MINERAL EXPLORATION PROJECT PROPOSAL

(MEPP)

FOR

Reconnaissance survey (G4) for REE mineralisation

in Samalpatti Block, Samalpatti Carbonatite-syenite complex, Krishnagiri District, Tamil Nadu

(Block ID: KIOCL_57_TN_SREE)

Date of Submission: 13th Aug 2024

Submitted by:

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

The DDG & CHAIRMAN,
TCC-NMET,
Geological Survey of India,
State Unit: Karnataka and Goa,
GSI Complex, Vasudha Bhavan,
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I. SUMMARY

BLOCK ID	**KIOCL_57_TN_SREE**
Title of the project	Reconnaissance survey (G4) for REE mineralisation in Samalpatti Block, Samalpatti Carbonatite-syenite complex, Krishnagiri District, Tamil Nadu
Exploration Agency	**KIOCL LIMITED, BANGALORE** ***Notified Exploration Agency***
Commodity	REE
Mineral Belt	Samalpatti Carbonatite-syenite complex
Completion period with entire Time Schedule to complete the project	12 months
Objective	1. To map the area of 90.00 Sq.km with Large Scale geological Mapping (LSM) works on 1: 12,500 scale. 2. To delineate the potential zones in different variety of the carbonatites and syenites bodies. 3. Sampling of carbonatites and syenites and other associated pegmatites, felsite and aplite veins. 4. Pitting / Trenching to expose the host rock for sampling and mapping works. 5. Geophysical survey works on pyroxenites to understand the subsurface configuration of carbonatites and syenite bodies using IP cum resistivity, SP and magnetic methods (8 to 10 line Km). 6. Carrying out scout drilling works of 500m to establish the sub surface continuity of the mineralization. 7. Generate the Geological report on the outcome of the exploration's activities

	carried out in the area, by systematic documentation of all the data sets specifically generated for this project.
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 technical expertise of KIOCL, limited except below indicated work components which will be outsourced by fixing agency through GEM portal or nomination basis to government departments/laboratories. 1. Ground Geophysics: By recognised agency . 2. Drilling works: Agency fixed through GEM portal. 3. External check Sample Analysis: Govt. laboratories. 4. Petro studies, XRD & SEM Studies: Geological Survey of India
Name/ Number of Geoscientists	THREE (03) Nos or more from Mineral Exploration Department, KIOCL Limited, Bangalore.
	Large Scale Geological Mapping (05 months) **Geologist Party Days** 170 days includes (LSM + Drilling works) - 140 days (Field) - 30 days (HQ) **Sampler Party 110 Days** (includes BRS+ Drill Core Samples)

1. Location

Latitude	**Annexure 04**
Longitude	**Annexure 04**
Villages	Gerigepally, Gullampatti, Jogipatti, Kanjanur, Kollapatti, Kurrukkapatti, Marappanayakkampatti,

	Mukkampatti, Onnagarai, Pallasulakarai, Salamarathupatti, Samalapatti, Senra Malai , Sunnampatti, Tippampatt, Valliyanur
Tehsil/ Taluk	Uttangarai
District	Krishnagiri
State	Tamil Nadu
2. Area (hectares / Square Kilometres	
Block Area	90 sq.km
Forest Area	Nil
Government Land	90 sq.km of Govt. and Private land
Private Land	
3. Accessibility	
Nearest Rail Head	Samalpatti Railway Station falls within the block
Road	NH 77 runs across the block in northern periphery
Airport	90 km from Salem Airport, Tamil Nadu.
4. Hydrography	
Local Surface Drainage Pattern Channels / Rivers / Streams	Mattur river forms the main drainage in the area and lies in the northwestern part of the area flowing west to east, Also, a few ephemeral streams occurring in dendritic pattern drain the area.
5. CLIMATE	
Mean Annual Rainfall	830mm
Temperature	32°C
6. Topography	
Toposheet No	57L/7
Morphology of the Area	The area forms an undulatory terrain with an average elevation of about 400 m. with a gentle gradient towards south with isolated mounds and hills, the heights of which are ranging from Δ 419 m to Δ 554 m.
7. Availability of the Baseline Geoscience Data	
Geological Map (1:50 K)	Available

Geochemical Map	Details of NGCM data extracted from NGDR portal is explained in the subsequent chapters.
Geophysical Map (Aero/ Ground, Regional/ Local Scale)	Details of NGPM data extracted from NGDR portal is explained in the subsequent chapters.

8. Justification for taking up Reconnaissance Survey (G4 Stage) Mineral Exploration

i. GSI in their field season 1992-93, carried out prospecting in and around the syenite carbonatite complex

ii. Carbonatites are the primary source of niobium and rare earth elements (REEs), particularly the light REEs, including La, Ce, Pr, and Nd. Carbonatites are a relatively rare type of igneous rock composed of greater than 50 vol % primary carbonate minerals, primarily calcite contain the highest concentrations of REEs of any igneous rocks.

iii. In the Samalpatti area, syenite carbonatite complex is spread over 100 sq.km, constitutes, ultramafites, pyroxenite bodies are intruded by intricate network of carbonatite veins, veinlets and stringers.

iv. Field relationship, mineralogy and texture, are some of the criteria based on which identified various types of syenites as fine grained grey syenite, coarse grey syenite, whitish grey garnet syenite, grey hornblende syenite, coarse leuco hornblende syenite, greyish white to pale pinkish syenite, grey and pink syenite, porphyritic syenite, syenitoidal syenite, etc.,

v. Similarly, the authors have also applied same criteria of field relationship, colour and texture recognised few varieties of carbonatites as dark grey carbonatite, green (chromiferous) carbonatite, whitish grey carbonatite, brownish grey carbonatite and white sovite type carbonatite.

vi. The previous work in the area 33 samples were studied and analysed for trace REE and major elemental geochemistry.

vii. As the area consists of both carbonatites as discrete veins and veinlets and syenites of various kinds, KIOCL has attempted to collect some samples specifically to analyse the lanthanoid elements.

viii. The analytical results of *09 samples of carbonatites have yielded 0.12 to 0.54 % of TREE and one sample of Nepheline Syenite Value 0.032 % and 2 samples of Pegmatoidal syenite show TREE value of 0.01 % respectively.*

ix. This forms the basis for mounting an G4 stage exploration program for delineating the different varieties of both syenites and carbonatites of Samalpatti area and to target the potential zones for REE mineralisation in the area.

II. DETAILED DESCRIPTION

A. BLOCK SUMMARY

1. Physiography

The area forms an undulatory terrain with an average elevation of about 400m, with a gentle gradient towards south with isolated mounds and hills, the heights of which are ranging from Δ 419 m to Δ 554 m. The area occupied by the charnockite epidote hornblende gneiss, metapyroxenite and carbonatite forms a plain to undulatory terrain whereas, dunite and syenite form small mounds and hills. Mattur River is flowing in west to east direction lies in the northern western part of the block. Also, several ephemeral streams occurring in dendritic pattern drain the area.

Fig 1: Google Earth Image of the block

2. Background Geology (Regional Geology, Geology of the Block)

The systematic geological mapping and mineral investigation works were carried out by GSI in parts of the taluks of Krishnagiri, Dharmapuri and Salem district covering SOI toposheet no 57L/7, 8 and L/11. The purpose was to collect Iron ore samples from Kanjamalai, near Salem. It was also reported that intrusion of syenites as major occurrence in the area. In the west of Samalpatti vicinity there are outcrops of pegmatites, aplite with thin quartz veins (BRC Iyengar and TS Seshadri 1958).

The carbonatite complex of Sevattur was explored by GSI and the authors have reported the occurrence of fenite, syenite, pyroxenite and carbonatites in the area (Narasimhan and Sundaram 1967-68).

Geochemical surveys over the Samalpatti-Mettusulakkarai area for Cu and Ni sulphide mineralisation was carried out by GSI. In their study they have also mapped the syenites, carbonatites, syenitoidal pegmatite etc., in the area (Shanmugam and Kumaraguru 1991-92).

GSI has carried out preliminary prospecting in and around syenite – carbonatite of Samalpatti area in TS 57L/7 for tin and tungsten exploration. As part of the investigation 350 Sq. km area was mapped on 1: 25,000 scale and collected 350 geochemical samples for trace elements, 50 stream sediment samples for analysis of tin and tungsten 36 bedrock samples for major element, 33 samples for trace REE and major element geochemistry and 21 samples for gold and PGE (B.V. Srinivasan, M. Renganathan 1995).

While mapping in the area, GSI reported suites of ultramafic pyroxenites, feldspathic pyroxenites, syenites and carbonatites of Venkatasamudram and Samalpatti areas as intrusives into the country rocks.

The authors have reported that to the west of Samalpatti, the samalpatti syenite carbonatite complex is spread over an area of 100 sq.km. They have brought out a number of syenite bodies and named them after their locales of presence based on different criterion viz., colour, mineralogy, texture and most importantly their field relation adopted by them for distinguishing. In Sunnampatti the syenite is fine grained and grey in colour, where as in Salamarathupatti there are two different varieties of syenites noted by them are coarse grained syenite grey in colour and other pink syenite varieties were mapped. The whitish grey garnet syenite is found in the Senra Malai area, in the hill 504 grey hornblende syenite of coarse-grained nature recorded. Around the same hill there is also the presence of coarse- leuco hornblende syenite has been mapped by them. In Jogipatti area the syenite is light greyish or pale pinkish white, in Valliyanur it is grey syenite, in Tippampatti the syenite is pink porphyritic, in addition

to these various syenites the syenitoidal pegmatite, riebeckite dykes, felsite and aplite are reported in the area.

In addition to the syenites, the area is also exposing the carbonatite varieties, northwest and southeast of Samalpatti. The authors have identified and differentiated various types of carbonatites in the area by applying the same criterion which was applied to syenites and named them as a) dark grey carbonatite, b) green coloured carbonatite (Chromiferous), c) whitish grey Carbonatite, d) brownish grey carbonatite, e) epidotised white carbonatite veins and f) pure white sovite type carbonatite.

As part of the NGPM programme of GSI, the area in and around Dharmapuri has been covered by the ground magnetic and gravity surveys in 2000-2001 by C.B.K. Sastry and D. Livingston. The authors observed that Bouguer gravity contour map has brought out significant highs and lows with associated structural features correlating the mapped geology and structures. The bouguer gravity map also brought out a prominent gradient zone with a swerve near south of Dharmapuri possibly indicating a strike slip nature of the fault zone with segmented faults.

