

MINERAL EXPLORATION PROJECT PROPOSAL (MEPP)

FOR

**Reconnaissance survey (G4) for Phosphorite, Baryte & REE
In Katamadevarahalli area, Kalburgi dist, Karnataka
(block id: kiocl_38_ka_kdpb)**

Date of Submission: 03rd May, 2023

Submitted by:

**KIOCL LIMITED,
(Notified *Exploration Agency*)
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To:

**The ADG &HOD and CHAIRMAN,
TCC-NMET, Southern Region,
Geological Survey of India,
Bandlaguda, GSI Complex,
Hyderabad, Telangana- 500068**

KUDREMUKH



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Summary of Reconnaissance Survey (G4) for Phosphorite, Barytes & REE in Katammadevarhalli area of Chittapur Taluks, Kalburgi district, Karnataka

BLOCK ID	KIOCL_38_KA_KDPB
Title of the project	Reconnaissance Survey (G4) for Phosphorite, Barytes & REE in Katammadevarhalli area, Chittapur Taluks, Kalburgi district, Karnataka.
Exploration Agency	KIOCL LIMITED, BANGALORE; Notified Exploration Agency
Commodity	Phosphorite, Baryte & REE
Mineral Belt	Bhima Basin
Completion period with entire Time Schedule to complete the project	12 months
Objective	i) To map the area on large scale geological mapping to target Phosphorite, Baryte and REE. ii) To demarcate / delineate the potential zones of mineralization for Phosphorite, Baryte & REE. iii) Estimate the resources if any grade, tonnage,
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	The work will be carried out solely by the Geologists of proposed agency ie., KIOCL, with its HQ at Bangalore.
Name/ Number of Geoscientists	THREE (03) Nos or more from Mineral Exploration Department, KIOCL Limited, Bangalore.
	Large Scale Geological Mapping (04 months) Geologist Party Days : 165 days - 120 days (Field) - 45 days (HQ) Drilling (03 months) Geologist Party Days : 145 days - 100 days (Field) - 45 days (HQ)
1. Location	
Latitude	Annexure 05
Longitude	Annexure 05
Villages	Pet sirur, Gungurthi, Belgumpa, Ivani, Indankal and Dandhoti
Tehsil/ Taluk	Chittapur
District	Kalburgi
State	Karnataka

2. Area (hectares / Square Kilometres)	
Block Area	150sqkm
Forest Area	Nil
Government Land	-
Private Land	150sqkm
3. Accessibility	
Nearest Rail Head	Kalburgi
Road	Block is situated at around 20km from Kalburgi
Airport	Nearest airport to the Block – Kalburgi
4. Hydrography	
Local Surface Drainage Pattern Channels / Rivers / Streams	Radial pattern drainage system
5. CLIMATE	
Mean Annual Rainfall	600mm
Temperature	Winter: Around 19.1°C Summer : Around 42°C
6. Topography	
Toposheet No	56G/3 & 56G/4 Block marked on SoI Toposheet is enclosed at Plate - 02
Morphology of the Area	The area presents a vast landscape of plain terrain with gentle undulations. Max. Elevation: 440m; Min Elevation: 395m
7. Availability of the Baseline Geoscience Data	
Geological Map (1:50 K)	Available
Geochemical Map	Available
Geophysical Map (Aero/ Ground, Regional/ Local Scale)	Aero-Geophysical Map available
i) Justification for taking up Reconnaissance Survey (G4 Stage) Mineral Exploration ii) Phosphate rocks are by far the most important phosphorus-bearing raw material used in the fertilizer industry. They are the primary source of phosphorus (P), which is an essential element for agriculture and various industrial applications. iii) Sedimentary phosphorites of marine origin are currently the primary raw material for phosphate industries, and account for a significant proportion of the world's phosphate rock production ('90%) iv) Submarine phosphorites are principally composed of carbonate-fluor-apatite (CFA) or Francolite with usually large admixtures of detrital impurities from the sediments in which they form or replace during authigenesis. v) Continental margins and epeiric seas seem to be the most favourable locations for the accumulation of phosphate deposits (Filippelli, G.M 2011). They occur at depths varying between 100 and 500 m, with a limited supply of terrigenous and carbonate detritus, which corresponds to a phosphogenic window (Föllmi, K.B.1996). In these environments, upwelling currents play an essential role in lifting phosphorus-rich deep water to the surface, triggering significant biological productivity (Pufahl, P.K.; Groat, L.A. 2017)	



- vi) One such sub-marine sedimentary sequence is in the Bhima basin as per the previous workers and they belong to Proterozoic. The authors have reported occurrences of Phosphorite in the Halkal shales. Since India is dependent on the import of majority of the phosphate fertilizers, it is pertinent to look for exploration of this scarce commodity.
- vii) *The search for the phosphorite mineralisation in the Bhima basin by N K Sood and Shyamala Rao during the GSI field season 1983-84 (1986) under all India Phosphorite scheme reported the occurrence of lenses, thin bands and boulders of phosphorite in Halkal shale formation in the Bhima basin.*
- viii) *They have also reported P_2O_5 content ranging from 12.57% to 18.69% in Katamadevarahalli, 15.52 to 23.93% around Gangurthi, Chennar in 9.00 % and in Halkal 6.38 to 9.52%.*
- ix) *Percentage of P_2O_5 % values as declared by NK SOOD & A SYAMALA RAO (FS 1983-84) (1986)GSI, are ranging from 6.38 to 23.9 % which are higher than the Threshold value of IBM.*
- x) *Phosphorite occurs as lensoidal boulders within shales on the foothills nearly from the centre of the shale formation. Phosphorite occurs as dark grey coloured with a yellowish-brown hue and in fact occurs as a bed of about 10 to 20cm thick and breaks into boulders. The bands occur discontinuously over 200m. The Phosphorite occurs has boulders, thin bands, lenses etc., within the shale horizon of Bhima Basin.*
- xi) *This forms the basis for mounting a reconnaissance survey (G4) for search and delineate potential zones of Phosphorite mineralisation, if any in the area for furthering the exploration.*
- xii) It is proposed to sampling is performed by gridding the entire area of study into 1 sq.km grid, initially to identify and delineate the potential zone for detailed sampling at closer interval upon the presence of phosphorite.
- xiii) *The first and foremost activity is to perform the Shapiro's Kit Test to ascertain the presence of the Phosphorite mineralisation in the rocks. If the Shapiro's Kit Tested positive in such locations, the samples will be collected systematically depending on the disposition of bed rock or channel sampling will be carried out.*
- xiv) Upon delineating the possible phosphorite bearing zone, the sampling density will be increased to ascertain and estimate the reconnaissance resource. Similarly, there are reported occurrence of Baryte in the area same will be investigated.
- xv) In general, there are reports that Phosphorite mineralisation is associated with the Rare Earth Elements (REE) also. The same will be considered for initial few samples to know the presence of such REEs. If found positive systematic approach will be followed.



Detailed Descriptions

1. Block Summary

1.1 Physiography

The area proposed for the reconnaissance survey for Phosphorite, Baryte, and REE exploration falling in Survey of India T.S. No.56G/3 and 56G/4 in the Kalburgi district, Karnataka.

The average elevation is between 399m to 462m above MSL with a very gentle upward gradient from south to north, such a negligible gradient in the sedimentary terrain is due to horizontal disposition of soft sediments like shale and Limestone etc., A few isolated small mounds with steep gradients are seen towards west, northwest of Katamadevarahalli (462m), northwest of Gangurti (423m).

