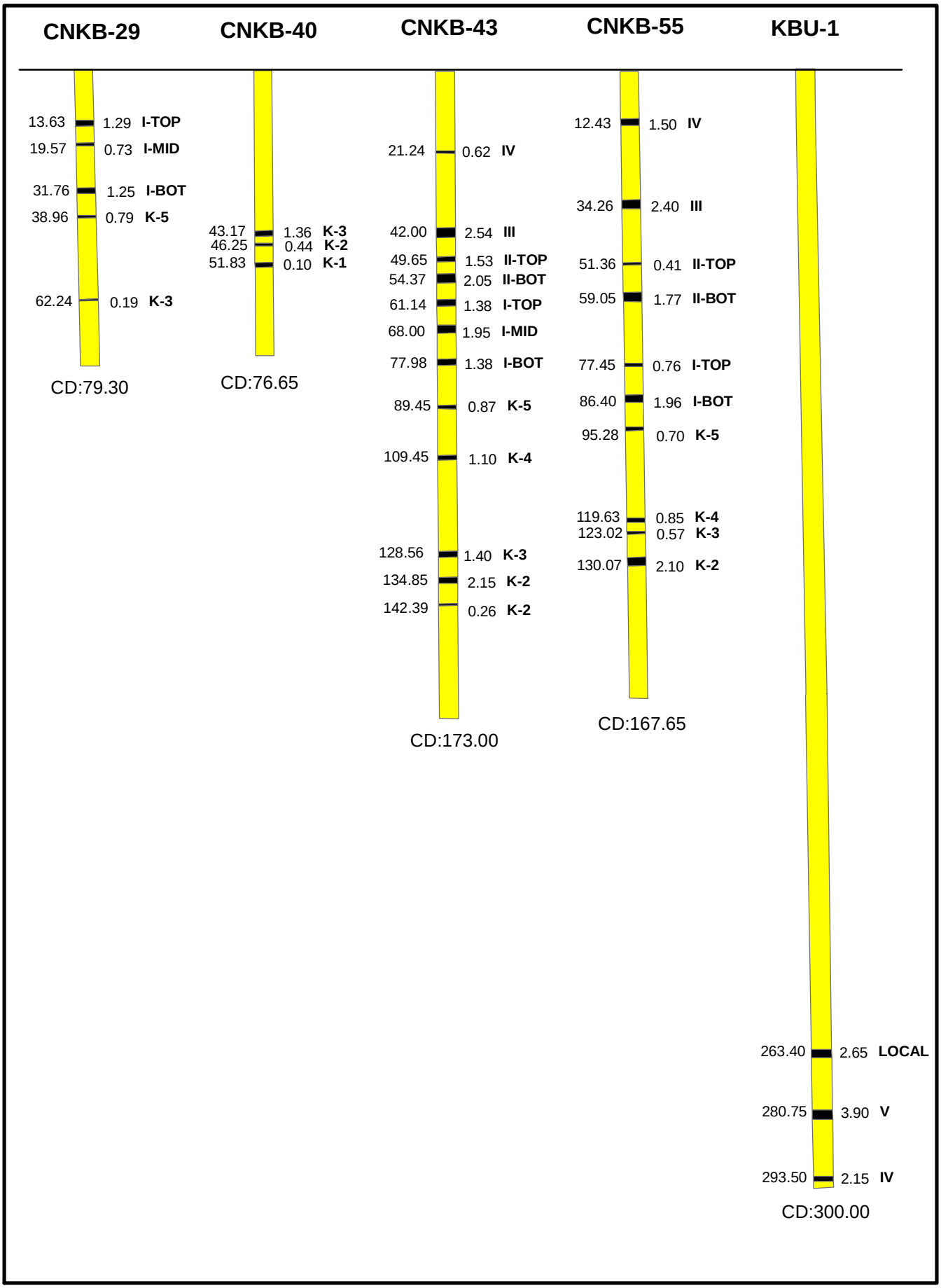
Legend

- Proposed Borehoes
- Old_BHS
- Faults
- Coal Blocks
- SEAM INCROP

Lithology

FORMATION

- SUPRA PANCHET
- PANCHET
- RANIGANJ
- BARREN MEASURE
- BARAKAR
- KARHARBARI
- TALCHIR
- METAMORPHICS


CNKB-29
13.63 1.29 I-TOP
19.57 0.73 I-MID
31.76 1.25 I-BOT
38.96 0.79 K-5
62.24 0.19 K-3
CD:79.30
CNKB-40
43.17 1.36 K-3
46.25 0.44 K-2
51.83 0.10 K-1
CD:76.65
CNKB-43
21.24 0.62 IV
42.00 2.54 III
49.65 1.53 II-TOP
54.37 2.05 II-BOT
61.14 1.38 I-TOP
68.00 1.95 I-MID
77.98 1.38 I-BOT
89.45 0.87 K-5
109.45 1.10 K-4
128.56 1.40 K-3
134.85 2.15 K-2
142.39 0.26 K-2
CD:173.00
CNKB-55
12.43 1.50 IV
34.26 2.40 III
51.36 0.41 II-TOP
59.05 1.77 II-BOT
77.45 0.76 I-TOP
86.40 1.96 I-BOT
95.28 0.70 K-5
119.63 0.85 K-4
123.02 0.57 K-3
130.07 2.10 K-2
CD:167.65
KBU-1
263.40 2.65 LOCAL
280.75 3.90 V
293.50 2.15 IV
CD:300.00

Project Cost Estimate for Reconaissance Survey (G4 Stage) in Khapia Block, North Karanpura Coalfield

Sl. No	Item Work	Item no in Soc	Unit	Rates as per SoC of	Rate (Rs)	Qty.	Amount (Rs)
