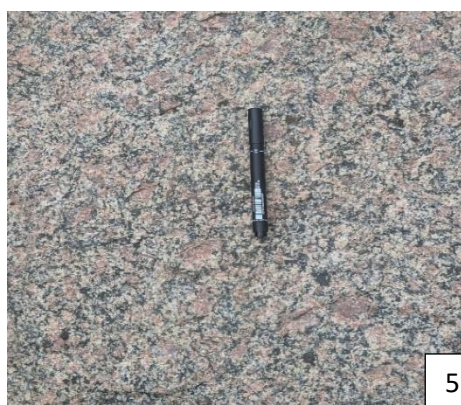
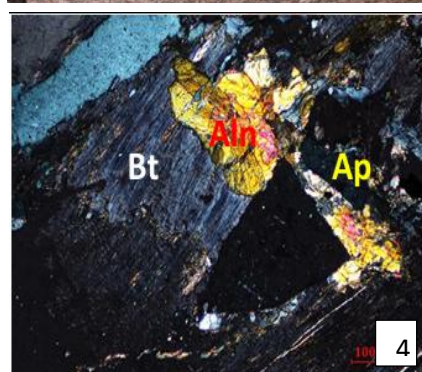
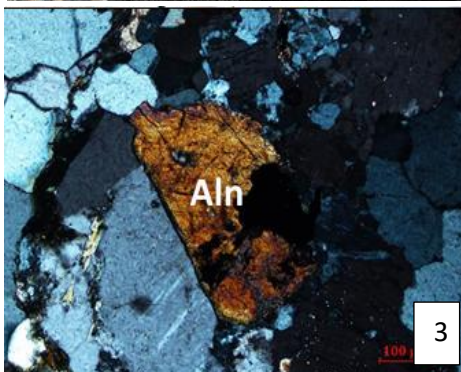


GEOLOGICAL REPORT

ON RECONNAISSANCE SURVEY (G4) FOR REE AND ASSOCIATED MINERALS IN MADDUR

AREA (160 Sq. Km) NARAYANPET DISTRICT, TELANGANA.

(UNDER NMEDT PROGRAMME) TEXT, ANNEXURES AND PLATES



CRITICAL MINERAL TRACKERS

(NOTIFIED PRIVATE EXPLORATION AGENCY)

DATE: JULY – 2026

CERTIFICATION

This is to certify that geological report has been prepared in respect of Reconnaissance Survey (G-4) for REE and Associated minerals in Maddur Block, District Narayanpet, State: Telangana by CRITICAL MINERAL TRACKERS on behalf of National Mineral Exploration and Development Trust (NMEDT). The report has been prepared in accordance with the Minerals (Evidence of Mineral Contents) Rule 2015 specified under Mineral Auction Rule, 2015 and amended up to 2021.



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DESIGNATION: Technical Area Expert

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DISTRICT, TELANGANA**

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TEXT

अध्याय – I

1.0.0 कार्यकारी सारांश

1.1.0 पृष्ठभूमि

लैंथेनाइड तत्वों को दो समूहों में विभाजित किया जाता है। हल्के दुर्लभ मृदा तत्व (Light Rare Earth Elements - LREE) वे तत्व हैं जिनकी परमाणु संख्या 57 से 62 तक होती है, अर्थात् लैंथेनम (La), सेरियम (Ce), प्रसीओडिमियम (Pr), नियोडिमियम (Nd), प्रोमेथियम (Pm) तथा समेरियम (Sm)। भारी दुर्लभ मृदा तत्व (Heavy Rare Earth Elements - HREE) वे तत्व हैं जिनकी परमाणु संख्या 63 से 71 तक होती है, जिनमें यूरोपियम (Eu), गैडोलिनियम (Gd), टर्बियम (Tb), डिस्प्रोसियम (Dy), होल्मियम (Ho), एर्बियम (Er), थुलियम (Tm), यिटरबियम (Yb) तथा ल्यूटेशियम (Lu) शामिल हैं। इसके अतिरिक्त इट्रियम (Y) और स्कैंडियम (Sc) को भी प्रायः इसी समूह में सम्मिलित किया जाता है। दुर्लभ मृदा तत्व (Rare Earth Elements - REE) 17 धात्विक तत्वों का एक समूह है, जो आधुनिक प्रौद्योगिकियों की एक विस्तृत श्रृंखला के लिए अत्यंत महत्वपूर्ण हैं। अपने नाम के विपरीत, ये पृथ्वी की पर्पटी में अपेक्षाकृत प्रचुर मात्रा में पाए जाते हैं; तथापि, इनका आर्थिक रूप से व्यवहार्य तरीके से निष्कर्षण एवं पृथक्करण कठिन तथा महंगा होता है। यही कारण है कि इन्हें दुर्लभमाना जाता है।

17 दुर्लभ मृदा तत्वों के समूह में 15 लैंथेनाइड तत्व शामिल हैं: लैंथेनम (La), सेरियम (Ce), प्रसीओडिमियम (Pr), नियोडिमियम (Nd), प्रोमेथियम (Pm), समेरियम (Sm), यूरोपियम (Eu), गैडोलिनियम (Gd), टर्बियम (Tb), डिस्प्रोसियम (Dy), होल्मियम (Ho), एर्बियम (Er), थुलियम (Tm), यिटरबियम (Yb) तथा ल्यूटेशियम (Lu)। इनके अतिरिक्त स्कैंडियम (Sc) और इट्रियम (Y) भी प्रायः लैंथेनाइड तत्वों के साथ पाए जाते हैं तथा उनके समान गुण प्रदर्शित करते हैं।

दुर्लभ मृदा तत्वों की विशेषता उनका उच्च घनत्व, उच्च गलनांक, उच्च विद्युत चालकता तथा उच्च तापीय चालकता है। इनके विशिष्ट विद्युत, धातुकर्मीय, उत्प्रेरक, नाभिकीय, चुंबकीय एवं प्रकाशीय गुण इन्हें विभिन्न उभरती हुई उच्च-स्तरीय और महत्वपूर्ण तकनीकी अनुप्रयोगों के लिए अनिवार्य बनाते हैं। ये भारत की ऊर्जा सुरक्षा से संबंधित क्षेत्रों, जैसे स्वच्छ ऊर्जा, रक्षा, नागरिक उपयोग, पर्यावरण संरक्षण तथा आर्थिक विकास में महत्वपूर्ण भूमिका निभाते हैं।

दुर्लभ मृदा तत्व प्राकृतिक रूप से अपने शुद्ध रूप में नहीं पाए जाते, बल्कि विभिन्न खनिजों में अंतर्निहित रूप से विद्यमान रहते हैं, जो मुख्यतः सिलिकेट, ऑक्साइड, कार्बोनेट अथवा फॉस्फेट समूहों से संबंधित होते हैं। सामान्यतः हल्के दुर्लभ मृदा तत्व (LREE) पृथ्वी की पर्पटी में अधिक मात्रा में पाए जाते हैं तथा भारी दुर्लभ मृदा तत्वों (HREE) की तुलना में अपेक्षाकृत आसानी से निष्कर्षित किए जा सकते हैं। इन खनिजों की दुर्लभता (जिन्हें पहले “अर्थ्स” कहा जाता था) के कारण ही इन्हें “दुर्लभ मृदा तत्व” नाम दिया गया। इस प्रकार का पहला खोजा गया खनिज गैडोलिनाइट (Gadolinite) था, जो सेरियम, इट्रियम, लौह, सिलिकॉन तथा अन्य तत्वों का एक यौगिक है। यह खनिज स्वीडन के यिटरबी (Ytterby) नामक गाँव की एक खदान से प्राप्त किया गया था। दुर्लभ मृदा तत्वों में से अनेक के नाम इसी स्थान से व्युत्पन्न किए गए हैं।

महत्वपूर्ण खनिज (Critical Minerals) वे खनिज हैं जो आर्थिक विकास तथा राष्ट्रीय सुरक्षा के लिए अत्यावश्यक होते हैं। जब किसी खनिज की आवश्यकता उसकी उपलब्ध संसाधन क्षमता से अधिक हो जाती है, तब वह महत्वपूर्ण खनिज की श्रेणी में आ जाता है। वर्तमान वैश्विक अर्थव्यवस्था लिथियम, ग्रेफाइट, कोबाल्ट, टाइटेनियम तथा दुर्लभ मृदा तत्वों जैसे खनिजों की उपलब्धता एवं उनके निष्कर्षण की प्रौद्योगिकी पर आधारित है। ये खनिज ऑटोमोबाइल उद्योग, पवन टर्बाइन, उत्प्रेरक (Catalysts), फ्लोरोसेंट एवं एलईडी प्रकाश व्यवस्था, काँच उद्योग, सैन्य अनुप्रयोगों, चिकित्सा उपकरणों तथा एयरोस्पेस जैसे क्षेत्रों की प्रगति के लिए अत्यंत महत्वपूर्ण हैं।

देश में संसाधन/भंडार की स्थिति, उत्पादन, आयात पर निर्भरता, भविष्य की प्रौद्योगिकी एवं स्वच्छ ऊर्जा में उपयोग तथा कृषि प्रधान अर्थव्यवस्था में उर्वरक खनिजों की आवश्यकता जैसे महत्वपूर्ण मानकों को ध्यान में रखते हुए समिति ने 30 महत्वपूर्ण खनिजों की पहचान की है। इनमें एंटीमनी बेरिलियम, बिस्मथ, कोबाल्ट, तांबा, गैलियम जर्मेनियम, ग्रेफाइट हैफ़नियम इंडियम लिथियम मोलिब्डेनम नियोबियम निकेल पीजीई (PGE), फॉस्फोरस पोटाश, दुर्लभ मृदा तत्व (REE), रेनियम सिलिकॉन, स्ट्रोंशियम, टैंटलम, टेल्यूरियम टिन टाइटेनियम टंग्स्टन वैनेडियम, जिरकोनियम, सेलेनियम

तथा कैडमियम शामिल हैं। (संदर्भ: क्रिटिकल मिनेरल्स फॉर इंडिया, महत्वपूर्ण खनिजों की पहचान संबंधी समिति की रिपोर्ट, खान मंत्रालय, जून 2023) MMDR अधिनियम में हाल ही में किए गए संशोधन के पश्चात भारत सरकार द्वारा महत्वपूर्ण खनिजों के अन्वेषण को सर्वोच्च प्राथमिकता दी जा रही है। चूँकि दुर्लभ मृदा तत्व (REE) अधिसूचित महत्वपूर्ण खनिजों में सम्मिलित हैं, इसलिए वर्तमान अन्वेषण कार्यक्रम को क्षेत्र में

भारतीय भूवैज्ञानिक सर्वेक्षण (GSI) द्वारा पूर्व में किए गए कार्यों के आधार पर तैयार किया गया। प्रस्ताव प्रस्तुत करने से पूर्व क्षेत्र का भ्रमण किया गया, कुछ ट्रेवर्स लिए गए, आधारशिला (Bedrock) नमूने एकत्रित

किए गए तथा उनका रासायनिक विश्लेषण किया गया। क्षेत्रीय भ्रमण के दौरान उत्तर-पश्चिम से दक्षिण-पूर्व (NW-SE) दिशा में विस्तृत एक प्रमुख भ्रंश/शीयर ज़ोन का अवलोकन किया गया, जो कई किलोमीटर तक फैला हुआ है। इस शीयर ज़ोन के साथ एक कार्टेज रीफ अंतःस्थापित पाई गई, जो ब्लॉक क्षेत्र के उत्तरी भाग से होकर गुजरती है। इस कार्टेज रीफ से एक नमूना भी एकत्रित किया गया तथा उसका स्वर्ण (Gold), आर्सेनिक (Arsenic), एंटीमनी (Antimony), बिस्मथ (Bismuth) एवं रजत (Silver) के लिए विश्लेषण किया गया, जिसमें उत्साहजनक मान प्राप्त हुए। इसी कारण इन तत्वों के लिए कार्टेज रीफ को लक्ष्य क्षेत्र के रूप में चयनित किया गया तथा प्रस्ताव में सम्मिलित किया गया। स्वर्ण एक अत्यंत मूल्यवान धातु है, जिसका उपयोग बुलियन, आभूषण निर्माण, औषधीय प्रयोजनों तथा विभिन्न औद्योगिक उपयोगों में किया जाता है।

देश में संसाधन/भंडार की स्थिति, उत्पादन, आयात पर निर्भरता, भविष्य की प्रौद्योगिकी एवं स्वच्छ ऊर्जा में उपयोग तथा कृषि प्रधान अर्थव्यवस्था में उर्वरक खनिजों की आवश्यकता जैसे महत्वपूर्ण मानकों को ध्यान में रखते हुए समिति ने 30 महत्वपूर्ण खनिजों (Critical Minerals) की पहचान की है। इनमें एंटीमनी (Antimony), बेरिलियम (Beryllium), बिस्मथ (Bismuth), कोबाल्ट (Cobalt), तांबा (Copper), गैलियम (Gallium), जर्मेनियम (Germanium), ग्रेफाइट (Graphite), हैफ्नियम (Hafnium), इंडियम (Indium), लिथियम (Lithium), मोलिब्डेनम (Molybdenum), नियोबियम (Niobium), निकेल (Nickel), पीजीई (PGE), फॉस्फोरस (Phosphorous), पोटैश (Potash), दुर्लभ मृदा तत्व (REE), रेनियम (Rhenium), सिलिकॉन (Silicon), स्ट्रोंशियम (Strontium), टैंटलम (Tantalum), टेल्यूरियम (Tellurium), टिन (Tin), टाइटेनियम (Titanium), टंग्स्टन (Tungsten), वैनैडियम (Vanadium), जिरकोनियम (Zirconium), सेलेनियम (Selenium) तथा कैडमियम (Cadmium) शामिल हैं। (संदर्भ: क्रिटिकल मिनेरल्स फॉर इंडिया, महत्वपूर्ण खनिजों की पहचान संबंधी समिति की रिपोर्ट, खान मंत्रालय, जून 2023) MMDR अधिनियम में हाल ही में किए गए संशोधन के पश्चात भारत सरकार द्वारा महत्वपूर्ण खनिजों के अन्वेषण को सर्वोच्च प्राथमिकता दी जा रही है। चूंकि दुर्लभ मृदा तत्व (REE) अधिसूचित महत्वपूर्ण खनिजों में सम्मिलित हैं, इसलिए वर्तमान अन्वेषण कार्यक्रम को क्षेत्र में भारतीय भूवैज्ञानिक सर्वेक्षण (GSI) द्वारा पूर्व में किए गए कार्यों के आधार पर तैयार किया गया। प्रस्ताव प्रस्तुत करने से पूर्व क्षेत्र का भ्रमण किया गया, कुछ ट्रेवर्स लिए गए, आधारशिला (Bedrock) नमूने एकत्रित किए गए तथा उनका रासायनिक विश्लेषण किया गया।

क्षेत्रीय भ्रमण के दौरान उत्तर-पश्चिम से दक्षिण-पूर्व (NW-SE) दिशा में विस्तृत एक प्रमुख भ्रंश/शीयर ज़ोन का अवलोकन किया गया, जो कई किलोमीटर तक फैला हुआ है। इस शीयर ज़ोन के साथ एक कार्टेज रीफ अंतःस्थापित पाई गई, जो ब्लॉक क्षेत्र के उत्तरी भाग से होकर गुजरती है। इस कार्टेज रीफ से एक नमूना भी एकत्रित किया गया तथा उसका स्वर्ण (Gold), आर्सेनिक (Arsenic), एंटीमनी (Antimony), बिस्मथ (Bismuth) एवं रजत (Silver) के लिए विश्लेषण किया गया, जिसमें उत्साहजनक मान प्राप्त हुए।

इसी कारण इन तत्वों के लिए कार्टेज रीफ को लक्ष्य क्षेत्र के रूप में चयनित किया गया तथा प्रस्ताव में सम्मिलित किया गया। स्वर्ण एक अत्यंत मूल्यवान धातु है, जिसका उपयोग बुलियन, आभूषण निर्माण, औषधीय प्रयोजनों तथा विभिन्न औद्योगिक उपयोगों में किया जाता है। एंटीमनी (Antimony) और बिस्मथ (Bismuth) महत्वपूर्ण खनिजों (Critical Minerals) की सूची में शामिल हैं तथा इनके महत्वपूर्ण औद्योगिक उपयोग भी हैं। आर्सेनिक (Arsenic) और रजत (Silver), जो स्वर्ण (Gold) के साथ संबद्ध तत्व हैं, उन्हें भी प्रस्ताव में सम्मिलित किया गया।

इसके पश्चात इस प्रस्ताव को NMEDT की TCC-I की 78वीं बैठक में मूल्यांकन हेतु प्रस्तुत किया गया। समिति ने प्रस्ताव का मूल्यांकन किया और यह मत व्यक्त किया कि यह क्षेत्र दुर्लभ मृदा तत्वों (REE) तथा उनसे संबंधित खनिजों की संभावित उपस्थिति के लिए अनुकूल है।

अतः प्रस्ताव को EC, NMEDT से अनुमोदन हेतु अनुशंसित किया गया। EC, NMEDT की 43वीं बैठक, जो 14 अगस्त 2025 को आयोजित की गई थी, में इस प्रस्ताव को ₹1,31,12,292/- की अनुमानित लागत के साथ अनुमोदित किया गया। इसकी सूचना पत्र संख्या F. No. 23/648/2025-NMET/350 दिनांक 04 सितम्बर 2025 के माध्यम से प्रदान की गई। तदनुसार, CMT ने 09 अक्टूबर 2025 को क्षेत्रीय कार्य प्रारम्भ किया तथा क्षेत्रीय कार्य के प्रथम चरण को पूर्ण करने हेतु अप्रैल 2026 के अंतिम सप्ताह तक कार्य सम्पन्न किया। इस चरण में भूवैज्ञानिक मानचित्रण, आधारशिला (Bedrock) नमूनों का संग्रह, रेगोलिथ (गड्ढा) नमूनों का संग्रह तथा बेडरॉक ग्रेब नमूनों का विश्लेषण शामिल था।

इन सभी कार्यों के आधार पर भूवैज्ञानिक प्रतिवेदन (Geological Report) तैयार किया गया, जिसे 03 जुलाई 2026 तक NMEDT को प्रस्तुत किया जाना निर्धारित किया गया।

मद्दूर ब्लॉक, जिसका क्षेत्रफल 160 वर्ग किमी है, 16.752° उत्तर से 16.951° उत्तर अक्षांश तथा 77.596° पूर्व से 77.663° पूर्व देशांतर के बीच स्थित है। यह तेलंगाना राज्य के नारायणपेट जिले के मद्दूर मंडल

का एक भाग है। ब्लॉक के भीतर एवं इसके आसपास के प्रमुख स्थानों में मददूर, नंदीपाड, पल्लेरला, लक्कायापल्ली, जादवरावपल्ली, दोरेपल्ली, मोनापुरम, रेनुवटला, अप्पारेडुपल्ली, चेन्नाराम, अभंगापुर, बंडाकोंडा तथा कोटाकोंडा शामिल हैं। यह ब्लॉक क्षेत्र टोपोशीट 56H/09 के मध्य भाग में स्थित है तथा इसकी सीमा निर्देशांक नीचे तालिका 1.1 में दिए गए हैं।

तालिका संख्या 1.1

तेलंगाना के नारायणपेट जिले में स्थित मददूर ब्लॉक के निर्देशांक

बिंदु	अक्षांश	देशांतर	ईस्टिंग (मी.)	नॉर्थिंग (मी.)	क्षेत्रफल
A	16.95	77.596	776478.86	1875850.73	160 वर्ग किमी
B	16.951	77.659	783190.96	1876051.27	
C	16.752	77.663	366976.59	1935306.34	
D	16.752	77.596	359650.24	1935355.85	

महबूबनगर रेलवे स्टेशन ब्लॉक क्षेत्र से लगभग 49 किमी दक्षिण-दक्षिणपूर्व दिशा में स्थित है और यह दक्षिण-मध्य रेलवे नेटवर्क का हिस्सा है। इसके अतिरिक्त नारायणपेट एवं महबूबनगर क्षेत्र सड़क नेटवर्क से भी अच्छी तरह जुड़े हुए हैं। रेल परिवहन के साथ-साथ सड़क परिवहन सुविधाएँ भी पर्याप्त रूप से उपलब्ध हैं।

CHAPTER –I

1.0.0 EXECUTIVE SUMMARY

1.1.0 Background information

The Rare earth elements (REE) are a Group of 17 metallic elements crucial for a vast array of modern technologies. Despite their name, they are relatively abundant in the Earth's crust; however, they are difficult and costly to extract and separate in an economically viable way. This is why they are considered rare. The group of 17 rare earth elements includes the 15 lanthanides: lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu). Besides these Scandium (Sc) and yttrium (Y), are often found alongside lanthanides and share similar properties.

Rare earth elements are characterized by high density, high melting point, high conductivity and high thermal conductance with distinctive electrical, metallurgical, catalytic, nuclear, magnetic and luminescent properties make them indispensable for a variety of emerging high end and critical technology applications which are relevant to India's energy security i.e., clean energy, defense, civilian application, environment and economic areas.

The lanthanide elements are divided into two groups. The light rare earth elements (LREE) are those with atomic numbers 57 through 62 (La, Ce, Pr, Nd, Pm, Sm) and the heavy rare earth elements (HREE) with atomic numbers from 63 to 71 (Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) and Y, Sc. Rare earth elements are not found in their pure form naturally but are embedded within various minerals, primarily belonging to the silicate, oxide, carbonate, or phosphate groups. Generally, the light rare earth elements (LREE) are more abundant in the earth's crust and easily extracted than heavy rare earth elements (HREE). It was the very scarcity of these minerals (previously called "earths") that led to the term "rare earth". The first such mineral discovered was gadolinite, a compound of cerium, yttrium, iron, silicon and other elements. This mineral was extracted from a mine in the village of Ytterby in Sweden; several of the rare earth elements bear names derived from this location.

Critical minerals are those minerals that are essential for economic development and national security. The minerals become critical when the requirement is more

than the availability of their resources. The global economy is presently based on the availability of minerals such as lithium, graphite, cobalt, titanium, and rare earth elements and their extraction technology. These are vital for the advancement of sectors such as in automobiles, wind turbines, catalysts, fluorescent LED lights, glass, military applications, medical equipment and aerospace, etc.

Exploration for critical minerals is being given top priority by the Government of India, after the recent amendment in the MMDR Act. Keeping in view that REE being a listed critical mineral, the present exploration program was planned on the basis of the previous work carried out in the area, and the proposal was put up for evaluation in the 78th meeting of TCC-I, NMEDT. The committee evaluated the proposal and opined that the area has potential for hosting REE and associated minerals. and it was recommended for approval to EC, NMEDT. In the 43rd meeting of EC, NMEDT held on 14th August 2025, approved the proposal with an estimated cost of Rs.1,31,12,292/- and communicated vide letter F. No 23/648/2025-NMET/350 dated 04th September 2025. Accordingly, CMT initiated the field work on 09 October 2025 and completed it in the last week of April 2025 to conclude the first phase of field work, including mapping and collection of bedrock samples, Regolith (Pit) samples and bedrock grab samples analyzed and prepared the Geological Report to submit by 03 July 2026 to NMEDT.

1.2.0 Location and accessibility of the block

The Maddur block, having an area of 160 sq. km, by latitudes 16.752°N to 16.951° N and longitudes 77.596°E to 77.663° E, forms a part of Maddur Mandal, in Narayanpet district of Telangana state. The main localities in and adjoining the block are Maddur, Nandipad, Pallerla, Lakkayapalli, Jadavaraopalli, Dorepalli, Monapuram, Renuvatla, Appareddipally, Chennaram, Abhangapur, Bandakonda, kotakonda, the block area forms the central part of the toposheet 56H/09 and the co-ordinates of the block boundary are given below in Table No 1.1

Table No-1.1

The Co-ordinates of Maddur block in Narayanpet district of Telangana.

Cardinal Points	Geographic Coordinate System in Degree Decimal (WGS 1984)		UTM (WGS 1984, Zone 44N)		Area in Sq. Km
	Latitude	Longitude	Easting (m)	Northing (m)	
A	77.596	16.95	776478.86	1875850.73	160 sq.km
B	77.659	16.951	783190.96	1876051.27	
C	77.663	16.752	366976.59	1935306.34	
D	77.596	16.752	359650.24	1935355.85	

The Mahabubnagar Railway station is 49 kms south- southeast to the block area and all these are part of the South-Central Railway network. Besides this, Narayanpet, Mahabubnagar area are well connected by road network. Apart from railways, road transport services are also good

1.3.0 Geology

Undivided Mahbubnagar District forms a part of the stable Dharwar Craton of South Indian shield. It exposes rocks of Peninsular Gneissic Complex, Dharwar Supergroup, Cuddapah Supergroup, Kurnool and Bhima Groups and also of Deccan Traps. The Peninsular Gneissic Complex, which covers most of the area, comprises granites, gneisses and migmatites with undigested patches of older metamorphic rocks. The Dharwar Supergroup rocks are represented mainly by Gadwal Schist Belt, running in NW-SE direction between Narayanpet and Manyapadu. It exposes basic, intermediate and acid volcanic rocks associated with agglomerate and thin bands of banded iron formation. The rocks of Peninsular Gneissic Complex and Dharwar Supergroup are intruded by younger granitoids of tonalite - trondhjemite granodiorite composition and diabase dykes. These dykes are tholeiitic to sub alkalic in composition and intrude along E-W, NW-SE and NE-SW directions. Radiometric dating by Sm-Nd, Rb-Sr and Pb-Pb methods indicated the age of the dyke systems to be around 2200 Ma. (Pandey eta, 1997) In recent years, a total of 16 kimberlite pipe occurrences have been reported

by GSI from Kotakonda, Maddur and Narayanpet areas of the district. In the southern part of the district, Proterozoic sedimentary rocks, belonging to Cuddapah Supergroup and Kurnool Group having 1100-600 million years age are exposed.

The Cuddapah sediments, deposited non- conformably over peninsular gneisses and Dharwars, comprise conglomerate, quartzite, limestone, dolomite and shale. The Kurnool Group of rocks overlies Cuddapah rock formations and consists mainly of limestone, shale and quartzite.

A thin sequence of Bhima Group of rocks (equivalents of Kurnool Group of rocks), comprising shale and sandstone are exposed in northwestern part of the district in Korangal taluk. Trap rocks of basaltic composition occur over the peninsular gneisses and Bhima Group of rocks in Korangal and Shadnagar taluks of the undivided Mahabubnagar district.

1.4.0 Previous Exploration

Geological mapping on 1:50K scale was carried out in FS 1972-73 by. B.K. Ranganath, in FS 197374 by S. Narsimha and S.K Bhattacharya.

In FS 1984-85 Geological mapping on 1:50 K scale was carried out by S.S. Nayak and Kasi Viswanathan and brought out the various geological units including the Kimberlite bodies. The entire area was rigorously searched for Kimberlites and a total of 37 bodies were identified and demarcated. Several clusters were identified and the belt was named as Narayanpet Kimberlite Belt. Out of these six Kimberlites of Maddur cluster fall in the block area.

No other exploration work has been done in the proposed block.

1.5.0 Present Exploration

Maddur Block of Narayanpet District in Telangana. was proposed for G-4 level of exploration for REE and associated Minerals. The Exploration has been carried out as per Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 to achieve the following objective to carry out Geological mapping on 1:12500 scale for delineation of different variants of granites, identification of mineralized areas of REE and associated minerals and their host rocks and controls mineral concentration. To collect surface bedrock samples for analyses of REE and associated

minerals/elements such as Zr, Hf, Rb, Sr and As, Sb, Bi, Ag, and Au along the major shear zone occupied by the quartz reef in order to decide further course of exploration program. To collect Regolith samples from Pits (1m*1m*1m) cu.m to know the concentration of REE and associated minerals/elements such as Zr, Hf, Rb, Sr in the regolith within the target area.

1.5.1 Exploration Methodology:

The G-4 stage of exploration for REE and associated minerals/elements in Maddur Block is to achieve the objective cited above in accordance with MEMC rule 2015(amended in 2021) as approved by NMEDT is furnished in table no 1.2 and the field component wise description has been given in subsequent paragraphs.

Table No 1.2

**Summarized Table showing Component wise proposed quantum Vs.
Quantum Achieved**

Sl. No.	Item of Work	Unit	Target	Achievement
1	Geological Mapping (on 1:12,500 Scale)	Sq. km	160	160
2	Geochemical Sampling			
	Bedrock Sample	Nos	115	115
3	Exploratory Mining			
	Pitting (1 cu.m each) collection of samples	1*1*1	150	150
4	Laboratory Studies			
	BRS: ICP-MS (including 10% check samples)	Nos	127	127
	Pitting sample: ICP-MS (including 10% check samples)	Nos	165	165
7	Preparation of standard thin section	Nos	30	30
8	Complete Petrographic/Mineragraphic Studies	Nos	30	30
9	EPMA/SEM studies for mineral phase analysis	Nos	10	10
10	Report Preparation (5 Hard copies with a soft copy)	Nos.	1	5

1.5.2 Geological Mapping

Large-scale geological mapping (LSM) was completed over an area of 160sq km in the Survey of India toposheet No 56H/09 on 1:12,500 scale. The toposheet was used to understand the area's topography, roads, and drainage, serving as the base map for the mapping effort. Handheld GPS device (GARMIN - GPS 12H) was used to record precise sample locations and conduct the geological survey with coordinates Degree, minutes, seconds, (WGS 1984 datum). The mapping systematically documented variations in lithologies and structural elements.

1.5.3 Pitting

Pitting in the present exploration work was carried out to collect 150 no's samples from pits of 1 cu.m which were dug by JCB as per the terrain and requirement. Surface Sampling In accordance with the approved NQT, the present G-4 stage exploration was carried out which includes collection of 115 bed rock samples.

1.5.4 Geochemical Analysis

All the 265 Nos of primary samples (115 Nos of Bed rock, 150 Nos of pit sample) subjected to analyses of trace elements REEs (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu) and associated elements/minerals Zr, Hf, Sr, Rb, Th, U by ICPMS instrument and As, Sb, Bi, Ag, Au by Fire Assay method at LUCID Laboratory Hyderabad.

Moreover, the external check samples of 27 Nos have been analysed for same elements from SHIVA Laboratory, Bengaluru. Further, 12Nos of selected granitic samples were subjected to analyses of major oxides, i.e., SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, P₂O₅, V₂O₅, Loss on Ignition (LOI).

The Σ REE+Sc+Y value in pit sample varies from 23.06 ppm to 1606.07 ppm with an average value of 279.24 ppm. The Σ REE+Sc+Y value in bed rock samples analysed up to 1682 ppm with average of 294.94 ppm within the entire block area.

1.5.5 Petrographic & Mineralogical Study

Petrographic and Mineralogical study has been carried out on 30 Nos of samples collected from different variants of granites. Ten (10 no's) Sections were Studied under SEM.

1.5.6 Preparation of Geological Report

Geological Report has been prepared in Head office of Critical Mineral Trackers, Hyderabad. Integration of geological and geochemical data was done using QGIS software for preparation of various maps and GCD kit module of R programming language has been used for generating geochemical plots. The report has been written using Microsoft word and excel.

1.6.0 Conclusions

The study area forms a part of the Eastern Dharwar Craton and predominantly occupied by variants of granites of peninsular Gneissic Complex-II and is an integral part of Narayanpet kimberlite belt in Maddur area Narayanpet district of Telangana.

The area forms a part of the Toposheet 56H/09 between latitude 16.752°N to 16.951° N, longitude 77.596°E to 77.663°E,

The lithological assemblage of the area is predominately composed of grey biotite granite pink alkali feldspar granite, porphyritic granite, leucogranite, of PGC -II which are of Archean to Paleoproterozoic. These are traversed by basic intrusive such as gabbro, dolerite, acid intrusive like pegmatite and quartz, five kimberlite bodies are located in the central part of the block area within the grey biotite granite. In the northern part of the block area there is a major shear trending NW-SE cuts across the block and runs for several kilometers. Within the shear zone a quartz reef is emplaced which is highly sheared in nature.

The pink alkali feldspar granite which has almost negligible mafics is seen bordering this shear zone and forms a positive topographic. The granite of the area retrograde metamorphism in the form of plagioclase altering to epidote and sericite. The overall metamorphic grade varies from lower amphibolite to green schist facies.

The nature of the granitoids highly heterogeneous, has gradational contacts and lacks metamorphic aureole. Stages of Granitization in the form of fragmentation and transformation of pre-existing lithounits into granitoids is evident.

Clouding of Feldspars and pink pigmentation of Feldspars suggest late-stage hydrothermal activity. Presence of myrmekitic borders to plagioclase suggest their metamorphic origin. Occurrence of Epidote indicates low temperature transformation due to hydrothermal activity. High alkali nature of these Granites is a clear indication of K-metasomatism. These Granites are Granodiorite to Quartzolite in chemical composition.

And interpreted to have formed as a result of a series of processes like assimilation, reconstitution and migmatization, caused by injection and metasomatism. when plotted in R1-R2 diagram of Bachelor and Bowden (1985). They fall in mantle fractionates field The chemical analysis, petrographic, and SEM-EDX studies complement each other in confirming the mineral assemblage like Albite, Microcline, Biotite, Muscovite, monazite, Apatite, Calcite kaolinite and illite which are the favorable minerals for hosting the Rare Earth Elements.

The geochemical anomaly threshold of the block area 240 ppm because it lies above the dataset median.

The Geochemical classes of the block area followed are follow

Geochemical background: <120 ppm TREE

Weakly anomalous: 120–240 ppm TREE

Geochemically anomalous: >240 ppm TREE

High-priority REE anomaly: >500 ppm TREE

Exceptional REE anomaly: >1000 ppm TREE

1.7.0 Recommendations

Five zones of REE Mineralization and one zone of precious minerals such as arsenic, antimony, gold, silver, bismuth have been identified and demarcated out of which the Pallerla zone and Lakkayapalli zone are more potential ones within the block which have given the TREE values above 1600 ppm with the maximum of value 1682. Among the REE besides Lanthanum, Cerium, Neodymium, certain uncommon elements like, Praseodymium, Samarium, Gadolinium, have analyzed higher values. Pallerla zone has the TREE maximum value is 1682 ppm and in Lakkayapalli zone the maximum value is more than 1600 ppm. 0.847 Sq. km in aerial extent.

Since these are values recorded in a younger intrusive alkali feldspar granite, seen bordering the major shear zone and as per the Bachelor and Bowden 1985 plot they are considered as mantle fractionates which is also substantiated by the petrographic studies.

Therefore, it is strongly opined that one borehole in Pallerla zone and one bore hole in Lakkayapalli zone may be drilled to ascertain the depth persistence of the mineralization.

Besides these along the quartz reef which has emplaced within the major shear zone / fault zone trending NW-SE direction is observed to be highly sheared. The bed rock samples of these quartz analyzed gave for arsenic, Au, As, Ag, Bi, Sb, the maximum value of arsenic as 82.2ppm, the maximum value of gold (Au)– 1.4ppm, the maximum value (Bi) -1.3ppm, and maximum value of antimony (Sb) 19.5ppm, and the maximum value of silver (Ag) 43.5ppm.

The exceptional TREE anomaly zones more than 1000 ppm are recommended next level exploration

CHAPTER – II

2.0.0 DETAILS OF THE QUALIFIED PERSON(S)/ EXPLORATION AGENCY

(To be provided separately for all the qualified persons signing off the report)

Table No 2.1

Details of Qualified Person(S)/Exploration Agency

(a) Name:	CRITICAL MINERAL TRACKERS (An Exploration Agency, NPEA) (recognized Ministry of Mines, Govt. of India)
(b) Address:	Concourse, No. 306, Greenland's Main Road, opp. Lal Bungalow, Greenlands, Begumpet, Hyderabad, Telangana 500016
(c) Contact Mobile No:	+91 7893847742 +91 9849574333
(d) E-Mail id:	criticalmineraltrackers@gmail.com
(e) Qualification:	Professionals with M. Sc (Geology) Qualification
(f) Experience:	Professionals with experience more than 35years
(g) Affiliation to any organization/company, if yes, specify the name of the organization or company.	An Exploration Agency, NPEA Recognized Ministry of Mines, Govt. of India

2.1.0. Details of qualification and experience of persons associated with various aspects of exploration assessment of resources and reserves.

The Details of personnel associated with the Exploration in Maddur block Narayanpet & of Telangana, are given in following Table No 2.2.

Table No 2.2

Details Of Personnel Associated with The Exploration Maddur Area in Narayanpet Rural Districts Telangana.

1	Overall Planning, Co-ordination & Overall supervision		Dr. K. Mahender Reddy Former Director of GSI
2	Project management & Field Operation	:	Shri Devigari Prem Kumar Geologist
		:	Shri Venne Naveen Kumar Geologist
3	Chemical Laboratory	:	LUCID (NABL -Accredited)
5	Petrological Laboratory	:	GSISR Petrology Division (Outsourced)
6	Data Processing & Documentation	:	Shri Devigari Prem Kumar Geologist
		:	
7	Reprography & Printing	:	CMT Head office

CHAPTER – III

3.0.0. TITLE AND OWNERSHIP

3.1.0. Title of the Report

GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE)
FOR REE AND ASSOCIATED MINERALS IN MADDUR BLOCK, NARYANPET
DISTRICTS IN TELANGANA

Ownership: Government of Telangana

Name of Prospector: (CRITICAL MINERAL TRACKERS) – NPEA
(Recognized by the Ministry of Mines, Government of India)

Address of Prospector: Concourse, No. 306, Greenland's Main Road, opp. Lal
Bungalow, Greenlands, Begumpet, Hyderabad, Telangana 500016.

E-mail of Prospector: criticalmineraltrackers@gmail.com

Telephone numbers of Prospector: + 91 7893847742, + 91 9849574333

3.2.0. Details of period of Prospecting

Reconnaissance Survey (G4) for REE and Associated in Maddur block in Narayanpet districts of Telangana. Maddur Block was recommended in 78th meeting on 14th August, 2025 Technical cum Cost Committee (TCC) of NMEDT was approved in 43rd meeting of EC, NMEDT (24th February 2025) and the same was intimated to CMT vide MoM letter No. F.NO. 23/648/2025-NMEDT/350 dated 04th September 2025.

Accordingly, CMT initiated Project on 04 September 2026, and the fieldwork was successfully carried out. The field activities included geological mapping on a scale of 1:12500 scale, collection of 115 bedrock samples, 150 pit samples, and along with 30 Chip Samples for petrographic studies.

The fieldwork was completed in the 2nd week of April 2025. Subsequently, Geological maps were finalized and digitized. Petrographic Studies were conducted at GSI, followed by SEM analysis. All the samples (Bedrock, Pit (Regolith) were submitted to lucid chemical laboratory for analysis of REE and associated elements. The

analytical data received was interpreted and plotted on the map for delineation of the mineralized zones. The petrographic data received along with photomicrographs was studied and corroborated with the chemical data and interpreted for identifying the mineralized zones. The work was reviewed by the TCC-1 Committee on 26th May 2025 and advised to submit the Geological Report to NMEDT before the timeline i.e., 03 July 2025.

CHAPTER - IV

4.0.0. DETAILS OF THE AREA UNDER STUDY

4.1.0 Location of the Block

The Maddur block, having an area of 160 sq. km, by latitudes 16.752°N to 16.951° N and longitudes 77.596°E to 77.663° E, forms a part of Maddur Mandal, in Narayanpet districts of Telangana state. The main localities in and adjoining the block are Maddur, Nandipad, Pallela, lakkayapalli, Jadavaraopalli, Dorepalli, Monapuram, Renuvatla, Appareddipally, Chennaram, Abhangapur, Bandakonda, kotakonda, the block is an area forms the central part of the toposheet 56H/09 and the co-ordinates of the block boundary are given below in Table No 1.1

Table No-4.1
Coordinates of cardinal points of Maddur block in
Narayanpet Districts of Telangana.

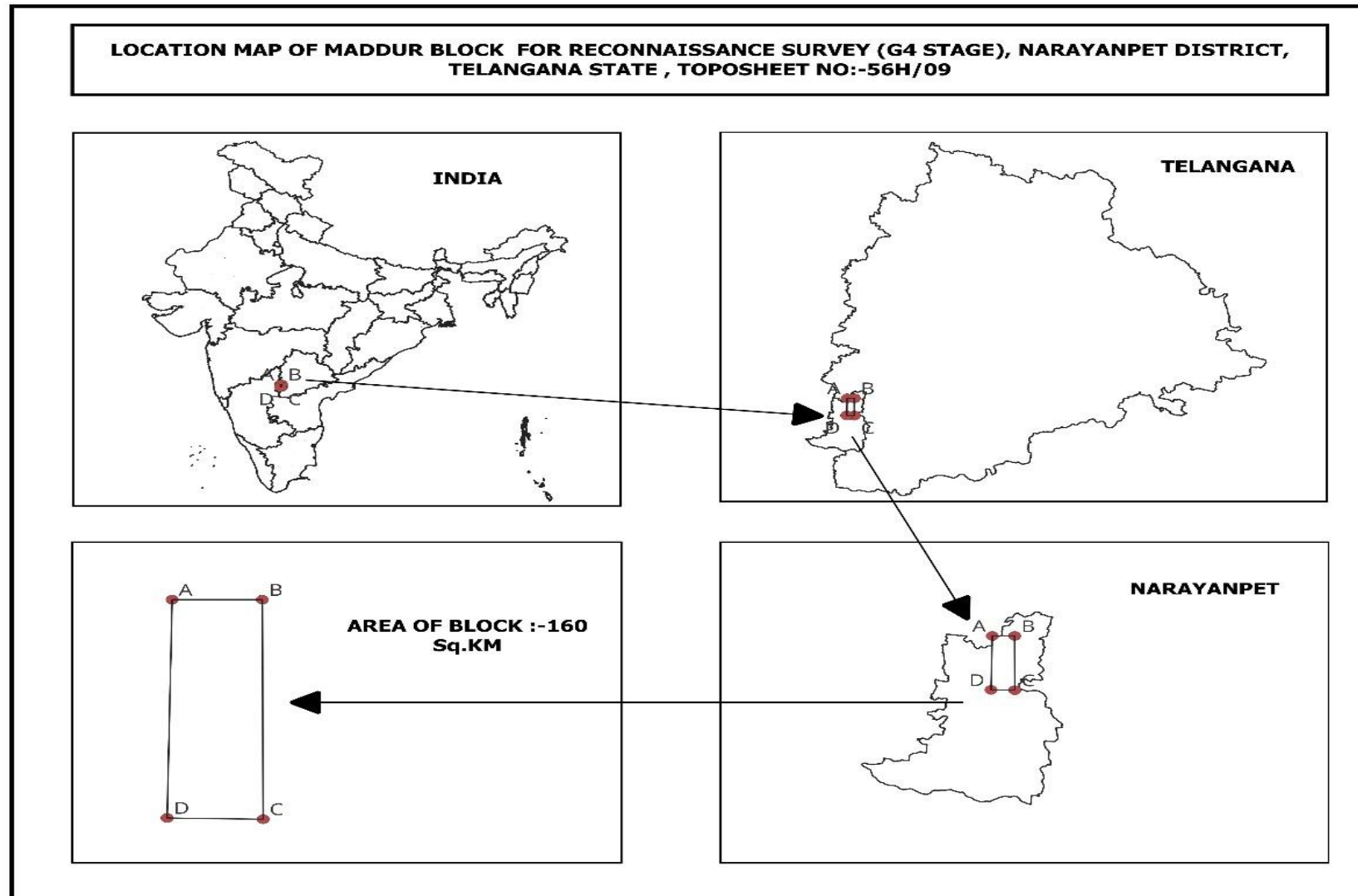
Cardinal Points	Geographic Coordinate System in Degree Decimal (WGS 1984)		UTM (WGS 1984, Zone 44N)		Area in Sq. Km
	Latitude	Longitude	Easting (m)	Northin g (m)	
A	77.596	16.95	776478.86	1875850.73	160 sq.km
B	77.659	16.951	783190.96	1876051.27	
C	77.663	16.752	366976.59	1935306.34	
D	77.596	16.752	359650.24	1935355.85	

4.2.0. Accessibility to the Block

The Mahabubnagar Railway station is 49 kms south- southeast to the block area and all these are part of the South-Central Railway network. Besides this, Narayanpet, Mahabubnagar area are well connected by road network. Apart from railways, road transport services are also good.

TEXT FIG No: 1

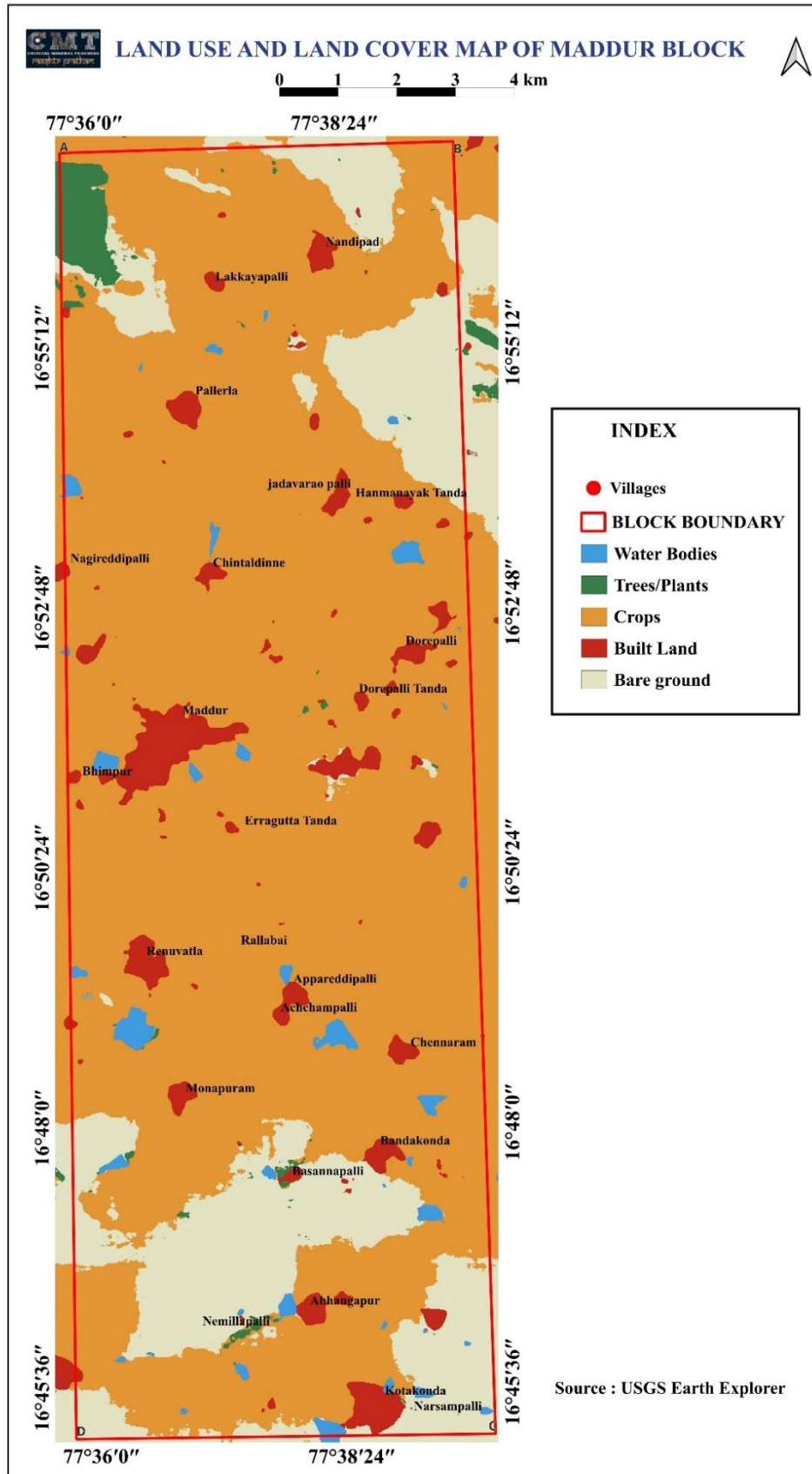
Location map of Maddur Block in parts of Narayanpet district in Telangana.



4.3.0. Land use land cover pattern

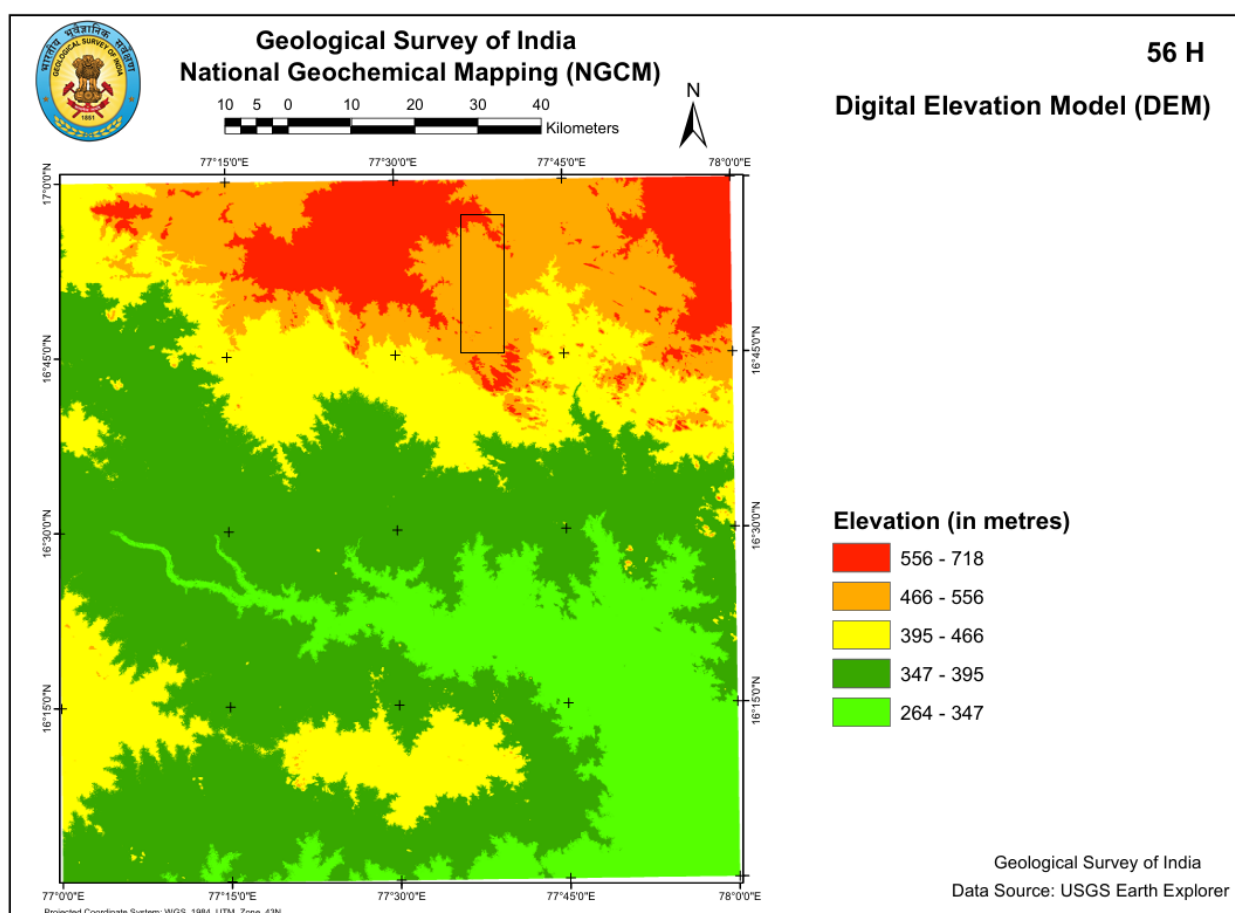
As reported by GSI from the land use /landcover map of the study area part of toposheet no.56 H/09 is occupied by cultivated lands, settlements, barren lands occupied by rock exposures, mango gardens and water bodies. Approximately 50 % of the area is covered by agricultural lands, Pedda Vagu a tributary of River Krishna and its stream network drain the area. Besides this several lakes are also present within the area. The landuse/landcover map of the area covered by toposheet 56H/09 is shown below in Fig No. 2 under Mineral(s) investigation or granted license or lease of Maddur Block was explored for the occurrences of Rare Earth Elements (REE) and Associated minerals.

Landuse Landcover Map of Maddur Block



4.3.0. Digital Elevation Model of the Block Area marked on 56H

The Maddur block area which is part of 56H/09 has been marked on the Digital Elevation Model (DEM) map of 56H. This map represents the elevation variation across parts of Gurmatkal, Yadgir, Maddur, Wadagera, Honwada Mahktal, Magnur, upperu, Raichur, Atmakur, Kadgchur, gabbur, districts within the NGCM toposheet 56 H. Elevation ranges from about 264m to 718 m, classified into five colour-coded categories from low (light green) to high (red). Higher elevation zones occur mainly in the north-Eastern region near Gurmatkal, Honwada Maddur, while lower elevations dominate the south-eastern areas around Atmakur, Gadwal, and. Major localities such as Gadwal, Makhtal, Gurmatkal, Maddur, Raichur, and are marked to provide spatial references. Overall, the map helps in understanding terrain relief, geomorphological patterns and the influence of elevation on regional geochemical variability.



TEXT FIG No: 2

CHAPTER – V

5.0.0. PHYSIOGRAPHY AND ENVIRONMENT

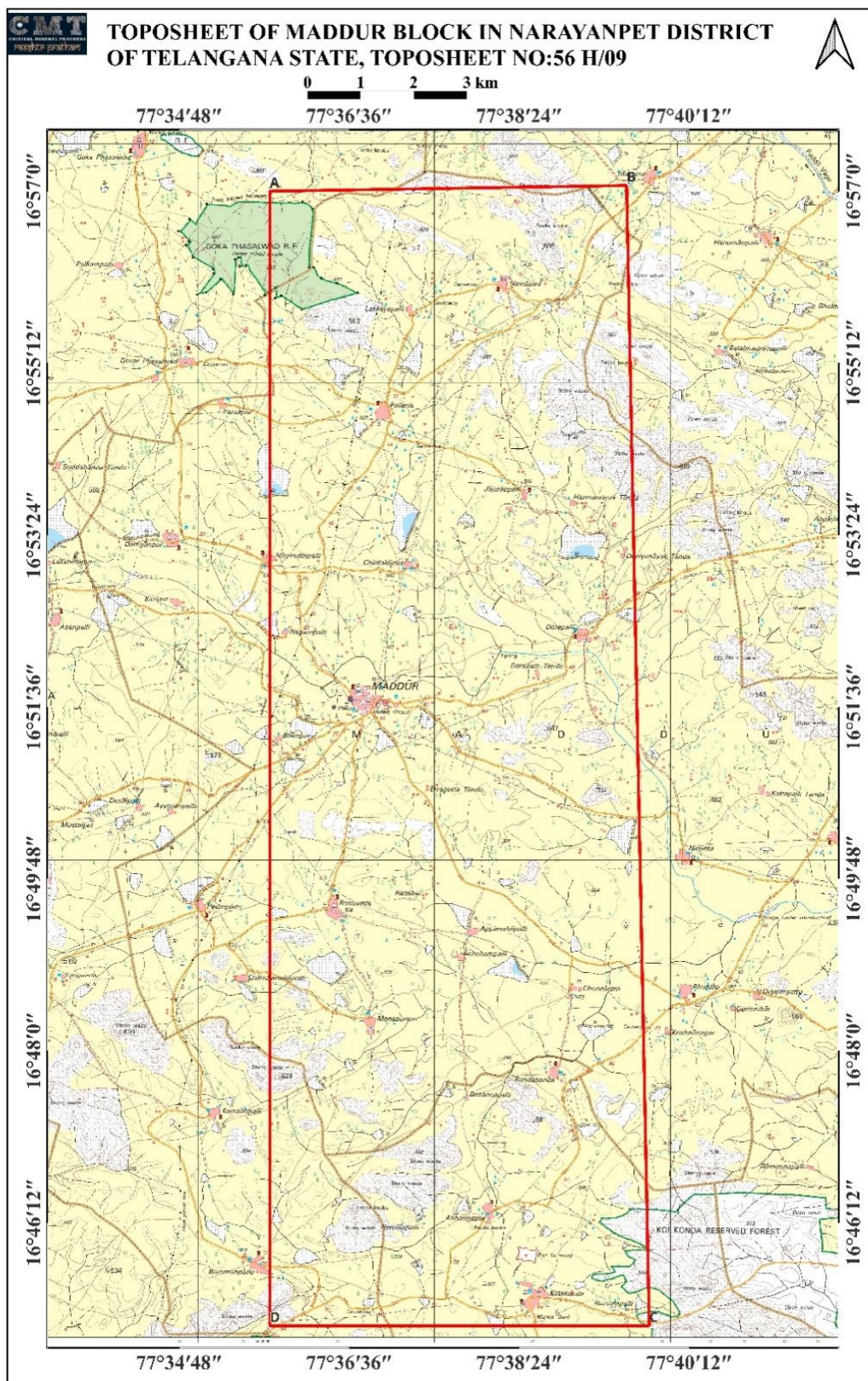
5.1.0. Topography

The area forms an undulating topography with scattered hillocks and mounds. within the vast Pediplain. Overall drainage pattern is dendritic to sub dendritic and is mainly controlled by joints. There is a major NW-SE trending Fault/Shear zone in 56H/09 toposheet which is occupied by a quartz reef and bordered by pink granite ridge. The other landforms observed are pediment, dissected plateau denudation hills, flood plain, residual hill, channel fill, which is part of the Eastern Dharwar Craton and exposes a variety of granites and under Peninsular Gneissic Complex-II.

5.2.0 Location and Toposheet Reference

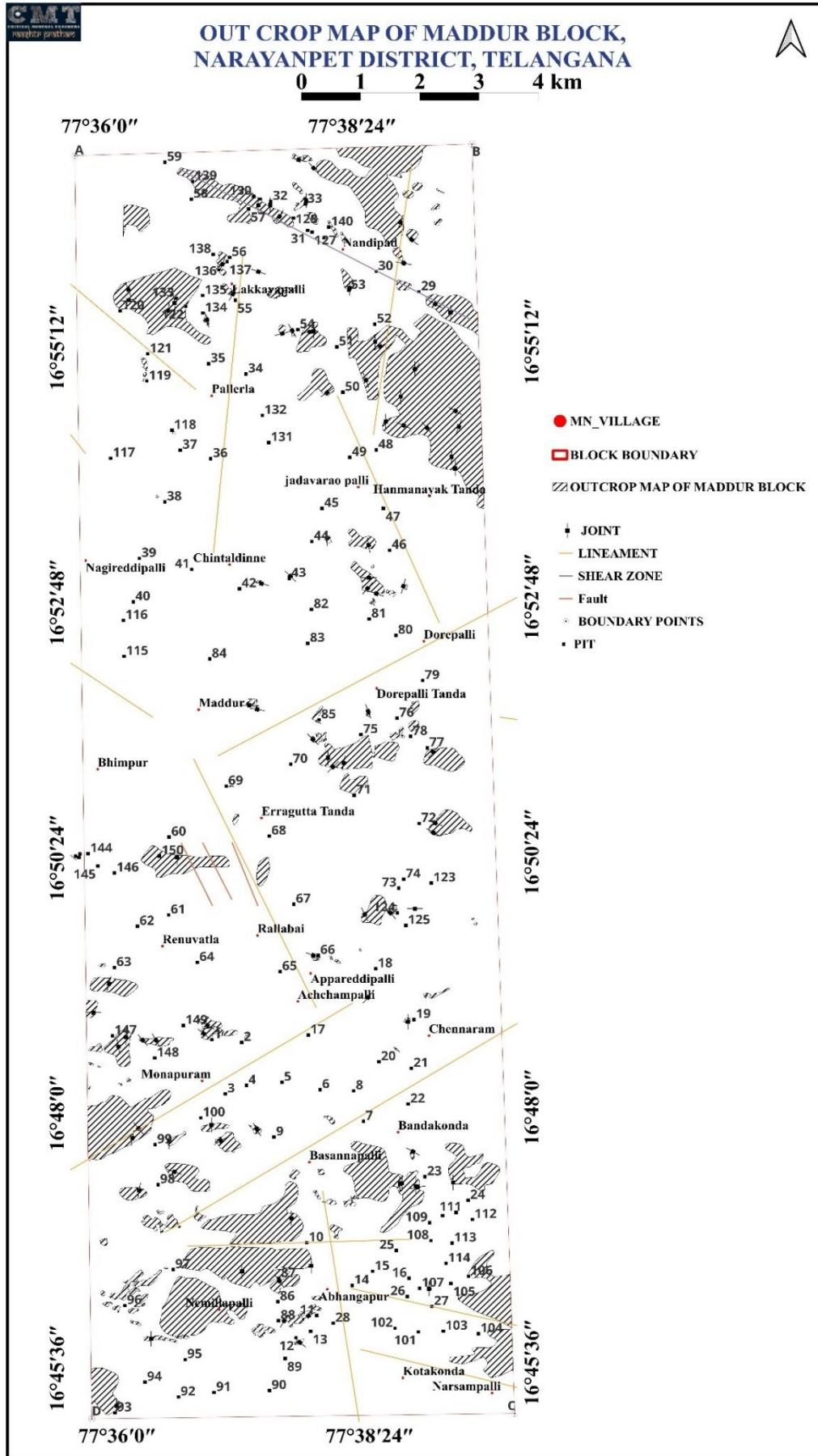
The presented toposheet of the Maddur Block (part of Toposheet No. 56H/09) provides a detailed base map for geological mapping and field investigations in Narayanpet districts of Telangana. The sheet accurately depicts the spatial distribution of settlements, drainage networks, transport routes, tanks, and minor geomorphological features, which serve as important reference points during geological traverses. The red demarcated boundary highlights the designated study area, enabling precise planning of traverses, sample collection, and lithological boundary identification. This toposheet forms a fundamental preliminary tool for understanding the terrain, assessing accessibility, and correlating geological features with surface morphology within the Maddur Block.

Plate No -2



5.3.0 Outcrop Distribution and Geological Framework

The outcrop map of the Maddur Block provides a detailed representation of all exposed bedrock occurrences within the mapped area, forming an essential basis for geological fieldwork and interpretation. The distribution of outcrops, shown through shaded polygons, highlights the areas where lithological units are accessible for direct observation, sampling, and structural measurements. The block boundary is clearly demarcated in red, ensuring accurate spatial control during geological traverses. Surrounding villages such as lakkayapalli, Pallela, Nandipaad, Jadavaraoplli, Manipura, Abhangapur and Bandakonda Appareddipalli serve as important reference points for navigation and planning of field operations. This map facilitates a clear understanding of surface geological.



5.4.0. Connectivity

The Mahabubnagar railway station is 49 kms south east of Maddur. Besides this, the block area is well connected by road network. Road transport is also good. Narayanpet district, Mahabubnagar are well connected to Maddur by road. Apart from railway, road transport service is also good.

5.5.0. Population

As per the Census data, 2011, Narayanpet district is approximately 41,756, out of which male and female were 20,697 and 21,055, respectively.

5.6.0. Socio Demographic profile

Maddur district of Telangana State had sex ratio of 1009 females for every 1000 male. In 2011 census, child sex ratio was 916 girls per 1000 boys. The literacy rate of the district was 49.93%. It has been observed from census data; 8.51% of the population were residing in the urban area whereas rest of the population were residing in rural areas. According to the 2011 census, 82.65% of the population in the district speaks Telugu, Hindi- 0.52%, Urdu- 4.96% and 9.40% speaks Lamani/Lambadi and 1.68% of Banjari.

5.7.0. Historical / Archaeological Site

Narayanpet in Telangana is a historically significant district known for its ancient Megalithic sites and religious landmarks. Key sites include the 3,500–4,000-year-old Mudumal Megalithic Astro/ archeological site (recently shortlisted by UNESCO for decongestion list), the Narayanpet Fort from the Nawabi era, and ancient temples like the Padamati Anjaneya Swamy Temple.

Narayanpet Fort: A structure dating back to the Nawabi era, reflecting the area's history under the Nizam and Qutb Shahi dynasties. **Tangidi Village (Maga Noor Mandal):** Features significant Megalithic Cist burials on the banks of the Krishna River, indicating early Iron Age settlements.

5. 8.0. Forests, sanctuaries, national park and wildlife sanctuaries

The block contains approximately 1.7 sq km of forest area And There are no sanctuaries, national park and wildlife sanctuaries. Within this block area.