The area is mainly drained by the Kagna River in the southern part of the area and flowing along east to west and joins the Bhima River near Yergundi Village. A number of nallas drain the entire area of exploration, flowing from north to south before joining Kagna River as tributaries.

The proposed area is well connected to Kalburgi by road and Rail. The nearest airport is Kalburgi at 12km. Kalburgi is the nearest city and administrative headquarters around 20 km from the proposed block. Power, Water, Fuel, Communication is available in vicinity of the proposed block (**Plate-01 & 02**).

1.2 Background Geology (Regional Geology, Geology of the Block)

The Bhima basin occupies over an area of about 5,000 sq. km. with a cumulative thickness of 150-200m (Janardhan Rao et al, 1975). From lithological similarity and proximity of outcrops, Foot (1876) correlated the Bhimas with Kurnools (Upper Vindhyan or Late Precambrian 900 – 500million years). Srinivasa Rao and Gowda (1970) based on reported arcitarchan assemblage of fossil records advocated a relatively younger age. Sarkar and Saha (1983) have grouped the Bhimas as Precambrian VI (900 – 1600 million years) along with Kaladgi's and Badami's.

The sedimentary rocks of the Bhima Group are deposited over an irregular basement of pink granites with a regional unconformity. They are bound in the south and east by pink granites, and the Deccan Traps in the north and west obscuring the original extent of the Basin. The rocks are flat bedded, unmetamorphosed, un-fossiliferous and undisturbed except for some local changes due to minor folding and faulting.



The sedimentation in the intercontinental Bhima Basin commenced over an undulating granite country with the coarse clastics – conglomerate and sandstone envisage a near shore environment – pointing to a very shallow sea. The influence of the clastics was short lived and their turn was taken by silt and clay and resulted in the deposition of a thick pile of greenish yellow and purple shales of the Rabanapalli. The Basin probably has deepened and the boundaries must have expanded, and sedimentation over a prolonged period of quiet basin must have resulted in the precipitation of huge pile of Shahabad limestone. The siliceous nature and intercalations of shales in the upper horizons of the Shahabad limestone indicate instability in the Basin. As the Basin got filled by the limestones the Basin became shallower and the clastics – conglomerate and sandstones followed by shales of Halkal formations deposited. This leads to the concept of sudden lowering of the eustatic level and consequent marine regression. Owing to some tectonic disturbances in the Basin, probably, once again become deeper and resulted in the deposition of Katamadevarahalli limestone and followed up by Harwal shales indicating a second cycle of sedimentation, corresponding to a transgression and regression. The presence of rare current bedding, ripple marks in the sandstone, association of limestones and ortho-quartzite (lower Halkal shale formations), high percentage of arkoses material in shales, and presence of glauconite within the limestones (Katamadevarahalli) are all indicative of shallow marine conditions for the deposition of Bhima sediments.

Deccan Trap Group of lava flows with intertrappeans		
----- Unconformity -----		
Bhima Group	Harwal shale	Purple shales
	Katamadevarahalli Limestone	Well bedded and flaggy dark grey limestone
	Halkal Formation	Greenish yellow to buff coloured shales with local quarzitic sandstone and conglomerate
	Shahabad Limestones	Limestone of varying physical and chemical properties
	Rabanapalli Formation	Greenish yellow and purple shales with thin siltstone and sandstone or conglomerate/grit at the bottom
----- Unconformity -----		
Pink granites		

Pink Granites: This granite forms the basement for the Bhimas. This granite is mostly confined to the southeastern and eastern parts of the area. They occur as bouldery



outcrops near Miryam, Bankur, Basawankhani and Chitapur. The granites are pink to grayish pink in colour medium to coarse grained and at places porphyritic. Faint foliation is developed trending in N 15° - 20° W to S 15° - 20° E with moderate to steep easterly dips.

Bhima Group: The Bhima Group is divided into five formations (Janardhan Rao et al, 1975) representing two cycles of deposition, each cycle beginning with a transgressive sea and ending its cycle with regression environment. Each formation grades into the other with a transitional member. There are no lithological breaks between these formations as one grades into the other. There are three shale formations occupying the lower, middle and upper horizons, indicating the dominance of mechanical sediments which are intervened by two formations of limestone representing the deposition of chemical precipitation.

Rabanapalli Formation: The Rabanapalli Formation is the oldest of the Bhima Group and is represented by greenish yellow and purple shales with thin siltstone and sandstone or conglomerate and grit at the bottom lying over the Pink Granite basement.

The conglomerate or grit : Representing the commencement of the sedimentation process in the Bhima Basin, it is a very impersistent layer and noted at Miryam. The conglomerate contains sub-rounded to rounded pebbles of quartz and minor amounts of felspar in a clayey and siliceous matrix.

The greenish yellow and purple shales : These shales represents the dominant members of the Rabanapalli Formation. The colour represents the state of oxidation of iron in the sediments. The greenish yellow shale exposures are very few and are noticed northwest of Bankur. They are friable and fissile with good amounts of mica and little chlorite.

Shahabad Limestone: Shahabad Limestone formation occupies the major part of the Bhima Basin, with thickness ranging upto 100m, and it has a gradational contact with the underlying Rabanapalli shales. Depending on their physical characters the limestones are divided into five units by Janardhan Rao (1975) as follows:-

- 5) Flaggy, dark grey argillaceous limestone.
- 4) Massive dark grey to bluish grey limestone.
- 3) Variegated and argillaceous limestone with various colour shades and containing chert bands in upper horizons.



2) Slabby to blocky, light grey to bluish grey limestone.

1) Flaggy and slabby limestone.

Halkal Formation: Major part of the formation is occupied by the Greenish yellow to buff coloured shales. The contact between the Halkal shales and the underlying Shahabad limestones is marked by a thin band of conglomerate and sandstone near the village Halkal. The conglomerate consists of chert and cherty limestone pebbles within a siliceous and calcareous matrix. The sandstones grade into orthoquartzites. Though the area covered by shales is fairly large, the exposures are few due to their susceptibility to weathering. The shales are greenish yellow to buff coloured and are friable and fissile. They are exposed near Katamadevarahalli, Bensur Buzur, Gangurti, Indankal, Devan Tangur, Kalkur, Andola, Martagi, Chennur and Halkal. On the western bank of the Bhima River near Kalkur about 15m thick shales are exposed.

Phosphorite mineralisation has been reported, for the first time, from several places associated with the Halkal shales.

Katamadevarahalli limestones: The Halkal shales grade into siliceous limestones which are light to dark grey in colour, well bedded with flags in between them. They are well exposed near Devan Tangur, Pit Sirur, Bensur Buzur, Katamadevarahalli, Kalkur, Martagi and Jawargi. At the lower portions these limestones contain thin bands and lenses of glauconite, mostly along bedding near Katamadevarahalli and Kalkur. Pyrite crystals are noticed within limestones at Pit Sirur.

Harwal Shales: This is the upper most horizon of the Bhima Group. The shales are purple in colour, friable and splintery and conformably overlie the Katamadevarahalli limestone with a gradational contact. In most of the places the shales are overlain by the Deccan traps. Good exposures of these shales are exposed on the western side of the Jawargi - Shahapur road.

DECCAN TRAP FLOWS: The Bhima Group of formations is overlain by the Deccan traps, towards the northern part, obscuring the original extent of the Bhima Basin. At Devan Tangur and at Pit Sirur they overlie the Harwal shales whereas at Gangurti and Indankal they overlie the Nalkal shales. An intertrappean bed (white calcareous clay) of about 2m thick is exposed just north of Kollur and Chandrampalle. Fossil Physa has been collected from Kollur.



