**Resubmission : 69.3.4 , 70.4.16 & 71st TCC dated 26.11.2024**

# PROPOSAL FOR REE
# PROSPECTS IN NELLIKUDUR BLOCK
# IN PARTS OF MAHABUBABAD & WARANGAL RURAL DISTRICTS
# TELANGANA
# FOR RECONNAISSANCE SURVEY (G4 STAGE) UNDER NMET.

## ( REE )

**BY**

**CRITICAL MINERAL TRACKERS**

**Place: Hyderabad**

**Date: 10th December 2024**

Dr.K.Mahender Reddy

Dr.K.Mahender Reddy

## I. Block Summary

**Summary of the Block for reconnaissance survey (G4 stage).**

| Features | Details |
|---|---|
| Block Id | CMT/NMET/TG/2024/Block-A |
| Exploration Agency | CRITICAL MINERAL TRACKERS |
| Commodity | REE AND STRATEGIC |
| Mineral Belt | Peninsular Gneissic Complex II ( PGC-II ) |
| Completion Period with Entire time schedule to complete the project | Six(6) Months |
| Objectives | To locate REE mineralised zones in the granite-gneiss terrain of "Nellikudur Block" of Mahabubabad and Warangal rural districts of Telangana.. |
| Whether the work will be carried out by the proposed agency or through outsourcing and details there of Components to be out sourced and name of the outsource agency | Primarily, M/S Critical Mineral Trackers will carry out the work. However, CMT will outsource some specialised works like chemical analysis and drilling. |
| Name , Number of Geoscientists | Geo Scientists – 4 ( 2 senior and 2 junior)<br>K.Mahender Reddy<br>S.Rama Murthy<br>Two Junior Geologists |
| Expected Field days(Geology)Geological party days | Total Field Man Days (Geologist) Approximately..<br>150 Man days<br>Geological Party Days 75 Approximately |

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## General Information about the block

| | | |
|---|---|---|
| **1.** | **Location** | |
| | Latitude | 17.5° to 17.68° N |
| | Longitude | 79.678° to 79.747°E |
| | Localities | Thorrur, Nellikudur, Nekkonda, Gurthur, Ammapuram |
| | Tehsil/Taluq/Mandal | Thorrur |
| | District | Warangal rural and Mahabubabad district |
| | State | Telangana |
| **2.** | **Area(Sq.km)** | |
| | Block Area | 154.7 sq.km |
| | Forest Area | Nil |
| | Government Land Area | Not known |
| | Private Land Area | Not known |
| **3.** | Accessibility | |
| | Nearest Rail Head | Warangal - 40 Km |
| | Road | Warangal-Thorrur state highway |
| | Airport | Shamshabad - Hyderabad |
| **4.** | Hydrography | |
| | Local Surface Drainage | Dendritic to Subdendritic pattern |
| | River/Stream | Ephemeral Streams(Only Primary), Akeru stream flows through the area |
| **5.** | Climate | Semi-Arid |
| | Mean Rainfall | 58.55mm |
| | Temperature | Minimum (December)- 12$^{o}$C<br>Maximum (June)-45$^{o}$C |
| **6.** | Topography | The terrain is undulatory with Hills, Tors,Mounds standing out prominently in a vast pediment-pediplain complex. |
| | Toposheet Number | 56O/10 |
| | Morphology of the Area | Undulatory with hills, Tors and pedestal rocks within the pediment-pediplain |
| | Availability of Baseline Geoscience data | Baseline data available from Bhukosh (GSI) |
| | Geological Map(1:50K/1:25K) | 1:50k Geological map available Bhukosh (GSI) |
| | Geochemical Map | Available from GSI portal |
| | Geo Physical Map(Aeromagnetic , Ground Geophysical Regional Local Scale Geophysical Maps) | Available from GSI portal |

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| | | |
|---|---|---|
| | Justification for taking up Reconnaissance survey/Regional Survey | • The main objective behind taking up this block is because GSI, during the 1:50 K mapping in the FS 1988-89 reported Cerium values more than 1000 ppm and Lanthanum values between 300 to 500 ppm from 56O/9 & 13 and later during the geochemical mapping, recorded significant values for Cerium and Lanthanum . Moreover, even during the mapping of the Eastern Dharwar Craton reported the presence of Allanite, a cerium epidote, and this is commonly present in the granites younger than 2500 Ma. The area was not targeted for Strategic Minerals like Strontium, Gallium, Zirconium during mapping therefore they can also be targeted in this block to assess their potential.<br>• Three clusters of with high values of REE and Zirconium were demarcated in 56O/9,10 & 13 based on NGCM data of which the maximum value of total REE is 6052 ppm whereas the Ce values go upto 2827 and La values upto 1215ppm and Zirconium upto 3044 ppm which prompted us to take up this block for G-4 Investigation of REE & STRATEGIC Minerals/Elements.<br>. |

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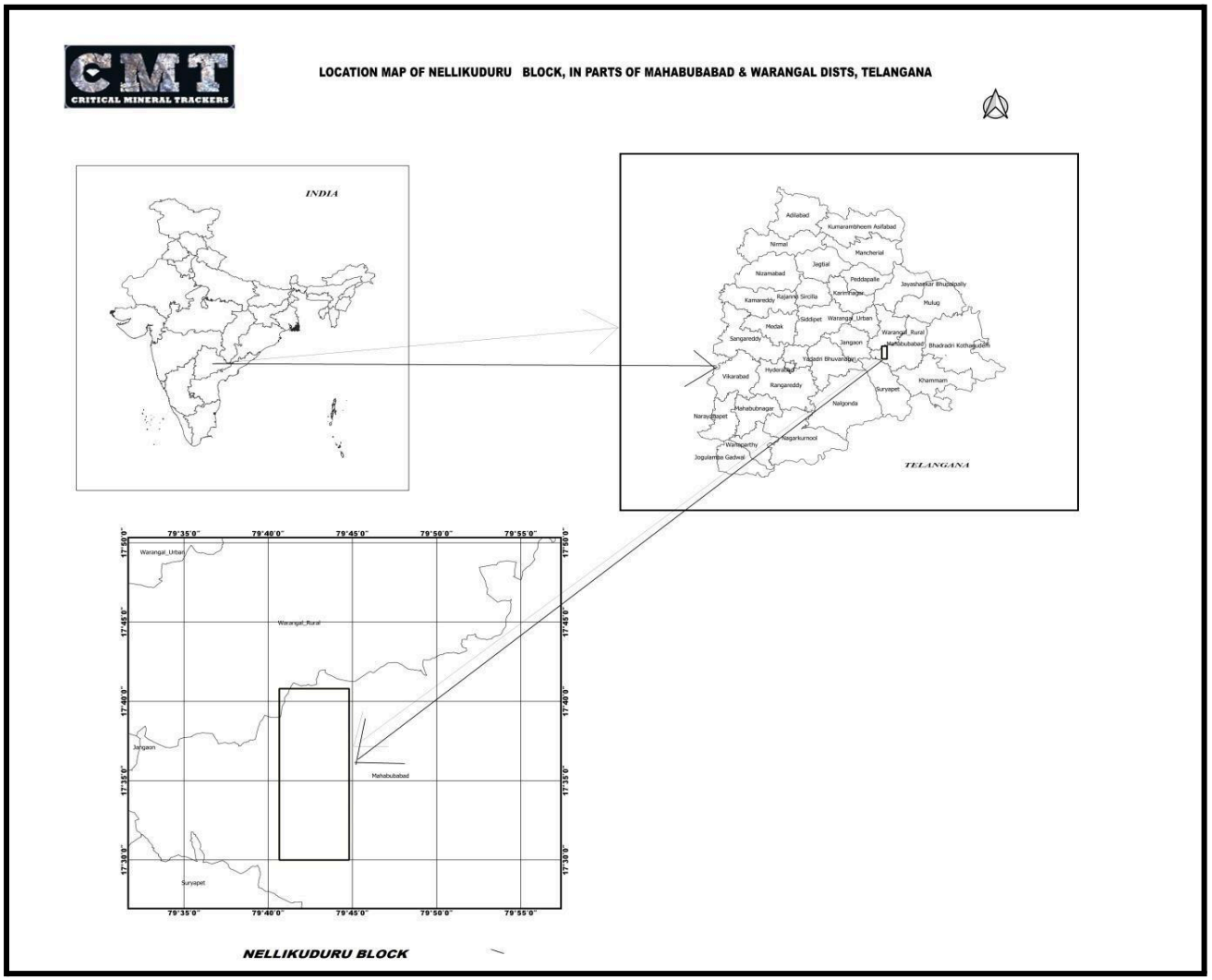
## Detailed Description of the Block

### Physiography

The physiography of the area proposed for study forms an undulating terrain comprising a vast pediment-pediplain complex interspersed with granitic knolls & mounds, which is a part of the Eastern Dharwar Craton and exposes a variety of granites and gneisses grouped under Peninsular Gneissic Complex-II.