5.9.0. Flora and Fauna within and nearby

The Narayanpet region lies in the semi-arid zone of southern Telangana and is characterized by dry deciduous vegetation and scrub forests. The ecology is influenced by low to moderate rainfall, rocky terrain, and red sandy soils, supporting hardy plant species adapted to drought conditions. The flora mainly consists of thorny shrubs and trees such as neem (*Azadirachta indica*), acacia (*Acacia nilotica*), and banyan (*Ficus benghalensis*), along with grasses and seasonal herbs. The fauna includes common wildlife like Indian hare (*Lepus nigricollis*), fox, mongoose, and reptiles such as lizards and snakes. Bird species like peafowl, partridges, and pigeons are also found in the area. Overall, the ecological setting of Narayanpet reflects a typical Deccan plateau environment with moderate biodiversity adapted to semi-arid conditions. Sanctuaries key hotspots for conservation within the region.

5.10.0. Drainage Pattern

There is no major drainage and the only rivulet that flows through the area from north to south is Peddavagu, a minor tributary of the river Krishna. Other streamlets and nalas that join the Peddavagu are very minor ones and often found dry. The drainage pattern in the area is generally dendritic to sub-dendritic and mainly controlled by joints.

5.11.0. Climatic Condition

Climate of the area is a typical hot semi-arid climate pattern, featuring intense summers (March–May), a monsoon season (June–October), and a mild winter (November–February).

Summer (March – May): High temperatures consistently exceeded 35⁰ C with peak, 40⁰ C – 45⁰ C dry heat in April and May often reaching).

Monsoon (June – October): June brought relief with pre-monsoon showers, with rainfall increasing significantly in July and August. Temperatures typically hovered around 30⁰ C during these months.

Winter (Nov – Feb): Pleasant and dry conditions prevailed, with daytime highs around 28⁰C and cooler nights during December and January

5.12. Any other factor having potential to affect the viability of the project and assessment of resources and reserves.

CHAPTER – VI

6.0.0. INFRASTRUCTURE

6.1.0. Local infrastructure Connectivity and facilities

The block has a very good road connectivity with other towns and Headquarters by road. It takes an hour to reach Narayanpet by The Maddur block is part of the Narayanpet districts. The mandal headquarters Maddur is central of the block. District administrative offices are located in Narayanpet. Major Banks have their branches in Maddur. Post office and medical centers are available in these two towns.

The Mahabubnagar railway station 49 kms south -south east to the Maddur block and besides this, the block area is well connected by road network. And Maddur area has good road connectivity Narayanpet district.

CHAPTER – VII

7.0.0 GEOLOGY

7.1.0 Regional Geology

The geological set of the area undivided Mahabubnagar district is predominately composed of variety of granites and gneissis with enclaves of mafic and ultramafic lithounits, schistose patches, BIF, intrusives both basic and acidic. It forms a part of the stable Dharwar craton of South Indian shield. It exposes rocks of Peninsular Gneissic Complex, Dharwar Supergroup, Cuddapah Supergroup, Kurnool and Bhima Groups and also of Deccan Traps. The Peninsular Gneissic Complex, which covers most of the area, comprises granites, gneisses and migmatites with undigested patches of older metamorphic rocks. The Dharwar Supergroup rocks are represented mainly by Gadwal Schist Belt, running in NW-SE direction between Narayanpet and Manyapadu. It exposes basic, intermediate and acid volcanic rocks associated with agglomerate and thin bands of banded iron formation. The rocks of Peninsular Gneissic Complex and Dharwar Supergroup are intruded by younger granitoids of tonalite - trondhjemite granodiorite composition and diabase dykes. These dykes are tholeiitic to sub alkalic in composition and intrude along E-W, NW-SE and NE-SW directions. A prominent quartz reef is seen along a major fault /shea zone trending in NW-SE direction extending more than 30 km. Radiometric dating by Sm-Nd, Rb-Sr and Pb-Pb methods indicated the age of the dyke systems to be around 2200 Ma. (Pandey etal, 1997). GSI reported 37 kimberlites from Kotakonda, Maddur and Narayanpet areas of the district. Which is consider to be Narayanpet kimberlite belt in the southern part of the district, Proterozoic sedimentary rocks, belonging to Cuddapah Supergroup and Kurnool Group having 1100-600 million years age are exposed.

The Cuddapah sediments, deposited non- conformably over peninsular gneisses and Dharwars, comprise conglomerate, quartzite, limestone, dolomite and shale. The Kurnool Group of rocks overlies Cuddapah rock formations and consists mainly of limestone, shale and quartzite. A thin sequence of Bhima Group of rocks (equivalents of Kurnool Group of rocks), comprising shale and sandstone are exposed in

northwestern part of the district in Korangal taluk. Trap rocks of basaltic composition occur over the peninsular gneisses and Bhima Group of rocks in Korangal and Shadnagar taluks of the district

Table No. 7.1
REGIONAL STRATIGRAPHIC SEQUENCE

LEGEND

LITHOLOGY	FORMATION	GROUP	SUPER GROUP	AGE
Basaltic Flows with intertrappeans		Sahyadri	Deccan trap	Cretaceous to Paleocene
Shale (Green to purple)		Bhima		Neoproterozoic
Sandstone				
Shale	Nandyal	Kurnool		
Shale, Limestone	Koilkuntla			
Limestone, Massive/flaggy	Nargi			
Quartzite	Banaganapalli			
Kimberlite	Intrusive	Nallamallai	Cuddapah	mesoproterozoic
Quartzite	Srisailem			
Shale, Phyllite	Cumbum			
Shale, Phyllite	Baireinkonda			
Dolomite, Sills	Vempalli	papagni		
Quartzite, arkose/conglomerate	Gulcheru			
quartz reef/vein	Acid Intrusives			Paleoproterozoic
pegmatite				
Dolerite/Gabbro	Baie intrusives			
Granites and Gneisses		PGC - II	PGC	Archean to Paleoproterozoic
Metabasalts, BIF, Andesite		Gadwal schist Belt	Dharwar	Archean
Rhyodacite				
Rhyolite, Acid tuffs				
Amphibolite biotite Scist				

Structural Features

Foliation

It is very prominent in the Gneisses with a general ranging from N25W-S25E to N40W-S40E with steep dips of 50 to 70 degrees mostly due easterly. But however minor variation in strike and dips of 50 to 70 degrees mostly due Easterly. But however minor variation in strike and dip of foliation is commonly seen due to folding and flexuring.

Lineation

This feature in the form of mineral lineation was often seen in these Granitoids. Generally, it is seen on the horizontal surface mainly marked by the preferred orientation of K-feldspar phenocrysts in porphyritic granodiorite whose longer axis is parallel to the regional foliation of the gneisses. Apart from this groove lineation is also seen in gneisses. These are well preserved in the magnetite/hematite quartzites near Vanchanagiri and Rangapuram in the form of meso-folds. At Rangapuram a very good meso-fold was observed which has a plunge of 50 degrees due to N40⁰W, and is tight Isoclinal in nature. The regional foliation also is in the same direction. In a quartzite hill near Vanchanagiri village, it was observed to have folded, with its axial plane trending in NNE-SSW direction, which is again refolded along NW-SE direction. This fold has a plunge with an angle of 50 degrees, due to NE direction. From the data collected from the area, it bears the imprints of at least 2 phases of deformation.

These are the most common secondary structures noticed in rocks of the area. Several sets of joints having a trend in almost all direction, but however on analysis it is found that the most prominent joint directions are N-S, E-W, NE-SW/N30W-S30E, N60E—S60W. Besides these a few sheet joints resulting in the blocky nature of the outcrops were also observed.

Lineaments

Several Lineaments were interpreted in the area which trend in NE-SW, NW-SE and N-S directions.

Fault

A major fault/shear extending in NW -SE direction along Gundumal, Nandipad and Allapur was inferred. Along this fault zone quartz reef is seen emplaced and it's highly sheared in nature.

Migmatitic Structures

The migmatite structures observed in the area are stromatic or layered, Agmatic, Schlieren, Folded, Pygmatic, Ophthalmic and Nebulous structures. These represent the different stages of migmatization noticed in area. Among the above-mentioned structures, layered and Agmatic structures are the most common ones.

Metamorphism

The Granitoids of the undivided Mahabubnagar show imprints of retrograde metamorphism in the form of garnet altering to biotite, biotite to chlorite, plagioclase feldspar to epidote and sericite in gneisses and granites, pyroxene to amphibole in pyroxenites.

The rocks of the area at present comprise the mineral assemblage characteristic of Almandine Amphibolite facies to green schist facies. The amphibolites and schist enclaves and metasediments show the effect of regional metamorphism. Neither cordierite nor sillimanite was noticed in the rocks suggesting a low grade of metamorphism.

The occurrence of clots of garnet in grey granodiorite and gneisses mostly occupying the central core portion of the ferromagnesian minerals suggests that they could be metamorphic residues and hence it would be proper to explain their development as a result of argillaceous sediments. This is evidenced by the presence of Almandine garnet surrounded by biotite. Which suggests that it has undergone retrograde metamorphism. The granodioritic rocks which are considered to be there constituted Dharwar rocks are often schistose and present some interesting metamorphic effects on them. The feldspars are highly epidotised and sericitised, segregation of quartz resulting in recrystallization, the biotite shows fragmentation and some of the porphyritic varieties of aplitic facies exhibit development of K - feldspar augens.

In spite of the presence of enclaves of gneisses and schistose rocks in the Granodiorites the following points suggest that the granitoids are not of intrusive origin but are a product of metasomatism and migmatization. The dykes of the area are in general fresh and unaltered/ but they have caused some effects along the borders of the country rock into which they are intruded.

Geochemistry

The granites of undivided Mahabubnagar district and its adjoining areas are formed to be highly heterogeneous in nature. The selected samples of these granitoids were analyzed for major and trace element concentration. Their analytical data were plotted various geochemical diagrams to arrive at their classification, source and nature of magma and their tectonic environment in which they got emplaced. When plotted the analytical data in QAPF diagram they plotted mostly in Granodiorite and Tonalite fields and few in Monzo granite. The feldspar triangle of O Connor (1965) indicated them to be Granodiorite to Quartz monzonite. The R₁—R₂ plot of De La Roche et al (1980) suggested these to be granodiorite to tonalite in composition. The data plotted on Middlemost (1994) diagram reflected them to be granodiorite to Quartz monzonite. TAS diagram of Cox et. al. (1979) indicated them to predominantly Granodiorite in composition. They're taking into consideration all the above plots these granites can be geochemically classified as Granodiorite- tonalite - Quartz monzonite suite (TGM). The SiO₂, K₂O plot of Peccerillo and Taylor (1976) indicates that these granites are predominantly high K-Calc alkaline in nature. AFM plot of Irvine and Baragar (1971) also suggests them to be Calc- alkaline in nature.

As per the tectonic discrimination diagram of Frost and Frost these granites are magnesian, Calc-alkali strongly peraluminous to marginally metaluminous and silica saturated in nature. The Si O₂ – K₂O plot suggests it to be S-type due to high potash whereas the Frost diagram suggests it to be I-type, probably these are affected by K metasomatism. As per the tectonic discrimination diagram of Maniar and Piccolli (1989) these granitoids fall in the IAG-CAG-CCG field and are more peraluminous and marginally metaluminous, highly magnesian, Calc-alkaline and silica saturated as per Frost and Frost (2008) tectonic discrimination diagram. As per the R₁—R₂ plot of Batchelor and Bowden (1985), these are post orogenic and pre-plate collision emplaced granites.

REE Mineralization

The Granitic variants within the GQM 56H map which forms part of the mahabubnagar district and ngcm data of REE reported TREE ranging from the 21.21 to 2572.35ppm. Among these REE, concentration of LREE specifically Ce (1418.52) maximum, La (533.60PPM max) Nd(214.24max), Eu (41.40 max) Pr (108.26max) Sm (40.83 maxPPM) Gd (24.83ppm max), Dy (20.23ppm max) granodiorites of the area gave 2 to 2 1/2 times more than the background values when a Geiger Muller Counter was operated the chemical analysis of the random samples collected from these granites gave significant concentration of LREE specifically Cerium (900-1200 ppm) and Lanthanum (200-400 ppm). Systematic studies and close spaced sample collection and their analysis might result in locating Cerium and Lanthanum deposits since these elements are sought after these days.

AGE

The granites of undivided Mahabubnagar district are considered to be equivalent of Closepet Granite which is 2500 Ma and the field relations substantiate this since they are a part of the Younger Gneissic Complex which is stratigraphically referred to as Peninsular Gneissic Complex -II and is considered to be of Archaean to Paleoproterozoic age. block location has been shown in the Text Figure 3 below



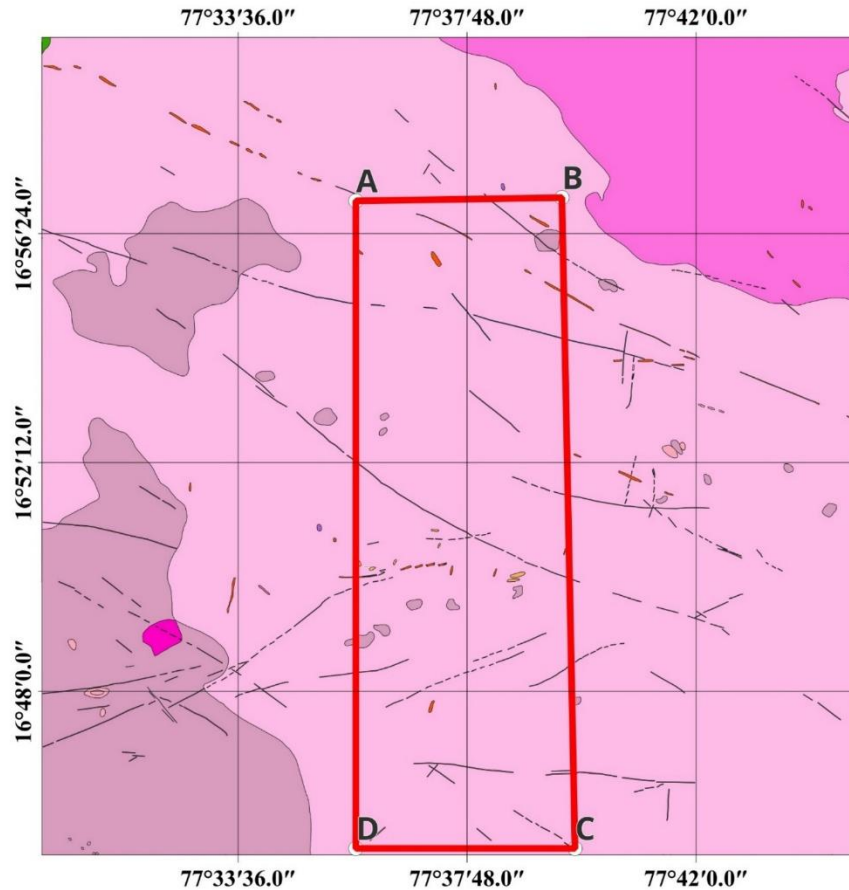
Plate No - 4



MADDUR BLOCK, SHOWN ON 1:50K GEOLOGICAL MAP, NARAYANPET DISTRICT, TELANGANA,

TOPOSHEET NO : 56H/09

0 1 2 3 4 km



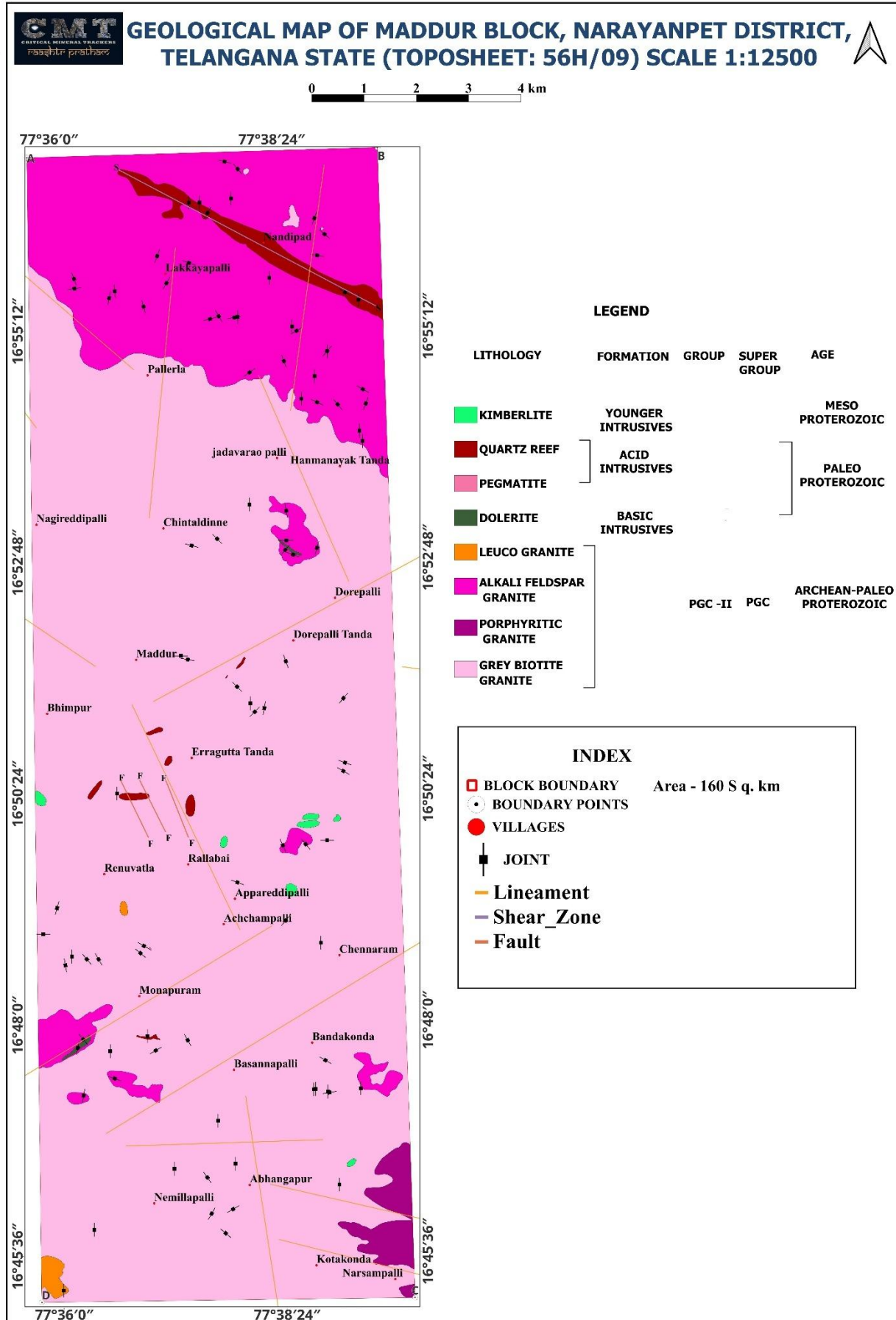
I N D E X				
LITHOLOGY	FORMATION	GROUP	SUPER GROUP	AGE
BASALT	MAHABALESHWAR	SAHYADRI	DECCAN TRAP	LATE CRETACEOUS-PALAEOCENE
KIMBERLITE	YOUNGER INTRUSIVES			MESO PROTEROZOIC
SYENITE				
QUARTZ VEIN/REEF	INTRUSIVES			PALEO PROTEROZOIC
DOLERITE				
GABBRO	PGC II		PGC	ARCHAEAN/PALEO PROTEROZOIC
GREY BIOTITE GRANITE				
GREY GRANITE				
GREY HORNBLende GNEISS				
LEUCO GRANITE				
MIGMATITE GNEISS				
META-BASALT	GADWAL	DHARWAR		ARCHAEAN
META-PYROXENITE				

- BLOCK BOUNDARY Area - 160 S q. km
- BOUNDARY POINTS
- villages
- Lineament
- Shear_Zone
- Fault

7.2.0. GEOLOGY OF THE BLOCK

The Maddur block area is located in Narayanpet district of Telangana and geologically part of the Narayanpet Kimberlite belt within the Eastern Dharwar Craton. The block area is 160 sq. kms and is part of the toposheet 56 H/09. The block area is composed of grey biotite granite occupying the central part of the block which is mostly a Pediment- Pediplain complex with ground level outcrops whereas the northern part and the southern part of the block is occupied by fine grained pink granite which is more aplitic in nature with almost negligible mafics and forms hills extending in NW-SE direction. Porphyritic granite is located east of Abhangapur village in the southern part of the block. Leucogranite is exposed in the southern part of the block area south of Basannapalli and east of Bommannapadu where few rocky knobs are present. Meta Gabbro is located south of Banda Konda village. Dolerite dyke located south west Monapuram. Pegmatite vein are located North of Monapuram and northeast of Jadavaraopalli These trend in NW-SE direction in the northern part of the block a major shear/fault zone passes through the block in a NW-SE direction which is occupied by the Quartz reef.

The Geological Survey of India (GSI) has identified 37 kimberlite pipes within the Narayanpet Kimberlite Belt. Of these, six kimberlite bodies, namely MK-2, MK-3, MK-4, MK-5, MK-6, and KK-3, are located within the Maddur Block area which are mostly covered by soil no outcrops were seen



7.3.0 Structures of the block

Joints

The lithounits which comprise predominantly granitic variants and are well jointed and are the most common secondary structures noticed in rocks of the area. Several sets of joints having a trend in almost all directions, but however on analysis it is found that the most prominent joint directions are N-S, E-W, NW- SE, SW- SW.

Lineaments

Prominent lineaments observed in the area are the major fractures which control the drainage network, the directions in which they are oriented are in NW- SE, NE-SW and N-S directions but among these the NW-SE trending lineaments are very significant. Along some of these lineaments dolerite dykes are seen emplaced and along some others stream courses are noticed.

Migmatitic Structures

The migmatite structures observed in the area are stromatic or layered, Agmatic, Schlieren, and Nebulous structures. These represent the different stages of migmatisation noticed in the area among the above-mentioned structures, Agmatic, Schlieren and Nebulous structures are the most common ones.



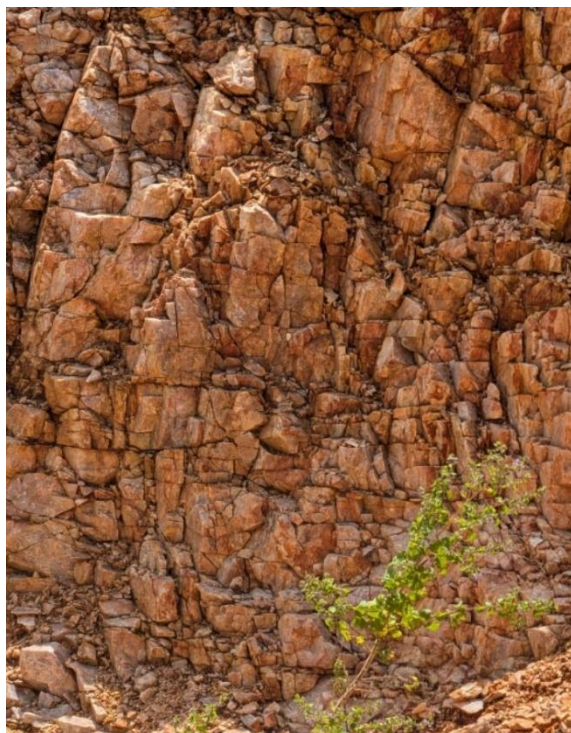
Field photograph No: 7.3.0- 1

Shear Zone

A major shear zone extending in NW -SE direction along Gundumal, Nandipad and Allapur was inferred. Along this fault zone quartz reef is seen emplaced and it's highly sheared in nature.

Fault

there are faults trending in NNW-SSE-SSE direction located north of Renuvatla which are parallel to each other these are smaller areas extending for about are kilometer these are in the central



Field photograph No: 7.3.0-2



Field photograph No: 7.3.0-3

Field photograph of sheared quartz seen along the major shear/fault zone trending NW-SE traversing the northern part of the block area

Near Nandipad evidences for ductile deformation was observed in the form of mylonitization where Feldspar often forms rounded to augen shaped clasts with thin pressure shadow tails. At most of the place's sericite and epidote replace the feldspar. Epidote also formed along the mylonite zones probably due to fluid movement. Titanite grains are completely skeletal in shape and formed over other grains indicating its late-stage development. Alteration of amphibolite-rich and feldspar-quartz rich bands define banding parallel to mylonitic foliation. Often zone of epidotization cut across the amphibolites and are parallel to the mylonitization. Based on the petrographic study, it is inferred that the original amphibolite rocks was affected by high temperature ductile deformation and shearing resulted into thin mylonite zone where grain size drastically reduced and S-C fabric was formed. The shearing was accompanied by intrusion of epidote veins. This rock represents a zone of high shear strain.

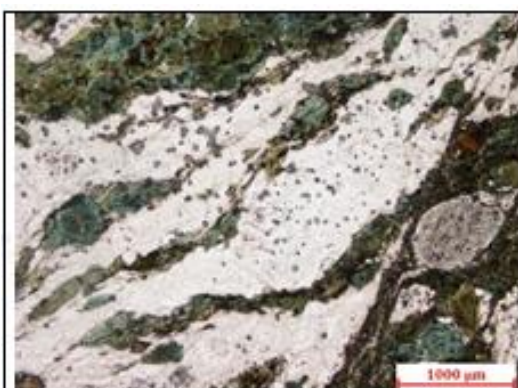


Fig. 85.1 Mylonitic foliation and augen shaped feldspar in sheared amphibolite; note the pressure shadow tail against the rounded feldspar clasts. under plane polarized light and 2X magnification.

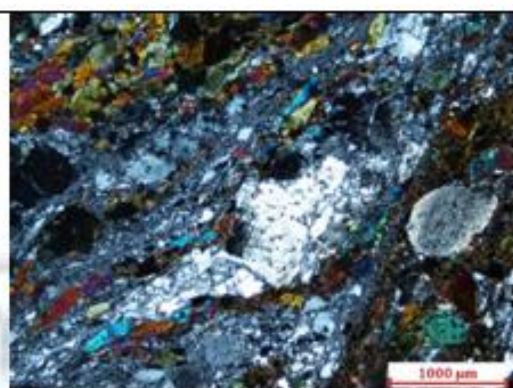


Fig. 85.2 Same as fig 85.1; under cross polarized light

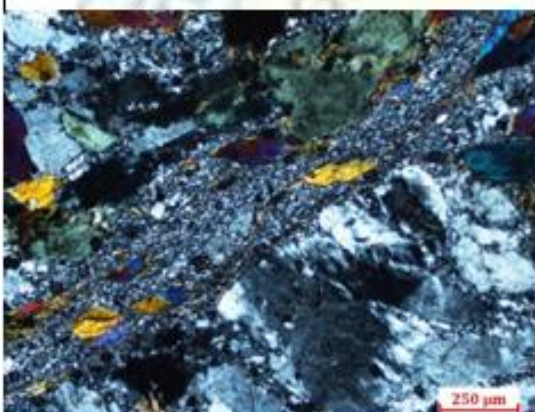


Fig. 85.3 Zone of mylonitisation cutting across the coarse grained rock; note amphibolite fishes showing sinistral sense of movement within very fine grained mylonitic zone;

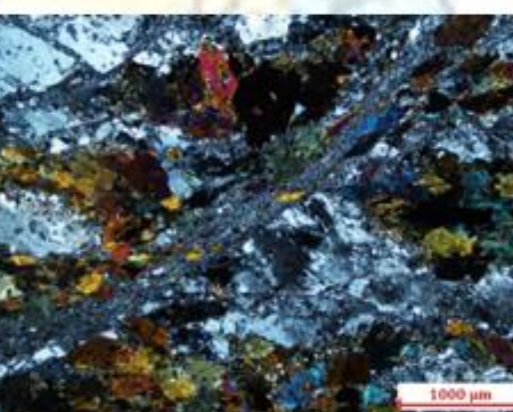


Fig. 85.4 Zone of mylonitisation cutting across the coarse grained rock; the foliation outside the mylonitic zone is abut against and dragged along the mylonitic foliation.

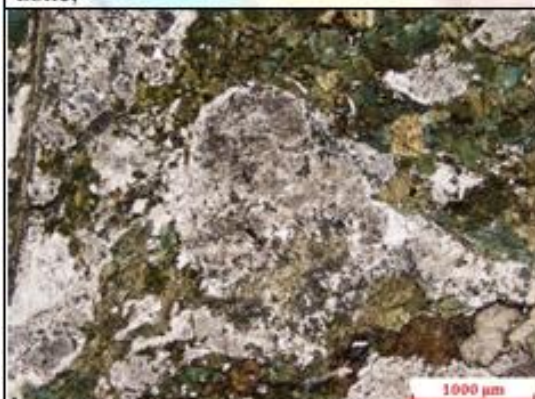


Fig. 85.5 Large feldspar replaced by sercite and epidotes; feldspar is surrounded by

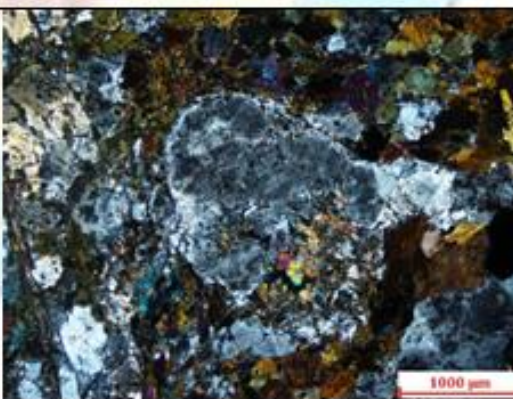


Fig.85.6 Same as Fig 85.5; under cross polarized light

Micro photograph No: 7.3.0 -4

7.4.0. Description of lithology

Grey Biotite Granodiorite

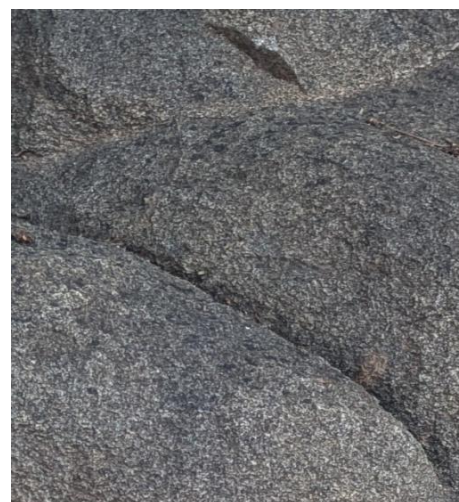
This Lithounit is medium to coarse-grained, grey in colour, meso to melanocratic, inequigranular and is primarily composed of Quartz, Plagioclase feldspar, K-feldspar, Biotite and under the microscope, perthitic alkali feldspar, microcline, plagioclase (Plg), and biotite (Bt), along with accessory phases such as epidote, apatite, allanite, titanite (Ttn),

zircon (Zrn), have been identified. This unit is seen occupying the central part of the block area north and south of Maddur and is the predominant lithounit within this block area. It's observed that this lithounit has at places enclaves of the parent rock which are mostly mafic rich and are considered to be restites which are predominantly. Amphibolite, The Biotite in this lithounit appears as subhedral flakes with moderate to strong pleochroism

and is commonly associated with accessory minerals. Accessory phases are well represented. Apatite occurs as small prismatic inclusions within biotite and feldspar, indicating early magmatic crystallization. Allanite is observed as high relief, brownish grains, often associated with altered places. Zircon occurs as small, euhedral grains with high relief and bright interference colors, typically enclosed within biotite, indicating early crystallization from the magma.



Field Photograph No: 7.4.0 -1.1



Field Photograph No: 7.4.0 -1.2

Allanite is dark brown in color and are associated with chlorite and epidote. Biotites are pleochroic in shades of yellow to brown and most of the places are replaced by chlorite along cleavages. Biotite and chlorites mostly occur as interstitial grains. Plagioclase grains are identified by its lamellar twinning and tiny epidote grains were formed over it. A late thin epidote vein cut across the rock. The presence of epidote (Ep) as high-relief, brightly birefringent grains associated with plagioclase indicates saussuritization under hydrothermal conditions.

Biotite (Bt) appears as pleochroic, flaky grains with moderate to high interference colors, often hosting accessory phases. Allanite (Aln), identified by its high relief and strong interference colors, occurs in association with biotite. Apatite (Ap) is present as small prismatic inclusions, commonly enclosed within biotite or feldspar.

Orthoclase is mostly altered to sericite indicated by its dusty appearance. Microcline grains have formed later as it has numerous inclusions of quartz and plagioclase.

Zircon is a secondary mineral which occurs as euhedral to subhedral accessory grains with high relief and bright interference colors, typically included within biotite or quartz, indicating a primary magmatic origin (Fig. 15F). The assemblage of epidote, sericite, and altered feldspars suggests fluid-assisted metasomatism, overprinting the original magmatic textures.

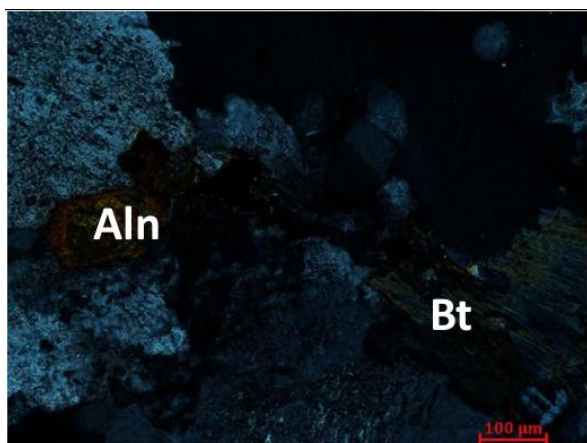


Fig. 61E. Photomicrograph showing presence of allanite (Aln) and biotite (Bt) under transmitted light XPL (10X).

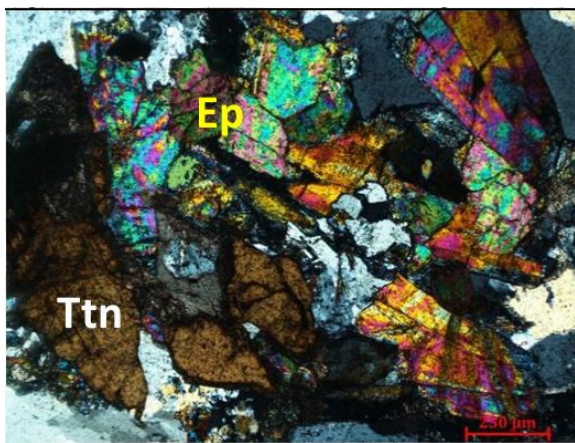


Fig. 18F. Photomicrograph showing presence of epidote (Ep) and titanite (Ttn) under transmitted light XPL (5X).

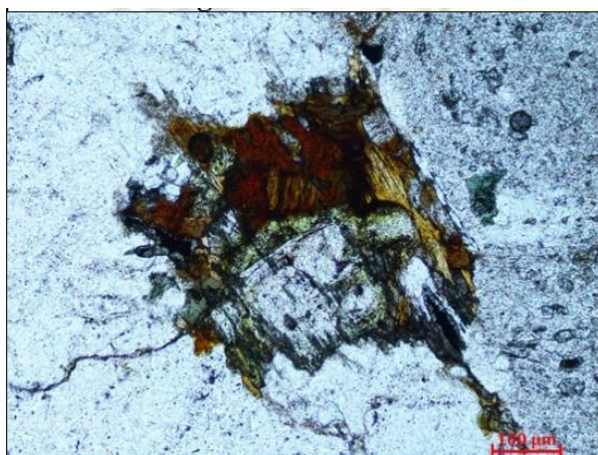


Fig 25.3 Allanite, biotite and epidote in granite; note the altered sericitised feldspar

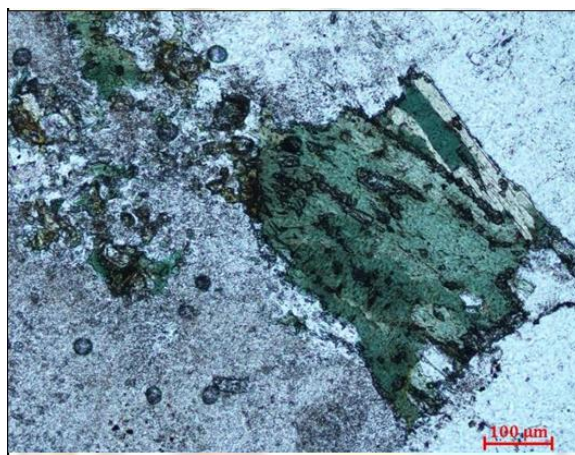


Fig. 25.4 Large Chlorite grain beside altered sericitised feldspar; few epidote and chlorite also form within feldspar during late hydrothermal event

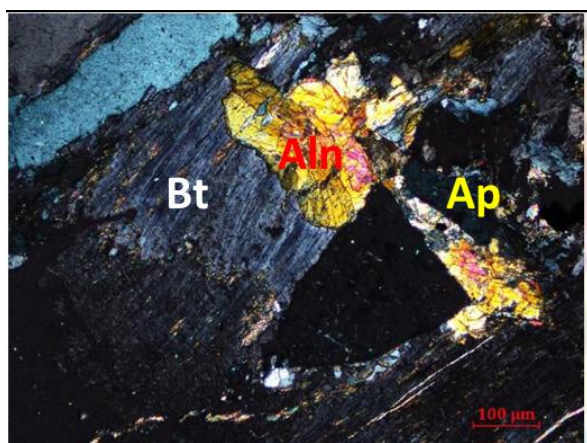


Fig. 15E. Photomicrograph showing presence of apatite (Ap), allanite (Aln) and biotite (Bt) under transmitted light XPL (10X).

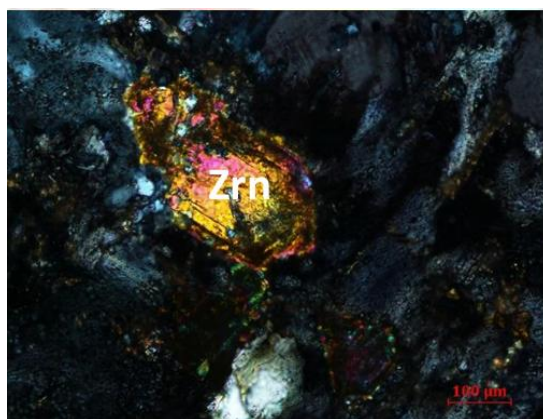
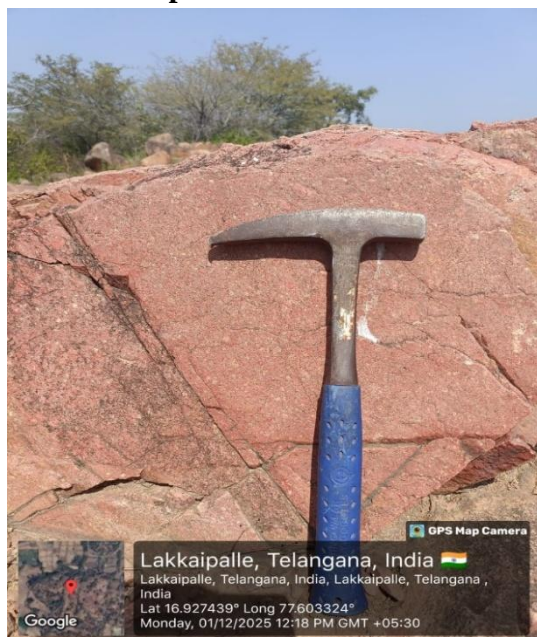


Fig. 15F. Photomicrograph showing presence of zircon (Zrn) under transmitted light XPL (10X).

Micro photograph No: 7.4.0 -1.3

Alkali Feldspar Granite



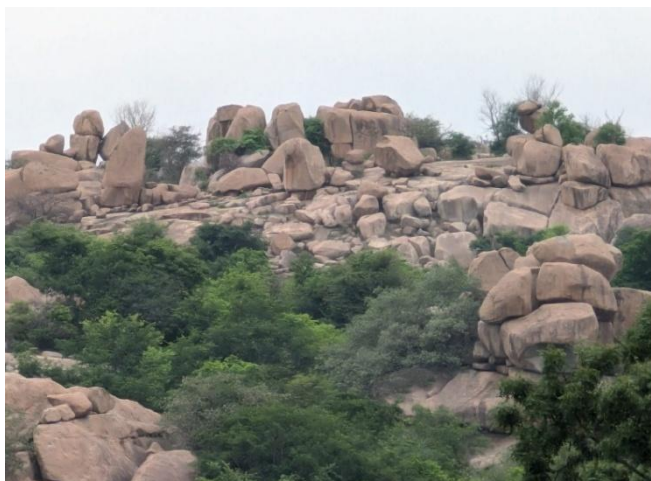
Field Photograph No: 7.4.0 -2.1

Photograph no: 4.b showing View of the pink alkali feldspar granite ridge around Lakkayapalli in the northern part of the block area



Field Photograph No: 7.4.0 -2.3

This lithounit is located in the northern part of the block area forming a ridge bordering a major fault/shear zone trending NW-SE extending for several k. Microscopic study reveals that the rock exhibits a coarse-grained, inequigranular texture. The modal mineral assemblage is dominated by K-feldspar (microcline and perthite), plagioclase, quartz, and accessory phases apatite, allanite and zircon.



Field Photograph No: 7.4.0 -2.2

Accessory minerals include titanite (Ttn), recognized by its high relief and wedge shaped morphology, and allanite (Aln), which appears as brownish, high-relief grains often associated with alteration halos.

The spatial association of epidote, calcite, and allanite with feldspar alteration zones indicates significant fluid-mediated metasomatism during the late to post-magmatic stages. Based on the petrographic features suggest crystallization from an evolved, silica-rich magma followed by extensive sub solidus re-equilibration and hydrothermal alteration. Porphyritic rock consisting of large alkali feldspar phenocrysts within quartz –biotite rich matrix. Alkali feldspar grains are characterized by tapered cross hatched twinning and flame perthite. Myrmekite intergrowth of albite-quartz along the feldspars boundaries is also conspicuous. Often coarsening of myrmekite form tiny grains along the boundaries. Alteration of alkali feldspar to sericite at places give the dusty appearance of feldspar. Epidote, sericite and chlorite are the secondary mineral assemblages formed during late hydrothermal alteration of the granitic rock. Alteration of orthoclase feldspar to sericite give a dusty appearance to it.

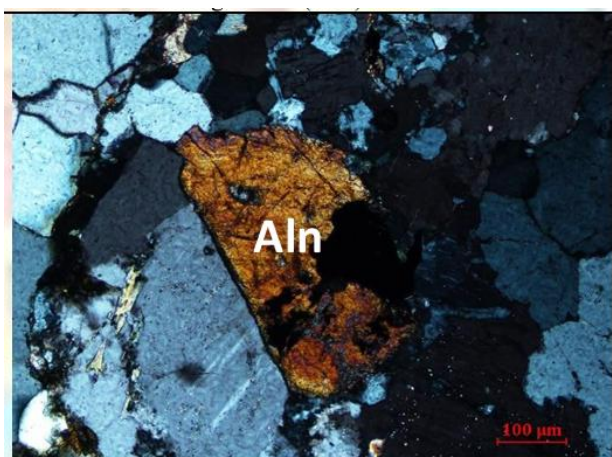


Fig. 47F. Photomicrograph showing presence of allanite (Aln) under transmitted light XPL (10X).

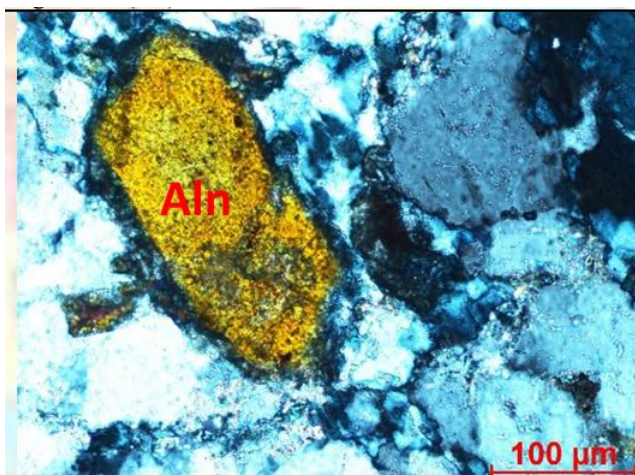


Fig. 77F. Photomicrograph showing presence of allanite (Aln) under transmitted light XPL (20X).

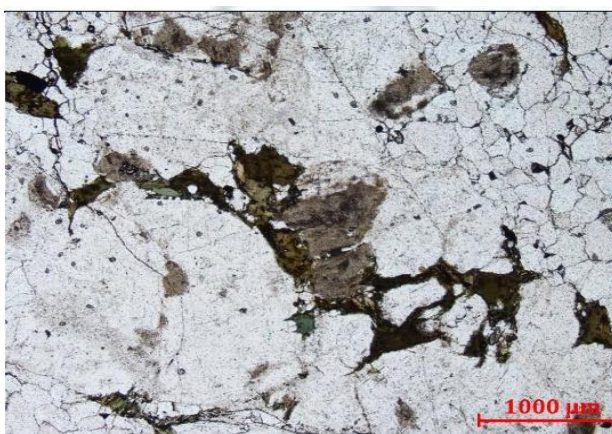


Fig 07.1 Alkali feldspar, quartz, altered dusty feldspar define the recrystallized aggregate; biotite occurs as interstitial mineral. Under 2X magnification

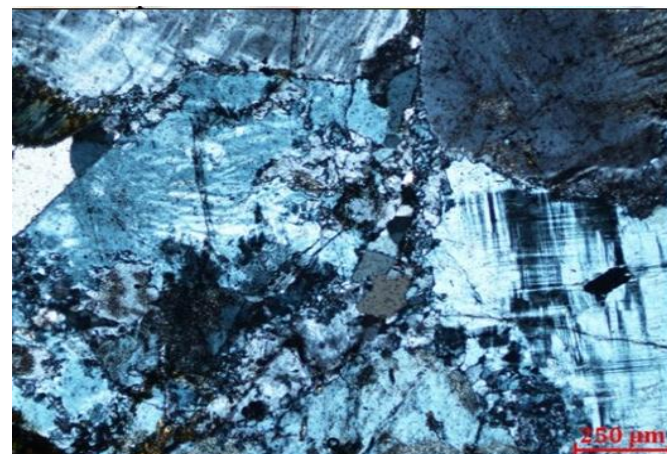


Fig.07.4 Coarsening of myrmekitic intergrowth along the feldspar grain boundaries;

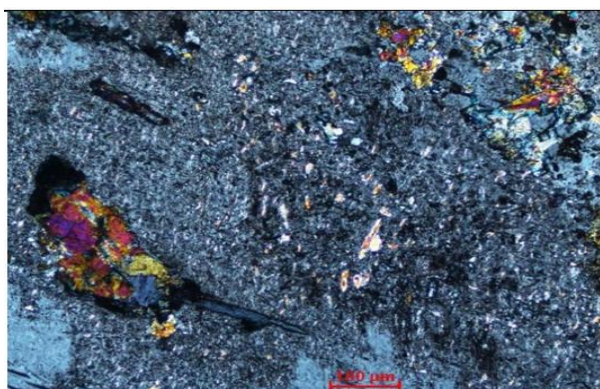


Fig. 12.7 Sericitization and epidote formation in plagioclase due to hydrothermal alteration; under cross polarized light

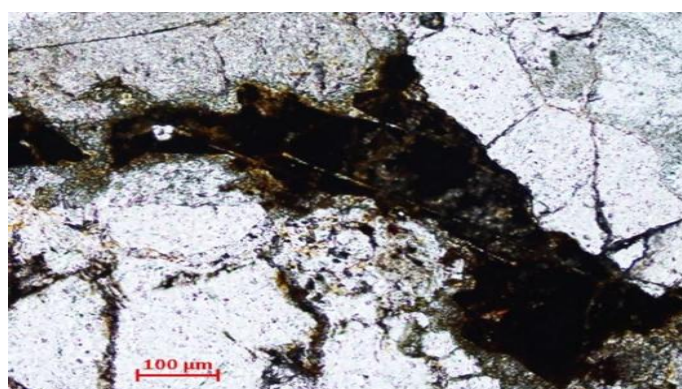


Fig. 67.11 Dark brown allanite with epidote rim; both contain REE; under plane polarized light



Fig. 60.5 Thin zone of brecciation with epidotization; plagioclase and quartz grains became brecciated; note the high RI epidote in matrix also

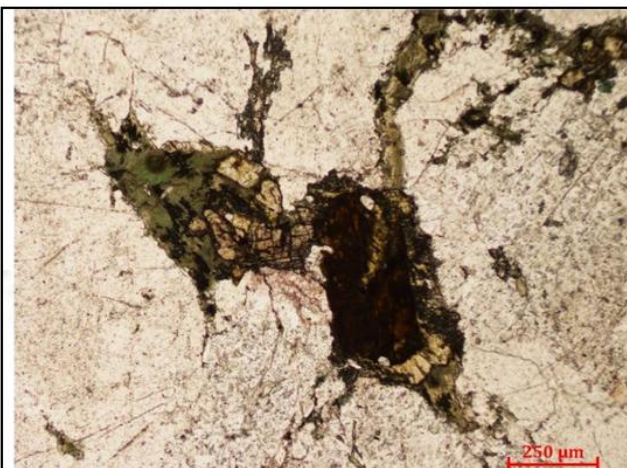


Fig.60.11 Allanite with epidote rim; formation of epidote and titanite forming over chloritized biotite

micro photograph No: 7.4.0 -2.4

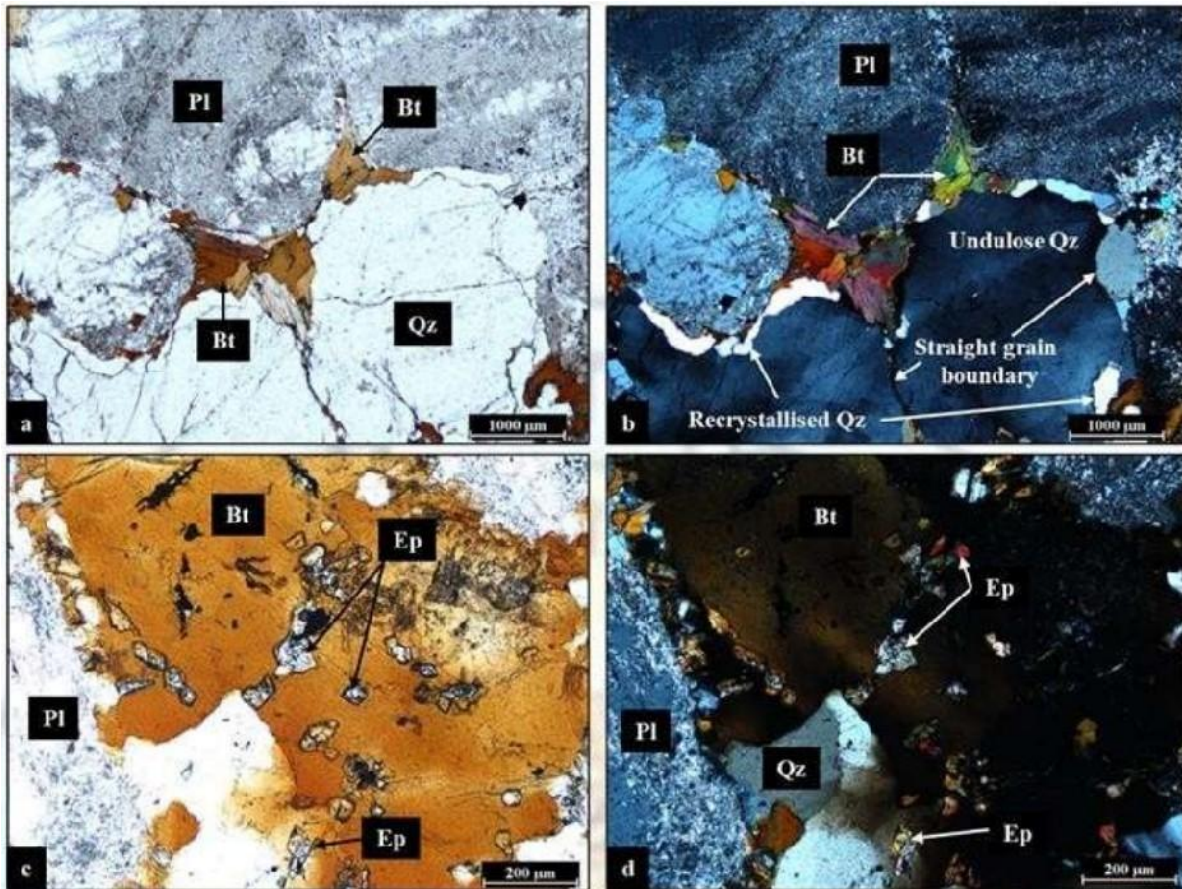
brown coloured, anhedral allanite(?) are present with an epidotrim. Biotite flakes are present as small mafic clusters. It is pleochroic from pale yellow to brown. At most of the places, biotite has been replaced by pale green coloured chlorite. Epidote also occurs as veins passing through a brecciated zone. This zone consists of broken feldspar grains and interstices are filled up by epidote.

Leucogranite

This lithounit is leucocratic, medium to fine grained exhibiting an inequigranular texture and is primarily composed of plagioclase feldspar and quartz with a minor amount of biotite oriented and forms a thin streak at places. This unit is exposed in the southern part of the block area south of Basnnapalli and east of Bommannapadu where few rocky knobs are present. Under the microscope besides plagioclase, quartz, biotite accessory minerals like zircon and secondary minerals such as epidote and sericite have also been observed. Plagioclase is subhedral and is characterized by its distinct thin and closely spaced lamellar twinning indicating, indicative of an albite (Na)-rich



Field Photograph No: 7.4.0 -3.1

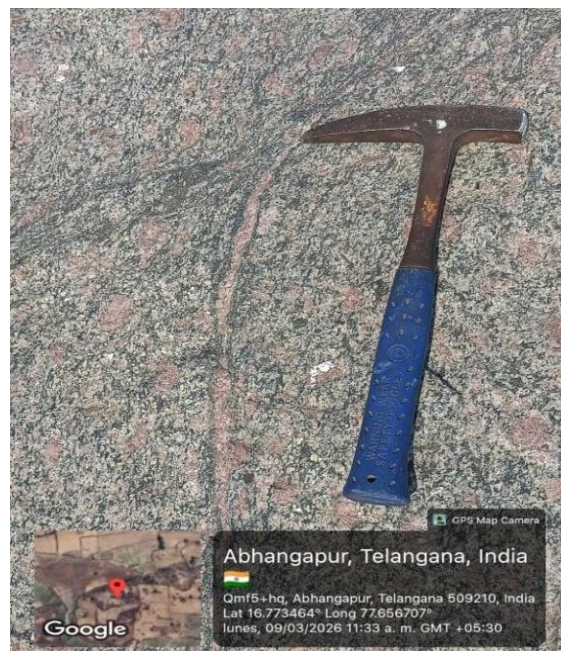


Micro photograph No: 7.4.0 -3.2

porphyritic granite

Porphyritic granite is located west of Abhangapur village in the southern part of the block

It is coarse-grained and inequigranular, displaying a distinct porphyritic texture. The predominant mineral assemblage is dominated by quartz and plagioclase in the groundmass with phenocrysts of K-feldspars mostly orthoclase with minor amounts of microcline (Fig. 31A). under the microscope it's observed that biotite occurs as segregated clusters, commonly surrounding K-feldspar phenocrysts and occupying the interstitial spaces of the groundmass. The principal accessory mineral identified is zircon, while opaque phases are represented mainly by magnetite with inclusions of ilmenite

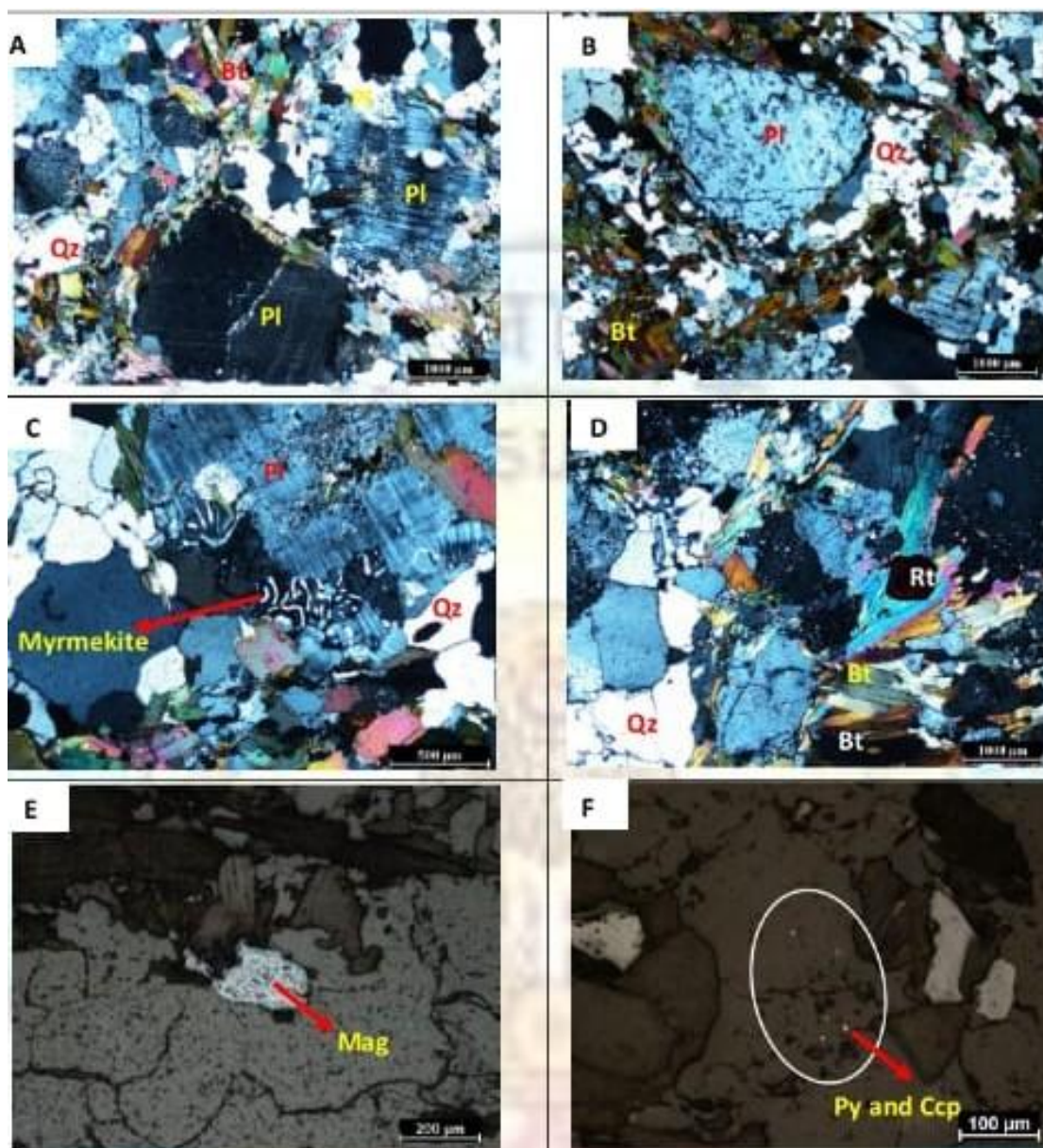


Field Photograph No: 7.4.0 – 4.1

Quartz is generally medium-grained and locally exhibits sub-grain formation adjacent to plagioclase. The plagioclase crystals display well-developed polysynthetic twinning (albite/carlsbad type), though in places the twinning is partially obliterated due to alteration. Grain boundaries are diffuse and irregular, reflecting recrystallization and secondary alteration processes (Fig. 31B).

Biotite is relatively common, forming subhedral to euhedral, elongated, foliated flakes. It shows distinct pleochroism from light to dark brown and frequently encloses accessory minerals. A characteristic feature observed is the development of myrmekite texture, manifested as micrographic intergrowths of vermicular quartz along the margins of plagioclase feldspar (Fig. 31C).

Zircon typically occurs as inclusions within biotite (Fig. 31D). Additional accessory minerals include rutile and magnetite (Fig. 31E). Minor sulphides are also recorded, occurring as fine disseminated grains of pyrite and chalcopyrite (Fig. 31F). the precipitation of secondary minerals such as epidote, and sericite. The rock represents a plutonic, albite-rich felsic lithology, initially crystallized from an evolved magma and subsequently overprinted by tectonic deformation and hydrothermal fluid infiltration.



Micro photograph No: 7.4.0 – 4.2

Meta Gabbro

Meta Gabbro is located south of Bandakonda village and it is coarse grained, melanocratic mainly composed of Clinopyroxene, Amphibole, Plagioclase, Titanite Alkali Feldspar with Secondary minerals: Sericite Epidote and sphene showing a granoblastic aggregate. Amphiboles are green to dark green in pleochroism and associated closely with clinopyroxene. Clinopyroxene mostly occur as subhedral grains as well as inclusions in amphiboles. Clinopyroxenes are characterized by pale green colour, one set of cleavage, higher order interference colour and inclined extinction... Secondary minerals such as sericite and epidote were formed by replacing plagioclase. Epidote grains are subhedral and mostly forming over plagioclase and often near amphiboles. Titanite, a dark yellowish brown coloured mineral formed interstitially. Inclusions of other minerals are also present within this late brown-coloured minerals.



Field Photograph No: 7.4.0 – 5.1

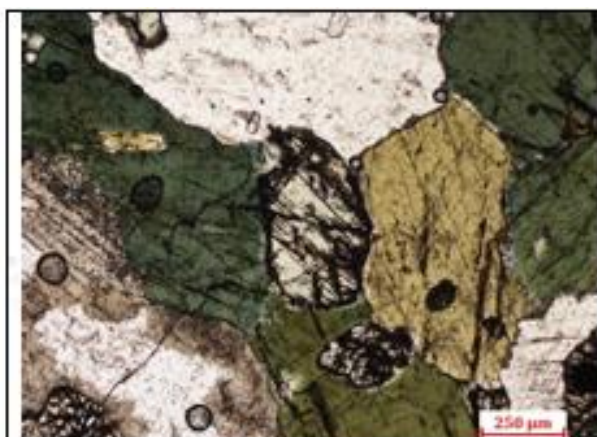


Fig. 80.1 Coarse grained Clinopyroxene, amphibole, plagioclase and orthoclase mineral assemblage of the rock

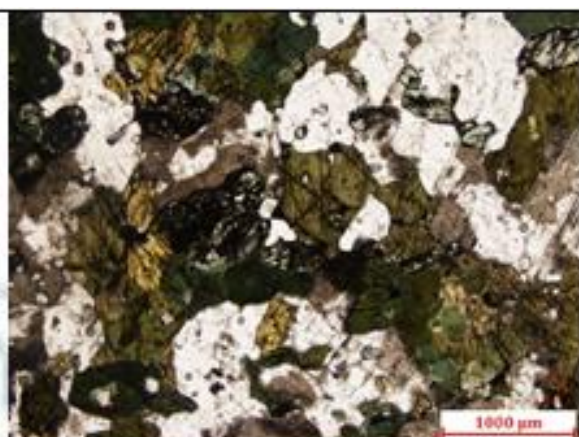


Fig 80.2 Altered orthoclase have dusty appearance

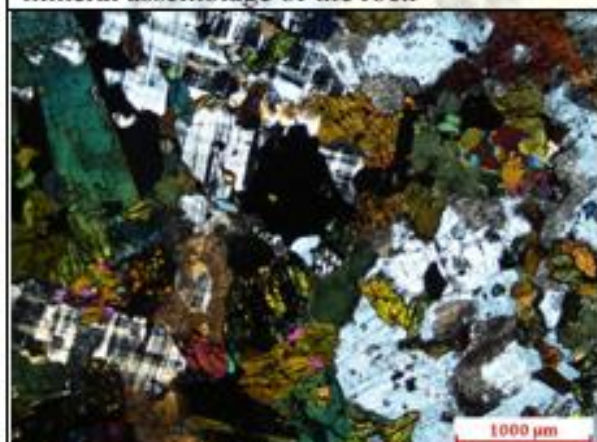


Fig. 80.3 Recrystallized aggregate of amphibole, plagioclase, clinopyroxene and altered orthoclase.