1.3 Mineral Potentiality based on Geology, Geophysics and Ground Geo Chemistry:

For the first time Phosphorite mineralisation has been reported from Bhima Basin by GSI. The Phosphorite occurrences are confined to the Halkal shales and are mostly found in the middle of the formation. They are greyish brown, grey and greyish black in colour and occur as thin bands at the following localities.

The search for the phosphorite mineralisation in the Bhima basin by N K Sood and Shyamala Rao 1986 in Hulkal shale formation in the Bhima basin has shown the P_2O_5 content ranging from 12.57% to 18.69% in Katamadevarahalli, Ganguthi 15.52 to 23.93%, Chennar 9.00 % and in Hulkal 6.38 to 9.52%. Phosphorite occurs as lensoidal boulders within shales on the foothills nearly from the centre of the shale formation. It is dark grey coloured with a yellowish-brown hue and in fact occurs as a bed of about 10 to 20cm thick and breaks into boulders. The band occurs discontinuously over 200m. The phosphorite occurs has boulders, thin bands, lenses etc., within the shale horizon, reported to be discontinuous and at times thick layers.

2 Scope for proposed Exploration:

Since antiquity farmers have applied lime-treated bones to soil as a means of improving soil fertility. However, it was only in the mid-19th century that J. von Liebig suggested the use of phosphorite as a fertilizer, and J. Lawes (1842) invented the dissolution of phosphorite in sulfuric acid to produce fertilizer. Sedimentary phosphates provide valuable information on the ecology and chemistry of the India's past oceans. Indeed, their genesis, accumulation, and preservation require specific paleo-environmental conditions, and involve complex biogeochemical processes during early diagenesis.

Continental margins and epeiric seas seem to be the most favourable locations for the accumulation of phosphate deposits (Filippelli, G.M 2011). They occur at depths varying between 100 and 500 m, with a limited supply of terrigenous and carbonate detritus, which corresponds to a phosphogenic window (Föllmi, K.B.1996). In these environments, upwelling currents play an essential role in lifting phosphorus-rich deep water to the surface, triggering significant biological productivity (Pufahl, P.K.; Groat, L.A. 2017)

The average content of phosphorous in the earth's crust is estimated to be 0.23% P_2O_5 . Igneous rocks contain an average of 0.16% to 0.43% P_2O_5 whereas the sedimentary rocks contain between 0.03% and 0.17% P_2O_5 , in general shales have the highest phosphate



content compared to any other rocks. Phosphorus occurs mostly in the apatite group of minerals.

Based on the work of NK Sood and Shyamala Rao 1986, it is confirmed that the presence of Phosphorite in the Bhima Basin exclusively associated with the Halkal shale formation. To establish the potentiality and economic viability of the phosphorite must be evaluated by systematic study on a larger scale in a limited area. Since, our country is agriculture based, dependent on the import of majority of the phosphate related fertilizer or phosphate itself.

- a) An area of 150 sq.km has been demarcated on the Survey of India TS 56G/3 and G/4 for large scale geological mapping on 1: 12,500 scale confine mainly to the Halkal Shale formation. There are carbonate related horizons are present in the area, which cannot be ruled out.
- b) Hence, the carbonate horizons are also tested initially with few samples, if positive, they will also be systematically sampled.
- c) To ascertain the potentiality of the Halkal shale horizon and the carbonate rocks, the entire area of exploration will be divided into 1 sq.km grid, mainly for the purpose of collection of samples (bedrock/channel, etc.,) as the disposition for the shale / carbonate formation is nearly horizontal to sub horizontal in nature.
- d) The foremost activity in the project is to perform the Shapiro's Kit Test to establish the presence of the Phosphorite mineralisation in those rocks.
- e) If the Shapiro's Kit Tested positive in such locations, the samples will be collected systematically depending on the disposition of bed rock or channel sampling.
- f) In each grid one sample is collected at appropriate location after the results show positive with Shapiro's kit test. The bed rock, channel, and other type of samples will be decided based on the positive result of Shapiro's kit test to systematically map and collect the samples to delineate the potential area / zone of Phosphorite mineralisation.
- g) Upon delineating the possible phosphorite bearing zone, the sampling density will be increased to ascertain and estimate the reconnaissance resource.
- h) In general, there are reports that Phosphorite mineralisation is associated with the rare earth elements also. The same will be considered for initial few samples to know the presence of such REEs. If found positive systematic approach will be followed.



3 Recommendations of G4 level Mineral Exploration Reports:

The search for phosphate or phosphorite deposits in the country was in Himalayan Region and in the Peninsular Shield area of Central India. Numerous phosphate sequences of economic significance have been found in the Proterozoic and Paleozoic basins of the Peninsular Shield in the Central India in the Aravalli Basin in Rajasthan and parts of Madhya Pradesh. Moderate to small deposits of Phosphorite have been found in Bijawars of Madhya Pradesh and Vindhyan Basin of Uttar Pradesh.

Till recently the Proterozoic Basins of South India are thought to be non-phosphatic. After the discovery of Phosphorite near Chelima in Cuddapah Basin during 1978. GSI has taken up a programme for search for Phosphorite in Proterozoic Basins of South India under the 'All India Phosphorite Scheme' and the scheme was taken up in 1980. As a sequel to this, Bhima Basin forms one of the Basins identified for Phosphorite search.

The search for the phosphorite mineralisation in the Bhima basin by GSI, N K Sood and Shyamala Rao 1986 in Hulkal shale formation in the Bhima basin has shown the P_2O_5 content ranging from 12.57% to 18.69% in Katamadevarahalli, Ganguthi 15.52 to 23.93%, Chennar 9.00 % and in Hulkal 6.38 to 9.52%. Phosphorite occurs as lensoidal boulders within shales on the foothills nearly from the centre of the shale formation. It is dark grey coloured with a yellowish-brown hue and infact occurs as a bed of about 10 to 20cm thick and breaks into boulders. The band occurs discontinuously over 200m. The phosphorite occurs has boulders, thin bands, lenses etc., within the shale horizon, reported to be discontinuous and at times thick layers.

4 Objectives:

- a. To carryout Large Scale Geological mapping in 1:12,500 scale.
- b. To delineate strike continuity and structural behaviour of Phosphorites, Baryte, and the Presence of REE also.
- c. Carry out scout drilling to establish possible extents of enriched / potential ore zones.
- d. On locating potential areas, to bring the area at G3 level ME Works or for auctioning.
- e. ME Works shall be confirming to
 - ✓ MMDR Act-1957 and Amendments,
 - ✓ Minerals (Evidence of Mineral Contents) Rule- 2015 and Amendments,



- ✓ Mineral (Auction) Rules-2015 and Amendments
- ✓ IBM GUIDELINES

A. PREVIOUS WORKS

- **NK SOOD & A SYAMALA RAO (FS 1983-84)(1986)GSI:** Under the 'All India Phosphorite Scheme' reconnaissance surveys for phosphorite in Bhima Basin were carried out over an area of about 1,100 sq. km. lying between 16°45' and 17°17', 76°40 and 77°17' in parts of toposheets Nos. 56 C/12, 15 and 16, 56 D/13 and 56 G/3 and 4 falling in parts of Gulburga district of Karnataka.
Reconnaissance surveys carried out for search for phosphorites have brought to light a number of phosphorite occurrences.
Phosphorites are confined to Halkal shales and are mostly found in the middle of the formation. They occur as thin bands and lenses of a few meters to about half a kilometer strike length.
The samples have analysed from 6.38 to 23.9 % P₂O₅.
- **A V JAYAPRAKASH(FS 1978), S K HANS & V SUNDARAM(FS-1983-84)GSI**
Nodular discontinuous thin bands of barytes are seen in the middle member of the Halkal formation at Katamdevarhalli.
The barytes (Jayaprakash, 1978) restricted to the top horizon of the Halkal shale near Katamdevarhalli occur in six bands
The lower two bands are nodular and discontinuous whereas the upper bands are traceable discontinuously over a length of 1.5 km. The maximum and minimum thicknesses of the bands are 10 cm and 3 cm respectively. The total thickness as seen 1 km west of Katamdevarhalli is 65 cm

B. BLOCK DESCRIPTION:

The boundary coordinates of the proposed block are given in table @ Annexure 05.