**PROPOSAL FOR REE PROSPECTS IN NELLIKUDUR BLOCK IN PARTS OF MAHABUBABAD & WARANGAL RURAL DISTRICTS, TELANGANA**

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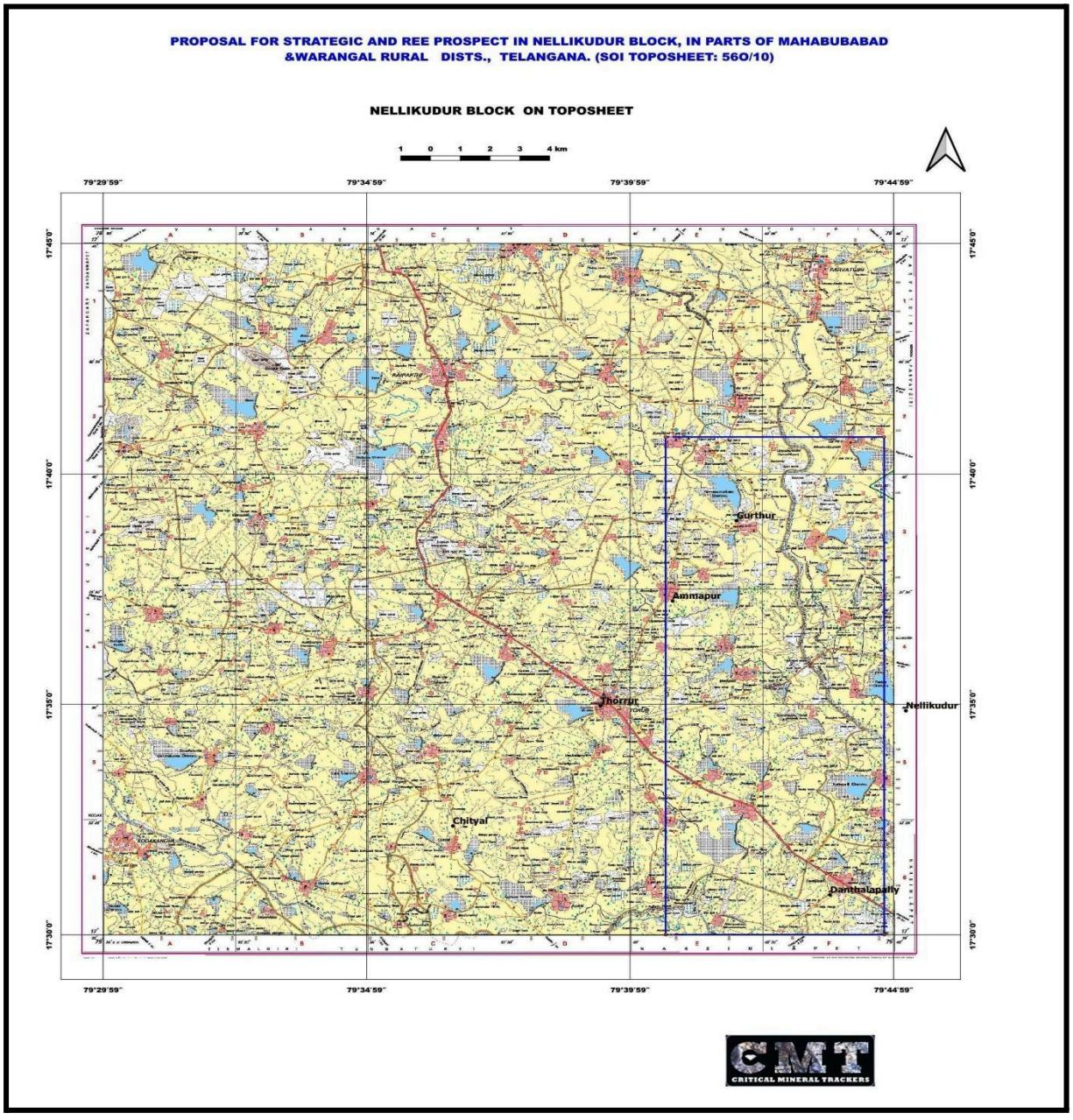
# PROPOSAL FOR REE PROSPECTS IN NELLIKUDUR BLOCK IN PARTS OF MAHABUBABAD & WARANGAL RURAL DISTRICTS, TELANGANA

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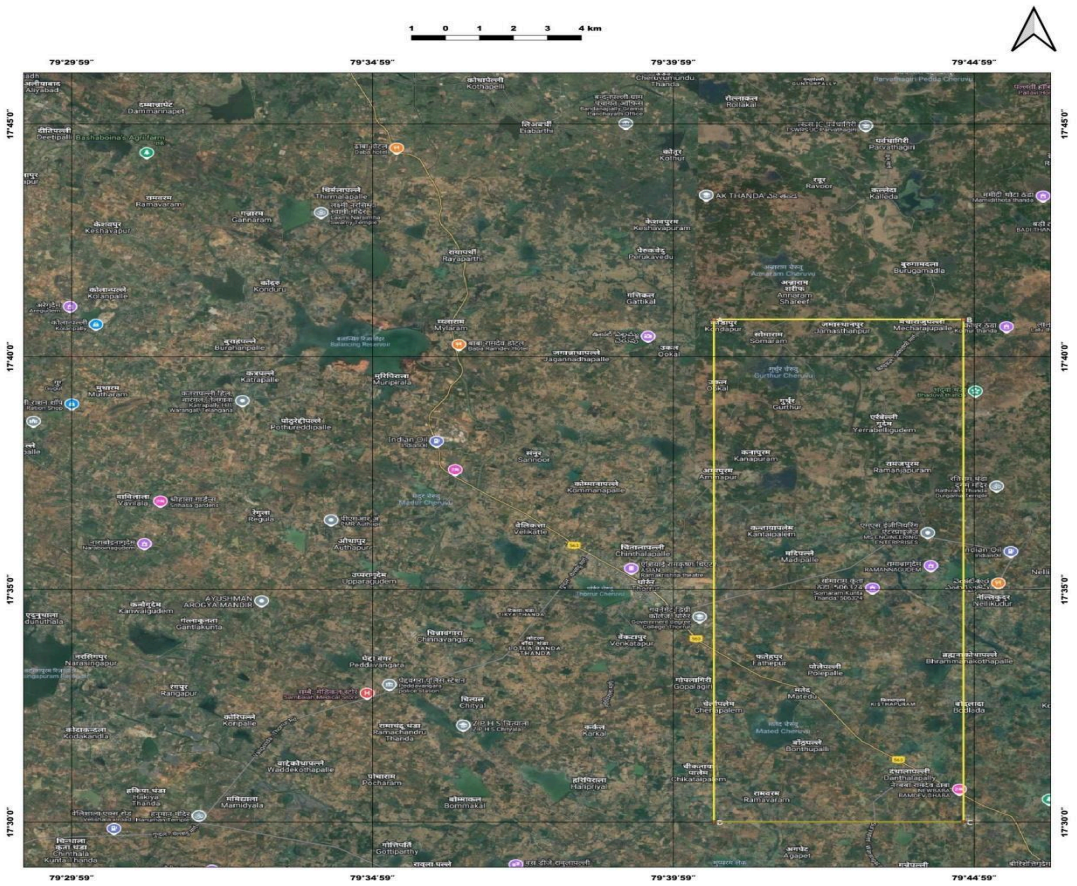
## PROPOSAL FOR REE PROSPECTS IN NELLIKUDUR BLOCK IN PARTS OF MAHABUBABAD & WARANGAL RURAL DISTRICTS, TELANGANA

**PROPOSAL FOR STRATEGIC AND REE PROSPECT IN NELLIKUDUR BLOCK, IN PARTS OF MAHABUBABAD &WARANGAL RURAL DISTS., TELANGANA. (SOI TOPOSHEET: 56O/10)**

**NELLIKUDUR BLOCK ON SATELLITE IMAGERY**

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**BACKGROUND GEOLOGY**

The Nellikudur Block forms a part of Eastern Dharwar Craton and is predominantly occupied by granite-granodiorite-monzogranite suite of rocks grouped under Peninsular Gneissic Complex-II . The geological setup of the area comprises migmatitic gneiss, grey biotite granite, pink porphyritic biotite granite, alkali feldspar granite and leuco granite intruded by gabbros, dolerites, pegmatites and quartz veins/reefs. These granites are considered to be the younger phase of granitisation, correlated with Closepet granite event(2500Ma) which is of Archaean to Paleo-proterozoic age.

**REGIONAL GEOLOGY AND GEOLOGY OF THE BLOCK**

The area in and around Nellikudur Block constitutes a part of Eastern Dharwar Craton and is occupied by a variety of granites of PGC-II ranging in composition from Granite- Granodiorite -Alkali felspar granite. The regional geological setup includes the migmatitic gneisses within the variants of granites. The granitic variants comprise of grey biotite granite, pink porphyroblastic granite, alkali feldspar granite and leuco granite intruded by gabbros/dolerites, pegmatites and quartz veins/reefs.

**STRATIGRAPHIC SEQUENCE OF THE BLOCK AREA**

| AGE | LITHOLOGY |
|---|---|
| Paleoproterozoic | Pegmatites, Quartz Veins.<br>Dolerite dykes |
| Archaean to Paleoproterozoic | leuco granite<br>Alkali felspar granite<br>Pink porphyritic granite<br>Grey biotite granite<br>migmatite gneiss |

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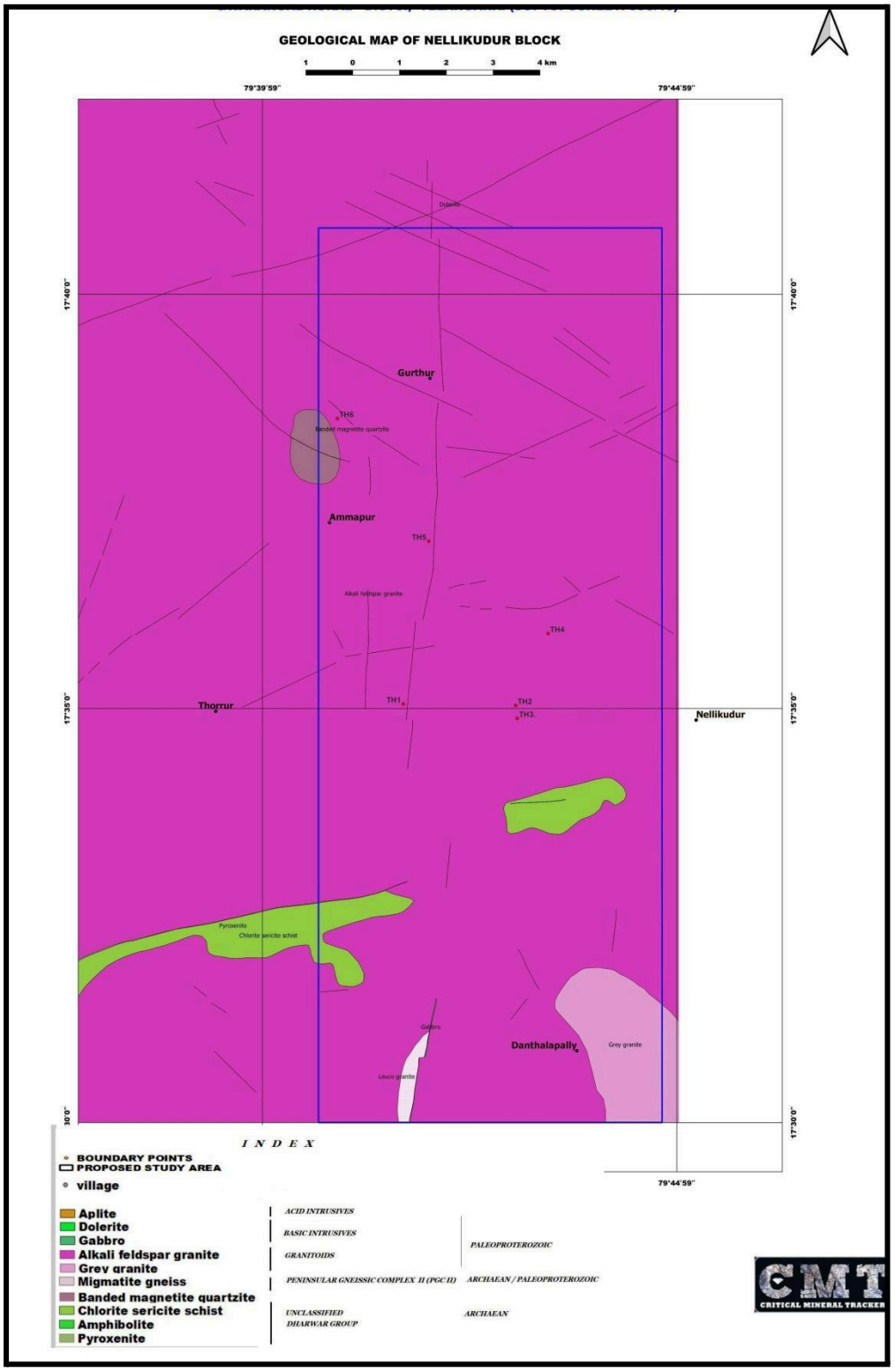


