PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITIC SANDSTONE IN MAGARLOD BLOCK,

DISTRICT- DHAMTARI, CHHATTISGARH

(AREA 100.00 Sq. Km)

GLAUCONITIC SANDSTONE

(Strategic & Critical/Fertilizer minerals)

80th NMET TCC-1 MEETING

28/08/25

DIRECTORATE OF GEOLOGY & MINING CHHATTISGARH

REGIONAL OFFICE RAIPUR,

SUMMARY OF THE BLOCK FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITIC SANDSTONE IN MAGARLOD BLOCK,

DISTRICT- DHAMTARI, CHHATTISGARH

Features	Details
Block ID	MAGARLOD BLOCK
Exploration Agency	Directorate of Geology & Mining Chhattisgarh
Commodity	GLAUCONITIC SANDSTONE
Mineral Belt	The proposed exploration block falls in southern part of Chhattisgarh Basin. Chandarpur Group of rocks belonging to Chhattisgarh Super Group of Meso-Neo proterozoic age are well exposed in the proposed block. The block is predominantly occupied by Lohardih sandstone of Chandarpur Group of lower Chhattisgarh Supergroup developed in southwestern and central part of the block. Kansapathar sandstone of Chandarpur Group is present in the north part of the block which is Glauconite bearing. Magarlod block is a part of Glauconitic sandstone Belt situated in the Dhamtari Distt., Chhattisgarh and falls in the Survey of India Toposheet no. 64H/14.
Completion period with entire Time schedule to complete the project	10 Months
Objectives	The exploration scheme of Magarlod G4 block for Glauconitic sandstone is formulated with the following objectives: 1. To carry out Geological & structural mapping on 1:12,500 scale for demarcation of Glauconitic sandstone with the structural features to identify the surface manifestations and lateral and vertical disposition of the mineralized zones. 2. To collect surface samples including bedrock, channel and Trench samples & to analyze for Glauconite to shape up for further course of exploration program. 3. Pitting / trenching will be done to expose the concealed host rock and mineralization. 4. If phase-I exploration data will give anamolous values, 05 Nos. boreholes on scout borehole, may be drilled. 5. To estimate resources as per Minerals (Evidence of Mineral Contents) Amendment Rules 2021 & UNFC norms. 6. To upgrade the block to the higher level of exploration.
Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	Work will be carried out by the proposed agency.

Name/Number of Geoscientists	Nos. of Geoscientists: 2
Expected Field days (Geology, Geophysics, surveyor)	Geologist Party days: 150 (At field) & 30 at HQ

1.	**Location**	
	Latitude - Longitude	20° 41' 34.15" N-20° 45' 00.00" N 81° 47' 30.00" E-81° 57' 30.013" E
	Villages	Beloura,Sonperi,Bendrachua,Bakori,Sonarin Daihan, Mareli,Charbhata, Rengadih,Pathar etc.
	Tehsil/Taluk	Magarlod
	District	Dhamtari
	State	Chhattisgarh
2.	**Area (hectares/ square kilometres)**	
	Block Area	100.00 sq.km
	Forest Area	The block co-ordinates were subjected in the Decision Support System (DSS) of Forest department, Ministry of Environment, Forest and Climate Change (MOEFCC). The area beolong Dhamtari forest division
	Government Land Area (Bilanam)	Data not available
	Charagaha	Data not available
	Private Land Area	Part of the area is private, cultivated land
3.	**Accessibility**	
	Nearest Rail Head	Kurud 25 Km in NW direction. The station lies on the Raipur–Dhamtari branch line of Bilaspur–Nagpur section.
	Road	The exploration block can be reached from Kurud via Raipur-Jagdalpur Road through NH-52.
	Airport	Raipur 65 km in North direction
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	The dendritic drainage.
	Rivers/ Streams	Mahanadi & Pairi
5.	**Climate**	
	Mean Annual Rainfall	Average annual rainfall is 1090 mm
	Temperatures	The cold season lasts for 2.7 months, from mid November to first week of February, with an average daily high temperature below 29°C. The coldest month of the year is December, with an average low of 15°C and high of 26°C. The hot season lasts for 2.0 months, from Mid April to Mid June, with an average daily high temperature above 37°C. The hottest month of the year is May, with an average high of 40°C and low of 28°C.
6.	**Topography**	
	Toposheet No.	64H/14
	Morphology of the Area	The block exhibits flat topography. The highest elevation of the area is 365m in the eastern part of the Block. The lowest elevation of the area is 313m in the western part of the block
7.	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	Geological Map, is available at 1:50,000 scale in Bhukosh(GSI)
	Geochemical Map	Geochemical map is available at 1:50,000 scale in NGDR Portal

	Geophysical Map	Not Available
8.	**Justification for taking up G-4 stage mineral exploration**	**1.** Today most of the potash demand is met through bedded marine evaporite deposits such as sylvite, carnalite, kainite, polyhalite, surface and sub-surface potash-rich brines. In absence of mineable evaporite potash deposit in India, it was considered necessary to look for non-traditional source of potash such as glauconitic sandstone and potash rich shales. **Hence, potash recovery from low grade glauconitic sandstone is essential, as its high grade deposits are limited in our country.** **2.** Glauconite comes in the category of critical minerals and Government of India is presently focusing and simultaneously carrying out the auctioning of potential Critical and Strategic Mineral blocks. So, the exploration of Glauconite prospects of the country is the need of the hour. **3.** GSI during systematic geological mapping on 1:50000 scale during 1985-86, observed the development of glauconitic sandstone in the some villages, which are located the near by area of the proposed block. **4.** GSI NGCM report "Geochemical Mapping in Toposheet No. 64 H/14 And Parts Of 64 H/10 in Raipur District, Chhattisgarh. (Interim report for the Field Season 2015-2016)" **5.** NGCM data (Stream sediment samples) suggests the presence of Glauconite in the block. A total of 25 stream sediment samples of NGCM falls within the proposed block. Values of K_2O is varying between 1.43% - 4.04%. Considering the consistency of glauconitic sandstone in the GSI's NGCM data, the present exploration programme is planned to prove the continuity of the glauconitic sandstone in the proposed area.

PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITIC SANDSTONE IN MAGARLOD BLOCK, DISTRICT- DHAMTARI, CHHATTISGARH

1. INTRODUCTION

1.1. Along with nitrogen and phosphorus, potassium is one of the most essential macronutrients and is required in agriculture in relatively large amounts for plant's healthy growth. After the growing recognition of potassium as one of the key nutrient in plant growth, subsequent development of potash industry was resulted. Reaching an estimated value of one million tonnes in 1921, production of potassium continues to increase consistently and reach to almost 34.6 million tonnes in 2013 (United State Geological Survey, 2013a, 2013b) expecting to raise 37.8 million tons in 2022 with the growth rate of about 2.9% annually (Rawashdeh et al., 2016).