A generalised stratigraphic succession of the rocks of the area is as follows

Age	Group	Lithology
Archaean	Younger Intrusive	Quartz veins
		Pegmatites
		Dolerite Dyke
	Ultramafic Alkaline Carbonatite complex	Syenitoidal Pegmatite
		Carbonatite
		Syenite
		Dunite
	Bhavani gneiss complex	Epidote- Hornblende gneiss
		Grey- Hornblende gneiss
		Meta Pyroxenites
	Charnockite	Charnockite with enclaves of schistose amphibolites, pyroxenites, pyroxene granulite

3. Mineral Potentiality based on Geology, Geophysics and Ground Geo Chemistry

Regional geochemical sampling and traverse geological mapping carried out by (Shanmugam and Kumaraguru 1991-92) for Cu-Ni sulphide mineralisation over the mafic ultramafic rocks around the samalpatti area as shown surface indication and manifestation for mineralisation in the form of shearing, brecciation, limonitization and sulphide mineralisation. The samples from various media analysed for Cu, Pb, Zn, Ni, Co, Mo and Au. The analytical results of soil and lithogeochemical samples of meta pyroxenite, the Cu varying from 200 to 500ppm, Ni from 500 to 2000ppm over metapyroxenite and dunite. Soil samples collected over the dunite body as shown the Co values from 90 to 150 ppm, Soil and lithogeochemical samples over the meta pyroxenite showing the Cr values from 500 to 2000 ppm. The soil and lithogeochemical samples from syenite analysed Mo 5 – 20 ppm.

The preliminary prospecting in the syenite-carbonatite complex in samalpatti area by Srinivasan and Renganathan (1995), where the studies is for tin and tungsten mineralisation and collected lithogeochemical samples hornblende migmatite gneiss, Hornblende agmatite gneiss, Epidote hornblende gneiss, pyroxenite granulite, charnockite in migmatites, charnockite in epidote hornblende gneiss. The analysis for the following elements in ppm Pb <10 to 130, Rb 15 to 139, Sr 45 to 360, Ba 30 to 3070, V 15 to 300, Cr 7 to >1000, Ni 10 to 490, Cu<10 to 645, Zn <10 to 245, Co <10 to 165, Li <10 to 20, Zr <30 to 300 Y <10 to 35 and Ga 15 to 30. The syenites, carbonatites are not analysed.

During the prefield studies carried out by the geoscientists of KIOCL has collected samples from carbonatites, nepheline syenites and Pegmatoidal syenites and the results of TREE are 213 to 5413 ppm in carbonatites, 315 ppm in Nepheline syenites and 72 to 97 ppm in Pegmatoidal syenites appended as table in page 8.

4. Scope for proposed Exploration

There are number of Carbonatite bodies exposed in the northern and southern part of the proposed block. The BRS (Bed Rock Samples) collected from these bodies have given encouraging results for LREE. In addition to the carbonatite bodies, a huge body of syenite was mapped in the area during previous works. Various types of syenites bodies as indicated in the text by the previous works will be delineated and mapped (subject to ground conditions) during large scale geological mapping.

An attempt to carry out a reconnaissance survey in the area will bring to light the potentiality of the area as for as the source for REE and RM mineralisation is concerned. It is pertinent to carry out a reconnaissance survey for delineating the various carbonatites, nepheline syenite and Pegmatoidal syenites to find out the potentiality. Various types of carbonatites and syenites were differentiated by the previous studies are to be mapped in detail along with channel sampling to understand the nature and type of mineralisation and minerals responsible for LREE and HREE. This will indicate the potential zones for REE mineralisation in the area.

In the previous studies, limited litho geochemical samples are collected for Cu-Ni mineralisation showing Cu 200 to 500ppm, Ni 500 to 200ppm, Co 90 to 150ppm etc, respectively from the meta pyroxenite and dunite.

In case of establishing sufficient strike length and width of the carbonatites, syenites, nepheline syenites, Pegmatoidal syenites through mapping works for potential zones of REE and RM, and subsurface continuity of these zones will be established by scout boreholes .

The previous studies were for Cu – Ni sulphide mineralisation and Co mineralisation in the meta pyroxenites and dunites, they may also be further tested for potential zones, if any.

5. Recommendations of G4 level Mineral Exploration Reports

There was no G4 level exploration was carried out in the area, however, some exploration programmes on regional scale were carried out in the area for Cu - Ni sulphide mineralisation and tin tungsten mineralisation by GSI.

GSI 1991-92 carried out geochemical survey and search for Cu-Ni sulphide mineralisation in Samalpatti-Mettusulakkarai area, as part of the investigation collected and analysed 2051 soil samples and 107 lithogeochemical samples from Samalpatti - Mettusulakkarai areas have analysed for Cu, Pb, Zn, Ni, Co, Cr, and Mo. Anomalous values obtained from the samples are i) 14 soil samples and 2 lithogeochemical samples from meta pyroxenite show Cu values from 200 to 500 ppm. (ii) 6 soil samples and 1 lithogeochemical sample collected from meta pyroxenite and dunite body show Ni values from 500 to 2,000 ppm., (iii) 6 soil samples collected from dunite body show Co values 90 - 150 ppm. (iv) 26 soil samples and 6 lithogeochemical samples from meta pyroxenite show Cr values from 500 to 2,000 ppm., (v) 5 soil samples from metapyroxenite and 2 soil samples from syenite analysed Mo 5 - 20 ppm. One sample collected

from sheared quartz vein analysed 20 ppm and one sample from meta pyroxenite analysed 20 ppm of Mo.

GSI 1982-83 reported around Sandur and north of Tadanur presence of columbite crystals in pegmatite veins. The quartz vein between north of Badappalli and Bajjanur is suspected to be mineralised. Minor quartz veins seen to the south of Mettusulakkarai along with floats of quartz in the soil cover is also suspected to be mineralised.

6. Objectives

1. To map the area of 90.00 Sq.km with Large Scale geological Mapping (LSM) works on 1: 12,500 scale.
2. To delineate the potential zones in different variety of the carbonatites and syenites bodies.
3. Sampling of carbonatites and syenites and other associated pegmatites, felsite and aplite veins.
4. Pitting / Trenching to expose the host rock for sampling and mapping works.
5. Geophysical survey works on pyroxenites to understand the subsurface configuration of carbonatites and syenite bodies using IP cum resistivity, SP and magnetic methods (8 to 10 line Km).
6. Carrying out scout drilling works of 500m to establish the sub surface continuity of the mineralization.
7. Generate the Geological report on the outcome of the exploration's activities carried out in the area, by systematic documentation of all the data sets specifically generated for this project in accordance with the provisions of MEMC Amendment Rules 2021

B. PREVIOUS WORKS

BRC Iyengar and TS Seshadri (1958) GSI has carried out systematic geological mapping and mineral investigation in parts of the taluks of Krishnagiri, Dharmapuri and Salem district covering parts of toposheet no 57L/7, 8 ad L/11 was carried out by GSI. The purpose was to collect Iron ore samples from Kanjamalai, near Salem. It was also reported that intrusion of syenites as major occurrence in the area. West of Samalpatti there are outcrops of Pegmatites, aplite with thin quartz veins.

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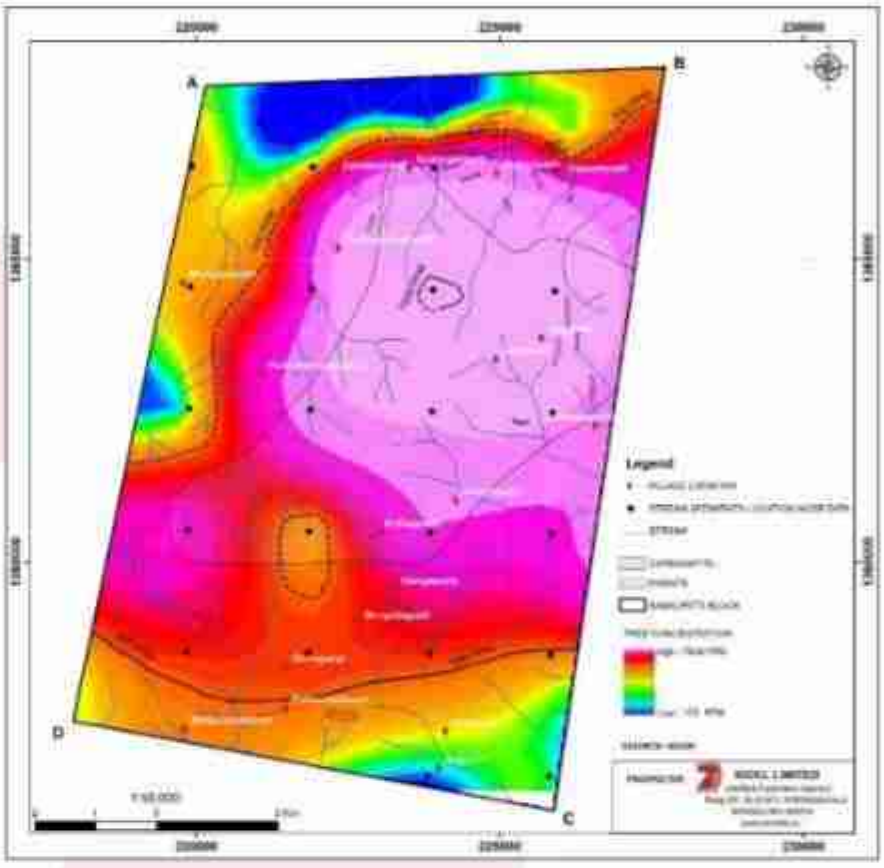
NGDR DATA Analysis