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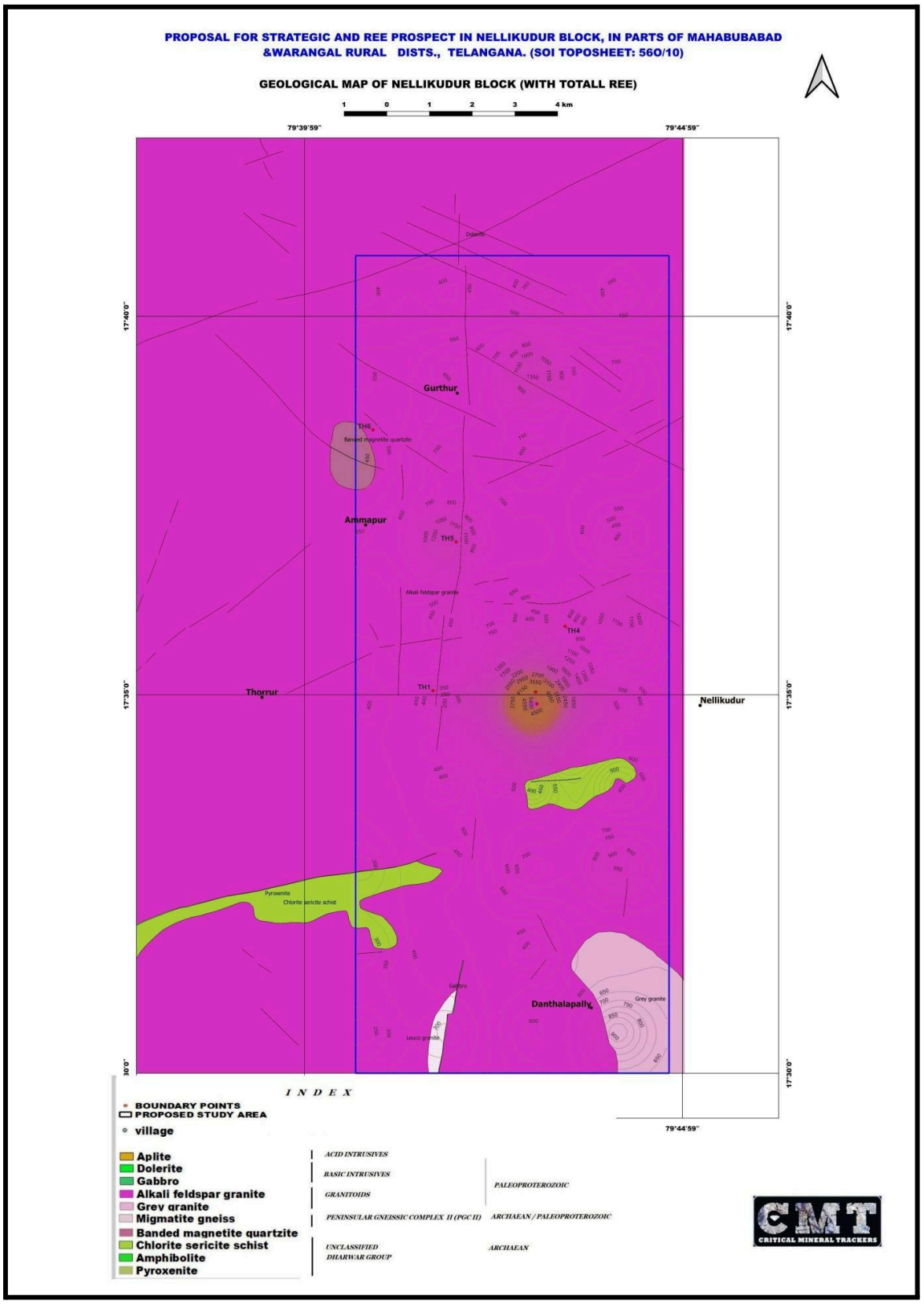


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**Mineral potentiality of the block:**

**Supporting Evidence for selecting the Nellikudur block for exploration of REE minerals.**

1. During the 1:50K mapping by GSi in the FS -1988-89 reported significant values of Cerium ( >1000 ppm) and Lanthanum (300 ppm-500 ppm) prompted us to download the NGCM data to check for the values and as expected the values were significant.
2. The higher values of Cerium are mainly due to the presence of Cerium epidote Allanite which is invariably present in these younger granites.
3. The area being predominantly occupied by a variety of granites of Archaean to Paleoproterozoic age which have potential for the occurrence of REE Minerals/Elements.
4. The NGCM data reflected high values for Total REE (6052 ppm), Ce(2827ppm) & La(1215 ppm) in the proposed block .

Therefore, Nellikudur block area is selected to assess the potential of REE minerals/elements.

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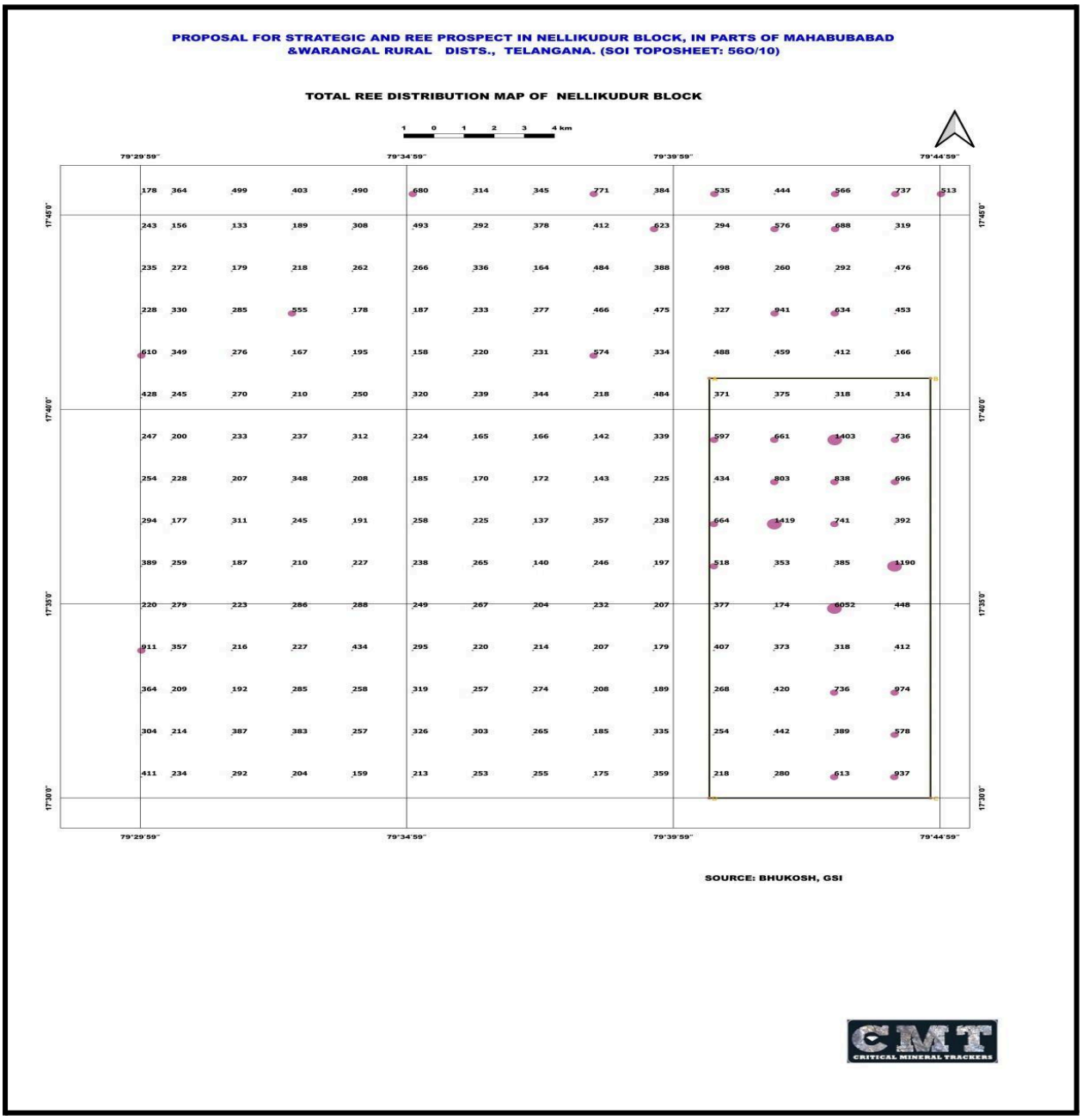
## Plates

The following plates indicate REE concentrations in stream sediments.