	I- Field operations (Outsourcing)						
A	**DRILLING**						
1	Drilling (As per MoC Rate 2022-23)	2.2.1.1b	m	6775	6775	1300	8807500
B	**GEOPHYSICAL STUDIES**						
1	Borehole Geophysical logging (As per MoC Rate 2021-22)	3.11	m	715	715	1300	929500
	Field operations Total (A+B)						**9737000**
	II- Field Work (In House)						
A	**GEOLOGICAL WORK**						
1	Survey Work -1 Surveyor	1.6.1a	Day	8300	8300	25	207500
2a	Geological Party days-Field - 1 Geologist	1.6.1b	Day	11000	11000	60	660000
2b	Geological Party days-HQ (Data processing & Report Preparation)-1 Geologist	1.6.1b	Day	9000	9000	30	270000
	Sub Total A						**1137500**
B	**GEOPHYSICAL STUDIES**						
3a	Geophysict Party days-Field (Field Work) - 1 Geologist	3.19	Day	11000	11000	10	110000
3b	Geophysicst Party days-HQ (Data processing & Report Preparation)-- 1 Geologist	3.19	Day	9000	9000	7	63000
	Sub Total B						**173000**
	Field Work Total (A+B)						**1310500**
	III-Laboratory Studies (In House)						
1	***Band By Band Analysis (Billing as per actuals)***						
a	Ash+Moisture	4.2.6	per sample	700	700	450	315000