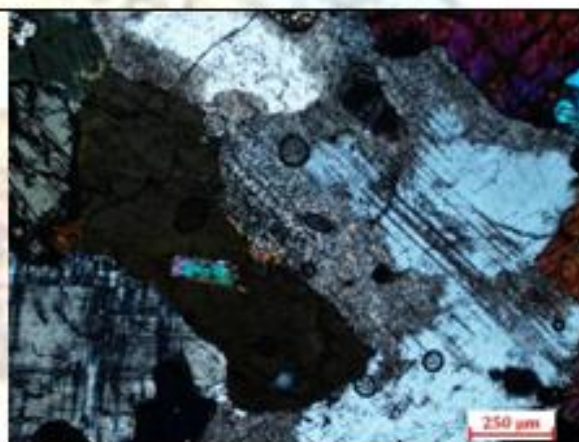


Fig. 80.4 Microcline and plagioclase both present in the gabbroic rock; microcline have formed during later event



Fig. 80.5 Amphibole, clinopyroxene, titanite on altered feldspar grains.

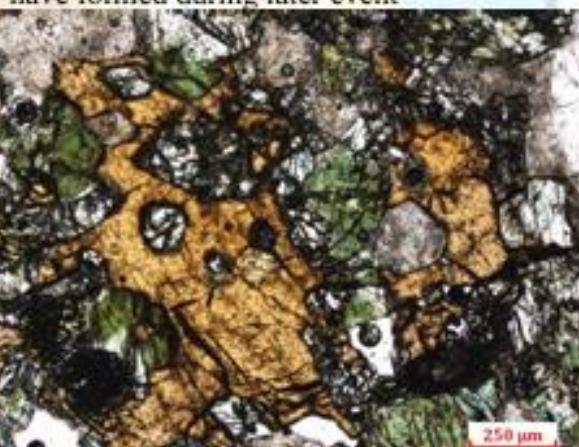


Fig. 80.6 Interstitial titanite with inclusions of clinopyroxene

Micro Photograph No: 7.4.0 – 5.2

Intrusives

The entire block area comprising of different variants of granites are traversed by a number of basic and acid intrusives. The basic intrusives are predominantly Dolerites with few Gabbro exposures. The acid intrusives include the Quartz and Pegmatite. The area being an integral part of the Narayanpet Kimberlite Belt where a number of clusters have been identified by GSI and five kimberlites of Maddur cluster are located within this area and all of them are within the grey biotite granite. The basic and acid intrusives are of Paleoproterozoic age whereas the kimberlites are of Mesoproterozoic age. The details of these are given below.

Pegmatite

Pegmatite vein are located North of Monapuram and northeast of Jadavaraopalli. These trend in NW-SE direction and are about 350 to 400 m long and 150 to 200 m wide.



Field Photograph No: 7.4.0 – 6.1

Quartz reef/vein

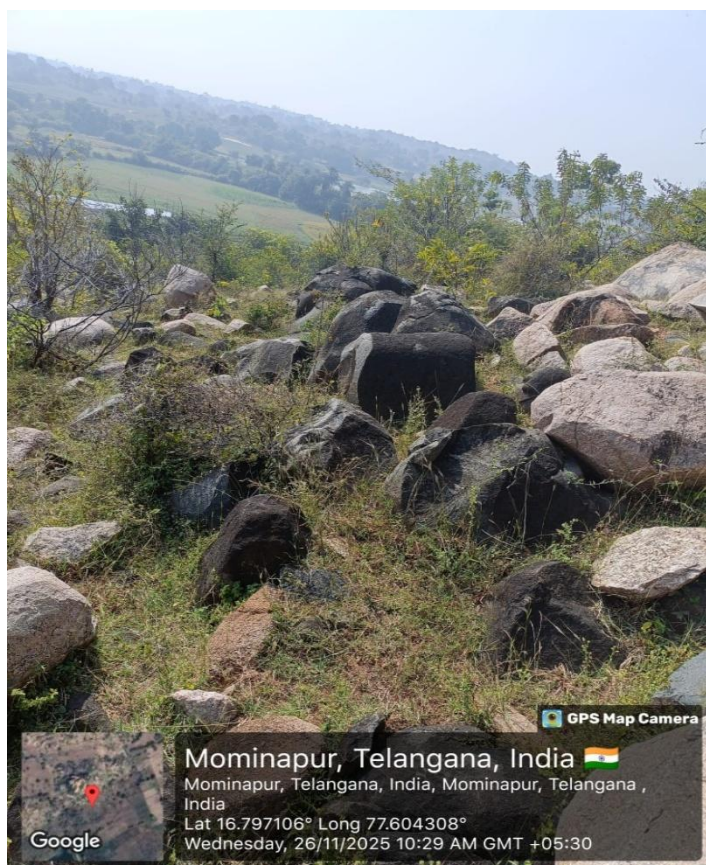
In the northern part of the block a major shear/fault zone passes through the block in a NW-SE direction along which a Quartz reef is seen emplaced.



Field Photograph No: 7.4.0 – 7.1

Dolerite dyke

View of the pink alkali feldspar granite ridge located south west Monapuram dolerite cutting across the alkali feldspar granite



Field Photograph No: 7.4.0 – 8.1

Kimberlite

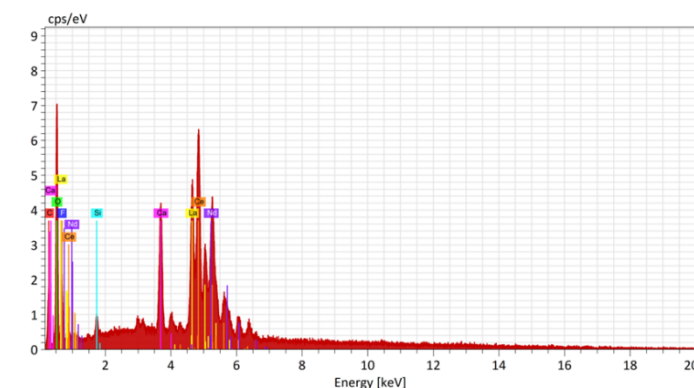
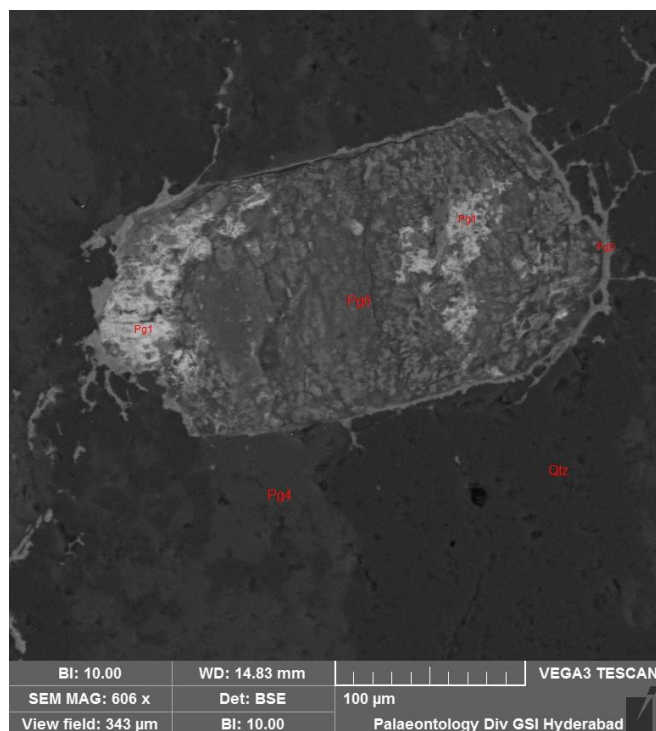
Kimberlites were located by GSI around Maddur and Narayanpet areas in undivided Mahabubnagar district, Telangana, and it has been referred as Narayanpet Kimberlite field (NKF). In this field 37 kimberlite pipes were identified which got emplaced during Mesoproterozoic, having age range of 1000-1300 my. The kimberlites of this field are small bodies except the Kotakonda and Vinjamur Kimberlites (KK-1 and KK-2) which are about 2 km in length with width varying from 20m to 100m. The outcrops are very few and sparse and are generally of 1 m x 2m in size. The kimberlites are oval, elliptical and linear in shape. The morphological, textural and mineralogical characters of the pipe rock indicate that they are eroded to near root zone level. The kimberlites are usually weathered and altered with a thin layer of calcrete/ or covered by colluvium. In this block area the cluster of this kimberlites have been named by GSI as Maddur cluster of which six pipe rocks are marked around Appireddipalli, Abhangapur, and Nidjinta, Monapuram but no outcrops are seen covered by regolith within the cultivated lands. As per GSI literature these rocks are hard, compact, dark blue, porphyritic enclosing numerous xenoliths of country rocks. The mineral assemblage of kimberlites reported are olivine, perovskite, phlogopite, richterite, serpentine and carbonates along with xenocrysts of chrome diopside. Chrome-spinel, picro-ilmenite are also recorded in varying proportions in different pipes.

7.5.0 SEM Studies:

The lithounits which analysed for significant values of REE were probed under SEM-EDX are found that the minerals, such as Monazite, Allanite, biotite, ilmenite, muscovite, Albite, Microcline, Calcite, Apatite, Bastnasite, Thorite, Titanite zircon which are the favorable minerals which host the rare earth elements, such as cerium, lanthanum, neodymium, samarium, europium, gadolinium, praseodymium and other rare earth elements. However, the Alkali feldspar granite samples analyzed significant concentration of REE (up to 1682 ppm) in Pallerla zone-and up to 1600 ppm in Lakkayapalli zone. (Cerium-lanthanum-Phosphate), Allanite-a cerium epidote, biotite, Muscovite are potassium, Albite and Microcline are alkali feldspars presence of Monazite Allanite, Bastnasite also contributes to the REE concentration since Monazite is Cerium lanthanum- Phosphate Hence, the mineralogical assemblage of the lithounit alkali feldspar granite, which is geochemically Quartzolite in composition, is hosting these REE minerals This lithounit is seen bordering the major shear zone Neither side granodiorite in composition, is hosting these REE minerals. When the chemical data was plotted in the R1-R2 plot of Bachelor and Bowden (1985). It fell in the Mantle fractionate field.

Thin section Sample No: –MN-47

Rock Type: Alkali feldspar granite

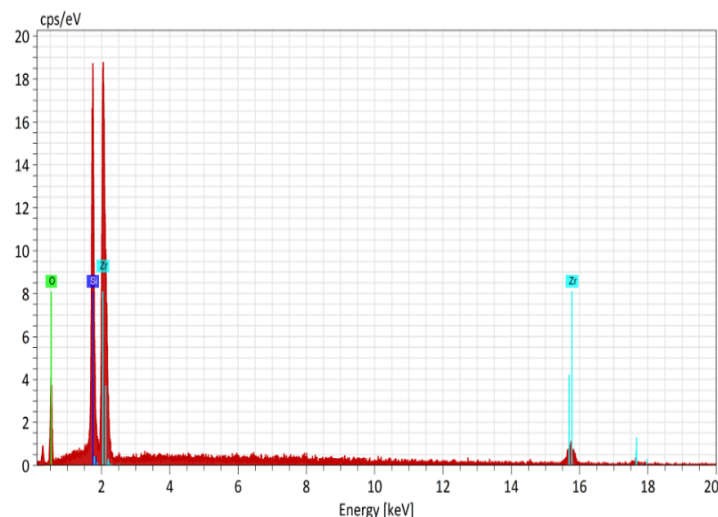
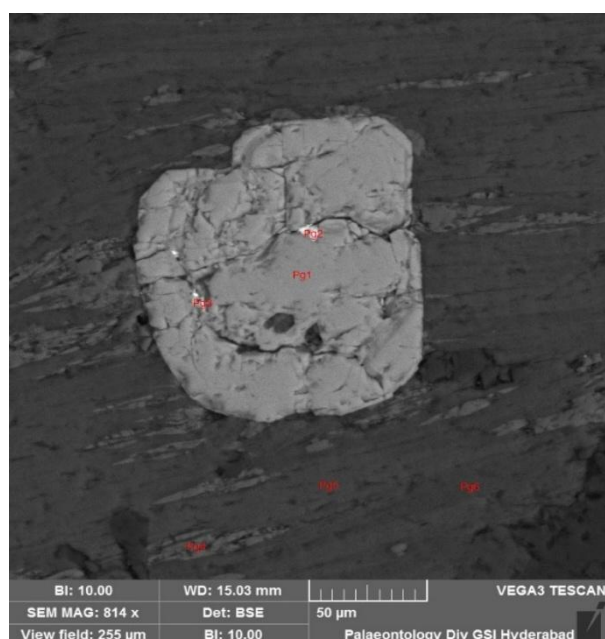


Back Scattered image (BSE) Showing
Bastnasite, Allanite, K- feldspar,
Quartz

Text Fig: No: 4

Thin section Sample No: MN-40

Rock Type: Alkali Feldspar Granite

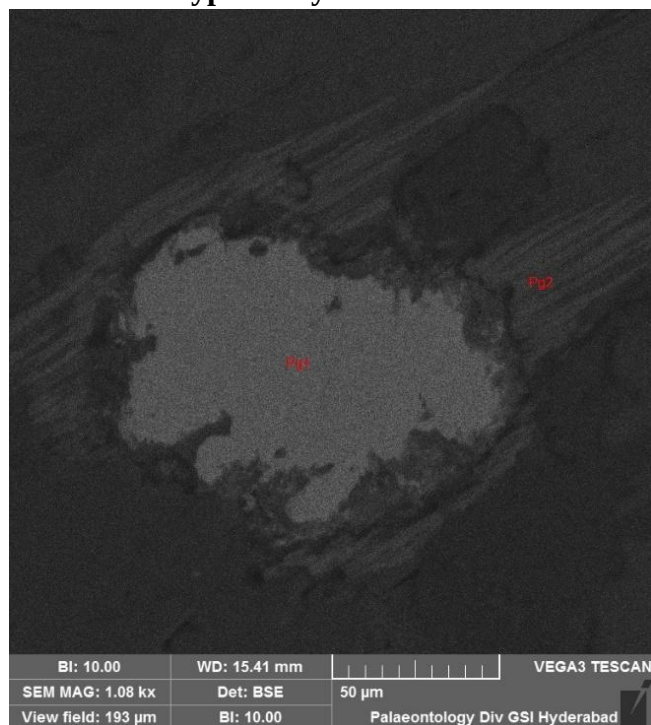


Back Scattered image (BSE)
Showing Zircon, iron oxide,
Argentite, amphibole, biotite,

Text Fig: No: 5

Thin section Sample No: MN-25

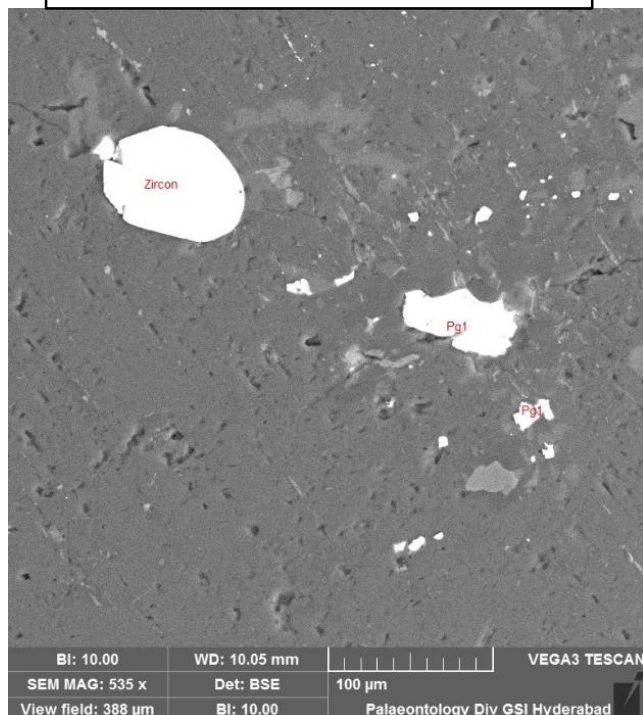
Rock Type: Grey Biotite Granite



Text Fig: No: 6

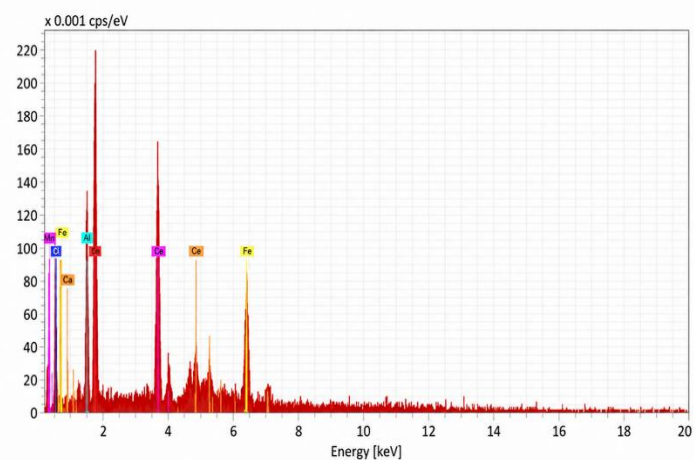
Thin Section Sample No: MN-60

Rock Name: Alkali Feldspar granite



Text Fig: No: 7

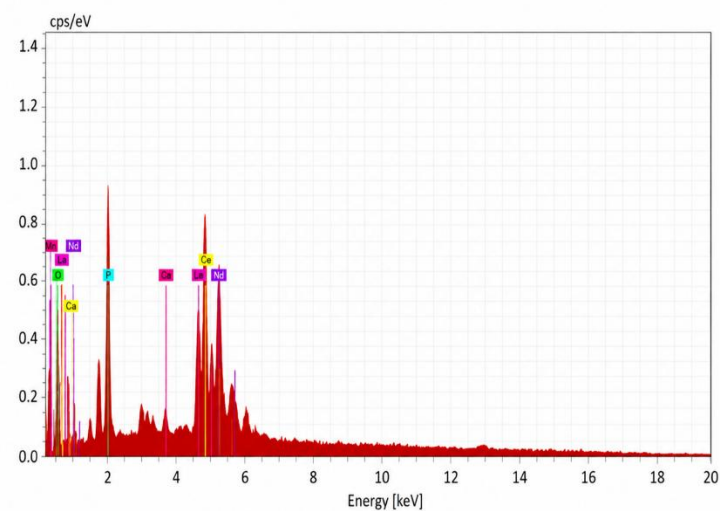
**SEM-EDS Lab, Palaeontology Division, Geological Survey Of India(SR)
Hyderabad**



Back Scattered image (BSE) Showing

Plagioclase

**SEM-EDS Lab, Palaeontology Division, Geological Survey Of India(SR)
Hyderabad**

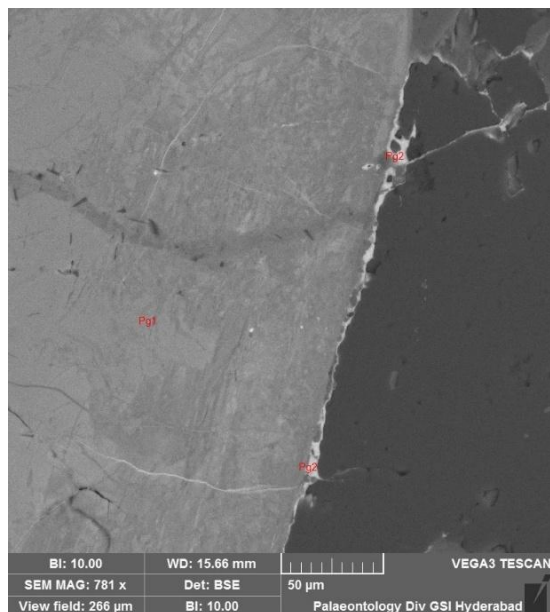


Back Scattered image (BSE) Showing

Zirconium, Plagioclase

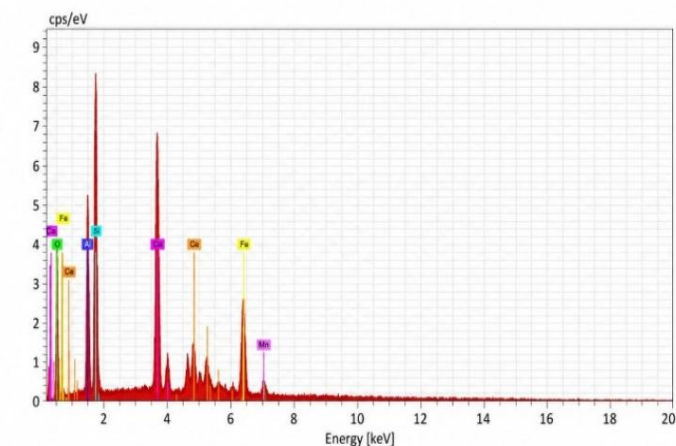
Thin section Sample No: MN- 67

Rock type: Alkali feldspar granite



Text Fig: No: 8

**SEM-EDS Lab, Palaeontology Division, Geological Survey Of India(SR)
Hyderabad**

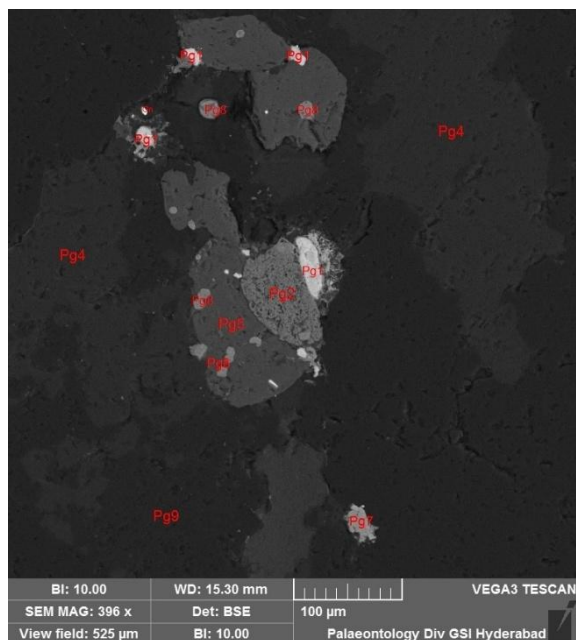


Back Scattered image (BSE) Showing

Apatite, vanadium with cerium, apatite,
zircon,amphibolite

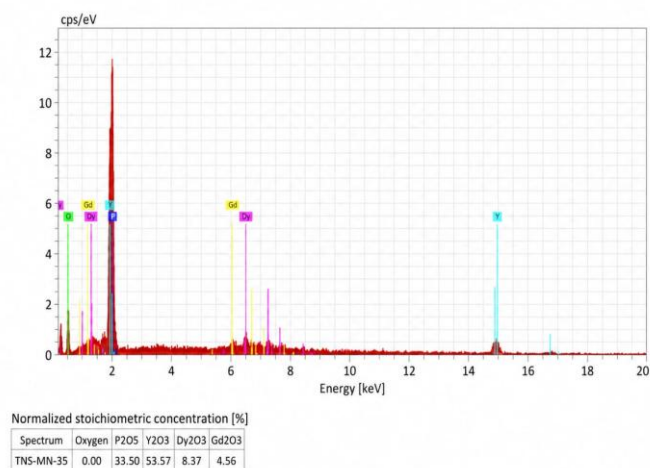
Thin section Sample No: MN- 35

Rock Type: Grey Biotite Granite



Text Fig: No: 9

**SEM-EDS Lab, Palaeontology Division, Geological Survey Of India(SR)
Hyderabad**

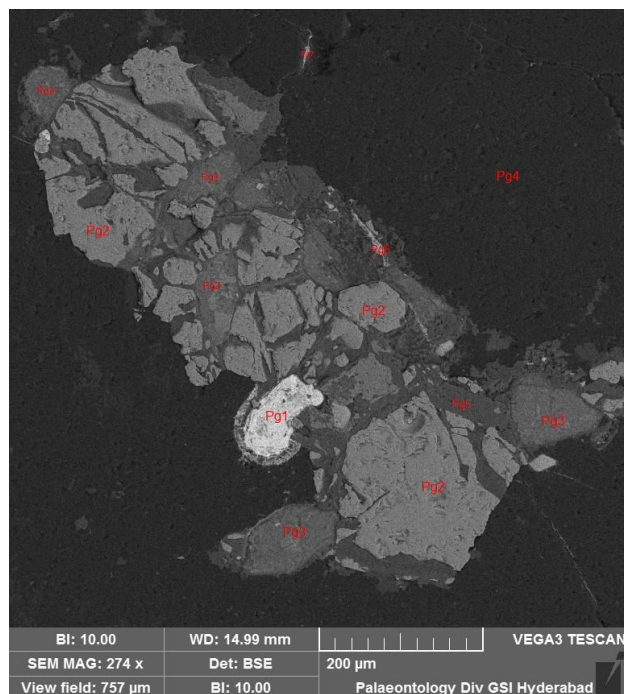


Back Scattered image (BSE) Showing

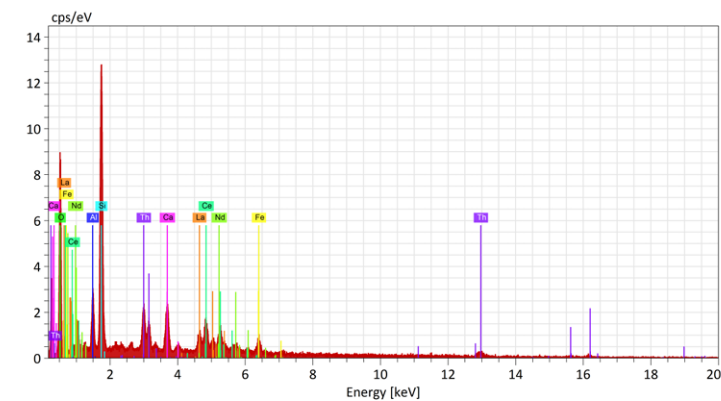
Thorite, Iron oxide, K- feldspar, Plagioclase,
Allanite, Zircon

Thin section Sample No: MN-17

Rock Type: Alkali Feldspar Granite



Text Fig No: 12

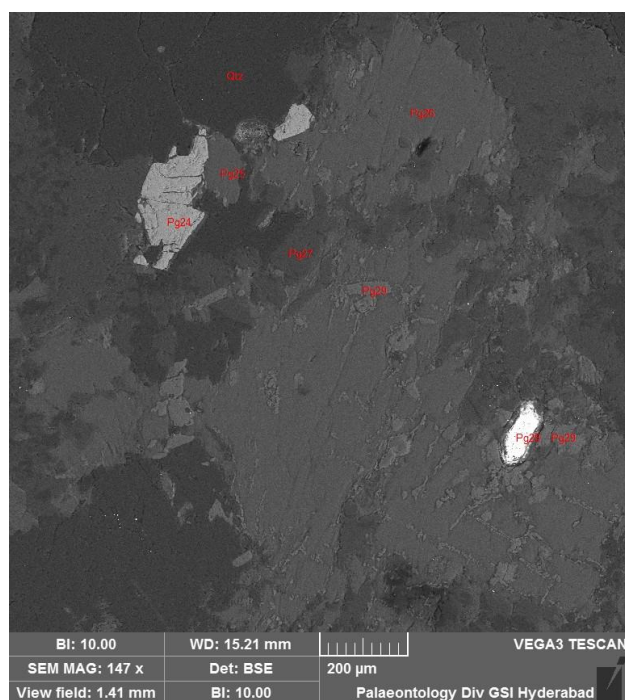


Normalized stoichiometric concentration [%]
SpectrumOxygenAl2O3SiO2 CaO FeO La2O3Ce2O3ThO2Nd2O3
MN 17 0.00 8.36 44.675.623.586.55 10.88 16.883.45

Back Scattered image (BSE)Showing
Thorite, Iron Oxide, Allanite,
Albite, Zircon

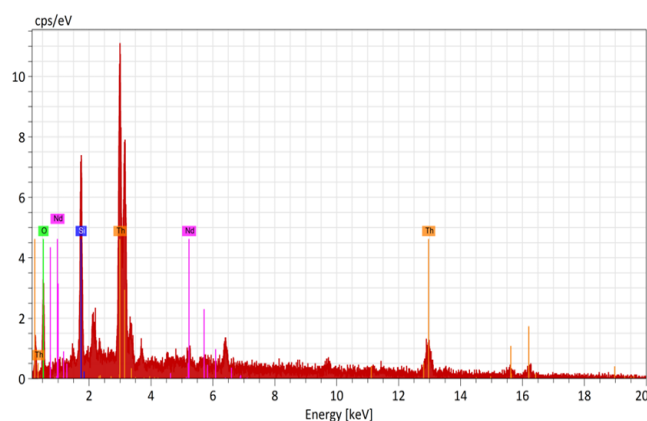
Thin Section Sample no: MN-7

Rock Type: Alkali feldspar granite



Text Fig No: 13

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Hyderabad



Normalized stoichiometric concentration [%]
SpectrumOxygenSiO2 Nd2O3ThO2
MN 7 0.00 23.481.99 74.53

Back Scattered image (BSE)Showing
iron oxide, biotite thorite, k-
feldspar,muscovite, epidote

7.6.0 Geochemistry

The geochemical evolution of granitic system is governed by progressive magmatic differentiation, late-stage fluid evolution, and hydrothermal overprinting. Major-element chemistry provides the first-order constraints on magma evolution, whereas trace elements including high field strength elements (HFSE), and rare earth elements (REE) preserve information on incompatible-element enrichment, accessory-mineral crystallization, and fluid–rock interaction. Integration of these datasets is therefore

essential for understanding the petrogenesis of REE systems and assessing their mineralization potential. REE commonly represent the final products of extreme fractional crystallization. During this process, early crystallization of quartz, feldspar, and ferromagnesian minerals progressively removes compatible elements from the melt, leading to concentration of incompatible elements in the residual liquid. Once saturation of accessory phases such as zircon, monazite, xenotime, allanite, apatite, and columbite-group minerals is reached, the geochemical behavior of HFSE and REE becomes increasingly controlled by these minerals rather than by major rock-forming phases. Subsequent hydrothermal activity may substantially modify the major-element composition of the host rocks through silicification, alkali depletion, sericitization, chloritization, and carbonatization. In contrast, many REE-bearing accessory minerals remain comparatively resistant to alteration, allowing the primary magmatic REE signature to be preserved even where major oxides have been extensively redistributed. Consequently, interpretation based solely on major oxides may underestimate the degree of magmatic evolution unless integrated with REE and HFSE geochemistry. The objective of this chapter is therefore to integrate the major-element, HFSE, and REE datasets into a coherent petrogenetic model describing magma evolution, hydrothermal modification, and REE and precious metals enrichment.

The analyzed samples are characterized by exceptionally high silica contents ranging from approximately **76 to 85 wt.% SiO₂**, indicating that they represent highly evolved felsic rocks or intensely silicified equivalents. In contrast, Na₂O and K₂O contents are uniformly low, whereas Al₂O₃ varies moderately and Fe₂O₃, MgO, TiO₂, and CaO display localized enrichment in a limited number of samples.”

The granitic variants of Maddur block are found to be highly heterogeneous in nature and the selected samples of these were analyzed for major oxides and trace elements such as REE and associated elements including the precious elements As Sb Bi within the quartz reef emplaced along the major fault zone trending NW- SE be targeted along the evaluating their concentration.

Twelve (12) Nos of granitic samples were Chemically analysed for major oxides. The details are shown on the table below:

Table No: 7.2

Comparison of Major Oxide values of Granite

Major Oxide	Range of Values for granite		
	Min %	Max %	Average
SiO ₂	76.08	85.1	82.41
Al ₂ O ₃	10.6	15.58	12.33
Fe ₂ O ₃	0.62	2.61	1.64
MnO	0.01	0.04	0.02
MgO	0.03	0.61	0.28
CaO	0.72	3.6	1.45
Na ₂ O	0.19	0.39	0.26
K ₂ O	0.04	0.31	0.23
TiO ₂	0.02	0.33	0.18
P ₂ O ₅	0.02	0.11	0.06
V ₂ O ₅	0.37	0.01	0.73
Loss on Ignition (LOI)	0.01	1.46	0.01

Their analytical data were plotted on various geochemical diagrams to arrive at their classification, source and nature of magma and their tectonic environment in which they got emplaced.

The QAP diagram of albert streckisen with modified CIPW normative calculations indicate overwhelmingly Quartz rich Granitoid field with one sample after the IUGS classification. The dominance of normative quartz reflex exceptionally high silica contents combined with strong depletion of normative felspar components resulting from the low Na₂O and K₂O concentrations.

The QAP diagram demonstrate that silica saturation remained extremely

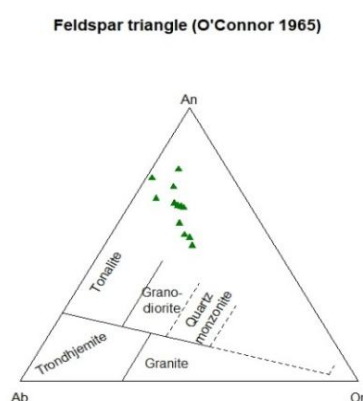
throughout the evolution of the system. Such quartz dominating residual compositions are consisted with late-stage granitic different ions and provide favourable conditions for the concentration of incompatible elements within Residual melts. The TAS diagram of M.J.Le Bas, Maitre placed all the analysed samples in the high silica but extremely low alkali portion of the classification field although silica contents correspond to evolved.

Felsic compositions, total alkalis significantly lower than those of unaltered rhyolites all granites. Such a position is typical for fresh igneous rock and these interpreted to reflect extensive alkali deflation rather than primary magma chemistry.

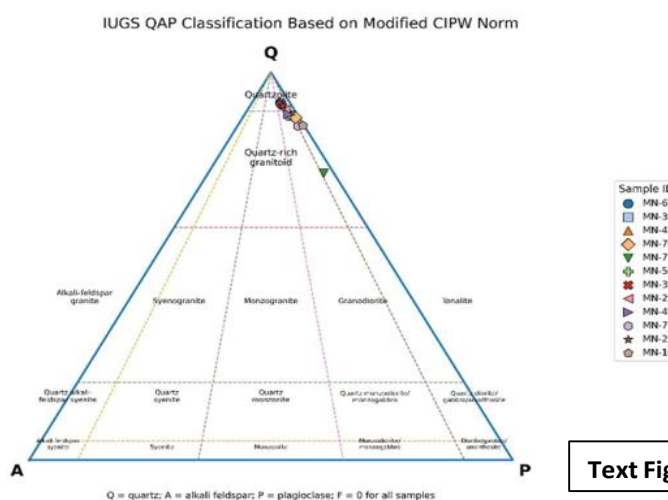
Hydrothermal fluids capable of destroying feldspars and promoting quartz enrichment commonly produced similar chemical signatures through removal of Na and K while leaving silica relatively immobile.

Consequently, the TAS classification should be regarded as an alteration sensitive indicator rather than a representation of the original magma composition. The silica rich alkali poor nature of the samples supports extensive hydrothermal modification of an evolved felsic precursor.

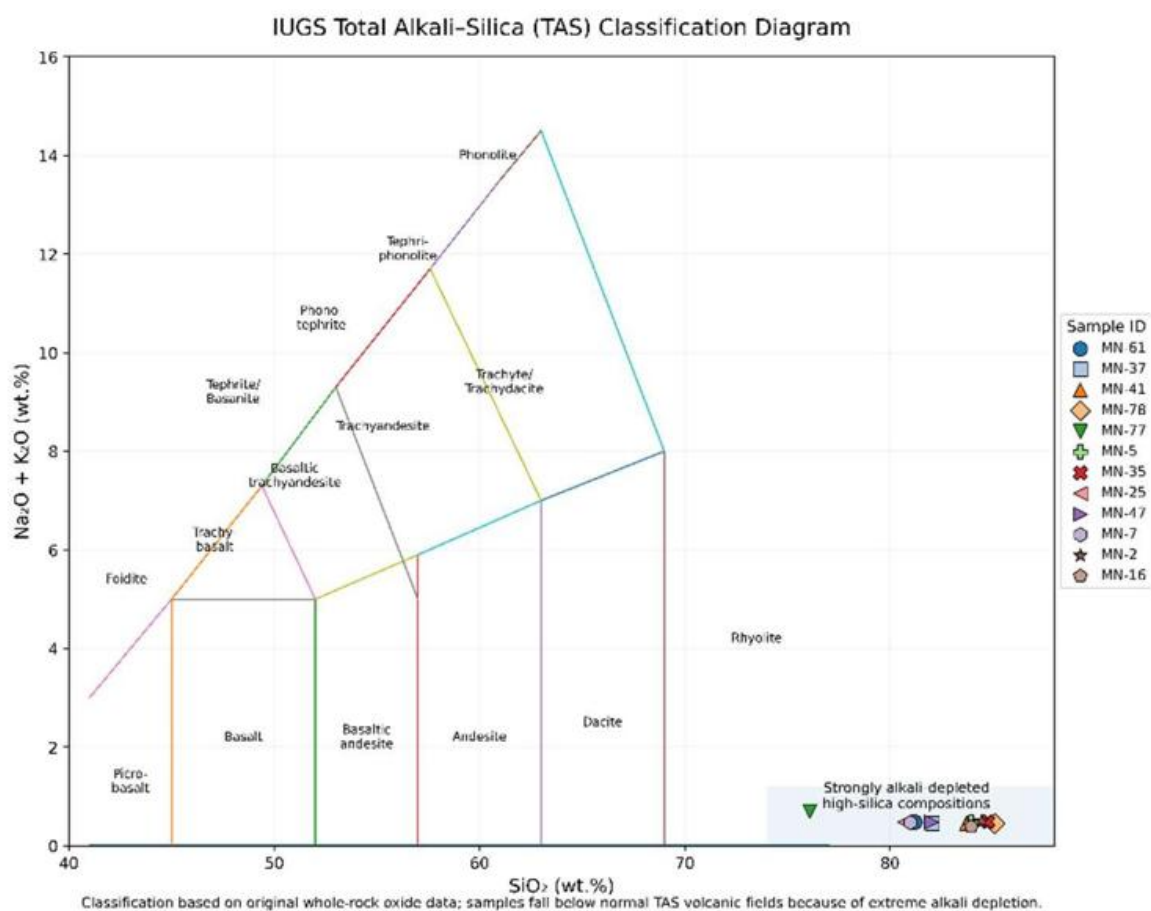
As per Shands classification the ASI graph where the A/NK, - A/CNK diagram indicates strongly peraluminous compositions. In fresh granite A/CNK values generally indicate S-type or strongly peraluminous magmas. In the present case the indices are more reasonably interpreted as evidence of hydrothermal alteration involving feldspar detracting and residual alumina enrichment.



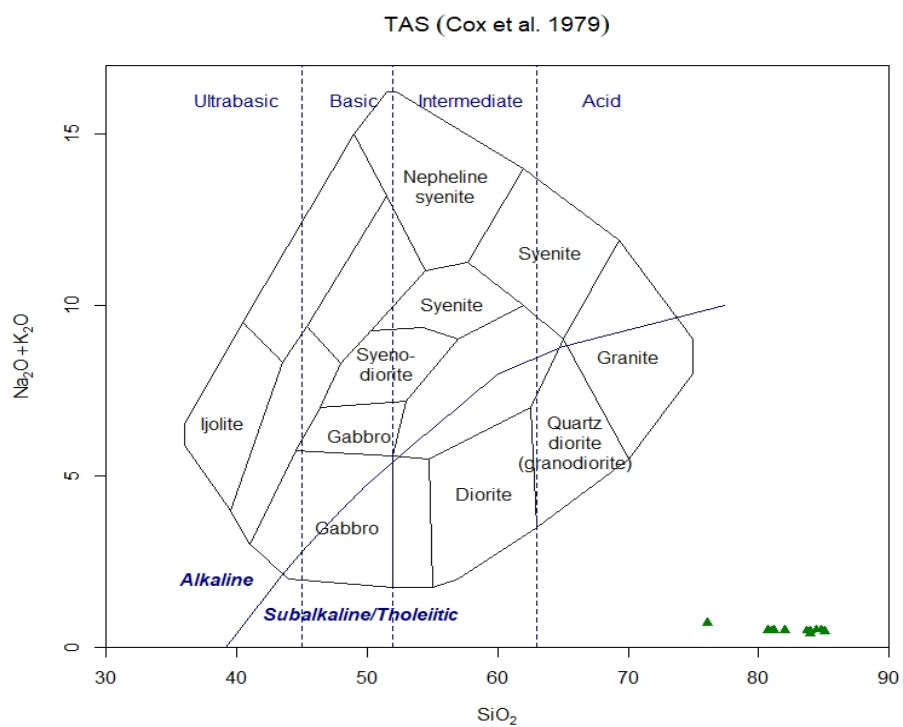
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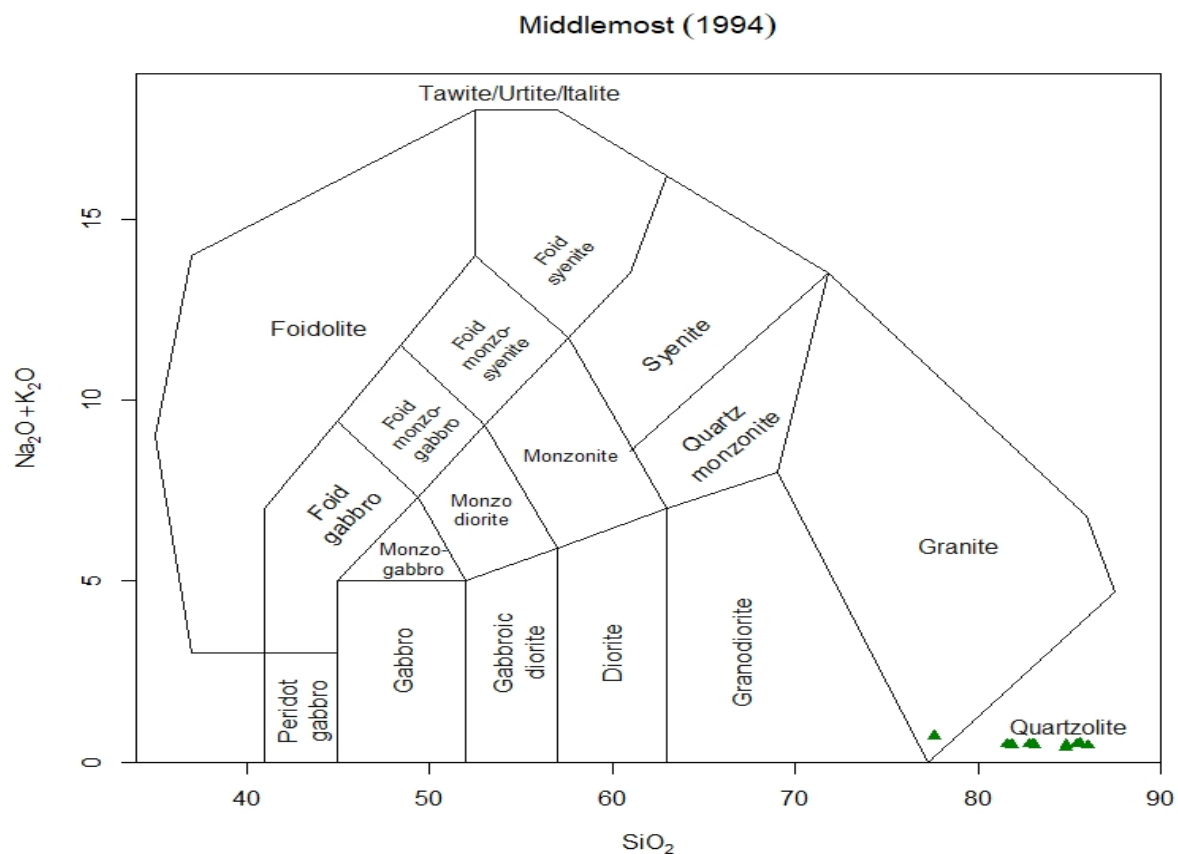
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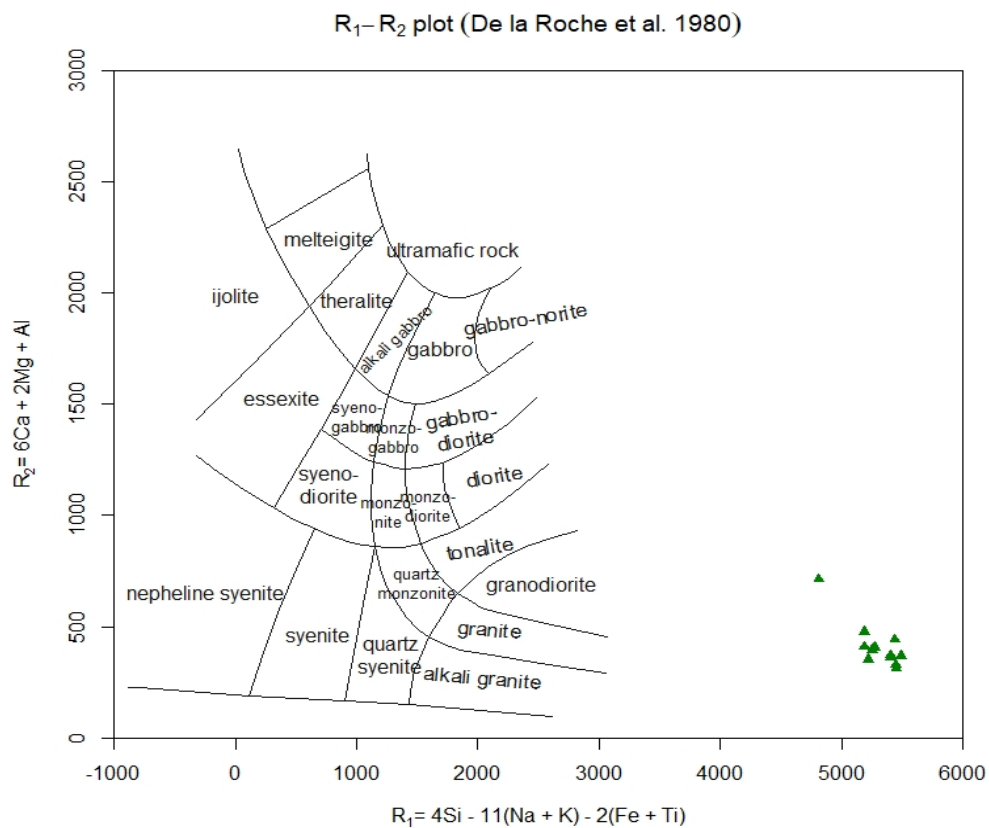
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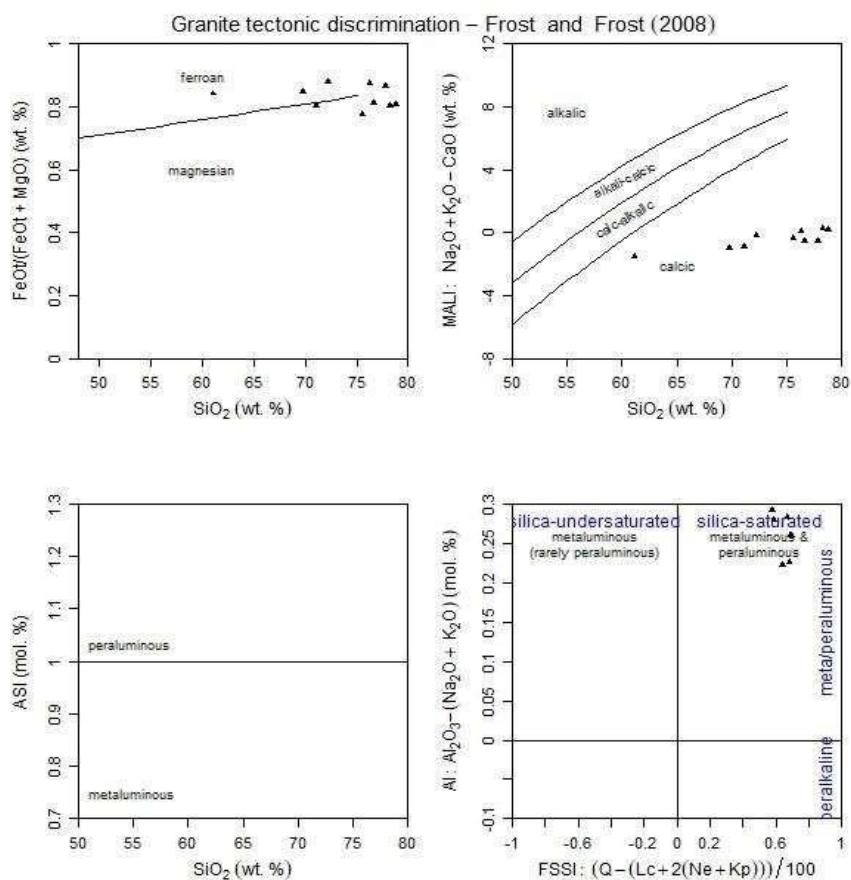
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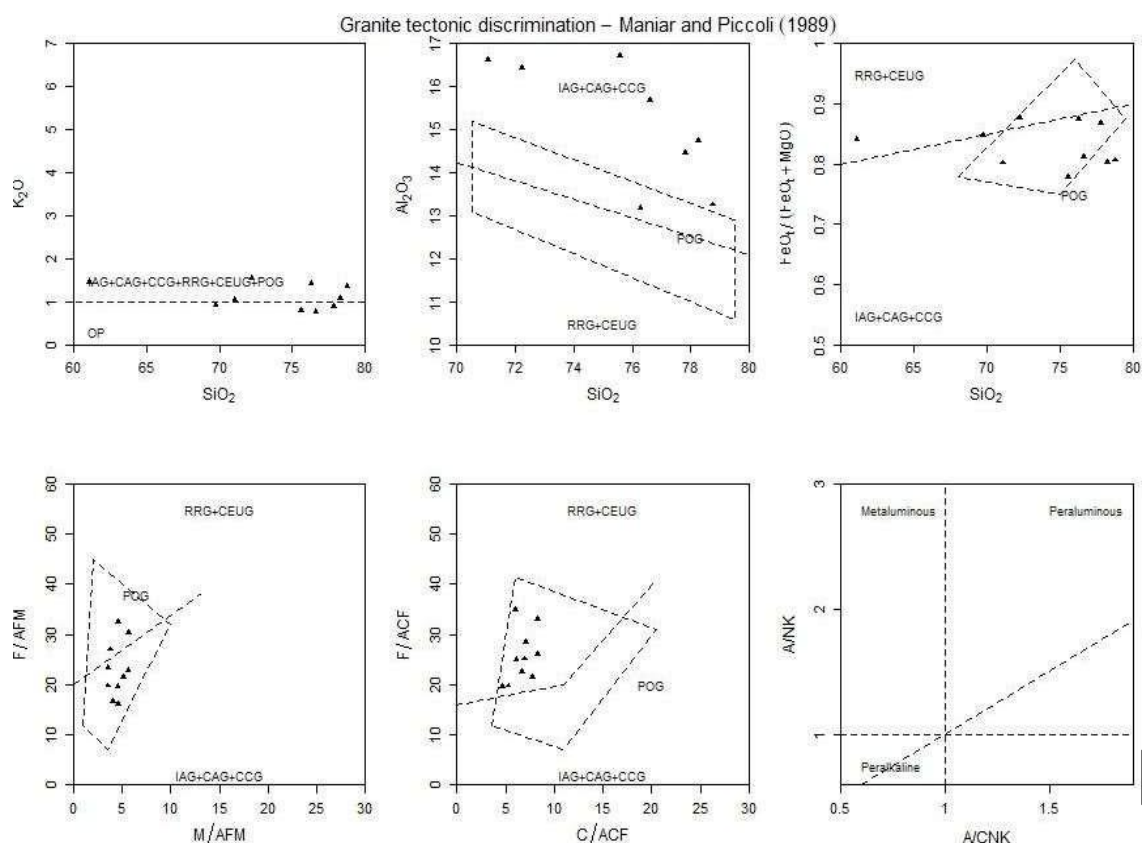
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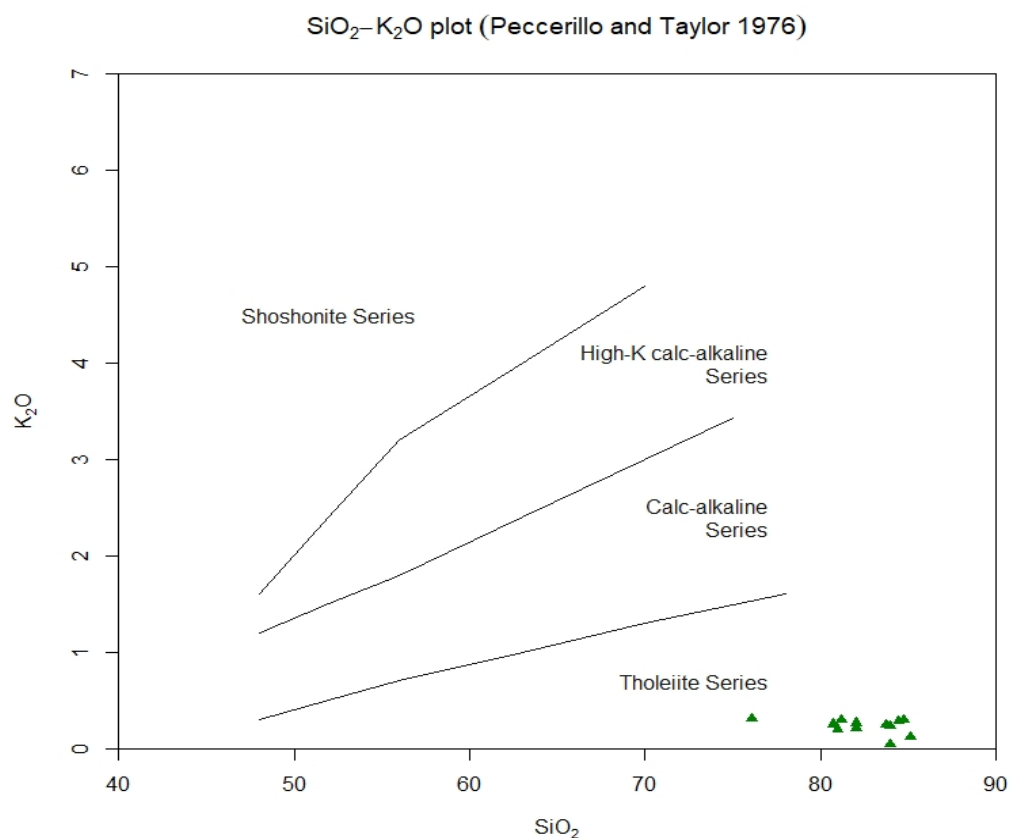
Text Fig: 19



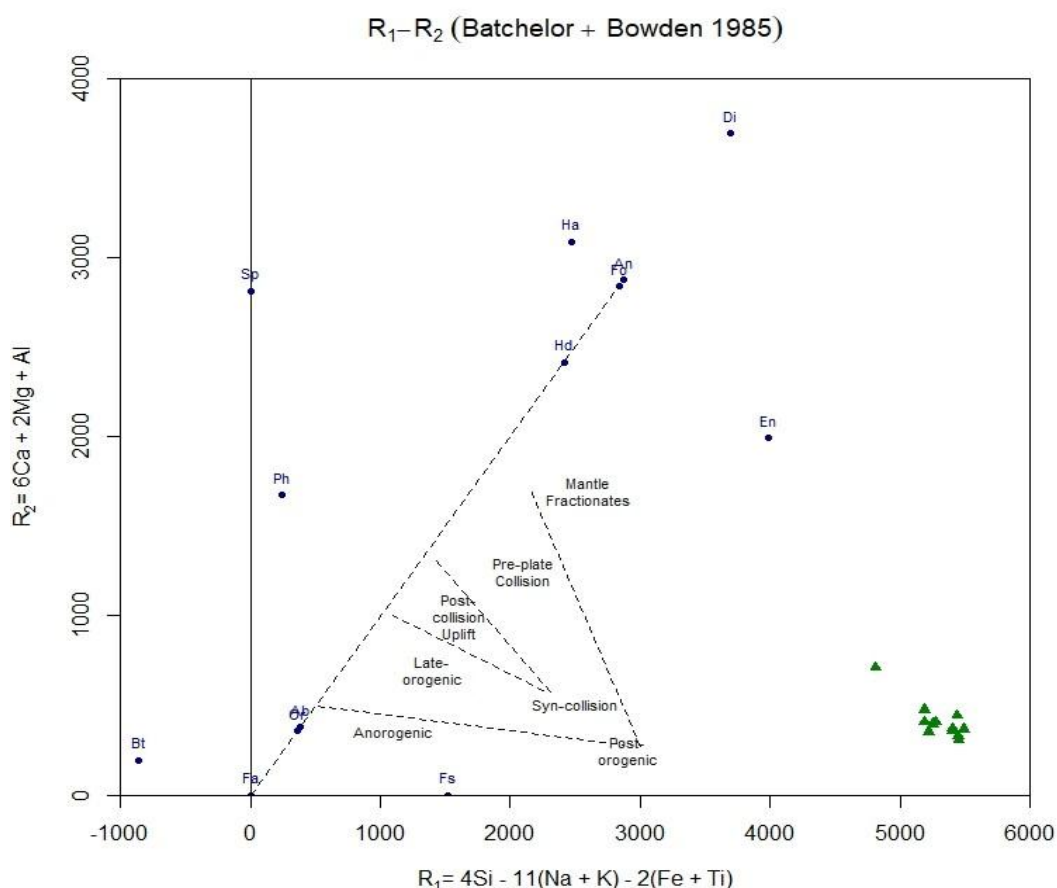
Text Fig: 20



Text Fig: 21



Text Fig: 22



Text Fig: No :23

When plotted the analytical data in QAP diagrams they plotted predominantly in quartzolite and Granodiorite fields. The feldspar triangle of O'Connor (1965) indicated them to be Granodiorite to tonalite in composition.

QAP diagram for by modified CIPW normative calculations indicating overwhelmingly quartz-rich normative compositions. Normalized QAP proportions place most samples within the quartz-rich granitoid field with one sample. After the IUGS classification, the dominance of normative quartz reflects the exceptionally high silica contents combined with strong depletion of normative feldspar components resulting from low Na_2O and K_2O concentrations. The QAP diagram demonstrates that silica saturation remained extremely high throughout the evolution of the system. Such quartz-dominated residual compositions are consistent with late-stage granitic differentiation and provide favorable conditions for the concentration of incompatible elements within residual melts.

R1—R2 plot of De La Roche et al (1980) suggested these to be predominantly granodiorite and couple them of granite composition. Which are highly alkali rich. The data plotted on Middlemost (1994) diagram reflected them to be predominately quartzolite except one plot fell granite field. TAS Diagram of Coxeter et al (1979) indicated them to be highly acidic and predominately granite in composition except one which plotted in the marginal zone of granite – granodiorite.

Taking into consideration all above plots these granitic variants can be geochemically classified as Granite -granodiorite – quartzolite suits (GGQ) The SiO_2 - K_2O plot of Percirillo and Taylor 1976 indicates that these granitic variants are calc alkaline to tholeiitic in nature. As per the tectonic Discrimination diagram of Frost – Frost diagram (2008) these are ferromagnesian, calcic, strongly peraluminous, and silica saturation in nature, as per the tectonic discrimination diagram of Maniar and Piccolo (1989) these granitic variants fall in the borderline of IAG-CAG-CCD and RRG- CEUG. According to the R1-R2 plot of Batchelor and Bowden (1985) These are mantle fractionates

As per the tectonic discrimination diagram of Maniar and Piccolli (1989) these granitic variants fall in the IAG-CAG-CCG field whereas they are more peraluminous and marginally metaluminous, ferro-magnesian, Calcic and silica saturated as per Frost and Frost (2008) tectonic discrimination diagram. According to the R_1 — R_2 plot of Batchelor (1985), these are mantle fractionates.

Summarized Table showing range of elemental concentration in Granitic Variants

Table No: 7.3

Lithology	Granite		
Element	Minimum Value (ppm)	Maximum Value (ppm)	Mean Value (ppm)
La	0.25	447	66.48
Ce	0.8	753.2	126.33
Pr	0.25	78.2	12.60
Nd	0.25	250.7	41.71
Sm	0.25	39.8	6.90
Sc	0.25	66.8	7.69
Eu	0.25	10.6	1.31
Gd	0.25	30.6	5.31
Tb	0.25	3.9	0.98
Dy	0.25	21	3.67
Ho	0.25	3.8	0.97
Er	0.1	11.9	1.99
Tm	0.2	1.5	0.52
Yb	0.25	8.8	1.81
Lu	0.25	1.2	0.47
Y	0.25	110.1	19.32
U	0.5	32	6.16
Th	0.5	385.6	52.10
Hf	0.3	10.7	3.34
Rb	1.4	305	144.53
Sr	1.4	1140.2	189.40
Ta	0.4	8.3	1.33
Nb	1.2	197.7	11.01
Zr	4.8	433.9	114.52

Mineralization

The present exploration and object to delineated the mineralized zones for REE within the granite variants Precious elements Au, Ag, As, Sb, Bi, along the major zone occupied by quartz reef was carried out, in the process collected and chemically analysed the 115 bed rock samples, 150 pit samples, latter carried out petrographic and SEM studies and based on the this data interpreted and delineated six potential zones of REE , And are zone of precious elements these zones are marked on the the geological map the block area and their individual zone details are

The analytical data was interpreted and the mineralized zones have been demarcated and details of each are follows six mineralized zones have been delineated within the block area, namely Lakkayapalli Zone, Pallerla Zone, Nandipad zone -A, Nandipad zone – B, Pedripad, Jadavaraopalli, The REE values recorded in Pallerla Zone-A range from 150 ppm to 1,682 (ppm). Lakkayapalli zone – 0.845Sq.km – TREE- 359.1-1600 (ppm)Pallerla zone - 0.837Sq.km – TREE – 462 -1682 ppm
 Nandipad zone – A (2.8 – TREE – 141 – 1182.8ppm)

Nandipad zone – B (Precious metals)

As – 1.1 to 82.2ppm, Au – 0.02 – to 1.4 ppm

Sb -1.3 – to 9.4 ppm

Bi - <0.5 to 1.3 ppm

Ag- 0.4to 43.5

Pedripad zone - 0.233 Sq.km – TREE - 89.7 -1529ppm

Jadavaraopalli Zone – 1.05 Sq. km – TREE196.1 to 1426 ppm

Petrographic studies thin section 30 thin sections of different granitic variants pertaining to the block area was carried out by GSI, SR petrological division which rewid presence of allanite apatite biotite alkali feldspars which host rare earth elements. Beside these zircon was also identified which host zirconium and hafnium, Titanite a titanium bearing mineral was also identified and reported. Ten (10) thin sections were selected submitted to lucid laboratories for SEM studies for mineral characterizes the results show presence of allanite, biotite apatite alkali feldspars, zircon, and titanite, which corrobated with analytical data and petrographic studies where high values of TREE 1682 ppm which includes values are Ce, La, Nd, Pr, Gd, Sm, Dy.