- Anomaly map of Total REE concentration showing a maximum value of 6052 ppm.

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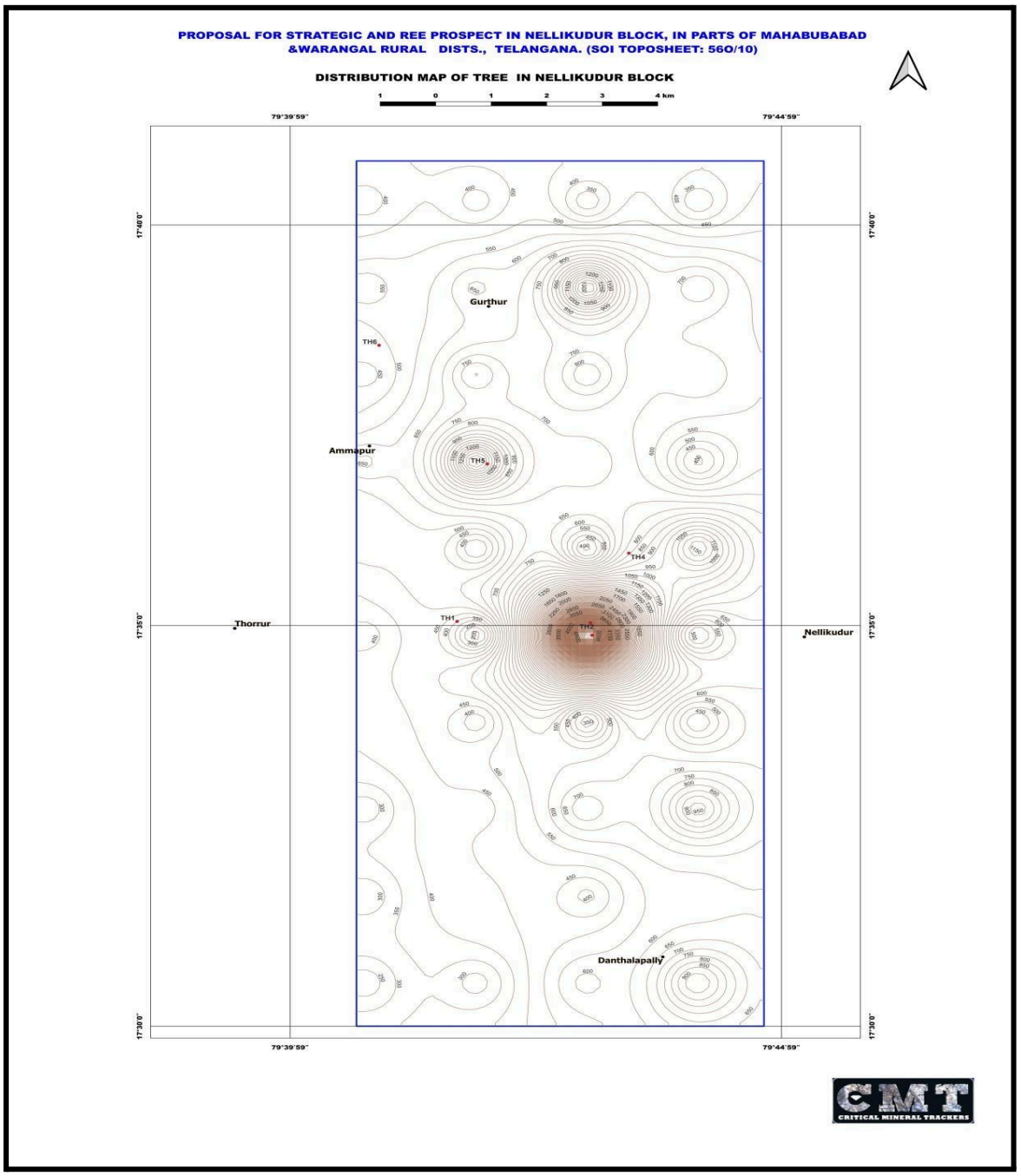


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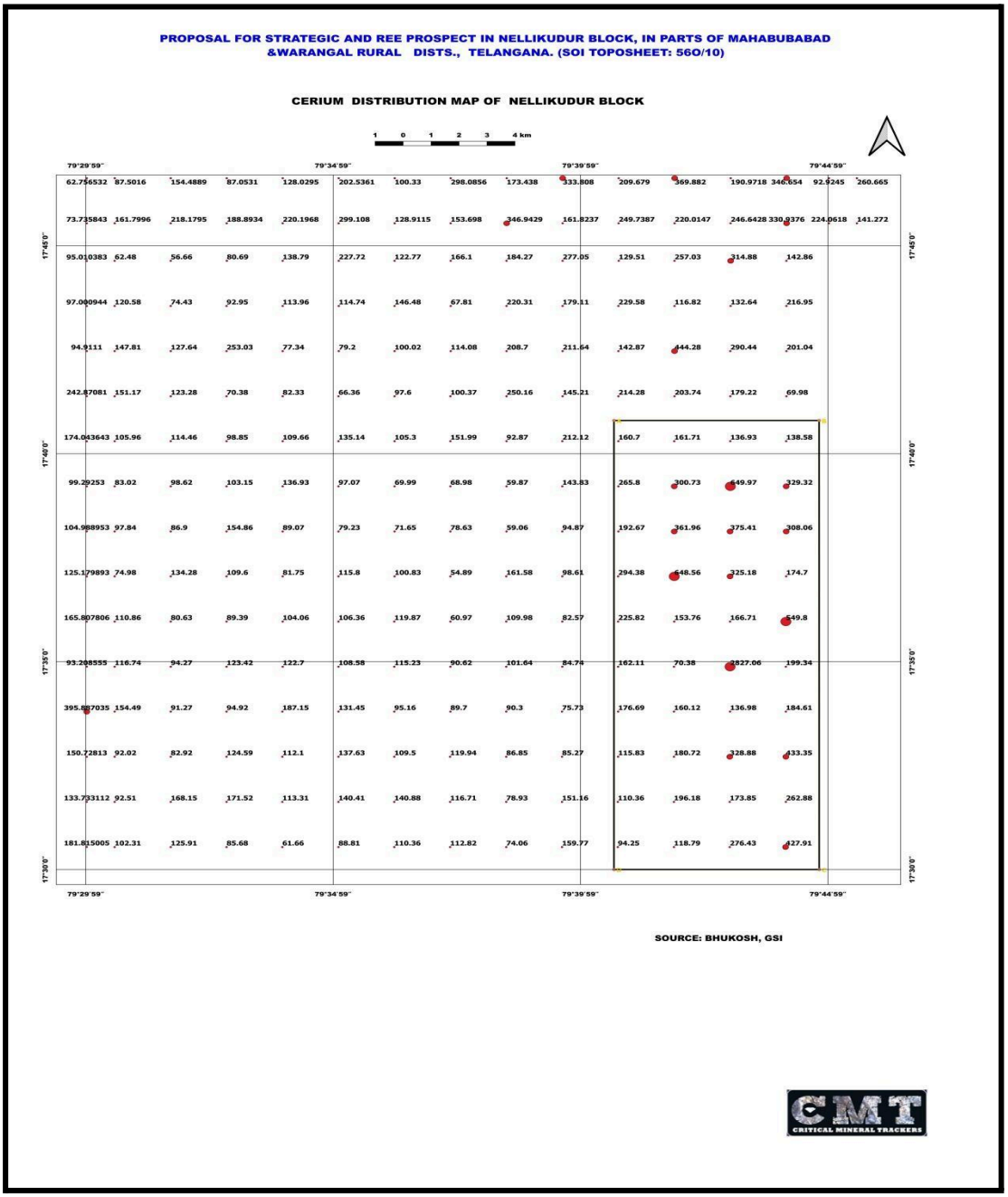
- Anomaly map of Cerium (Ce) concentration showing a maximum value of 2827ppm.