1.2. Today most of the potash demand is met through bedded marine evaporite deposits such as sylvite, carnalite, kainite, polyhalite, surface and sub-surface potash-rich brines. These minerals are mixture of soluble salts, mainly potassium chloride or sulfates. More than 90% of these deposits are mainly concentrated in countries like Canada, Russia, Belarus, Brazil, China, Chile, Germany and USA (Anderson, 1985; The New York Times Editorial Board, 2013; Rawashdeh and Maxwell, 2014) on which rest of the world is dependent for supply of potash fertilizer.

1.3. In order to sustain crop production and to ensure self-sufficiency, exploration and investigation of alternative resource for potassium such as K-bearing silicates could be one of the options to meet the future demand (Manning, 2010; Manning, 2012; Ciceri et al., 2015).

1.4. In absence of mineable evaporite potash deposit in India, it was considered necessary to look for non-traditional source of potash such as glauconitic sandstone and potash rich shales. In many countries deficient in the conventional evaporite deposits insoluble potash used 'to be extracted out of silicate and non silicate minerals. Thus alunite in Bulla dealah in New castle, (Australia) containing 5% to 10%. K_2O was commercially exploited. Extraction of potassium from shales has also been discussed by Everest et al. (1964),Similarly glauconite has been used in USSR as a source of potassium fertilizer's (GSI, CGPB report, 1978 p. 94).

1.5. Out of different non-conventional sources, glauconitic sandstones deposits are available in plenty and are considered as one of the indigenous resources for potassium in India. India has vast reserves of more than 3,000 million tonnes of glauconitic sandstone containing 4 to 8% K_2O occurring in States like Madhya Pradesh, Uttar Pradesh, Bihar. Chhattisgarh, Rajasthan and Gujrat (Kumar and Bakliwal, 2005).

2. BACKGROUND

2.1. Exploration for strategic, critical, precious, rare earths and PGE are given top priority by Govt. of India, after amendment of MMDR Act, 2015 and it's subsequent amendments up to 2023. Keeping in view that Glauconite comes underin the category of critical minerals, the present proposal has been prepared and being put up for Reconnaissance Survey for DGM/NMET funding and execution.

3. LOCATION AND ACCESSABILITY

3.1. Magarlod block is a part of Dhamtari Glauconitic sandstone Belt and it is situated in the north-eastern part of the Dhamtari Distt., Chhattisgarh and falls in the Survey of India toposheet no. 64H/14. The exploration block can be reached from Kurud via Raipur-Jagdalpur Road through NH-30. The station lies on the Raipur–Dhamtari branch line of Bilaspur–Nagpur section. Kurud railway station is the nearest railway station from the block located 25 Km away in NE direction on Raipur–Dhamtari branch line of Bilaspur–Nagpur section. Raipur is the nearest airport from the block which is 65 km in NNE direction from the block. Block boundary corner points of Magarlod block is given below:

CORNER_ID	DD° MM' SS"		UTM Zone 44N(m)	
	LATITUDE	**LONGITUDE**	**NORTHING**	**EASTING**
A	20° 45' 0.000" N	81° 47' 30.000" E	2294681.591	582415.1767
B	20° 45' 0.025" N	81° 55' 0.003" E	2294751.097	595428.9746
C	20° 43' 49.316" N	81° 55' 29.697" E	2292582.061	596300.1234
D	20° 43' 49.669" N	81° 57' 30.013" E	2292613.189	599780.0246
E	20° 41' 37.632" N	81° 57' 29.815" E	2288553.717	599798.3409
F	20° 41' 34.152" N	81° 47' 30.665" E	2288353.171	582465.3614

4. PHYSIOGRAPHY AND DRAINAGE

4.1. The block area exhibits flat topography. The regional slope of the area is towards north and northeast. The highest elevation of the area is 379m in the eastern part of the Block. The lowest elevation of the area is 313m in the western part of the block.

4.2. The drainage pattern in the area is of dendritic type. Small stream is present in the area. Mahanadi river passes about 2 km in the west from the north- western margin of the block and western side Pairi river passes from the block.

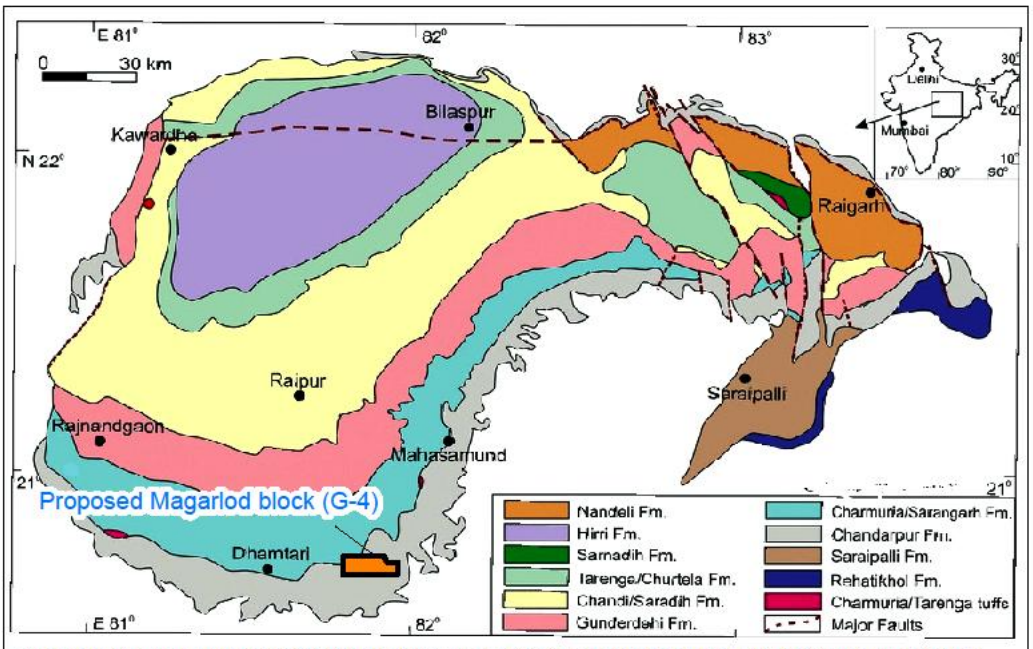
5. CLIMATE

5.1. The climate is tropical monsoon type. The cold season lasts for 2.7 months, from mid November to first week of February, with an average daily high temperature below 29°C. The coldest month of the year is December, with an average low of 15°C and high of 26°C.

5.2. The hot season lasts for 2.0 months, from Mid April to Mid June, with an average daily high temperature above 37°C. The hottest month of the year is May, with an average high of 40°C and low of 28°C.

5.3. Average annual rainfall is 1090 mm with maximum precipitation during July and August.

6. REGIONAL GEOLOGY



A generalised geological map of Chhattisgarh basin showing various lithological unites of Chhattisgarh Super Group ,modified Mukherjee et al.(2014) and Saha and Paternibis- Deb(2014).