**GEOLOGICAL MAP OF MADDUR BLOCK, NARAYANPET DISTRICT,
TELANGANA STATE (TOPOSHEET: 56H/09) SCALE 1:12500**

DELINEATED ZONES



0 1 2 3 km

LEGEND

LITHOLOGY

- KIMBERLITE
- QUARTZ REEF
- PEGMATITE
- DOLERITE
- LEUCO GRANITE
- ALKALI FELDSPAR GRANITE
- PORPHYRITIC GRANITE
- GREY BIOTITE GRANITE

FORMATION

- YOUNGER INTRUSIVES**
- ACID INTRUSIVES
- BASIC INTRUSIVES

GROUP

PGC -II

SUPER GROUP

PGC

AGE

MESO PROTEROZOIC

PALEO PROTEROZOIC

ARCHEAN-PALEO PROTEROZOIC

INDEX

Area - 160 S q. km

- BLOCK BOUNDARY
- BOUNDARY POINTS
- villages
- Lineament
- Shear_Zone
- Fault

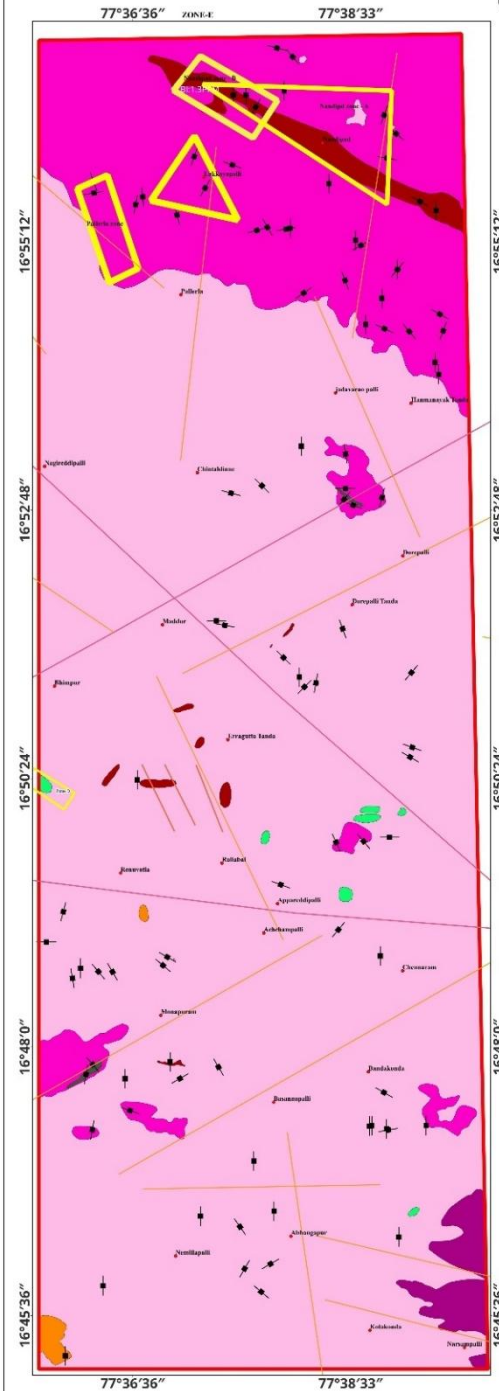
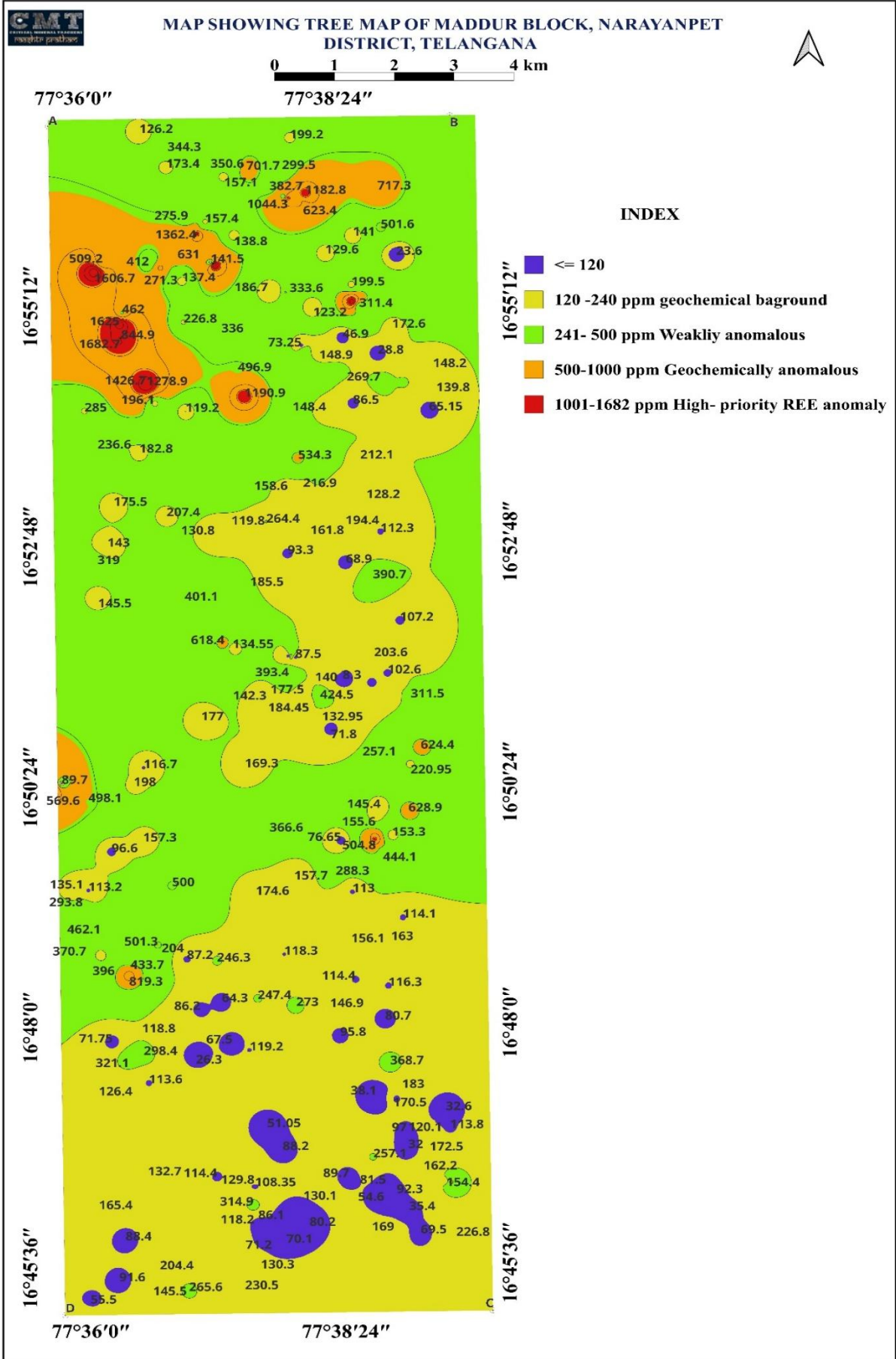


Plate No 7



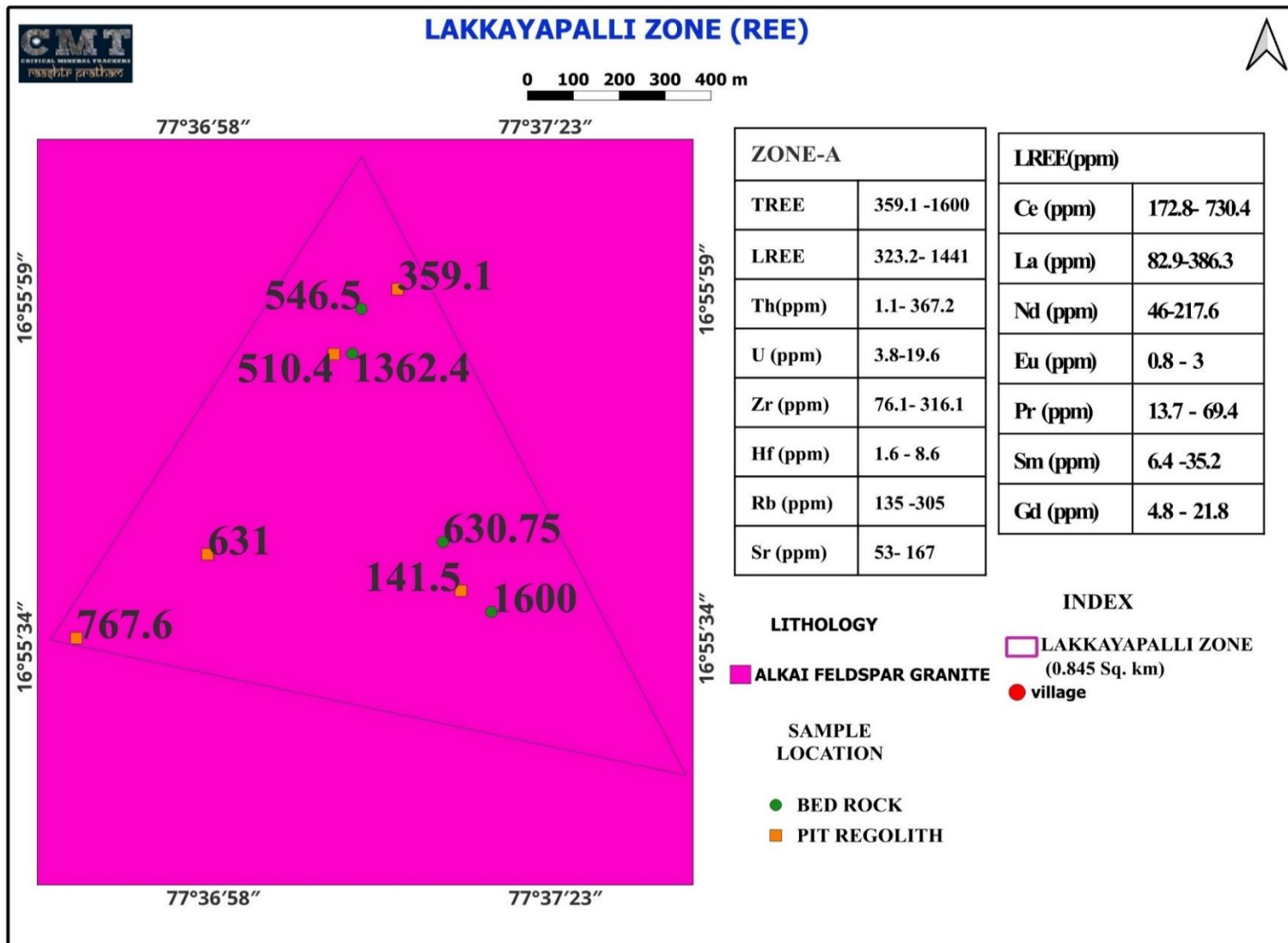


Plate No 8

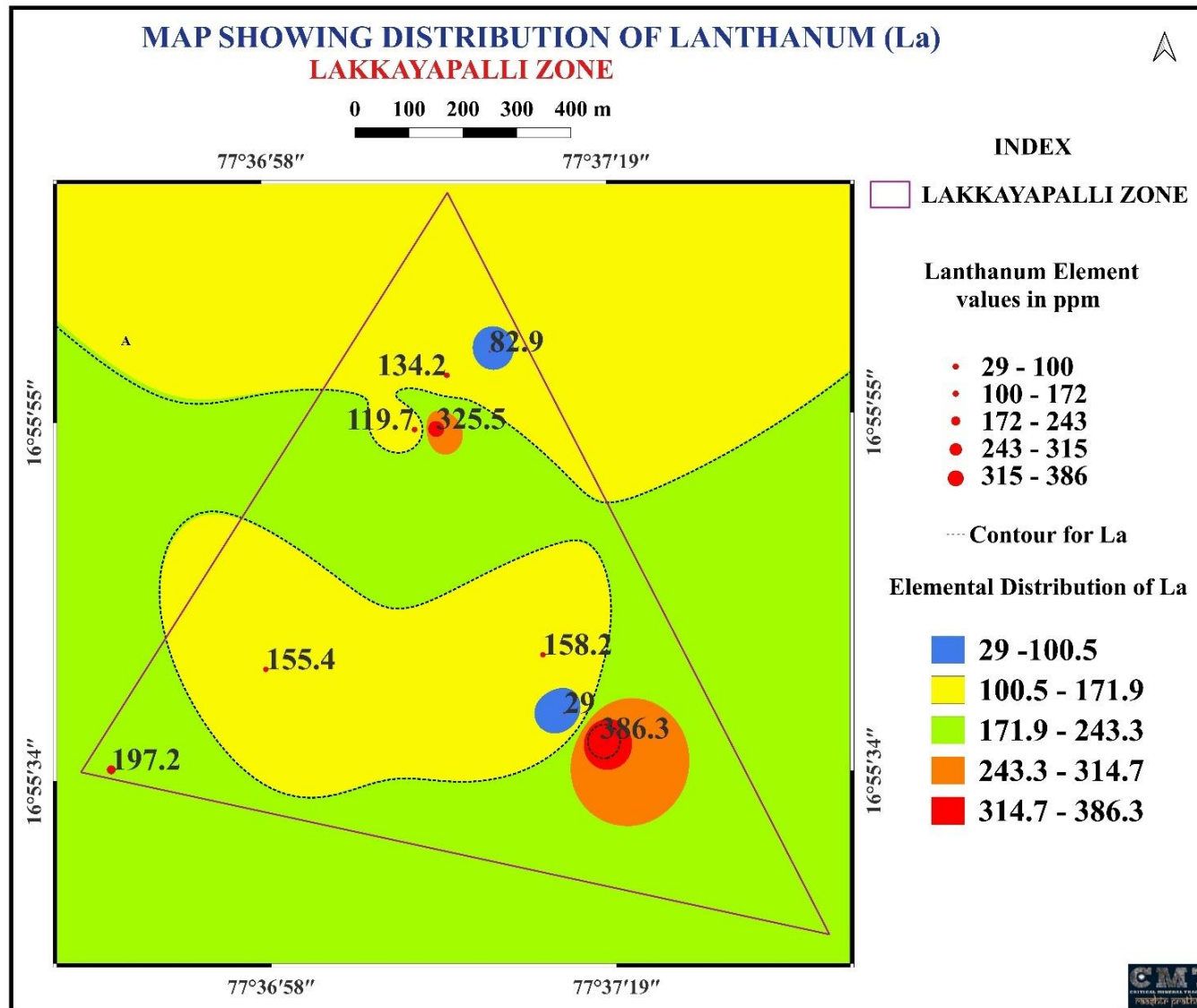


PLATE NO- 9

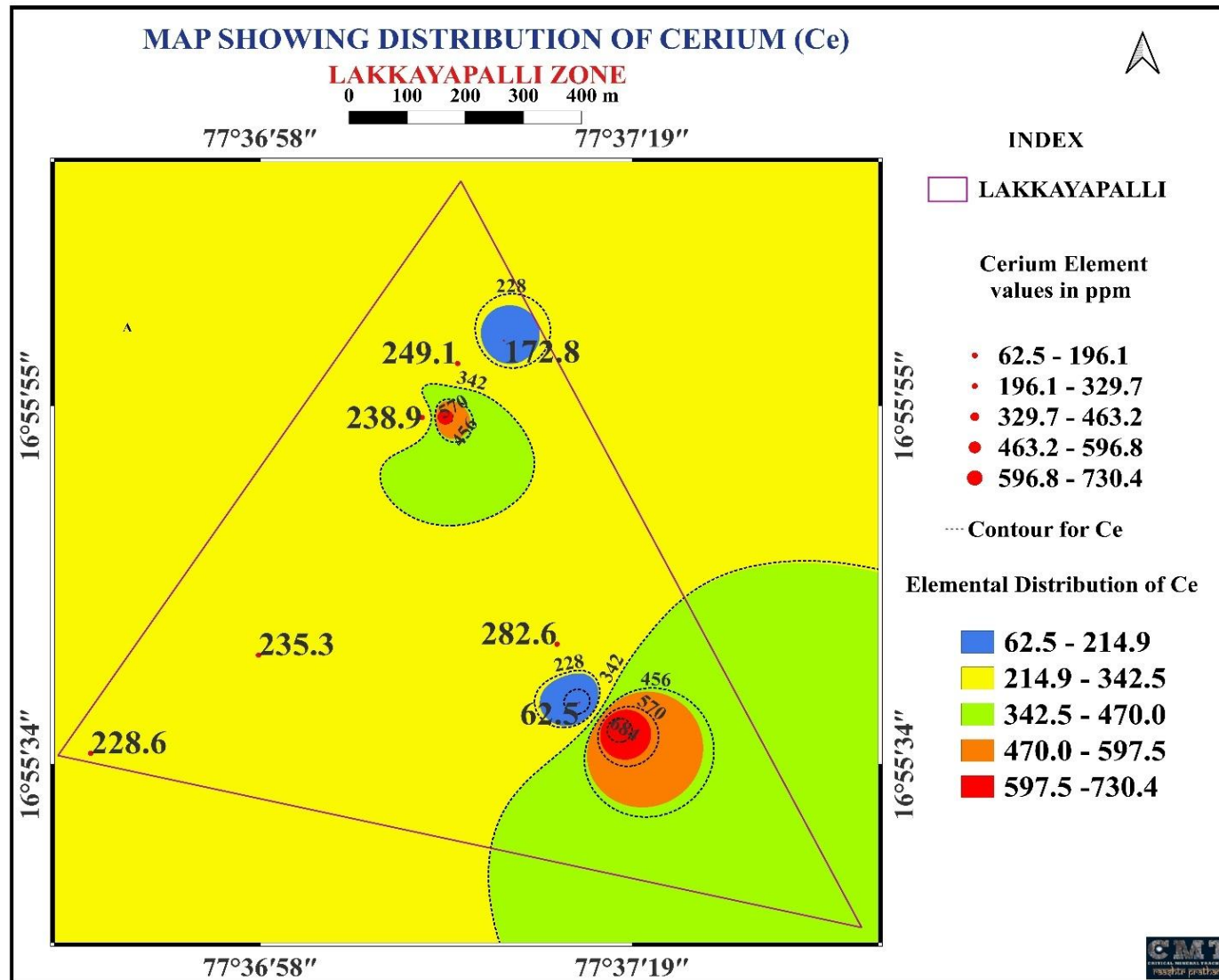


Plate No: 10

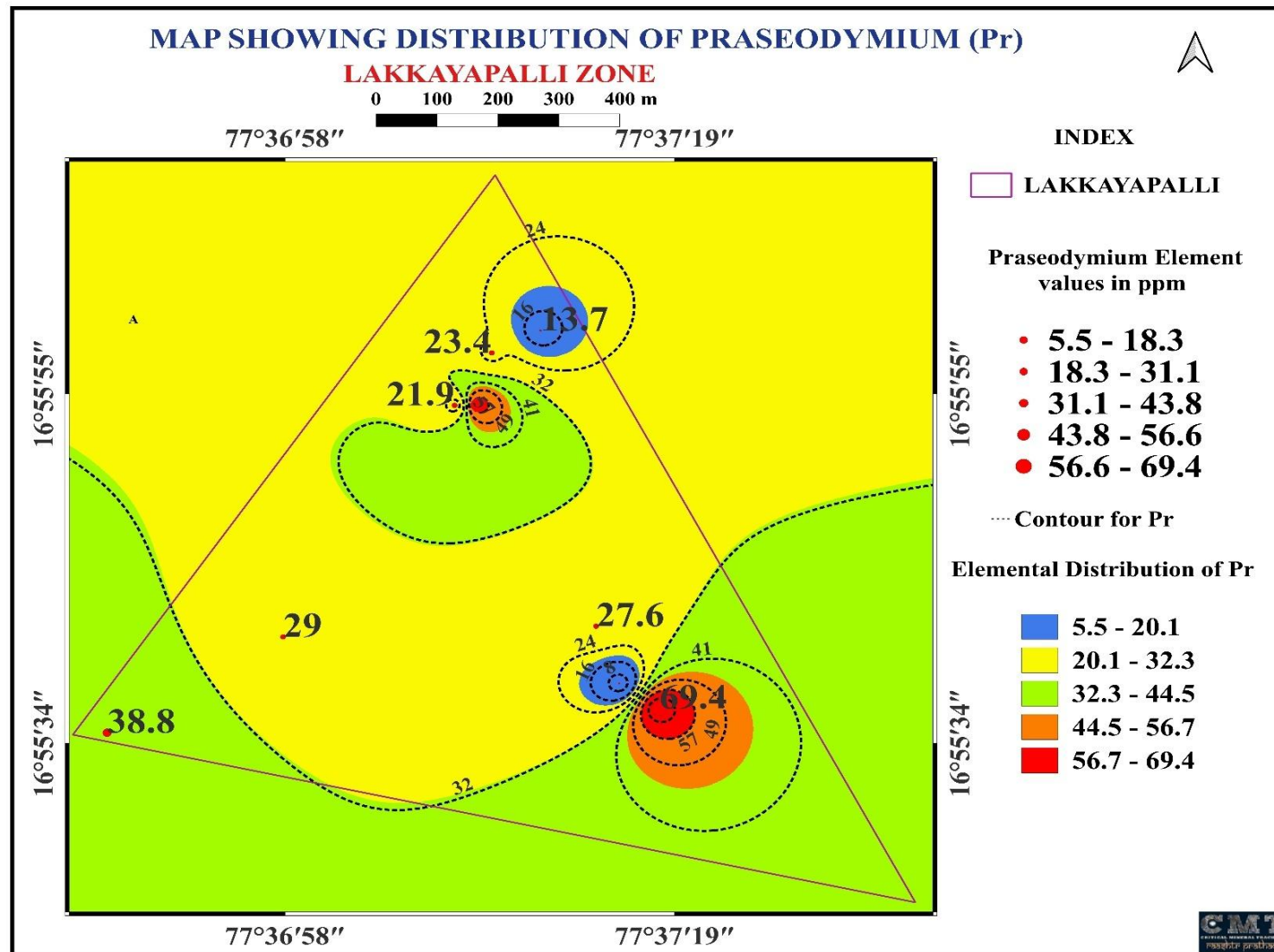


Plate No: 11

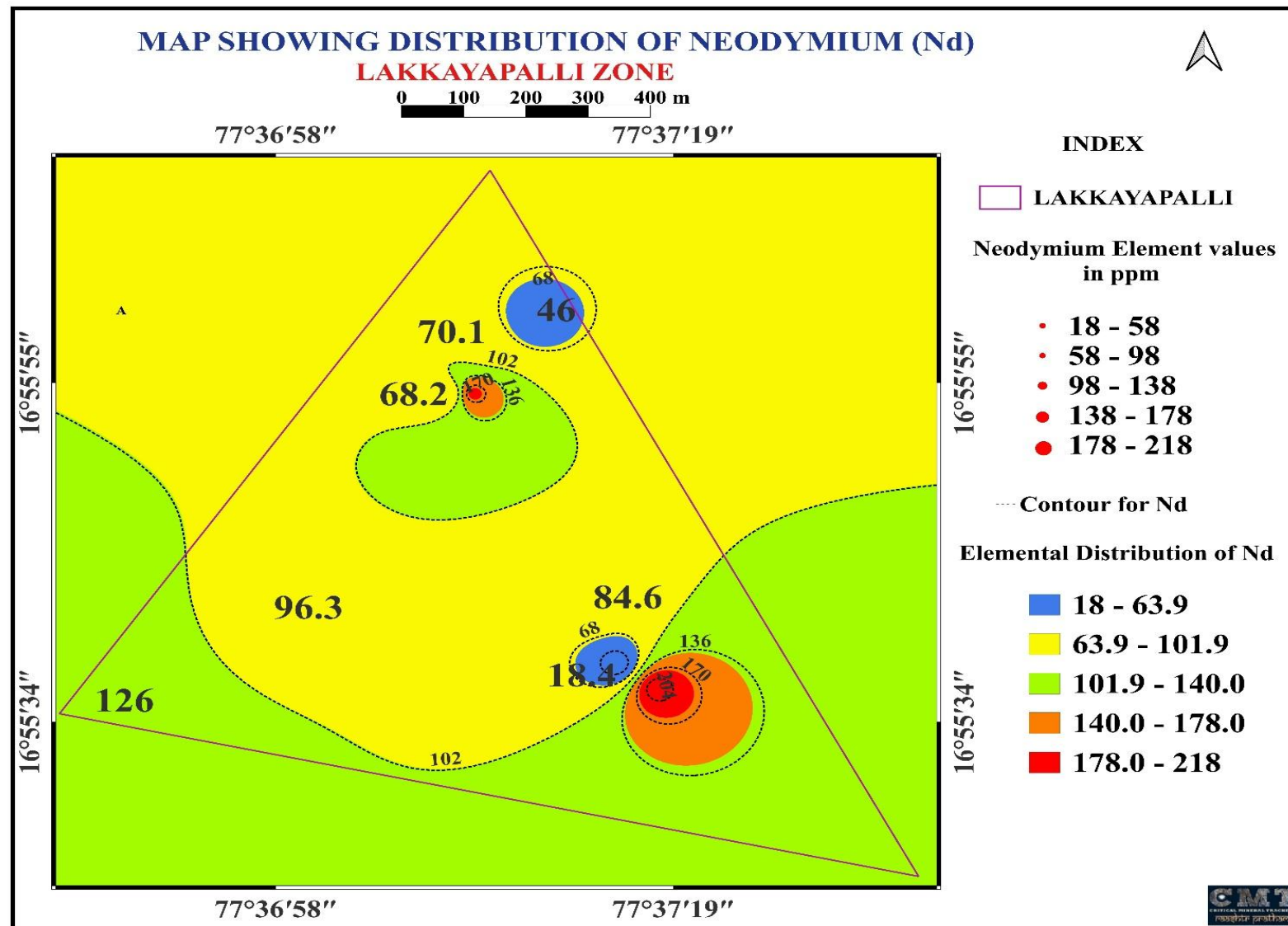


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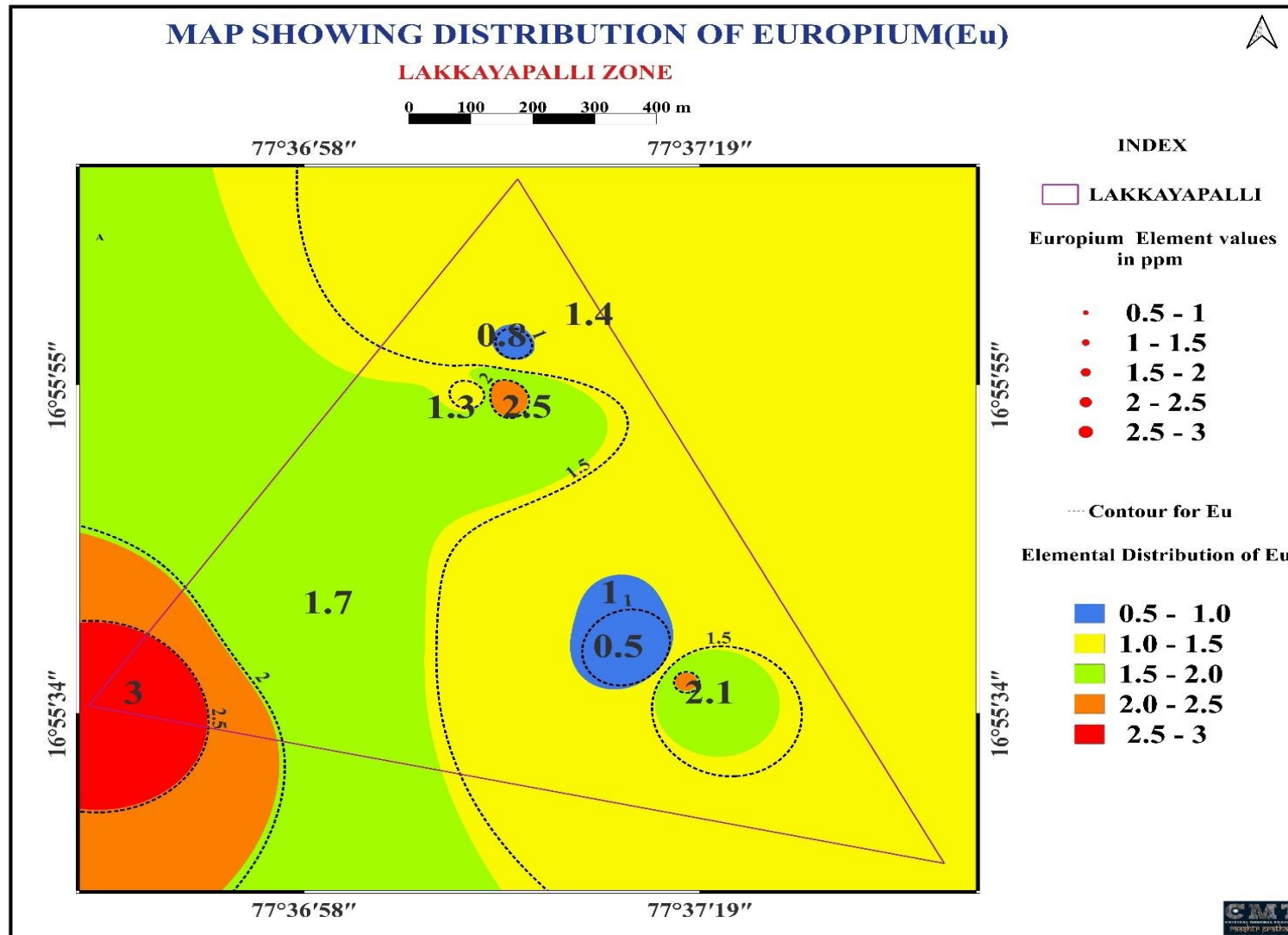


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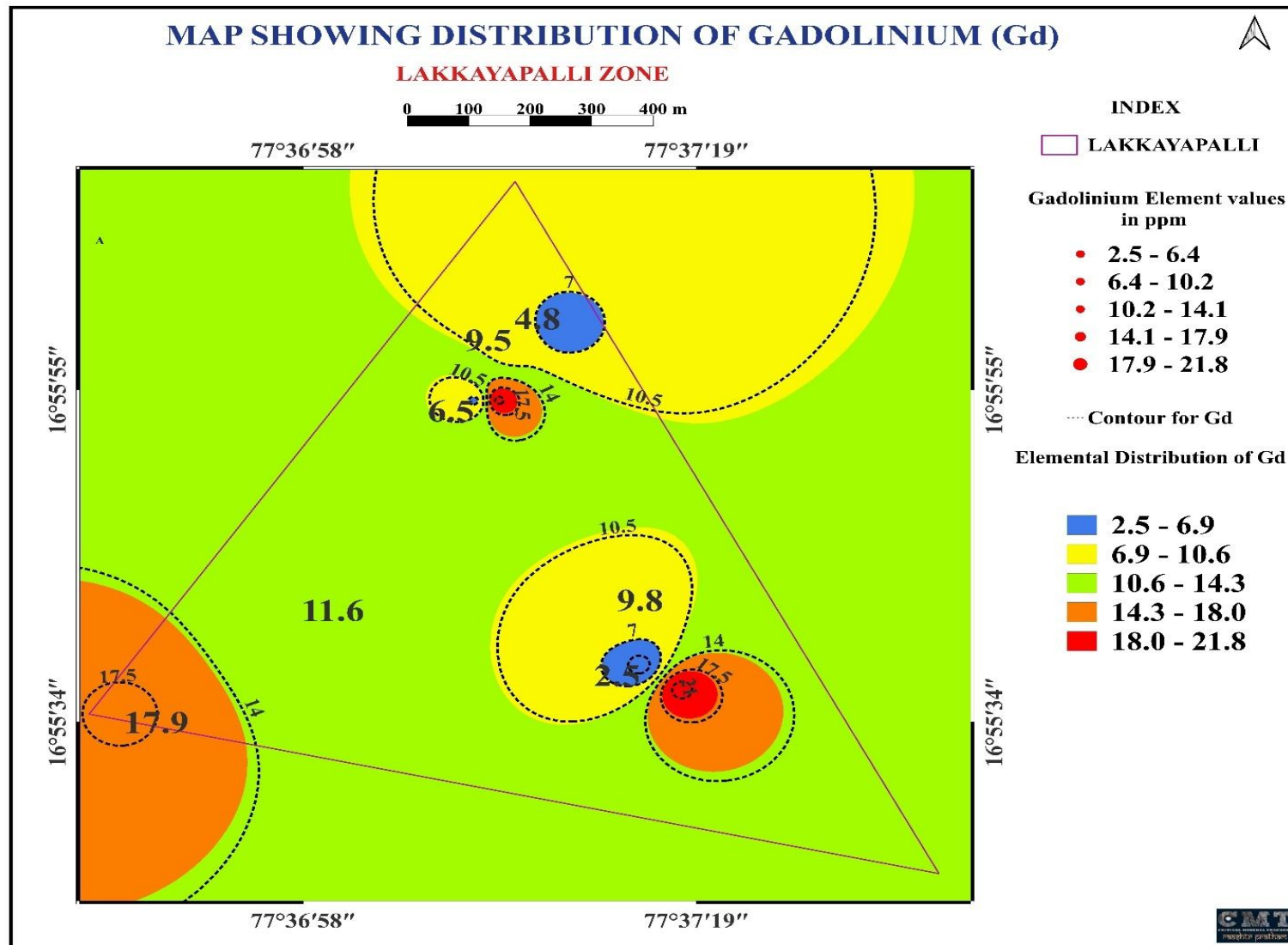
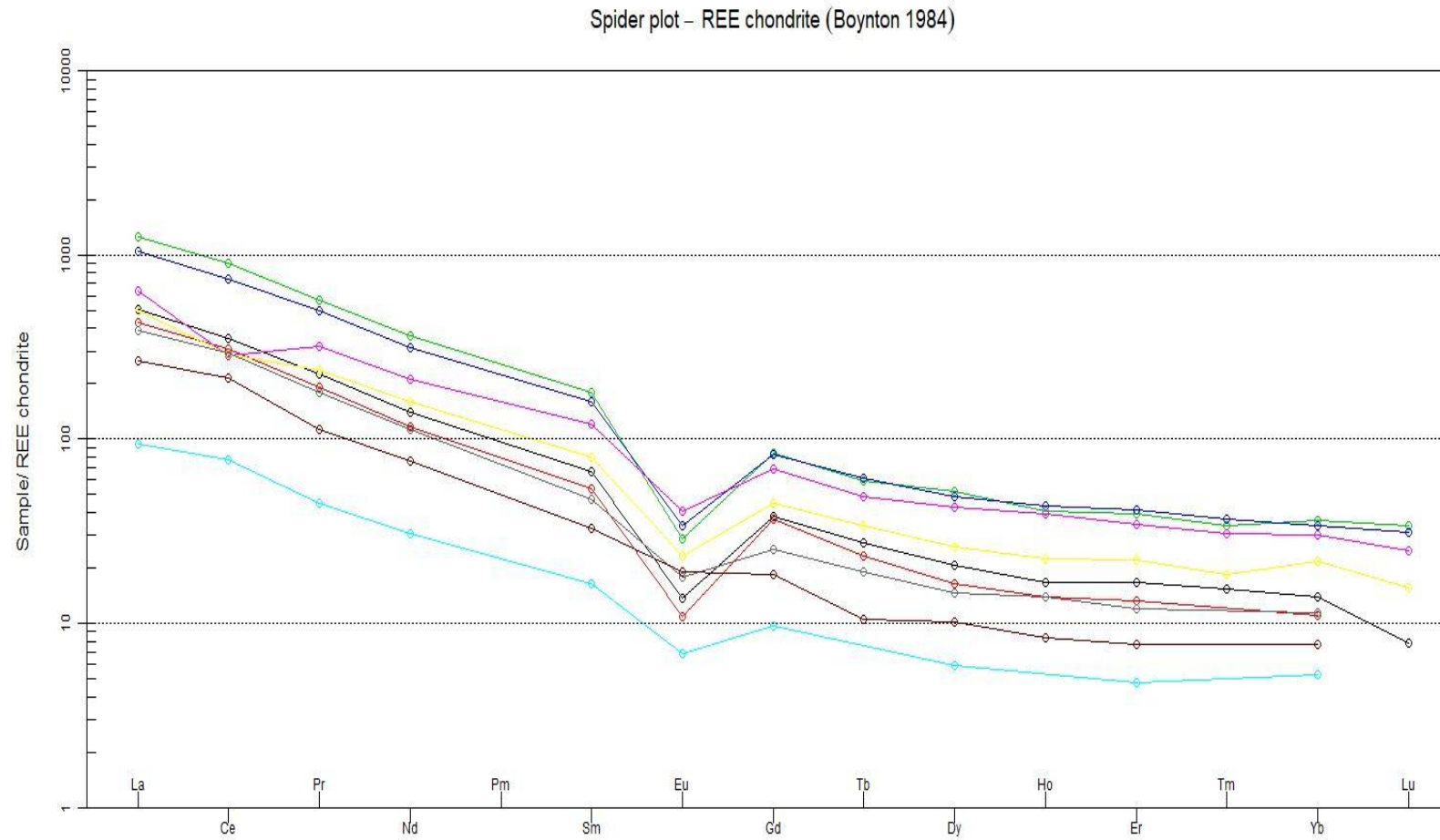


Plate No: 15

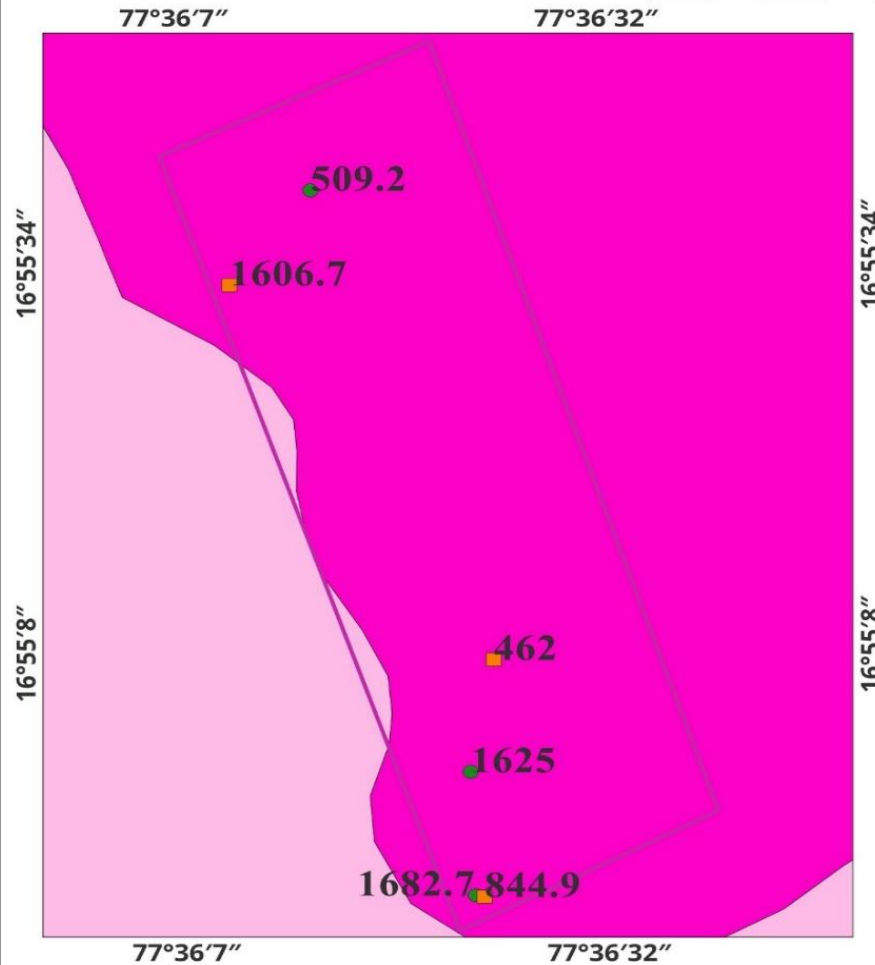
Lakkayapalli zone Most of the REE data in this plot shows negative Europium anomaly indicating late crystallization of feldspar in magma melt.



Text fig- 24

PALLERLA ZONE - (REE)

0 100 200 300 400 m



ZONE		LREE(ppm)	
TREE	462 -1682	Ce (ppm)	193 - 753.2
LREE	397.5- 1503.5	La (ppm)	106.6 -447
Th(ppm)	111.4- 385.6	Nd (ppm)	66.1 -250.7
U (ppm)	3.9 -22.6	Eu (ppm)	0.7 - 4
Zr (ppm)	147.6 - 1503.30	Pr (ppm)	19.5 - 78.2
Hf (ppm)	4 - 9.5	Sm (ppm)	10.3 -39.8
Rb (ppm)	129.1 -223.9	Gd (ppm)	7.8 - 28
Sr (ppm)	30.3 - 81.9		

LITHOLOGY

- ALKALI FELDSPAR GRANITE
- GREY BIOTITE GRANITE

SAMPLE LOCATION

- BED ROCK
- PIT REGOLITH

INDEX

- Pallerla Zone-A (0.837)
- village

Plate No: 16

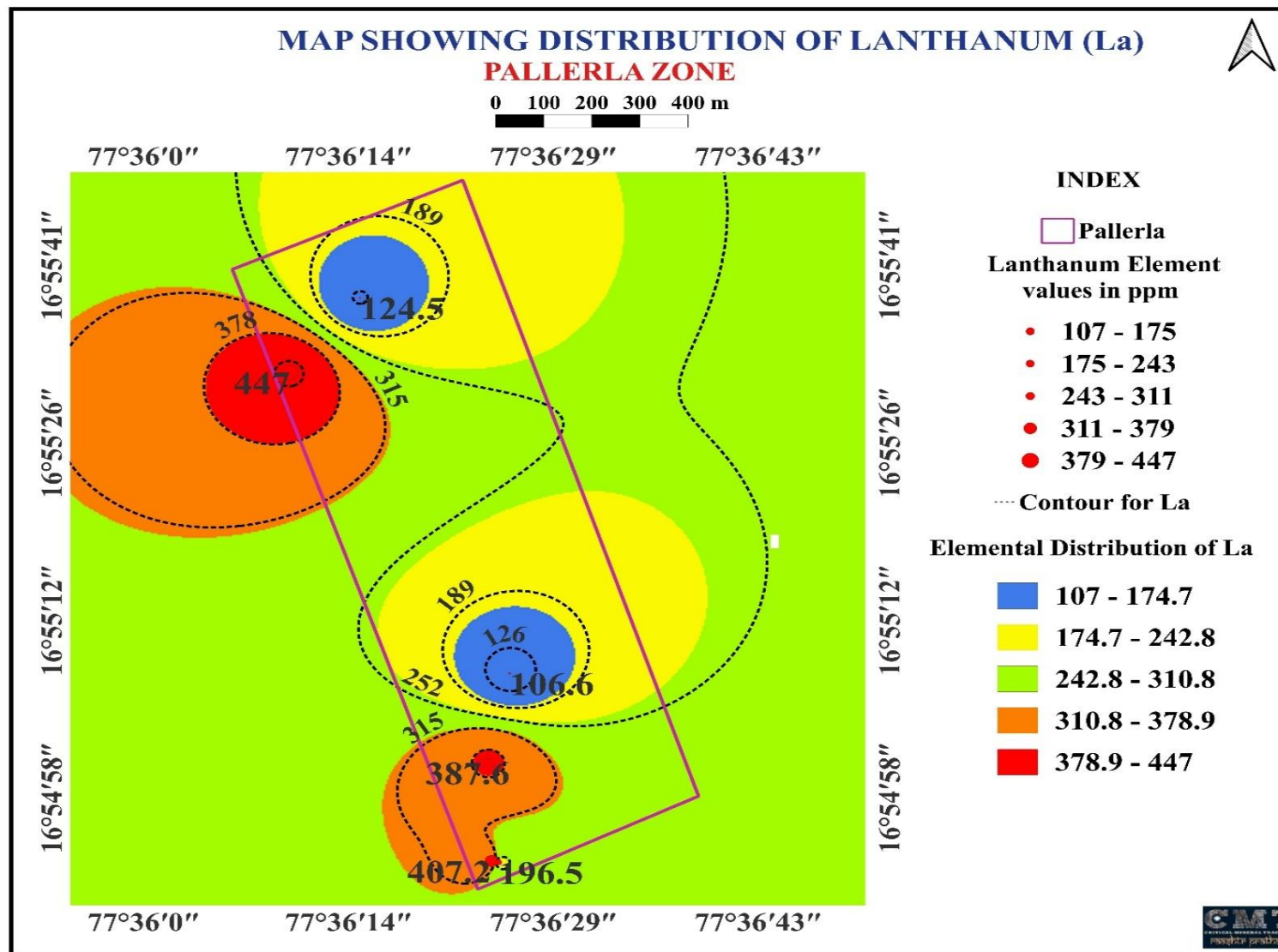
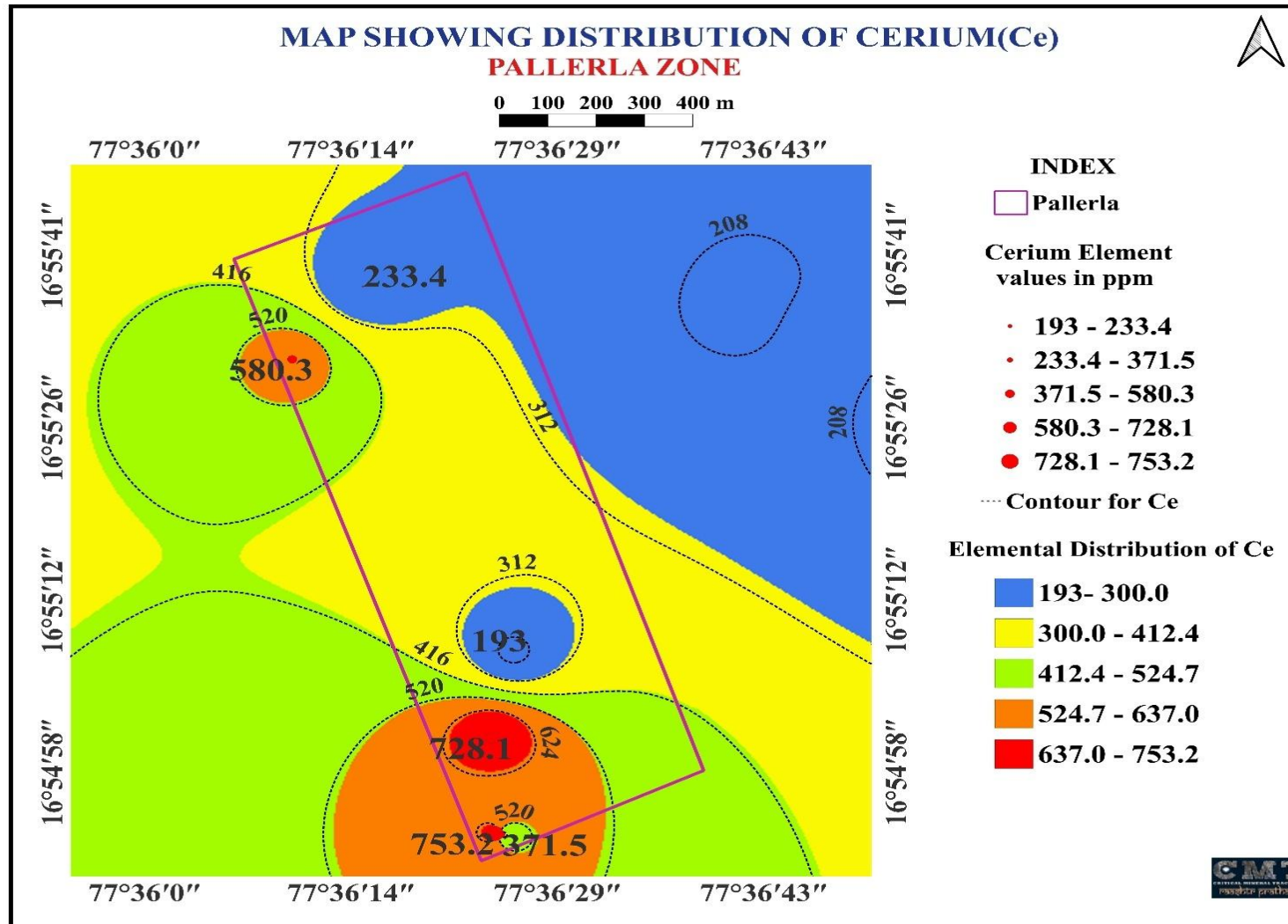


Plate No: 17



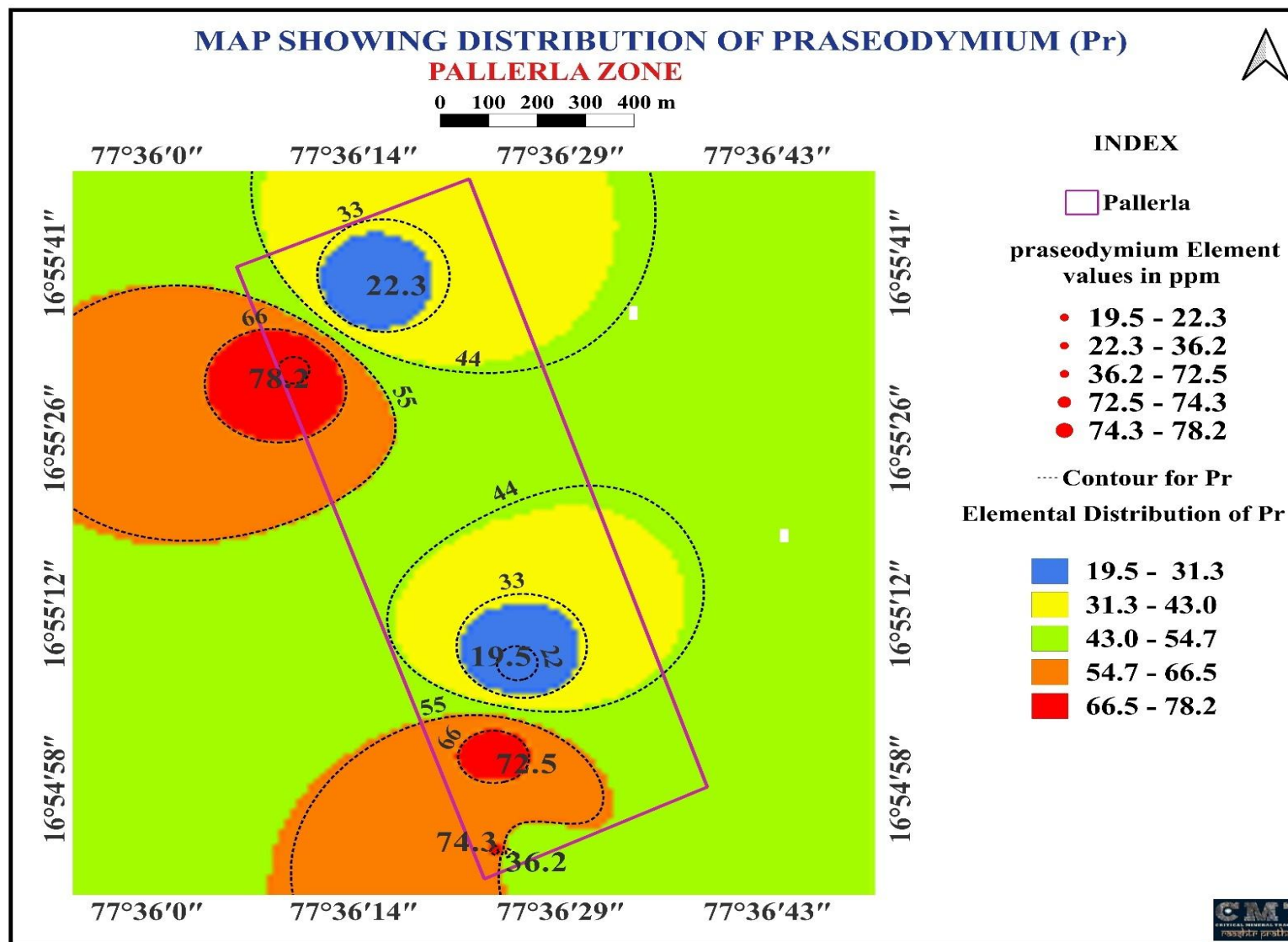


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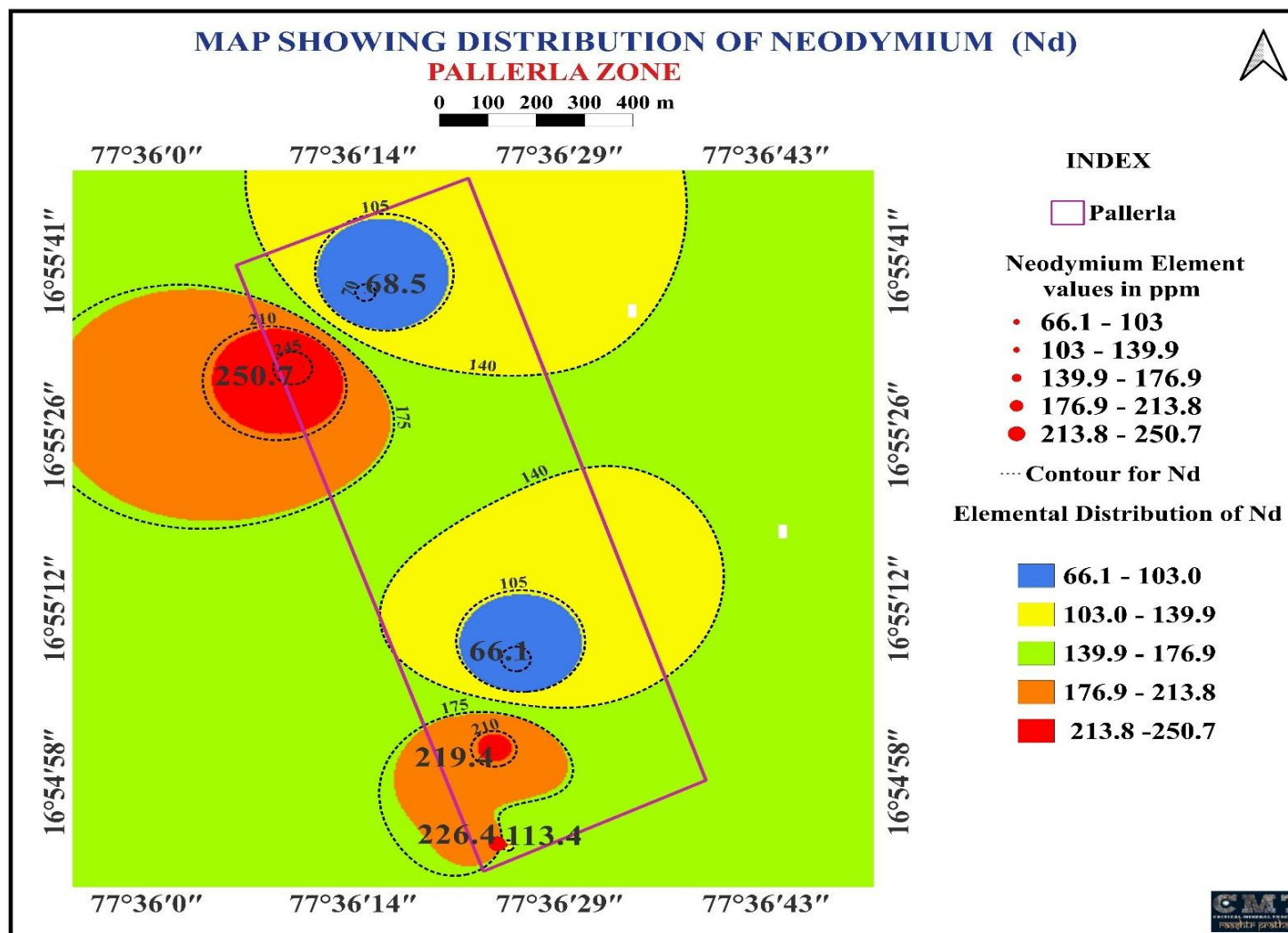


Plate No: 20

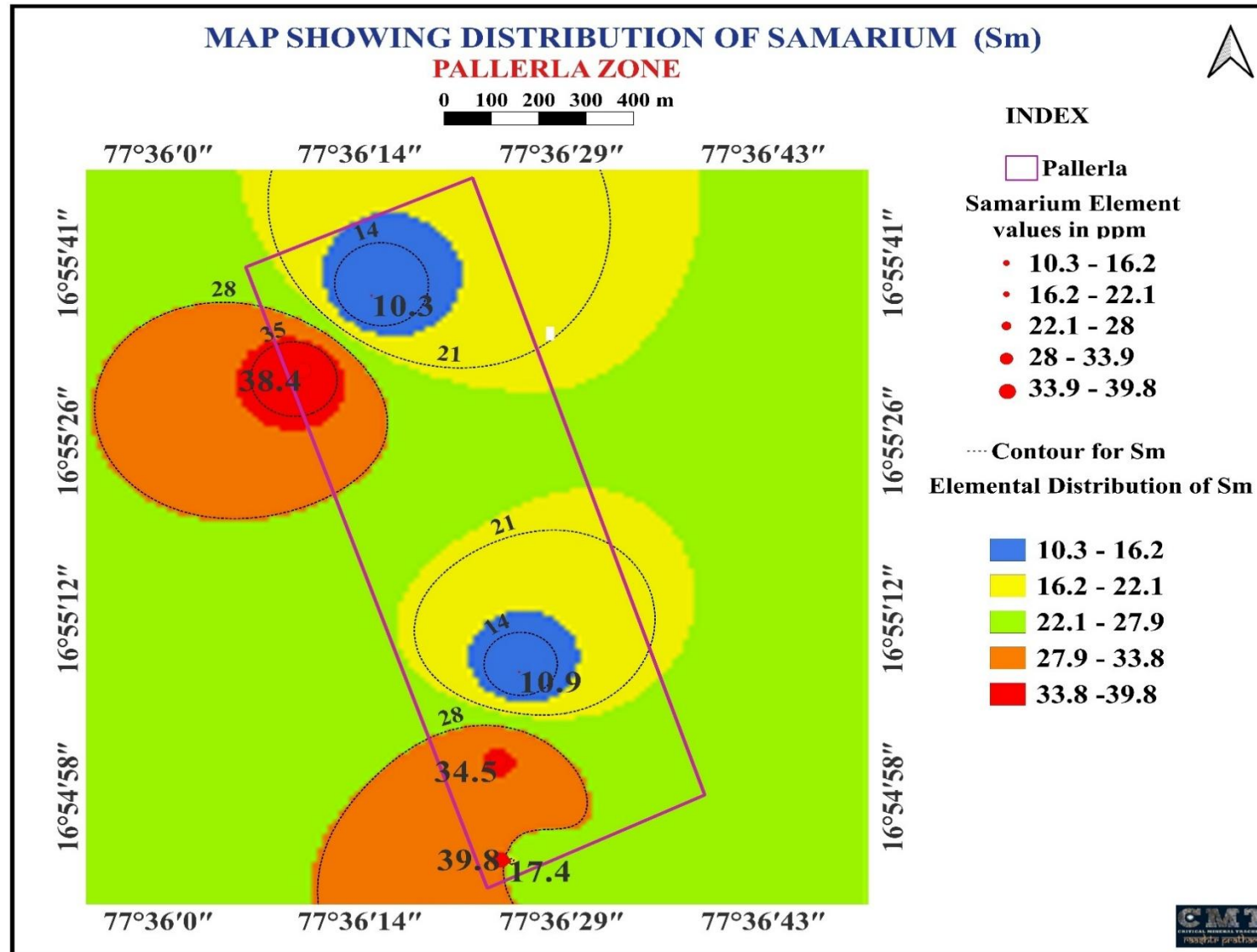


Plate No: 21

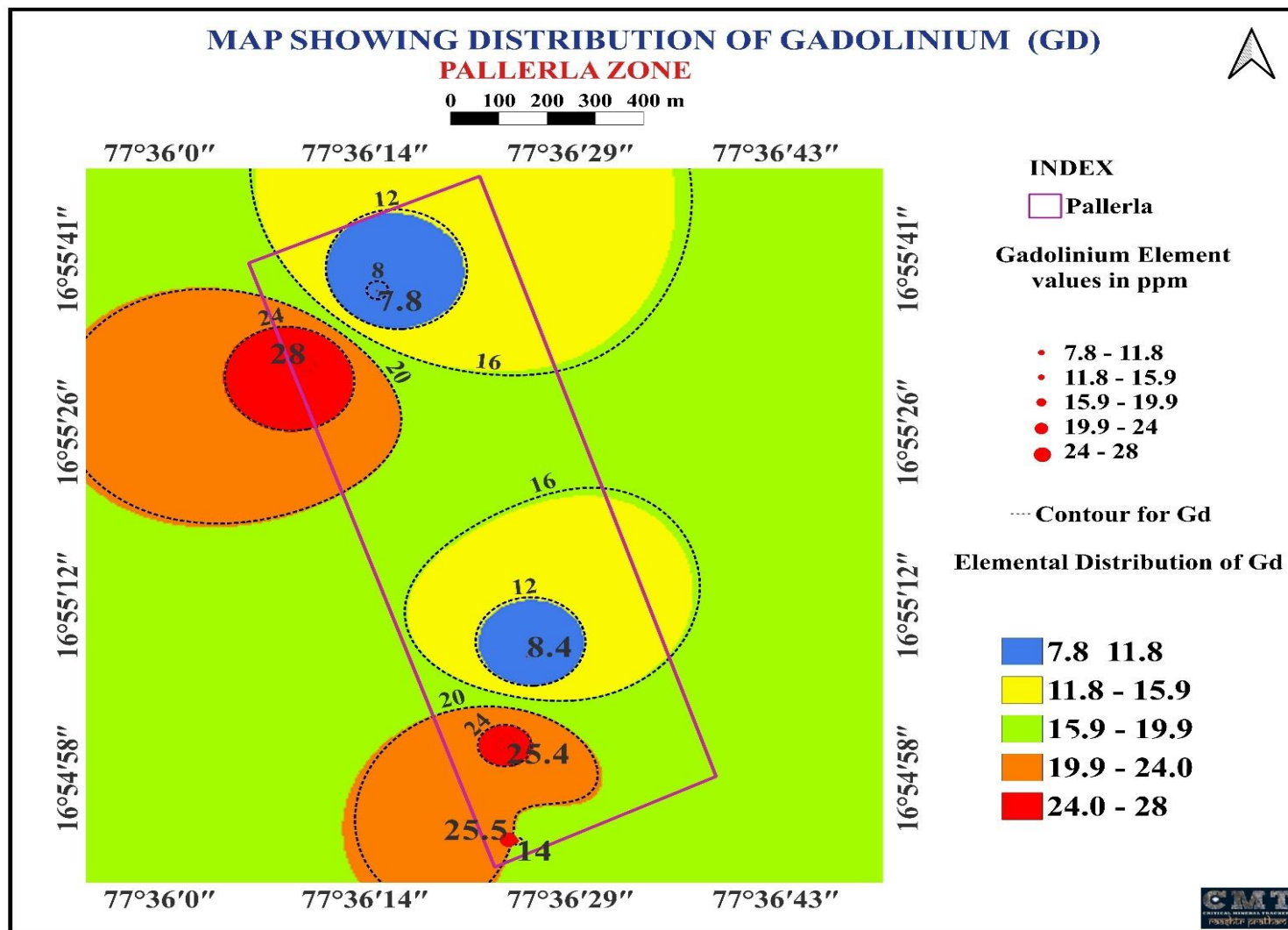
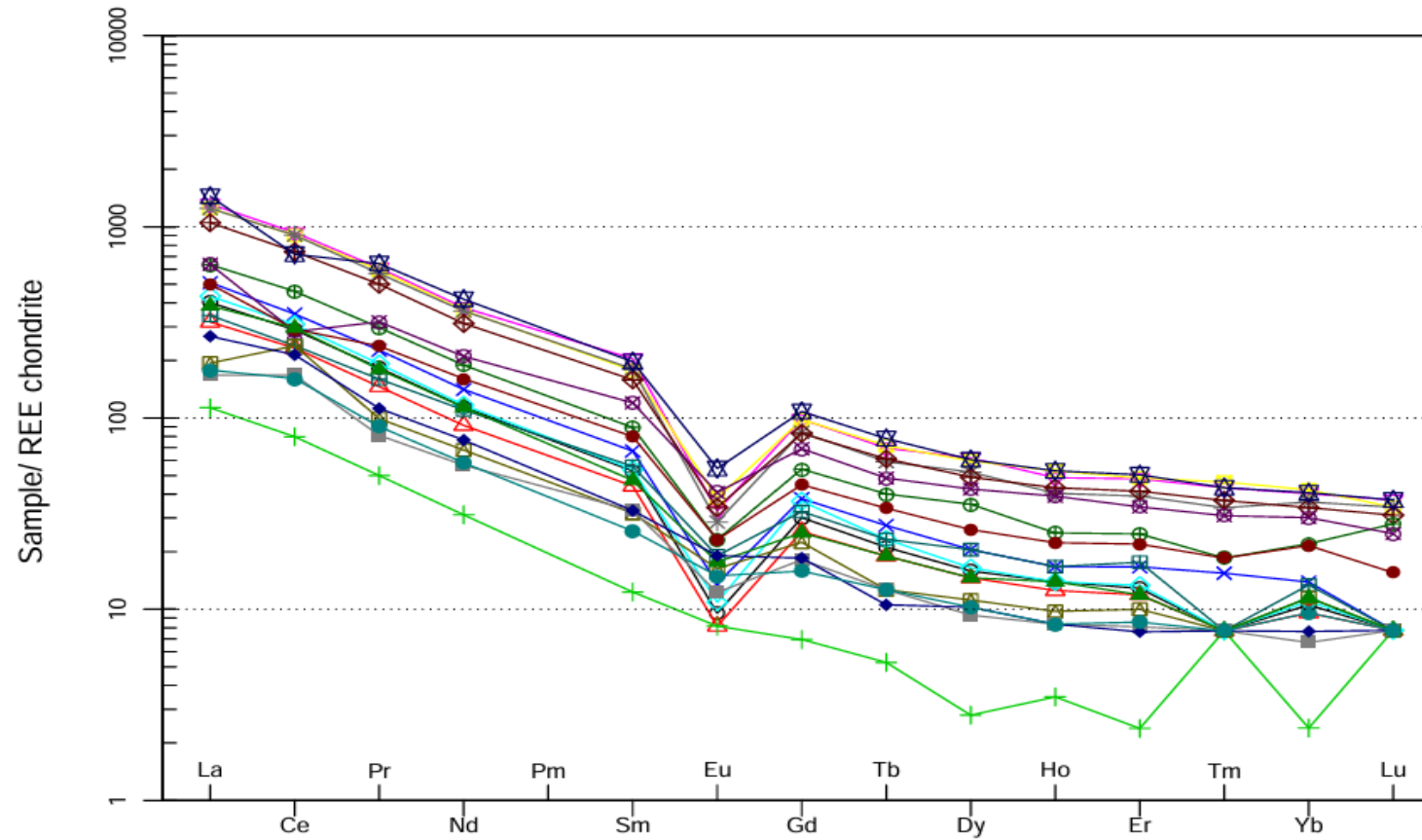


Plate No: 22

Pallerla zone Most of the REE data in this plot shows negative Europium anomaly indicating late crystallization of feldspar in magma melt.