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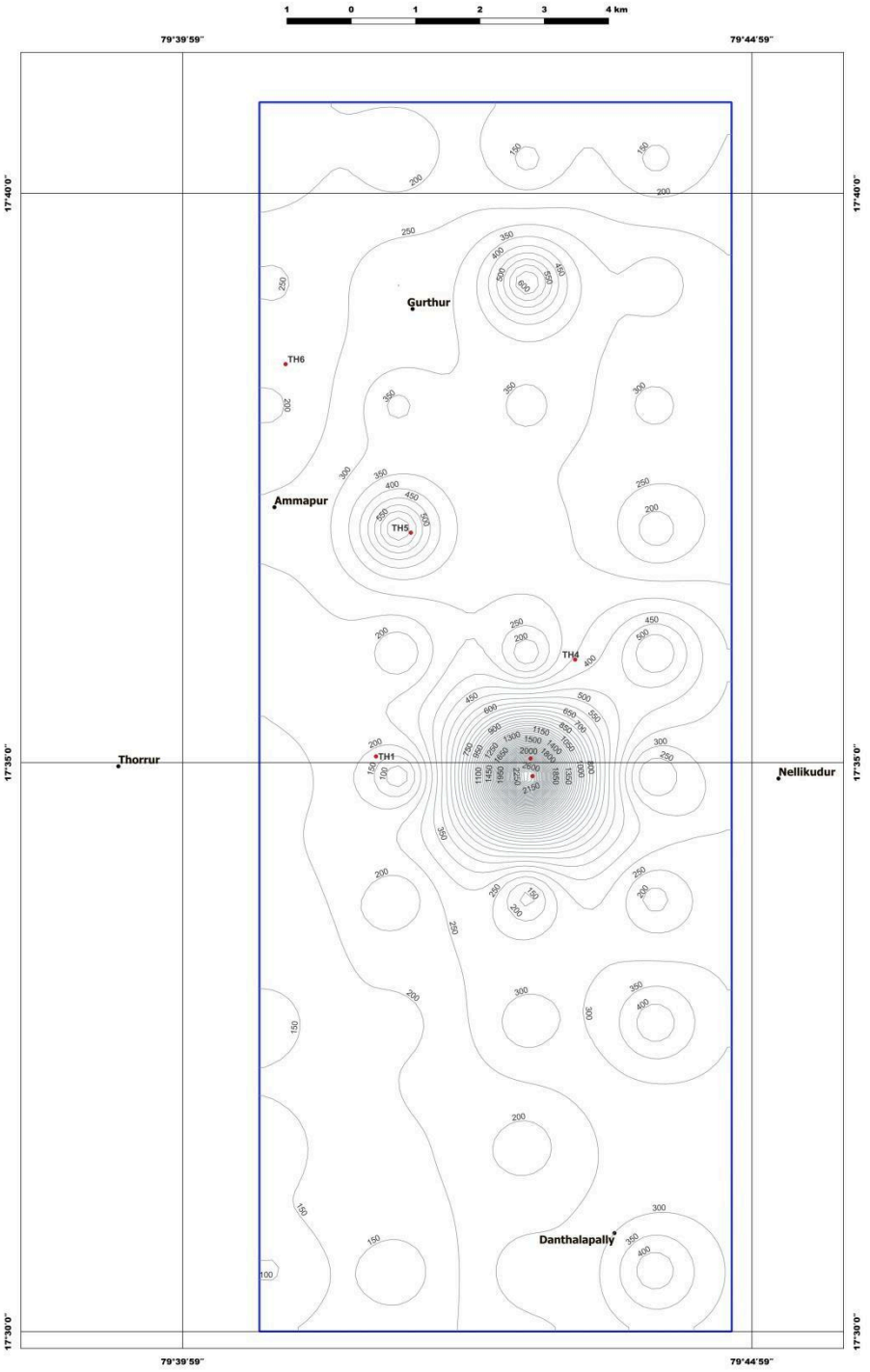
**PROPOSAL FOR STRATEGIC AND REE PROSPECT IN NELLIKUDUR BLOCK, IN PARTS OF MAHABUBABAD &WARANGAL RURAL DISTS., TELANGANA. (SOI TOPOSHEET: 560/10)**

**DISTRIBUTION MAP OF CERIUM IN NELLIKUDUR BLOCK**

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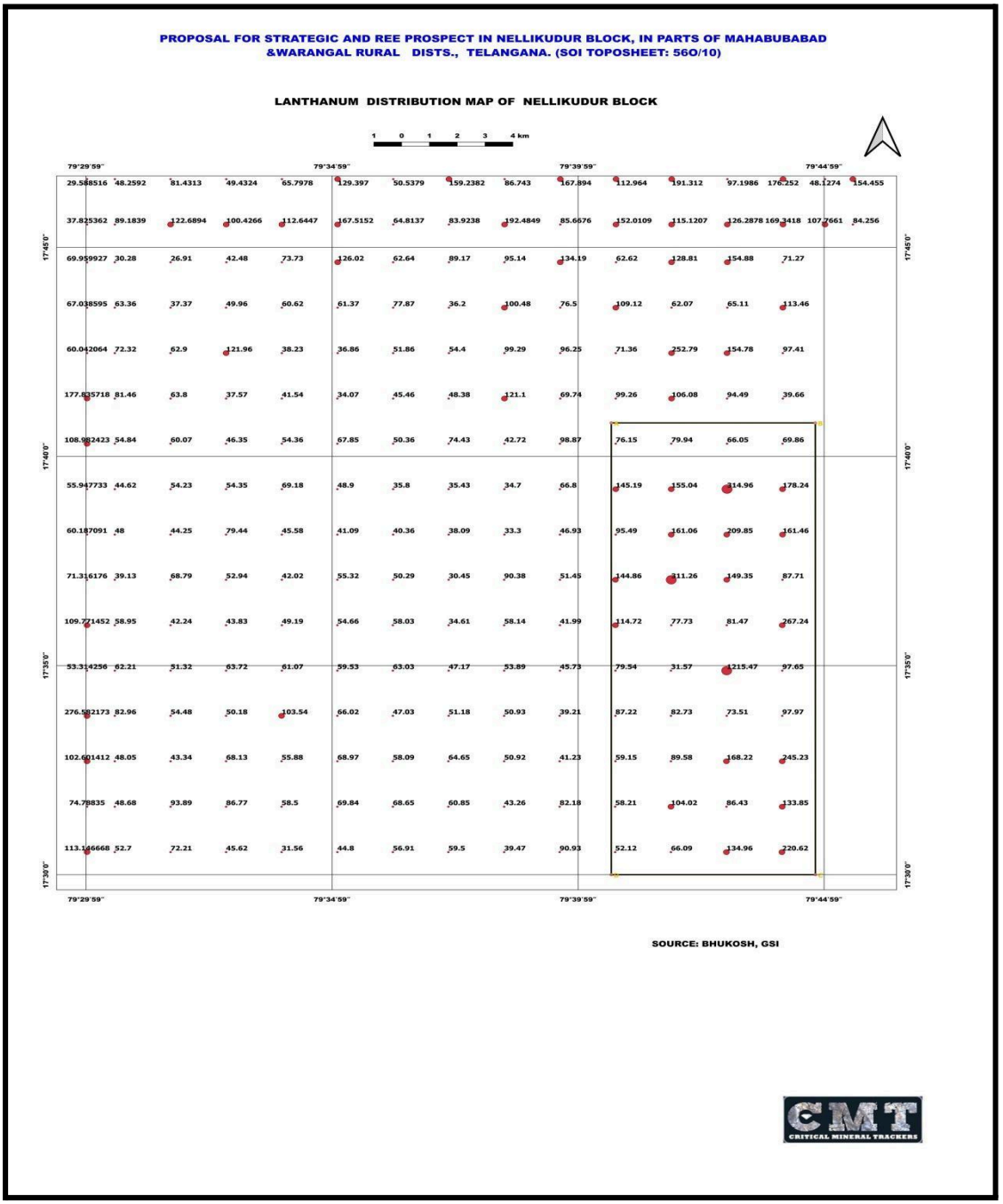
- Anomaly Map of Lanthanum (La) Concentration showing a maximum value of 1215 ppm.

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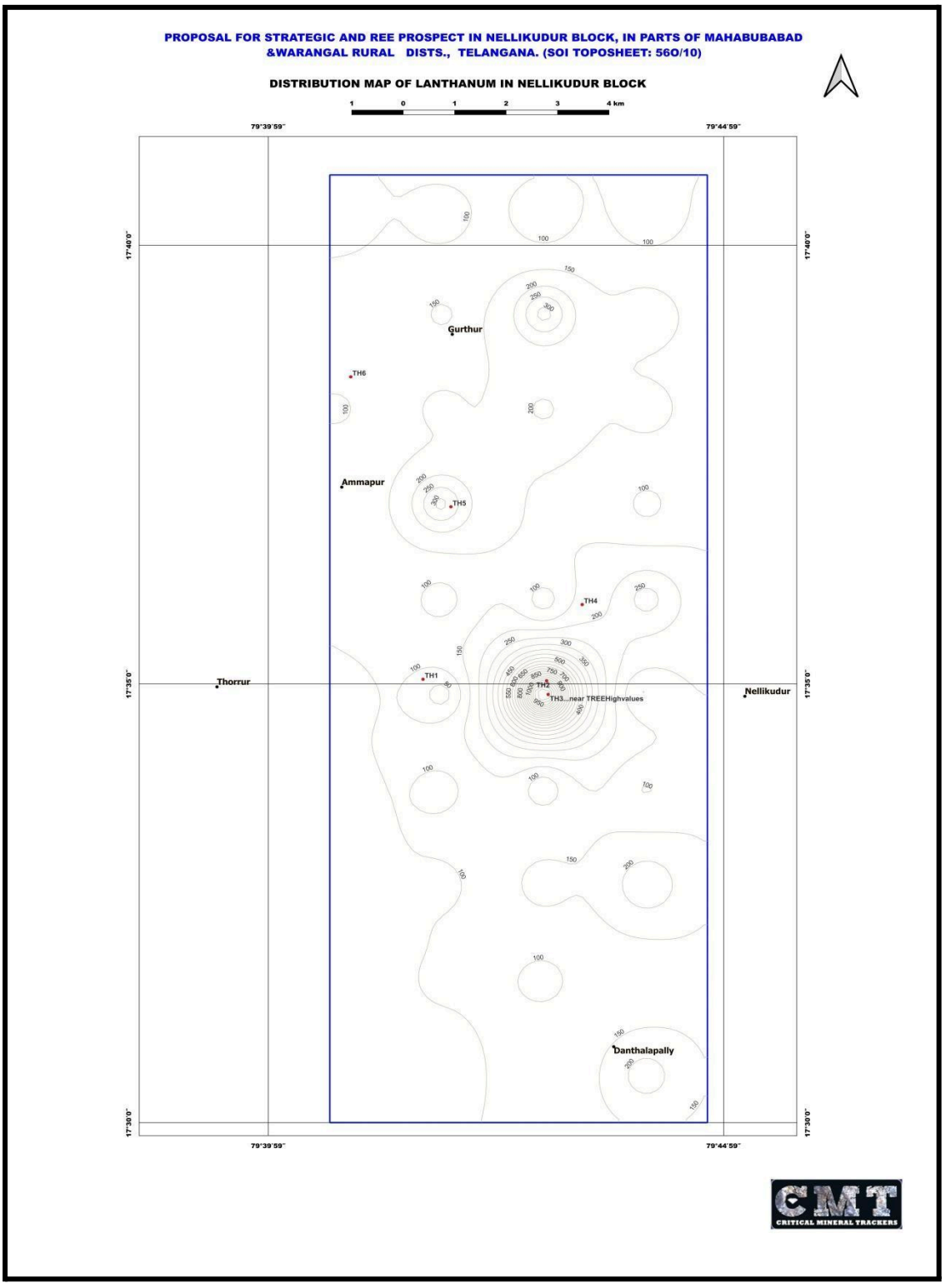


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II. **Previous work**

During the 1:50K mapping by GSi in the FS -1988-89, Mahender Reddy & Rehmtulah Khan have reported significant values of Cerium ( >1000 ppm) and Lanthanum (300 ppm-500 ppm) prompted us to download the NGCM data to check for the values and as expected the values were significant.