6.1. Regionally, The proposed block falls in the southern part of Chhattisgarh basin and lithostratigraphically forms part of Raipur Group and Chandarpur Group of Chhattisgarh Supergroup belonging to Meso-Neo proterozoic age. The intracratonic Chhattisgarh Basin is crescent shaped and covers about 33,000 sq km area in Raipur, Durg, Balod, Rajnandgaon, Bilaspur and Raigarh districts of Chhattisgarh and adjoining parts of Orissa. The rocks of Chhattisgarh Basin rests unconformably over the basement complex comprising different elements of the Archaean-Lower Proterozoic supracrustals and granitoids of Bastar Province in the south and the Bilaspur-Raigarh-Sarguja (BRS) metamorphics of the Satpura Belt in the north. The basin is bounded to the west by the N-S trending volcanics of Dongargarh

Supergroup with faulted contact and to the northeast and southeast by Gondwana rocks (Mahanadi lineament) and the Eastern Ghat Mobile Belt (EGMB) respectively(Geology and mineral resources of Chhattisgarh, 2013).

6.2. The litho-units of the region, ranges from Meso-Neo Proterozoic age Charmuria cherty limestone, Meso-Neo Proterozoic age Kansapathar Glauconitic Sandstone, Meso-Neo Proterozoic age Lohardih Ferruginous Sandstone and Late proterozoic Dongargarh Granite. Dongargarh Granite are exposed in south-western and south-eastern part as represented in Regional Geology Map in Plate-II. Ferruginous Sandstone of Lohardih formation of Chandarpur Group and Chhatisgarh Super group is present in the central part of the region. Glauconitic Sandstone of Kansapathar formation of Chandarpur Group and Chhatisgarh Super group is present in the eastern part of the region while Cherty Limestone of Charmuria formation of Raipur Group and Chhatisgarh Super group is present in the northern part of the region.

6.3. Regional stratigraphic succession of the litho-units after Das e. al (1992), GSI is illustrated in the Table 6.1

Table 6.1

Regional Stratigraphic sequence of Litho units (After GSI)

Super Group	Group	Formation	Member	Lithology
Chhattisgarh Super Group		Intrusives		Dolerite dykes
	RAIPUR GROUP	Maniari Formation (70m+)		Purple shale with dolomite, dolomitic limestone and gypsum
		Hirri Formation (70m+)		Grey dolomite, argillaceous dolomite
		Tarenga Formation (180m?)	Bilha Member	Purple dolomitic argillite
			Dagauri Member	Green clay, chert and shale intercalation (tuffaceous?)
			Kusmi Member	Pink to purple calcareous shale
		Chandi Formation (67m)	Nipania Member	Purple and bedded limestone Purple argillaceous stromatolitic dolomite
			Pendri/Deodonger Member	Purple and grey stromatolitic limestone and dolomite with flaggy limestone-shale intercalation/ferruginous glauconitic arenite and Shale
		Gunderdehi Formation	Newari Member	Pink and buff Shale with Flaggy Limestone.
			Andha/Dotopar Member	Predominantly pink, purple and grey shale with limestone intercalations/ arenite/ buff to green shale member in the middle
		Charmuria Formation (490m)	Bagbura Member	Purple limestone (phosphatic)
			Kasdol Member	Dark grey bedded limestone/ argillaceous limestone with minor shale intrecalations
			Ranidhar Member	Cherty limestone and dolomite (phosphatic at places)
			Sirpur Member	Chert and clay intercalation

	CHANDARPUR GROUP	Kansapathar Formation (20-200m)		White to pinkish, glauconitic quartz arenite
		Chaporadih Formation (20-200m)		Purple, green, grey and black shale with fine quartz arenite intercalation
		Lohardih Formation (20m)	--Unconformity----	Ferruginous purple arkose and gritty wacke arenite with shale partings and conglomerate at the base
	SINGHORA GROUP	Chhuipali Formation (300m?)		Stromatolitic limestone and dolomite at the upper part Variegated shale with minor bedded limestone, chert, siltstone intercalations
		Bhalukona Formation (20m)		Quartz arenite/siltstone and minor shale
		Saraipali Formation (60m)		Variegated shale with minor siltstone and limestone Porcellanite, tuff/tuffite
		Rehatikhol Formation (20m+)	-- Unconformity	Feldspathic arenite, arkose and conglomerate at the base

7. GEOLOGY OF THE PROPOSED AREA

7.1. The proposed block area consist of Meso-Neo Proterozoic age lito-units of Kansapathar and Lohardih formation of Chandarpur Group of Chhattisgarh Super Group of rocks. The Meso-Neo Proterozoic Kansapathar Formation is the topmost unit of the siliciclastic Chandarpur Group of rocks which records a fluvial to marine transition and comprises a fining-upwards transgressive succession overlain by a coarsening-upwards prograding succession. The Kansapathar Formation is composed of medium- to coarse-grained, well sorted quartz-arenite/sandsone. These sandstone is having variable glauconitc content.

7.2. The Meso Proterozoic Lohardih Formation is the lowermost unit of Chandarpur Group of rocks. The Lohardih Formation is composed of medium- to coarse-grained, Ferruginous Sandstone.The sandstone of Lohardih Formation is arenitic, comprising ferruginous arenite with polymictic conglomerate at the base. The rock is greyish white to pinkish grey, medium to coarse-grained feldspathic sandstone and ferruginous arenite with shale partings at base. This formation has been interpreted as initial alluvial fan associated with braided fluvial sediment and followed by marine transgression producing wave-tide dominated shallow marine shoal bar, which shows signature of reworking of fluvial sediments.

7.3. General strike of the area is almost NW-SE dipping northerly. At places lithounit trend varies from NE-SW with low to moderate dip due in north.

7.4. The tentative srtratigraphic sequence of litho units exposed in the Block area (After GSI) is given in Table 7.1

Table 7.1

Stratigraphic sequence of the Magarlod Glauconite Block

(After GSI)

Age	Super Group	Group	Formation	Lithology
			Recent-Sub recent	Soil/Laterite
Meso Proterozoic – Neo Proterozoic	Chhattisgarh	Chandarpur	Kansapathar	Glauconitic Sandstone
			Lohardih	Sandstone

8. PREVIOUS WORK

8.1. Pioneering geological work in the Chhattisgarh basin was carried out by V. Ball (1877), W. King(1885-90) and Fermor (1919), followed by Narayana Murthy (1955, 1960), Narayana Murthy and Radhakrishna (1961), N.V.B.S. Dutt (1964), W.A. Schnitzer (1971), Murti (1996), Das et al. (1992). Chaudhari et al. (2002) and Deb (2004) provided recent geological summaries of the basin.