i. NGCM Data Interpretation

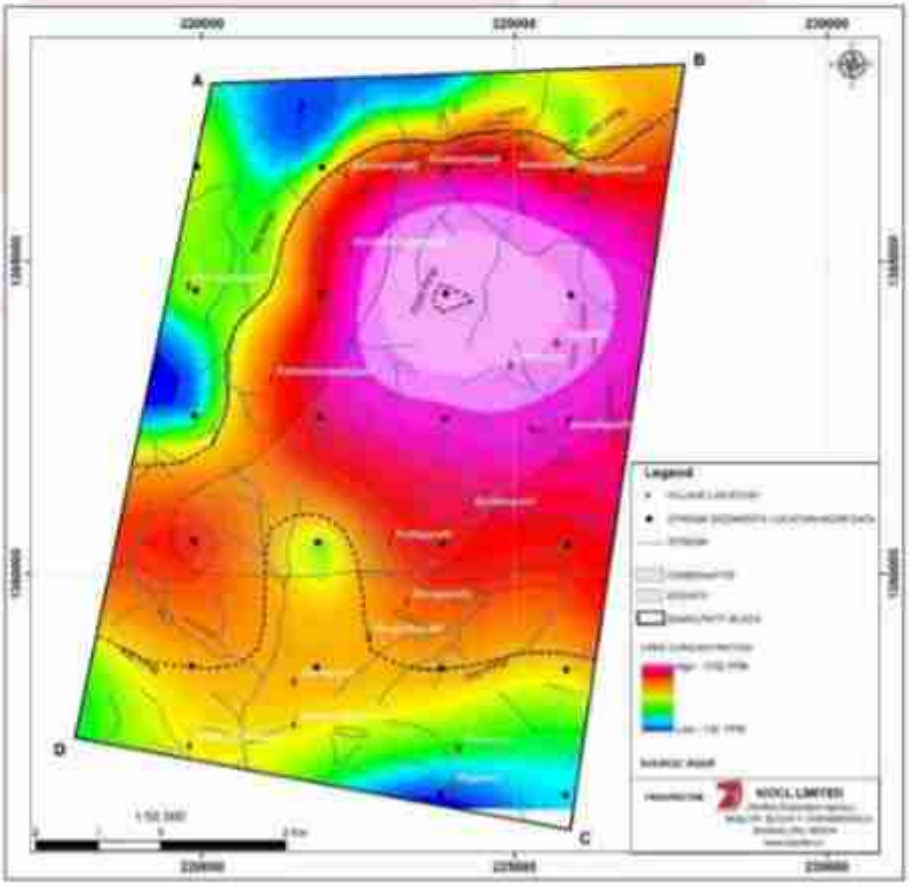
Stream sediment sample contour map / 2D interpolation is carried out using Geosoft software for the NGCM data which is downloaded from NGDR portal to analyse the concentration of the LREE and TREE in the Samalpatti block . It is noted from the analysis that around 61 Sq.Km (67 % of the total block extent) is having TREE concentration > 500 ppm and LREE concentration around 54 Sq.km (60 % of the total block extent) as represented in the maps.

ii. NGPM Data Interpretation

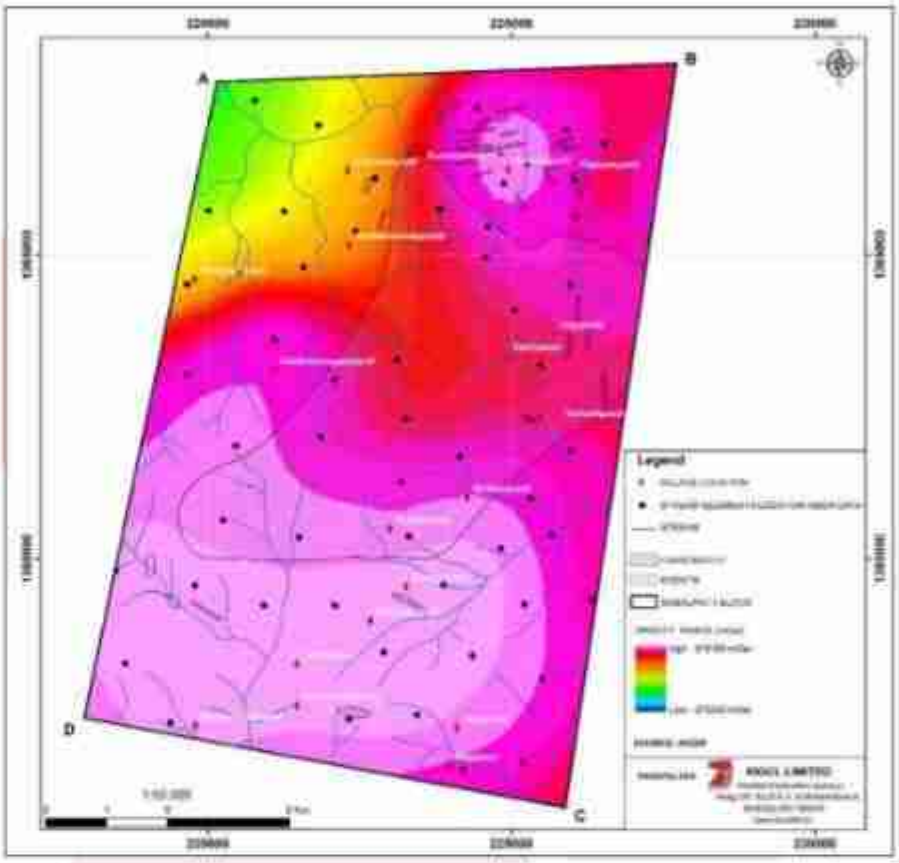
It is noted in the Observed and Bouguer gravity data with higher concentration values in the Syenite and carbonatite zone as depicted in the maps.



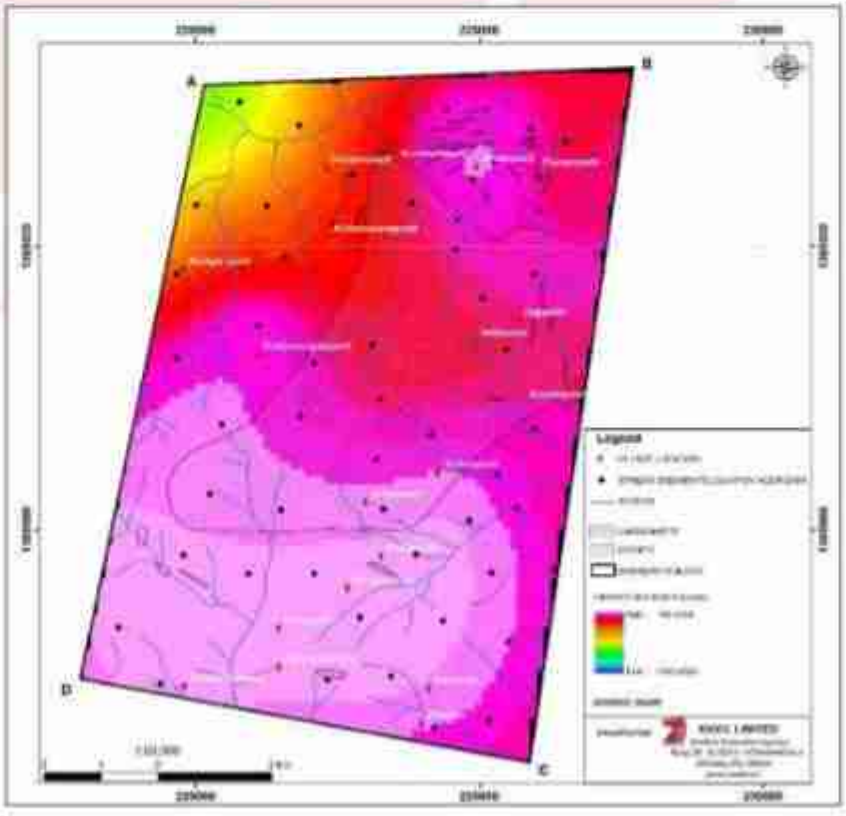
TREE Concentration for NGCM Stream Sediment Sample data Samalpatti Block



LREE concentration for NGCM Stream Sediment Sample Data Samalpatti Block



Observed Gravity Data of Samalpatti Block (NGPM)



Bouguer Gravity Data of Samalpatti Block (NGPM)

C. PRELIMINARY FIELD INSPECTION BY KIOCL

KIOCL geoscientists conducted Preliminary Field Inspection from 12th to 14th April 2024 (3 working days). Geological field traverses were conducted in an around Samalpatti area with the primary objective to trace carbonatite bodies indicative of REE and RM mineralization. The different rock types observed in this area are Pyroxenite, Dunite, Syenite, Pegmatoidal Syenite and Carbonatites. The lithologies in the area trending North 60 to 70 degrees east with a dip amount of 70 degree towards south. Significant interest of multiple small bodies of carbonatite were identified with an average width of 3- 4 meters and approx. length of 30-150meters.

BLOCK DESCRIPTION

The boundary coordinates of the proposed block are given in table @ Annexure 04.

LITHOLOGY:

Sovitic carbonatite:

The sovitic variety of carbonatite are found as small boulders in the north of Jogipatti area, which is whitish grey in color and medium to coarse grains of calcite and dolomite crystals, the accessory minerals are not seen prominently in megascopic condition. However, floats of magnetite crystals found all around the outcrop. Outcrops of Sovitic Carbonatite is given shown below in Fig 2 and Fig 3.

Figure 2

Figure 3

Ankeritic carbonatite:

The ankeritic variety of carbonatite are found as discontinuous outcrops near Pallasulakarai area, which is brownish in color and medium to coarse grains of calcite, dolomite, and feldspar minerals, the accessory of appatite, magnetite is present.

Figure 4: Outcrop of Ankeritic Carbonatite

Figure 5: Hand Specimen Ankeritic Carbonatite

Pegmatitic carbonatite:

The carbonatite observed as boulders in Jogipatti area, which is in pegmatitic, the crystals of calcite, apatite, and the mafic minerals of reibeckite, agerine, magnetite were present prominently.

Figure 6: Pegmatitic Carbonatite

Calc silicate marble

In Onnakarai area the greyish white color and fine to medium grains of calcite and silica are found as sugary texture and named the rock as calc silicate marble by the early workers and it is still debate about origin. We also conducted the acid test which gives good effervescences and proves as igneous origin with presence of mafic enclaves within the rock.

Figure 7&8: Calc-Silicate marble

Dunite Saprolite:

Dunite are exposed near Kanjanur and Kurrukkapatti, it is fine grained greenish in colour, containing olivine and veins of Magnesite. 2 BRS samples collected for Ni, Cr and MgO Analysis, and the results are given in Table No 1 below.

Table No 1: Analysis Results of Saprolite Zone

Sample Id	Cr	Ir	Pd	Pt	Rh	Ru	Ni	MgO
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	(XRF)%
57 BRS 16	185	10	ND	ND	0.5	60	101	11.98
57 BRS 17	1716	1	ND	ND	0.5	544	604	10.06

Figure 9: White coloured Magnesite Veins observed in Saprolite zone

Figure 10: Weathered Dunite

ANALYSIS REPORT

Total 19 Bedrock Samples are collected during the course of Pre-Field studies and analysed for total Rare Earth Elements and the results are given below in table no 2.