Spider plot – REE chondrite (Boynton 1984)

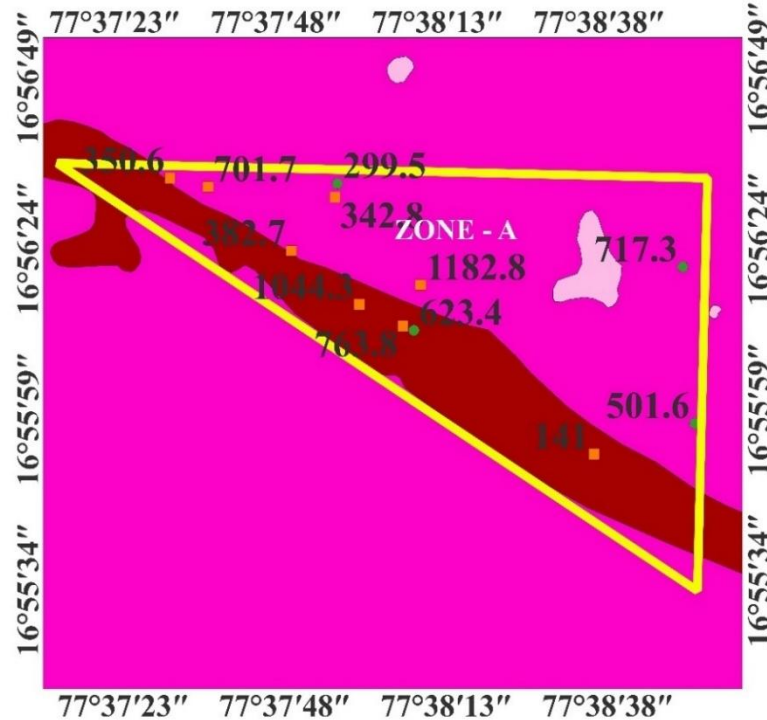


Text fig- 25



NANDIPAD - A (REE)

0 200 400 600 800 m



ZONE-A	
TREE	141 -1182.8
LREE	16.8- 199.3
Th(ppm)	22.1-
U (ppm)	1.9-11.8
Zr (ppm)	4.8- 367.5
Hf (ppm)	2.7 - 9.1
Rb	57.1- 260
Sr (ppm)	36.4- 612.2

LREE(ppm)	
Ce (ppm)	64.4- 594.5
La (ppm)	29.6 -228.1
Nd (ppm)	8.3 - 191.5
Eu (ppm)	0.8 - 6.9
Pr (ppm)	5.5 - 50.6
Sm (ppm)	3.1-33.6
Gd (ppm)	2.7- 30.6

LITHOLOGY
■ **ALKALI FELDSPAR GRANITE**

SAMPLE LOCATION

- BED ROCK
- PIT REGOLITH

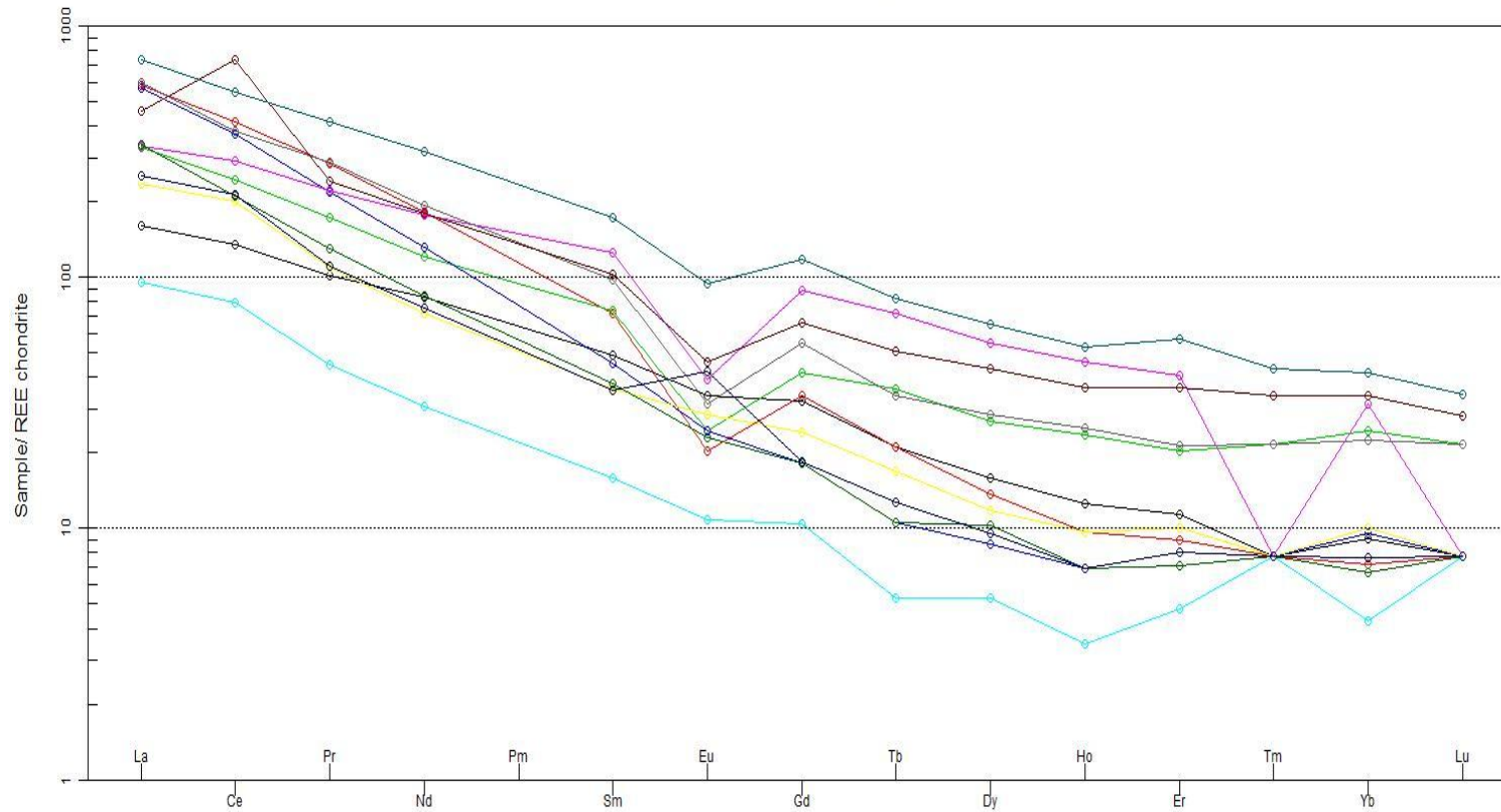
INDEX

- Nandipad zone -A
(2.8 Sq. km)
- village

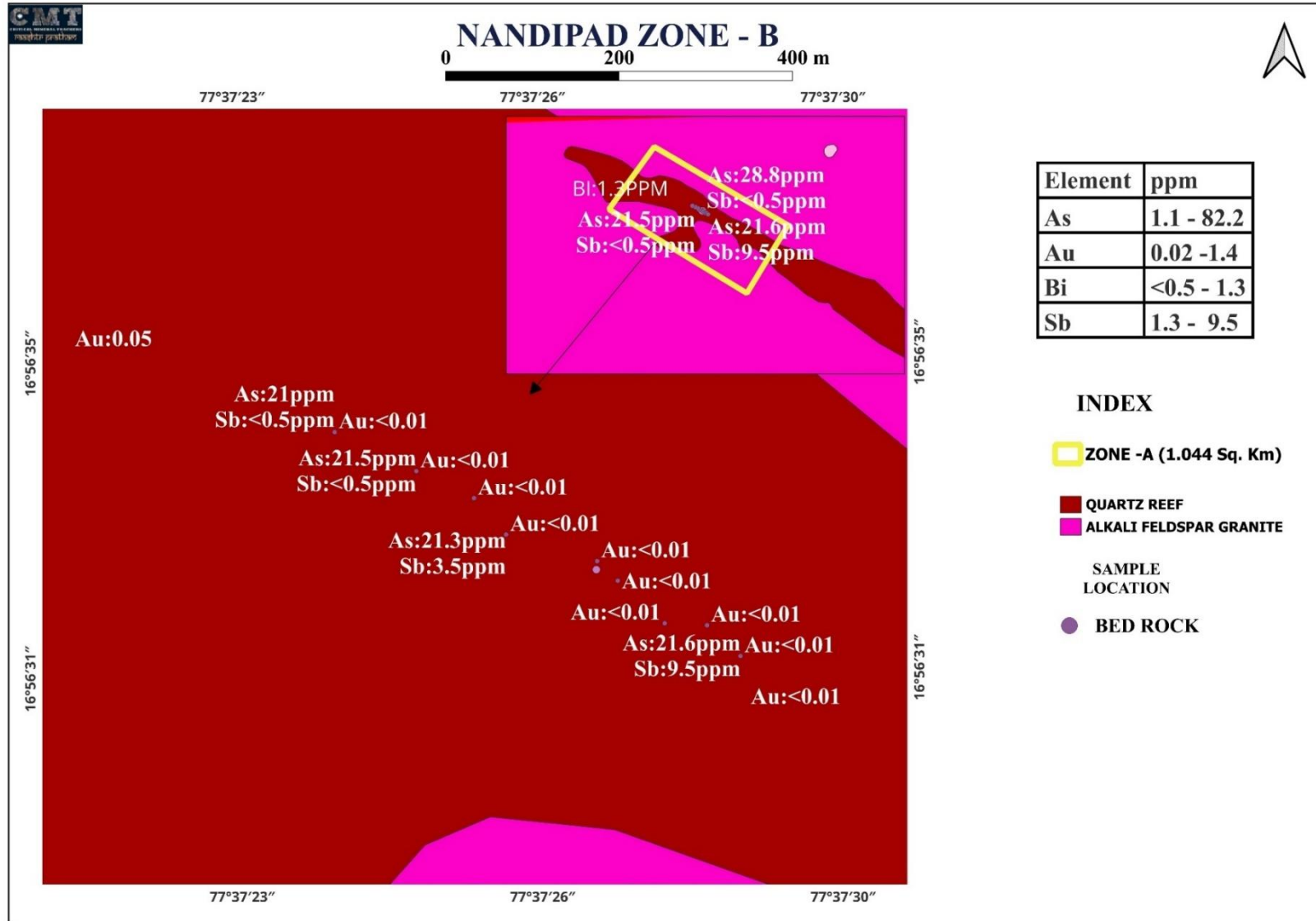
Plate No: 23

Nandipad – A zone Most of the REE data in this plot shows negative Europium anomaly indicating late crystallization of feldspar in magma melt.

Spider plot – REE chondrite (Boynton 1984)



Text fig No: 26

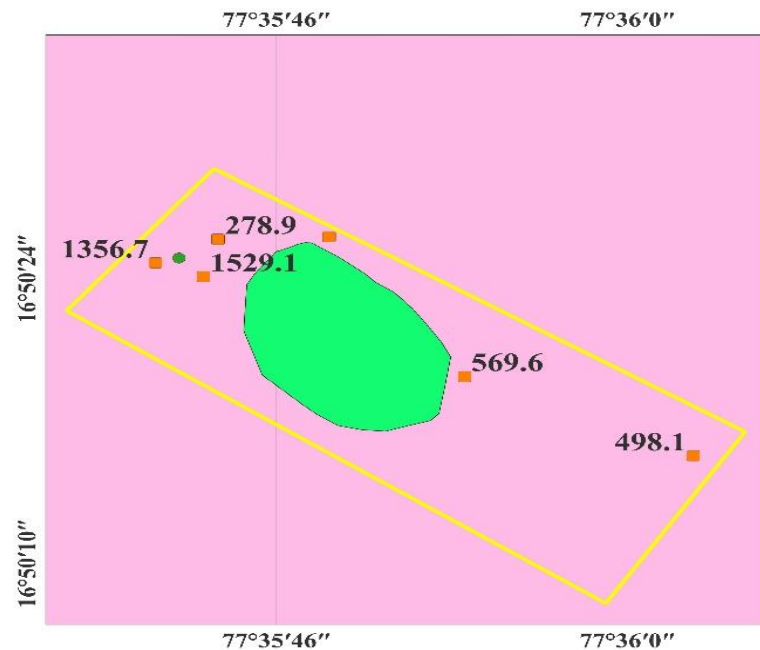




PEDRIPAD ZONE - (REE)



0 100 200 300 m



ZONE -D	
TREE	88.2 to 1472.9
LREE	78.7 to 1358.1
Th (ppm)	8.9 to 55
U (ppm)	1.4 to 5.7
Zr (ppm)	24 to 433.9
Hf (ppm)	1 to 10.7
Rb (ppm)	20.5 to 243.7
Sr (ppm)	251.4 to 734.2

LREE (ppm)	
La	10 to 339.1
Ce	56.9 to 651.6
Pr	2.1 to 71.3
Nd	7.8 to 249.4
Sm	1.9 to 36.1
Eu	1.2 to 10.6
Gd	1.4 to 27.1

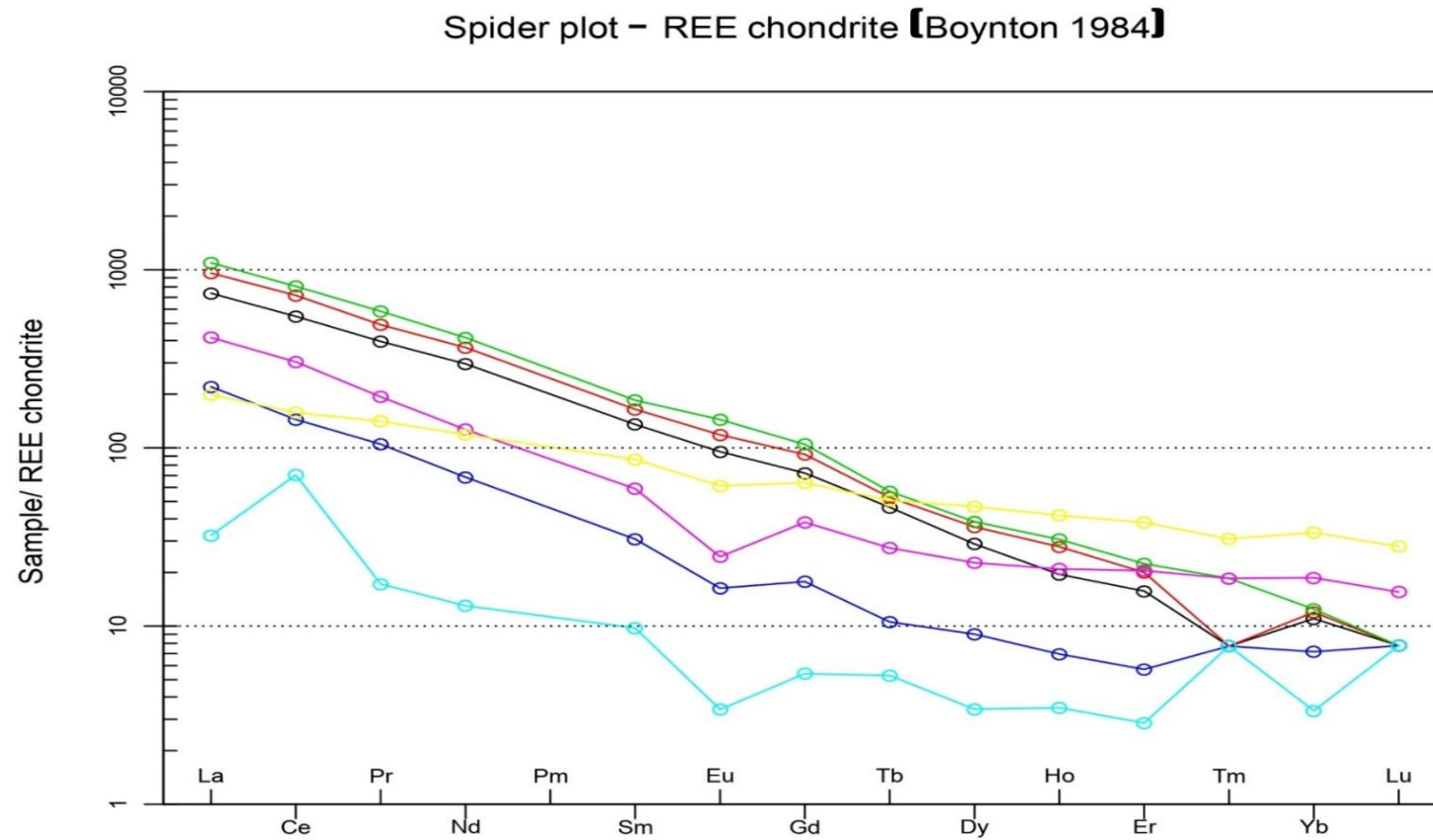
LITHOLOGY
 KIMBERLITE
 GREY BIOTITE GRA

SAMPLE LOCATION
 BED ROCK
 PIT REGOLITH

INDEX
 PEDRIPAD ZONE- (0.233Sq.km)

Plate No: 25

perdripad zone Most of the REE data in this plot shows negative Europium anomaly indicating late crystallization of feldspar in magma melt.



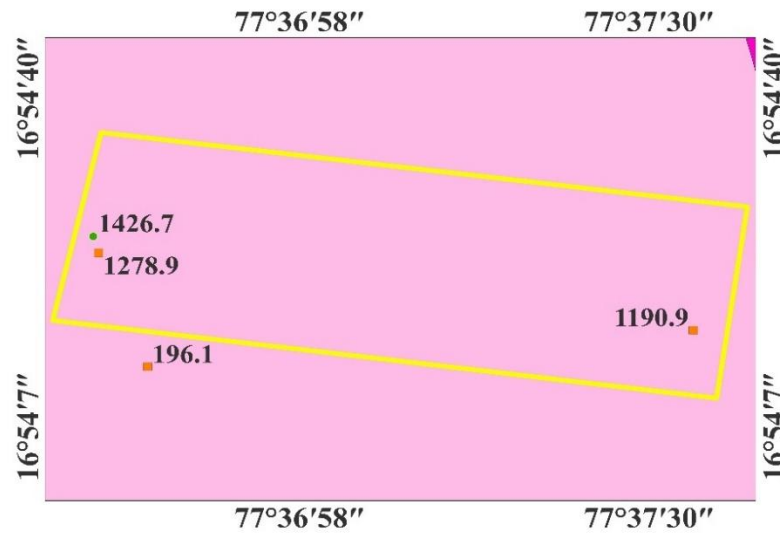
Text fig -27



JADAVARAOPALLI - (REE)



0 200 400 600 800 m



ZONE-A	
TREE	196.10-1426.7
LREE	177.10-1278.8
Th(ppm)	42.10 - 332.5
U(ppm)	3.-15
Zr(ppm)	127- 248.7
Hf(ppm)	3.4 - 7.3
Rb(ppm)	65- 230.9
Sr (ppm)	10.9- 4006

LREE(ppm)	
Ce (ppm)	99.90 - 647.9
La (ppm)	38.50 -340.1
Nd (ppm)	23.60 - 210.1
Eu (ppm)	1.10 - 7.3
Pr (ppm)	7.30 - 62.3
Sm (ppm)	3.80 -38.5
Gd (ppm)	3.4- 30.5

LITHOLOGY
 GREY BIOTITE GRANITE

INDEX
 Jadava rao palli
 (1.05Sq. km)

SAMPLE LOCATION

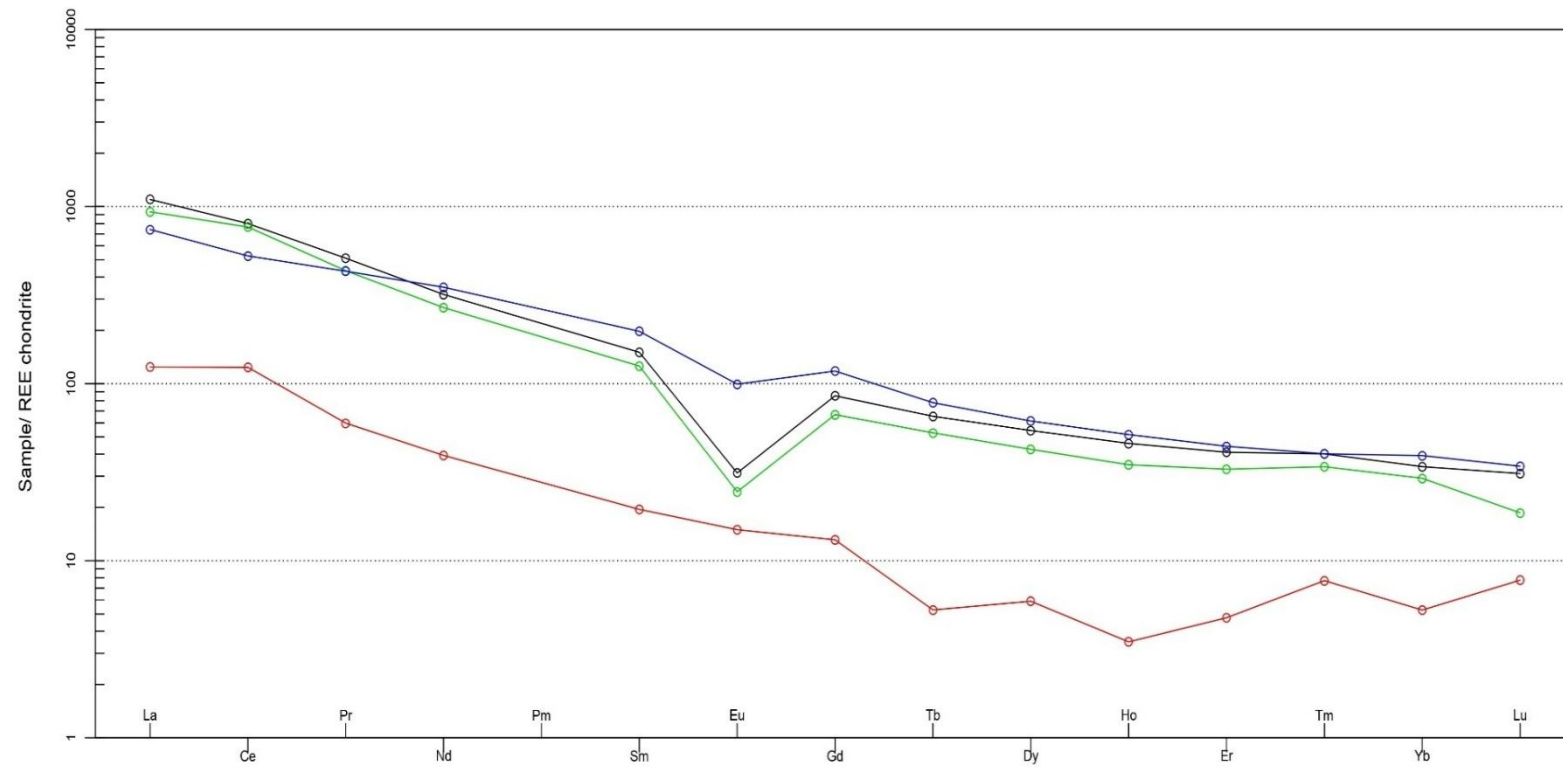
● BED ROCK
 ■ PIT REGOLITH

● village

Plate No: 26

Jadavarao palli, The REE data in this plot shows negative Europium anomaly indicating early and late crystallization feldspar in magma melt.

Spider plot - REE chondrite [Boynton 1984]



Text fig -28

Values reported below detection limits were replaced by one-half of the stated detection limit for calculations (for example, <0.5 was treated as 0.25).

REE concentrations were normalized to CI-chondrite values commonly attributed to Sun and McDonough (1989): La 0.237, Ce 0.613, Pr 0.0928, Nd 0.457, Sm 0.148, Eu 0.0563, Gd 0.199, Tb 0.0361, Dy 0.246, Ho 0.0546, Er 0.160, Tm 0.0247, Yb 0.161 and Lu 0.0246 ppm. Calculated parameters:

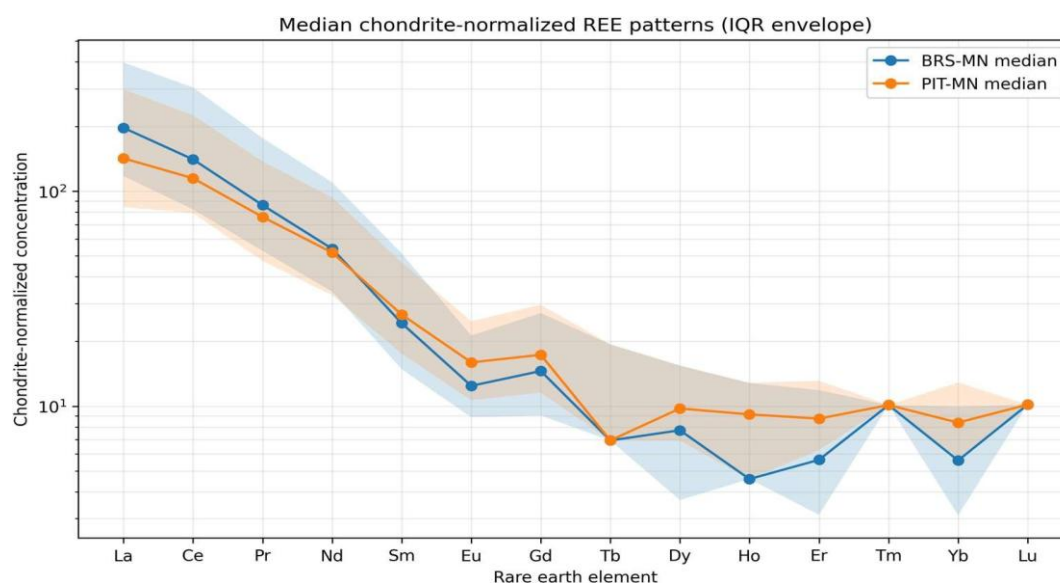
- $Eu/Eu^* = Eu_N / (Sm_N \times Gd_N)^{0.5}$
- $Ce/Ce^* = Ce_N / (La_N \times Pr_N)^{0.5}$
- $(La/Yb)_N$ and $(Gd/Yb)_N$ for LREE-HREE fractionation
- Y/Ho, Zr/Hf, Th/U and LREE/HREE ratios

Following table shows the descriptive statistics;

Parameter	Minimum	Q1	Median	Mean	Q3	Maximum
Total REE	8.05	116	175	295	344	1.68e+03
Eu/Eu*	0.225	0.527	0.696	0.75	0.853	3.05
Ce/Ce*	0.53	1.01	1.07	1.16	1.19	3
Y/Ho	0.25	26	29.3	31.1	36.1	94
(La/Yb) _N	0.679	13.7	21.1	30.9	38.2	177
(Gd/Yb) _N	0.405	1.85	2.21	2.63	2.79	10.4
Zr/Hf	12.2	32.5	35.2	35.8	38	82.2
Th/U	0.021	4.51	7.25	9.79	12.7	46.5

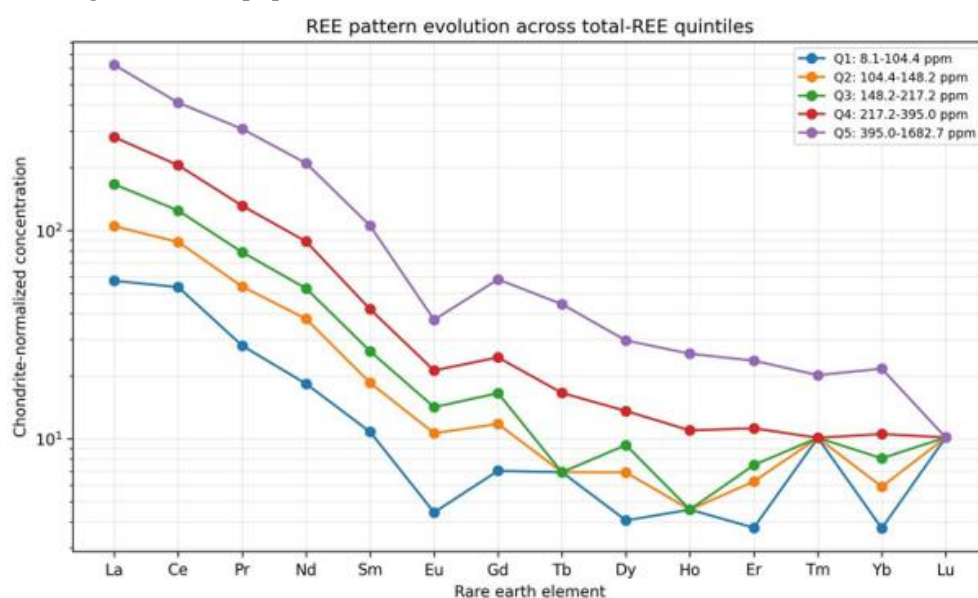
Group	n	Median ΣREE	Median Eu/Eu*	Median Ce/Ce*	Median Y/Ho	Median (La/Yb) _N
BRS-MN	93	187	0.663	1.06	27.5	36.8
PIT-MN	150	168	0.706	1.09	30.5	17.6

Median chondrite-normalized REE patterns



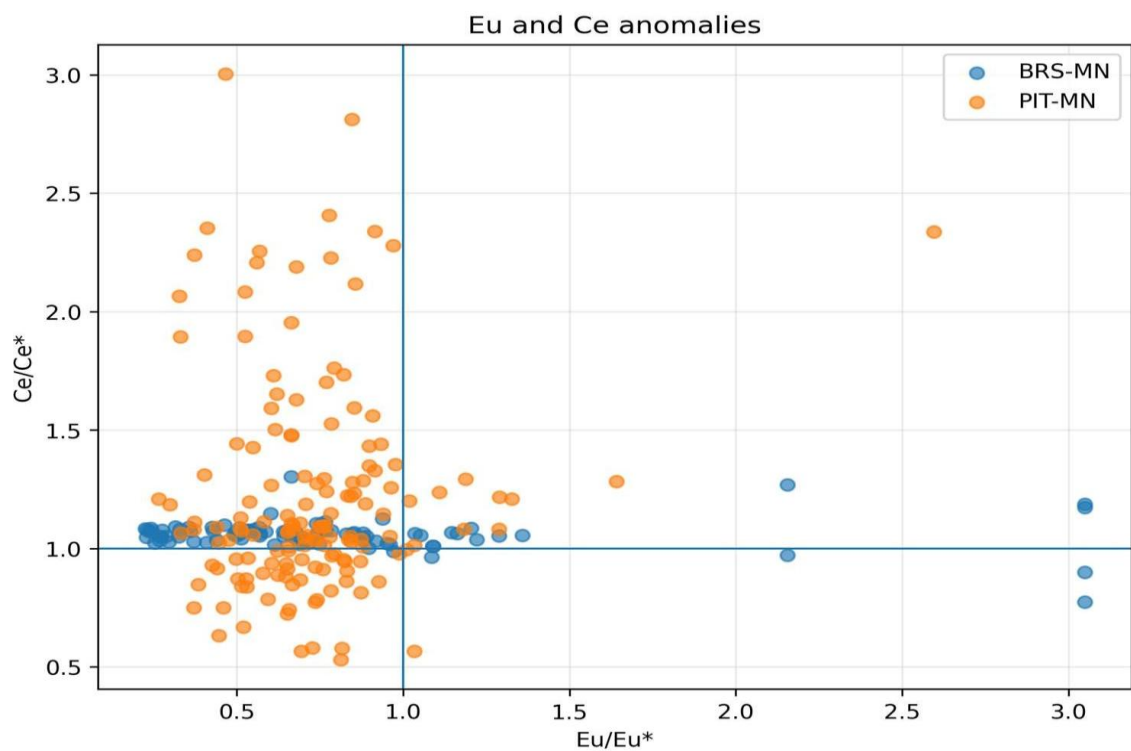
Text fig -29

Both groups are LREE-enriched relative to HREE. BRS-MN has a higher median (La/Yb)_N than PIT-MN, indicating stronger LREE-HREE fractionation. The interquartile envelopes show substantial within-group variability, so neither sample prefix represents a single homogeneous geochemical population.



Text fig: 30

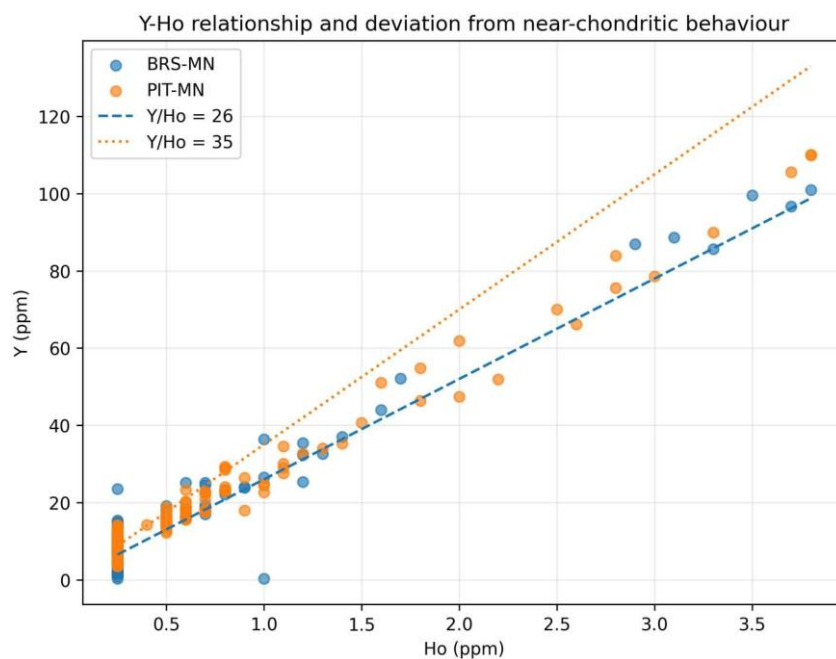
The progressive increase in normalized REE abundance with Σ REE is broadly coherent rather than restricted to one or two individual REEs. This pattern is compatible with varying proportions of REE-bearing accessory phases. Crossing or strongly irregular patterns would be more diagnostic of selective redistribution



Text fig -31

Negative Eu anomalies dominate, while most Ce anomalies cluster near unity. The Eu pattern is compatible with feldspar fractionation or alteration; the lack of widespread strong Ce anomalies argues against pervasive redox-driven Ce mobility.

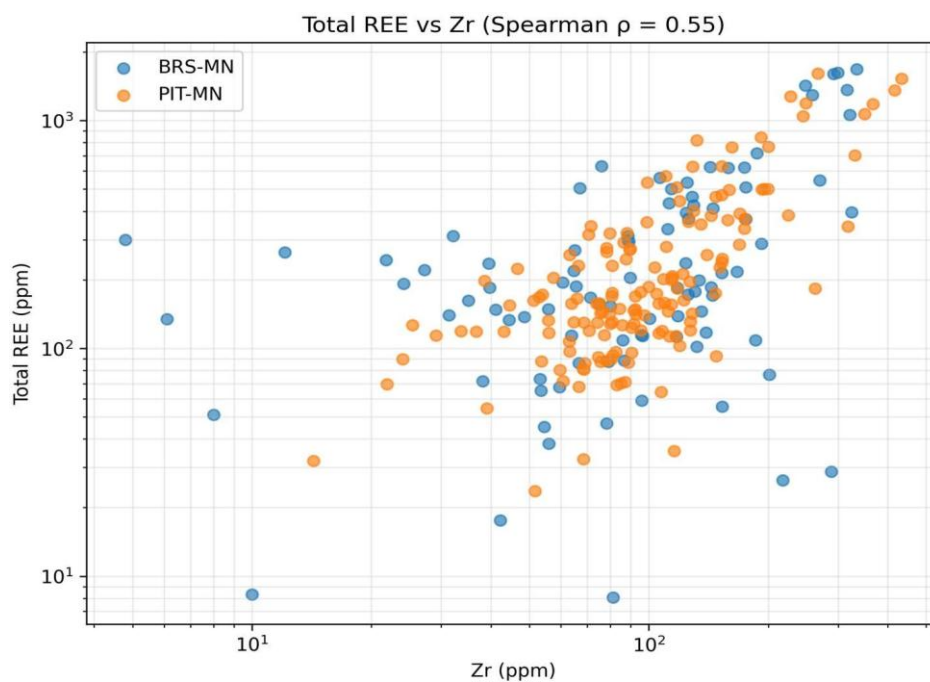
Y-Ho relationship



Text fig -32

Many samples lie near a coherent Y-Ho trend, but significant deviations occur. Values outside the approximate near-chondritic range can flag fluid-rock interaction, although low-level Ho censoring and mineral-specific partitioning must be considered.

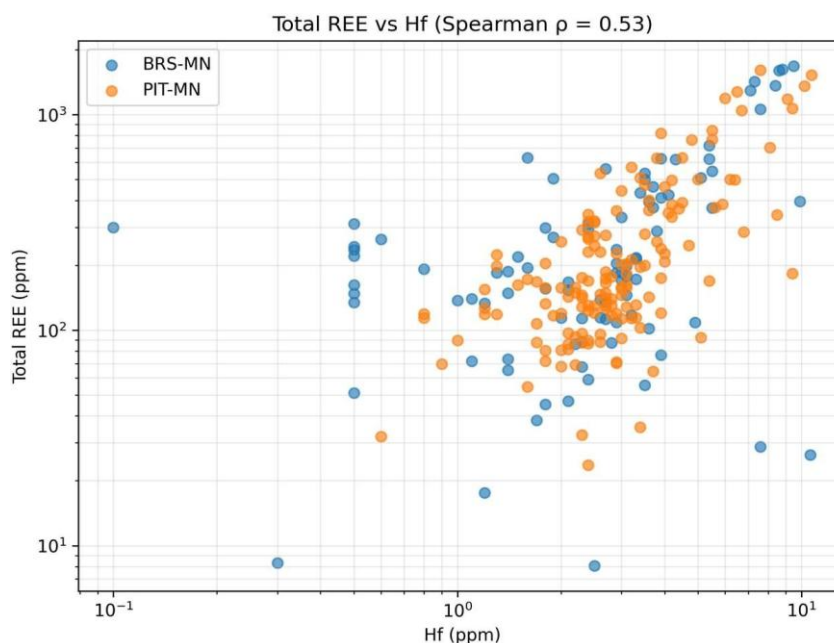
Total REE versus Zr



Text fig -33

The moderate positive correlation ($\rho=0.55$) indicates partial zircon or zircon-associated control, but zircon alone does not explain the full REE variation.

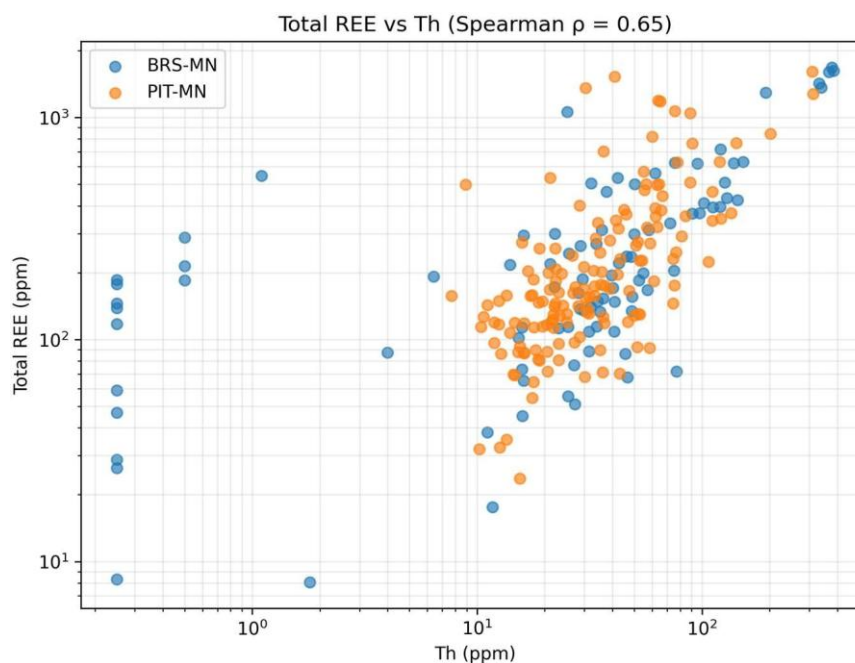
Total REE versus Hf



Text fig -34

The moderate correlation ($\rho=0.53$) parallels the Zr relationship and supports a contribution from zircon or evolved Zr-Hf-bearing mineral assemblages.

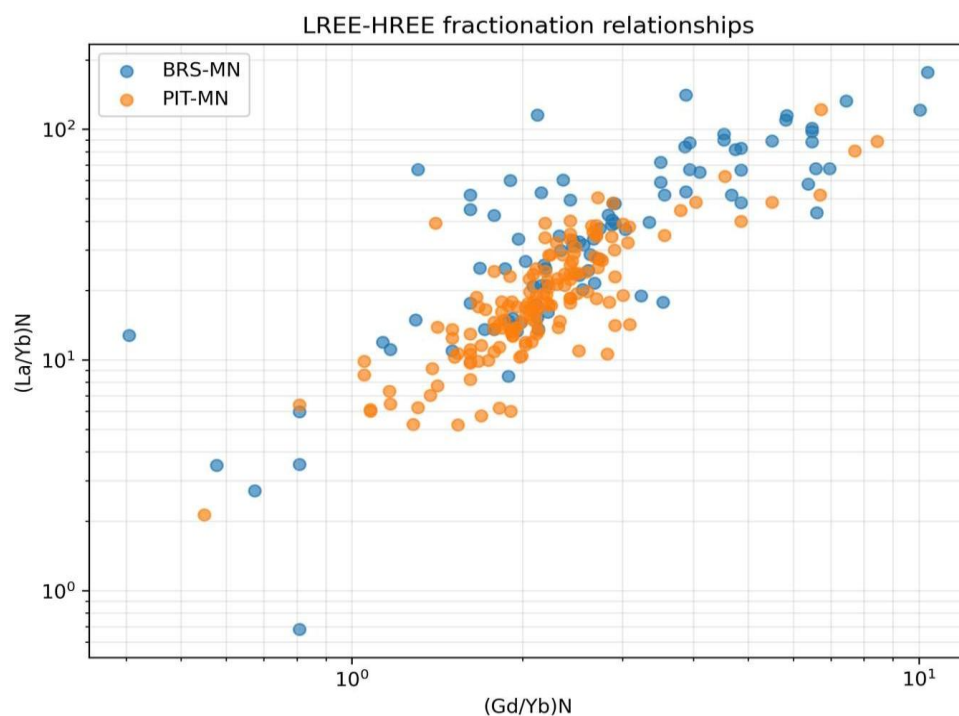
Total REE versus Th



Text fig -35

The strong positive relationship ($\rho=0.65$) is compatible with control by Th-bearing LREE minerals, particularly monazite and/or allanite. Mineralogical confirmation is essential.

LREE-HREE fractionation



Text fig -36

This plot separates variation in overall LREE/HREE fractionation from middle-to-heavy REE fractionation. Broad scatter may reflect multiple protoliths, accessory-mineral proportions, fractional crystallization and/or later fluid modification.

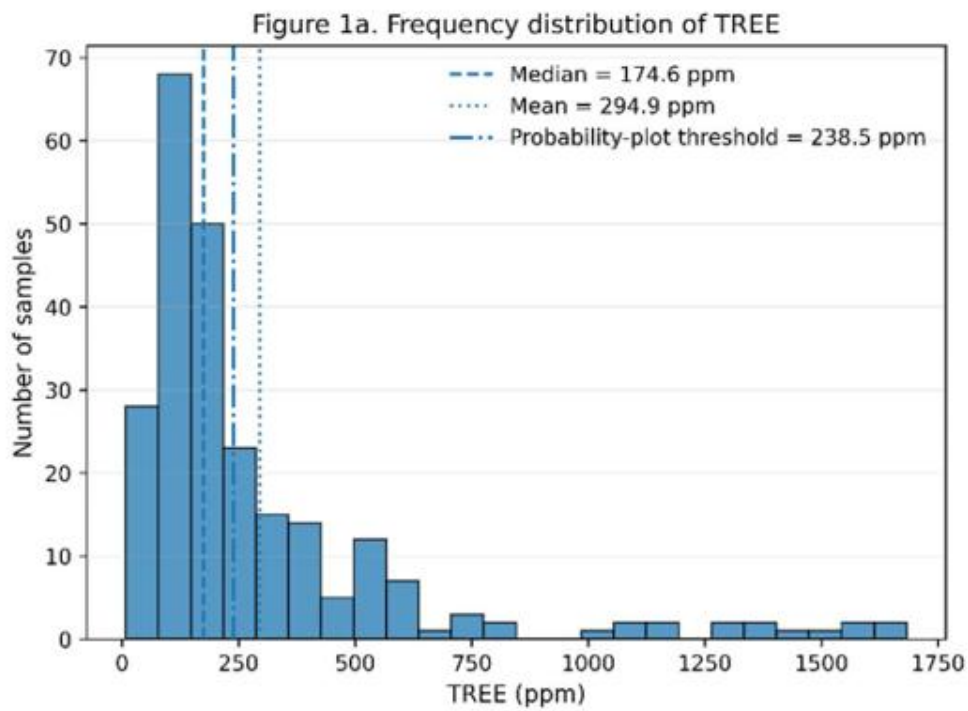
From all these plots, the most defensible interpretation is that the dataset records strong primary mineralogical and magmatic controls, with possible superimposed fluid-related fractionation in a subset of samples.

Evidence supporting primary/accessory-mineral control: coherent normalized REE patterns; strong $\Sigma\text{REE}-Y$ and $\Sigma\text{REE}-Th$ relationships; moderate $\Sigma\text{REE}-Zr-Hf$ correlations.

Possible hydrothermal indicators: anomalous Y/Ho in a substantial subset; wide variation in Eu/Eu^* ; and dispersion away from simple fractionation trends.

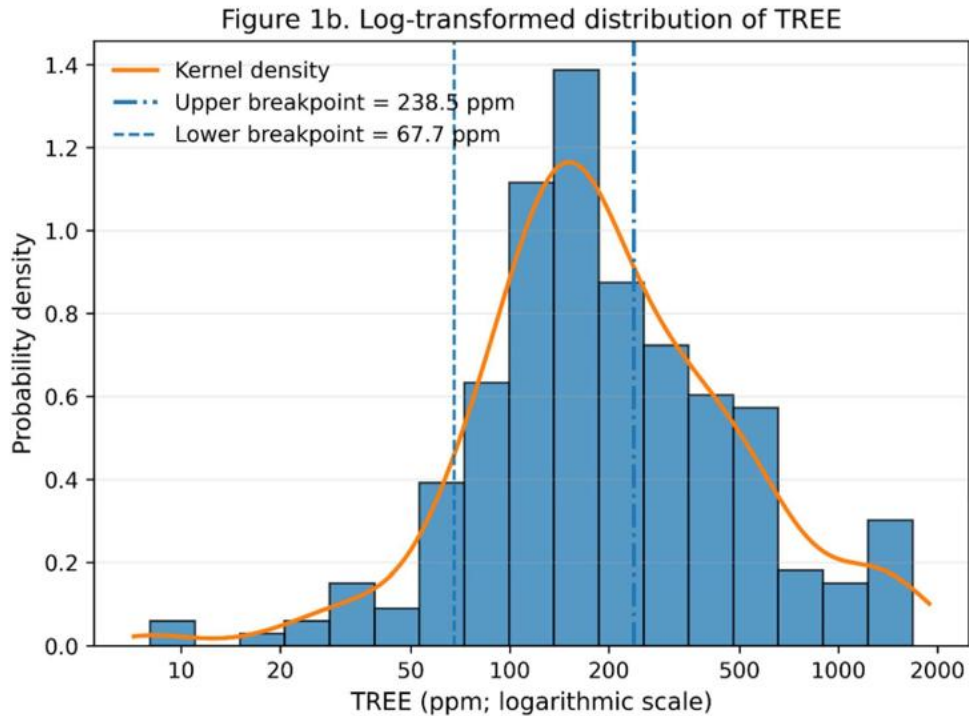
Evidence presently lacking: demonstrable mass gain or loss relative to a known parent rock, systematic alteration zoning, mineral replacement textures, fluid-sensitive major-element indices, and direct association with F-, P- or carbonate-bearing alteration.

Thus, in conclusion it can be stated that the dataset demonstrates marked LREE enrichment, widespread negative Eu anomalies and substantial variation in Y/Ho and LREE/HREE fractionation. The dominant statistical signal links total REE with Y and Th, with secondary links to Zr-Hf-Nb, indicating strong control by accessory minerals. A hydrothermal contribution is plausible for samples with non-chondritic Y/Ho and unusual anomaly patterns, but cannot be established conclusively without fresh-parent comparisons, alteration mineralogy and mass-balance constraints.



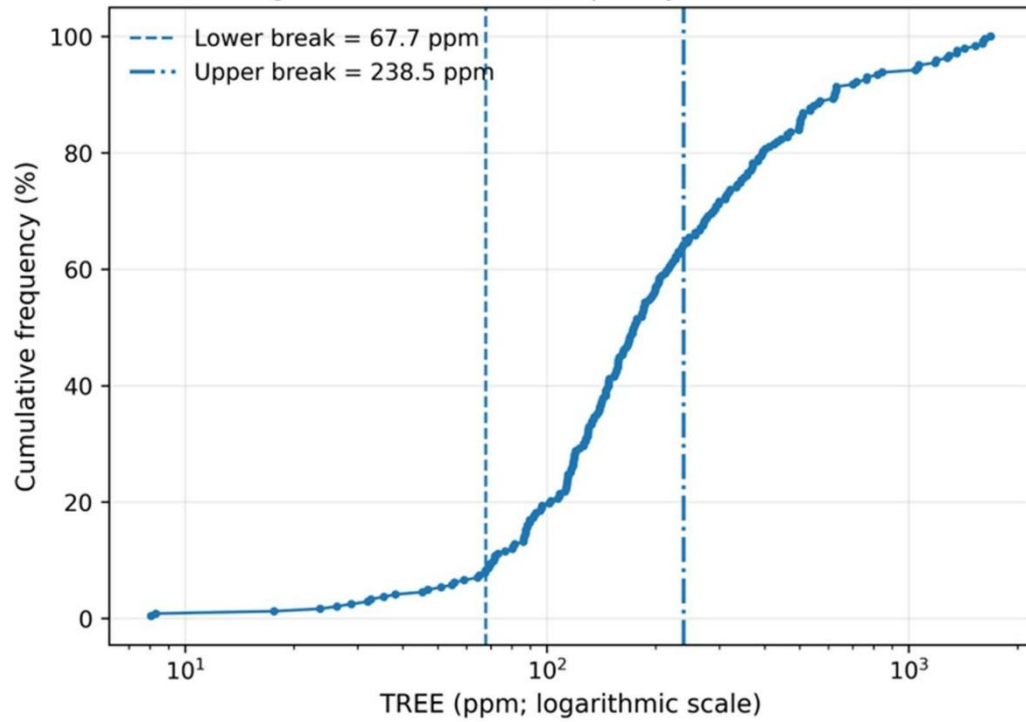
Text fig -37

This classification is statistically derived from b l o c k dataset and is appropriate for Exploration. defensible statistical basis for selecting the threshold.



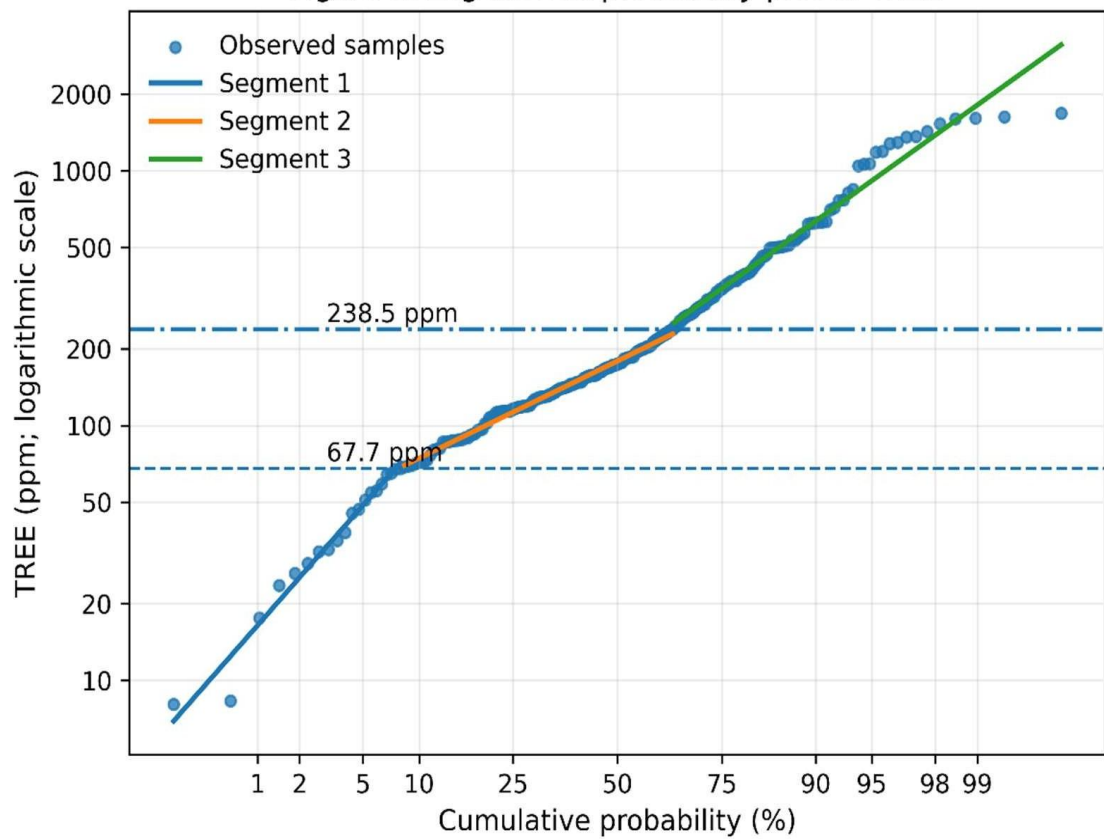
Text fig -38

Figure 2. Cumulative frequency curve for TREE



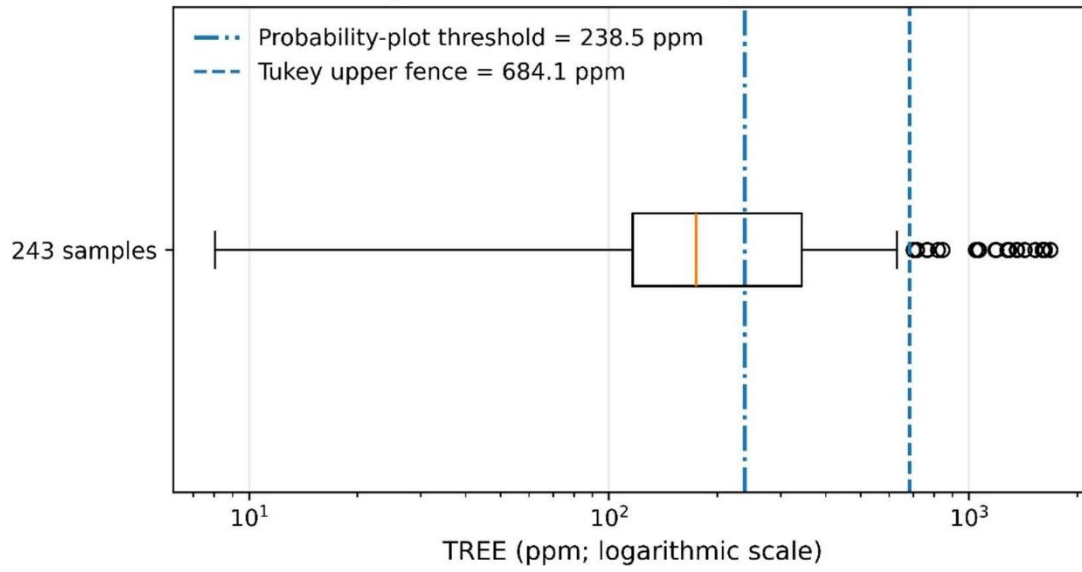
Text fig -39

Figure 3. Log-normal probability plot of TREE

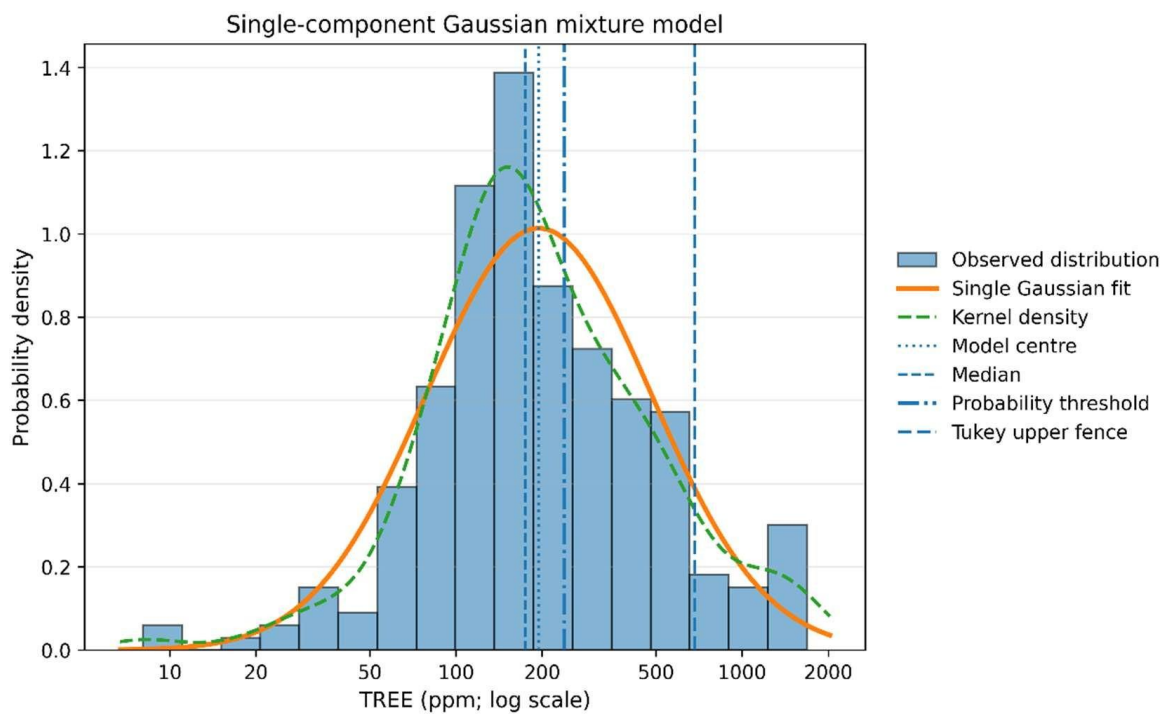


Text fig -40

Figure 4. Box-and-whisker plot of TREE



Text fig -41



Text fig -42

Summary statistics

Parameter	Value
Number of samples	243
Minimum TREE	8.05 ppm
Maximum TREE	1682.70 ppm
Median TREE	174.60 ppm
Mean TREE	294.94 ppm
25th percentile	116.50 ppm
75th percentile	343.55 ppm
90th percentile	624.20 ppm
95th percentile	1066.03 ppm

Statistical natural cut-off

Using clustering of the log-transformed TREE values, the dataset separates naturally into:

- Background to moderately enriched population centered around 115 ppm.
- Enriched population centered around 499 ppm.

The transition between these two populations occurs at approximately:

Natural TREE cut-off $\approx$ 240 ppm

This value represents the statistical break between the background and enriched populations in the dataset.

exploration classes

the following classification:

TREE (ppm) Interpretation

<120	Background
120–240	Weak enrichment
240–500	Moderate enrichment (anomalous)
500–1000	High enrichment
>1000	Very high enrichment / exceptional targets

Interpretation

The result suggests that:

- TREE values form a continuous geochemical population.
There is no statistically distinct background and anomalous population.
- Enrichment appears to occur gradually through geological processes such as magmatic differentiation, rather than through two discrete populations.
This is common in granitoid and pegmatitic REE systems

Geological interpretation

A TREE cut-off of **~240 ppm** because:

- It lies above the dataset median (174.6 ppm).
- It corresponds to a natural statistical break rather than an arbitrary threshold.
- It separates the main background population from a distinctly enriched population.

This **240-ppm** value is a **geochemical anomaly threshold**.

These are classes of anomaly of the block:

- **Geochemical background:** <120 ppm TREE
- **Weakly anomalous:** 120–240 ppm TREE
- **Geochemically anomalous:** >240 ppm TREE
- **High-priority REE anomaly:** >500 ppm TREE
- **Exceptional REE anomaly:** >1000 ppm TREE

Main results

Method	TREE threshold
Lower probability-plot breakpoint	67.7 ppm
Upper probability-plot breakpoint	238.5 ppm
Tukey upper outlier fence	684.1 ppm
Median TREE	174.6 ppm
Mean TREE	294.9 ppm

The most defensible **natural geochemical screening cut-off is approximately 240 ppm TREE**, based on the upper breakpoint in the segmented log-normal probability plot.

An important result is that the Bayesian Information Criterion favours a **single-component Gaussian model** (the last figure). Therefore, the samples do not form two sharply separated statistical populations. The approximately **240 ppm threshold should consequently be described as a pragmatic geochemical anomaly threshold**, rather than a mathematically unique population boundary or an economic cut-off

Accordingly, I have prepared a contour map , you may build a map like this to delineate the actual interesting zones logically (not as shown by you in the given LSM actual scale map) where you can clearly demarcate the **Geochemically anomalous: >240 ppm TREE** and **High-priority REE anomaly: >500 ppm TREE**. My suggestion is that you prepare your own contour map demarcating all the zones as per TREE thresholds at GIS. Also calculate the estimated areas. The map should be given at original scale.

Significant Anomalous Samples Sample

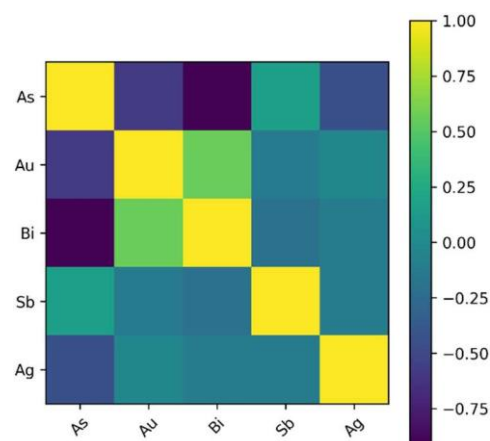
Anomalous Element	Value
BRS-MN-91 A u	0.18 ppm
BRS-MN-59 A g	43.5 ppm
BRS-MN-123 S b	9.5 ppm
BRS-MN-21 B i	1.3 ppm

The analytical data indicate:

- Overall **low precious-metal background**.
- Presence of **isolated hydrothermal anomalies** in Au, Ag, Sb, and Bi.
- Lack of a strong multi-element geochemical association suggests that mineralization is likely **localized rather than widespread**.
- Elevated Sb and Bi indicate possible hydrothermal fluids, while the Ag anomaly may represent a separate mineralizing event or a silver-rich vein.

The Au anomaly at **BRS-MN-91** is the most prospective sample for follow-up. This represents a weak but significant gold anomaly. The correlation matrix shows that generally weak to moderate correlations, implying that mineralization may not be controlled by a single hydrothermal event.

Correlation of major oxides with precious-metal dataset suggests only weak but distinct hydrothermal anomalies.