8.2. H.B.Medlicott (1866-67) and W. T. Blanford (1869-70) took few traverses and mentioned about quartzites and limestones of Chhattisgarh basin and correlated these with the Cuddapah Supergroup. P.N.Bose (1898-99) described the sediments of this basin as 'Chhattisgarh Plain Series' comprising the Chandarpur Sandstone in the lower part and the Raipur shales and limestones in the upper part and correlated them with Lower Vindhyans. D. Bhattacharjee (1936-37, 37-38) mapped the Western part of Durg district and correlated these formations with the Cuddapahs. A sequence of these rocks given by him is as follows: Raipur limestones, Shales and phyllites, Chandarpur sandstone, Khairagarh sandstones. Sen (1963-64), Sen and

Satyanarayanan (1964-65) and Satyanarayanan (1965-67) and Murti (1967-72) carried out systematic geological mapping in parts of Raipur, Durg and Bilaspur districts and located a few rock phosphate bearing horizons in the clay pockets found inthe upper part of Chandarpur sandstone and at the base of Charmuria limestone.

8.3. Dutt (1964) studied in the southwestern part of the Chhattisgarh basin and classified the succession into five series, the Chandarpur Sandstone, Charmuria Limestone, Gunderdehi Shale, Khairagarh Sandstone and Raipur Shale-Limestone. Schnitzer (1969-1971) established five cycles of sedimentation, separated by unconformities in the east central part of the basin. Murti (1987) worked in the south central part of the basin, assigned a "Supergroup" status to the Chhattisgarh succession and classified the rocks into two groups separated by an unconformity, the lower, Chandarpur Group, and the upper, Raipur Group. Each group comprises several formations. Das et al. (1992) considered that the Singhora Group is the lowermost unit of the Chhattisgarh Supergroup and occurs between the granite gneissic complex of the basement and the Chandarpur Group.

8.4. N.V.B.S. Dutt, K.S. Murti, and a host of GSI workers made valuable contribution towards elucidation of stratigraphy and structure of chhattisgarh Basin. N.V.B.S. Dutt (1963) covered the southern part of Chhattisgarh Basin by traverse mapping and suggested the following succession:-

Raipur shale and limestone	-	(450m)
Khairagarh sandstone	-	Variable
Gundardehi shale	-	(180m)
Charmuria limestone	-	(300m)
Chandrapur sandstone	-	(300m)
----------unconformity----------		
Archean		Granitoids

8.5. During phosphorite investigation (1972-73) U.S. Vatsa et al. observed three different litho members in the Chandrapur Formation, viz. ferruginous sandstone, feldspathic sandstone and orthoquartzite in the southern part of the chhattisgarh basin and reported the presence of phosphate with P_2O_5 content maximum upto 29% in a few clay samples within cherty-limestone of Charmuria Formation.

8.6. S. Singanenjam & G. Suresh Geologist (Jr.) (1985-86), during systematic geological mapping in 1:50000 scale of toposheet no 64H/13 and 64H/14, The second type is a continuous belt exposed between Sargi and Phuljhar. This belt, with an average width of 7 km passes through Mohdi, Magarlor, Parsabura (all in 64H/14) Kulharikot, Atarmara and Sankra. In hand specimen this rock is purple to reddish brown in colour, constituted by medium to coarse grained well rounded and well sorted sand grains. Occasional layers of„granules" of quartz grains are observed as is seen in the mound south of Kumharmara. The high degree of

maturity is visible in the hand specimen itself. Though glauconite grains are disseminated throughout the body of the rock, at places, as exposed in the nala south of Phuljhar, the glauconite grains form a distinct layer along the bedding Plane. Well rounded heavy minerals are visible to naked eye.

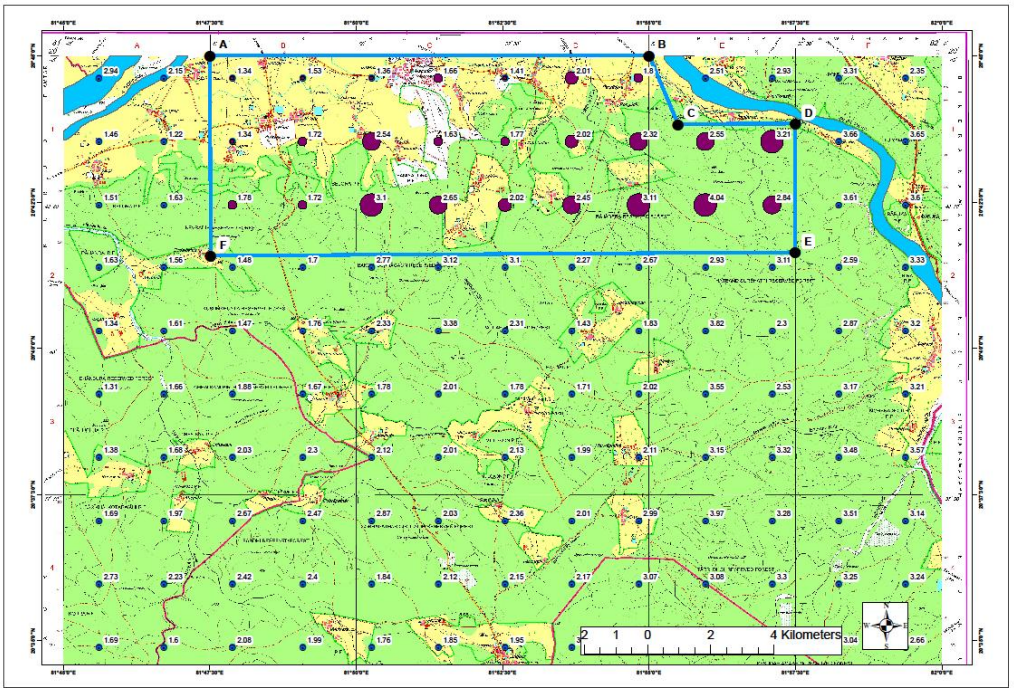
8.7. Bhalukona and Chhuipali (Das et al. 1992; 2003). Patranabis-Deb (2004) and Patranabis-Deb and Chaudhuri (2008) made threefold classification of the succession around the eastern part of the basin. They classified the succession into the Chandarpur, Raipur and Kharsiya groups. Chakrobarty et al. (2015) proposed a four-tier lithostratigraphy for the Chhattisgarh Supergroup namely, Singhora Group, Chadarpur Group, Raipur Group and Kharsiya Group.

8.8. Das et al. (1992) divided the Chhattisgarh Basin into Hirri and Baradwar sub-basins, and Singhora and Barapahar protobasins. They classified the Chhattisgarh Supergroup into three unconformity-bound groups, the Singhora Group, the Chandarpur Group and the Raipur Group in ascending order.