PRELIMINARY FIELD INSPECTION BY KIOCL:

No Preliminary Field Inspection carried out

C. PLANNED METHODOLOGY

- i. An area of 150 sq.km has been demarcated on the Sol TS 56G/3 and G/4 for Large Scale geological mapping on 1:12,500 scale. This area is exclusively covered by the Halkal shale formation where the occurrence of Phosphorite is reported.
- ii. Apart from the shale, the carbonate facies must also be sampled for the presence of phosphorite mineralisation.
- iii. After the delineation of Halkal shale horizon first to perform the Shapiro's Kit Test to know the presence of the Phosphorite mineralisation in the rock. If the Shapiro's Kit Test is positive in such locations, the samples will be collected systematically depending on the disposition as bed rock or channel sampling is performed on a 1 sq.km grid over the area.
- iv. Demarcation / Delineation of the potential zone based on the chemical analytical results.
- v. If warranted later, seek the approval of the TCC, NMET for scout boreholes.

D. NATURE, QUANTUM AND TARGET

- LSM works 1 : 12,500 – 150 sq.km
- Shapiro's Kit test - 200 nos
- Bedrock channel sampling – 150 nos
- Trenching works – 100 cum
- Scout drilling works - 500 m
- Radicals for analysis -
 - 750 nos of Bed Rock, Trench and borehole samples to be analysed for phosphate rock.(SiO₂, TiO₂, Al₂O₃, Fe₂O₃, FeO, CaO, MgO, P₂O₅, F, MnO, K₂O, Nb, LOI)
 - 20 nos of samples to be analysed for 7 radicals baryte (BaO, Al₂O₃, SiO₂, K₂O, Na₂O, CaO, Fe₂O₃)
 - 20 nos of samples to be analysed for 34 elemental analysis for REE.
 - LREE : La, Ce, Pr, Nd, Pm, Sm, Gd, Er
 - HREE: Tb, Dy, Ho, Er, Tm, Yb, Lu, Sc, Y.

Quantum of work proposed is provided @ Annexure No - 02.

E. TIME LINES

Total period proposed for G4 level Mineral Exploration works is 12 months.
Time Schedule Chart is provided @ Annexure No - 01



F. BREAKUP OF EXPENDITURE:

Total estimated cost is **Rs. 1,88,11,065 /- (including GST @ 18%). (Say Rs.189 Lakhs).**

Cost estimate is provided @ Annexure No – 03

G. TERMS OF PAYMENT

- KIOCL shall raise invoice for the quantum work executed and completed in accordance with the approved MEPP, as per NMET guidelines, for payment.
- Projected cost estimates are based on the SOC of NMET circulated vide Office Memorandum Dtd. 31st Mar 2020. However, cost of execution will be claimed with appropriate escalation as per procedure.

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TIME SCHEDULE

SI	Details of Works		Duration in months	1	2	3	4	5	6	7	8	9	10	11	12		
1	CAMP SETTING		01	↔					Review								
2	LARGE SCALE GEOLOGICAL MAPPING (Includes 150 sq km of LSM + 100 nos of BRS +100 cum Trenching)		04		↔												
	2.1	Geologist Party days (02 Party)			220 manday												
	2.2	Laboratory Works	03		↔												
					50 days												
3	Surface Drilling		5														
	3.1	Preparatory works for drilling (Approach road making)	1								↔						
	3.2	Drilling works (01 rig - 500m)									↔						
	3.3	Geologist Party days (01 Party)									90 days						
	3.4	Laboratory Works	04									↔					
											90 days						
4	Survey Works																
	4.1	Survey party days for DGPS survey of Boreholes 5 pts) - 01 party	05 days											↔			
5	Camp Winding		01												↔		
6	Preparation of Reports and Maps		01												↔		

QUANTUM OF WORK

Sl	Stage	Components		Unit	Qty	
1	Large Scale Geological Mapping (1:12,500)	Large Scale Geological Mapping (1:12500 Scale)		sqkm	150.0	
2		Bed Rock Samples		nos	100	
3		Trenching works		cum	100	
4	Drilling works	No of Bore Holes		nos	5	
5		Approach Road making		km	3	
6		Core Drilling (NQ series)		m	500	
7		Detailed core/ sample logging including supply of core/ sample boxes		m	500	
8		Transportation of drill rigs (01 unit x 600 km one way)		km	1200	
9		Drill core preservation		m	100	
10		DGPS Survey (Borehole points 5 nos + Base point 1 no)		nos	6	
11	Lab works- Phosphate rock	Primary Analysis	BRS	nos	150	500
12			Trench samples	nos	100	
13			Drill Core	nos	250	
14		Internal Check sample analysis (5%)	BRS	nos	8	25
15			Trench samples	nos	5	
16			Drill Core	nos	13	
17		External Check sample analysis (10%)	BRS	nos	15	50
18			Trench samples	nos	10	
19			Drill Core	nos	25	
20	Sample for analysis of Baryte (7 radicals)			nos	20	20
21	Sample for analysis of 34 radials for REE			nos	20	20
22	Petro studies	Preparation of Standard Thin section		nos	10	
23		Petrographic studies		nos	10	
24		Preparation of Polished Thin section		nos	10	
25		Ore microscopic studies		nos	10	
26		Photomicrographs		nos	20	
27	Report preparation			nos	1	



COST ESTIMATES

SI	Item of Work	Unit	Rates as per NMET SoC 2020-21		Year 2022-23		Remarks
			SOC Item No	Rates as per SOC	Qty	Amount (Rs)	
(a)	(b)	(c)	(d)	(e)	(f)	(g)=(e)*(f)	
1	LARGE SCALE GEOLOGICAL MAPPING WORKS (1:12,500 scale :150.0sq km)						
1.1	Geologist Party days - Field	days	1.2	11,000	220.0	24,20,000	38,95,640
1.2	Geologist Party days - HQ		1.2	9,000	90.0	8,10,000	
1.3	Labour charges	days	5.7	431	440.0	1,89,640	
2	TRENCHING WORKS						
2.1	Trenching works	cum	2.1.2	3,800	100.0	3,80,000	
3	SURVEY WORKS						
3.1	Fixation of borehole and determination of Co-ordinates and RL by DGPS	days	1.6.2	19,200	5.0	96,000	
4	DRILLING						
4.1	Surface Drilling (01 rig - Soft Rock)	m.	2.2.1.4a	6,775	500.0	33,87,500	44,15,760
4.2	Transportation of drill rigs (01 unit x 600 km one way)	km	2.2.8	36	1200.0	43,200	
4.3	Drilling camp setting cost	per drill	2.2.9a	2,50,000	1.0	2,50,000	
4.4	Monthly accomadation charges for drilling camp	monthly basis	2.2.9	50,000	3.0	1,50,000	
4.5	Drilling camp winding cost	per drill	2.2.9b	2,50,000	1.0	2,50,000	
4.6	Approach road making for Rugged - Flat terrain	Km	2.2.10a	22,020	3.0	66,060	
4.7	Construction of Concrete pillar (12"X 12"X30")	per borehole	2.2.7a	2,000	5.0	10,000	