Text fig -43

Au anomaly is probably due to the transportation of gold Quartz- rich hydrothermal fluids

The combined datasets indicate: Quartz-rich hydrothermal fluids

Hydrothermal alteration preceded or accompanied mineralization.

High CIA values and alkali depletion indicate pervasive fluid-rock interaction.

Gold occurs in silica-rich altered zones.

The Au anomaly (0.18 ppm) is consistent with quartz-vein or silicified alteration rather than disseminated mineralization.

Sb and Bi are useful pathfinder elements.

Elevated Sb and Bi are typical of late hydrothermal systems and may mark fluid conduits.

Silver behaves independently.

The isolated Ag anomaly (~43.5 ppm) probably reflects a local Ag-bearing vein or sulphide concentration rather than the main Au event.

CHAPTER - VIII

8.0.0. PREVIOUS EXPLORATION

8.1.0 General

Geological mapping on 1:50K scale was carried out in FS 1972-73 by. B.K. Ranganath, in FS 197374 by S. Narsimha and S.K Bhattacharya.

In FS 1984-85 Geological mapping on 1:50 K scale was carried out by S.S. Nayak and Kasi Viswanathan and brought out the various geological units including the Kimberlite bodies. The entire area was rigorously searched for Kimberlites and a total of 37 bodies were identified and demarcated. Several clusters were identified and the belt was named as Narayanpet Kimberlite Belt. Out of these six Kimberlites of Maddur cluster fall in the block area.

NGCM was carried out in this area covered by toposheet 56H/09 by Parvathy. R. Krishnan and Swetha Rath in FS 2014-15 and reported TREE up to a maximum of **2572.35** ppm. Apart from the work cited above, no other exploration work has been done in the proposed block.

CHAPTER - IX

9.0.0 AERIAL OR GROUND GEOPHYSICAL OR GEOCHEMICAL SURVEY

9.1.0 Aerial or Ground Geophysical Survey

Areal or ground geophysical survey was not carried out during the present exploration.

9.2.0 Geochemical Survey

Surface geochemical survey has been carried out in the block with collection of 115 no's Bed rock samples and 150 no regolith (Pit) samples by analysed of REE elements (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu,) and Associated Elements (Zr, Hf, Th, U, Sr, Rb) by ICP-MS instrument. All these analyses have been carried out in LUCID Laboratory in Hyderabad. The details of chemical analyses are given in Annexure (I to III).

The element wise geochemical distribution maps manifest the Bed rock, Regolith (Pit), geochemistry to understand in the best possible way. Elemental distribution maps in the form of classed post maps and contour maps were prepared by using inverse power weightage method of Interpolation module of QGIS software. During the preparation of geochemical contours, the contour intervals were kept depending upon the minimum and maximum values in order to cover the entire range of data. In case of elemental values below the detection limit, new values have been assigned which are smaller than the detection limit to show the decreasing trend of the contours. The geochemical distribution map has been prepared for all the trace elements and Σ REE. The element wise interpretation is furnished below.

CHAPTER - X

10.0.0 EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION

10.1.0 Background

Maddur Block was proposed for G-4 level of exploration of REE and associated elements. The Exploration has been carried out as per Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 to achieve the following objective

- i. To carry out Geological & Structural mapping on 1:12500 scale for identification of REE and associated elements bearing formation (host rock) with the structural features to identify the surface manifestation and lateral disposition of the mineralized zones.
- ii. To collect Bedrock samples for analyses of REE and associated elements. to decide further courses of exploration program.
- iii. Pitting to know the concentration of REE and associated elements in the regolith within the target area.

10.2.0 Exploration Methodology

The components of G-4 level of exploration for REE and associated elements. in Maddur Block to full fill the above-mentioned objective in accordance with MEMC rule 2015(amended till 2021) as approved by NMET is furnished in table no 10.1 and the field component wise description has been given in subsequent paragraphs

Table No 10.1

Summarized Table showing Component wise proposed quantum Vs. Quantum Achieved

Sl. No.	Item of Work	Unit	Target	Achievement
1	Geological Mapping (on 1:12,500 Scale)	Sq. km	160	160
2	Geochemical Sampling			
	A. Bedrock samples	No	115	115
3	Exploration			
	Excavation (Pitting) in 150 Pits	Cu.m	150	150
	Pit samples	Nos	150	150
4	Laboratory Studies			
	23 Elements by ICPMS of Surface Primary Samples	Nos	275	275
	Elements by ICPMS of Surface Check Samples	Nos	27	27
7	Petrological Samples (Rock Samples)	Nos	30	30
8	EPMA/SEM Studies (Rock Samples)	Nos	10	10
9	XRD Mineral phase analysis	Nos	5	5
10	Report Preparation (5 Hard copies with a soft copy)	Nos.	1	5

Geological Mapping

Large scale Geological mapping (LSM) completed in the total area of 160 sq. km on 1:12500 scale in the part of Survey of India Toposheet No 56H/09. Survey of India toposheet was used to understand the topography, roads, and drainage of the mapped area and was also used as a base map for the LSM. For recording precise sample location and to carry out a geological survey, handheld GPS of GARMIN 12H has been used. The coordinates had been recorded degree, minutes, Seconds coordinate system with WGS 1984 datum. Variation of lithologies along with the structural elements were systematically recorded and prepared the final geological map as presented in Plate No- 05.

During mapping, different variants of granites belonging to the Peninsular Gneissic Complex (PGC) were demarcated. These granitic variants are characterized by the presence of enclaves of amphibolite, and These are traversed by intrusives such as dolerite, gabbro and. Acid intrusive are quartz reef, pegmatite, The detailed chapter mentions the above

Pitting

Pitting in the present exploration work has been carried out to collect the Regolith Samples by JCB as per requirement and the approval of the landowner. Pits were dug with a dimension of 1 cu.m (1m*1m*1m). Hence a total of 150 cu.m of pitting has been carried out. Few photographs of the pits are the place the below and the entire list of pits locations mentioned in the Annexures.

Images showing the pit study area in Maddur Block



Photograph No: 10.2.0-1.1



Photograph No: 10.2.0-1.2



Photograph No: 10.2.0-1.3



Photograph No: 10.2.0-1.4

Chemical Analysis

All the 165 Nos of primary samples (115 Nos of Bed rock, pit (REGOLITH) subjected to analyses of REE (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu) and associated elements (Zr, Hf, Th, U, Sr, Rb) by ICP- MS instrument. The samples from quartz were analysed for As, Au, Sb, Bi by fire assay method. The results of these samples have been discussed with the description in the block geology under sub head geochemistry.

Moreover, the external check samples of 27 Nos have been analysed for same elements from SHIVA Laboratory, Bengaluru.

Further, 12 no of selected granitic samples were subjected to analyses of major oxides, i.e., SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, P₂O₅, V₂O₅, Loss on Ignition (LOI) by XRF instrument. The results of these samples have been discussed with the description in the block geology under sub head geochemistry.

Physical Analysis

30 Nos of samples have been studied under microscope for complete petrographic Study. Ten samples have been subjected to SEM-EDX and Five. The study report has been discussed under the description of lithology in chapter-VII.

Preparation of Geological Report:

Geological Report has been prepared in Head Office, CMT, Hyderabad by integration of geological and geochemical data. QGIS software has been used for preparation of various maps and GCD kit module of R programming language has been used for generating geochemical plots. The report has been written using Microsoft word and excel 2019 versions.

CHAPTER - XI

11.0.0 Location of Data Point

11.1.0 Accuracy and Quality of Survey

The current exploration for REE and Associated minerals was conducted at the G-4 stage. To accurately record sample locations and perform geological surveys, a handheld GPS device from GARMIN – GPS 12H was utilized. The coordinates were recorded using the degree, minutes, seconds (WGS 1984 datum).

11.2.0 Quality and adequacy of topographic control

The topographic survey was out of the scope of present G-4 stage exploration.

CHAPTER - XII

12.0.0 Sampling

Sampling is a systematic process for collection of material from any media which can provide the best representation. In the present study in the Maddur Block, sampling includes bed rock sampling (BRS), and pit sample (PT).

A total of 115 Nos. of BRS, 150 NoS (PT) Pit samples and 30 no thin section has been collected.

12.1.0 Sampling techniques:

A. Bedrock Sampling:

A total of 115 Nos. of bed rock samples (BRS) were collected systematically from different lithounits exposed in the study area. The samples were collected by chipping exposed rock by sledgehammer (5kg) and chisel. The sample locations are plotted on geological map. First, each BRS sample of 2-3 kgs collected from the field was crushed. After crushing, the crushed samples were mixed thoroughly and reduced the sample size to 500 gm by conning and quartering. These samples were powdered and completely passed through (-) 200 mesh size sieves from which 100 g sample packed in polythene sample pouch and sent for chemical analysis for REE and Associated elements by ICPMS from LUCID Laboratory, Hyderabad and 12 selected samples of granitic rock were also analysed for major oxides by XRF. The remaining 400 g sample has been preserved for future reference.

Pit Regolith sampling:

- i. **Methodology for Collection of pit regolith samples:** pit sample comprises of material collected from within the block area About 2 Kg samples was collected was dried in natural sunlight and They were marked systematically with suffix PIT- MN. These samples were preserved in plastic bags, and one set of samples were transported to LUCID Laboratory for analysis, Hyderabad and another set preserved in the CMT Headquarters.
- ii. **Processing of Collected Samples:** The 2 kg samples were passed through available sieve to get uniform natural fractions of the samples. Then these portions were pounded and passed through (-) 200 mesh sized sieve from which 500 g sample has been collected by coning and quartering. From the 500 g

sample, 100 g sample packed in polythene sample pouch and sent for chemical analysis for 34 elements by ICPMS from LUCID Laboratory for analysis, Hyderabad and another set were preserved in the CMT Headquarters.

12.2.0 Nature, quality and appropriateness of sample preparation technique

Sampling methodology adopted for bedrock, Pit sample is different from each other. The detailed description of sampling methods for each type of sample has been discussed in subsequent paragraphs.

12.3.0 Quality control procedures adopted during sampling

The samples have been prepared under the supervision of a geologist and a qualified sampling technician. All the stream-sediment samples collected from the field were dried under natural sunlight, packed properly in the polythene sample bag with proper tag. Then the entire samples were transported to central sample processing unit located in Hyderabad.

12.4.0 Measures taken to ensure that the sampling is representative

It is very important to submit the representative sample of collected material for geochemical analyses. As discussed in the previously, initial sieving has been carried out on the regolith to collect the natural fraction. Further after pounding and passing samples of regolith and through (-)200 mesh sieve and crushing, grinding and passing 200 mesh sieves for Bed rock samples, quantity of the samples has been reduced to 500 gm by coning and quartering method after thoroughly mixing to maintain the homogeneity of the samples.

12.5.0 Appropriateness of grain size

In accordance with the standard sampling procedures, it has also been observed that smaller the particle size, higher the homogeneity of the sample as well as

higher the dissolvability during the chemical analysis. As per the standard practice, samples are generally pounded to (-)200 mesh size for analysis of REE and Associated elements through ICPMS.

CHAPTER - XIII

13.0.0 DRILLING TECHNIQUE AND DRILL SAMPLING EMPLOYED

Drilling work was not in the scope of the present level of exploration work.

CHAPTER - XIV

14.0.0 SUB-SAMPLING TECHNIQUES AND SAMPLE PREPARATION

As drilling was not in the scope of present exploration work, hence drill core samples have not been generated in the present project. The sampling technique of Pit sample, thin section and bedrock has been discussed in Chapter XII.

CHAPTER - XV

15.0.0 QUALITY OF ASSAY DATA AND LABORATORY TEST

15.1.0 The nature, quality and appropriateness of Chemical analysis

A total 165 Nos of surface samples which includes 30 Nos of Thin sections, 115 Nos of Bed rock samples and 150 Nos of pit samples have been analysed for La, Ce, Pr, Nd, Sm, Eu, Sc, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Th, U, Sr, Hf, Zr, Rb and REE and Associated elements by ICP-MS instrument and by WD-XRF instrument. 12 no of samples were analysed for major oxides, i.e. SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, P₂O₅, V₂O₅, Loss on Ignition (LOI).

Methodology for analysing REE and Associated elements:

ICP-MS instrument model (Agilent 7850) and the sensitivity is measured by external solutions (Tuning solution provided by Agilent), with surrogate calibration for 23 elements (La, Ce, Pr, Nd, Sm, Eu, Sc, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Th, U, Sr, Hf, Zr, Rb). Matrix correction is made by using standard CRM (Certified reference material).

Methodology of Chemical Analyses by XRD/XRF

Chemical Laboratory, SHIVA, Bengaluru make 1.60 KW POWDER X RAY DIFRACTOMETER METHOD (XRD/XRF) instrument for analyses of major oxides.

First pellets of the powdered samples are made using hydraulic press. Then the XRD/XRF instrument is calibrated using suitable matrix matching CRMs. After calibration of the instrument the samples are analysed and the values of, i.e., SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, P₂O₅, V₂O₅,

Loss on Ignition (LOI) Are obtained from the software.

15.2.0 Quality control procedure

The standard procedure of quality control has been adopted during the chemical analysis in NABL accredited Chemical laboratory, LUCID, Hyderabad

15.3.0. External Check Analysis

In accordance with the standard practice of quality assurance and quality control, 27 Check samples were analysed at SHIVA Analytical in Bengaluru, Karnataka as external check samples. The analytical results of external check samples have been compared with the corresponding analysis of primary samples and have been presented as Annexure No II- III

The statistical analysis of primary and external check analysis data has been carried out on REE and Associated elements, i.e., La, Ce, Pr, Nd, Sm, Eu, Sc, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Th, U, Sr, Hf, Zr, Rb by ICP-MS and furnished in Annexure No (II to IV).

The analytical data of check samples have been compared with the data of primary samples and it was found that most of the samples are strongly correlatable. However, couple of bedrock samples and pit samples showed some variation. Further the Scatter plot of the principal Vs external check assay (Text Fig 27-43) in respect of above-mentioned elements shows scatter of values are closely following the line slightly below the bisector. The primary and check data set are close to each other. Thus, it can be inferred that the chemical analysis of the samples shows the repeatability in inter laboratory setting and hence the reliability of the analysis carried out is also established. Further it also proves the homogeneity of the samples prepared.

15.4.0 Security and chain of control of samples

The samples have been prepared at centralized mechanized sampling unit with proper labeling and tag and sent to chemical laboratory in supervision of qualified sampling technician.

The samples have been transported from field to sample processing unit with proper sampling of sampling bags and the same has been verified in the sampling unit before opening the bags.

At the sampling unit, standard procedure has been followed, and all the precautionary measures have been taken to avoid the contamination. Further, the remaining samples are properly preserved with sample tags for any future reference under the custody of the company.

Annexure - I

Major oxides analytical Results



Issued to:
The Director,
Critical Mineral trackers,
Con course No 406,7-1-58/ce/406,
opp Lal Bungalow,Green lands ,Hyderabad-500016.

Sample Particulars: Pink And Grey Granites
Sample Qty : 500g x 12 N
Test Parameters: Major Oxides

Report No : LL/25-26/010466 (1-12)
Report Issue Date : 25.01.2026
Date of Receipt of Sample : 23.12.2025
Date of Starting of Analysis : 22.01.2026
Date of Completing of Analysis : 23.01.2026

Sl.No	Lab. No.	Sample No	Sample ID	Silica as SiO ₂ (% by mass)	Aluminium as Al ₂ O ₃ (% by mass)	Iron as Fe ₂ O ₃ (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na ₂ O (% by mass)	Potassium as K ₂ O (% by mass)	Titanium as TiO ₂ (% by mass)	Phosphorus as P ₂ O ₅ (% by mass)	Loss on Ignition (LOI) (% by mass)	Vanadium as V ₂ O ₅ (ppm)
01	LL/25-26/0010466/46	Pink granite	BRS -MN-61	81.20	13.44	1.86	0.02	0.23	0.72	0.19	0.29	0.24	0.05	1.46	<0.01
02	LL/25-26/0010466/47	Pink granite	BRS -MN-37	82.04	12.74	1.87	0.02	0.29	1.32	0.25	0.21	0.13	0.05	0.53	<0.01
03	LL/25-26/0010466/48	Pink granite	BRS -MN-41	83.72	11.65	1.34	0.01	0.22	1.23	0.22	0.24	0.15	0.05	0.61	<0.01
04	LL/25-26/0010466/49	Pink granite	BRS -MN-78	85.10	10.61	1.27	0.01	0.09	1.44	0.33	0.12	0.10	0.02	0.50	<0.01
05	LL/25-26/0010466/50	Pink granite	BRS -MN-77	76.08	15.58	1.49	0.04	0.45	3.60	0.39	0.31	0.20	0.06	1.42	0.01
06	LL/25-26/0010466/51	Pink granite	BRS -MN-5	83.94	10.60	1.67	0.01	0.26	1.30	0.24	0.23	0.15	0.06	1.00	<0.01
07	LL/25-26/0010466/52	Grey granite	BRS -MN-35	84.76	10.75	1.90	0.03	0.24	0.82	0.20	0.29	0.24	0.05	0.37	<0.01
08	LL/25-26/0010466/53	Grey granite	BRS -MN-25	80.70	14.62	1.72	0.02	0.24	1.03	0.23	0.25	0.17	0.07	0.53	<0.01
09	LL/25-26/0010466/54	Grey granite	BRS -MN-47	82.02	11.75	2.61	0.04	0.46	1.33	0.22	0.26	0.33	0.11	0.52	<0.01
10	LL/25-26/0010466/55	Grey granite	BRS -MN-7	80.98	12.69	2.16	0.04	0.61	1.84	0.27	0.20	0.26	0.10	0.56	<0.01
11	LL/25-26/0010466/56	Grey granite	BRS -MN-2	84.46	11.39	1.21	0.01	0.21	0.88	0.22	0.28	0.12	0.05	0.70	<0.01
12	LL/25-26/0010466/57	Grey granite	BRS -MN-16	83.95	12.15	0.62	0.01	0.03	1.89	0.35	0.04	0.02	0.03	0.60	<0.01

Test Method: IBM Manual & Instrument Used: ICP OES, Flame Photometer.
Note: The above results are expressed on dry basis.

Alavi
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Page No. 1 of 1

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Annexure - II

Summarized table showing statistical analyses of BED ROCK (BRS) samples of REE and Associated elements



TEST RESULTS



Issued to:
Critical Mineral Trackers,
N.No 7-1-58/CC/406, 'Concourse', Opp.Lal Bungalow
Greenlands, Ameerpet,
Hyderabad-500 016
Kind Attn:Mr.K.Nageshwar Rao, 7893847742
Sample Qty : 500g x 38Nos

ULR : TC59182500000040F
LAB REGISTRATION NO: LL/25-26/010466(1 to 38)
Date. Of Receipt of Sample : 23.12.2025
Date. Of Starting of Analysis : 02.01.2026
Date. Of Completing of Analysis : 23.01.2026

S.No	Sample Name	Sample Id	Lanthanum as La	Cerium as Ce	Praseodymium as Pr	Neodymium as Nd	Samarium as Sm	Europium as Eu	Gadolinium as Gd	Terbium as Tb	Dysprosium as Dy	Holmium as Ho	Erbium as Er	Thulium as Tm	Ytterbium as Yb	Lutetium as Lu	Yttrium as Y	Scandium as Sc	Hafnium as Hf	Rubidium as Rb	Strontium as Sr	Tantalum as Ta	Niobium as Nb	Zirconium as Zr
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
1	Pink granite	BRS-MN-62	124.5	233.4	22.3	68.5	10.3	0.7	7.8	1.0	5.1	1.0	2.7	<0.5	2.2	<0.5	26.5	2.7	5.1	223.9	30.3	<1.0	11.9	175.7
2	Pink granite	BRS-MN-34	98.4	187.7	17.8	54.9	8.6	0.6	6.6	0.9	4.7	0.9	2.5	<0.5	2.0	<0.5	23.8	2.1	3.9	80.1	48.6	<1.0	9.4	145.2
3	Pink granite	BRS-MN-36	35.1	64.5	6.1	18.7	2.4	0.6	1.8	<0.5	0.9	<0.5	0.5	<0.5	0.5	<0.5	4.1	1.2	1.0	147.2	267.7	<1.0	4.3	48.6
4	Pink granite	BRS-MN-23	158.2	282.6	27.6	84.6	13.1	1.0	9.8	1.3	6.6	1.2	3.5	0.5	2.9	<0.5	35.4	2.2	1.6	253.5	109.6	<1.0	7.0	76.1
5	Pink granite	BRS-MN-14	65.1	108.9	9.6	29.0	4.2	0.6	3.2	<0.5	1.9	<0.5	1.0	<0.5	<0.5	<0.5	8.9	1.7	<1.0	203.0	283.4	<1.0	3.2	39.5
6	Pink granite	BRS-MN-08	49.2	86.3	7.8	24.6	3.3	0.7	2.5	<0.5	1.4	<0.5	0.7	<0.5	0.7	<0.5	6.6	1.9	1.4	119.4	223.2	<1.0	5.7	65.6
7	Pink granite	BRS-MN-38	19.1	32.8	3.2	10.0	1.4	<0.5	1.1	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	1.4	1.4	106.4	135.3	<1.0	5.3	53.2
8	Pink granite	BRS-MN-48	78.0	149.7	14.2	43.3	5.9	0.8	3.9	<0.5	1.9	<0.5	0.9	<0.5	0.9	<0.5	8.5	2.4	4.9	223.4	161.7	<1.0	6.8	185.7
9	Pink granite	BRS-MN-69	47.0	97.6	10.5	37.0	6.4	1.1	5.4	0.7	3.9	0.8	2.2	<0.5	2.2	<0.5	22.1	7.0	<1.0	185.5	257.1	<1.0	4.4	32.1
10	Pink granite	BRS-MN-70	58.4	115.3	11.6	38.6	6.2	0.9	4.9	0.6	3.4	0.6	1.9	<0.5	1.9	<0.5	18.7	6.2	<1.0	157.8	274.0	<1.0	3.9	21.8
11	Pink granite	BRS-MN-68	33.7	64.4	6.2	19.3	3.1	0.5	2.6	<0.5	2.1	<0.5	1.3	<0.5	1.3	<0.5	11.4	1.3	1.9	183.4	141.9	<1.0	7.5	65.0
12	Pink granite	BRS-MN-66	36.6	60.3	5.6	16.9	2.6	0.6	2.3	<0.5	1.6	<0.5	1.0	<0.5	1.0	<0.5	9.4	0.9	1.4	151.4	189.0	<1.0	5.1	55.9
13	Pink granite	BRS-MN-64	16.5	28.8	2.5	7.2	0.8	<0.5	0.5	<0.5	5.1	1.0	<0.5	<0.5	<0.5	<0.5	<0.5	1.0	1.1	187.2	114.2	<1.0	4.6	31.4

Page 1 of 3

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E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com CIN No. : U24239TG2004PTC042390



TEST RESULTS



Issued to:
Critical Mineral Trackers,
N.No 7-1-58/CC/406, 'Concourse', Opp.Lal Bungalow
Greenlands, Ameerpet,
Hyderabad-500 016
Kind Attn.:Mr.K.Nageshwar Rao, 7893847742
Sample Qty : 500g x 38Nos

ULR : TC591825000000040F
LAB REGISTRATION NO: LL/25-26/010466(1 to 38)
Date. Of Receipt of Sample : 23.12.2025
Date. Of Starting of Analysis : 02.01.2026
Date. Of Completing of Analysis : 23.01.2026

S.No	Sample Name	Sample Id	Lanthanum as La	Cerium as Ce	Praseodymium as Pr	Neodymium as Nd	Samarium as Sm	Europium as Eu	Gadolinium as Gd	Terbium as Tb	Dysprosium as Dy	Holmium as Ho	Erbium as Er	Thulium as Tm	Ytterbium as Yb	Lutetium as Lu	Yttrium as Y	Scandium as Sc	Hafnium as Hf	Rubidium as Rb	Strontium as Sr	Tantalum as Ta	Niobium as Nb	Zincium as Zn
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
14	Grey granite	BRS-MN-65	37.6	67.9	6.2	19.7	2.7	0.6	2.1	<0.5	1.3	<0.5	0.7	<0.5	0.6	<0.5	6.9	0.7	1.4	114.3	198.6	<1.0	4.0	53.5
15	Grey granite	BRS-MN-72	39.5	71.9	6.7	21.2	3.2	0.6	2.5	<0.5	1.6	<0.5	0.9	<0.5	1.0	<0.5	8.7	3.0	<1.0	172.1	240.9	<1.0	5.2	41.1
16	Grey granite	BRS-MN-73	47.8	86.6	8.0	24.7	3.6	0.6	2.7	<0.5	1.9	<0.5	1.3	<0.5	1.3	<0.5	12.9	2.0	<1.0	152.7	157.3	<1.0	5.5	35.1
17	Grey granite	BRS-MN-24	32.8	65.2	6.4	19.9	2.7	<0.5	1.7	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	1.7	1.6	251.6	90.3	<1.0	2.9	60.7
18	Grey granite	BRS-MN-27	1.3	2.8	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	20.4	<1.0	<1.0	<1.0	6.1
19	Grey granite	BRS-MN-11	38.5	80.1	8.6	30.1	6.2	0.6	4.9	0.6	2.7	<0.5	0.9	<0.5	0.6	<0.5	8.5	1.4	2.5	157.3	130.5	<1.0	4.5	81.3
20	Grey granite	BRS-MN-13	32.5	64.1	6.2	19.6	2.9	<0.5	2.0	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	1.0	1.3	221.7	150.6	<1.0	1.2	39.7
21	Grey granite	BRS-MN-29	24.5	44.9	4.5	14.1	2.0	0.5	1.5	<0.5	1.0	<0.5	0.5	<0.5	<0.5	<0.5	4.6	2.2	1.2	116.1	173.9	<1.0	6.1	44.4
22	Grey granite	BRS-MN-28	70.8	137.8	13.6	44.6	7.6	0.8	6.0	0.8	3.8	0.7	1.7	<0.5	1.0	<0.5	17.0	4.8	3.6	266.6	178.2	<1.0	13.7	132.3
23	Grey granite	BRS-MN-19	49.7	101.4	10.2	34.1	5.8	0.7	4.3	0.5	2.3	<0.5	0.8	<0.5	0.5	<0.5	7.4	2.5	2.4	194.4	126.6	<1.0	4.7	88.6
24	Grey granite	BRS-MN-1	19.7	34.6	3.2	9.8	1.5	<0.5	1.2	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	3.3	0.8	<1.0	182.1	237.6	<1.0	3.8	27.2
25	Grey granite	BRS-MN-30	118.1	218.4	21.8	72.6	11.2	1.7	9.1	1.2	6.4	1.2	3.3	<0.5	2.8	<0.5	32.3	4.2	3.9	193.7	125.4	<1.0	8.4	201.5
26	Grey granite	BRS-MN-31	36.0	76.4	7.2	23.2	3.2	0.5	2.0	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	1.0	1.9	204.4	92.6	<1.0	2.4	67.0

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Reviewed

A.L. Kanta Rao
A.L. Kanta Rao
AUTHORISED SIGNATORY

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E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com CIN No. : U24239TG2004PTC042390



TEST RESULTS



Issued to:
Critical Mineral Trackers,
N.No 7-1-58/CC/406, 'Concourse', Opp.Lal Bungalow
Greenlands, Ameerpet,
Hyderabad-500 016
Kind Attn.:Mr.K.Nageshwar Rao, 7893847742
Sample Qty : 500g x 38Nos

ULR : TC591825000000040F
LAB REGISTRATION NO: LL/25-26/010466(1 to 38)
Date. Of Receipt of Sample : 23.12.2025
Date. Of Starting of Analysis : 02.01.2026
Date. Of Completing of Analysis : 23.01.2026

S.No	Sample Name	Sample Id	Lanthanum as La	Cerium as Ce	Praseodymium as Pr	Neodymium as Nd	Samarium as Sm	Europium as Eu	Gadolinium as Gd	Terbium as Tb	Dysprosium as Dy	Holmium as Ho	Erbium as Er	Thulium as Tm	Ytterbium as Yb	Lutetium as Lu	Yttrium as Y	Scandium as Sc	Hafnium as Hf	Rubidium as Rb	Strontium as Sr	Tantalum as Ta	Niobium as Nb	Zirconium as Zr
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
27	Grey granite	BRS-MN-4	43.7	72.8	6.5	19.4	2.4	0.6	1.8	<0.5	0.9	<0.5	0.6	<0.5	0.6	<0.5	5.0	0.8	2.1	184.8	169.9	<1.0	4.1	80.0
28	Grey granite	BRS-MN-3	27.9	50.5	4.9	15.6	2.5	0.5	1.9	<0.5	1.3	<0.5	0.7	<0.5	0.6	<0.5	5.9	0.8	1.8	197.6	195.1	<1.0	4.8	75.1
29	Grey granite	BRS-MN-54	34.5	63.5	5.6	16.8	2.4	0.5	1.7	<0.5	1.2	<0.5	0.7	<0.5	0.7	<0.5	6.0	0.5	2.0	133.3	383.2	<1.0	4.2	63.9
30	Grey granite	BRS-MN-40	54.5	121.7	13.0	46.0	7.8	1.7	6.3	0.8	4.4	0.8	2.4	<0.5	2.3	<0.5	23.3	8.3	2.7	77.2	339.7	<1.0	11.7	100.6
31	Grey granite	BRS-MN-58	51.9	82.4	6.8	18.7	1.8	0.4	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	0.8	2.4	191.5	160.3	<1.0	2.1	89.0
32	Quartz reef	BRS-MN-45	25.7	47.6	4.9	15.9	2.5	0.5	1.9	<0.5	1.4	<0.5	0.8	<0.5	0.7	<0.5	6.6	<0.5	2.1	160.0	113.0	<1.0	3.5	71.2
33	Grey granite	BRS-MN-50	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	23.5	23.5	<1.0	1.4	67.5	<1.0	<1.0	8.0
34	Grey granite	BRS-MN-51	19.1	30.7	2.6	7.1	0.7	<0.5	0.5	<0.5	<0.5	<0.5	0.1	<0.5	<0.5	<0.5	8.0	1.2	1.1	204.6	159.0	<1.0	1.3	38.2
35	Grey granite	BRS-MN-52	78.9	140.5	12.6	38.5	5.4	0.8	3.9	<0.5	2.1	<0.5	0.9	<0.5	0.8	<0.5	12.3	0.7	1.8	174.7	257.6	<1.0	2.8	88.7
36	Grey granite	BRS-MN-76	22.6	45.3	4.8	16.4	3.1	<0.5	2.6	<0.5	2.2	<0.5	1.3	<0.5	1.4	<0.5	6.5	0.9	2.9	163.9	126.8	1.0	6.8	85.9
37	Grey granite	BRS-MN-74	17.9	34.8	3.7	12.1	2.4	0.5	1.9	<0.5	1.4	<0.5	0.8	<0.5	0.8	<0.5	7.8	1.0	2.2	135.9	120.2	<1.0	4.7	66.7
38	Grey granite	BRS-MN-75	19.6	39.4	4.2	13.8	2.6	<0.5	2.1	<0.5	1.6	<0.5	0.9	<0.5	0.9	<0.5	0.8	<0.5	2.8	127.4	97.9	<1.0	7.5	79.2

Test Method: SOP OM-8 and SOP-OM-12, Instrument Used: ICP-OES/MS

Page 3 of 3

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LL/MSP7.8/F03

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TEST REPORT



ULR : TC59182600000042F

Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/406,
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016
Kind Attn.:Mr K.Nageshwar Rao, 7893847742

Report No. : LL/25-26/011173/1,2,3
Issue Date : 24/01/2026
Customer Ref.: Test Request Form
Ref.Date : 09/01/2026

Sample Particulars : Basic Intrusive rocks

Sample description : Basic Intrusive rocks
Qty. Received : 3 nos
Mode of Packing : Polythene cover
Test Parameters : REE and Zr,Hf,Sr,Rb,Nb,Ta.
Date of Receipt of Sample : 09/01/2026
Date of completion of analysis : 24/01/2026

Date of Starting of Analysis : 10/01/2026

SAMPLE TESTED AS RECEIVED

TEST RESULTS

S.No	Parameters	UOM	Reg No:LL/2526/011173/1 Sample ID:BRS-MN-80, Basic Intrusive rocks	Reg No:LL/25-26/011173/2 Sample ID:BRS-MN-85, Basic Intrusive rocks	Reg No:LL/25-26/011173/3 Sample ID:BRS-MN-97, Basic Intrusive rocks
1	Cerium as Ce	ppm	69.7	109.0	113.8
2	Dysprosium as Dy	ppm	2.6	5.1	3.5
3	Erbium as Er	ppm	1.2	2.4	2.0
4	Europium as Eu	ppm	1.5	2.5	1.0
5	Gadolinium as Gd	ppm	4.4	8.3	4.9
6	Holmium as Ho	ppm	<0.5	0.9	0.7
7	Lanthanum as La	ppm	30.7	49.8	55.8
8	Lutetium as Lu	ppm	<0.5	<0.5	<0.5
9	Neodymium as Nd	ppm	29.1	50.3	38.9
10	Praseodymium as Pr	ppm	7.3	12.4	11.6
11	Samarium as Sm	ppm	5.4	9.6	6.2
12	Scandium as Sc	ppm	25.1	21.1	4.4
13	Terbium as Tb	ppm	0.5	1.0	0.6
14	Thulium as Tm	ppm	<0.5	<0.5	<0.5
15	Yttrium as Y	ppm	12.4	24.0	18.7
16	Ytterbium as Yb	ppm	1.1	1.9	1.8
17	Hafnium as Hf	ppm	0.8	<0.2	0.6
18	Zirconium as Zr	ppm	24.1	4.8	12.1
19	Strontium as Sr	ppm	1140.2	612.2	238.8
22	Thorium as Th	ppm	6.4	22.2	28.8
23	Uranium as U	ppm	2.3	5.3	6.2
24	Rubidium as Rb	ppm	96.1	57.1	44.1
25	Niobium as Nb	ppm	7.0	11.8	2.7
26	Tantalum as Ta	ppm	<1.0	<1.0	<1.0

Note: Test Method: SOP OM 08

NOTE : This report and results relate only to the sample / items tested.

Reviewed by

End of Report

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

Page No. 1 of 1

Note: This report is subject to the terms and conditions mentioned overleaf **145343**



Testing to the Core



TEST REPORT

LL/MSP7.8/F03

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ULR : TC591826000000042F

Issued to:

Critical Minerals Trackers

Concourse, No 406,7-1-58/CC/406,

Lal Bungalow, Greenland,

Ameerpet, Hyderabad-500016

Kind Attn: Mr.K.Nageshwar Rao, 7893847742

Report No. : LL/25-26/011173/4 to 8

Issue Date : 24/01/2026

Customer Ref.: Test Request Form

Ref.Date : 09/01/2026

Sample Particulars : Quartz

Sample description : Quartz

Qty. Received : 5 nos

Mode of Packing : Polythene cover

Test Parameters : REE and Zr,Hf,Sr,Rb,Nb,Ta.

Date of Receipt of Sample : 09/01/2026

Date of completion of analysis : 24/01/2026

Date of Starting of Analysis : 10/01/2026

SAMPLE TESTED AS RECEIVED

TEST RESULTS

S.No	Parameters	RegNo: LL/25-26/011173/4 Sample ID:BRS- MN-89,Quartz	RegNo: LL/25-26/011173/5 Sample ID:BRS- MN-87,Quartz	RegNo: LL/25-26/011173/6 Sample ID:BRS- MN-88,Quartz	RegNo: LL/25-26/011173/7 Sample ID:BRS- MN-90,Quartz	Reg No: LL/25-26/011173/8 Sample ID:BRS- MN-91,Quartz
		ppm				
1	Gold as Au	<0.01	<0.01	0.05	0.02	0.18
2	Arsenic as As	3.8	2.6	5.0	5.1	1.4
3	Silver as Ag	0.5	0.4	0.4	0.4	0.7
4	Bismuth as Bi	<1.0	<1.0	<1.0	<1.0	<1.0
5	Antimony as Sb	<1.0	<1.0	<1.0	<1.0	<1.0

Note: Test Method: SOP OM08

NOTE : This report and results relate only to the sample / items tested.

End of Report

Reviewed by

Page No. 1 of 1

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

Note: This report is subject to the terms and conditions mentioned overleaf 145344

TEST REPORT



ULR : TC59182600000040F

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, 9032012955

Report No. : LL/25-26/010466
Issue Date : 23/01/2026
Customer Ref.: Test Request Form
Ref.Date : 23/12/2025

Sample Particulars : Quartz Reef & Quartz vein

Sample description : Quartz Reef & Quartz vein

Qty. Received : ~500gX7 nos

Mode of Packing : Poly bag

Test Parameters : Au,As,Sb,Bi,Ag.

Date of Receipt of Sample : 23/12/2025

Date of Starting of Analysis : 02/01/2026

Date of completion of analysis : 23/01/2026

SAMPLE TESTED AS RECEIVED

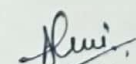
TEST RESULTS

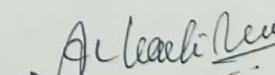
S.No	Lab Id	Sample Name	Sample Id	Ag(ppm)	As(ppm)	Au(ppm)	Bi(ppm)	Sb(ppm)
1	LL/25-26/010466/1	Quartz reef	BRS-MN-45	2.7	4.1	0.04	<1.0	<1.0
2	LL/25-26/010466/2	Quartz reef	BRS-MN-46	<0.1	5.6	0.06	<1.0	<1.0
3	LL/25-26/010466/3	Quartz reef	BRS-MN-20	<0.1	2.7	0.05	<1.0	<1.0
4	LL/25-26/010466/4	Quartz reef	BRS-MN-21	<0.1	8.3	0.06	1.3	1.3
5	LL/25-26/010466/5	Quartz reef	BRS-MN-59	43.5	1.1	0.05	<1.0	<1.0
6	LL/25-26/010466/44	Quartz vein	BRS-MN-32	<0.1	2.5	0.06	<1.0	<1.0
7	LL/25-26/010466/45	Quartz vein	BRS-MN-33	<0.1	4.7	0.06	<1.0	<1.0

Test Method: SOP OM I2

NOTE : This report and results relate only to the sample / items tested.

End of Report


Reviewed by


A.L. Kanta Rao
Authorized Signatory

Page No. 1/1

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

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TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC59182600000121F
LAB REGISTRATION NO: LL/25-26/012781(1to 14)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysis : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Maddura Block MN
Sample Qty : 500g x 14Nos
Test Parameters: Trace elements & REE

S.No	Sample name	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
PPM																													
1	Pink Granite	BRS-MN-110	56.1	<0.5	<0.5	0.5	1.4	<0.5	33.1	<0.5	14.3	5.0	1.5	<0.5	<0.5	15.8	<0.5	2.6	<0.5	1.7	190.8	<1.0	2.3	<1.0	98.7	83.9	1.6	<1.0	96.5
2	Pink Granite	BRS-MN-112	99.7	3.7	2.0	0.6	5.3	0.7	50.7	<0.5	30.9	9.8	5.8	<0.5	0.7	46.3	<0.5	9.1	1.6	25.1	178.8	<1.0	2.9	8.1	242.7	126.0	9.4	1.2	124.0
3	Pink Granite	BRS-MN-106	78.9	1.5	0.8	0.5	3.0	<0.5	43.3	<0.5	22.5	7.5	3.2	<0.5	<0.5	22.1	<0.5	5.9	0.8	10.6	225.6	1.9	3.3	11.5	67.0	131.5	9.9	<1.0	125.6
4	Pegmatite	BRS-MN-83A1	6.3	0.5	0.5	<0.5	0.5	<0.5	2.4	<0.5	1.9	0.6	<0.5	<0.5	<0.5	11.7	<0.5	5.5	0.6	4.3	113.9	<1.0	1.2	<1.0	249.2	23.8	8.1	<1.0	42.3
5	Pink Granite	BRS-MN-84	91.6	1.7	1.0	0.7	3.2	<0.5	53.6	<0.5	23.5	8.0	3.1	<0.5	<0.5	54.8	<0.5	16.6	0.9	11.9	173.3	<1.0	3.1	3.8	98.4	175.0	9.1	<1.0	133.9
6	Grey Granite	BRS-MN-93	35.7	1.4	0.8	0.5	2.1	<0.5	18.0	<0.5	12.6	3.9	2.2	<0.5	<0.5	31.4	<0.5	21.1	0.8	10.4	266.6	<1.0	2.3	31.8	149.2	117.5	5.6	<1.0	86.8
7	Leuco granite	BRS-MN-96	104.7	0.9	0.6	0.9	2.6	<0.5	63.6	<0.5	25.6	8.9	2.7	<0.5	<0.5	21.1	<0.5	3.4	0.6	7.4	194.6	4.8	1.5	4.7	92.5	396.4	10.7	1.3	64.7
8	Leuco granite	BRS-MN-92	26.4	0.6	<0.5	<0.5	1.1	<0.5	10.0	<0.5	8.1	2.4	1.2	<0.5	<0.5	25.4	<0.5	5.2	0.5	5.2	127.1	1.8	3.5	7.0	149.7	34.5	3.7	<1.0	153.0
9	Gabbro	BRS-MN-79	80.3	1.2	0.5	0.7	2.3	<0.5	48.8	<0.5	20.3	7.0	2.5	<0.5	<0.5	40.2	<0.5	7.8	<0.5	6.9	155.4	1.6	3.0	6.7	97.9	282.0	3.9	<1.0	144.6
10	Pink Granite	BRS-MN-81	20.3	<0.5	<0.5	<0.5	0.8	<0.5	11.0	<0.5	6.1	2.1	0.8	<0.5	<0.5	15.9	<0.5	9.3	0.5	3.7	132.2	2.0	1.8	7.7	112.1	18.0	3.6	<1.0	54.5
11	Pink Granite	BRS-MN-99	90.6	2.9	1.9	0.9	4.0	0.6	46.5	<0.5	28.5	8.9	4.4	0.6	0.5	14.0	<0.5	4.0	1.5	25.1	147.1	6.6	3.3	3.1	155.3	274.8	26.5	1.0	166.7
12	Pink Granite	BRS-MN-82	16.6	<0.5	<0.5	<0.5	0.7	<0.5	8.8	<0.5	5.1	1.8	0.7	<0.5	<0.5	11.1	<0.5	32.0	0.5	3.9	126.6	<1.0	1.7	3.9	143.9	8.8	4.7	<1.0	56.0
13	Pink Granite	BRS-MN-103	54.5	0.5	<0.5	0.6	1.5	<0.5	30.5	<0.5	14.0	5.0	1.7	<0.5	<0.5	23.1	<0.5	8.1	<0.5	4.0	186.5	7.7	2.7	10.9	154.1	211.3	6.5	<1.0	117.3
14	Grey Granite	BRS-MN-94	45.4	2.0	1.1	<0.5	2.9	<0.5	22.1	<0.5	17.3	5.2	3.1	<0.5	<0.5	34.0	<0.5	11.6	1.1	14.2	253.2	1.5	2.6	8.7	144.9	151.6	9.1	<1.0	95.8

Note : The above results are expressed on dry basis.

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS

Page 1 of 2

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End of Report

[Signature]
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AUTHORISED SIGNATORY

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TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406, 7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet, Hyderabad-500016

ULR : TC591826000000121F
LAB REGISTRATION NO: LL/25-26/012781(15to 28)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysis : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.: Mr. K. Nageshwar Rao, 7893847742

Sample Particulars: Maddura Block MN
Sample Qty : 500g x 14Nos
Test Parameters: Trace elements & REE

S.No	Sample name	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
PPM																													
15	Pink Granite	BRS-MN-104	17.4	1.0	0.6	<0.5	1.4	<0.5	7.5	<0.5	7.9	2.1	1.6	<0.5	<0.5	<0.5	<0.5	10.8	0.6	6.8	188.6	<1.0	2.1	51.4	109.9	176.9	7.1	<1.0	78.3
16	Pink Granite	BRS-MN-114	132.9	2.4	1.1	0.8	5.2	<0.5	68.8	<0.5	41.6	13.0	6.2	<0.5	0.5	0.5	<0.5	5.4	0.9	14.9	174.9	<1.0	3.8	6.8	146.6	172.7	11.2	<1.0	192.5
17	Pink Granite	BRS-MN-111	249.1	5.3	2.8	0.8	9.5	1.0	134.2	<0.5	70.1	23.4	10.5	<0.5	1.1	1.1	<0.5	12.4	2.3	36.4	145.9	<1.0	5.5	4.4	162.2	96.5	16.5	<1.0	269.8
18	Grey Granite	BRS-MN-108	10.2	<0.5	<0.5	<0.5	<0.5	<0.5	9.4	<0.5	2.4	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	9.1	0.5	3.0	146.9	<1.0	10.6	4.4	94.6	375.3	2.9	<1.0	217.4
19	Pink Granite	BRS-MN-101	5.9	0.5	0.5	<0.5	0.5	<0.5	3.6	<0.5	1.9	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	10.8	0.7	14.6	236.0	<1.0	7.6	7.8	146.7	204.3	4.5	<1.0	288.6
20	Pink Granite	BRS-MN-98	86.3	0.9	<0.5	<0.5	3.1	<0.5	44.7	<0.5	26.0	8.3	3.7	<0.5	<0.5	<0.5	<0.5	5.0	<0.5	4.5	257.1	6.9	3.1	11.8	129.4	87.9	6.2	<1.0	130.7
21	Grey Biotite Granite	BRS-MN-102	3.6	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.5	<0.5	1.2	121.1	<1.0	0.3	2.1	94.6	56.6	1.8	<1.0	10.0
22	Grey Granite	BRS-MN-86	65.7	0.8	<0.5	0.8	2.0	<0.5	37.2	<0.5	18.1	6.0	2.2	<0.5	<0.5	<0.5	<0.5	11.9	<0.5	6.0	215.6	4.6	2.6	17.9	152.8	256.9	6.7	<1.0	118.5
23	Grey Granite	BRS-MN-83	80.5	2.1	1.2	0.8	3.7	<0.5	44.5	<0.5	24.6	7.7	3.9	<0.5	<0.5	<0.5	<0.5	7.1	1.1	15.4	259.8	5.2	3.0	10.4	123.1	253.2	15.2	1.0	143.5
24	Pink Granite	BRS-MN-115	71.4	0.6	<0.5	0.5	1.8	<0.5	40.3	<0.5	17.9	6.4	2.1	<0.5	<0.5	<0.5	<0.5	4.4	<0.5	4.5	161.7	3.7	3.1	4.9	111.0	120.7	4.1	<1.0	135.8
25	Pink Granite	BRS-MN-117	78.3	2.6	1.4	0.8	4.1	0.5	38.7	<0.5	25.3	7.8	4.5	<0.5	0.5	0.5	<0.5	9.9	1.3	19.1	252.2	2.4	2.9	14.7	114.5	185.6	11.3	<1.0	118.2
26	Pink Granite	BRS-MN-100	90.4	2.4	1.3	1.1	4.2	0.5	46.8	<0.5	29.4	9.0	4.8	4.4	0.5	0.5	<0.5	5.1	1.3	17.8	284.4	8.5	3.3	18.5	104.5	331.7	15.3	<1.0	152.8
27	Pink Granite	BRS-MN-105	55.6	0.6	<0.5	0.6	1.4	<0.5	35.0	<0.5	13.4	4.8	1.6	<0.5	<0.5	<0.5	<0.5	3.7	<0.5	4.5	229.1	2.2	3.2	10.6	124.0	470.7	6.8	<1.0	139.6
28	Grey Granite	BRS-MN-95	28.7	0.4	<0.5	<0.5	0.9	<0.5	14.4	<0.5	8.4	2.7	1.1	<0.5	<0.5	<0.5	<0.5	5.1	<0.5	2.4	162.5	<1.0	2.4	5.1	176.4	91.3	2.0	<1.0	95.9

Note : The above results are expressed on dry basis.

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS

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Reviewed

End of Report

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S.No	LATITUDE	LONGITUDE	Sample Id	La	Ce	Pr	Nd	Sm	Sc	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y	U	Th	Hf	Rb	Sr	Ta	Nb	Zr	LREE	HREE	Total REE
1	16.92726	77.60423	BRS-MN-62	124.5	233.4	22.3	68.5	10.3	2.7	0.7	7.8	1	5.1	1	2.7	0.25	2.2	0.25	26.5	13.3	126.5	5.1	223.9	30.3	<1.0	11.9	175.7	459.7	20.3	509.2
2	16.9267	77.61149	BRS-MN-34	98.4	187.7	17.8	54.9	8.6	2.1	0.6	6.6	0.9	4.7	0.9	2.5	0.25	2	0.25	23.8	12.6	101.9	3.9	80.1	48.6	<1.0	9.4	145.2	368	18.1	412
3	16.92399	77.61661	BRS-MN-36	35.1	64.5	6.1	18.7	2.4	1.2	0.6	1.8	0.25	0.9	0.25	0.5	0.25	0.5	0.25	4.1	5.2	28.7	1	147.2	267.7	<1.0	4.3	48.6	127.4	4.7	137.4
4	16.92801	77.62079	BRS-MN-23	158.2	282.6	27.6	84.6	13.1	2.2	1	9.8	1.3	6.6	1.2	3.5	0.5	2.9	0.25	35.4	14.5	152.2	1.6	253.5	109.6	<1.0	7	76.1	567.1	26.05	630.75
5	16.92189	77.63287	BRS-MN-14	65.1	108.9	9.6	29	4.2	1.7	0.6	3.2	0.25	1.9	0.25	1	0.25	0.25	0.25	8.9	10.9	48.4	<1.0	203	283.4	<1.0	3.2	39.5	217.4	7.35	235.35
6	16.92216	77.6301	BRS-MN-08	49.2	86.3	7.8	24.6	3.3	1.9	0.7	2.5	0.25	1.4	0.25	0.7	0.25	0.7	0.25	6.6	8.1	29.4	1.4	119.4	223.2	<1.0	5.7	65.6	171.9	6.3	186.7
7	16.91293	77.63524	BRS-MN-38	19.1	32.8	3.2	10	1.4	1.4	0.25	1.1	0.25	0.6	0.25	0.25	0.25	0.25	1.9	4.3	15.8	1.4	106.4	135.3	<1.0	5.3	53.2	66.75	3.2	73.25	
8	16.92216	77.6301	BRS-MN-45	25.7	47.6	4.9	15.9	2.5	<0.5	0.5	1.9	<0.5	1.4	<0.5	0.8	<0.5	0.7	<0.5	6.6	10.2	40.7	4.9	223.4	161.7	<1.0	6.8	185.7	97.1	4.8	108.5
9	16.9194	77.64436	BRS-MN-48	78	149.7	14.2	43.3	5.9	2.4	0.8	3.9	0.25	1.9	0.25	0.9	0.25	0.9	0.25	8.5	11.7	58	<1.0	185.5	257.1	<1.0	4.4	32.1	291.9	8.6	311.4
10	16.90664	77.65124	BRS-MN-69	47	97.6	10.5	37	6.4	7	1.1	5.4	0.7	3.9	0.8	2.2	0.25	2.2	0.25	22.1	8.2	25.6	<1.0	157.8	274	<1.0	3.9	21.8	199.6	15.7	244.4
11	16.90706	77.64755	BRS-MN-70	58.4	115.3	11.6	38.6	6.2	6.2	0.9	4.9	0.6	3.4	0.6	1.9	0.25	1.9	0.25	18.7	8.4	33.9	1.9	183.4	141.9	<1.0	7.5	65	231	13.8	269.7
12	16.90921	77.6558	BRS-MN-68	33.7	64.4	6.2	19.3	3.1	1.3	0.5	2.6	0.25	2.1	0.25	1.3	0.25	1.3	0.25	11.4	18.5	34.3	1.4	151.4	189	<1.0	5.1	55.9	127.2	8.3	148.2
13	16.90674	77.6563	BRS-MN-66	36.6	60.3	5.6	16.9	2.6	0.9	0.6	2.3	0.25	1.6	0.25	1	0.25	1	0.25	9.4	8.2	32	1.1	187.2	114.2	<1.0	4.6	31.4	122.6	6.9	139.8
14	16.90203	77.65508	BRS-MN-64	16.5	28.8	2.5	7.2	0.8	1	0.25	0.5	0.25	5.1	1	0.25	0.25	0.25	0.25	29.7	16.1	1.4	114.3	198.6	<1.0	4	53.5	56.05	7.85	65.15	
15	16.88838	77.64175	BRS-MN-65	37.6	67.9	6.2	19.7	2.7	0.7	0.6	2.1	0.25	1.3	0.25	0.7	0.25	0.6	0.25	6.9	4.4	40.9	<1.0	172.1	240.9	<1.0	5.2	41.1	134.7	5.7	148
16	16.88159	77.64148	BRS-MN-72	39.5	71.9	6.7	21.2	3.2	3	0.6	2.5	0.25	1.6	0.25	0.9	0.25	1	0.25	8.7	7.4	28.2	<1.0	152.7	157.3	<1.0	5.5	35.1	143.1	7	161.8
17	16.88324	77.64172	BRS-MN-73	47.8	86.6	8	24.7	3.6	2	0.6	2.7	0.25	1.9	0.25	1.3	0.25	1.3	0.25	12.9	7.4	39.7	1.6	251.6	90.3	<1.0	2.9	60.7	171.3	8.2	194.4
18	16.86285	77.62373	BRS-MN-24	32.8	65.2	6.4	19.9	2.7	1.7	0.25	1.7	0.25	0.6	0.25	0.25	0.25	0.25	1.8	20	48.8	<1.0	20.4	<1.0	<1.0	<1.0	6.1	127.25	3.8	134.55	
19	16.86135	77.63248	BRS-MN-27	1.3	2.8	0.25	0.7	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.5	1.8	2.5	157.3	130.5	<1.0	4.5	81.3	5.55	2	8.05	
20	16.85367	77.63563	BRS-MN-11	38.5	80.1	8.6	30.1	6.2	1.4	0.6	4.9	0.6	2.7	0.25	0.9	0.25	0.6	0.25	8.5	2.7	52.4	1.3	221.7	150.6	<1.0	1.2	39.7	164.1	10.45	184.45
21	16.85062	77.63758	BRS-MN-13	32.5	64.1	6.2	19.6	2.9	1	0.25	2	0.25	0.8	0.25	0.25	0.25	0.25	0.25	2.1	6.9	35.2	1.2	116.1	173.9	<1.0	6.1	44.4	125.55	4.3	132.95
22	16.85676	77.6455	BRS-MN-29	24.5	44.9	4.5	14.1	2	2.2	0.5	1.5	0.25	1	0.25	0.5	0.25	0.25	0.25	4.6	2.2	15.3	3.6	266.6	178.2	<1.0	13.7	132.3	90.5	4.25	101.55
23	16.85581	77.65157	BRS-MN-28	70.8	137.8	13.6	44.6	7.6	4.8	0.8	6	0.8	3.8	0.7	1.7	0.25	1	0.25	17	5.1	35.8	2.4	194.4	126.6	<1.0	4.7	88.6	275.2	14.5	311.5
24	16.84318	77.65137	BRS-MN-19	49.7	101.4	10.2	34.1	5.8	2.5	0.7	4.3	0.5	2.3	0.25	0.8	0.25	0.5	0.25	7.4	4.3	42.7	<1.0	182.1	237.6	<1.0	3.8	27.2	201.9	9.15	220.95
25	16.83051	77.64034	BRS-MN-1	19.7	34.6	3.2	9.8	1.5	0.8	0.25	1.2	0.25	0.8	0.25	0.25	0.25	0.25	0.25	3.3	3.2	27	3.9	193.7	125.4	<1.0	8.4	201.5	69.05	3.5	76.65
26	16.83066	77.64444	BRS-MN-30	118.1	218.4	21.8	72.6	11.2	4.2	1.7	9.1	1.2	6.4	1.2	3.3	0.25	2.8	0.25	32.3	2.8	32.1	1.9	204.4	92.6	<1.0	2.4	67	443.8	24.5	504.8
27	16.83128	77.6483	BRS-MN-31	36	76.4	7.2	23.2	3.2	1	0.5	2	0.25	0.7	0.25	0.25	0.25	0.25	0.25	1.6	2.8	36.4	2.1	184.8	169.9	<1.0	4.1	80	146.5	4.2	153.3
28	16.81358	77.64693	BRS-MN-4	43.7	72.8	6.5	19.4	2.4	0.8	0.6	1.8	0.25	0.9	0.25	0.6	0.25	0.6	0.25	5	7.6	49	1.8	197.6	195.1	<1.0	4.8	75.1	145.4	4.9	156.1
29	16.81761	77.64979	BRS-MN-3	27.9	50.5	4.9	15.6	2.5	0.8	0.5	1.9	0.25	1.3	0.25	0.7	0.25	0.6	0.25	5.9	6.4	25.4	2	133.3	383.2	<1.0	4.2	63.9	101.9	5.5	114.1
30	16.82312	77.59847	BRS-MN-54	34.5	63.5	5.6	16.8	2.4	0.5	0.5	1.7	0.25	1.2	0.25	0.7	0.25	0.7	0.25	6	4.9	29.8	2.7	77.2	339.7	<1.0	11.7	100.6	123.3	5.3	135.1
31	16.82017	77.59966	BRS-MN-40	54.5	121.7	13	46	7.8	8.3	1.7	6.3	0.8	4.4	0.8	2.4	0.25	2.3	0.25	23.3	5.2	16.1	2.4	191.5	160.3	<1.0	2.1	89	244.7	17.5	293.8
32	16.81175	77.60221	BRS-MN-58	51.9	82.4	6.8	18.7	1.8	0.8	0.4	1.2	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.4	12.5	57.2	2.1	160	113	<1.0	3.5	71.2	162	2.95	167.15
33	16.78302	77.62805	BRS-MN-50	0.25	0.8	0.25	0.25	0.25	23.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	23.5	4.2	27.2	<1.0	1.4	67.5	<1.0	<1.0	8	2.05	2	51.05
34	16.79741	77.60404	BRS-MN-51	19.1	30.7	2.6	7.1	0.7	1.2	0.25	0.5	0.25	0.25	0.25	0.1	0.25	0.25	0.25	8	7.1	77.1	1.1	204.6	159	<1.0	1.3	38.2	60.45	2.1	71.75
35	16.7953	77.60886	BRS-MN-52	78.9	140.5	12.6	38.5	5.4	0.7	0.8	3.9	0.25	2.1	0.25	0.9	0.25	0.8	0.25	12.3	8.3	49.9	1.8	174.7	257.6	<1.0	2.8	88.7	276.7	8.7	298.4
36	16.77323	77.626	BRS-MN-76	22.6	45.3	4.8	16.4	3.1	0.9	0.25	2.6	0.25	2.2	0.25	1.3	0.25	1.4	0.25	6.5	4	31.5	2.9	163.9	126.8	1	6.8	85.9	92.45	8.5	108.35
37	16.7677	77.63055	BRS-MN-74	17.9	34.8	3.7	12.1	2.4	1	0.5	1.9	0.25	1.4	0.25	0.8	0.25	0.8	0.25	7.8	8.3	45.6	2.2	135.9	120.2	<1.0	4.7	66.7	71.4	5.9	86.1
38	16.76698	77.62669	BRS-MN-75	19.6	39.4	4.2	13.8	2.6	0.25	0.25	2.1	0.25	1.6	0.25	0.9	0.25	0.9	0.25	0.8	1	4	2.8	127.4	97.9	<1.0	7.5	79.2	79.85	6.5	87.4
39	16.78781	77.64785	BRS-MN-80	30.7	69.7	7.3	29.1	5.4	25.1	1.5	4.4	0.5	2.6	0.25	1.2	0.25	1.1	0.25	12.4	2.3	6.4	0.8	96.1	1140.2	<1.0	7	24.1	143.7	10.55	191.75
40	16.9425	77.63258	BRS-MN-85	49.8	109.7	12.4	50.3	9.6	21.1	2.5	8.3	1	5.1	0.9	2.4	0.25	1.9	0.25	24	5.3	22.2	<0.2	57.1	612.2	<1.0	11.8	4.8	234.3	20.1	299.5
41	16.88367	77.62927	BRS-MN-97	55.8	113.8	11.6	38.9	6.2	4.4	1	4.9	0.6	3.5	0.7	2	0.25	1.8	0.25	18.7	6.2	28.8	0.6	44.1	238.8	<1.0	2.7	12.1	127.3	14	264.4
42	16.79055	77.60961	BRS-MN-110	33.1	56.1	5	14.3	1.5	<0.5	0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	2.6	15.8	2.3	98.7	83.9	<1.0	1.6	96.5	110.5	1.4	113.6
43	16.89626	77.60829	BRS-MN-112	50.7	99.7	9.8	30.9	5.8	<0.5	0.6	5.3	0.7	3.7	0.7	2	<0.5	1.6	<0.5	25.1	9.1	46.3	2.9	242.7	126	1.2	9.4	1			