8.9. It suggests that the area is very much suitable for the exploration of fertilizer minerals.

8.10. **NGCM INVESTIGATIONS**

Geological Survey of India under National Geochemical Mapping program systematic stream sediment sampling was carried out in the study area in 1 X 1 km interval in grid pattern. A total of 25 stream sediment samples generated falls within the proposed block Values of K_2O is varying between 1.34% - 4.04%



FID	SAMPLE NO	LONGITUDE	LATITUDE	SiO_2	Al_2O_3	Fe_2O_3	K_2O
0	64H14/146/S/16	81.79807	20.7075	68.28	10.65	5.23	1.78
1	64H14/147/S/16	81.81807	20.7075	67.32	11.72	6.27	1.72
2	64H14/148/S/16	81.83767	20.7075	67.64	11.04	3.39	3.1
3	64H14/149/S/16	81.85667	20.7075	68.04	11.27	4.02	2.65
4	64H14/150/S/15	81.87567	20.7075	70.28	10.04	4.2	2.02
5	64H14/151/S/15	81.89467	20.7075	69.41	11.42	4.34	2.45
6	64H14/152/S/16	81.91367	20.7075	63.97	14.11	5.7	3.11
7	64H14/153/S/16	81.93267	20.7075	64.94	12.89	2.69	4.04
8	64H14/154/S/16	81.95167	20.7075	62.38	13.6	4.56	2.84
9	64H14/159/S/15	81.79807	20.72556	72.71	9.05	5.43	1.34
10	64H14/160/S/15	81.81807	20.72556	68.7	10.63	6.15	1.72
11	64H14/161/S/16	81.83767	20.72556	68.18	10.24	3.88	2.54
12	64H14/162/S/15	81.85667	20.72556	70.27	9.77	6.24	1.63
13	64H14/163/S/15	81.87567	20.72556	67.49	11.43	5.94	1.77
14	64H14/164/S/15	81.89467	20.72556	70.8	10.06	4.56	2.02
15	64H14/165/S/15	81.91367	20.72556	71.06	10.24	4.26	2.32
16	64H14/166/S/16	81.93267	20.72556	62.85	12.49	3.99	2.55
17	64H14/167/S/16	81.95167	20.72556	61.26	13.57	4.91	3.21
18	64H14/172/S/15	81.79807	20.74361	69.92	10.21	5.96	1.34
19	64H14/173/S/15	81.81807	20.74361	68.13	11.11	6.29	1.53
20	64H14/174/S/16	81.83767	20.74361	63.92	12.3	7.25	1.36
21	64H14/175/S/16	81.85667	20.74361	69.21	10.58	6.06	1.66
22	64H14/176/S/16	81.87567	20.74361	72.37	9.41	5.2	1.41
23	64H14/177/S/15	81.89467	20.74361	66.5	11.65	5.99	2.01
24	64H14/178/S/15	81.91367	20.74361	66.01	11	6.09	1.8

9. PROPOSED SCHEME OF EXPLORATION

9.1. **Geological mapping:** Geological & structural mapping on 1:12,500 scale will be carried out in the proposed block for demarcation of Glauconitic sandstone with the structural features to identify the surface manifestations and lateral and vertical disposition of the mineralized zones

9.2. **Survey:** DGPS survey will be done for determining co-ordinate and reduced level (RL) of all the borehole locations and corner point.

9.3. **Surface Geochemical sampling (Bed Rock/Channel/Chip Sample):** During the course of sampling, around 125 nos. of bed rock /Channel/Chip samples shall be collected from the suitable surface locale. A total of 125 nos. of primary and 13 nos. of external check surface samples will be analysed for 4 radicals (K_2O, SiO_2, Al_2O_3& Fe_2O_3). 10% of Primary samples (15 Nos) will be sent to NABL External Labs as External Check Samples.

9.4. **Exploratory Mining (Trenching/Pitting)** Pitting (Excavation) shall be carried out in the potential zones identified based on the results of geological mapping and geochemical sampling. A provision of pitting of 100 cubic meter has been planned. Pitting work will be carried out by excavating pitting of 1m width x 1m length, and up to 1.5m depth in the area to expose the source rock and mineralization. Locations of pits on ground will be decided by field geologist based on field observations. Pitting will be geologically mapped thoroughly by the field geologist. Around 100 nos. of pit samples shall be genrated. A total of 100 no of primary and 10 no of external check pit samples will be analysed for 4 radicals (K_2O, SiO_2, Al_2O_3 & Fe_2O_3). 10% of Primary samples (10 Nos) will be sent to NABL External Labs as External Check Samples.

9.5. **Drilling:** If phase-I exploration data will give anamolous values, 05 Nos. scout boreholes will be drilled. The boreholes will be planned judicially after the completion of phase-I exploration.

9.6. **Drill core logging:** Geological core logging will be carried out systematically by recording carefully the minute details and physical/lithological characters of the rock formations including colour, core recovery, grain size, weathered zone, texture, banding, mineralogical composition, micro-structural/structural details, lithological variations along with visual estimate in respect of Potash content encountered in boreholes. As per the requirement the

Rock quality designation (RQD) shall also be carried out, while logging drill cores. On the basis of these parameters, grade of glauconite can be broadly assessed and it will also be helpful in sampling/demarcating the Phosphorite zones.

9.7. **Drill core sampling:** For preparation of samples, the borehole core will be splitted into two equal halves by using core splitter. One half will be powdered to -200 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gram of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-200 mesh size) will be kept as duplicate half for future reference. It will generate about 75 Nos of **primary samples** and 07 Nos of **External Check samples** (10% of Primary samples). External Check samples will be sent to NABL Lab for analysis. **Composite samples** will be prepared borehole wise based on the analytical results of primary sample at every 8m interval (8m bench height). Composite samples shall be prepared from the entire borehole in which glauconitic sandstone bands will be intersected. This will generate about 20 nos. of composite samples. Each sample should be marked at every 1m length in case of continuance of similar mineralogical composition down the borehole. The sample length towards the floor marked by non-ore zone needs also to be adjusted as per variations of the litho-units. Even if the floor is distinctly differentiated by the presence of non-mineralized zone, at least two nos. samples after the Glauconite zone need to be drawn to mark the floor of the Glauconite zone decisively.

9.8. **Chemical Analysis:** All the primary samples and 10% of the Primary samples as External check samples will be analyzed for 4 radicals (K_2O, SiO_2, Al_2O_3 & Fe_2O_3). About 10% of primary samples will be sent to NABL external laboratory as External check samples for analysis of 4 radicals i.e. K_2O, SiO_2, Al_2O_3 & Fe_2O_3. Around 20 composite samples will be analyzed for 12 radicals i.e. K_2O, Na_2O, CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, Mn_2O_3, TiO_2, and LOI.

9.9. **XRD Study:** To know the different mineral phases, for recovery of potash, XRD study will be performed in 5 samples of glauconitic sandstone.

9.10. **Determination of Bulk density/specific gravity:** To calculate the resource, volume of the ore body need to be multiplied with a density factor. Hence, 2 nos. of samples will be drawn from the glauconitic sandstone for determination of Bulk density/specific gravity.