4.8	Core preservation	m	5.3	1,590	100.0	1,59,000		
4.9	Land/Crop compensation (in case the BH falls in agriculture land)	per borehole	5.6	20,000	5.0	1,00,000		
5	LABORATORY STUDIES							
5.1		Sampler charges	days	1.5.2	5,100	72.0	3,67,200	
5.2	Sample processing works	Labour charges	days	5.7	431	288.0	1,24,128	4,91,328 Amount will be reimbursed for unskilled labour as per the notified rates by the Central Labour Commissioner (Rs.431/- per day) or respective State Govt. whichever is higher
5.3	Sample analysis - Phosphate rock	Primary	per sample	4.1.3	9,805	500.0	49,02,500	56,37,875
5.4		Internal Check (5%)		4.1.3	9,805	25.0	2,45,125	
5.5		External Check (10%)		4.1.3	9,805	50.0	4,90,250	
5.6	Sample for analysis of Baryte (7 radicals)	per sample	4.1.7a	3,176	20.0	63,520	63,520	
5.7	Sample for analysis of 34 radials for REE	per sample	4.1.14	7,731	20.0	1,54,620	1,54,620	
5.8	Petro studies	Preparation of Standard Thin section	nos	4.3.1	2,353	10.0	23,530	65,850
5.9		Complete Petrological Report of rock sample	nos	4.3.4	4,232	10.0	42,320	
6	Determination of bulk density	nos	4.1	3,540	10.0	35,400	35,400	
7	Peer review of report	lumpsum				10,000	10,000	
8	Sub Total					1,47,69,993	1,47,69,993	

9	Preparation of Exploration Project Proposal	lumpsum	5.1	2% of approved project cost subject to minimum of ₹ 2 lakh and maximum of ₹ 5 lakh"	5 Hard copies along with Soft copy	2,95,400	2,95,400	EA has to submit the Hard copies and the soft copy of the final proposal along with maps and Plan as suggested by the TCC- NMET in its meeting while clearing the proposal.
10	Exploration Report (5% of (SI 9 + SI 10))		5.2(iii)	For the projects having cost exceeding Rs 50 lakhs but less than Rs 150 lakhs : A Minimum of Rs.2.5 lakhs or 5% of the value of work whichever is more	5 Hard copies along with Soft copy	7,38,500	7,38,500	EA has to submit the final Geological Report in Hard Copies (5 nos) and the soft copy to NMET.
11	GRAND TOTAL (9 to 11)					1,58,03,893	1,58,03,893	
12	GST 18%					28,44,701	28,44,701	GST will be reimbursed as per actual and as per notified prescribed rate
13	Grand Total (with GST 18%)					1,86,48,593	1,86,48,593	Say Rs.187 Lakhs

Letter of undertaking as per NMET format

KUDREMU KH
 ಐಎಸ್‌ಒ 9001, 14001 ಮತ್ತು
 ಓಹೆಸ್‌ಎಸ್‌ಎಸ್ 45001 ಸಂಸ್ಥೆ
 ಆರ್‌ಐ‌ಎಸ್‌ಒ 9001, 14001 ಮತ್ತು
 ಆರ್‌ಐ‌ಎಸ್‌ಒ 45001 ಕಂಪನಿ
 ISO 9001, 14001 &
 OHSAS 45001 COMPANY

ಕೆಐಒಸಿಎಲ್ ಲಿಮಿಟೆಡ್

(ಭಾರತ ಸರ್ಕಾರದ ಉದ್ಯಮ)

ನೋಂದಾಯಿತ ಕಾರ್ಯಾಲಯ :
 ಎನ್‌ಎ ವಿಭಾಗ, ಕೋರಮಂಗಲ
 ಬೆಂಗಳೂರು - 560 034.

ದೂರವಾಣಿ : 080-25531461 ರಿಂದ 66
 ಫ್ಯಾಕ್ಸ್ : 080-25532153-5941
 ವೆಬ್ ಸೈಟ್ : www.kiocltd.in

के आई ओ सी एल लिमिटेड

(भारत सरकार का उद्यम)

पंजीकृत कार्यालय :
 II ब्लॉक, कोरमंगला,
 बेंगलूर - 560 034.

कार्यालय : 080-25531461 - 66
 फेक्स : 080-25532153-5941
 वेबसाईट : www.kiocltd.in

KIOCL LIMITED

(A Government of India Enterprise)

Registered Office :
 II Block, Koramangala,
 Bengaluru - 560 034.

Telephone : 080-25531461 - 66
 Fax : 080-25532153-5941
 Website : www.kiocltd.in
 CIN : L13100KA1976GOI002974

Annexure-4

FORMAT FOR CERTIFICATE TO BE SUBMITTED ALONG WITH PROJECT PROPOSAL

To

The Director & HOD
 National Mineral Exploration Trust (NMET)
 Ministry of Mines
 F-114, Shastri Bhavan
 New Delhi- 110001

It is certified that

1. Project titled "KATAMADEVARAHALLI PHOSPHORITE BLOCK (Block ID: KIOCL_38_KA_KDPB), Kalburgi (Dist), Karnataka" along with estimated cost Rs.1,86,48,593/- (including GST) is submitted for consideration of NMET funding.
2. The project proposal is prepared following the guidelines prescribed in Minerals (Evidence of Mineral Contents) Rules, 2015 in case of mineral exploration project proposals.
3. The Proposal has been duly examined and concurred by associate finance in accordance with canons of financial propriety.
4. The same project proposal or project proposal with similar objectives has not been submitted to any other funding agency by this organisation and the project proposal bears no duplication with existing work / ongoing project undertaken by this agency.

Yours faithfully

टी.सामिनाथन/T. SAMINATHANअध्यक्ष सह प्रबंध निदेशक
Chairman cum Managing Director

केआईओसीएल लिमिटेड/KIOCL LIMITED

II ब्लॉक, कोरमंगला, बेंगलूर-560034
II Block, Koramangala, Bengaluru-560034

Date: 03/05/2023

Place: Bangalore



ಪರಿಸರ-ನಮ್ಮ ಧೈಯ ನಮ್ಮ ಧ್ಯಾನ ಪರಿಸ್ಥಿತಿಕಿ-ಹಮಾರಾ ಲಕ್ಷ್ಯ ಹಮಾರಿ ನಿಷ್ಠಾ ECOLOGY-OUR MISSION OUR OBSESSION

f https://www.facebook.com/kiocltd t https://www.twitter.com/cmdkiocl

Boundary Co-Ordinates of the Block

Sl no	Boundary Points	Easting	Northing
1	A	712754.00	1909300.00
2	B	718040.00	1909225.00
3	C	718043.00	1913248.00
4	D	721528.00	1913271.00
5	E	722505.00	1907323.00
6	F	723881.00	1907157.00
7	G	723665.00	1912014.00
8	H	725931.00	1911847.00
9	I	726064.00	1898093.00
10	J	722447.00	1897975.00
11	K	718447.00	1901123.00
12	L	714761.00	1899397.00
13	M	712855.00	1899573.00

KUDREMUKH



Consent letter received from Dept of Geology & Mining, GoK**GOVERNMENT OF KARNATAKA**

No. DMG/ -17013/6/2018 /2021-22

Office of the Director,
Department of Mines and Geology,
No.49, Khanijabhavan, Race Course Road,
Bangalore-1 Date: 24-01-2022.To,
M/s: KIOCL Limited,
(A Government of India Enterprises),
II Block, Kormangala,
Bengaluru - 560034

27 JAN 2022

Sir,

Sub:- Permissions for carrying out G4 level exploration works -reg.**Ref:-1.** Your Letter No:KIOCL/MED/2021 dated 11.08.2021.2. Geological Survey of India, Bengaluru, E mail: dated
21.01.2022.