S.No	LATITUDE	LONGITUDE	Sample Id	La	Ce	Pr	Nd	Sm	Sc	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y	U	Th	Hf	Rb	Sr	Ta	Nb	Zr	LREE	HREE	Total REE
51	16.78764	77.64813	BRS-MN-81	11	20.3	2.1	6.1	0.8	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3.7	9.3	15.9	1.8	112.1	18	<1.0	3.6	54.5	40.3	1.3	45.3
52	16.88953	77.63516	BRS-MN-99	46.5	90.6	8.9	28.5	4.4	0.6	0.9	4	0.5	2.9	0.6	1.9	<0.5	1.5	<0.5	25.1	4	14	3.3	155.3	274.8	1	26.5	166.7	179.8	11.4	216.9
53	16.78824	77.64531	BRS-MN-82	8.8	16.6	1.8	5.1	0.7	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3.9	32	11.1	1.7	143.9	8.8	<1.0	4.7	56	33	1.2	38.1
54	16.88188	77.64717	BRS-MN-103	30.5	54.5	5	14	1.7	<0.5	0.6	1.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4	8.1	23.1	2.7	154.1	211.3	<1.0	6.5	117.3	106.3	2	112.3
55	16.77481	77.62011	BRS-MN-94	22.1	45.4	5.2	17.3	3.1	<0.5	<0.5	2.9	<0.5	2	<0.5	1.1	<0.5	1.1	<0.5	14.2	11.6	34	2.6	144.9	151.6	<1.0	9.1	95.8	93.1	7.1	114.4
56	16.91425	77.64168	BRS-MN-104	7.5	17.4	2.1	7.9	1.6	<0.5	<0.5	1.4	<0.5	1	<0.5	0.6	<0.5	0.6	<0.5	6.8	10.8	<0.5	2.1	109.9	176.9	<1.0	7.1	78.3	36.5	3.6	46.9
57	16.82491	77.63938	BRS-MN-114	68.8	132.9	13	41.6	6.2	<0.5	0.8	5.2	0.5	2.4	<0.5	1.1	<0.5	0.9	<0.5	14.9	5.4	0.5	3.8	146.6	172.7	<1.0	11.2	192.5	263.3	10.1	288.3
58	16.9327	77.61919	BRS-MN-111	134.2	249.1	23.4	70.1	10.5	<0.5	0.8	9.5	1.1	5.3	1	2.8	<0.5	2.3	<0.5	36.4	12.4	1.1	5.5	162.2	96.5	<1.0	16.5	269.8	488.1	22	546.5
59	16.79531	77.61704	BRS-MN-108	9.4	10.2	0.8	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3	9.1	<0.5	10.6	94.6	375.3	<1.0	2.9	217.4	22.8	0.5	26.3
60	16.91157	77.64716	BRS-MN-101	3.6	5.9	0.6	1.9	<0.5	<0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5	0.7	<0.5	14.6	10.8	<0.5	7.6	146.7	204.3	<1.0	4.5	288.6	12	2.2	28.8
61	16.85514	77.63485	BRS-MN-98	44.7	86.3	8.3	26	3.7	<0.5	<0.5	3.1	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	4.5	5	<0.5	3.1	129.4	87.9	<1.0	6.2	130.7	169	4	177.5
62	16.8575	77.64091	BRS-MN-102	2.2	3.6	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	5.5	<0.5	0.3	94.6	56.6	<1.0	1.8	10	7.1	0	8.3
63	16.93146	77.62487	BRS-MN-86	37.2	65.7	6	18.1	2.2	<0.5	0.8	2	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	6	11.9	<0.5	2.6	152.8	256.9	<1.0	6.7	118.5	130	2.8	138.8
64	16.87311	77.63189	BRS-MN-83	44.5	80.5	7.7	24.6	3.9	<0.5	0.8	3.7	<0.5	2.1	<0.5	1.2	<0.5	1.1	<0.5	15.4	7.1	<0.5	3	123.1	253.2	1	15.2	143.5	162	8.1	185.5
65	16.87145	77.60274	BRS-MN-115	40.3	71.4	6.4	17.9	2.1	<0.5	0.5	1.8	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	4.5	4.4	<0.5	3.1	111	120.7	<1.0	4.1	135.8	138.6	2.4	145.5
66	16.90251	77.60104	BRS-MN-117	38.7	78.3	7.8	25.3	4.5	<0.5	0.8	4.1	0.5	2.6	0.5	1.4	<0.5	1.3	<0.5	19.1	9.9	0.5	2.9	114.5	185.6	<1.0	11.3	118.2	155.4	10.4	184.9
67	16.79896	77.61391	BRS-MN-100	46.8	90.4	9	29.4	4.8	4.4	1.1	4.2	0.5	2.4	0.5	1.3	<0.5	1.3	<0.5	17.8	5.1	0.5	3.3	104.5	331.7	<1.0	15.3	152.8	181.5	10.2	213.9
68	16.77249	77.65319	BRS-MN-105	35	55.6	4.8	13.4	1.6	<0.5	0.6	1.4	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	4.5	3.7	<0.5	3.2	124	470.7	<1.0	6.8	139.6	111	2	117.5
69	16.76111	77.61093	BRS-MN-95	14.4	28.7	2.7	8.4	1.1	<0.5	<0.5	0.9	<0.5	0.4	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	5.1	<0.5	2.4	176.4	91.3	<1.0	2	95.9	55.3	1.3	59
70	16.79324	77.64747	BRS-MN-5	106.3	168.4	14.7	48.2	6.2	3.4	1.1	3.5	<0.5	2.6	<0.5	1.3	<0.5	1.2	<0.5	11.8	7.7	90.5	5.5	249.8	439.5	<1.0	3.6	175.6	344.9	8.6	368.7
71	16.85804	77.6325	BRS-MN-10	103.2	186.5	18	58.8	7.6	3.6	1.2	3.9	<0.5	1.8	<0.5	0.7	<0.5	0.8	<0.5	7.3	8.4	111.8	3.6	276.8	144.7	0.7	6	124.1	375.3	7.2	393.4
72	16.85427	77.63733	BRS-MN-12	111.2	202.7	19.5	62.8	7.1	3.3	1.2	4.3	<0.5	2.4	<0.5	0.7	<0.5	0.9	<0.5	8.4	9.5	143.9	4.1	256.5	86.7	0.5	4.9	129.7	404.5	8.3	424.5
73	16.922	77.63348	BRS-MN-15	93.8	151.8	14.3	40.9	5.2	5.4	1.2	3.2	<0.5	2.1	<0.5	1.2	<0.5	1.2	<0.5	13.3	10.5	72.2	3	217.1	219.6	<1.0	12.7	111.6	307.2	7.7	333.6
74	16.93889	77.6475	BRS-MN-17	180.6	335	34.5	108.5	14.1	5.5	1.5	8.8	1	4.4	0.7	1.9	<0.5	1.5	<0.5	19.3	8.1	121.1	5.4	220.6	103.8	<1.0	5.8	187.5	674.2	18.3	717.3
75	16.84573	77.65299	BRS-MN-18	144.6	272.6	28.4	96.1	18.1	10	1.9	13.4	1.6	7.2	1.2	2.3	<0.5	1.7	<0.5	25.3	4.9	75.9	3.9	112.9	896.3	<1.0	12.8	142.8	561.7	27.4	624.4
76	16.86351	77.62249	BRS-MN-25	152.1	295.4	29.4	94.8	12.5	5.9	1.6	6.5	0.8	3	<0.5	1.3	<0.5	0.9	<0.5	14.2	4.9	95.4	4.3	174.9	172.3	<1.0	7.7	158.6	585.8	12.5	618.4
77	16.86144	77.63283	BRS-MN-26	124.8	271.5	28.6	86	12.9	5	1.4	6.6	0.8	4	0.6	1.7	<0.5	1.3	<0.5	16.5	6.8	61.9	2.7	119.4	19.2	1.4	5.4	106.6	525.2	15	561.7
78	16.91237	77.63551	BRS-MN-37	87.3	158.6	16.3	54.3	9.1	2.9	1.7	6.2	0.8	4.1	0.7	2	<0.5	2.3	<0.5	24.5	12.3	97.7	3.7	160.1	225.1	<1.0	9.1	125.8	327.3	16.1	370.8
79	16.81026	77.60102	BRS-MN-41	128.1	187	16.4	40.6	3.8	7.1	0.9	2.1	<0.5	1.1	<0.5	0.8	<0.5	1.3	<0.5	6.8	8.6	120.2	9.9	113.8	212.5	<1.0	5.5	324.7	376.8	5.3	396
80	16.81231	77.61541	BRS-MN-43	62.2	90.5	8.3	24.7	2.9	1	0.9	2.2	<0.5	1.6	<0.5	0.8	<0.5	1	<0.5	7.9	23	75	2.9	181.6	217.2	0.7	3.3	89.8	189.5	5.6	204
81	16.92023	77.64323	BRS-MN-47	280.8	550.2	57.2	193.5	35.7	4.3	2.7	25.5	3.5	20.2	3.7	9.5	1.4	8.2	1.1	96.7	19	192.3	7.1	188.4	275.8	4.3	26.9	258.7	1120.1	73.1	1294.2
82	16.79703	77.62279	BRS-MN-49	14.7	27.7	3	9.1	1.5	0.3	0.5	1.3	<0.5	1	<0.5	0.6	<0.5	0.9	<0.5	6.9	12.3	46.7	2.3	96.2	114.9	<1.0	2.2	59.6	56.5	3.8	67.5
83	16.81567	77.59713	BRS-MN-55	92.3	187.7	21	73.2	12	14.4	3.2	9.4	1.2	6.4	1.3	3.3	<0.5	3.6	0.5	32.6	5.8	37.7	3.7	162.5	690.5	<1.0	11.1	128.8	389.4	25.7	462.1
84	16.81121	77.60699	BRS-MN-56	136	214.5	17.8	49.6	5.4	<0.5	1.5	2.1	<0.5	1.1	<0.5	0.5	<0.5	0.8	<0.5	4.4	6.3	129	3.4	127.1	197.2	0.6	3.1	112.5	424.8	4.5	433.7
85	16.93246	77.64793	BRS-MN-60	101.7	197.9	21	72.7	14.4	6.4	1.8	10.8	1.7	8.6	1.7	4.3	0.7	5.1	0.7	52.1	9	50.2	3.5	164.8	150.4	<1.0	19.2	114	409.5	33.6	501.6
86	16.77346	77.65671	BRS-MN-118	94.2	216.8	25.4	86.3	16.4	15.9	2.9	11.6	1.6	7.9	1.6	4	0.6	4.8	0.7	44	5.9	42.2	3.5	82.1	705.3	<1.0	18.2	125	442	32.8	534.7
87	16.90687	77.61074	BRS-MN-129	340.1	647.9	62.3	191.3	29.3	3.9	2.3	22.1	3.1	17.5	3.3	8.6	1.3	7.1	1	85.6	15	332.5	7.3	157.9	92.6	<1.0	17.5	248.1	1273.2	64	1426.7
88	16.91457	77.60679	BRS-MN-130	407.2	753.2	74.3	226.4	39.8	6.5	2.4	25.5	3.3	19.9	3.5	10.1	1.4	8.4	1.2	99.6	22.6	378.2	9.5	147.4	77.8	<1.0	23.5	334.6	1503.3	73.3	1682.7
89	16.91679	77.60674	BRS-MN-131	387.6	728.1	72.5	219.4	34.5	5.7	2.8	25.4	3.4	19.2	3.8	10.2	1.5	8.8	1.1	101	20.1	385.6	8.8	177.1	68.8	<1.0	20.9	299.1	1444.9	73.4	1625
90	16.9266	77.62176	BRS-MN-132	386.3	730.4	69.4	217.6	35.2	9.8	2.1	21.8	2.8	16.8	2.9	8.2	1.1	7.6	1.1	86.9	19.6	367.2	8.6	259.7	167	<1.0	17.8	292.2	1441	62.3	1600
91	16.93181	77.61899	BRS-MN-133	325.5	598.7	61.1	187.3	30.9	6.4	2.5	21.5	2.9	15.8	3.1	8.7	1.2	7.1	1	88.7	18	338.9	8.4	206.3	53	<1.0	22.4	316.1	1206	61.3	1362.4
92	16.93644	77.63581	BRS-MN-134	176.6	301.1	26.6	79.1	8.9	1	1.8	4.7	0.5	2.8	0.5	1.5	<0.5	2	<0.5	16.3	11.5	138.6	5.4	140.5	176	0.6	5.6	174.4	594.1	12	

S.No	LATITUDE	LONGITUDE	Sample Id	As(ppm)	Au(ppm)	Bi(ppm)	Sb(ppm)	Ag(ppm)
94	16.94648	77.614243	BRS-MN-45	4.1	0.04	<1.0	<1.0	2.7
95	16.94503	77.617525	BRS-MN-46	5.6	0.06	<1.0	<1.0	<0.1
96	16.94304	77.622453	BRS-MN-20	2.7	0.05	<1.0	<1.0	<0.1
97	16.94347	77.621458	BRS-MN-21	8.3	0.06	1.3	1.3	<0.1
98	16.92872	77.648144	BRS-MN-59	1.1	0.05	<1.0	<1.0	43.5
99	16.85086	77.619206	BRS-MN-32	2.5	0.06	<1.0	<1.0	<0.1
100	16.84557	77.620067	BRS-MN-33	4.7	0.06	<1.0	<1.0	<0.1
101	16.94235	77.624195	BRS-MN-119	23.6	<0.01	<0.5	<0.5	
102	16.94229	77.624263	BRS-MN-120	19.2	<0.01	<0.5	<0.5	
103	16.94215	77.624417	BRS-MN-121	23.6	<0.01	<0.5	1.6	
104	16.94214	77.624558	BRS-MN-122	28.8	<0.01	<0.5	<0.5	
105	16.94204	77.624668	BRS-MN-123	21.6	<0.01	<0.5	9.5	
106	16.94244	77.623893	BRS-MN-124	21.3	<0.01	<0.5	3.5	
107	16.94256	77.623788	BRS-MN-125	19	<0.01	<0.5	<0.5	
108	16.94283	16.942827	BRS-MN-126	29	<0.01	<0.5	<0.5	
109	16.94264	77.623597	BRS-MN-127	21.5	<0.01	<0.5	<0.5	
110	16.94277	77.623327	BRS-MN-128	21	<0.01	<0.5	<0.5	
111	16.94188	77.625013	BRS-MN-87	2.6	<0.01	<1.0	<1.0	0.4
112	16.94089	77.626902	BRS-MN-88	5	0.05	<1.0	<1.0	0.4
113	16.94006	77.628335	BRS-MN-89	3.8	<0.01	<1.0	<1.0	0.5
114	16.92601	77.652838	BRS-MN-90	5.1	0.02	<1.0	<1.0	0.4
115	16.92467	77.655242	BRS-MN-91	1.4	0.18	<1.0	<1.0	0.7

Annexure -III

Summarized table showing statistical analyses of regolith (Pit) samples of REE and Associated elements



TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Amberpet,Hyderabad-500016

ULR : TC591826000000123F
LAB REGISTRATION NO: LL/25-26/012783(1to15)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysis : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742
Sample Particulars: Pit
Sample Qty : 500g x 15 Nos
Test Parameters: Trace elements & REE

S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
		PPM																										
1	PIT-MN-1	39.2	1.3	0.7	0.5	1.9	<0.5	14.9	<0.5	11.3	3.6	2.1	3.8	<0.5	16.2	<0.5	4.7	0.8	7.1	139.3	42.8	2.3	58.9	154.0	271.9	6.5	<1.0	75.6
2	PIT-MN-2	73.5	3.0	1.7	1.3	5.2	0.6	80.2	<0.5	37.9	11.7	5.7	4.9	0.6	35.2	<0.5	3.6	1.4	18.6	152.1	10.2	2.5	49.6	124.1	163.7	8.4	<1.0	87.7
3	PIT-MN-3	31.6	1.4	0.9	0.6	2.1	<0.5	19.2	<0.5	11.8	3.4	2.1	3.8	<0.5	12.8	<0.5	3.4	0.8	8.5	166.2	7.4	2.1	41.2	131.0	196.8	5.4	<1.0	69.0
4	PIT-MN-4	32.6	1.0	0.6	<0.5	1.4	<0.5	9.1	<0.5	7.0	1.9	1.5	2.0	<0.5	17.8	<0.5	3.7	0.8	6.4	221.7	7.3	3.7	48.3	99.3	42.8	3.3	<1.0	107.4
5	PIT-MN-5	113.4	2.2	1.3	0.9	4.0	<0.5	67.8	<0.5	28.1	9.2	4.2	1.5	0.5	76.8	<0.5	7.1	1.2	13.1	269.0	6.1	4.7	46.6	162.9	294.1	8.5	<1.0	153.2
6	PIT-MN-6	93.9	5.8	2.9	1.8	8.4	1.1	46.2	<0.5	49.6	12.7	9.8	7.5	1.1	15.8	<0.5	2.9	2.2	30.0	242.1	13.9	2.5	51.9	139.5	570.1	14.9	<1.0	89.8
7	PIT-MN-7	35.0	1.8	1.0	0.7	2.5	<0.5	17.1	<0.5	14.1	3.9	2.6	5.8	<0.5	23.1	<0.5	5.9	1.0	10.3	159.7	8.7	2.6	49.2	161.7	198.2	8.5	<1.0	90.6
8	PIT-MN-8	61.8	2.4	1.4	1.0	3.4	<0.5	24.8	<0.5	19.6	5.5	3.8	8.8	<0.5	18.8	<0.5	5.5	1.3	13.1	134.4	53.7	2.6	83.8	144.7	228.6	13.4	<1.0	91.8
9	PIT-MN-9	46.6	2.0	1.1	1.2	2.9	<0.5	21.7	<0.5	17.5	5.0	3.3	5.5	<0.5	11.9	<0.5	1.9	1.1	11.3	212.7	8.9	2.0	68.0	144.8	455.4	8.9	<1.0	70.8
10	PIT-MN-10	33.7	1.6	0.9	0.5	2.2	<0.5	16.0	<0.5	12.1	3.4	2.4	4.5	<0.5	20.5	<0.5	4.4	1.0	9.9	393.3	12.2	2.6	74.4	152.1	158.4	8.2	<1.0	78.1
11	PIT-MN-11	36.4	1.1	0.7	<0.5	1.4	<0.5	8.5	<0.5	7.1	2.1	1.5	1.5	<0.5	30.1	<0.5	4.5	0.7	6.7	247.5	6.7	2.0	46.1	229.5	87.9	7.3	1.0	66.6
12	PIT-MN-12	42.4	0.7	0.5	<0.5	1.2	<0.5	9.4	<0.5	7.3	2.2	1.5	1.0	<0.5	36.1	<0.5	7.6	0.6	4.4	204.0	2.8	2.9	44.3	196.9	90.5	5.0	<1.0	87.1
13	PIT-MN-13	36.2	1.5	1.0	<0.5	1.9	<0.5	7.7	<0.5	6.6	1.8	1.8	1.4	<0.5	43.1	<0.5	8.6	1.0	9.2	281.6	6.1	2.9	50.6	195.5	135.1	7.7	1.1	85.0
14	PIT-MN-14	74.1	1.4	0.8	2.0	2.3	<0.5	17.3	<0.5	11.6	3.4	2.4	6.3	<0.5	25.1	<0.5	5.4	0.8	7.7	199.2	15.7	2.4	60.2	156.8	149.3	9.1	<1.0	80.9
15	PIT-MN-15	38.3	1.3	0.9	0.6	1.9	<0.5	15.7	<0.5	11.0	3.1	2.1	5.6	<0.5	18.2	<0.5	3.6	1.0	8.2	260.8	5.7	2.4	53.4	160.0	188.5	9.3	<1.0	80.4

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis.

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End of Report

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Lucid Laboratories Pvt. Ltd.

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TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC591826000000124F
LAB REGISTRATION NO: LL/25-26/012784(1to10)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysis : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit
Sample Qty : 500g x 10Nos
Test Parameters: Trace elements & REE

S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
UOM (PPM)																												
1	PIT-MN-16	37.4	1.3	0.8	0.5	1.8	<0.5	13.0	<0.5	9.9	2.7	2.1	3.8	<0.5	18.7	<0.5	3.7	0.9	7.3	238.1	10.4	2.1	66.3	167.6	152.9	8.5	<1.0	68.2
2	PIT-MN-17	47.0	1.8	1.1	0.7	2.7	<0.5	24.6	<0.5	16.9	4.9	3.1	3.3	<0.5	16.2	<0.5	5.4	0.9	11.3	116.8	10.9	1.3	75.5	68.9	524.7	5.9	<1.0	43.2
3	PIT-MN-18	51.1	1.5	0.9	0.8	2.4	<0.5	20.3	<0.5	14.0	4.1	2.6	5.3	<0.5	21.9	<0.5	4.4	1.0	9.0	151.7	9.6	3.0	55.0	177.8	382.1	10.2	<1.0	112.9
4	PIT-MN-19	63.5	2.2	1.2	1.0	3.7	<0.5	34.3	<0.5	24.1	7.2	4.0	7.7	<0.5	23.1	<0.5	3.4	1.2	12.9	277.0	6.1	3.1	55.8	125.0	235.2	10.3	<1.0	122.5
5	PIT-MN-20	55.3	1.6	0.9	0.7	2.5	<0.5	17.6	<0.5	14.2	4.0	2.5	4.3	<0.5	19.5	<0.5	5.6	1.0	9.8	280.3	6.2	3.3	60.8	195.0	292.5	8.9	<1.0	77.3
6	PIT-MN-21	49.2	1.7	1.0	0.9	2.5	<0.5	22.3	<0.5	15.4	4.4	2.9	5.0	<0.5	20.4	<0.5	3.3	1.1	9.9	183.1	6.7	2.8	62.1	174.5	290.6	9.2	<1.0	105.9
7	PIT-MN-22	28.6	1.7	0.9	0.6	2.2	<0.5	13.6	<0.5	11.5	3.2	2.5	5.2	<0.5	23.1	<0.5	6.0	0.9	9.8	234.4	7.2	2.0	46.9	139.4	221.9	7.5	<1.0	68.6
8	PIT-MN-23	89.8	0.9	0.6	0.8	2.4	<0.5	47.3	<0.5	22.3	7.6	2.8	1.7	<0.5	61.1	<0.5	7.3	0.8	6.0	151.9	3.8	9.4	41.5	212.8	86.8	4.2	<1.0	262.9
9	PIT-MN-24	13.6	0.6	<0.5	<0.5	0.8	<0.5	5.4	<0.5	4.0	1.1	0.9	1.8	<0.5	12.6	<0.5	4.5	0.6	3.8	468.8	10.6	2.3	64.8	242.5	66.5	4.2	<1.0	68.4
10	PIT-MN-25	72.5	3.4	1.9	1.5	6.1	0.7	75.1	<0.5	44.6	12.8	7.1	6.2	0.7	18.9	<0.5	7.4	1.7	22.8	176.3	10.9	3.8	65.1	79.4	327.4	15.0	<1.0	140.2

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis.

End of Report

Page 1 of 1

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TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC591826000000125F
LAB REGISTRATION NO: LL/25-26/012785(1to10)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysi : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit
Sample Qty : 500g x 10Nos
Test Parameters: Trace elements & REE

S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
		UOM (PPM)																										
1	PIT-MN-26	34.3	0.5	<0.5	<0.5	0.9	<0.5	6.7	<0.5	4.6	1.3	0.9	1.4	<0.5	17.6	<0.5	2.6	0.4	3.6	241.6	4.9	1.6	58.2	57.3	60.3	5.5	<1.0	39.1
2	PIT-MN-27	14.3	0.7	0.5	<0.5	0.8	<0.5	5.3	<0.5	4.0	1.1	0.9	2.4	<0.5	13.5	<0.5	8.3	0.6	4.8	328.9	4.8	3.4	68.3	182.6	47.0	5.5	<1.0	115.7
3	PIT-MN-28	29.6	1.3	0.8	0.5	1.9	<0.5	15.6	<0.5	11.1	3.2	2.1	5.2	<0.5	18.9	<0.5	5.8	0.8	8.1	222.2	8.6	1.8	63.0	165.8	106.8	8.3	<1.0	59.7
4	PIT-MN-29	9.2	<0.5	<0.5	<0.5	0.5	<0.5	4.7	<0.5	2.9	0.9	0.7	0.7	<0.5	15.5	<0.5	2.4	0.5	3.5	164.6	2.7	2.4	46.3	89.4	275.4	6.3	<1.0	51.6
5	PIT-MN-30	64.4	1.7	1.0	0.8	2.7	<0.5	29.6	<0.5	18.3	5.5	3.1	3.3	<0.5	22.1	<0.5	1.9	0.9	9.7	339.8	6.8	2.7	64.7	166.8	36.4	7.5	<1.0	92.7
6	PIT-MN-31	169.7	4.0	2.1	1.9	7.2	0.8	90.1	<0.5	51.7	15.6	8.1	6.0	0.8	45.1	<0.5	7.6	1.9	24.0	298.4	15.4	5.9	104.5	117.2	196.9	21.6	1.6	224.8
7	PIT-MN-32	236.0	17.7	8.6	2.9	23.0	3.3	103.1	<0.5	106.8	27.1	24.6	48.7	3.4	36.5	<0.5	4.8	6.6	89.9	175.2	12.8	8.1	45.3	113.4	383.0	31.8	2.3	330.7
8	PIT-MN-33	161.9	3.8	2.1	2.1	6.3	0.7	72.9	<0.5	43.0	13.3	7.0	4.6	0.8	111.5	<0.5	11.8	2.1	22.2	242.1	9.4	8.5	57.4	209.1	265.9	13.1	1.0	317.4
9	PIT-MN-34	149.4	3.0	1.6	1.5	6.1	0.6	85.2	<0.5	45.1	14.0	6.9	3.9	0.7	34.5	<0.5	5.3	1.3	16.7	164.6	10.2	4.2	43.5	159.5	371.2	11.1	<1.0	174.4
10	PIT-MN-35	97.8	3.0	1.4	1.1	4.3	0.5	53.6	<0.5	30.5	9.7	4.9	4.3	0.5	54.0	<0.5	6.2	1.3	13.9	181.9	6.3	4.0	46.0	170.5	246.6	10.3	<1.0	151.0

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis

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Page 1 of 1

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TEST RESULTS



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC59182600000126F
LAB REGISTRATION NO: LL/25-26/012786(1to10)
Date. Of Receipt of Sample : 14.02.2026
Date. Of Starting of Analysis : 25.02.2026
Date. Of Completing of Analysis : 12.03.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit
Sample Qty : 500g x 10Nos
Test Parameters: Trace elements & REE

S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Cr	Co	Hf	Ni	Rb	Sr	Nb	Ta	Zr
PPM																												
1	PIT-MN-36	53.5	1.3	0.8	1.0	2.2	<0.5	24.4	<0.5	15.0	4.7	2.4	5.4	<0.5	25.0	<0.5	3.5	0.8	7.7	201.0	7.1	2.9	50.1	102.8	521.1	9.1	<1.0	108.0
2	PIT-MN-37	99.9	1.9	1.0	1.1	3.4	<0.5	38.5	<0.5	23.6	7.3	3.8	4.0	<0.5	42.1	<0.5	4.7	1.1	10.5	268.2	10.8	3.4	52.2	121.2	369.6	10.7	<1.0	127.0
3	PIT-MN-38	63.0	2.9	1.5	1.4	4.5	0.5	40.7	<0.5	29.6	8.6	5.3	6.2	0.6	22.4	<0.5	3.0	1.4	16.6	162.2	7.3	3.1	795.3	127.2	252.5	11.3	<1.0	117.9
4	PIT-MN-39	83.7	1.3	0.8	1.1	2.5	<0.5	49.4	<0.5	16.3	5.6	2.7	3.7	<0.5	75.4	<0.5	4.7	0.7	7.7	284.1	5.0	2.3	41.6	147.9	270.1	7.5	1.4	80.8
5	PIT-MN-40	50.5	3.0	1.8	0.9	3.6	0.6	14.6	<0.5	13.2	3.4	3.1	28.3	0.5	11.1	<0.5	2.1	1.6	17.9	254.7	68.6	2.1	97.9	86.3	82.7	20.6	<1.0	75.7
6	PIT-MN-41	89.3	2.4	1.3	1.1	4.1	0.5	43.4	<0.5	30.3	9.0	4.9	6.5	0.5	22.4	<0.5	3.0	1.4	12.7	170.9	7.6	4.0	43.5	126.4	221.0	8.8	<1.0	114.5
7	PIT-MN-42	53.3	1.7	1.1	0.8	2.6	<0.5	29.0	<0.5	17.4	5.3	3.0	4.3	<0.5	31.4	<0.5	4.9	1.1	11.2	200.5	4.9	3.3	42.6	185.0	251.1	12.5	<1.0	127.1
8	PIT-MN-43	47.2	1.8	1.0	0.8	2.7	<0.5	24.6	<0.5	17.7	5.0	3.1	5.1	<0.5	21.4	<0.5	3.7	0.9	9.9	207.7	6.1	2.5	42.5	141.1	360.1	8.4	<1.0	95.4
9	PIT-MN-44	43.0	2.5	1.4	1.4	3.7	0.5	43.2	<0.5	26.8	7.8	4.6	6.7	0.5	17.6	<0.5	3.2	1.3	15.2	232.4	9.2	3.0	59.4	107.4	807.2	11.7	<1.0	109.5
10	PIT-MN-45	209.5	4.3	1.9	3.2	12.4	0.7	114.5	<0.5	109.8	28.5	19.7	6.4	1.2	21.1	<0.5	4.1	1.5	20.7	128.3	8.8	2.6	44.4	112.6	227.7	10.0	<1.0	99.1

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis.

End of Report

Page 1 of 1

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TEST REPORT



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC591826000000192F
LAB REGISTRATION NO: LL/25-26/014252(1to40)
Date. Of Receipt of Sample : 20.032026
Date. Of Starting of Analysis : 01.04.2026
Date. Of Completing of Analysis : 17.04.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit
Sample Qty : 500g x 40Nos

Test Parameters: REE & Trace elements

Test Parameters: REE & Trace elements																										
S.No	Sample Code	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sc	Y	Th	U	Zr	Hf	Rb	Sr	Ta	Nb	
		PPM																								
1	PIT-MN-46	33.5	51.8	5.7	18.2	3.0	0.7	2.2	<0.5	1.4	<0.5	0.7	<0.5	0.8	<0.5	2.5	7.7	23.3	3.2	80.1	2.3	114.6	202.4	<1.0	6.0	
2	PIT-MN-47	48.7	84.0	9.2	30.1	5.1	0.8	4.1	0.5	2.9	0.5	1.6	<0.5	1.5	<0.5	4.9	18.2	29.8	3.8	121.9	3.2	196.5	115.8	1.4	20.4	
3	PIT-MN-48	16.8	34.2	3.4	11.9	2.2	0.5	1.8	<0.5	1.4	<0.5	0.8	<0.5	0.8	<0.5	4.3	8.4	16.2	3.1	88.9	2.4	121.4	86.0	<1.0	5.8	
4	PIT-MN-49	31.6	57.3	6.2	21.4	3.8	0.7	3.1	<0.5	2.2	<0.5	1.2	<0.5	1.2	<0.5	6.1	13.6	19.5	2.6	92.4	2.7	69.6	142.2	<1.0	7.7	
5	PIT-MN-50	35.3	55.2	6.7	23.3	3.9	0.8	3.2	<0.5	2.0	<0.5	1.1	<0.5	1.0	<0.5	4.3	12.1	12.5	2.4	84.3	2.2	93.6	335.6	<1.0	7.3	
6	PIT-MN-51	24.9	50.8	5.1	17.4	3.2	0.7	2.5	<0.5	1.8	<0.5	1.0	<0.5	1.0	<0.5	3.7	11.1	21.7	3.3	90.5	2.4	118.2	94.4	<1.0	7.0	
7	PIT-MN-52	41.0	76.4	8.2	28.5	5.0	1.0	4.3	0.6	3.1	0.6	1.7	<0.5	1.7	<0.5	8.8	18.6	20.8	2.6	114.1	3.5	97.1	128.4	<1.0	10.0	
8	PIT-MN-53	20.1	70.2	4.0	13.5	2.4	<0.5	2.2	<0.5	1.7	<0.5	1.0	<0.5	1.0	<0.5	3.1	10.4	21.9	3.6	74.3	2.5	213.9	58.3	<1.0	22.7	
9	PIT-MN-54	40.7	57.0	8.5	31.6	6.2	1.2	5.0	0.6	3.4	0.6	1.6	<0.5	1.5	<0.5	11.1	17.6	17.8	2.1	100.0	2.7	130.4	272.6	<1.0	9.7	
10	PIT-MN-55	29.0	62.5	5.5	18.4	3.2	0.5	2.5	<0.5	1.9	<0.5	1.0	<0.5	1.1	<0.5	5.1	10.8	28.2	4.1	79.6	2.3	144.3	60.0	<1.0	8.9	
11	PIT-MN-56	25.0	94.9	4.7	15.1	2.4	0.6	1.9	<0.5	1.3	<0.5	0.7	<0.5	0.7	<0.5	2.6	7.5	33.3	3.1	106.0	3.1	134.7	110.0	<1.0	8.7	
12	PIT-MN-57	28.0	67.9	6.0	21.4	3.9	0.7	3.2	<0.5	2.3	<0.5	1.3	<0.5	1.3	<0.5	7.1	14.0	17.3	1.9	73.8	2.0	74.3	43.0	<1.0	6.4	
13	PIT-MN-58	36.5	71.1	7.1	23.8	4.1	0.8	3.4	<0.5	2.4	0.5	1.4	<0.5	1.3	<0.5	5.7	15.3	33.3	2.8	104.5	2.7	97.9	57.1	<1.0	9.3	
14	PIT-MN-59	30.3	56.9	5.4	17.3	2.7	0.5	2.0	<0.5	1.2	<0.5	0.6	<0.5	0.6	<0.5	1.6	7.1	36.4	2.9	85.8	2.7	171.2	81.1	<1.0	4.3	
15	PIT-MN-60	15.1	66.3	3.4	12.3	2.2	<0.5	1.9	<0.5	1.4	<0.5	0.8	<0.5	0.8	<0.5	4.6	7.9	12.5	2.7	56.0	1.9	99.1	116.6	<1.0	7.4	
16	PIT-MN-61	28.5	56.1	7.6	28.5	5.2	1.1	4.0	0.5	2.5	0.5	1.3	<0.5	1.4	<0.5	5.5	14.6	7.7	1.3	63.8	1.8	95.3	470.8	<1.0	8.2	
17	PIT-MN-62	17.0	43.9	4.0	14.1	2.4	0.6	1.8	<0.5	1.2	<0.5	0.6	<0.5	0.7	<0.5	3.3	7.0	11.9	3.2	82.7	2.3	133.5	392.6	<1.0	5.7	
18	PIT-MN-63	18.7	47.0	4.9	17.2	2.9	0.6	2.3	<0.5	1.7	<0.5	1.0	<0.5	1.1	<0.5	5.5	10.3	17.9	2.8	117.2	3.2	119.6	285.3	<1.0	7.3	
19	PIT-MN-64	139.8	198.7	21.7	71.5	11.8	1.7	9.0	1.1	5.7	1.1	2.9	<0.5	2.7	<0.5	3.3	29.0	64.4	7.0	199.8	6.2	109.9	252.1	1.3	15.5	
20	PIT-MN-65	26.2	102.5	4.9	16.3	2.9	0.6	2.5	<0.5	1.8	<0.5	1.1	<0.5	1.1	<0.5	4.4	10.3	37.0	2.2	147.1	3.9	87.5	144.1	<1.0	8.7	

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis.

End of Report

Page 1 of 2

P.V. Satya Kumar
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TEST REPORT



Issued to:
Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

ULR : TC591826000000192F
LAB REGISTRATION NO: LL/25-26/014252(1to40)
Date. Of Receipt of Sample : 20.03.2026
Date. Of Starting of Analysis : 01.04.2026
Date. Of Completing of Analysis : 17.04.2026

Kind Attn.:Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit
Sample Qty : 500g x 40Nos

Test Parameters: REE & Trace elements

S.No	Sample Code	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sc	Y	Th	U	Zr	Hf	Rb	Sr	Ta	Nb
		PPM																							
21	PIT-MN-66	46.2	44.7	9.0	29.7	4.4	1.0	3.2	<0.5	1.9	<0.5	1.0	<0.5	1.1	<0.5	4.8	10.7	13.5	1.3	75.2	2.2	102.1	215.1	<1.0	8.6
22	PIT-MN-67	100.5	139.7	16.2	54.3	9.1	1.4	7.1	0.8	4.4	0.8	2.2	<0.5	2.0	<0.5	5.0	23.1	46.0	4.0	158.1	4.4	93.4	168.0	1.6	14.3
23	PIT-MN-68	37.1	64.6	7.9	26.7	4.6	1.0	3.5	<0.5	2.4	<0.5	1.2	<0.5	1.3	<0.5	6.1	12.9	29.9	2.1	80.6	2.4	104.1	201.0	1.0	10.7
24	PIT-MN-69	28.1	87.4	6.0	20.7	3.9	0.8	3.3	<0.5	2.4	0.5	1.3	<0.5	1.4	<0.5	7.1	14.1	35.6	3.4	95.4	2.8	99.4	159.7	<1.0	10.7
25	PIT-MN-70	28.7	56.9	5.9	20.7	3.7	0.6	3.0	<0.5	2.3	<0.5	1.2	<0.5	1.1	<0.5	5.3	12.9	24.1	2.4	128.7	3.6	118.8	52.1	<1.0	9.7
26	PIT-MN-71	14.7	30.4	3.1	10.9	2.0	<0.5	1.5	<0.5	0.8	<0.5	0.4	<0.5	<0.5	<0.5	3.7	4.3	20.6	1.6	60.8	1.8	80.8	4.2	<1.0	3.1
27	PIT-MN-72	30.6	135.3	8.2	30.0	7.2	0.7	5.9	0.9	5.3	0.9	2.4	<0.5	1.9	<0.5	9.9	17.9	22.3	2.2	63.2	2.0	229.6	127.3	3.4	36.6
28	PIT-MN-73	33.7	54.1	7.2	24.8	4.4	0.7	3.9	0.5	2.6	0.5	1.4	<0.5	1.3	<0.5	5.4	15.1	31.4	2.1	114.0	3.0	88.8	84.5	<1.0	11.8
29	PIT-MN-74	33.8	48.4	7.2	24.8	4.4	0.6	3.6	<0.5	2.4	<0.5	1.1	<0.5	1.0	<0.5	5.9	12.2	22.3	1.9	111.8	3.0	77.0	26.2	<1.0	10.1
30	PIT-MN-75	25.5	75.1	5.1	16.9	2.9	0.5	2.2	<0.5	1.3	<0.5	0.5	<0.5	0.5	<0.5	3.5	6.0	30.7	2.9	97.6	2.8	172.9	53.5	<1.0	8.1
31	PIT-MN-76	48.7	75.4	9.0	30.6	5.2	0.8	4.1	0.5	2.8	0.5	1.6	<0.5	1.4	<0.5	6.0	17.0	16.8	1.3	114.5	3.1	126.5	159.1	<1.0	12.4
32	PIT-MN-77	49.7	83.2	9.7	31.2	4.9	0.6	3.5	<0.5	1.9	<0.5	0.9	<0.5	0.7	<0.5	5.0	9.9	35.9	2.7	108.8	3.0	264.1	49.5	<1.0	9.5
33	PIT-MN-78	19.5	47.3	3.9	13.2	2.1	<0.5	1.7	<0.5	1.5	<0.5	0.9	<0.5	0.8	<0.5	2.0	9.7	28.6	2.4	119.7	3.4	204.3	89.7	<1.0	6.3
34	PIT-MN-79	22.9	36.0	4.6	16.5	3.0	0.6	2.5	<0.5	1.9	<0.5	1.0	<0.5	0.9	<0.5	6.7	10.6	14.0	0.5	63.0	1.7	124.6	86.2	<1.0	6.7
35	PIT-MN-80	89.0	182.3	17.7	56.0	8.9	0.9	6.1	0.7	3.8	0.7	1.8	<0.5	1.6	<0.5	3.4	17.8	61.9	2.5	169.6	4.5	120.7	110.8	1.0	11.3
36	PIT-MN-81	13.7	26.5	2.8	9.7	1.7	<0.5	1.5	<0.5	1.2	<0.5	0.7	<0.5	0.6	<0.5	3.6	6.9	14.7	1.1	83.1	2.2	105.7	71.2	<1.0	4.1
37	PIT-MN-82	19.9	33.3	3.9	13.7	2.6	0.5	2.1	<0.5	1.6	<0.5	0.9	<0.5	0.8	<0.5	5.0	9.0	15.5	3.1	81.0	2.2	89.5	166.8	<1.0	6.0
38	PIT-MN-83	52.4	104.2	10.4	34.7	5.7	1.1	4.4	0.5	2.7	0.5	1.4	<0.5	1.3	<0.5	5.3	13.9	26.5	2.9	152.6	3.9	98.3	360.7	<1.0	10.0
39	PIT-MN-84	119.8	140.7	21.7	69.4	10.6	1.5	7.3	0.9	4.1	0.7	1.7	<0.5	1.3	<0.5	3.9	17.5	28.6	2.6	129.7	3.6	138.8	167.5	1.4	16.3
40	PIT-MN-85	17.8	38.7	3.5	12.0	3.8	<0.5	1.7	<0.5	1.1	<0.5	0.5	<0.5	<0.5	<0.5	2.7	5.7	15.2	2.3	53.7	1.7	201.1	20.3	<1.0	4.9

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS
Note : The above results are expressed on dry basis.

End of Report

Page 2 of 2

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TEST REPORT

Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet,Hyderabad-500016

Kind Attn: Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit Samples

Sample Qty : 200g x 89Nos

Test Parameters: REE & Trace Elements

ULR : TC591826000000227F
LAB REGISTRATION NO: LL/26-27/000948(1to 89)
Date. Of Receipt of Sample : 20.04.2026
Date. Of Starting of Analysis : 02.05.2026
Date. Of Completing of Analysis : 09.05.2026

Test Parameters: REE & Trace Elements		PPM																							
S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Zr	Hf	Rb	Sr	Nb	Ta
1	PIT-MN-86	105.7	6.0	3.1	1.7	8.0	1.1	68.2	<0.5	44.9	12.3	8.0	16.8	1.0	42.5	0.5	29.9	3.1	34.5	70.6	2.5	120.3	219.4	10.1	1.0
2	PIT-MN-87	51.7	2.3	1.5	0.9	3.1	0.5	21.8	<0.5	18.0	4.8	3.5	6.0	<0.5	53.0	<0.5	6.1	1.5	14.2	68.7	2.7	160.9	<1.0	6.0	1.6
3	PIT-MN-88	57.2	1.8	0.8	0.5	2.2	<0.5	20.4	<0.5	12.9	4.3	2.4	5.9	<0.5	36.8	<0.5	3.4	0.8	9.0	36.7	1.2	141.3	<1.0	6.0	<1.0
4	PIT-MN-89	58.8	2.3	1.3	0.8	2.4	<0.5	18.9	<0.5	17.0	4.4	3.0	7.8	<0.5	52.1	<0.5	2.1	1.4	12.2	64.8	2.8	102.1	35.4	4.9	0.7
5	PIT-MN-90	80.8	4.1	2.7	1.6	5.9	0.8	40.7	<0.5	30.2	8.5	5.7	23.5	0.8	43.3	<0.5	3.3	2.3	22.9	80.8	2.6	96.5	66.4	5.5	<1.0
6	PIT-MN-91	86.1	4.3	2.4	1.4	5.6	0.9	63.9	<0.5	40.0	11.3	6.0	14.3	0.8	50.8	<0.5	4.7	2.2	26.4	78.3	2.4	249.5	13.0	6.6	<1.0
7	PIT-MN-92	52.3	2.0	1.7	0.7	3.1	0.5	37.6	<0.5	21.4	6.3	2.4	2.1	0.5	74.4	<0.5	1.6	1.5	13.4	76.5	2.3	117.5	<1.0	6.2	0.7
8	PIT-MN-93	118.1	3.2	1.8	0.9	3.9	0.6	37.4	<0.5	26.2	8.0	5.0	6.9	0.5	74.3	<0.5	6.8	1.7	16.6	66.5	2.4	117.5	<1.0	5.2	0.5
9	PIT-MN-94	50.9	1.3	1.1	0.5	1.3	<0.5	12.7	<0.5	8.8	2.3	1.9	1.4	<0.5	58.4	<0.5	5.1	1.0	8.4	74.6	3.0	136.0	21.2	3.7	<1.0
10	PIT-MN-95	62.4	3.7	1.8	1.1	4.9	0.6	51.0	<0.5	27.3	8.5	5.4	15.4	0.5	33.0	<0.5	6.9	1.8	20.0	57.5	1.8	116.2	<1.0	5.6	<1.0
11	PIT-MN-96	70.8	2.9	1.6	0.9	2.8	<0.5	32.7	<0.5	21.7	5.9	3.7	7.1	0.5	47.4	<0.5	11.2	1.6	13.2	66.0	2.7	207.2	157.7	4.7	<1.0
12	PIT-MN-97	52.9	2.0	1.2	0.6	2.6	0.5	28.0	<0.5	20.5	5.7	2.6	2.5	<0.5	30.8	<0.5	2.8	1.4	12.2	55.8	1.8	177.3	<1.0	4.8	<1.0
13	PIT-MN-98	40.5	2.3	1.5	0.9	3.2	<0.5	20.0	<0.5	16.6	5.1	3.8	20.1	<0.5	10.7	<0.5	<0.5	1.3	11.1	25.4	1.2	190.3	453.6	3.7	1.4
14	PIT-MN-99	185.5	2.1	1.2	1.0	3.6	<0.5	61.7	<0.5	35.2	10.5	4.1	3.8	<0.5	63.2	<0.5	3.9	1.1	11.3	88.0	2.5	129.8	<1.0	4.8	<1.0
15	PIT-MN-100	50.3	1.7	1.1	0.5	2.1	<0.5	22.8	<0.5	17.3	5.0	2.6	6.7	<0.5	14.7	<0.5	1.0	0.9	7.8	33.6	0.8	85.8	<1.0	3.3	<1.0
16	PIT-MN-101	62.7	3.1	2.1	1.1	3.6	0.6	26.9	<0.5	23.8	6.5	5.1	9.6	<0.5	21.0	<0.5	4.8	2.5	20.3	52.9	1.7	166.9	258.5	7.6	0.7
17	PIT-MN-102	66.1	4.6	2.6	0.8	4.6	1.0	22.4	0.5	21.7	5.6	4.3	8.5	0.7	38.9	<0.5	4.1	2.9	22.7	92.4	5.4	167.2	18.0	5.0	4.3
18	PIT-MN-103	37.5	0.9	0.6	<0.5	1.2	<0.5	9.8	<0.5	8.1	2.2	1.1	1.8	<0.5	14.5	<0.5	2.0	0.6	5.7	21.9	0.9	124.2	<1.0	2.9	<1.0
19	PIT-MN-104	81.0	3.5	2.5	1.1	6.0	1.0	49.3	<0.5	31.8	9.7	5.6	7.5	0.7	53.0	<0.5	4.5	2.3	24.8	103.5	2.9	115.1	38.2	5.6	<1.0
20	PIT-MN-105	102.5	4.4	2.5	1.1	4.5	0.8	36.3	<0.5	26.7	7.5	6.6	4.4	0.7	107.0	<0.5	6.5	2.4	22.9	46.7	1.3	97.0	80.5	7.3	0.6
21	PIT-MN-106	51.1	3.4	1.8	1.1	4.3	0.7	29.4	<0.5	24.5	7.0	3.8	2.1	0.5	30.4	<0.5	3.9	2.0	22.7	44.6	1.2	91.1	<1.0	4.6	<1.0
22	PIT-MN-107	43.5	1.9	1.8	0.6	1.9	<0.5	8.8	<0.5	8.4	2.3	2.1	4.0	<0.5	51.5	<0.5	3.6	2.8	14.2	147.7	5.1	240.7	3.4	4.1	<1.0
23	PIT-MN-108	12.3	0.8	<0.5	<0.5	0.9	<0.5	5.2	<0.5	4.0	1.0	1.3	1.8	<0.5	10.2	<0.5	5.9	<0.5	4.7	14.3	0.6	29.1	27.9	3.0	<1.0
24	PIT-MN-109	35.4	1.9	1.2	0.6	2.6	<0.5	17.1	<0.5	13.5	3.5	2.7	4.8	<0.5	27.1	<0.5	3.0	1.8	11.9	63.2	2.1	155.8	29.0	4.1	<1.0
25	PIT-MN-110	40.7	2.8	1.8	1.0	3.4	0.6	20.7	<0.5	19.3	4.9	2.8	10.8	0.5	50.0	<0.5	7.5	2.0	16.8	91.8	3.1	89.9	34.0	5.1	<1.0
26	PIT-MN-111	42.4	2.7	2.0	0.7	4.6	0.6	18.6	<0.5	17.2	4.8	3.8	4.1	0.5	46.8	<0.5	3.8	2.2	15.9	127.1	3.9	212.6	<1.0	3.2	<1.0
27	PIT-MN-112	55.0	2.0	1.4	0.6	2.1	0.5	11.9	<0.5	11.8	3.0	2.6	7.5	<0.5	10.4	<0.5	5.1	1.3	14.1	29.1	0.8	40.0	<1.0	3.2	<1.0
28	PIT-MN-113	74.0	2.4	1.5	1.2	3.3	0.5	32.2	<0.5	23.5	6.5	3.3	7.2	<0.5	27.3	<0.5	7.7	1.5	15.4	54.0	1.6	92.1	131.4	7.4	0.6
29	PIT-MN-114	70.8	2.6	1.2	1.0	3.2	0.5	30.5	<0.5	21.4	6.8	3.7	5.0	<0.5	26.7	<0.5	8.1	1.6	13.9	51.2	1.5	90.4	129.3	7.2	0.5
30	PIT-MN-115	108.3	5.5	2.8	1.7	6.6	1.1	54.6	<0.5	40.1	11.3	8.0	20.2	0.9	81.3	0.5	3.0	2.8	27.6	86.5	2.3	90.4	30.1	9.3	0.6

Test Method: SOP OM-08- SOP OM-12-Instrument Used: ICP-MS

Note : The above results are expressed on dry basis.

End of Report

P.V.V. Sathya Kumari
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Authorized Signatory

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TC-5918



TEST REPORT

Critical Minerals Trackers
Concourse, No.406,7-1-58/CC/4
Lal Bungalow, Greenland,
Ameerpet, Hyderabad-500016

Kind Attn.: Mr.K.Nageshwar Rao, 7893847742

Sample Particulars: Pit Samples

Sample Qty : 200g x 89Nos

Test Parameters: REE & Trace Elements

ULR : TC591826000000227F
LAB REGISTRATION NO: LL/26-27/000948(1to 89)
Date. Of Receipt of Sample : 20.04.2026
Date. Of Starting of Analysis : 02.05.2026
Date. Of Completing of Analysis : 09.05.2026

S.No	Sample Code	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	U	Yb	Y	Zr	Hf	Rb	Sr	Nb	Ta
		PPM																							
31	PIT -MN-116	151.3	3.1	2.1	1.9	4.4	0.5	71.5	<0.5	38.6	11.2	5.4	7.7	0.5	56.9	<0.5	2.4	2.0	18.8	79.8	2.4	134.0	67.7	8.5	0.6
32	PIT -MN-117	141.9	3.9	2.5	1.2	3.9	0.6	43.7	0.6	31.6	9.3	5.8	13.1	0.6	33.8	<0.5	6.0	3.0	23.3	169.3	6.8	103.9	27.2	7.8	0.6
33	PIT -MN-118	619.2	13.7	6.9	1.8	17.3	2.5	289.5	0.6	161.2	53.0	24.5	9.0	2.5	312.6	1.1	11.1	6.1	70.0	228.0	6.5	230.9	10.9	15.9	1.4
34	PIT -MN-119	371.5	11.4	5.2	1.7	14.0	1.8	196.5	0.9	113.4	36.2	17.4	13.0	1.9	201.5	0.6	8.1	4.6	54.8	191.9	5.5	129.1	81.9	13.4	1.0
35	PIT -MN-120	580.3	19.5	10.6	4.0	28.0	3.8	447.0	1.2	250.7	78.2	38.4	21.3	3.7	310.1	1.4	10.5	8.5	110.1	266.6	7.6	197.5	43.2	23.4	1.7
36	PIT -MN-121	193.0	6.6	3.7	1.4	8.4	1.2	106.6	<0.5	66.1	19.5	10.9	8.0	1.1	111.4	<0.5	3.9	2.8	32.7	147.6	4.0	191.1	55.9	10.5	0.8
37	PIT -MN-122	228.6	13.7	7.2	3.0	17.9	2.8	197.2	0.8	126.0	38.8	23.4	23.0	2.3	142.4	1.0	4.6	6.3	75.6	200.1	5.5	135.0	58.8	20.6	1.8
38	PIT -MN-123	251.6	3.8	1.7	2.1	8.3	0.7	179.5	<0.5	107.9	33.4	14.0	6.0	0.7	77.7	<0.5	9.2	1.0	18.2	129.0	3.8	139.7	179.8	5.6	<1.0
39	PIT -MN-124	418.1	15.4	8.8	3.9	21.4	2.8	243.3	0.9	161.9	46.0	26.5	22.9	2.7	75.9	1.1	8.6	7.0	83.9	350.3	9.4	137.7	110.0	20.4	0.7
40	PIT -MN-125	222.7	4.2	2.6	1.5	6.0	0.8	84.3	0.4	53.9	15.7	7.9	12.4	0.8	66.7	0.2	2.3	2.3	28.4	119.5	3.0	173.6	1.4	16.8	1.0
41	PIT -MN-126	309.4	9.1	4.5	2.3	14.2	1.8	185.5	0.7	116.3	34.9	19.1	12.7	1.6	90.5	0.7	2.7	4.7	46.3	162.2	4.8	260.0	78.2	18.2	1.5
42	PIT -MN-127	594.5	13.9	7.6	3.4	17.1	2.6	143.4	0.9	107.2	29.6	20.0	27.4	2.4	88.6	1.1	10.1	7.1	66.1	245.0	6.7	108.3	121.2	23.2	1.4
43	PIT -MN-128	169.7	3.3	1.5	1.7	4.7	0.5	104.2	<0.5	50.6	15.9	7.4	5.1	0.5	65.9	<0.5	3.3	1.4	16.2	143.6	4.2	114.5	76.8	6.8	0.4
44	PIT -MN-129	172.7	3.1	1.7	3.1	4.8	0.5	78.5	<0.5	45.2	13.5	6.9	2.3	0.6	121.5	<0.5	4.2	1.6	16.1	135.3	4.1	182.1	67.9	8.8	0.8
45	PIT -MN-130	189.6	4.1	2.3	2.4	6.5	0.8	138.2	<0.5	61.0	20.6	9.6	3.7	0.8	55.6	<0.5	2.9	2.4	29.3	152.7	3.5	126.8	143.9	10.0	0.8
46	PIT -MN-131	425.1	19.8	9.3	7.3	30.5	3.7	230.0	1.1	210.1	52.6	38.5	44.1	3.7	64.0	1.3	3.0	8.2	105.6	248.7	6.0	65.0	406.8	26.2	1.5
47	PIT -MN-132	209.7	6.6	3.8	2.1	9.6	1.3	98.2	0.5	78.7	21.1	12.6	13.2	1.2	62.9	0.5	2.8	3.8	34.0	159.6	4.2	130.1	106.7	17.2	1.4
48	PIT -MN-133	192.8	3.6	2.1	1.2	5.8	0.7	60.0	<0.5	40.8	12.1	6.2	6.8	0.6	62.3	<0.5	2.1	2.4	22.6	99.0	2.9	131.3	64.6	11.1	0.8
49	PIT -MN-134	135.2	3.0	1.7	0.9	4.7	0.6	51.9	<0.5	34.0	9.9	6.4	4.5	0.6	58.7	<0.5	3.1	1.4	16.5	89.6	2.4	237.5	149.6	8.7	<1.0
50	PIT -MN-135	235.3	8.4	4.6	1.7	11.6	1.6	155.4	0.5	96.3	29.0	15.6	13.2	1.6	120.1	0.6	3.8	4.5	51.1	152.9	4.5	177.4	66.8	29.2	1.3
51	PIT -MN-136	238.9	4.7	2.5	1.3	6.5	1.0	119.7	<0.5	68.2	21.9	9.2	8.8	0.9	88.8	<0.5	3.9	2.4	24.4	117.8	3.4	162.0	89.8	10.6	0.7
52	PIT -MN-137	172.8	3.3	1.6	1.4	4.8	0.6	82.9	<0.5	46.0	13.7	6.4	7.9	0.5	84.5	<0.5	3.9	1.6	15.6	125.9	3.6	305.0	98.8	8.7	<1.0
53	PIT -MN-138	129.9	3.3	1.8	1.1	4.1	0.6	55.2	<0.5	35.0	11.0	5.0	10.7	0.6	51.7	<0.5	2.6	2.0	15.6	78.2	2.7	159.3	69.3	12.7	0.6
54	PIT -MN-139	122.2	4.5	2.4	1.7	6.1	0.8	88.1	<0.5	54.0	16.1	8.0	8.1	0.7	41.4	<0.5	1.7	2.6	29.0	71.5	2.4	103.5	13.8	7.9	1.4
55	PIT -MN-140	440.7	21.0	11.9	6.9	30.6	3.8	228.1	1.1	191.5	50.6	33.6	39.0	3.9	65.3	1.4	4.8	8.7	110.0	367.5	9.1	187.9	494.6	25.8	1.1
56	PIT -MN-141	579.9	11.6	4.2	8.7	23.8	2.0	296.8	<0.5	219.5	59.9	32.1	65.8	2.5	30.4	<0.5	5.7	2.5	47.4	416.2	10.2	30.2	444.6	161.2	4.7
57	PIT -MN-142	651.6	12.4	4.7	10.6	27.1	2.2	339.1	<0.5	249.4	71.3	36.1	66.8	2.7	40.8	0.6	5.1	2.6	51.9	433.9	10.7	20.5	734.2	197.7	8.3
58	PIT -MN-143	316.6	2.9	1.2	1.2	4.6	0.5	68.3	<0.5	41.1	12.8	6.0	6.9	0.5	39.0	<0.5	2.9	1.5	14.8	110.8	3.5	176.5	<1.0	15.9	0.8
59	PIT -MN-144	56.9	1.1	0.6	<0.5	1.4	<0.5	10.0	<0.5	7.8	2.1	1.9	1.5	<0.5	35.2	<0.5	1.4	0.7	5.7	24.0	1.0	243.7	<1.0	7.0	<1.0
60	PIT -MN-145	245.5	7.3	4.3	1.8	9.9	1.5	129.0	0.5	76.1	23.6	11.5	12.1	1.3	55.0	0.6	3.2	3.9	40.7	110.5	3.2	211.1	<1.0	14.2	1.2

Test Method: SOP OM 08 & Instrument Used: ICP-MS

Note : The above results are expressed on dr

End of Report

P.V. Sanyal
Reviewed By

Page 2 of 3

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

S.No	LATITUDE	LONGITUDE	Sample Id	La	Ce	Pr	Nd	Sm	Sc	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y	U	Th	Hf	Rb	Sr	Ta	Nb	Zr	LREE	GCRT			
1	16.81119	77.61584	PIT-MN-1	14.9	39.2	3.6	11.3	2.1	3.8	0.5	1.9	<0.5	1.3	<0.5	0.7	<0.5	0.8	<0.5	7.1	4.7	16.2	2.3	154	271.9	<1.0	6.5	75.6	71.6	12.5	246.3		
2	16.8107	77.62055	PIT-MN-2	80.2	73.5	11.7	37.9	5.7	4.9	1.3	5.2	0.6	3	0.6	1.7	<0.5	1.4	<0.5	18.6	3.6	35.2	2.5	124.1	163.7	<1.0	8.4	87.7	210.3	9.2	247.4		
3	16.80266	77.61785	PIT-MN-3	19.2	31.6	3.4	11.8	2.1	3.8	0.6	2.1	<0.5	1.4	<0.5	0.9	<0.5	0.8	<0.5	8.5	3.4	12.8	2.1	131	196.8	<1.0	5.4	69	68.7	5.2	86.2		
4	16.80395	77.62122	PIT-MN-4	9.1	32.6	1.9	7	1.5	2	<0.5	1.4	<0.5	1	<0.5	0.6	<0.5	0.8	<0.5	6.4	3.7	17.8	3.7	99.3	42.8	<1.0	3.3	107.4	52.1	3.8	64.3		
5	16.80437	77.62685	PIT-MN-5	67.8	113.4	9.2	28.1	4.2	1.5	0.9	4	0.5	2.2	<0.5	1.3	<0.5	1.2	<0.5	13.1	7.1	76.8	4.7	162.9	294.1	<1.0	8.5	153.2	223.6	9.2	247.4		
6	16.80314	77.63288	PIT-MN-6	46.2	93.9	12.7	49.6	9.8	7.5	1.8	8.4	1.1	5.8	1.1	2.9	<0.5	2.2	<0.5	30	2.9	15.8	2.5	139.5	570.1	<1.0	14.9	89.8	214	21.5	273		
7	16.79808	77.63969	PIT-MN-7	17.1	35	3.9	14.1	2.6	5.8	0.7	2.5	<0.5	1.8	<0.5	1	<0.5	1	<0.5	10.3	5.9	23.1	2.6	161.7	198.2	<1.0	8.5	90.6	73.4	6.3	95.8		
8	16.80289	77.63818	PIT-MN-8	24.8	61.8	5.5	19.6	3.8	8.8	1	3.4	<0.5	2.4	<0.5	1.4	<0.5	1.3	<0.5	13.1	5.5	18.8	2.6	144.7	228.6	<1.0	13.4	91.8	116.5	8.5	146.9		
9	16.79581	77.62546	PIT-MN-9	21.7	46.6	5	17.5	3.3	5.5	1.2	2.9	<0.5	2	<0.5	1.1	<0.5	1.1	<0.5	11.3	1.9	11.9	2	144.8	455.4	<1.0	8.9	70.8	95.3	7.1	119.2		
10	16.77918	77.63042	PIT-MN-10	16	33.7	3.4	12.1	2.4	4.5	0.5	2.2	<0.5	1.6	<0.5	0.9	<0.5	1	<0.5	9.9	4.4	20.5	2.6	152.1	158.4	<1.0	8.2	78.1	68.1	5.7	88.2		
11	16.76775	77.63186	PIT-MN-11	8.5	36.4	2.1	7.1	1.5	1.5	<0.5	1.4	<0.5	1.1	<0.5	0.7	<0.5	0.7	<0.5	6.7	4.5	30.1	2	229.5	87.9	1	7.3	66.6	55.6	3.9	67.7		
12	16.76432	77.62852	PIT-MN-12	9.4	42.4	2.2	7.3	1.5	1	<0.5	1.2	<0.5	0.7	<0.5	0.5	<0.5	0.6	<0.5	4.4	7.6	36.1	2.9	196.9	90.5	<1.0	5	87.1	62.8	3	71.2		
13	16.76529	77.63084	PIT-MN-13	7.7	36.2	1.8	6.6	1.8	1.4	<0.5	1.9	<0.5	1.5	<0.5	1	<0.5	1	<0.5	9.2	8.6	43.1	2.9	195.5	135.1	1.1	7.7	85	54.1	5.4	70.1		
14	16.77239	77.63753	PIT-MN-14	17.3	74.1	3.4	11.6	2.4	6.3	2	2.3	<0.5	1.4	<0.5	0.8	<0.5	0.8	<0.5	7.7	5.4	25.1	2.4	156.8	149.3	<1.0	9.1	80.9	110.8	5.3	130.1		
15	16.77456	77.64081	PIT-MN-15	15.7	38.3	3.1	11	2.1	5.6	0.6	1.9	<0.5	1.3	<0.5	0.9	<0.5	1	<0.5	8.2	3.6	18.2	2.4	160	188.5	<1.0	9.3	80.4	70.8	5.1	89.7		
16	16.77339	77.64656	PIT-MN-16	13	37.4	2.7	9.9	2.1	3.8	0.5	1.8	<0.5	1.3	<0.5	0.8	<0.5	0.9	<0.5	7.3	3.7	18.7	2.1	167.6	152.9	<1.0	8.5	68.2	65.6	4.8	81.5		
17	16.8117	77.63112	PIT-MN-17	24.6	47	4.9	16.9	3.1	3.3	0.7	2.7	<0.5	1.8	<0.5	1.1	<0.5	0.9	<0.5	11.3	5.4	16.2	1.3	68.9	524.7	<1.0	5.9	43.2	97.2	6.5	118.3		
18	16.82198	77.64195	PIT-MN-18	20.3	51.1	4.1	14	2.6	5.3	0.8	2.4	<0.5	1.5	<0.5	0.9	<0.5	1	<0.5	9	4.4	21.9	3	177.8	382.1	<1.0	10.2	112.9	92.9	5.8	113		
19	16.81393	77.64789	PIT-MN-19	34.3	63.5	7.2	24.1	4	7.7	1	3.7	<0.5	2.2	<0.5	1.2	<0.5	1.2	<0.5	12.9	3.4	23.1	3.1	125	235.2	<1.0	10.3	122.5	134.1	8.3	163		
20	16.80739	77.64224	PIT-MN-20	17.6	55.3	4	14.2	2.5	4.3	0.7	2.5	<0.5	1.6	<0.5	0.9	<0.5	1	<0.5	9.8	5.6	19.5	3.3	195	292.5	<1.0	8.9	77.3	94.3	6	114.4		
21	16.80629	77.64738	PIT-MN-21	22.3	49.2	4.4	15.4	2.9	5	0.9	2.5	<0.5	1.7	<0.5	1	<0.5	1.1	<0.5	9.9	3.3	20.4	2.8	174.5	290.6	<1.0	9.2	105.9	95.1	6.3	116.3		
22	16.80071	77.64679	PIT-MN-22	13.6	28.6	3.2	11.5	2.5	5.2	0.6	2.2	<0.5	1.7	<0.5	0.9	<0.5	0.9	<0.5	9.8	6	23.1	2	139.4	221.9	<1.0	7.5	68.6	60	5.7	80.7		
23	16.78928	77.64928	PIT-MN-23	47.3	89.8	7.6	22.3	2.8	1.7	0.8	2.4	<0.5	0.9	<0.5	0.6	<0.5	0.8	<0.5	6	7.3	61.1	9.4	212.8	86.8	<1.0	4.2	262.9	170.6	4.7	183		
24	16.7855	77.65609	PIT-MN-24	5.4	13.6	1.1	4	0.9	1.8	<0.5	0.8	<0.5	0.6	<0.5	<0.5	<0.5	0.6	<0.5	3.8	4.5	12.6	2.3	242.5	66.5	<1.0	4.2	68.4	25	2	32.6		
25	16.77778	77.6446	PIT-MN-25	75.1	72.5	12.8	44.6	7.1	6.2	1.5	6.1	0.7	3.4	0.7	1.9	<0.5	1.7	<0.5	22.8	7.4	18.9	3.8	79.4	327.4	<1.0	15	140.2	213.6	14.5	257.1		
26	16.77054	77.64623	PIT-MN-26	6.7	34.3	1.3	4.6	0.9	1.4	<0.5	0.9	<0.5	0.5	<0.5	<0.5	<0.5	0.4	<0.5	3.6	2.6	17.6	1.6	57.3	60.3	<1.0	5.5	39.1	47.8	1.8	54.6		
27	16.76894	77.65011	PIT-MN-27	5.3	14.3	1.1	4	0.9	2.4	<0.5	0.8	<0.5	0.7	<0.5	0.5	<0.5	0.6	<0.5	4.8	8.3	13.5	3.4	182.6	47	<1.0	5.5	115.7	25.6	2.6	35.4		
28	16.76651	77.63446	PIT-MN-28	15.6	29.6	3.2	11.1	2.1	5.2	0.5	1.9	<0.5	1.3	<0.5	0.8	<0.5	0.8	<0.5	8.1	5.8	18.9	1.8	165.8	106.8	<1.0	8.3	59.7	62.1	4.8	80.2		
29	16.92798	77.65028	PIT-MN-29	4.7	9.2	0.9	2.9	0.7	0.7	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3.5	2.4	15.5	2.4	89.4	275.4	<1.0	6.3	51.6	18.4	1	23.6		
30	16.93126	77.64355	PIT-MN-30	29.6	64.4	5.5	18.3	3.1	3.3	0.8	2.7	<0.5	1.7	<0.5	1	<0.5	0.9	<0.5	9.7	1.9	22.1	2.7	166.8	36.4	<1.0	7.5	92.7	121.7	6.3	141		
31	16.93782	77.63278	PIT-MN-31	90.1	169.7	15.6	51.7	8.1	6	1.9	7.2	0.8	4	0.8	2.1	<0.5	1.9	<0.5	24	7.6	45.1	5.9	117.2	196.9	1.6	21.6	224.8	337.1	16.8	383.9		
32	16.94244	77.62697	PIT-MN-32	103.1	236	27.1	106.8	24.6	48.7	2.9	23	3.4	17.7	3.3	8.6	<0.5	6.6	<0.5	89.9	4.8	36.5	8.1	113.4	383	2.3	31.8	330.7	500.5	62.6	701.7		
33	16.94194	77.63247	PIT-MN-33	72.9	161.9	13.3	43	7	4.6	2.1	6.3	0.8	3.8	0.7	2.1	<0.5	2.1	<0.5	22.2	11.8	111.5	8.5	209.1	265.9	1	13.1	317.4	300.2	15.8	342.8		
34	16.91543	77.62267	PIT-MN-34	85.2	149.4	14	45.1	6.9	3.9	1.5	6.1	0.7	3	0.6	1.6	<0.5	1.3	<0.5	16.7	5.3	34.5	4.2	159.5	371.2	<1.0	11.1	174.4	302.1	13.3	336		
35	16.91711	77.61676	PIT-MN-35	53.6	97.8	9.7	30.5	4.9	4.3	1.1	4.3	0.5	3	0.5	1.4	<0.5	1.3	<0.5	13.9	6.2	54	4	170.5	246.6	<1.0	10.3	151	197.6	11	226.8		
36	16.90225	77.61689	PIT-MN-36	24.4	53.5	4.7	15	2.4	5.5																							