The higher values of Cerium are mainly due to the presence of Cerium epidote Allanite which is invariably present in these younger granites.

The area being predominantly occupied by a variety of granites of Archaean to Paleoproterozoic age which have potential for the occurrence of REE Minerals/Elements.

The NGCM data reflected high values for Total REE (6052 ppm), Ce(2827ppm) & La(1215 ppm) in the proposed block

No other exploration work has been done in the proposed block

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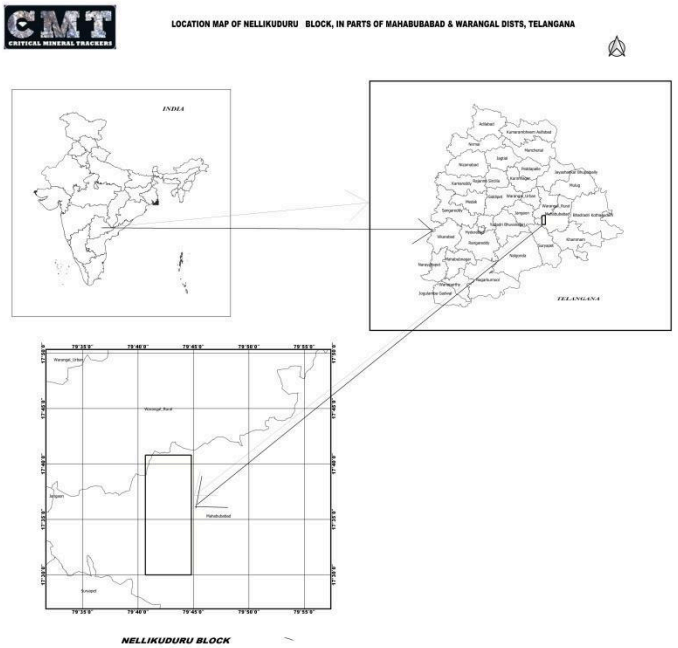
**III Block Description with boundary coordinates**

| | |
|---|---|
| Latitude(Northern) | 17.5° to 17.68° |
| Longitude(Eastern) | 79.678° to 79.747° |
| localities | Nellikuduru,Thorrur,Nekkonda |
| Tehsil/Taluq/mandal | Thorrur,Nellikudur,Dhanthalapally,Raiparthy |
| Districts | Mahabubabad and Warangall rural |
| State | TELANGANA |




| ID | POINT | Coordinates in Decimal degree | |
|---|---|---|---|
| | | Latitude(N) | Longitude(E) |
| 1 | A | 17.68 | 79.678 |
| 2 | B | 17.68 | 79.747 |
| 3 | C | 17.50 | 79.747 |
| 4 | D | 17.50 | 79.678 |

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## IV. Methodology of Investigation

1. Collection of the previous data pertaining to Geological, Geochemical and Geophysical etc..
2. Reconnoitory traverses – to understand major lithologies exposed in the block area.
3. Systematic Geological Mapping of the block area on 1:125000
   - Systematic sampling of bedrock samples
   - Pitting and Trenching would be carried out in a grid pattern in the block area to identify the mineralised zones of REE.
   - Sample Collection in pits will be collected at an interval of 1000m
   - Samples within the trenches will be at one metre interval.
   - The samples generated in field are sent to chemical, petrological & Ore microscopy studies.
   - After Identification of the Mineralised zone test boreholes( 4 nos) shall be planned to assess the subsurface persistence of the mineralisation.
   - Analysis of the samples in NABL accredited laboratories for REE minerals/elements.
   - Preparation of elemental contour diagram and variation diagrams.
   - Resource Estimation

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## V. Nature, Quantum, Target:

G-4 Reconnaissance Survey

Area- 154.17 Sq km (Geological mapping on 1:25,000 scale)

Four coring boreholes up to 40 m depth (One borehole for every 38 Sq Km)

Core Samples will be collected at 5m interval, Hence 4*8=32 samples

Pitting samples—70 Nos (each one size 1*1*1m)= 70 samples

Trenching samples: 20 nos(each one size 10*1*1m)=20*10=200 samples

## VI . Manpower Deployment:

1. Two senior Geologists
2. Two junior geologists
3. Two labour for each team(4 labour)
4. One sampler +2 labour for sample collection & preparation.
5. One Geophysicist.

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## VII. SUMMARY OF EXPENDITURE

| COST ESTIMATE FOR RECONNAISSANCE SURVEY (G4) OF NELLIKUDUR BLOCK IN PARTS OF MAHABUBABAD AND WARANGAL RURAL DISTRICTS OF TELANGANA | | |
|---|---|---|
| **S.NO.** | **ITEM** | **COST ESTIMATE (in Rupees)** |
| A. | Geological Work | **36,05,960** |
| B. | Survey Work | **1,53,600** |
| C. | Core Drilling( 4 Bore Holes ) 40m Depth Each | **23,02,400** |
| D. | Laboratory Studies & Petrological Studies | **1,700,910** |
| E. | Preparation of Project Proposal | **2,45,135** |
| F. | Preparation of Final Geological Report<br>5 Additional Copies | **6,12,839**<br>**5,000** |
| | **Total(without GST)** | **7,789,870** |

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## VIII. BREAK-UP OF EXPENDITURE

| Title of Project – PROPOSAL FOR REE AND STRATEGIC PROSPECTS IN "NELLIKUDUR BLOCK" IN PARTS OF MAHABUBABAD AND WARANGAL RURAL DISTRICTS IN TELANGANA. (G4 STUDY)<br>Name of the Exploration Agency – Critical Mineral Trackers, Hyderabad<br>**Total Area -154.17sq.km ; No of Boreholes- 4 ; Completion Time -6 months** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Item of Work** | **Unit** | **Rates as per NMET SOC** | | **Estimated Cost of the Proposal** | | **Remarks** |
| | | | **SOC-Item -Sl No.** | **Rates as per SOC** | **Quantum** | **Total Amount(Rs)** | |
| **A** | **Geological Work** | | | | | | |
| 1 | Geological Mapping(1:25,000) & sampling – Geologist field-days | 154.17 sq.km | 1.2 | 11000 | 150 | 1,650,000 | man days |
| 2 | Geologists(HQ)days, pre & post field interpretation 15 +30 days | One Geologist Per Day | 1.2 | 9000 | 45 | 405,000 | man days |
| 3 | Pitting-140 Nos each one size 1*1*1m(1 Cu.m each) | Per Cu.m | 2.1.2 | 3800 | 140 | 532,000 | cu.m |
| 4 | Trenching-20 nos, each one size 10*1*1(10 cu.m each) | Per Cu.m | 2.1.1 | 3300 | 200 | 660,000 | cu.m |
| 5 | sampler | 60 days | 1.5.2 | 5100 | 60 | 306,000 | man days |
| 6 | Labour(2 labour) attached to sampler | 2 labours | 1.5.2 | 443 | 120 | 53,160 | labour days |
| 7 | Labour (150 Field days) per team:2 workers : 150*4 for two geologist teams | Per Team of 2 Geologists (2*2=4) Labour/Field workers | 5.7 | 443 | 600 | 265,800 | labour days |
| | **Sub-Total -A** | | | | | **3,632,960** | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **B** | **Survey Work:** | | | | | | |
| 1 | Surveyor: Fixation & connection of boundary points(4 nos),4 Bh by Total station/DGPS | One surveyor | 1.6.2 | 19,200 | 8 | 153,600 | Total 8 points |
| | **Sub-total-B** | | | | | **153,600** | |
| **C** | **Core Drilling** | | | | | | |
| 1 | core drilling :4 points( each 40m deep) 4*40 | Per meter | 2.2.1.4 | 11,500 | 160 | 1,840,000 | 160m,Hard rock |
| 2 | Construction of BH pillar(12”*12”*30”) | Per pillar | 2.2.2a | 2000 | 4 | 8,000 | 4 pillars |
| 3 | **Mob & demob drilling machine & iner BH shifting | Per shifting | lumpsum | | 6 shiftings | 120,000 | |
| 4 | Compensation for 4 Bhs | | 5.6 | 20,000 | 4 | 80,000 | 4 BHs |
| 5 | Drill core preservation in GI boxes | Per meter | 5.3 | 1590 | 160 | 254,400 | 160m core |
| | **Subtotal-C** | | | | | **2,302,400** | |
| **D** | **Laboratory Studies** | | | | | | |
| 1 | Trench Samples (20*5=100 nos):ICP-MS | Per Sample (17 elements) | 4.1.13 | 5380 | 100 | 538,000 | 100 samples |
| 2 | Pitting Sample: (140*1=140 nos)-ICP-MS | Per Sample(17 elements) | 4.1.13 | 5380 | 140 | 753,200 | 140 samples |
| 3 | Core drilling Samples-4*8=32<br>Total depth 40m each, samples will be collected at every 5m interval.<br>ICP-MS | Per sample(14 Elements | 4.1.13 | 5380 | 32 | 172,160 | 32 samples |
| 4 | Preparation of standard thin section | Per sample | 4.3.1 | 2353 | 30 | 70,590 | 30 sections |
| 5 | Complete petrographic/oremicroscopic/mineragraphic studies | Per sample | 4.3.4 | 4232 | 30 | 126,960 | 30 sections |
| 6 | XRD analysis for identification of minerals(random) | Per sample | 4.5.1 | 4000 | 10 | 40,000 | 10 samples |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Subtotal-D** | | | | | **1,700,910** | |
| | TOTAL (A+B+C+D) | | | | | | |
| **F** | **Preparation of Exploration Proposal**<br><br>(5 Hard copies with a soft copy) | | 5.1 | 2% of the project cost subject to a maximum of 5 lakhs | 1 | 245,135 | 2% of the Project cost. |
| **G** | **Geological Report**<br><br>(5 Hard copies with a soft copy) | | 5.2 | 5% of the Project cost | | 612,839 | 5% of the Project Cost. |
| | Additional Copy | | | 1000 | 5 | 5000 | |
| | **Project Cost without GST** | | | | | **7789870** | |
| | 18% GST | | | | | **1402177** | |
| | **Total Project Cost** | | | | | **9,192,046** | |