Adverting to the above cited subject, your proposal seeking permission to carry out G4 level Mineral Exploration for Phosphorite and Baryte commodities in Hulkal Shale formation of Chittapur and Jevargi taluks of Kalburgi district under NMET fund has been received in this officer vide reference(1).

The said proposals were forwarded to the GSI for their opinion especially on overlapping issues, if any. The GSI, Bengaluru has communicated its opinion vide e-mail at reference(2), where in it is stated that, the proposed blocks fall within exploration work for limestone commodity by GSI during 1964-65, there is no overlap in commodities (A copy of the e-mail is attached).

Hence, in view of the no objection by GSI the Department of Mines & Geology is here by conveying its consent for G4 level reconnaissance survey proposals of the following blocks before NMET Technical Committee, Government of India on behalf of Government of Karnataka after verifying the reports of State DMG, GSI and other agencies.

SL. No	Name of the Block	Extent in Sq.Km.	District	Mineral
1	Katamadevarahalli(KD Halli) Phosphorite and baryte Block	150	Kalburgi	Phosphorite and baryte
2	Hulkal phosphorite Block	165	Kalburgi	Phosphorite

Further, as per the discussion held in 55th SGPB meeting dated on 29.09.2021, you are requested to include the e-mail copy of GSI in your proposal while submitting the proposals to NMET.

Enclosure:

1. GSI, Bengaluru e-mail dated: 21.01.2022

Yours faithfully,

DIRECTOR



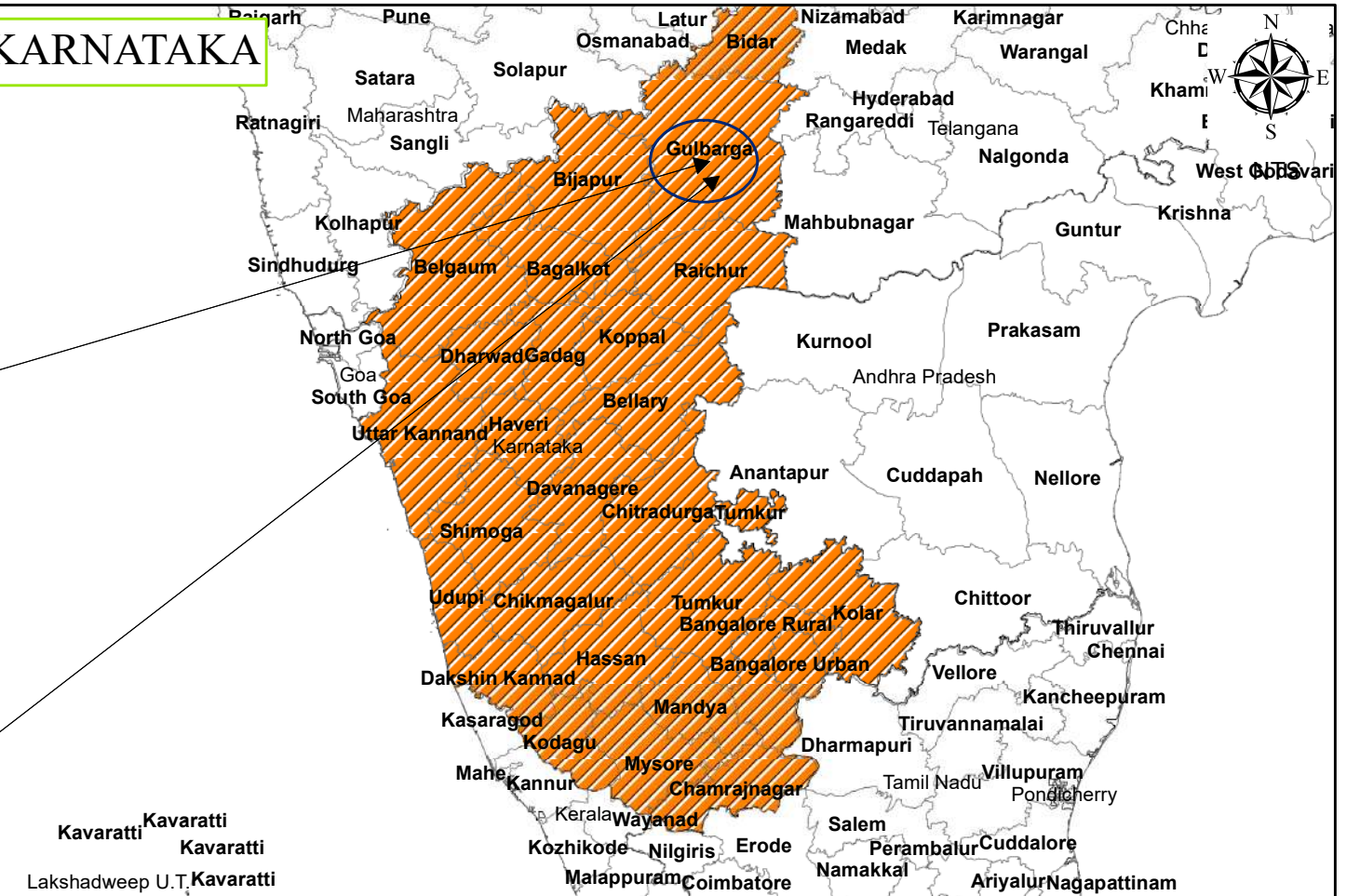
JAM (one)
for receipt of
24/01/2022
04/02/2022
A. G. M. / M. P.
A. G. M. / Geo.
S. M. E.