Table No 2: Analysis Report of Bedrock Samples

Analytical Result s of BRS Sample Samalpatti Area																				
Sample No	LITHOLOGY	HREE											LREE						Total REE	Total REE
		Dy	Er	Gd	Ho	Tb	Lu	Sc	Tm	Y	Yb	Total H-REE	Eu	La	Nd	Pr	Sm	Total L-REE		
		PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	(%)
57BRS 1	Calc Silicate Marble	1	1	2	ND	1	ND	<1	ND	5	<1	10.2	<1	12.38	12.77	11.7	2.69	39.54	49.74	0.005
57BRS 2	Calc Silicate Marble	2	1	6	ND	1	ND	<1	ND	10	1	21.74	2	33.01	36.33	18.05	7.53	96.51	118.25	0.012
57BRS 3	Pyroxenite	2	1	5	ND	1	ND	4	ND	7	1	19.76	1	13.09	23.42	8.15	6.03	52.18	71.94	0.007
57BRS 4	Pyroxenite	8	3	17	1	3	<1	3	ND	31	2	69.12	6	40.29	112.37	31.18	29.08	219.18	288.3	0.029
57BRS 5	Carbonatite	60	18	126	8	19	2	3	2	204	10	450.65	53	353.99	719.87	178.7	203.29	1528.56	1979.21	0.198
57BRS 6	Carbonatite	88	28	183	12	27	2	4	2	295	14	654.33	80	902.17	1290.73	338.42	318.96	2929.85	3584.18	0.358
57BRS 7	Carbonatite	58	18	119	8	18	2	2	1	197	9	432.29	51	280.55	687.02	165.54	195.72	1379.65	1811.94	0.181
57BRS 8	Carbonatite	38	11	85	5	13	2	3	<1	132	6	295.83	34	189.89	459.34	115.64	130.24	929.44	1225.27	0.123
57BRS 9	Carbonatite	46	17	122	6	15	1	22	2	160	8	398.45	45	2656.53	1533.23	531.8	247.52	5014.48	5412.93	0.541
57BRS 10	Carbonatite	23	8	54	3	8	1	8	<1	94	5	204.45	22	443.19	476.66	141.14	101.52	1184.4	1388.85	0.139
57BRS 11	Carbonatite	26	10	65	4	9	1	9	ND	106	6	235.27	26	754.73	660.84	208.63	129.03	1779.49	2014.76	0.201
57BRS 12	Carbonatite	22	8	54	3	8	1	12	ND	95	5	209.18	21	471.09	456.97	140.69	96.9	1187.1	1396.28	0.140
57BRS 13	Pegmatoital Syenite	1	1	3	0	1	ND	ND	ND	6	1	13.16	1	25.29	21.7	7.01	4.3	59.18	72.34	0.007
57BRS 14	Carbonatite	38	13	82	5	13	2	3	1	140	7	303.69	39	454.26	732.81	200.02	164.98	1591.06	1894.75	0.189
57BRS 15	Pegmatoital Syenite	3	1	5	0	1	ND	ND	ND	13	2	24.5	1	25.84	30.42	8.28	6.82	72.85	97.35	0.010
57BRS 16	Dunite (Saprolite)	1	1	6	ND	1	<1	3	ND	6	1	19.47	1	27.48	24.87	16.05	5.24	74.68	94.15	0.009
57BRS 17	Dunite (Saprolite)	ND	ND	3	ND	1	<1	1	ND	1	ND	6.29	ND	6.48	5.75	12.13	1.22	25.58	31.87	0.003
57BRS 18	Nephiline Syenite	4	2	11	1	2	<1	1	ND	19	2	42.46	4	118.17	101.15	31.61	18.15	272.84	315.3	0.032
57BRS 19	Carbonatite	3	2	12	0	2	<1	6	ND	15	1	40.75	3	50	76.76	24.77	17.46	172.13	212.88	0.021

CONCLUSION & SUGGESTIONS

Preliminary geological traverses were carried out in Samalpatti carbonatite complex to study REE and RM potentiality. Total 19 BRS samples are collected. Out of 19 BRS collected, 10 samples are carbonatite and remaining from other litho units. out of 10 carbonatite samples 9 have indicated total REE value >6500 ppm with average value of 1947 ppm. This indicates potentiality of the carbonatites bodies in situated in Jogipatti and Pallasulakarai . The details of samples collected from various litho units, and their respective values are given in the below indicated table.

DETAILS OF BRS COLLECTED			
Lithology	No of samples collected	Samples Represented TREE >500 ppm	Samples Represented TREE >500 ppm (%)
Carbonatite	10	9	90
Dunite (Saprolite)	2	0	0
Nephiline Syenite	1	0	0
Calc silicate marble	2	0	0
Pyroxenite	2	0	0
Pegmatoidal Syenite	2	0	0

Hence, the detail work will be required in the extensions areas to get more information regarding the REE and RM mineralization.

D. PLANNED METHODOLOGY

i. Carry out systematic large scale geological mapping on 1: 12,500 scale to trace the lithological assemblages specially the carbonatite, nepheline syenite, and Pegmatoidal syenites in the area and map them initially as an out crop geological map, followed by interpreted geological map on the same scale.

ii. Systematic bedrock / channel / groove sampling in the area in carbonatite and other assemblages to draw the anomaly map of the area. Both petrological, ore microscopic, XRD and SEM studies will be carried out to understand the nature of mineralisation and genetic relationships, and the minerals that are responsible for REE and RM etc.,

iii. Ground Geophysics with the combination of IP cum Resistivity, SP and magnetic in the northern and southern zone of the block covering a tentative extent 18.60 sq.km with an Carbonatite bearing Pyroxenite bodies for establishing the sub surface extent of the Carbonatites. Map indicating the Geophysical lines at a grid interval of 200m for a cumulative length of 100-line kilometres (10 units as per NMET-SOC serial no 3.4b) is provided at Plate no 6. Abstract details for deriving Ground Geophysical Components are provided below.

Table No 03: Abstract details of Geophysical Components Proposed

Northern Zone (8.57 sqkm)	
1 line (km)	2.19
total lines with 200m interval (nos)	21
Total line kilometers (km)	45.99
Southern Zone (10.06 sqkm)	
1 line (km)	2.87
total lines with 200m interval (nos)	19
Total line kilometers (km)	54.53
Total line kilometers Proposed. (Northern Zone (45.99-line Km) + Southern Zone (54.53 line Km) =	**100.52**
Total units Proposed as per NMET Soc (Northern Zone (5 units) + Southern Zone (5units)) =	**10**

iv. Pitting and trenching in the area will be taken up depending on the exposure of the host rocks tracing and sampling.

v. If geochemical analysis yields positive zones, those profiles subsurface drilling will be taken up as scout boreholes.

vi. Generate the G4 Geological report on the outcome of the exploration activities carried out in the area, by systematic documentation of all the data sets specifically generated for this project.

E. NATURE, QUANTUM, AND TARGET

- LSM works 1: 12,500 - 90 sq.km
- Geophysical Surveys over the Carbonatite bodies (N & S block) - 18.63 sq.km with 10 units as per NMET Soc (Sl. No 3.4b)
- Bedrock channel sampling - 100 Nos
- Stream Sediment samples - 30 Nos
- Trenching works - 140 cum
- Trench samples - 100 Nos
- Scout drilling works - 500 m
- Core sampling - 400 Nos.
- Primary Sample Analysis - 700 no's (BRS 100 + SSS 30 + Trench Samples 100 + Heavy minerals Separation 70 + Drill core samples 400)
- External Check Sample analysis @10 %as per standard norms
- SEM studies to identify Mineral phase of REE / RM - 20 Nos.
- Petrographic and XRD studies - 10 Nos.
- Radicals for analysis

REE	La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Sc.
RM	Ta, Sn, Be, Cs, Ge, Hf, In, Li, Nb, W, Zr, Rb, V , Sr, Ba,Cr, Ni, Cu.

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

F. TIMELINES

Total period proposed for G4 level Mineral Exploration works is 12 months.

Time Schedule Chart is provided @ **Annexure No – 01.**

G. BREAKUP OF EXPENDITURE

Total estimated cost is **Rs. 3,67,95,602/- (including GST @ 18%). (Say Rs. 368Lakhs).**

Cost estimate is provided @ **Annexure No – 03.**

H. TERMS OF PAYMENT

- KIOCL shall raise invoice for the quantum of works executed and completed in accordance with the approved sanction order received from NMET for release of payment.
- ***" The price quoted in Annexure 03 (Cost estimate) is as per unit price of NMET SoC approved by Ministry of Mines Dtd 31st March 2020 and is valid up to 31st March 2021. As the proposed work is being carried out during Fy 2024-25 and beyond, NMET may reimburse project amount including escalation amount as per clause 4 (page no 05) of NMET SoC Dtd 31.03.2020"***

TIME SCHEDULE

Sl	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 90 sq km of LSM + 100 nos of BRS + 30 SSS + 140 cum Trial pit/ Trenches)	3		↔										
	2.1 Geologist Party days (01 Party)			80 working days										
	2.2 Laboratory Works	3		↔ 90 days										
3	**Ground Geophysical works**													
	3.1 Ground Geophysics	02				↔ 60 days								
4	**Surface Drilling**													
	4.1 Preparatory works for drilling (Approach road making)	01							↔					
	4.2 Drilling works (01 rig - 500m with 05 Bhs)	3								↔				
	4.3 Geologist Party days (01 Party)										60 days			
	4.4 Laboratory Works	03									↔ 80 days			
5	**Survey Works**													
	5.1 DGPS survey works of 09 points (05 BHs+4 Boundary = 09 nos)	01											↔	
6	**Camp Winding**	01												↔
7	**Preparation of Reports and maps**	01												↔

QUANTITY OF WORK

Sl	Stage	Components		Unit	Qty		Remarks
1	Large Scale Geological Mapping (1:12,500)	LSM		sqkm	**90**		
2		Bed Rock Samples		nos	**100**		
3		Stream Sedimnet Sampling with collection of Heavy Minerals		nos	**30**		
4		Trial pits & Trenching works		cum	**140**		Trial pits: 40 cum + Trenches: 100 cum
5	Geophysical Surveys	IP, SP, Resistivity and Magnetic Survey for 2 sqkm (2.7km X 0.8km)		line km	**10 units or 100 linekm**		1 unit @ 10lkm
6	Survey works	DGPS Survey for fixing up of borehole points		nos	**9**		(5BHs+4 Boundary = 9 nos)
7	Drilling works	No of Boreholes		nos	**5**		
8		Core Drilling (NQ series)		m	**500**		
9		Detailed core/ sample logging including supply of core/ sample boxes		m	**500**		
10		Drill core preservation		m	**420**		420m= @ 80m per BH X 4 BHs + 100m (1 complete BH)
11	Lab works Sample analysis	Primary Analysis (34 elemental analysis: Nb, Sr, Ta, W, Mo, Sn,Rb, Be,Cs, Li & RE) by ICPOES (Sequential technics)	BRS	nos	**100**	**700**	
12			SSS	nos	**30**		
14			Trench samples	nos	**100**		
13			Heavy Minerals Separation from SSS & Trial pits	nos	**70**		Heavies from 30 SSS + 40 Trial pits
15			Drill Core	nos	**400**		@ 80 samples per borehole X 5 nos
16		External Check sample analysis (10%) (34 elemental : REE)	BRS	nos	**10**	**70**	
17			SSS	nos	**3**		
18			Trench samples	nos	**10**		
19			Heavy Mineral Seperation	nos	**7**		
20			Drill Core	nos	**40**		