b	House Keeping	4.2.1	per sample	115	115	450	51750
c	Sample preparation for Band by Band Analysis	4.2.2	per sample	500	500	450	225000
2	***Overall analysis (Billing as per actuals)***						
a	Proximate analysis	4.2.7	per sample	935	935	160	149600
b	Moisture at 60% RH & 40C	4.2.8	per sample	1010	1010	160	161600
c	GCV	4.2.11	per sample	1505	1505	160	240800
d	Sample preparation & House Keeping	4.2.3	per sample	795	795	160	127200
3	***Special Test (Billing as per actuals)***						
a	Ultimate analysis	4.2.17	per sample	9945	9945	17	169065
b	Total Sulphur	4.2.14	per sample	1900	1900	17	32300
c	Distribution of Sulpher	4.2.15	per sample	3695	3695	17	62815
d	HGI including sample preparation	4.2.18	per sample	3805	3805	17	64685
e	AFT (Ash Fusion Temperature)	4.2.20	per sample	2745	2745	17	46665
f	Ash analysis	4.2.25	per sample	325	325	17	5525
h	Ash sample preparation 800^{o}C from coke for analysis	4.2.5	per sample	875	875	17	14875
i	Roga Index(Instead of caking Index)	4.2.22	per sample	5365	5365	17	91205
j	Swelling Index	4.2.23	per sample	2745	2745	17	46665
k	LTGK coke type	4.2.24		4550	4550	17	77350
4	**Petrographic analysis (Billing as per actuals)**						
a	Pellet preparation	4.3.14a	per sample	1160	1160	17	19720
b	Maceral Analysis (with photomicrography)	4.3.14e	per sample	25000	25000	17	425000
c	Microlithotype Analysis (with photomicrography)	4.3.14g	per sample	25000	25000	17	425000
d	Mean Ro%	4.3.14j	per sample	16345	16345	17	277865
	Laboratory Studies Total						**3029685**
	IV. Miscellaneous Charges (In House)						
a	Preparation of Exploration Proposal	5.1	lump sum	380000	380000		307905

b	Outsourcing process cost (2% of approved project cost or 5 Lakh, whichever is lower)	2.3	lump sum	500000	500000		307905
c	Operational charges for CMPDI	Point 3 of SOC					855275
d	DGPS Survey of bundary, borehole points (4 boreholes & 15 boundary point)	1.6.2	per point	19200	19200	19	364800
e	Borehole pillaring	2.2.7	Per bh	2000	2000	4	8000
f	Land crop compensation	5.6	Per bh	20000	20000	4	80000
g	Geological Report preparation (3% or 7.5 Lakh whichever is more)	5.2					750000
h	Peer review			10000	10000		10000
	Miscellaneous Charges Total						**2683885**
	Total (I- Field op +II- Field work+III- Lab+ IV -Misc)						16761070
	GST (@18%)						3016993
	Grand Total						19778063
							1.977806307

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

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

3)For Drilling the approved rates of MoC i.e Rs 6775/- per meter for FY 2022-23 has been considered.

4)For Geophysical logging the approved rates of MoC

5) GPL rates is Rs 715/- per meter of minimum 6 parameters, the break up is as follow

	Probe	SoC item No	te 2021-22 (in Rs)
1	Base Log	3.11a	166
2	Dual Density	3.11d	112
3	Natural Gamma	3.11h	99
4	Caliper	3.11g	21
5	SPR	3.11i	42
6	Resistivity	3.11c	42
7	Deviation	3.11m	99
8	Sonic	3.11k	134

	Total		**715**

6) The number of sample proposed for band by band analysis and Overall analysis is tenatative for budget rate. However the billing will be for actual numbers of samples analyzed .

7) Rs 10000/- for Peer review is budgeted rate.

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Time Schedule/Action Plan for Khapia Block, North Karanpura Coalfield													
S. No	**Activities**												
		Months	1	2	3	4	5	6	7	8	9	10	11	12
1	Outsourcing	Months	<------>											
2	Mobilising	Months				↔								
3	Drilling (Nos of rigs-1 rigs)	Months						<------->						
4	Borehole Geophysical logging	Days						<-------->						
5	Survey Party days (1 Party)	Days						<-------->						
6	Geologist Party days, Field (1 Party)	Days						<------->						
7	Geophysict Party days, Field (1 Party)	Days						<------->						
8	Laboratory Studies (Band By Band)	Nos.							<-------->					
9	Laboratory Studies (Overall)	Nos.								<--------->				
10	Laboratory Studies (Special) & (Petrography)	Nos.										↔		
11	Geologist Party days, HQ (1 Party)	Days										<---------->		
#REF!	Report Writing & Peer Review	Months										<---------->		

Note: Please add activities accordingly and timelime (months)

Total Time Period of Completion of Project- *12 months from Sanction of Project*

Remarks
3 Months
1 months
1300 in 4 Bh
3000 in 4 Bh
25 Days
60 Days
10 Days
210 sample
160 sample
16 Sample
30 Days
4 Months