KEY MAP SHOWING AREA OF EXPLORATION

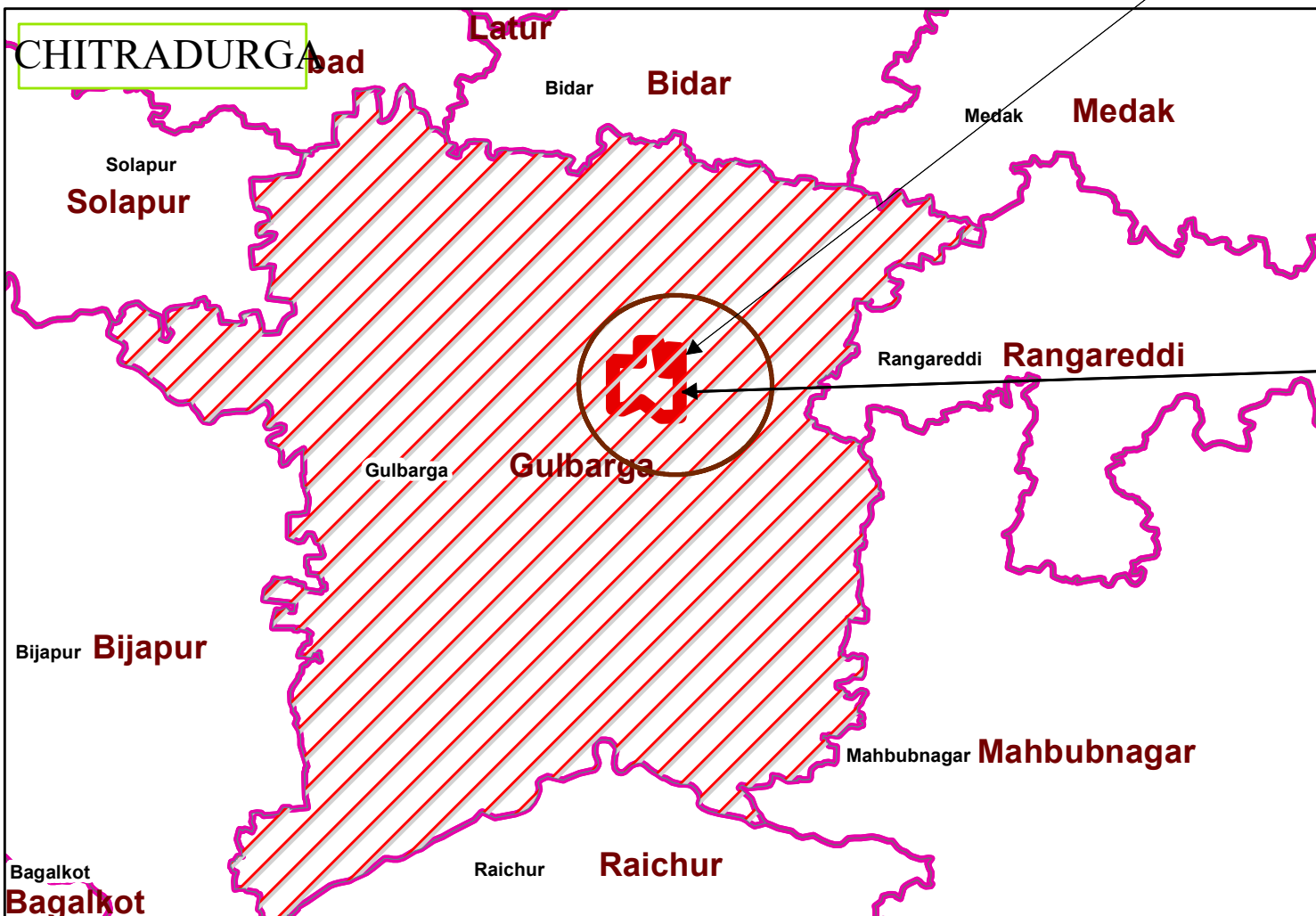
INDIA



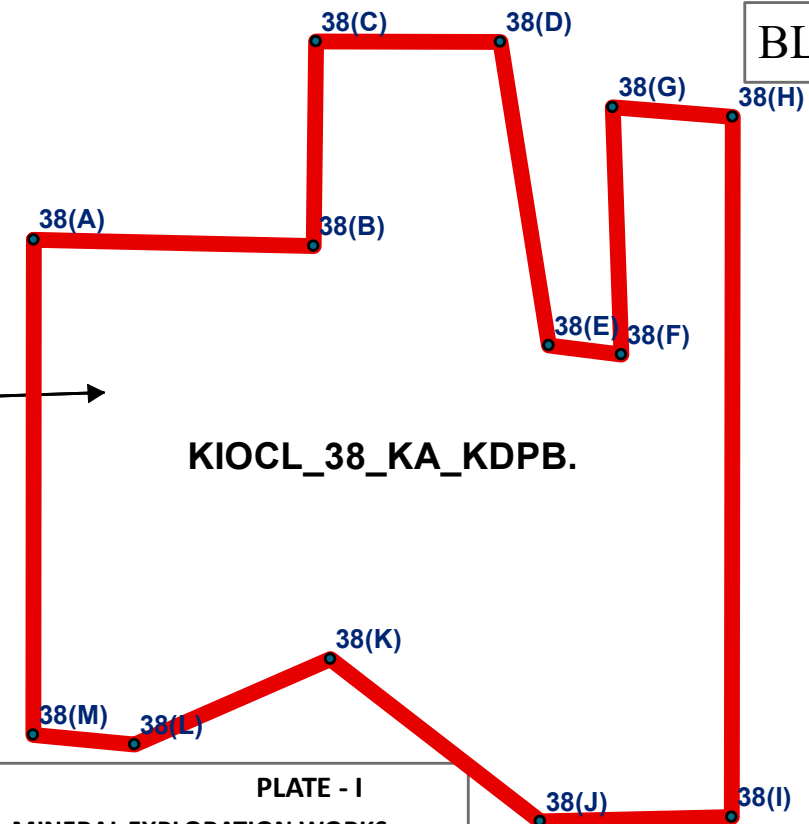
KARNATAKA



CHITRADURGA



BLOCK BOUNDARY



KIOCL_38_KA_KDPB.

TITLE : KEY MAP
PROJECT : G4 LEVEL MINERAL EXPLORATION WORKS
FOR KATANMADEVARAHALLI PHOSPHORITE BLOCK(KDPB).
(BLOCK ID : KIOCL_38_KA_KDPB)
LESSEE AREA : KDPB BLOCK
VILLAGE : KATANMADEVARAHALLI TALUK : CHITTAPUR
DISTRICT : KALABURGI STATE : KARNATAKA

PROSPECTOR  KIOCL LIMITED
(Notified Exploration Agency)
Regd.Off: BLOCK II, KOTAMANGALA,
BANGALURU 560 034
(www.kioclttd.in)

17°19'30"N

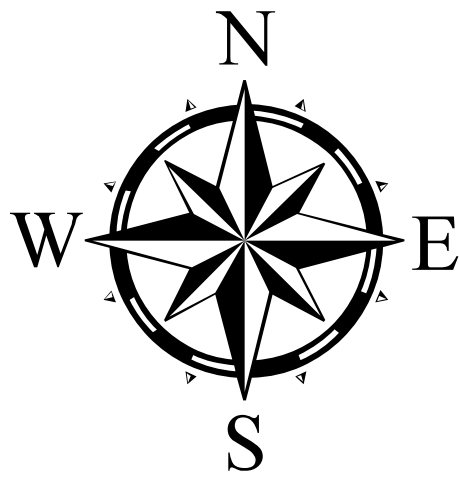
76°57'0"E

77°1'30"E

77°6'0"E

77°10'30"E

17°19'30"N



KATAMADEVARAHALLI
PHOSPHORITE ME BLOCK MARKED ON
TOPOSHEET 56 G/3, 56 G/4
FOR G4 LEVEL MINERAL EXPLORATION WORKS

1:50,000

2.5 1.25 0 2.5 Km

Legend

KD Halli ME Block (150.00 sq.km)

PLATE - 2

G4 LEVEL MINERAL EXPLORATION WORK FOR KATAMADEVARAHALLI PHOSPHORITE BLOCK (BLOCK ID : KIOCL_38_KA_KDPB)		
TOTAL AREA : 150.00 sqkm		
SOI TOPOSHEET NO : 56 G/3 & 56 G/4		
Point	Latitude(dd°mm'ss.s")	Longitude(dd°mm'ss.s")
38(A)	17 15 32.079	77 00 04.302
38(B)	17 15 27.855	77 03 03.187
38(C)	17 17 38.685	77 03 04.712
38(D)	17 17 38.208	77 05 02.717
38(E)	17 14 24.429	77 05 33.590
38(F)	17 14 18.555	77 06 20.083
38(G)	17 16 56.562	77 06 14.584
38(H)	17 16 50.345	77 07 31.211
38(I)	17 09 23.012	77 07 30.611
38(J)	17 09 20.466	77 05 28.232
38(K)	17 11 04.223	77 03 14.021
38(L)	17 10 09.353	77 01 08.734
38(M)	17 10 15.715	77 00 04.291

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Regd. Off : BLOCK II, KORAMANGALA -
BANGALURU 560 034
(www.kiocltd.in)