21	Sample preparation & handling		nos	**770**	
22	Petro studies	Preparation of Standard Thin section	nos	**10**	
23		Completed Petrographic studies	nos	**10**	
24		Preparation of Polished Thin section	nos	**10**	
25		Mineragraphic studies	nos	**10**	
26		XRD mineral phase analysis	nos	**10**	
27		SEM Studies	hrs	**20**	
28	Determination of Insitu bulk density		nos	**5**	
29	Report preparation		nos	**1**	

COST ESTIMATES

Sl	Item of Work	Unit	Rates as per NMET SoC 2020-21		Year 2021-22			Outsourcing components	Remarks
			SOC Item No	Rates as per SOC	Qty	Amount (Rs)			
(a)	(b)	(c)	(d)	(e)	(f)	(g)=(e)*(f)		(g)	(h)
1	**LARGE SCALE GEOLOGICAL MAPPING WORKS (1:12500 scale :90sq km)**								
1.1	Geologist Party days - Field	days	1.2	11,000	140.0	15,40,000			
1.2	Geologist Party days - HQ		1.2	9,000	30.0	2,70,000			
1.3	Labour charges @ 2nos per Geologist	days	5.7	504	280.0	1,41,120			
2	**TRENCHING WORKS**								
2.1	Trial pits/ Trenching works	cum	2.1.2	3,800	140.0	5,32,000	**26,55,920**		
3	**Survey works**								
3.1	Demarkation of Lease boundary and fixation of borehole and determination of coordinates and RL by DGPS	Per point of observation	1.6.2	19,200	9.0	1,72,800			(5Bhs+4 Boundary = 9 nos)
4	**Geophysical Surveys (Outsourcing)**								
4.1	IP, SP, Resistivity and Magnetic Survey for 18.5 sqkm (North Block : 8.56sqkm + South Block: 10.06 sqkm)	line km	3.4b	14,48,693	10.0	1,44,86,930	**1,44,86,930**	**1,44,86,930**	10 units of 10 line km length
5	**DRILLING**								

5.1	Surface Drilling (01 rig - Medium Hard Rock) **(Outsourcing)**		m.	2.2.1.3a	10,100	500.0	50,50,000		**50,50,000**	
5.2	Core preservation		m	5.3	1,590	420.0	6,67,800	**57,17,800**		420m= @ 80m per BH X 4 BHs + 100m (1 complete BH)
6	**LABORATORY STUDIES**									
6.1	Sample processing works- 770 Nos (700 primary +70 external check)	Sampler charges	days	1.5.2	5,100	110.0	5,61,000	**7,82,760**		@ 770 samples / 7 samples per day
6.2		Labour charges	days	5.7	504	440.0	2,21,760			Amount will be reimbursed for unskilled labour as per the notified rates by the Central Labour Commissioner (Rs.504/- per day) or respective State Govt. whichever is higher)
6.3	Primary Analysis (REE and RM) by ICPOES (Sequential technics)	Primary	per sample	4.1.13	5,380	700.0	37,66,000	**41,42,600**		700nos (BRS : 100 +SSS : 30 + Trench: 100+ Heavies: 70 + Drill core: 400)
6.4		External Check (10%) **(Outsourcing)**		4.1.13	5,380	70.0	3,76,600		**3,76,600**	
6.5	Petro studies **(Outsourcing)**	Preparation of Standard Thin section	nos	4.3.1	2,353	10.0	23,530	**2,40,160**	**2,40,160**	

6.6		Complete Petrological Report of rock sample	nos	4.3.4	4,232	10.0	42,320			
6.7		Preparation of Polished Thin section	nos	4.3.2	1,549	10.0	15,490			
6.8		Mineragraphic studies	nos	4.3.4	4,232	10.0	42,320			
6.9		XRD for Mineral phase analysis	nos	4.5.1	4,000	10.0	40,000			
6.10		SEM studies	hrs	4.4.2	2,940	20.0	58,800			
6.11	Determination of Insitu bulk density		nos	4.10	3,540	5.0	17,700			
7	**Sub Total (1+2+3+4+5+6)**						**2,80,26,170**	**2,80,26,170**	**2,01,53,690**	
8	**Peer review of report**		lumpsum		MoM Office Memorandum Dtd 12 July 2023		30,000	31,56,543		
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"		5,00,000			

10	Exploration Report (5% of (Sl 9 + Sl 10))	lumpsum	5.2(iii)	Detailed exploration with cost of work exceeding Rs.150 Lakh and less than Rs 300 lakhs: A min. of Rs.7.5 Lakhs or 3% of the value of work whichever is more.	8,40,785			
11	Tender processing Cost	lumpsum	2.3	One time in case of outsourced component(s) of project work (2% of the approved project cost or 5 lakh whichever is lower)	4,03,074			Tendering Cost (Rs. 2,01,53,690)= Geophysics(Rs 1,44,86,930) + Drilling (Rs 50,50,000) + External Check (Rs 3,76,600) + Petro (Rs. 2,40,160)
12	Operational Charges (Reimbursement of cost in case of outsoruced components of project work)	lumpsum	6(iii)	Rs 8.75 lakhs + 5% of balance amount outsourced in excess of Rs1 Cr and maximum of Rs. 15 Lakhs	13,82,685			
13	**GRAND TOTAL (7 to 12)**				**3,11,82,713**	**3,11,82,713**		
14	**GST 18%**				**56,12,888**	**56,12,888**		GST will be reimbursed as per actual and as per notified prescribed rate
15	**Grand Total (with GST 18%)**				**3,67,95,602**	**3,67,95,602**		

BOUNDARY CO-ORDINATES OF THE BLOCK

Boundary Point	Latitude (dd mm ss)	Longitude (dd mm ss)
A	12° 21' 41.02" N	78° 25' 35.36" E
B	12° 21' 53.55" N	78° 29' 46.73" E
C	12° 15' 13.28" N	78° 28' 49.85" E
D	12° 15' 58.97" N	78° 24' 26.29" E

CONSENT LETTER RECEIVED FROM DEPT OF MINING & GEOLOGY, GOVT. OF TAMILNADU

Natural Resources (MMD.1) Department, Secretariat, Chennai - 600 009

Letter No.175/MMD.1/2024-1, Dated 13.03.2024

From
Thiru K. Phanindra Reddy, I.A.S.,
Additional Chief Secretary to Government (FAC)

To
The Assistant General Manager (Mineral Exploration),
Tvl.KIOCL Limited, II Block Koramangala,
Bengaluru – 560 034.

13/03/24

Sir,

Sub: Natural Resources Department – Mines and Minerals – Exploration – Proposal submitted by Tvl.KIOCL Limited for exploration of REE in Carbonatites of Hogenakkal, Krishnagiri District at G4 level – Covering an overall extent of 90 sq. km – Consent requested to carry out survey Under NMET fund – Remarks received from GSI – Recommended and forwarded to Government - Regarding.

Ref: 1. Your letter No.KIOCL/MED/2023/647, dated 18.11.2023.

2. From the Director, GSI, email letter dated 05.03.2024.

3. From the Commissioner of Geology and Mining letter No.8286/MM11/2023, dated 07.03.2024.

*****

I invite attention to your letter 1st cited wherein you have requested the State Government of Tamil Nadu to accord necessary permissions to Tvl.KIOCL Limited for carrying out G4 level of mineral exploration works for Carbonatites (REE) in Hogenakkal, Krishnagiri District over an extent of 90.00 sq.km.

2. I am to inform that with regard to the proposal of Tvl.KOICL Limited, Geological Survey of India (GSI) has been consulted and the Director, GSI in his email letter 2nd cited has informed that the block proposed by KIOCL for REE is completely overlapping with the block already explored by GSI for PGE commodity.

3. In the letter 3rd cited, the Commissioner of Geology and Mining has informed that since the GSI has not explored REE mineral in the proposed block submitted by KIOCL, the Government may consider

this proposal and further requested to accord consent to Tvl.KIOCL for carrying out G4 stage of exploration for REE in carbonatites of Hogenakkal area, Krishnagiri District under NMET Fund.

4. Under the circumstances, based on the request of Commissioner of Geology and Mining, the Government of Tamil Nadu is according consent for carrying out G4 stage of exploration for Carbonatites (REE) over an extent of 90.00. sq.km. in Hogenakkal area, Krishnagiri District under NMET Fund.