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**IX. TIMELINE: SIX MONTHS( 180 days)**

| Sno | Activity | Unit | Months | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 1 | Geologist Party Days HQ | Days | | | | | | | 45 Days |
| 2 | Geologist Party Days Field | Days | | | | | | | 150 Days |
| 3 | Sampling (Pitting & Trenching) | Days | | | | | | | 60ays |
| 4 | Laboratory Studies | Days | | | | | | | 120 Days |
| 5 | Core Drilling | Days | | | | | | | 50 Days |
| 6 | Survey Party Days | Days | | | | | | | 15 Days |
| 7 | Geo Physical Survey | Days | | | | | | | 30 Days |
| 8 | Post Field Interpretation | Days | | | | | | | 20 Days |
| 9 | Report Compilation & Submission | Days | | | | | | | 15 Days |

XI. **REFERENCES**


- Unpublished report of GSI titled " A Report on the geology of the area around Narsampet & Warangal, Warangal district, AP by K. Mahender Reddy & Rehmatullah Khan; FS 1988-89
- Geology and mineral resources of Telangana, GSI Misc Pub. 30 (1st edition), 2015


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69.3.4 : **Reference of 69th TCC recommendations :**

***The committee suggested Critical Mineral Trackers to conduct a field visit to collect bedrock samples for analysis and present the findings and the revised proposal at the next TCC meeting.***

**Follow up action :**As a follow up action to the recommendations of the 69th TCC ,NMET , CMT has made a field trip and collected bed rock samples from five locations of the block area. The five samples have been analysed in the NABL accredited labs and the results of the REE have been tabulated in table below for ready reference and lab reports are in the annexures. The total REE of the samples analysed is upto 1241.4 ppm

***70.4.16 :*** **Reference of 70th TCC recommendations :**

***The committee recommended the item to be approved for presentation at the forthcoming TCC meeting with a modified title focusing solely on REE exploration***

**Follow up action :** As per the recommendations of the TCC, the title of the project is modified also the corresponding maps

**71st Recommendations during the presentations on 25th and 26th Nov 2024-12-10**

The committee recommended to submit the DPR and the Budget

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**Table showing the analytical results of bed rack samples**

| | | Lucid Reports (Phase -2) | | | Lucid Reports (Phase -1) | Shiva Labs | Lucid Reports (Phase -1) |
|---|---|---|---|---|---|---|---|
| S.No | Elements | TNW-6 | TNW-4 | TNW-5 | TH-4 | TH-2 | TH-2 |
| 1 | Europium as Eu | 5.7 | 0.5 | 1.2 | 1.4 | 1.1 | 0.5 |
| 2 | Gadolinium as Gd | 43 | 30.7 | 9 | 14.6 | 15.4 | 13.3 |
| 3 | Terbium as Tb | 4.1 | 0.5 | 0.5 | 0.5 | 1.1 | 0.5 |
| 4 | Dysprosium as Dy | 18.6 | 4 | 1 | 3.7 | 3.1 | 2.2 |
| 5 | Erbium as Er | 7.8 | 4.3 | 5.4 | 4.7 | 1.5 | 4.1 |
| 6 | Thulium as Tm | 0.5 | 0.5 | 0.5 | 0.5 | <0.5 | 0.5 |
| 7 | Ytterbium as Yb | 21.1 | 42.3 | 17.7 | 1.7 | 1.1 | 1.6 |
| 8 | Holmium as Ho | 2.5 | 0.5 | 0.5 | 0.5 | <0.5 | 0.5 |
| 9 | Lutetium as Lu | 1.2 | 1.6 | 0.5 | 1 | <0.5 | 0.5 |
| 10 | Yttrium as Y | 74.6 | 3.5 | 0.5 | 16.2 | 10 | 7.7 |
| 11 | Neodymium as Nd | 252 | 91.3 | 24 | 139.7 | 111.4 | 168.3 |
| 12 | Scandium as Sc | 7.4 | 7.8 | 9.5 | 4.3 | 1.1 | 1.2 |
| 13 | Cerium as Ce | 480.7 | 268 | 87.5 | 118.5 | 357.8 | 198.2 |
| 14 | Lanthanum as La | 180.4 | 126.1 | 55.9 | 70.2 | 184.5 | 98.1 |
| 15 | Praseodymium as Pr | 95.5 | 50.4 | 15.8 | 21.3 | 33.7 | 26.4 |
| 16 | Samarium as Sm | 46.3 | 17.3 | 4.2 | 11.3 | 18.1 | 13.1 |
| | Total REE | 1241.4 | 649.3 | 233.7 | 410.1 | 739.9 | 536.7 |

Dr.K.Mahender Reddy

F-01-MSP7.8-TRP

LUCID Laboratories Pvt. Ltd.
Testing to the Core

TC-5918

Plot No. 3, IDA, Balanagar,
Hyderabad - 500 037, Telangana.
Ph: 040-6904 2222/10 Lines
E-mail: info@lucidlabsindia.com
Web: www.lucidlabsindia.com

# TEST REPORT

ULR : TC591824000002620F

Issued to:
**Critical Mineral Trackers**
H No. 7-1-58/CC/406, 'Concourse', Opp. Lal Bungalow
Greenlands, Begumpet
Hyderabad - 500 016
Kind Attn.:Mr. K Nageswara Rao, 78938-47742

Report No. : LL/24-25/006499
Issue Date : 15/10/2024
Customer Ref.: Test Request Form
Ref.Date : 11/03/2024

**Sample Particulars : Alkali Feldspar Granite**

**Sample description :** Alkali Feldspar Granite

**Qty. Received :** ~500gX1 No.
**Sample Code :** TH-4
**Mode of Packing :** Polythene Cover
**Test Parameters :** Zirconium as Zr,Rare Earth Elements

**Date of Receipt of Sample** : 07/10/2024
**Date of Starting of Analysis :** 08/10/2024
**Date of completion of analysis :** 15/10/2024

*SAMPLE TESTED AS RECEIVED*

## TEST RESULTS

| S.No. | Parameters | UOM | Results | Test Method |
|---|---|---|---|---|
| 1 | Zirconium as Zr | ppm | 185.1 | SOP OM-12 |
| 2 | Europium as Eu | ppm | 1.4 | SOP OM-08 |
| 3 | Gadolinium as Gd | ppm | 14.6 | SOP OM-08 |
| 4 | Terbium as Tb | ppm | <1.0 | SOP OM-08 |
| 5 | Dysprosium as Dy | ppm | 3.7 | SOP OM-08 |
| 6 | Erbium as Er | ppm | 4.7 | SOP OM-08 |
| 7 | Thulium as Tm | ppm | <1.0 | SOP OM-08 |
| 8 | Ytterbium as Yb | ppm | 1.7 | SOP OM-08 |
| 9 | Holmium as Ho | ppm | <1.0 | SOP OM-08 |
| 10 | Lutetium as Lu | ppm | 1.0 | SOP OM-08 |
| 11 | Yttrium as Y | ppm | 16.2 | SOP OM-08 |
| 12 | Neodymium as Nd | ppm | 139.7 | SOP OM-08 |
| 13 | Scandium as Sc | ppm | 4.3 | SOP OM-08 |
| 14 | Cerium as Ce | ppm | 118.5 | SOP OM-08 |
| 15 | Lanthanum as La | ppm | 70.2 | SOP OM-08 |
| 16 | Praseodymium as Pr | ppm | 21.3 | SOP OM-08 |
| 17 | Samarium as Sm | ppm | 11.3 | SOP OM-08 |

Reviewed by

A.L.Kanta Rao
Authorized Signatory

Page No. 1/2

**Note:** This report is subject to the terms and conditions mentioned overleaf 112905

Dr.K.Mahender Reddy

F-01-MSP7.8-TRP

LUCID
Testing to the Core

TC-5918

Plot No. 3, IDA, Balanagar,
Hyderabad - 500 037, Telangana.
Ph: 040-6904 2222/10 Lines
E-mail: info@lucidlabsindia.com
Web: www.lucidlabsindia.com

# TEST REPORT

ULR : TC591824000002618F

Issued to:
**Critical Mineral Trackers**
H No. 7-1-58/DC/406, 'Concourse', Opp. Lal Bungalow
Greenlands, Begumpet
Hyderabad - 500 016
Kind Attn: Mr. K Nageswara Rao, 78938-47742

Report No. : LL/24-25/006497
Issue Date : 15/10/2024
Customer Ref.: Test Request Form
Ref.Date : 11/03/2024

**Sample Particulars : Alkali Feldspar Granite**

**Sample description :** Alkali Feldspar Granite
**Qty. Received :** ~500gX1 No.
**Sample Code :** TH-2
**Mode of Packing :** Polythene Cover
**Test Parameters :** Zirconium as Zr,Rare Earth Elements

**Date of Receipt of Sample** : 07/10/2024
**Date of completion of analysis :** 15/10/2024
**Date of Starting of Analysis :** 08/10/2024
*SAMPLE TESTED AS RECEIVED*

**TEST RESULTS**

| S.No | Parameters | UOM | Results | Test Method |
|---|---|---|---|---|
| 1 | Zirconium as Zr | ppm | 232.3 | SOP OM-12 |
| 2 | Europium as Eu | ppm | <1.0 | SOP OM-08 |
| 3 | Gadolinium as Gd | ppm | 13.3 | SOP OM-08 |
| 4 | Terbium as Tb | ppm | <1.0 | SOP OM-08 |
| 5 | Dysprosium as Dy | ppm | 2.2 | SOP OM-08 |
| 6 | Erbium as Er | ppm | 4.1 | SOP OM-08 |
| 7 | Thulium as Tm | ppm | <1.0 | SOP OM-08 |
| 8 | Ytterbium as Yb | ppm | 1.6 | SOP OM-08 |
| 9 | Holmium as Ho | ppm | <1.0 | SOP OM-08 |
| 10 | Lutetium as Lu | ppm | <1.0 | SOP OM-08 |
| 11 | Yttrium as Y | ppm | 7.7 | SOP OM-08 |
| 12 | Neodymium as Nd | ppm | 168.3 | SOP OM-08 |
| 13 | Scandium as Sc | ppm | 1.2 | SOP OM-08 |
| 14 | Cerium as Ce | ppm | 198.2 | SOP OM-08 |
| 15 | Lanthanum as La | ppm | 98.1 | SOP OM-08 |
| 16 | Praseodymium as Pr | ppm | 26.4 | SOP OM-08 |
| 17 | Samarium as Sm | ppm | 13.1 | SOP OM-08 |