17°15'0"N

76°57'0"E

77°1'30"E

77°6'0"E

77°10'30"E

17°15'0"N

OPEN SERIES
MAP

No. E43R4

Scale 1:50,000

E43Q15 (56C/15)	E43R3 (56G/3)	E43R7 (56G/7)
E43Q16 (56C/16)	E43R4 (56G/4)	E43R8 (56G/8)
E43W13 (56D/13)	E43X1 (56H/1)	E43X5 (56H/5)

1 Rangareddy, ANDHRA PRADESH.
2 Mahabubnagar, ANDHRA PRADESH.

17°10'30"N

76°57'0"E

77°1'30"E

77°6'0"E

77°10'30"E

17°10'30"N

भारतीय सर्वेक्षण विभाग

SURVEY OF INDIA

1st Edition 2009. Price : Rs. 50/-

CONVENTIONAL SYMBOLS

Express highway, with toll, with bridge, with distance stone

Roads, metalled, according to importance

Roads, double carriageway, according to importance

Unmetalled road, Cart-track, Pack-track with pass, Foot-path

Streams, with track in bed, undefined, Canal

Dams, masonry or rock-filled, earthwork, Weir

River, dry with water channel, with island & rocks, Tidal river

Submerged rocks, Shoal, Swamp, Reeds

Wells, lined, unlined, Tube-well, Spring, Tank, perennial dry

Embankments, road or rail, tank, Broken ground

Railways, broad gauge, double, single with station, under constr.

Railways, other gauges, double, single with distance stone, do.

Mineral line or tramway, Kin. Cutting with tunnel

Contours with sub-features, Rocky slopes, Cliffs

Sand features (1)flat, (2)sand-hills(permanent), (3)uneset(shifting)

Towns or Villages, inhabited, deserted, Fort

Huts, permanent, temporary, Tower, Antiquities

Temple, Chhatra, Church, Mosque, Igath, Tomb, Graves

Lighthouse, Lightship, Buoy, lighted, unlighted, Anchorage

Mine, Vine on trellis, Grass, Scrub

Palme, palmyra, other, Plantain, Conifer, Bamboo, Other trees

Areas, cultivated, wooded, Surveyed tree

Boundary, international

state, demarcated, undemarcated

district, subdivision, taluk or M.A. Forest

Boundary pillars, surveyed, unlocated

Height, triangulated, station, point, approximate

Bench-mark, geodetic, tertiary, canal

Post office, Overhead tank

Rest house or inspection bungalow, Circuit house, Police station

Camping ground, Forest, reserved, protected

Spaced names, administrative, locality or tribal

Hospital, Dispensary, Veterinary, Hospital / Dispensary

Aerodrome, Helipad, Tourist site

Power line, with pylons surveyed, with poles unsurveyed

KIKRI

NAGA

17°6'0"N

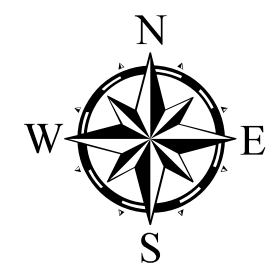
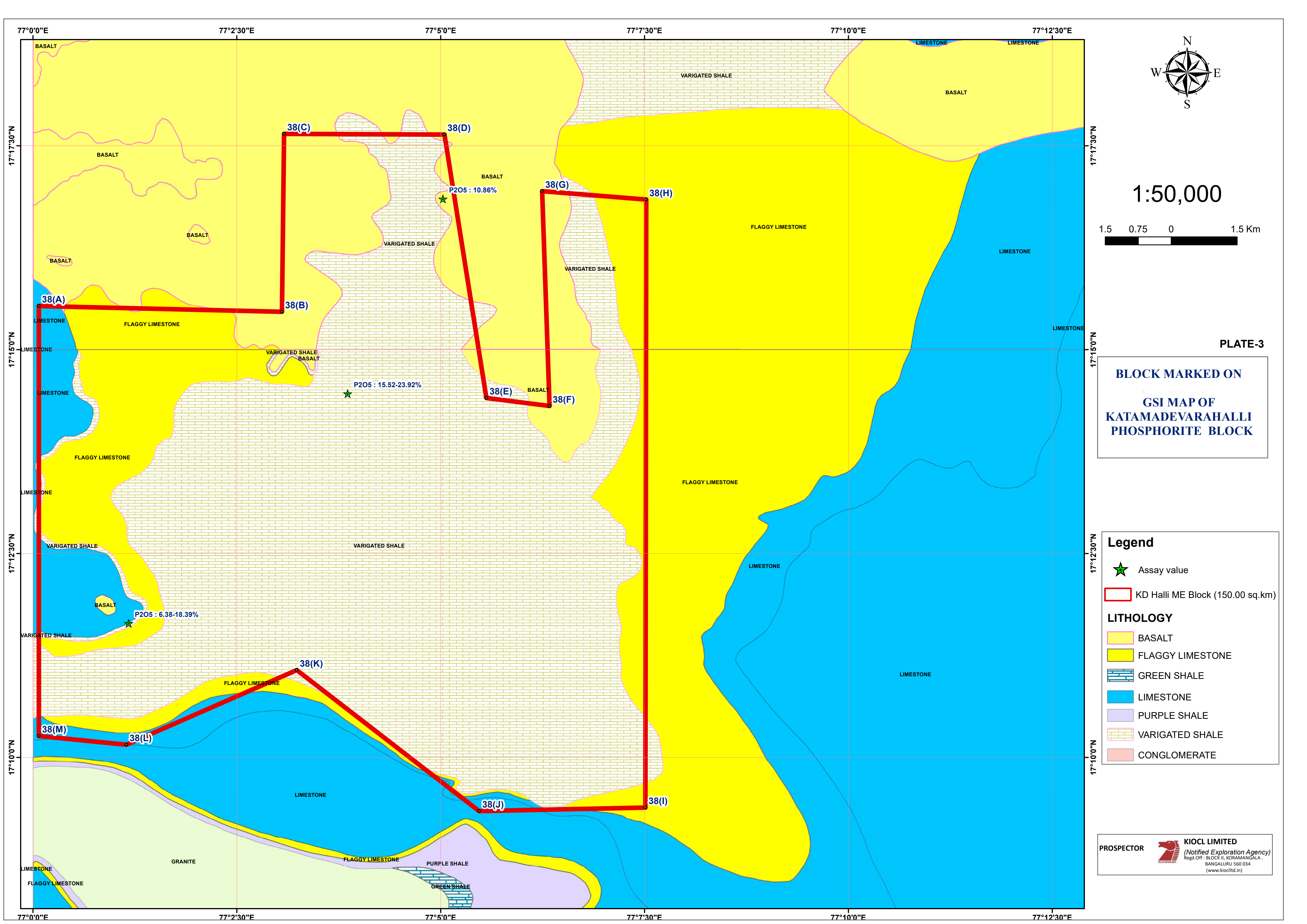
76°57'0"E

77°1'30"E

77°6'0"E

77°10'30"E

17°6'0"N



1:50,000



PLATE-3

**BLOCK MARKED ON
GSI MAP OF
KATAMADEVARAHALLI
PHOSPHORITE BLOCK**

Legend

- Assay value
- KD Halli ME Block (150.00 sq.km)
- LITHOLOGY**
 - BASALT
 - FLAGGY LIMESTONE
 - GREEN SHALE
 - LIMESTONE
 - PURPLE SHALE
 - VARIGATED SHALE
 - CONGLOMERATE

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Regd. OFF : BLOCK II, KORAMANGALA .
BANGALURU 560 034
(www.kioclttd.in)