10. QUANTUM OF WORK

10.1. The following quantum of work have been proposed for Reconnaissance Survey (G-4 stage) f

S. No	Item of Work	Unit	Target
1	Large Scale Mapping (1:12500 scale)	Sq. Km	100.00
2	DGPS Survey for Borehole fixation	Nos.	05
3	Surface sampling (Bed Rock/Channel/Chip Sample)	Nos.	125
4	Exploratory Mining (Trenching/Pitting)	Cu. m.	100
5	Drilling (Core)	m.	300
6	Sample Preparation & Chemical Analysis		
A.	Surface samples (Bedrock/Channel/Chip etc Samples)		
	i) Primary, & 10% External check for 4 radicals viz. K_2O, SiO_2, Al_2O_3 & Fe_2O_3	Nos.	138(125+13)
B.	Pit Samples		
	i) Primary, & 10% External check for 4 radicals viz. K_2O, SiO_2, Al_2O_3 & Fe_2O_3	Nos.	110 (100+10)
C.	BH samples		
	i) Primary, & 10% External check for 4 radicals viz. K_2O, SiO_2, Al_2O_3 & Fe_2O_3	Nos.	82 (75+7)
7	Petrographic Studies	Nos	10
8	XRD Study	Nos.	5
9	Determination of Bulk Density/specific gravity	Nos.	2
10	Geological Report preparation	Nos.	1

ndstone in:

11. TIME SCHEDULE

11.1. The proposed exploration programme envisages geological mapping, Surface sampling, Trenching, core drilling, sample preparation and laboratory studies, which will be completed within 10 months, geological report preparation. Therefore, a total of 10 months is planned for completion of the entire proposed programme.

Timeline Reconnaissance survey (G4) for Glauconitic Sandstone in Magarlod Block,														
District: Dhamtari , State: Chhattisgarh.														
[Block area- 100.00 sq. km; Schedule timeline- 10 months]														
S. No.	**Component**	**Months**	**1**	**2**	**3**	**4**		**5**	**6**	**7**	**8**		**9**	**10**
1	Camp Setting	**months**												
2	Geological Mapping	**months**												
3	Survey days	**days**												
4	Pitting	**cu.m**												
5	Drilling (2 rig)	**m**												
6	Geologist days	**days**					Review					Review		
7	Sampling days,	**days**												
8	Camp winding	**months**												
9	Laboratory Studies	**months**												
10	Geologist days, HQ	**days**												
11	Report Writing	**months**												

12 Manpower deployment

Manpower deployment	1. Geologist : 2Nos 2. Surveyor : 1No. 3. Jeep Driver with Jeep : 2No As per requirement 4. Driller Mechanic: 01Nos. 5. Asstt. Driller with Drill Machine : 01Nos. 6. Truck : 1 Nos. 7. Mini truck; 1 Nos. 8. Tractor with Tanker: 1 Nos.

Reference:-

1. GEOCHEMICAL MAPPING IN TOPOSHEET NO. 64 H/14 AND PARTS OF 64 H/10 IN RAIPUR DISTRICT, CHHATTISGARH. (Interim report for the Field Season 2015-2016) Jidesh P.C, Sr. Geologist, Bhupesh B Urkude, Sr. Geologist, Project: Geochemical Mapping State Unit: Maharashtra, Nagpur.
2. GEOLOGY OF THE AREA IN AND AROUND RAJIM-PANDUKA MAGARLOR, RAIPUR DISTRICT, MADHYA PRADESH,(Annual Progress Report for the Field Season 1985-1986), S. Singanenjam, G. Suresh Geologist (Jr.)

Submitted By

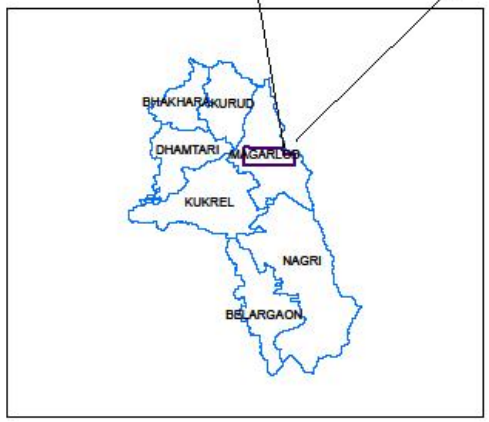
Parmanand Khute
Assistant Geologist
Regional Office Raipur

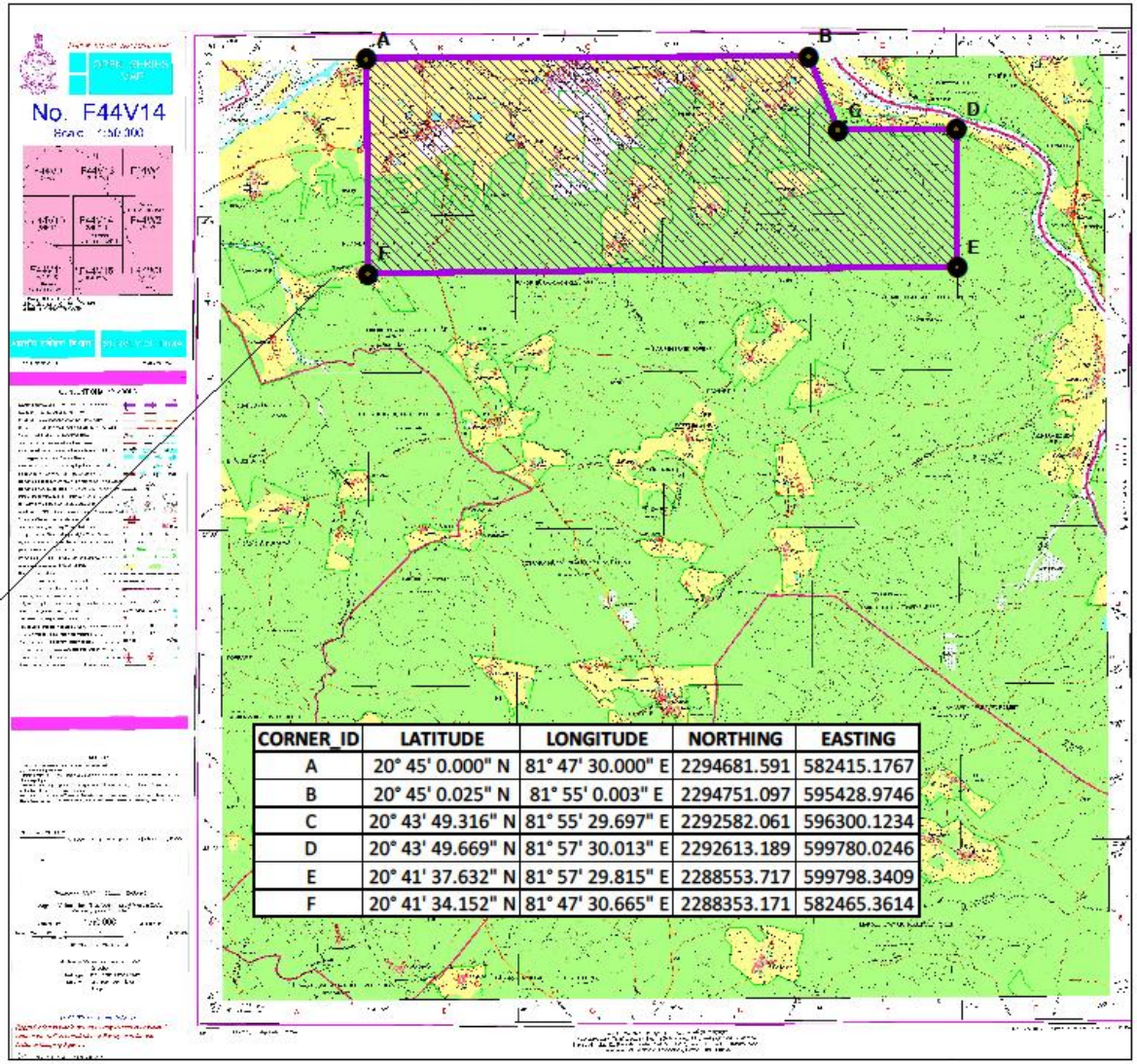
COST ESTIMATION FOR PRELIMINARY EXPLORATION (G-4) FOR GLAUCONITE SANDSTONE IN MAGARLOD BLOCK,
TEHSIL: MAGARLOD, DISTRICT: DHAMTARI,
Total Area - 100.00 sq km; Nos. of Borehole - 05 ; Completion Time - 10 Months,