Yours faithfully,

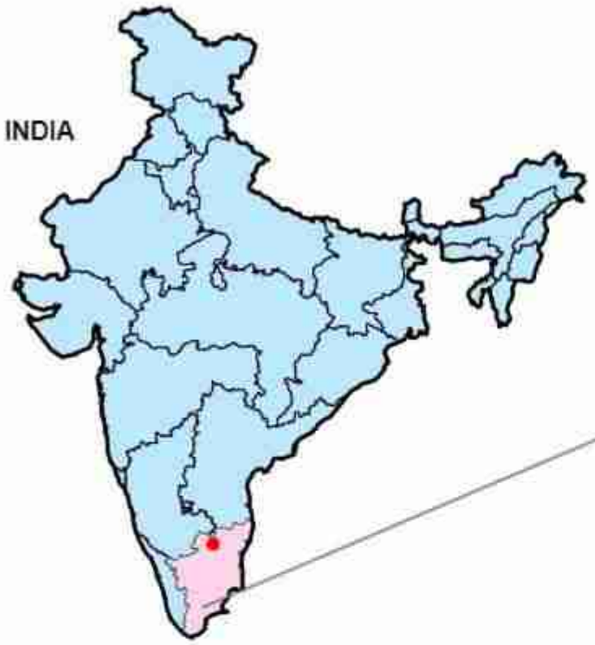
13/2/2024

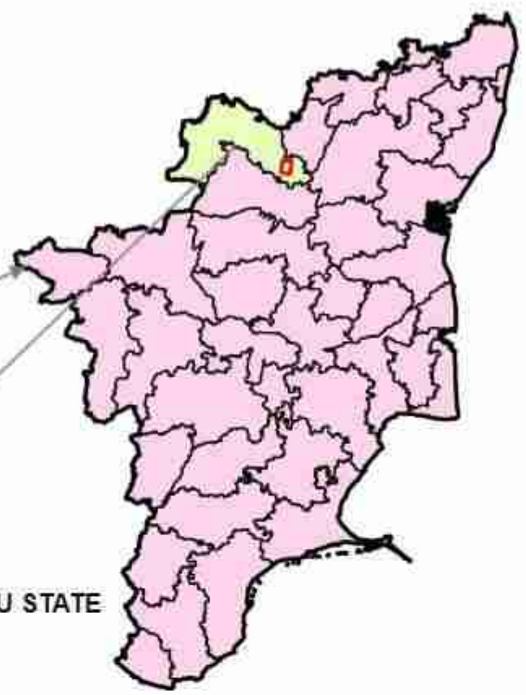
for Additional Chief Secretary to Government (FAC)

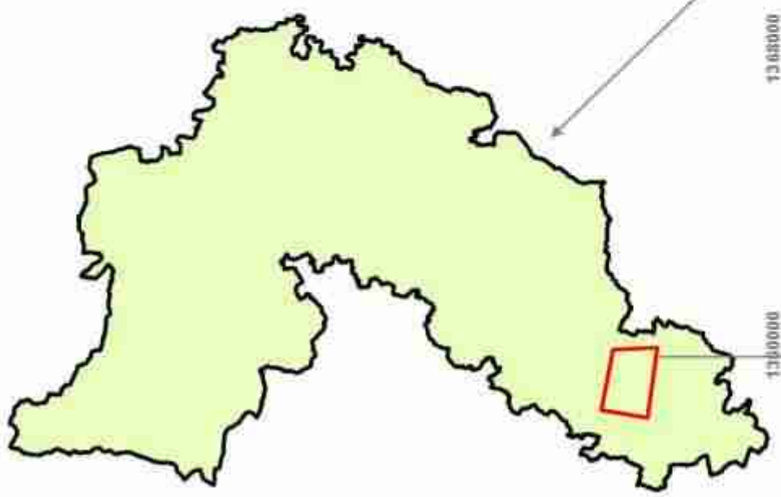
13-2-2024

Copy to:
The Commissioner of Geology and Mining,
Guindy, Chennai – 600 032.

KEY MAP OF SAMALPATTI BLOCK, UTTANGARAI TALUK, KRISHNAGIRI DISTRICT, TAMILNADU







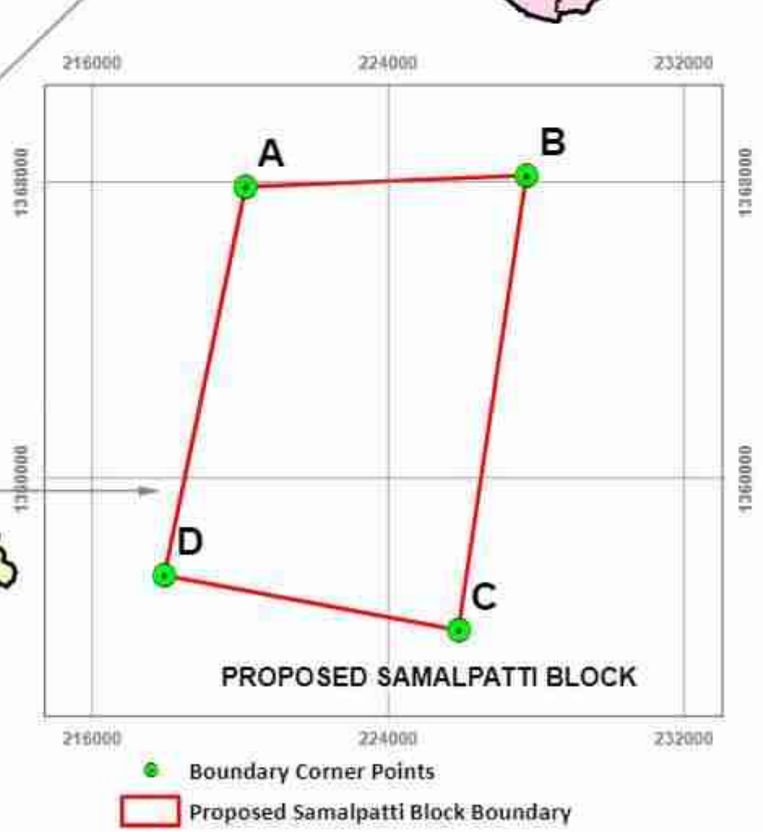


PLATE NO : 01

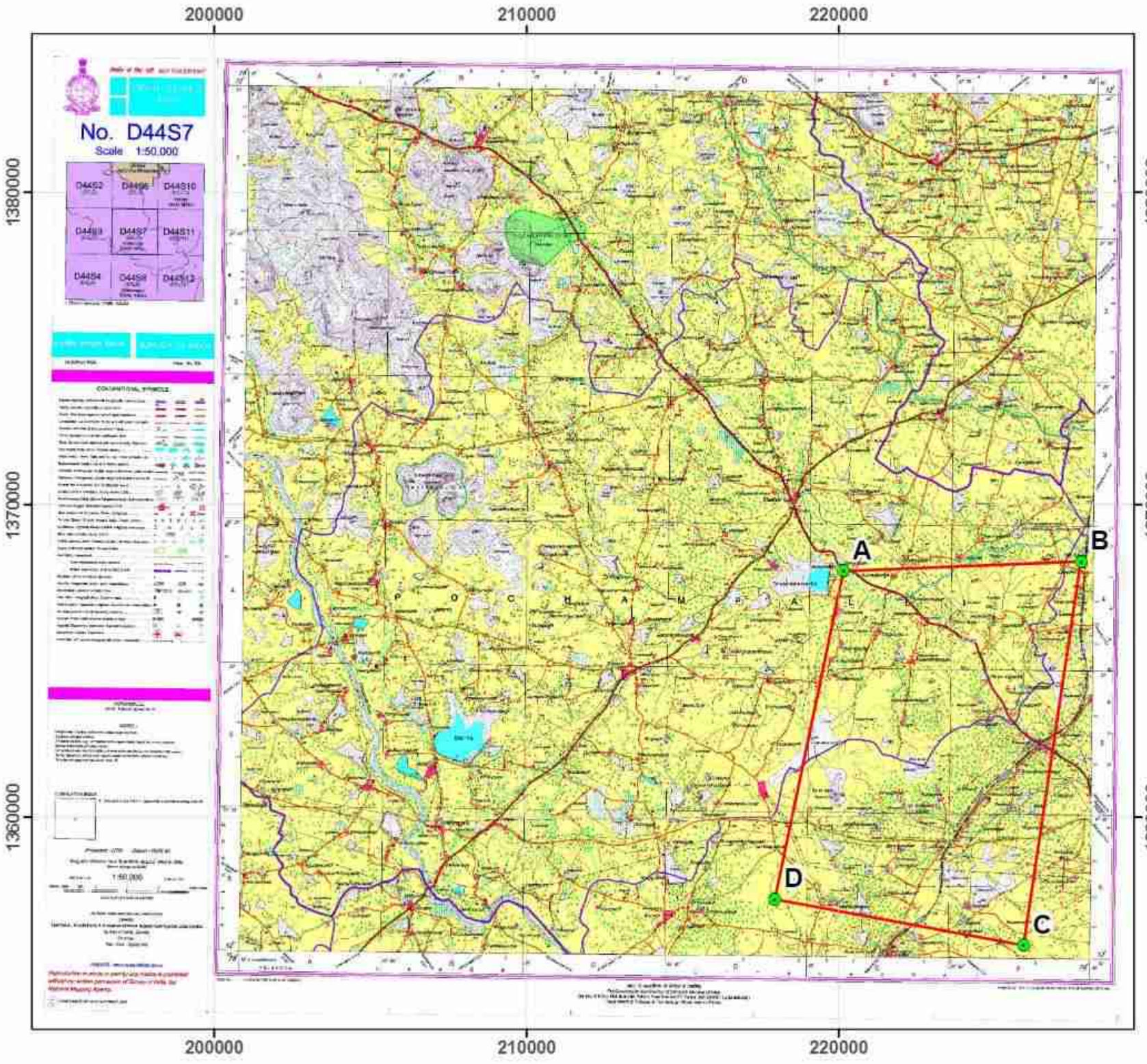
KEY MAP OF PROPOSED SAMALPATTI BLOCK

PROJECT	RECONNAISSANCE SURVEY (G4) FOR REE MINERALISATION		
BLOCK	SAMALPATTI BLOCK		
EXTENT	90.00 Sq.Km		
TALUK : UTTANGARAI	DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU	

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Redg.Off : BLOCK II, KORAMANGALA
BANGALURU 560034
(www.kioclltd.in)

SAMALPATTI BLOCK MARKED ON GSI GEOLOGICAL MAP OF 1 :50000



5 2.5 0 5 Km

LEGEND

- PROPOSED BOUNDARY CORNER POINTS
- PROPOSED SAMALPATTI BLOCK

BOUNDARY POINTS OF PROPOSED SAMALPATTI BLOCK

DATUM :WGS -84 ZONE 44- NORTH

Point ID	Longitude	Latitude	Easting	Northing
A	78° 25' 35.36" E	12° 21' 41.02" N	220142.591	1367862.604
B	78° 29' 46.73" E	12° 21' 53.55" N	227743.827	1368175.711
C	78° 28' 49.85" E	12° 15' 13.28" N	225909.252	1355885.955
D	78° 24' 26.29" E	12° 15' 58.97" N	217953.331	1357366.228