Reviewed by

A. L.Kanta Rao
Authorized Signatory

Page No. 1/2

**Note:** This report is subject to the terms and conditions mentioned overleaf

112901

Dr.K.Mahender Reddy

SHIVA
Part of the Cotecna Group

**SHIVA ANALYTICALS (INDIA) PRIVATE LIMITED**
Plot No. 24D(P) & 34D, KIADB Industrial Area, Hoskote, Bangalore - 562 114. Karnataka, India
Tel : +91-80-2801 5333 Email : info@shivaanalyticals.com Website : www.shivaanalyticals.com
CIN : U24230KA1994PTC125297 | GSTIN : 29AACCS8434K1ZV

**Test Report**

| | |
|---|---|
| **Customer Name** | **Critical Mineral Trackers 406, Concourse Building, Opp Lab Bungalow, Ameeroet, Hyderaban, Pin Code-500016** |
| **Discipline & Group** | Chemical & Ores and Minerals. |
| **Customer Ref.** | Samples received by Courier |
| **Commodity** | Geological Rock Sample |
| **Lab ID** | G9620 |
| **Date of Received** | 17-Oct-24 |
| **Date of Completed** | 22-Oct-24 |
| **Date of Reporting** | 23-Oct-24 |
| **Sample Count** | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Sl. No. | 1 | 2 |
| | | | Customer Code | Rock | Rock |
| | | | Customer Description | TH-2 | TH-3 |
| | | | Lab ID | G9620-1 | G9620-2 |
| Element | Method | Units | LOQ | Test Results | |
| Scandium as Sc | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.1 | <0.5 |
| Yttrium as Y | SOP/OM/052 | ppm (mg/kg) | 0.5 | 10.3 | 4.0 |
| Lanthanum as La | SOP/OM/052 | ppm (mg/kg) | 0.5 | 184.5 | 40.6 |
| Cerium as Ce | SOP/OM/052 | ppm (mg/kg) | 0.5 | 357.8 | 70.8 |
| Praseodymium as Pr | SOP/OM/052 | ppm (mg/kg) | 0.5 | 33.7 | 6.3 |
| Neodymium as Nd | SOP/OM/052 | ppm (mg/kg) | 0.5 | 111.4 | 18.2 |
| Samarium as Sm | SOP/OM/052 | ppm (mg/kg) | 0.5 | 18.1 | 2.5 |
| Europium as Eu | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.1 | 1.3 |
| Gadolinium as Gd | SOP/OM/052 | ppm (mg/kg) | 0.5 | 15.4 | 2.6 |
| Terbium as Tb | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.1 | <0.5 |
| Dysprosium as Dy | SOP/OM/052 | ppm (mg/kg) | 0.5 | 3.1 | 1.0 |
| Holmium as Ho | SOP/OM/052 | ppm (mg/kg) | 0.5 | <0.5 | <0.5 |
| Erbium as Er | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.5 | <0.5 |
| Thulium as Tm | SOP/OM/052 | ppm (mg/kg) | 0.5 | <0.5 | <0.5 |
| Ytterbium as Yb | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.1 | <0.5 |
| Lutetium as Lu | SOP/OM/052 | ppm (mg/kg) | 0.5 | <0.5 | <0.5 |
| Thorium as Th | SOP/OM/052 | ppm (mg/kg) | 0.5 | 128.8 | 12.0 |
| Uranium as U | SOP/OM/052 | ppm (mg/kg) | 0.5 | 1.2 | 0.6 |
| Zirconium as Zr | SOP/OM/049 | ppm (mg/kg) | 5 | 61.02 | 42.58 |

**Abbreviations**
SOP/OM/052-- 4 Acid digestion follwed by ICPMS Finish
SOP/OM/049-- Borate Fusion follwed by ICPOES Finish
LOQ-- Limit of Quantification

**Accuracy and precision matrix, method and instrument dependent.**

SHIVA ANALYTICALS (INDIA) PRIVATE LIMITED Authorized Signatory (Emp. ID. 653)

**Mr. Satyanarayana - Manager - Ores & Minerals**
**AUTHORISED SIGNATORY.**

**** END OF THE REPORT ****

1. The results listed above pertain only to the tested samples and applicable parameters.2. Samples which are degradable will be disposed immediately after testing and others will be disposed after one month from the date of issue of test certificate unless otherwise specified. 3. Total liability of our laboratory is limited to the invoiced amount. 4.This report is not to be reproduced either wholly or in part and cannot be used as an evidence in the Court of Law and should not be used inany advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required,please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

Prepared by:
Verified by:

Page No.1 of 1

Dr.K.Mahender Reddy

TC-5918

**ULR : TC591824000002661F**

Issued to:
**Critical Mineral Trackers**
H No. 7-1-58/CC/406, 'Concourse', Opp. Lal Bungalow
Greenlands, Begumpet
Hyderabad - 500 016
Kind Attn.:Mr. K Nageswara Rao, 78938-47742

Report No. : LL/24-25/007411
Issue Date : 11/11/2024
Customer Ref.: Test Request Form

Ref.Date : 05/11/2024

**Sample Particulars : Granite**

**Sample description :** Granite,Sample ID:TNW-4

**Qty. Received :** ~500gX1 No.

**Mode of Packing :** Polythene Cover
**Test Parameters :** Rare Earth Elements

**Date of Receipt of Sample** : 06/11/2024
**Date of completion of analysis :** 11/11/2024
**Date of Starting of Analysis :** 07/11/2024

*SAMPLE TESTED AS RECEIVED*

**TEST RESULTS**

| S.No. | Parameters | UOM | Results | Test Method |
|---|---|---|---|---|
| 1 | Cerium as Ce | ppm | 268.0 | SOP OM-08 |
| 2 | Dysprosium as Dy | ppm | 4.0 | SOP OM-08 |
| 3 | Erbium as Er | ppm | 4.3 | SOP OM-08 |
| 4 | Europium as Eu | ppm | <1.0 | SOP OM-08 |
| 5 | Gadolinium as Gd | ppm | 30.7 | SOP OM-08 |
| 6 | Holomium as Ho | ppm | <1.0 | SOP OM-08 |
| 7 | Lanthanum as La | ppm | 126.1 | SOP OM-08 |
| 8 | Lutetium as Lu | ppm | 1.6 | SOP OM-08 |
| 9 | Neodymium as Nd | ppm | 91.3 | SOP OM-08 |
| 10 | Praseodymium as Pr | ppm | 50.4 | SOP OM-08 |
| 11 | Samerium as Sm | ppm | 17.3 | SOP OM-08 |
| 12 | Scandium as Sc | ppm | 7.8 | SOP OM-08 |
| 13 | Terbium as Tb | ppm | <1.0 | SOP OM-08 |
| 14 | Thorium as Th | ppm | 43.4 | SOP OM-08 |
| 15 | Thulium as Tm | ppm | <1.0 | SOP OM-08 |
| 16 | Uranium as U | ppm | 72.6 | SOP OM-08 |
| 17 | Yttrium as Y | ppm | 3.5 | SOP OM-08 |

**A.L.Kanta Rao**
**Authorized Signatory**

**Reviewed by**

Page No. 1/2

Dr.K.Mahender Reddy

TC-5918

ULR : TC591824000002663F

Issued to:
**Critical Mineral Trackers**
H No. 7-1-58/CC/406, 'Concourse', Opp. Lal Bungalow
Greenlands, Begumpet
Hyderabad - 500 016
Kind Attn.:Mr. K Nageswara Rao, 78938-47742

Report No. : LL/24-25/007413
Issue Date : 11/11/2024
Customer Ref.: Test Request Form

Ref.Date : 05/11/2024

**Sample Particulars : Granite**

**Sample description :** Granite,Sample ID:TNW-6

**Qty. Received :** ~500gX1 No.

**Mode of Packing :** Polythene Cover
**Test Parameters :** Rare Earth Elements

**Date of Receipt of Sample** : 06/11/2024
**Date of completion of analysis :** 11/11/2024
**Date of Starting of Analysis :** 07/11/2024

*SAMPLE TESTED AS RECEIVED*

**TEST RESULTS**

| S.No. | Parameters | UOM | Results | Test Method |
|---|---|---|---|---|
| 1 | Cerium as Ce | ppm | 480.7 | SOP OM-08 |
| 2 | Dysprosium as Dy | ppm | 18.6 | SOP OM-08 |
| 3 | Erbium as Er | ppm | 7.8 | SOP OM-08 |
| 4 | Europium as Eu | ppm | 5.7 | SOP OM-08 |
| 5 | Gadolinium as Gd | ppm | 43.0 | SOP OM-08 |
| 6 | Holomium as Ho | ppm | 2.5 | SOP OM-08 |
| 7 | Lanthanum as La | ppm | 180.4 | SOP OM-08 |
| 8 | Lutetium as Lu | ppm | 1.2 | SOP OM-08 |
| 9 | Neodymium as Nd | ppm | 252.0 | SOP OM-08 |
| 10 | Praseodymium as Pr | ppm | 95.5 | SOP OM-08 |
| 11 | Samerium as Sm | ppm | 46.3 | SOP OM-08 |
| 12 | Scandium as Sc | ppm | 7.4 | SOP OM-08 |
| 13 | Terbium as Tb | ppm | 4.1 | SOP OM-08 |
| 14 | Thorium as Th | ppm | 8.6 | SOP OM-08 |
| 15 | Thulium as Tm | ppm | <1.0 | SOP OM-08 |
| 16 | Uranium as U | ppm | 23.5 | SOP OM-08 |
| 17 | Yttrium as Y | ppm | 74.6 | SOP OM-08 |

**A.L.Kanta Rao**
**Authorized Signatory**

**Reviewed by**

Page No. 1/2

Dr.K.Mahender Reddy