S. No.	Item of work	Unit	Rates as per NMET SoC 2020-21		*Total*	
			SoC Item - S.No.	Rates as per SoC	Qty.	Amount
A.	**GEOLOGICAL WORK**					
3	Geologist Party Days (1 Party) Field	Day	1.3	11000	150	0
4	Geologist Party Days (1 Party) HQ	Day	1.3	9000	30	0
5	Labour charges for Geological Field work	Per Labour	5.7	541	300	162300
6	Core Sampling Party Days - (2 Parties)	Day	1.5.2	5100	45	229500
7	Labour for Sampling	Per Labour	5.7	541	180	97380
8	Survey work for BH Fixation	Per point of observation	1.6.2	19200	5	96000
	Sub Total A					**585180**
B.	**Pitting & Trenching**					
1	Excavation pit up to depth 2.00 m	Cu.Meter	2.1.2	3800	**100**	**380000**
	Sub Total B					**380000**
C.	**DRILLING**				0	
1	Surface drilling (Outsource)	Meter	2.2.1.3	10100	300	**3030000**
2	Road making (flat terrain)	Per km	2.2.10a	22020	10	**220200**
3	Construction of concrete piller	Per borehole	2.2.7a	2000	5	**10000**
4	Transportation (1 rigs)	Per km	2.2.8	36	75	**2700**
5	Monthly Accommodation charges for drilling camp	Monthly basis	2.2.9	50000	3	**150000**
6	Camp Establishment cost	Per Drill	2.2.9a	250000	1	**250000**
7	Camp Winding	Per Drill	2.2.9b	250000	1	**250000**
8	Drill core preservation	Per meter	2.2.8	1590	150	**238500**
	Sub Total C					**4151400**
D.	**LABORATORY STUDIES**					
a	Bulk density/S.Gv.	per sample	4.1	3540	2	**7080**
b.	Chemical Analysis					
1	Primary + Check Samples					
	(i) Primary Samples 4 radicals (K2O, SiO2, Al2O3 & Fe2O3)	per sample	4.1.15a	4200	300	**1260000**
	(ii)For Check Samples 4 radicals (K2O, SiO2, Al2O3 & Fe2O3)	per sample	4.1.15a	4200	30	**126000**
	(iii) preparation of standard thin section	per sample	4.3.1	2353	10	**23530**
	(iv) Petrological study	per sample	4.3.4	4232	10	**42320**
	(v) XRD studies	per sample	4.5.1	4000	5	**20000**
	Sub Total D					**1478930**

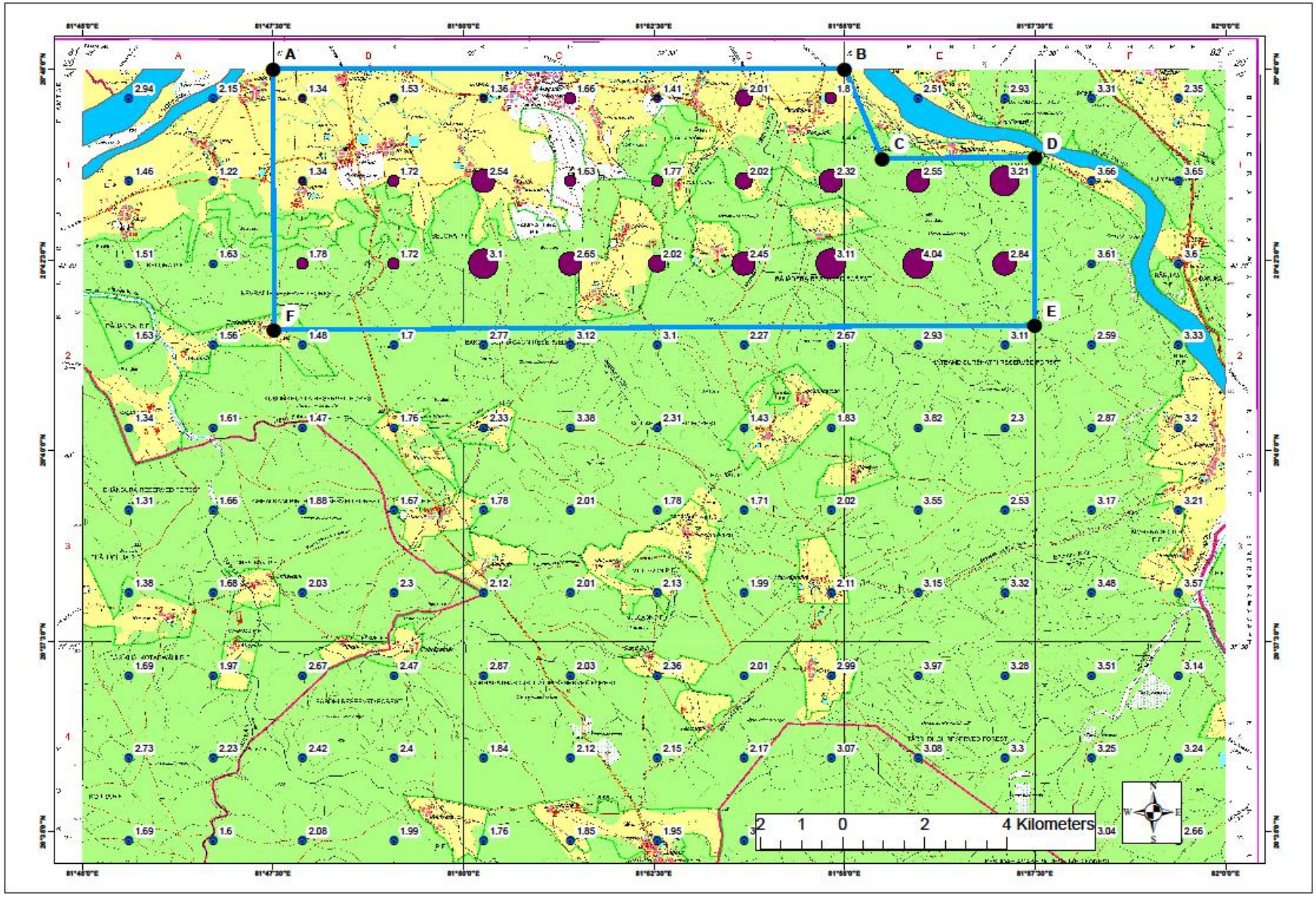
E.	Land/crop compensation	Per BH	5.6	20000	5	**100000**
	Sub Total E					**200000**
E.	**Total A + B + C +D+E**					**6415510**
F.	Peer review					30000
	Preparation of exploration proposal	One Number (5 Hard copies along with soft copy)	5.1	2% of the project cost or Rs 3.8 lakh whichever is lower		128310
	Geological Report Preparation	Copy per 5 Hard copies of report along with soft copy	5.2	For the projects having cost upto Rs 150 lakhs : A Minimum of Rs.2.5lakhs or 3% of the value of work whichever is more		320776
	Sub Total F					**479086**
	Grand Total E+F					**6894596**
	GST 18%					**1241027**
	Grand Total: with GST 18%					**8135623**