PLATE NO : 02

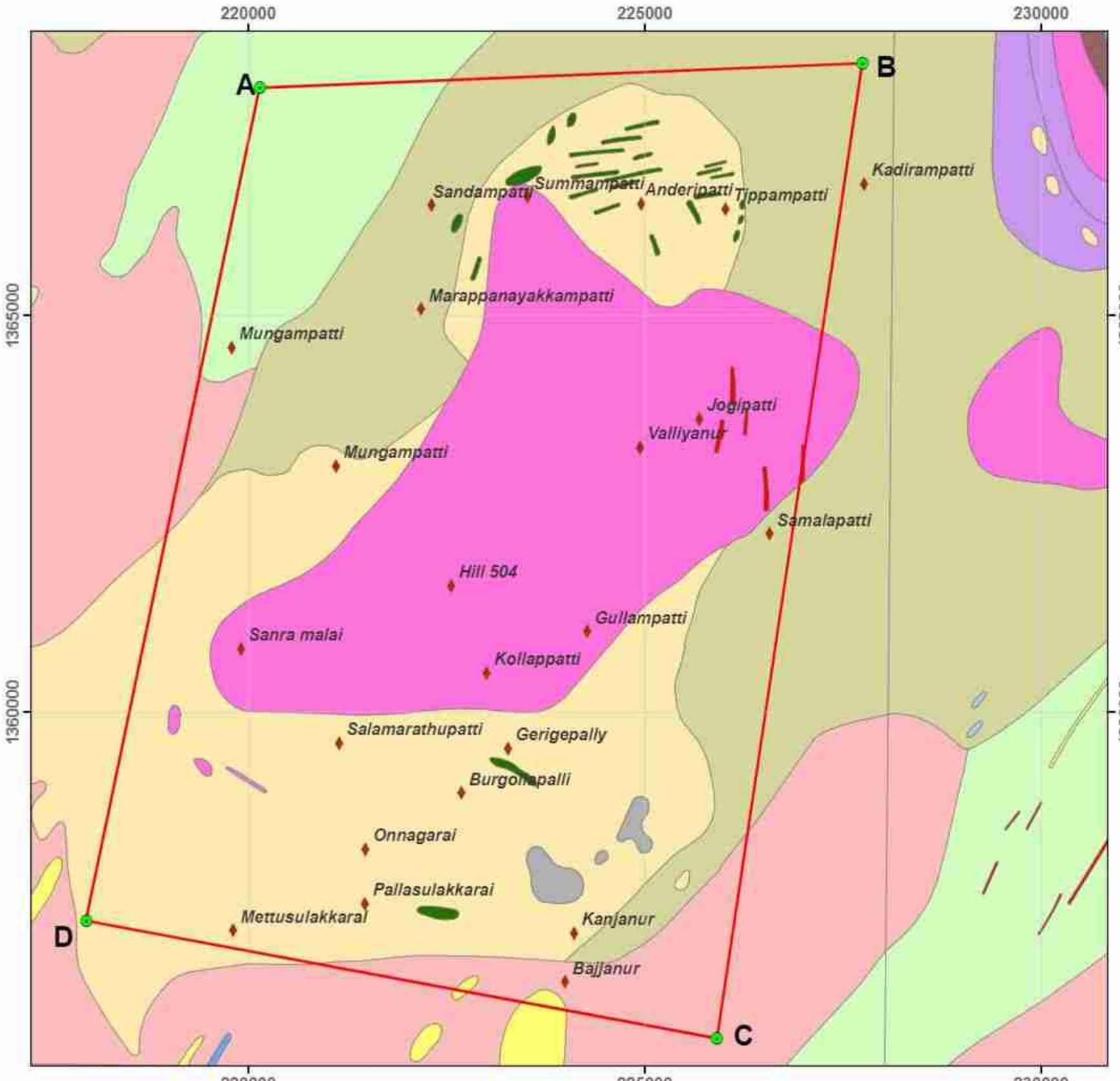
SAMALPATTI BLOCK MARKED ON SOI TOPOSHEET 57L/7

PROJECT	RECONNAISSANCE SURVEY (04) FOR REE MINERALISATION	
BLOCK	SAMALPATTI BLOCK	
EXTENT	90.00 Sq.Km	
TALUK : UTTANGARAI	DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Redg.Off : BLOCK II, KORAMANGALA
BANGALURU 560034
(www.kioclltd.in)

SAMALPATTI BLOCK MARKED ON GSI GEOLOGICAL MAP OF 1 :50000



1:50,000

2 1 0 2 Km

LEGEND

- PROPOSED BOUNDARY CORNER POINTS
- PROPOSED SAMALPATTI BLOCK
- VILLAGE LOCATION

LITHOLOGIC

- ACID TO INTERMEDIATE CHARNOCKITE
- BIOTITE HORNBLENDE GNEISS
- CARBONATITE
- DUNITE
- EPIDOTE-HORNBLENDE GNEISS
- GARNET GNEISS
- HORNBLENDE-BIOTITE SYENITE
- PORPHYRITIC SYENITE
- PYROXENE GRANULITE
- PYROXENITE
- QUARTZ VEIN/REEF
- SYENITE
- ULTRAMAFITE

PLATE NO : 03

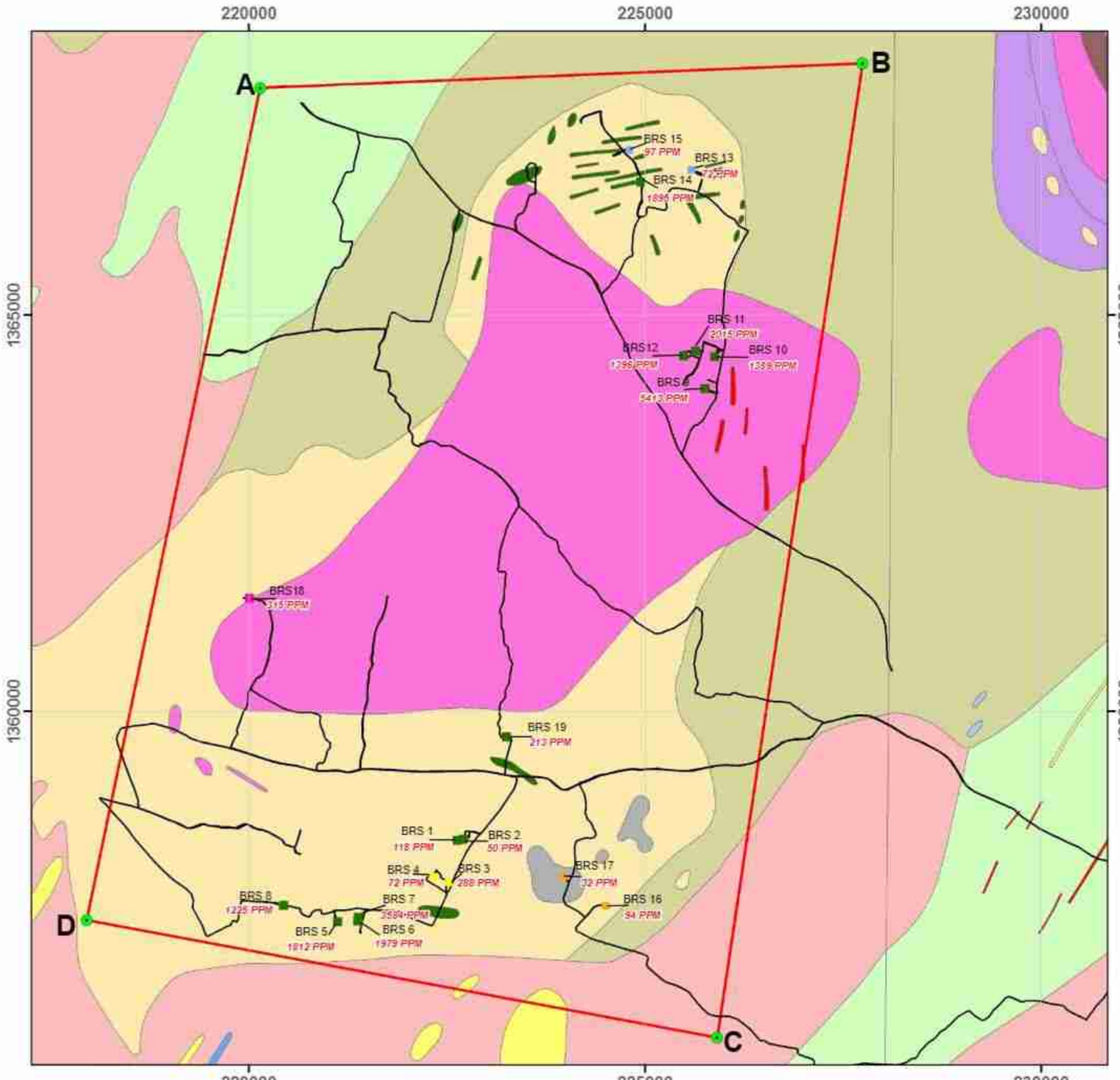
SAMALPATTI BLOCK MARKED ON GSI GEOLOGICAL MAP OF 1 :50000

PROJECT	RECONNAISSANCE SURVEY (G4) FOR REE MINERALISATION	
BLOCK	SAMALPATTI BLOCK	
EXTENT	90.00 Sq.Km	
TALUK : UTTANGARAI	DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Redg.Off : BLOCK II, KORAMANGALA
BANGALURU 560034
(www.kioclltd.in)

TRAVERSE DATA OF PRELIMINARY FIELD INSPECTION ALONG WITH BRS SAMPLE LOCATION SAMALPATTI BLOCK



1:50,000

2 1 0 2 Km

LEGEND

- PROPOSED BOUNDARY CORNER POINTS
- PROPOSED SAMALPATTI BLOCK
- TRAVERSE DATA

BRS LOCATION

- CARBONATITE
- DUNITE/SAPROLITE
- PEGMATOIDAL SYENITE
- PYROXENITE
- SYENITE

LITHOLOGIC

- ACID TO INTERMEDIATE CHARNOCKITE
- BIOTITE HORNBLENDE GNEISS
- CARBONATITE
- DUNITE
- EPIDOTE-HORNBLENDE GNEISS
- GARNET GNEISS
- HORNBLENDE-BIOTITE SYENITE
- PORPHYRITIC SYENITE
- PYROXENE GRANULITE
- PYROXENITE
- QUARTZ VEIN/REEF
- SYENITE
- ULTRAMAFITE