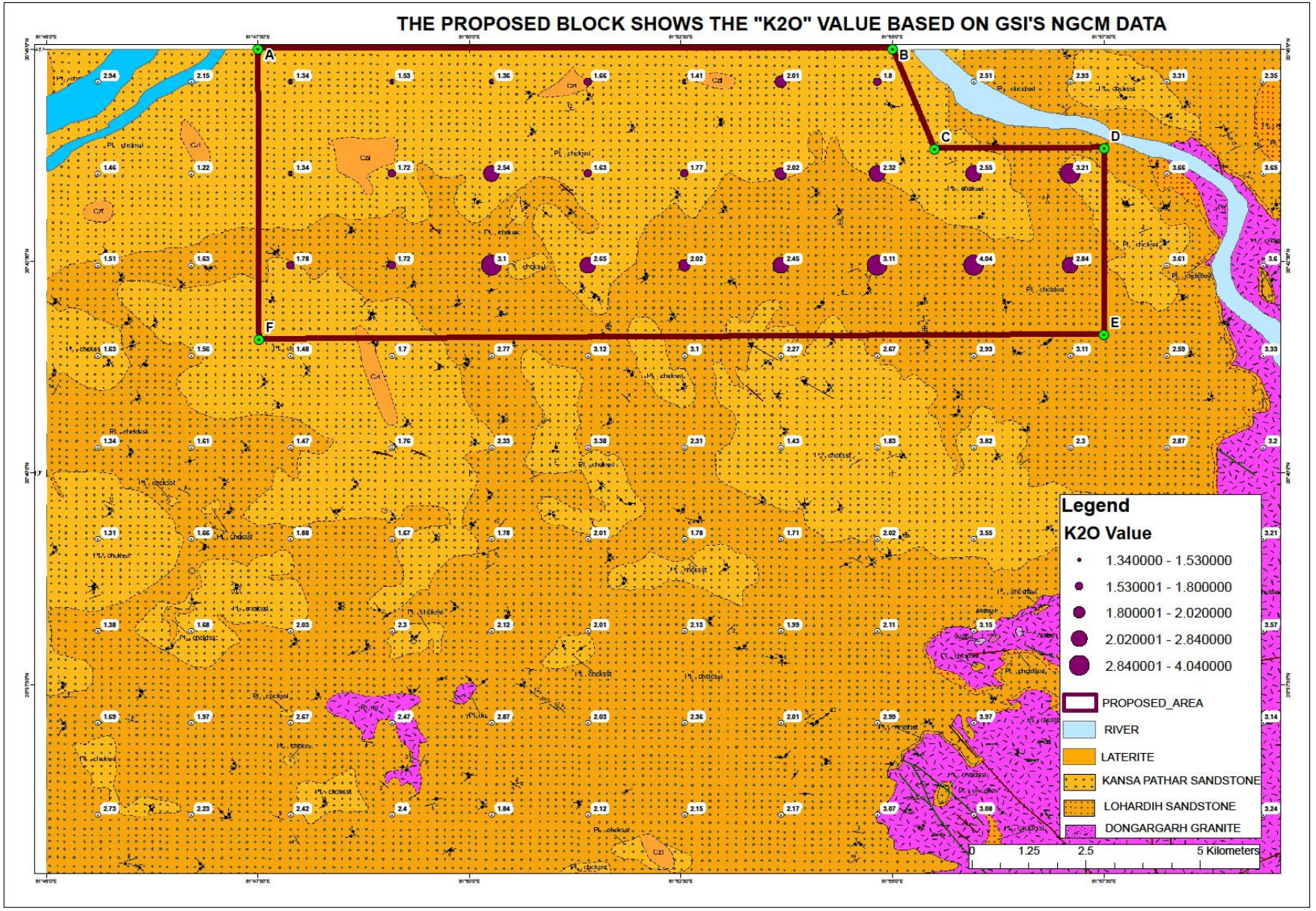
LOCATION MAP OF MAGARLOD BLOCK, DISTRICT-DHAMTARI(CG)
AREA-100.00 sqkm





CORNER_ID	LATITUDE	LONGITUDE	NORTHING	EASTING
A	20° 45' 0.000" N	81° 47' 30.000" E	2294681.591	582415.1767
B	20° 45' 0.025" N	81° 55' 0.003" E	2294751.097	595428.9746
C	20° 43' 49.316" N	81° 55' 29.697" E	2292582.061	596300.1234
D	20° 43' 49.669" N	81° 57' 30.013" E	2292613.189	599780.0246
E	20° 41' 37.632" N	81° 57' 29.815" E	2288553.717	599798.3409
F	20° 41' 34.152" N	81° 47' 30.665" E	2288353.171	582465.3614


A
B
C
D
E
F
2 1 0 2 4 Kilometers
N
W
E
S


THE PROPOSED BLOCK SHOWS THE "K2O" VALUE BASED ON GSI'S NGCM DATA
A
B
C
D
E
F
Legend
K2O Value
1.340000 - 1.530000
1.530001 - 1.800000
1.800001 - 2.020000
2.020001 - 2.840000
2.840001 - 4.040000
PROPOSED_AREA
RIVER
LATERITE
KANSA PATHAR SANDSTONE
LOHARDIH SANDSTONE
DONGARGARH GRANITE
0
1.25
2.5
5 Kilometers


A
B
C
D
E
F
1.34
1.53
1.36
1.66
1.41
2.01
1.8
1.34
1.72
2.54
1.63
1.77
2.02
2.32
2.55
3.21
1.78
1.72
3.1
2.65
2.02
2.45
3.11
4.04
2.84