PLATE NO : 04

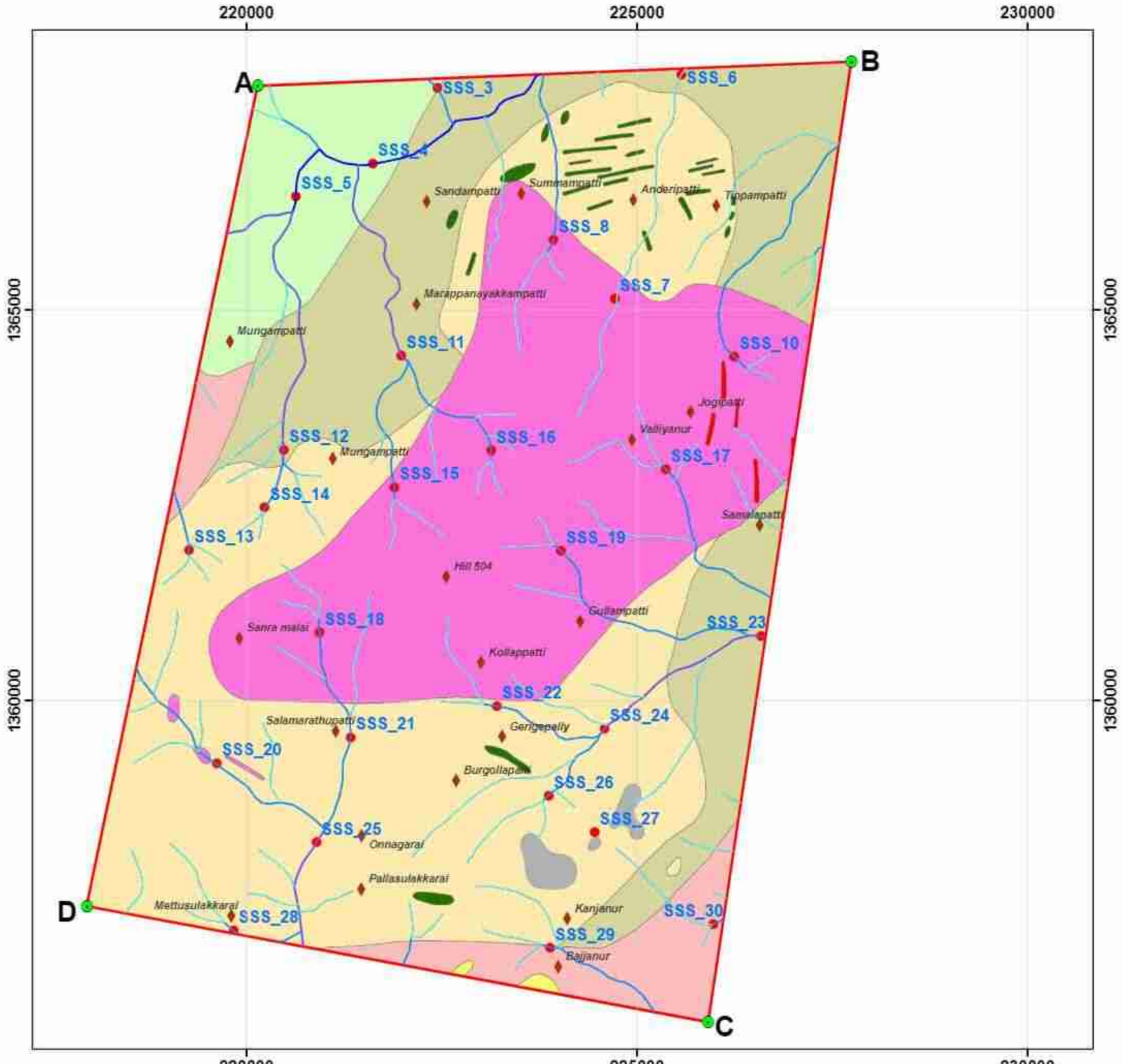
TRAVERSE DATA OF PRELIMINARY FIELD INSPECTION ALONG WITH BRS SAMPLE LOCATION

PROJECT	RECONNAISSANCE SURVEY (G4) FOR REE MINERALISATION		
BLOCK	SAMALPATTI BLOCK		
EXTENT	90.00 Sq.Km		
TALUK : UTTANGARAI		DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Redg.Off : BLOCK II, KORAMANGALA
BANGALURU 560034
(www.kioclltd.in)

PROPOSED STREAM SEDIMENT SAMPLE LOCATION SAMALPATTI BLOCK



N

1:50,000

2 1 0 2 Km

LEGEND

- Proposed SSS Location

STREAM ORDER

- 1 (Count 58)
- 2 (Count 18)
- 3 (Count 4)
- 4 (Count 1)
- VILLAGE LOCATION
- SAMALPATTI BLOCK

LITHOLOGY

- ACID TO INTERMEDIATE CHARNOCKITE
- BIOTITE HORNBLENDE GNEISS
- CARBONATITE
- DUNITE
- EPIDOTE-HORNBLENDE GNEISS
- PYROXENE GRANULITE
- PYROXENITE
- QUARTZ VEIN/REEF
- SYENITE

PLATE NO : 05

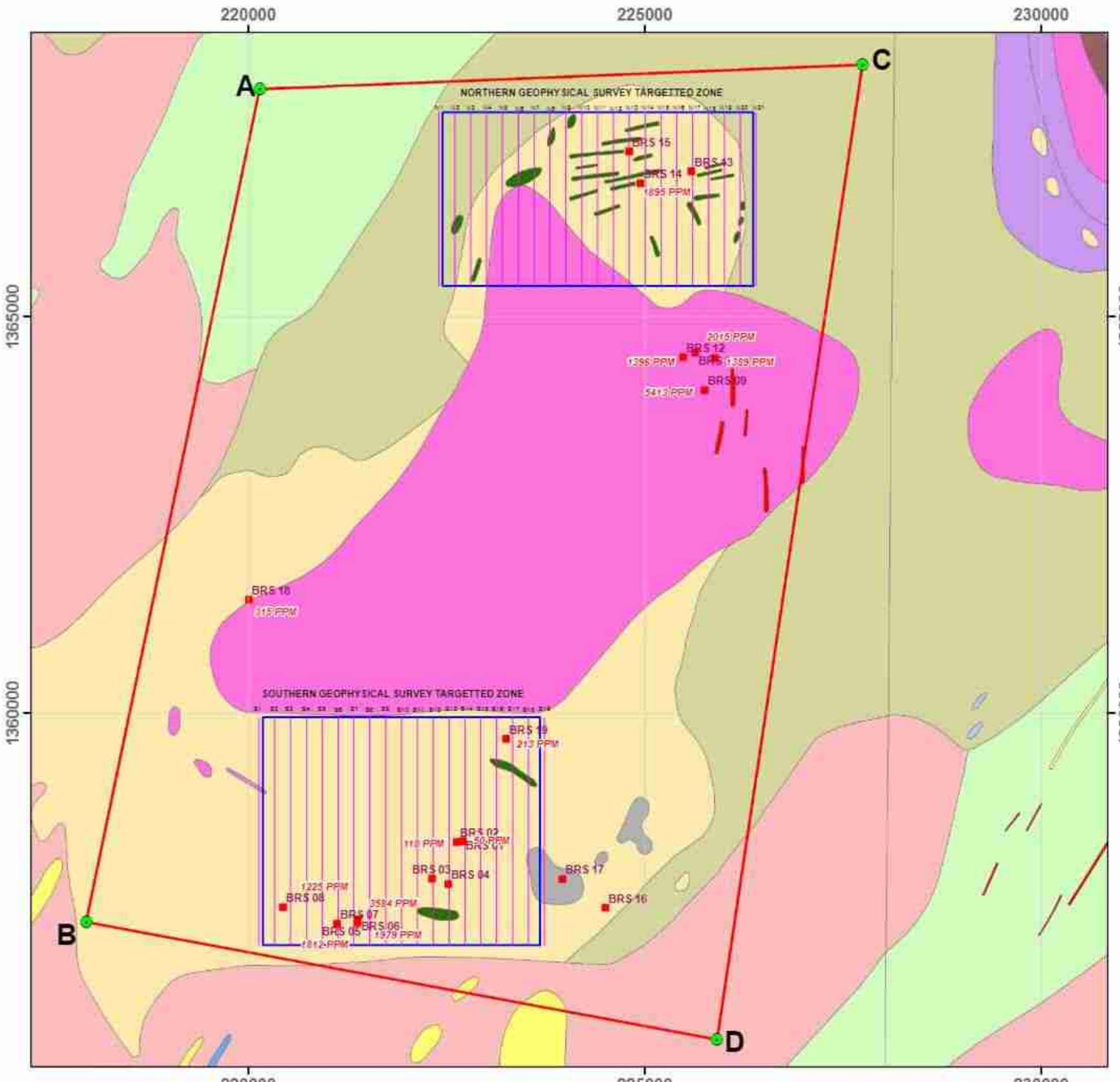
PROPOSED STREAM SEDIMENT SAMPLE LOCATION SAMALPATTI BLOCK

PROJECT	RECONNAISSANCE SURVEY (04) FOR REE MINERALISATION	
BLOCK	SAMALPATTI BLOCK	
EXTENT	90.00 Sq.Km	
TALUK : UTTANGARAI	DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU

PROSPECTOR

KIOCL LIMITED
(Notified Exploration Agency)
Redg.Off : BLOCK II, KORAMANGALA
BANGALURU 560034
(www.kioclltd.in)

GEOPHYSICAL SURVEY PLAN FOR SAMALPATTI BLOCK



1:50,000

2 1 0 2 Km

LEGEND

- PROPOSED BOUNDARY CORNER POINTS
- PROPOSED SAMALPATTI BLOCK
- GEOPHYSICAL SURVEY LINE
- CARBONATITES TARGETED ZONE

LITHOLOGIC

- ACID TO INTERMEDIATE CHARNOCKITE
- BIOTITE HORNBLENDE GNEISS
- CARBONATITE
- DUNITE
- EPIDOTE-HORNBLENDE GNEISS
- GARNET GNEISS
- HORNBLENDE-BIOTITE SYENITE
- PORPHYRITIC SYENITE
- PYROXENE GRANULITE
- PYROXENITE
- QUARTZ VEIN/REEF
- SYENITE
- ULTRAMAFITE

Northern Zone	
1 line (km)	219
total lines with 200m interval (nos)	21
Total line kilometers	4599
1 Line Unit as per NHET (km)	10
Total Units (approx)	5
Southern Zone	
1 line (km)	287
total lines with 200m interval (nos)	19
Total line kilometers	5433
1 Line Unit as per NHET (km)	10
Total Units (approx)	5
Total units Proposed. (Northern Zone (5 units) + Southern Zone (5units)) =	10

PLATE NO : 06

GEOPHYSICAL SURVEY PLAN FOR SAMALPATTI BLOCK

PROJECT	RECONNAISSANCE SURVEY (G4) FOR REE MINERALISATION	
BLOCK	SAMALPATTI BLOCK	
EXTENT	90.00 Sq.Km	
TALUK : UTTANGARAI	DISTRICT : KRISHNAGIRI	STATE : TAMIL NADU

PROSPECTOR

KIOCL LIMITED
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