S.No	LATITUDE	LONGITUDE	Sample Id	La	Ce	Pr	Nd	Sm	Sc	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y	U	Th	Hf	Rb	Sr	Ta	Nb	Zr	LREE		
51	16.9195	77.63714	PIT-MN-51	24.9	50.8	5.1	17.4	3.2	3.7	0.7	2.5	<0.5	1.8	<0.5	1	<0.5	1	<0.5	11.1	3.3	21.7	2.4	118.2	94.4	<1.0	7	90.5	102.1	6.3	123.2
52	16.92298	77.64319	PIT-MN-52	41	76.4	8.2	28.5	5	8.8	1	4.3	0.6	3.1	0.6	1.7	<0.5	1.7	<0.5	18.6	2.6	20.8	3.5	97.1	128.4	<1.0	10	114.1	160.1	12	199.5
53	16.92835	77.63916	PIT-MN-53	20.1	70.2	4	13.5	2.4	3.1	<0.5	2.2	<0.5	1.7	<0.5	1	<0.5	1	<0.5	10.4	3.6	21.9	2.5	213.9	58.3	<1.0	22.7	74.3	110.2	5.9	129.6
54	16.92228	77.63099	PIT-MN-54	40.7	57	8.5	31.6	6.2	11.1	1.2	5	0.6	3.4	0.6	1.6	<0.5	1.5	<0.5	17.6	2.1	17.8	2.7	130.4	272.6	<1.0	9.7	100	145.2	12.7	186.6
55	16.92703	77.62115	PIT-MN-55	29	62.5	5.5	18.4	3.2	5.1	0.5	2.5	<0.5	1.9	<0.5	1	<0.5	1.1	<0.5	10.8	4.1	28.2	2.3	144.3	60	<1.0	8.9	79.6	119.1	6.5	141.5
56	16.93374	77.62035	PIT-MN-56	25	94.9	4.7	15.1	2.4	2.6	0.6	1.9	<0.5	1.3	<0.5	0.7	<0.5	0.7	<0.5	7.5	3.1	33.3	3.1	134.7	110	<1.0	8.7	106	142.7	4.6	157.4
57	16.94128	77.62346	PIT-MN-57	28	67.9	6	21.4	3.9	7.1	0.7	3.2	<0.5	2.3	<0.5	1.3	<0.5	1.3	<0.5	14	1.9	17.3	2	74.3	43	<1.0	6.4	73.8	127.9	8.1	157.1
58	16.94294	77.6144	PIT-MN-58	36.5	71.1	7.1	23.8	4.1	5.7	0.8	3.4	<0.5	2.4	0.5	1.4	<0.5	1.3	<0.5	15.3	2.8	33.3	2.7	97.9	57.1	<1.0	9.3	104.5	143.4	9	173.4
59	16.94879	77.61028	PIT-MN-59	30.3	56.9	5.4	17.3	2.7	1.6	0.5	2	<0.5	1.2	<0.5	0.6	<0.5	0.6	<0.5	7.1	2.9	36.4	2.7	171.2	81.1	<1.0	4.3	85.8	113.1	4.4	126.2
60	16.84302	77.6095	PIT-MN-60	15.1	66.3	3.4	12.3	2.2	4.6	<0.5	1.9	<0.5	1.4	<0.5	0.8	<0.5	0.8	<0.5	7.9	2.7	12.5	1.9	99.1	116.6	<1.0	7.4	56	99.3	4.9	116.7
61	16.83082	77.60925	PIT-MN-61	28.5	56.1	7.6	28.5	5.2	5.5	1.1	4	0.5	2.5	0.5	1.3	<0.5	1.4	<0.5	14.6	1.3	7.7	1.8	95.3	470.8	<1.0	8.2	63.8	127	10.2	157.3
62	16.8291	77.60428	PIT-MN-62	17	43.9	4	14.1	2.4	3.3	0.6	1.8	<0.5	1.2	<0.5	0.6	<0.5	0.7	<0.5	7	3.2	11.9	2.3	133.5	392.6	<1.0	5.7	82.7	92	4.3	96.6
63	16.82268	77.60056	PIT-MN-63	18.7	47	4.9	17.2	2.9	5.5	0.6	2.3	<0.5	1.7	<0.5	1	<0.5	1.1	<0.5	10.3	2.8	17.9	3.2	119.6	285.3	<1.0	7.3	117.2	91.3	6.1	113.2
64	16.82333	77.6137	PIT-MN-64	139.8	198.7	21.7	71.5	11.8	3.3	1.7	9	1.1	5.7	1.1	2.9	<0.5	2.7	<0.5	29	7	64.4	6.2	109.9	252.1	1.3	15.5	199.8	445.2	22.5	500
65	16.82172	77.62679	PIT-MN-65	26.2	102.5	4.9	16.3	2.9	4.4	0.6	2.5	<0.5	1.8	<0.5	1.1	<0.5	1.1	<0.5	10.3	2.2	37	3.9	87.5	144.1	<1.0	8.7	147.1	153.4	6.5	174.6
66	16.82418	77.63285	PIT-MN-66	46.2	44.7	9	29.7	4.4	4.8	1	3.2	<0.5	1.9	<0.5	1	<0.5	1.1	<0.5	10.7	1.3	13.5	2.2	102.1	215.1	<1.0	8.6	75.2	135	7.2	157.7
67	16.83224	77.62911	PIT-MN-67	100.5	139.7	16.2	54.3	9.1	5	1.4	7.1	0.8	4.4	0.8	2.2	<0.5	2	<0.5	23.1	4	46	4.4	93.4	168	1.6	14.3	158.1	321.2	17.3	366.6
68	16.84298	77.62537	PIT-MN-68	37.1	64.6	7.9	26.7	4.6	6.1	1	3.5	<0.5	2.4	<0.5	1.2	<0.5	1.3	<0.5	12.9	2.1	29.9	2.4	104.1	201	1	10.7	80.6	141.9	8.4	169.3
69	16.85088	77.61865	PIT-MN-69	28.1	87.4	6	20.7	3.9	7.1	0.8	3.3	<0.5	2.4	0.5	1.3	<0.5	1.4	<0.5	14.1	3.4	35.6	2.8	99.4	159.7	<1.0	10.7	95.4	146.9	8.9	177
70	16.85419	77.62893	PIT-MN-70	28.7	56.9	5.9	20.7	3.7	5.3	0.6	3	<0.5	2.3	<0.5	1.2	<0.5	1.1	<0.5	12.9	2.4	24.1	3.6	118.8	52.1	<1.0	9.7	128.7	116.5	7.6	142.3
71	16.8492	77.63892	PIT-MN-71	14.7	30.4	3.1	10.9	2	3.7	<0.5	1.5	<0.5	0.8	<0.5	0.4	<0.5	<0.5	<0.5	4.3	1.6	20.6	1.8	80.8	4.2	<1.0	3.1	60.8	61.1	2.7	71.8
72	16.84465	77.64915	PIT-MN-72	30.6	135.3	8.2	30	7.2	9.9	0.7	5.9	0.9	5.3	0.9	2.4	<0.5	1.9	<0.5	17.9	2.2	22.3	2	229.6	127.3	3.4	36.6	63.2	212	17.3	257.1
73	16.83455	77.64577	PIT-MN-73	33.7	54.1	7.2	24.8	4.4	5.4	0.7	3.9	0.5	2.6	0.5	1.4	<0.5	1.3	<0.5	15.1	2.1	31.4	3	88.8	84.5	<1.0	11.8	114	124.9	10.2	155.6
74	16.83595	77.64658	PIT-MN-74	33.8	48.4	7.2	24.8	4.4	5.9	0.6	3.6	<0.5	2.4	<0.5	1.1	<0.5	1	<0.5	12.2	1.9	22.3	3	77	26.2	<1.0	10.1	111.8	119.2	8.1	145.4
75	16.8587	77.64012	PIT-MN-75	25.5	75.1	5.1	16.9	2.9	3.5	0.5	2.2	<0.5	1.3	<0.5	0.5	<0.5	0.5	<0.5	6	2.9	30.7	2.8	172.9	53.5	<1.0	8.1	97.6	126	4.5	140
76	16.8612	77.64588	PIT-MN-76	48.7	75.4	9	30.6	5.2	6	0.8	4.1	0.5	2.8	0.5	1.6	<0.5	1.4	<0.5	17	1.3	16.8	3.1	126.5	159.1	<1.0	12.4	114.5	169.7	10.9	203.6
77	16.85647	77.65061	PIT-MN-77	49.7	83.2	9.7	31.2	4.9	5	0.6	3.5	<0.5	1.9	<0.5	0.9	<0.5	0.7	<0.5	9.9	2.7	35.9	3	264.1	49.5	<1.0	9.5	108.8	179.3	7	201.2
78	16.85831	77.64798	PIT-MN-78	19.5	47.3	3.9	13.2	2.1	2	<0.5	1.7	<0.5	1.5	<0.5	0.9	<0.5	0.8	<0.5	9.7	2.4	28.6	3.4	204.3	89.7	<1.0	6.3	119.7	86	4.9	102.6
79	16.86705	77.65002	PIT-MN-79	22.9	36	4.6	16.5	3	6.7	0.6	2.5	<0.5	1.9	<0.5	1	<0.5	0.9	<0.5	10.6	0.5	14	1.7	124.6	86.2	<1.0	6.7	63	83.6	6.3	107.2
80	16.87418	77.64588	PIT-MN-80	89	182.3	17.7	56	8.9	3.4	0.9	6.1	0.7	3.8	0.7	1.8	<0.5	1.6	<0.5	17.8	2.5	61.9	4.5	120.7	110.8	1	11.3	169.6	354.8	14.7	390.7
81	16.8768	77.64168	PIT-MN-81	13.7	26.5	2.8	9.7	1.7	3.6	<0.5	1.5	<0.5	1.2	<0.5	0.7	<0.5	0.6	<0.5	6.9	1.1	14.7	2.2	105.7	71.2	<1.0	4.1	83.1	54.4	4	68.9
82	16.87841	77.63256	PIT-MN-82	19.9	33.3	3.9	13.7	2.6	5	0.5	2.1	<0.5	1.6	<0.5	0.9	<0.5	0.8	<0.5	9	3.1	15.5	2.2	89.5	166.8	<1.0	6	81	73.9	5.4	93.3
83	16.87311	77.63189	PIT-MN-83	52.4	104.2	10.4	34.7	5.7	5.3	1.1	4.4	0.5	2.7	0.5	1.4	<0.5	1.3	<0.5	13.9	2.9	26.5	3.9	98.3	360.7	<1.0	10	152.6	208.5	10.8	238.5
84	16.87085	77.61632	PIT-MN-84	119.8	140.7	21.7	69.4	10.6	3.9	1.5	7.3	0.9	4.1	0.7	1.7	<0.5	1.3	<0.5	17.5	2.6	28.6	3.6	138.8	167.5	1.4	16.3	129.7	363.7	16	401.1
85	16.86109	77.63352	PIT-MN-85	17.8	38.7	3.5	12	3.8	2.7	<0.5	1.7	<0.5	1.1	<0.5	0.5	<0.5	<0.5	<0.5	5.7	2.3	15.2	1.7	201.1	20.3	<1.0	4.9	53.7	75.8	3.3	87.5
86	16.76999	77.62573	PIT-MN-86	68.2	105.7	12.3	44.9	8	16.8	1.7	8	1	6	1.1	3.1	0.5	3.1	<0.5	34.5	29.9	42.5	2.5	120.3	219.4	1	10.1	70.6	240.8	22.8	314.9
87	16.77364	77.62595	PIT-MN-87	21.8	51.7	4.8	18	3.5	6	0.9	3.1	<0.5	2.3	0.5	1.5	<0.5	1.5	<0.5	14.2	6.1	53	2.7	160.9	<1.0	1.6	6	68.7	100.7	8.9	129.8
88	16.76701	77.62579	PIT-MN-88	20.4	57.2	4.3	12.9	2.4	5.9	0.5	2.2	<0.5	1.8	<0.5	0.8	<0.5	0.8	<0.5	9	3.4	36.8	1.2	141.3	<1.0	<1.0	6	36.7	97.7	5.6	118.2
89	16.76108	77.62675	PIT-MN-89	18.9	58.8	4.4	17	3	7.8	0.8	2.4	<0.5	2.3	<0.5	1.3	<0.5	1.4	<0.5	12.2	2.1	52.1	2.8	102.1	35.4	0.7	4.9	64.8	102.9	7.4	130.3
90	16.75609	77.62421	PIT-MN-90	40.7	80.8	8.5	30.2	5.7	23.5	1.6	5.9	0.8	4.1	0.8	2.7	<0.5	2.3	<0.5	22.9	3.3	43.3	2.6	96.5	66.4	<1.0	5.5	80.8	167.5	16.6	230.5
91	16.7559	77.61542	PIT-MN-91	63.9	86.1	11.3	40	6	14.3	1.4	5.6	0.8	4.3	0.9	2.4	<0.5	2.2	<0.5	26.4	4.7	50.8	2.4	249.5	13	<1.0	6.6	78.3	208.7	16.2	265.6
92	16.75526	77.60979	PIT-MN-92	37.6	52.3	6.3	21.4	2.4	2.1	0.7	3.1	0.5	2	0.5	1.7	<0.5	1.5	<0.5	13.4	1.6	74.4	2.3	117.5	<1.0	0.7	6.2	76.5	120.7	9.3	145.5
93	16.7529	77.59967	PIT-MN-93	37.4	118.1	8	26.2	5	6.9	0.9	3.9	0.5	3.2	0.6	1.8	<0.5	1.7	<0.5	16.6	6.8	74.3	2.4	117.5	<1.0	0.5	5.2	66.5	195		

S.No	LATITUDE	LONGITUDE	Sample Id	La	Ce	Pr	Nd	Sm	Sc	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y	U	Th	Hf	Rb	Sr	Ta	Nb	Zr	LREE	HREE	Total REE
101	16.76497	77.64792	PIT-MN-101	26.9	62.7	6.5	23.8	5.1	9.6	1.1	3.6	<0.5	3.1	0.6	2.1	<0.5	2.5	<0.5	20.3	4.8	21	1.7	166.9	258.5	0.7	7.6	52.9	126.1	11.9	167.9
102	16.76559	77.64422	PIT-MN-102	22.4	66.1	5.6	21.7	4.3	8.5	0.8	4.6	0.7	4.6	1	2.6	<0.5	2.9	0.5	22.7	4.1	38.9	5.4	167.2	18	4.3	5	92.4	120.9	16.9	169
103	16.76503	77.65186	PIT-MN-103	9.8	37.5	2.2	8.1	1.1	1.8	<0.5	1.2	<0.5	0.9	<0.5	0.6	<0.5	0.6	<0.5	5.7	2	14.5	0.9	124.2	<1.0	<1.0	2.9	21.9	58.7	3.3	69.5
104	16.76456	77.65743	PIT-MN-104	49.3	81	9.7	31.8	5.6	7.5	1.1	6	0.7	3.5	1	2.5	<0.5	2.3	<0.5	24.8	4.5	53	2.9	115.1	38.2	<1.0	5.6	103.5	178.5	16	226.8
105	16.77249	77.65319	PIT-MN-105	36.3	102.5	7.5	26.7	6.6	4.4	1.1	4.5	0.7	4.4	0.8	2.5	<0.5	2.4	<0.5	22.9	6.5	107	1.3	97	80.5	0.6	7.3	46.7	180.7	15.3	223.3
106	16.77359	77.65598	PIT-MN-106	29.4	51.1	7	24.5	3.8	2.1	1.1	4.3	0.5	3.4	0.7	1.8	<0.5	2	<0.5	22.7	3.9	30.4	1.2	91.1	<1.0	<1.0	4.6	44.6	116.9	12.7	154.4
107	16.77181	77.64821	PIT-MN-107	8.8	43.5	2.3	8.4	2.1	4	0.6	1.9	<0.5	1.9	<0.5	1.8	<0.5	2.8	<0.5	14.2	3.6	51.5	5.1	240.7	3.4	<1.0	4.1	147.7	65.7	8.4	92.3
108	16.77925	77.65011	PIT-MN-108	5.2	12.3	1	4	1.3	1.8	<0.5	0.9	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	4.7	5.9	10.2	0.6	29.1	27.9	<1.0	3	14.3	23.8	1.7	32
109	16.78206	77.64993	PIT-MN-109	17.1	35.4	3.5	13.5	2.7	4.8	0.6	2.6	<0.5	1.9	<0.5	1.2	<0.5	1.8	<0.5	11.9	3	27.1	2.1	155.8	29	<1.0	4.1	63.2	72.8	7.5	97
110	16.78314	77.65202	PIT-MN-110	20.7	40.7	4.9	19.3	2.8	10.8	1	3.4	0.5	2.8	0.6	1.8	<0.5	2	<0.5	16.8	7.5	50	3.1	89.9	34	<1.0	5.1	91.8	89.4	11.1	128.1
111	16.78362	77.65416	PIT-MN-111	18.6	42.4	4.8	17.2	3.8	4.1	0.7	4.6	0.5	2.7	0.6	2	<0.5	2.2	<0.5	15.9	3.8	46.8	3.9	212.6	<1.0	<1.0	3.2	127.1	87.5	12.6	120.1
112	16.78249	77.65673	PIT-MN-112	11.9	55	3	11.8	2.6	7.5	0.6	2.1	<0.5	2	0.5	1.4	<0.5	1.3	<0.5	14.1	5.1	10.4	0.8	40	<1.0	<1.0	3.2	29.1	84.9	7.3	113.8
113	16.77881	77.65346	PIT-MN-113	32.2	74	6.5	23.5	3.3	7.2	1.2	3.3	<0.5	2.4	0.5	1.5	<0.5	1.5	<0.5	15.4	7.7	27.3	1.6	92.1	131.4	0.6	7.4	54	140.7	9.2	172.5
114	16.77566	77.65246	PIT-MN-114	30.5	70.8	6.8	21.4	3.7	5	1	3.2	<0.5	2.6	0.5	1.2	<0.5	1.6	<0.5	13.9	8.1	26.7	1.5	90.4	129.3	0.5	7.2	51.2	134.2	9.1	162.2
115	16.87145	77.60274	PIT-MN-115	54.6	108.3	11.3	40.1	8	20.2	1.7	6.6	0.9	5.5	1.1	2.8	0.5	2.8	<0.5	27.6	3	81.3	2.3	90.4	30.1	0.6	9.3	86.5	224	20.2	292
116	16.87708	77.60272	PIT-MN-116	71.5	151.3	11.2	38.6	5.4	7.7	1.9	4.4	0.5	3.1	0.5	2.1	<0.5	2	<0.5	18.8	2.4	56.9	2.4	134	67.7	0.6	8.5	79.8	279.9	12.6	319
117	16.90251	77.60104	PIT-MN-117	43.7	141.9	9.3	31.6	5.8	13.1	1.2	3.9	0.6	3.9	0.6	2.5	<0.5	3	0.6	23.3	6	33.8	6.8	103.9	27.2	0.6	7.8	169.3	233.5	15.1	285
118	16.90676	77.61082	PIT-MN-118	289.5	619.2	53	161.2	24.5	9	1.8	17.3	2.5	13.7	2.5	6.9	1.1	6.1	0.6	70	11.1	312.6	6.5	230.9	10.9	1.4	15.9	228	1149.2	50.7	1278.9
119	16.91455	77.60694	PIT-MN-119	196.5	371.5	36.2	113.4	17.4	13	1.7	14	1.9	11.4	1.8	5.2	0.6	4.6	0.9	54.8	8.1	201.5	5.5	129.1	81.9	1	13.4	191.9	736.7	40.4	844.9
120	16.92558	77.60286	PIT-MN-120	447	580.3	78.2	250.7	38.4	21.3	4	28	3.7	19.5	3.8	10.6	1.4	8.5	1.2	110.1	10.5	310.1	7.6	197.5	43.2	1.7	23.4	266.6	1398.6	76.7	1606.7
121	16.9188	77.60715	PIT-MN-121	106.6	193	19.5	66.1	10.9	8	1.4	8.4	1.1	6.6	1.2	3.7	<0.5	2.8	<0.5	32.7	3.9	111.4	4	191.1	55.9	0.8	10.5	147.6	397.5	23.8	462
122	16.92618	77.61326	PIT-MN-122	197.2	228.6	38.8	126	23.4	23	3	17.9	2.3	13.7	2.8	7.2	1	6.3	0.8	75.6	4.6	142.4	5.5	135	58.8	1.8	20.6	200.1	617	52	767.6
123	16.8353	77.65093	PIT-MN-123	179.5	251.6	33.4	107.9	14	6	2.1	8.3	0.7	3.8	0.7	1.7	<0.5	1	<0.5	18.2	9.2	77.7	3.8	139.7	179.8	<1.0	5.6	129	588.5	16.2	628.9
124	16.83069	77.6455	PIT-MN-124	243.3	418.1	46	161.9	26.5	22.9	3.9	21.4	2.7	15.4	2.8	8.8	1.1	7	0.9	83.9	8.6	75.9	9.4	137.7	110	0.7	20.4	350.3	899.7	60.1	1066.6
125	16.82868	77.64683	PIT-MN-125	84.3	222.7	15.7	53.9	7.9	12.4	1.5	6	0.8	4.2	0.8	2.6	0.2	2.3	0.4	28.4	2.3	66.7	3	173.6	1.4	1	16.8	119.5	386	17.3	444.1
126	16.93663	77.63533	PIT-MN-126	185.5	309.4	34.9	116.3	19.1	12.7	2.3	14.2	1.6	9.1	1.8	4.5	0.7	4.7	0.7	46.3	2.7	90.5	4.8	260	78.2	1.5	18.2	162.2	667.5	37.3	763.8
127	16.93754	77.63346	PIT-MN-127	143.4	594.5	29.6	107.2	20	27.4	3.4	17.1	2.4	13.9	2.6	7.6	1.1	7.1	0.9	66.1	10.1	88.6	6.7	108.3	121.2	1.4	23.2	245	898.1	52.7	1044.3
128	16.93977	77.63054	PIT-MN-128	104.2	169.7	15.9	50.6	7.4	5.1	1.7	4.7	0.5	3.3	0.5	1.5	<0.5	1.4	<0.5	16.2	3.3	65.9	4.2	114.5	76.8	0.4	6.8	143.6	349.5	11.9	382.7
129	16.94281	77.62532	PIT-MN-129	78.5	172.7	13.5	45.2	6.9	2.3	3.1	4.8	0.6	3.1	0.5	1.7	<0.5	1.6	<0.5	16.1	4.2	121.5	4.1	182.1	67.9	0.8	8.8	135.3	319.9	12.3	350.6
130	16.94325	77.62429	PIT-MN-130	138.2	189.6	20.6	61	9.6	3.7	2.4	6.5	0.8	4.1	0.8	2.3	<0.5	2.4	<0.5	29.3	2.9	55.6	3.5	126.8	143.9	0.8	10	152.7	421.4	16.9	471.3
131	16.90464	77.62614	PIT-MN-131	230	425.1	52.6	210.1	38.5	44.1	7.3	30.5	3.7	19.8	3.7	9.3	1.3	8.2	1.1	105.6	3	64	6	65	406.8	1.5	26.2	248.7	963.6	77.6	1190.9
132	16.90892	77.62519	PIT-MN-132	98.2	209.7	21.1	78.7	12.6	13.2	2.1	9.6	1.2	6.6	1.3	3.8	0.5	3.8	0.5	34	2.8	62.9	4.2	130.1	106.7	1.4	17.2	159.6	422.4	27.3	496.9
133	16.92745	77.61179	PIT-MN-133	60	192.8	12.1	40.8	6.2	6.8	1.2	5.8	0.6	3.6	0.7	2.1	<0.5	2.4	<0.5	22.6	2.1	62.3	2.9	131.3	64.6	0.8	11.1	99	313.1	15.2	357.7
134	16.92508	77.61597	PIT-MN-134	51.9	135.2	9.9	34	6.4	4.5	0.9	4.7	0.6	3	0.6	1.7	<0.5	1.4	<0.5	16.5	3.1	58.7	2.4	237.5	149.6	<1.0	8.7	89.6	238.3	12	271.3
135	16.92783	77.61597	PIT-MN-135	155.4	235.3	29	96.3	15.6	13.2	1.7	11.6	1.6	8.4	1.6	4.6	0.6	4.5	0.5	51.1	3.8	120.1	4.5	177.4	66.8	1.3	29.2	152.9	533.3	33.4	631
136	16.9318	77.61861	PIT-MN-136	119.7	238.9	21.9	68.2	9.2	8.8	1.3	6.5	0.9	4.7	1	2.5	<0.5	2.4	<0.5	24.4	3.9	88.8	3.4	162	89.8	0.7	10.6	117.8	459.2	18	510.4
137	16.93309	77.61993	PIT-MN-137	82.9	172.8	13.7	46	6.4	7.9	1.4	4.8	0.5	3.3	0.6	1.6	<0.5	1.6	<0.5	15.6	3.9	84.5	3.6	305	98.8	<1.0	8.7	125.9	323.2	12.4	359.1
138	16.93425	77.61774	PIT-MN-138	55.2	129.9	11	35	5	10.7	1.1	4.1	0.6	3.3	0.6	1.8	<0.5	2	<0.5	15.6	2.6	51.7	2.7	159.3	69.3	0.6	12.7	78.2	237.2	12.4	275.9
139	16.94574	77.61464	PIT-MN-139	88.1	122.2	16.1	54	8	8.1	1.7	6.1	0.7	4.5	0.8	2.4	<0.5	2.6	<0.5	29	1.7	41.4	2.4	103.5	13.8	1.4	7.9	71.5	290.1	17.1	344.3
140	16.9383	77.63613	PIT-MN-140	228.1	440.7	50.6	191.5	33.6	39	6.9	30.6	3.9	21	3.8	11.9	1.4	8.7	1.1	110	4.8	65.3	9.1	187.9	494.6	1.1	25.8	367.5	951.4	82.4	1182.8
141	16.84022	77.59462	PIT-MN-141	296.8	579.9	59.9	219.5	32.1	65.8	8.7	23.8	2.5	11.6	2	4.2	<0.5	2.5	<0.5	47.4	5.7	30.4	10.2	30.2	444.6	4.7	161.2	416.2	1196.9	46.6	1356.7
142	16.84003	77.59517	PIT-MN-142	339.1	651.6	71.3	249.4	36.1	66.8	10.6	27.1	2.7	12.4	2.2	4.7	0.6	2.6	<0.5	51.9	5.1	40.8	10.7	20.5	734.2	8.3	197.7	433.9	1358.1	52.3	1529.1
143	16.84055	77.59533	PIT-MN-143	68.3	116.6	12.8	41.1	6	6.9	1.2	4.6	0.5	2.9	0.5	1.2	<0.5														

Annexure -IV



Summarised table showing statistical analyses of primary Vs. external check samples of REE Elements



SHIVA ANALYTICALS INDIA PRIVATE LIMITED

Plot No. 24D [P] & 34 D, KIADB Industrial Area, Hoskote,
Bangalore – 562 114. Phone No: 080 -2801 -5333,
Website: www.shivaanalyticals.com

TEST REPORT

Shiva Assay(TREE)_G5423

Customer Name	Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concourse No.406, 7-1-58/CC/406, Opp Lal Bungalow, Greenlands, Hyderabad-500016
Discipline & Group	Chemical & Ores and Minerals.
Customer Ref.	Samples Received by Courier.
Commodity	Geological Powder Samples
Lab ID	G5423
Sample Receipt Date	18-Jun-26
Analysis Completion Date	30-Jun-26
Date of Reporting	30-Jun-26
Sample Count	15

SL No.	Customer Code	Sample Description	Method	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052
			Units	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)
			Lab ID	Sc	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
1	PIT-MN-2	Powder	G5423-1	3.0	16.7	72.5	65.9	10.0	35.4	4.9	1.2	5.5	0.6	2.7	<0.5	1.6	<0.5	1.2	<0.5
2	PIT-MN-16	Powder	G5423-2	1.8	6.5	10.1	33.9	2.3	8.9	1.5	0.6	2.0	<0.5	1.2	<0.5	0.7	<0.5	0.8	<0.5
3	PIT-MN-50	Powder	G5423-3	4.2	13.9	41.5	64.5	7.6	27.5	4.7	1.3	5.1	0.6	2.8	<0.5	1.5	<0.5	1.4	<0.5
4	PIT-MN-41	Powder	G5423-4	5.4	12.2	42.4	79.8	8.2	29.0	4.6	1.2	5.1	<0.5	2.4	<0.5	1.2	<0.5	1.2	<0.5
5	PIT-MN-69	Powder	G5423-5	7.6	17.6	32.5	99.8	6.8	25.8	4.4	1.1	5.9	0.5	2.9	0.5	1.7	<0.5	1.6	<0.5
6	PIT-MN-57	Powder	G5423-6	6.5	16.4	32.1	78.3	6.6	25.0	5.0	0.9	5.2	0.5	2.7	0.6	1.7	<0.5	1.4	<0.5
7	PIT-MN-75	Powder	G5423-7	2.7	8.3	27.7	83.3	6.1	23.1	3.3	0.9	4.4	<0.5	2.0	<0.5	0.7	<0.5	0.6	<0.5
8	PIT-MN-130	Powder	G5423-8	0.6	10.7	59.2	82.7	8.6	29.2	4.2	1.5	4.5	<0.5	1.8	<0.5	1.1	<0.5	0.8	<0.5
9	PIT-MN-1	Powder	G5423-9	2.1	7.2	14.5	39.0	3.0	10.9	1.9	0.5	2.3	<0.5	1.2	<0.5	0.7	<0.5	0.7	<0.5
10	PIT-MN-77	Powder	G5423-10	3.8	11.2	57.1	93.2	10.7	36.9	5.6	1.2	6.0	0.6	2.4	<0.5	1.2	<0.5	0.8	<0.5
11	PIT-MN-77	Powder	G5423-10	4.1	11.0	56.7	92.4	10.5	36.0	5.8	1.1	5.8	0.6	2.6	<0.5	1.1	<0.5	0.9	<0.5
12	PIT-MN-74	Powder	G5423-11	5.0	13.0	39.1	54.4	7.5	27.9	5.2	0.9	5.0	0.6	2.8	<0.5	1.4	<0.5	1.2	<0.5
13	PIT-MN-85	Powder	G5423-12	1.7	6.1	19.9	43.4	3.8	13.7	2.5	<0.5	2.8	<0.5	1.3	<0.5	0.5	<0.5	0.6	<0.5
14	PIT-MN-73	Powder	G5423-13	4.2	15.4	36.3	57.6	7.4	27.0	4.5	1.1	5.0	0.6	3.0	0.7	1.5	<0.5	1.3	<0.5
15	PIT-MN-51	Powder	G5423-14	3.1	13.7	29.9	61.9	6.0	21.8	3.8	1.1	4.3	<0.5	2.2	<0.5	1.4	<0.5	1.2	<0.5
16	PIT-MN-119	Powder	G5423-15	4.2	24.3	83.4	175.1	14.9	51.0	8.1	1.0	9.5	0.9	4.5	0.8	2.4	<0.5	2.0	<0.5

Abbreviations

LOQ-- Limit Of Quantification

SOP/OM/051-- 4 Acid digestion followed by ICPOES Finish

SOP/OM/052-- 4 Acid digestion followed by ICPMS Finish

Prepared by: Ambarish
Verified by: Satyanarayana

Page No.1 of 2

Customer Name	Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concourse No.406, 7-1-58/CC/406, Opp Lal Bungalow, Greenlands, Hyderabad-500016
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Discipline & Group	Chemical & Ores and Minerals.
Customer Ref.	Samples Received by Courier.
Commodity	Geological Powder Samples
Lab ID	G5423
Sample Receipt Date	18-Jun-26
Analysis Completion Date	30-Jun-26
Date of Reporting	30-Jun-26
Sample Count	15

Sl. No.	Customer Code	Sample Description	Method	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051
			Units	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)
			LOQ	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
			Lab ID	Th	U	Li	Rb	Nb	Hf	Ta	Co	Cr	Ba	Ni	Pb	Sr	Zn	Zr
1	PIT-MN-2	Powder	G5423-1	16.9	2.6	17.2	178.4	21.0	0.6	<0.5	8.7	63.8	437.3	30.7	28.4	144.7	15.7	50.2
2	PIT-MN-16	Powder	G5423-2	7.7	2.5	15.6	253.0	13.7	<0.5	9.9	137.7	408.6	40.9	32.9	35.5	12.8	46.6	
3	PIT-MN-50	Powder	G5423-3	20.3	2.5	15.8	158.1	18.2	2.2	<0.5	6.6	90.3	809.9	18.1	23.3	421.1	17.5	64.4
4	PIT-MN-41	Powder	G5423-4	21.8	1.6	15.2	219.2	20.1	3.1	<0.5	7.1	95.8	705.9	21.6	28.5	93.9	20.6	85.9
5	PIT-MN-69	Powder	G5423-5	39.1	3.8	23.1	210.1	26.8	2.4	<0.5	10.4	222.1	602.1	40.8	37.9	174.1	32.7	76.0
6	PIT-MN-57	Powder	G5423-6	15.6	2.2	32.0	127.3	9.9	<0.5	<0.5	8.7	174.0	327.6	48.4	21.3	67.1	17.9	68.2
7	PIT-MN-75	Powder	G5423-7	30.5	3.2	15.4	285.8	13.2	1.4	<0.5	5.5	39.7	571.2	21.0	37.3	92.7	9.8	85.8
8	PIT-MN-130	Powder	G5423-8	23.3	2.8	11.7	236.0	10.3	1.3	<0.5	5.5	53.4	1230.3	15.2	21.7	218.8	15.8	83.6
9	PIT-MN-1	Powder	G5423-9	10.2	2.5	11.2	217.0	6.1	<0.5	<0.5	6.0	80.9	257.5	24.7	29.5	119.7	6.0	54.4
10	PIT-MN-77	Powder	G5423-10	36.7	3.1	21.2	371.4	15.0	0.7	<0.5	4.0	174.1	908.6	29.5	39.1	88.8	19.7	92.4
11	PIT-MN-77	Powder	G5423-10	37.3	2.9	20.9	370.2	14.6	0.8	<0.5	3.9	173.3	907.9	29.3	38.3	87.3	18.6	91.5
12	PIT-MN-74	Powder	G5423-11	30.9	1.8	21.3	166.3	15.1	2.4	<0.5	6.1	208.1	451.3	35.0	13.3	61.8	6.4	90.7
13	PIT-MN-85	Powder	G5423-12	18.6	1.7	8.3	332.8	7.8	0.8	<0.5	6.4	232.0	232.5	25.5	13.8	46.9	22.9	39.3
14	PIT-MN-73	Powder	G5423-13	24.7	1.7	16.9	197.4	16.5	1.9	<0.5	5.0	306.7	744.5	34.4	20.3	90.3	25.8	76.8
15	PIT-MN-51	Powder	G5423-14	29.2	3.9	19.5	239.0	15.5	2.0	<0.5	6.5	218.1	853.6	29.1	35.4	147.4	30.4	71.2
16	PIT-MN-119	Powder	G5423-15	78.5	6.1	11.1	236.8	19.2	3.0	<0.5	5.1	137.2	499.6	21.3	40.3	105.4	43.8	133.3



Mr. SATYANARAYANA - AGM- ORES & MINERALS - AUTHORIZED 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 in any 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: Ambarish
 Verified by: Satyanarayana

Page No.2 of 2

Customer Name	Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concourse No.406, 7-1-58/CC/406, Opp Lal Bungalow, Greenlands, Hyderabad-500016
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Discipline & Group
Customer Ref.
Commodity
Lab ID
Sample Receipt Date
Analysis Completion Date
Date of Reporting
Sample Count

Chemical & Ores and Minerals.
Samples Received by Conter.
Geological Powder Samples
G5448
20-Jun-26
01-Jul-26
02-Jul-26
10

Sl. No.	Customer Code	Sample Description	Method	SOP/OM/051	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052	SOP/OM/052
			Units	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)
			LOQ	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
			Lab ID	Sc	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
1	BRS-MN-132	Powder	G5448-1	3.9	38.4	180.0	336.6	23.5	96.9	13.9	1.1	17.4	1.4	7.5	1.3	4.1	0.5	3.4	<0.5
2	BRS-MN-12	Powder	G5448-2	1.5	8.1	34.6	69.0	6.0	25.9	5.1	0.6	5.2	<0.5	2.2	<0.5	0.8	<0.5	0.6	<0.5
3	BRS-MN-18	Powder	G5448-3	3.0	12.4	59.8	130.7	9.5	43.0	8.5	0.9	8.9	0.9	4.0	0.6	1.3	<0.5	0.9	<0.5
4	BRS-MN-131	Powder	G5448-4	2.7	43.3	180.7	347.1	24.4	202.5	14.8	1.1	17.9	1.5	8.6	1.5	4.5	0.5	3.6	0.6
5	BRS-MN-110	Powder	G5448-5	0.9	2.0	38.8	66.3	4.6	18.0	2.1	0.7	2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
6	BRS-MN-23	Powder	G5448-6	2.2	44.2	202.3	367.6	26.6	107.1	15.7	1.1	19.0	1.6	8.4	1.4	4.7	0.6	3.8	0.6
7	BRS-MN-115	Powder	G5448-7	1.8	4.8	52.6	91.2	6.8	24.7	2.7	0.8	4.3	<0.5	0.7	<0.5	0.5	<0.5	<0.5	<0.5
8	BRS-MN-14	Powder	G5448-8	1.7	14.2	80.2	151.1	9.9	40.7	5.8	1.2	7.3	0.6	3.0	0.5	1.6	<0.5	1.4	<0.5
9	BRS-MN-37	Powder	G5448-9	<0.5	4.3	29.9	52.1	3.8	14.4	1.9	0.7	2.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5
10	BRS-MN-47	Powder	G5448-10	1.4	46.7	130.9	256.4	19.4	86.2	14.9	1.5	16.4	1.6	9.1	1.6	4.7	0.6	3.9	0.6

Abbreviations

LOQ - Limit Of Quantification

SOP/OM/051 - 4 Acid digestion followed by ICP-OES Finish

SOP/OM/052 - 4 Acid digestion followed by ICP-MS Finish

Prepared by: Ambarish
Verified by: Satyanarayana

Page No.1 of 2

Customer Name	Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concourse No.406, 7-1-58/CC/406, Opp Lal Bungalow, Greenlands, Hyderabad-500016
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Discipline & Group Chemical & Ores and Minerals.
Customer Ref. Samples Received by Courier.
Commodity Geological Powder Samples
Lab ID G5448
Sample Receipt Date 20-Jun-26
Analysis Completion Date 01-Jul-26
Date of Reporting 02-Jul-26
Sample Count 10

Sl. No.	Customer Code	Sample Description	Method	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM052	SOP/OM051	SOP/OM051	SOP/OM051	SOP/OM051	SOP/OM051	SOP/OM051
			Units	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)	ppm(mg/kg)
			LOQ	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	10	5	5	5	5	5
			Lab ID	Th	U	Li	Rb	Nb	Hf	Ta	Co	Cr	Ba	Ni	Pb	Sr	Zn	Zr
	BRS-MN-132	Powder	G5448-1	34.3	23.7	9.0	368.0	21.8	4.3	4.7	2.3	205.1	353.3	12.4	63.5	104.9	45.6	200.5
	BRS-MN-12	Powder	G5448-2	17.6	17.5	7.2	295.5	12.4	1.8	2.0	2.0	128.2	369.8	13.2	30.1	147.4	24.7	76.7
	BRS-MN-18	Powder	G5448-3	12.3	6.9	1.2	117.4	15.4	1.8	2.8	4.1	179.2	399.4	13.3	28.6	814.7	48.8	97.9
	BRS-MN-131	Powder	G5448-4	43.1	24.9	8.2	324.5	23.3	1.9	4.9	3.0	204.0	384.0	15.1	47.6	93.5	25.8	214.8
	BRS-MN-110	Powder	G5448-5	12.6	5.1	6.1	208.9	4.3	1.2	1.1	1.7	163.2	435.0	10.8	22.7	132.5	12.0	82.7
	BRS-MN-23	Powder	G5448-6	46.2	22.2	6.1	366.5	21.0	1.4	4.6	2.5	361.0	364.9	15.3	66.4	107.3	34.3	207.6
	BRS-MN-115	Powder	G5448-7	18.2	9.0	10.5	237.7	8.8	2.0	2.2	2.1	99.7	497.3	10.2	28.2	136.9	27.4	119.9
	BRS-MN-14	Powder	G5448-8	15.8	18.3	25.4	282.8	11.8	1.1	3.2	4.6	136.5	768.2	13.3	36.7	321.4	29.9	122.5
	BRS-MN-37	Powder	G5448-9	9.0	11.0	10.3	253.2	5.5	<0.5	1.5	2.7	255.2	484.2	15.3	29.9	215.4	15.8	59.9
	BRS-MN-47	Powder	G5448-10	19.8	21.7	20.4	289.7	29.4	1.1	10.8	4.4	304.6	650.3	15.0	46.2	245.6	32.8	191.4

[Signature]

Mr. SATYANARAYANA - AGM- ORES & MINERALS - AUTHORIZED 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 in any 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: Ambarish
Verified by: Satyanarayana

Page No.2 of 2



SHIVA ANALYTICALS (INDIA) PRIVATE LIMITED

Plot No. 24D [P] & 34 D, KIADB Industrial Area, Hoskote
Bangalore – 562 114. Phone No: 080 – 2801 5333,
Website: www.shivaanalytics.com

TEST REPORT

Customer Name	Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concourse No.406, 7- 1-58/CC/406, Opp Lal Bungalow, Greenlands, Hyderabad-500016
Discipline & Group	Chemical & Ores and Minerals.
Customer Ref.	Samples received by Courier
Commodity	Geological Rock Powder
Lab ID	G5447
Sample Receipt Date	20-Jun-26
Analysis Completion Date	01-Jul-26
Date of Reporting	02-Jul-26
Sample Count	2

Sl. No.				1	2
Customer Code				BRS-MN-120	BRS-MN-121
Sample Description				Powder	Powder
Lab ID				G5447-1	G5447-2
Elements	Method	Units	LOQ	Test Results	
Gold as Au	SOP/OM/058	ppm (mg/kg)	0.01	<0.01	<0.01
Silver as Ag	SOP/OM/059	ppm (mg/kg)	1	<1	<1
Arsenic as As	SOP/OM/059	ppm (mg/kg)	5	<5	<5
Antimony as Sb	SOP/OM/051	ppm (mg/kg)	5	<5	<5
Bismuth as Bi	SOP/OM/051	ppm (mg/kg)	5	<5	<5

Abbreviations

SOP/OM/051: 4 acid digestion followed by ICPOES finish
SOP/OM/059: 2 acid digestion followed by ICPOES finish
SOP/OM/058: Lead Fire assay followed by AAS finish



Mr. SATYANARAYANA - AGM - ORES & MINERALS - AUTHORIZED SIGNATORY.

** END OF THE REPORT **

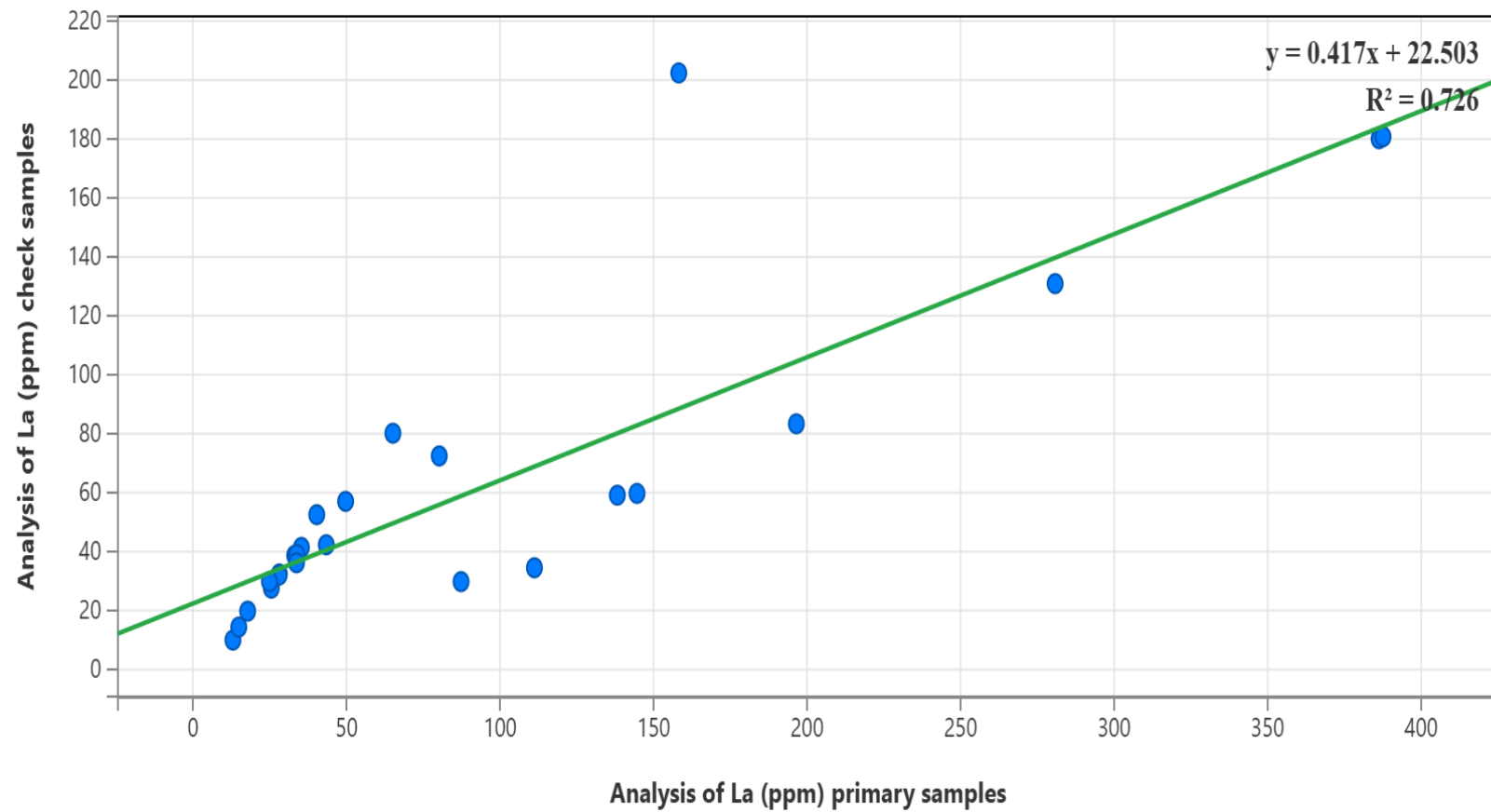
1. The results listed above pertain only to the tested samples and applicable parameters. 2. Samples which are degradable will be disposed immediately after testing and others will be disposed after one month from the date of issue of test certificate unless otherwise specified. 3. Total liability of 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 in any 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: Ambarish
Verified by: Satyanarayana

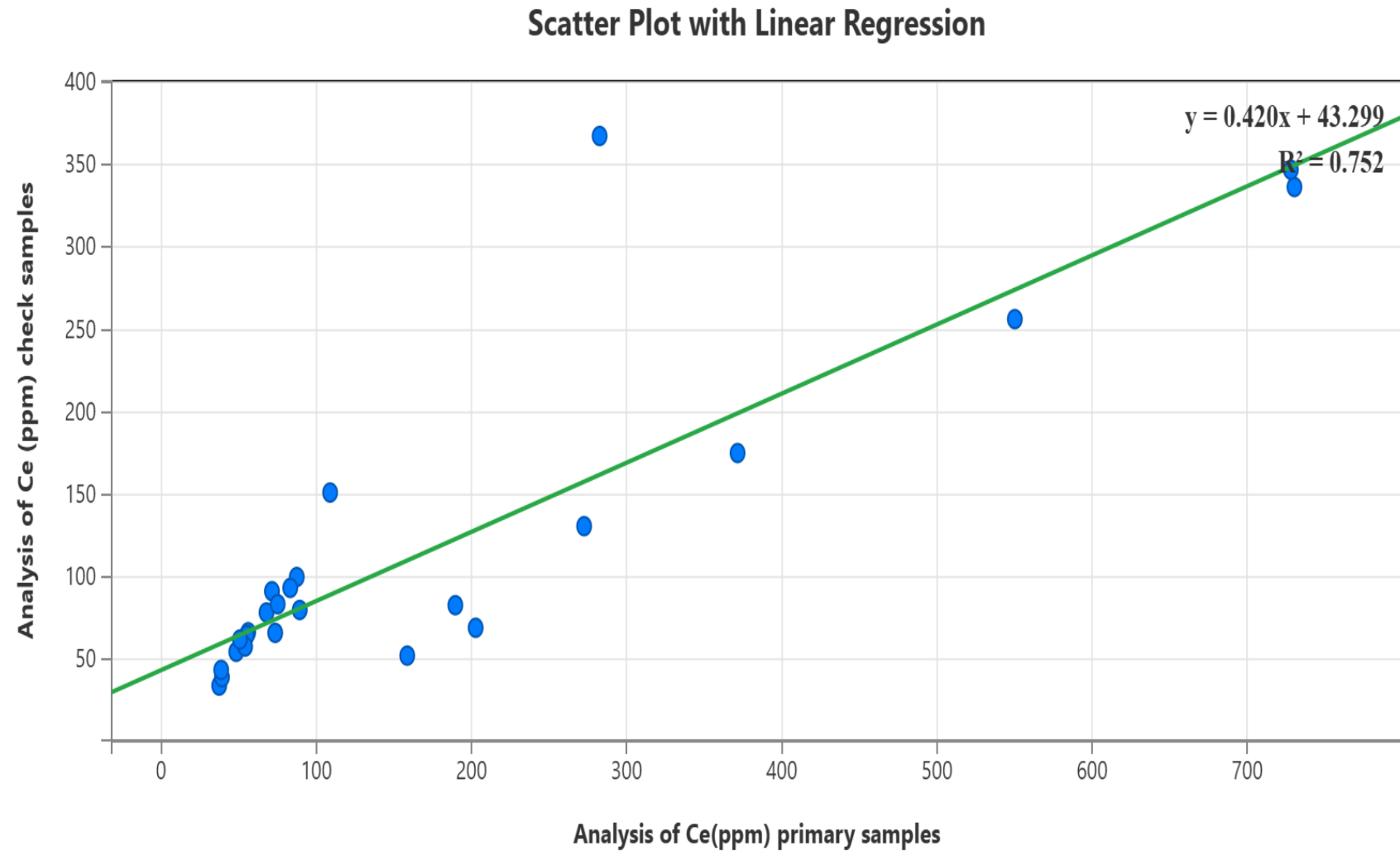
Page No.1 of 1

S No	Sample Id	Sc	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	TREE
1	BRS-MN-132	3.9	38.4	180.0	336.6	23.5	96.9	13.9	1.1	17.4	1.4	7.5	1.3	4.1	0.5	3.4	<0.5	729.9
2	BRS-MN-12	1.5	8.1	34.6	69.0	6.0	25.9	5.1	0.6	5.2	<0.5	2.2	<0.5	0.8	<0.5	0.6	<0.5	159.6
3	BRS-MN-18	3.0	12.4	59.8	130.7	9.5	43.0	8.5	0.9	8.9	0.9	4.0	0.6	1.3	<0.5	0.9	<0.5	284.4
4	BRS-MN-131	2.7	43.3	180.7	347.1	24.4	102.5	14.8	1.1	17.9	1.5	8.6	1.5	4.5	0.5	3.6	0.6	755.3
5	BRS-MN-110	0.9	2.0	38.8	66.3	4.6	18.0	2.1	0.7	2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	136.2
6	BRS-MN-23	2.2	44.2	202.3	367.6	26.6	107.1	15.7	1.1	19.0	1.6	8.4	1.4	4.7	0.6	3.8	0.6	806.9
7	BRS-MN-115	1.8	4.8	52.6	91.2	6.8	24.7	2.7	0.8	4.1	<0.5	0.7	<0.5	0.5	<0.5	<0.5	<0.5	190.7
8	BRS-MN-14	1.7	14.2	80.2	151.1	9.9	40.7	5.8	1.2	7.3	0.6	3.0	0.5	1.6	<0.5	1.4	<0.5	319.2
9	BRS-MN-37	<0.5	4.3	29.9	52.1	3.8	14.4	1.9	0.7	2.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	110.4
10	BRS-MN-47	1.4	46.7	130.9	256.4	19.4	86.2	14.9	1.5	16.4	1.6	9.1	1.6	4.7	0.6	3.9	0.6	595.9
1	PIT-MN-2	3.0	16.7	72.5	65.9	10.0	35.4	4.9	1.2	5.5	0.6	2.7	<0.5	1.6	<0.5	1.2	<0.5	221.2
2	PIT-MN-16	1.8	6.5	10.1	33.9	2.3	8.9	1.5	0.6	2.0	<0.5	1.2	<0.5	0.7	<0.5	0.8	<0.5	70.3
3	PIT-MN-50	4.2	13.9	41.5	64.5	7.6	27.5	4.7	1.3	5.1	0.6	2.8	<0.5	1.5	<0.5	1.4	<0.5	176.6
4	PIT-MN-41	5.4	12.2	42.4	79.8	8.2	29.0	4.6	1.2	5.1	<0.5	2.4	<0.5	1.2	<0.5	1.2	<0.5	192.7
5	PIT-MN-69	7.6	17.6	32.5	99.8	6.8	25.8	4.4	1.1	5.9	0.5	2.9	0.5	1.7	<0.5	1.6	<0.5	208.7
6	PIT-MN-57	6.5	16.4	32.1	78.3	6.6	25.0	5.0	0.9	5.2	0.5	2.7	0.6	1.7	<0.5	1.4	<0.5	182.9
7	PIT-MN-75	2.7	8.3	27.7	83.3	6.1	23.1	3.3	0.9	4.4	<0.5	2.0	<0.5	0.7	<0.5	0.6	<0.5	163.1
8	PIT-MN-130	0.6	10.7	59.2	82.7	8.6	29.2	4.2	1.5	4.5	<0.5	1.8	<0.5	1.1	<0.5	0.8	<0.5	204.9
9	PIT-MN-1	2.1	7.2	14.5	39.0	3.0	10.9	1.9	0.5	2.3	<0.5	1.2	<0.5	0.7	<0.5	0.7	<0.5	84.0
10	PIT-MN-77	3.8	11.2	57.1	93.2	10.7	36.9	5.6	1.2	6.0	0.6	2.4	<0.5	1.2	<0.5	0.8	<0.5	230.7
12	PIT-MN-74	5.0	13.0	39.1	54.4	7.5	27.9	5.2	0.9	5.0	0.6	2.8	<0.5	1.4	<0.5	1.2	<0.5	164.0
13	PIT-MN-85	1.7	6.1	19.9	43.4	3.8	13.7	2.5	<0.5	2.8	<0.5	1.3	<0.5	0.5	<0.5	0.6	<0.5	96.3
14	PIT-MN-73	4.2	15.4	36.3	57.6	7.4	27.0	4.5	1.1	5.0	0.6	3.0	0.7	1.5	<0.5	1.3	<0.5	165.6
15	PIT-MN-51	3.1	13.7	29.9	61.9	6.0	21.8	3.8	1.1	4.3	<0.5	2.2	<0.5	1.4	<0.5	1.2	<0.5	150.4
16	PIT-MN-119	4.2	24.3	83.4	175.1	14.9	51.0	8.1	1.0	9.5	0.9	4.5	0.8	2.4	<0.5	2.0	<0.5	382.1

Scatter Plot with Linear Regression

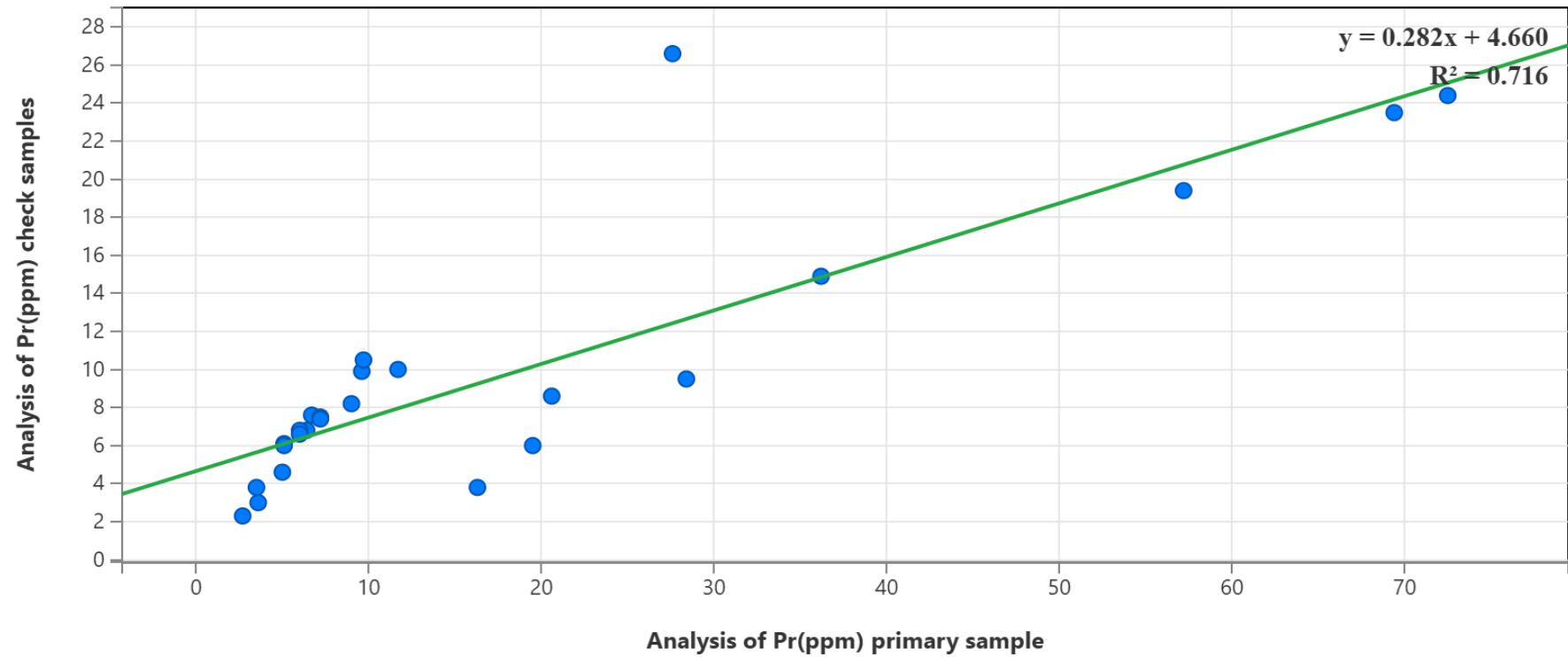


Text fig - 44



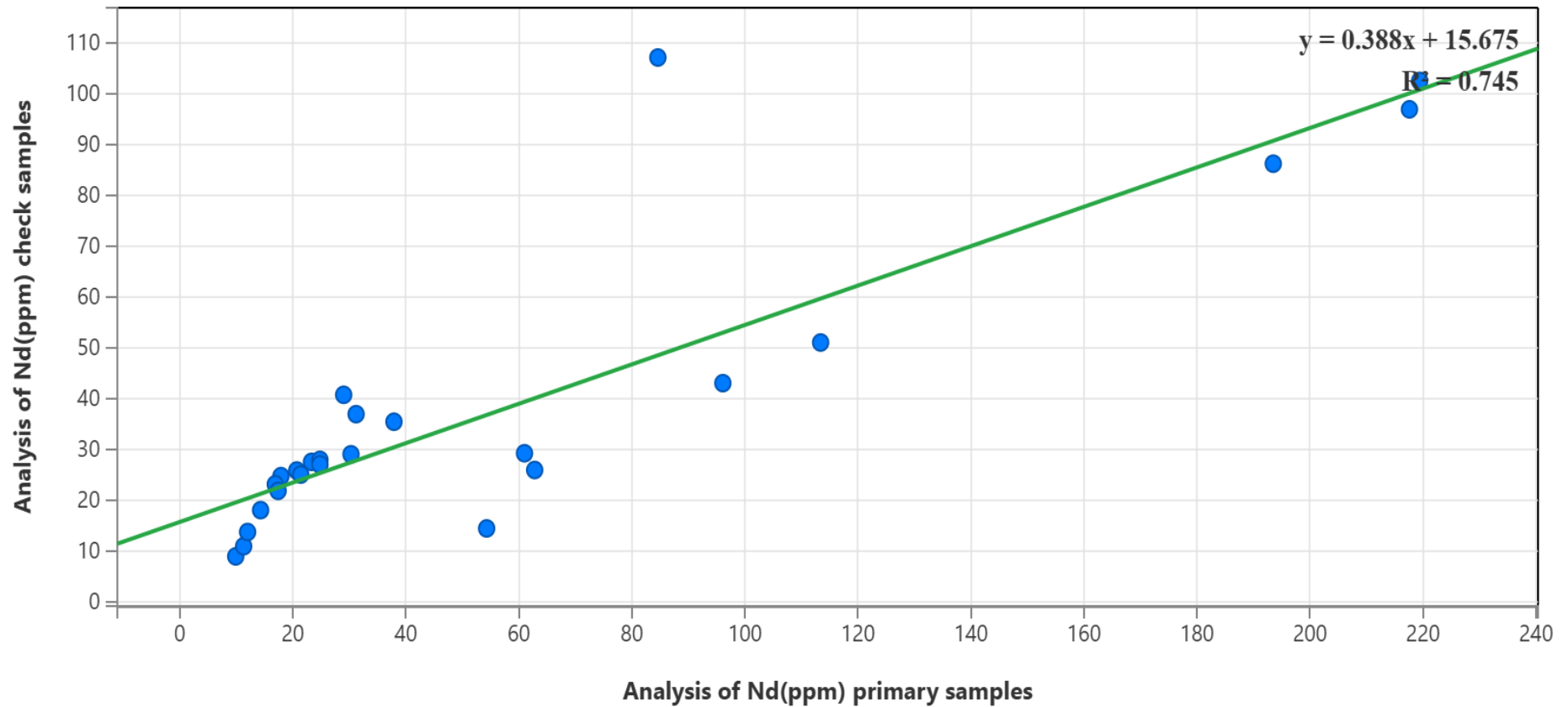
Text fig - 45

Scatter Plot with Linear Regression



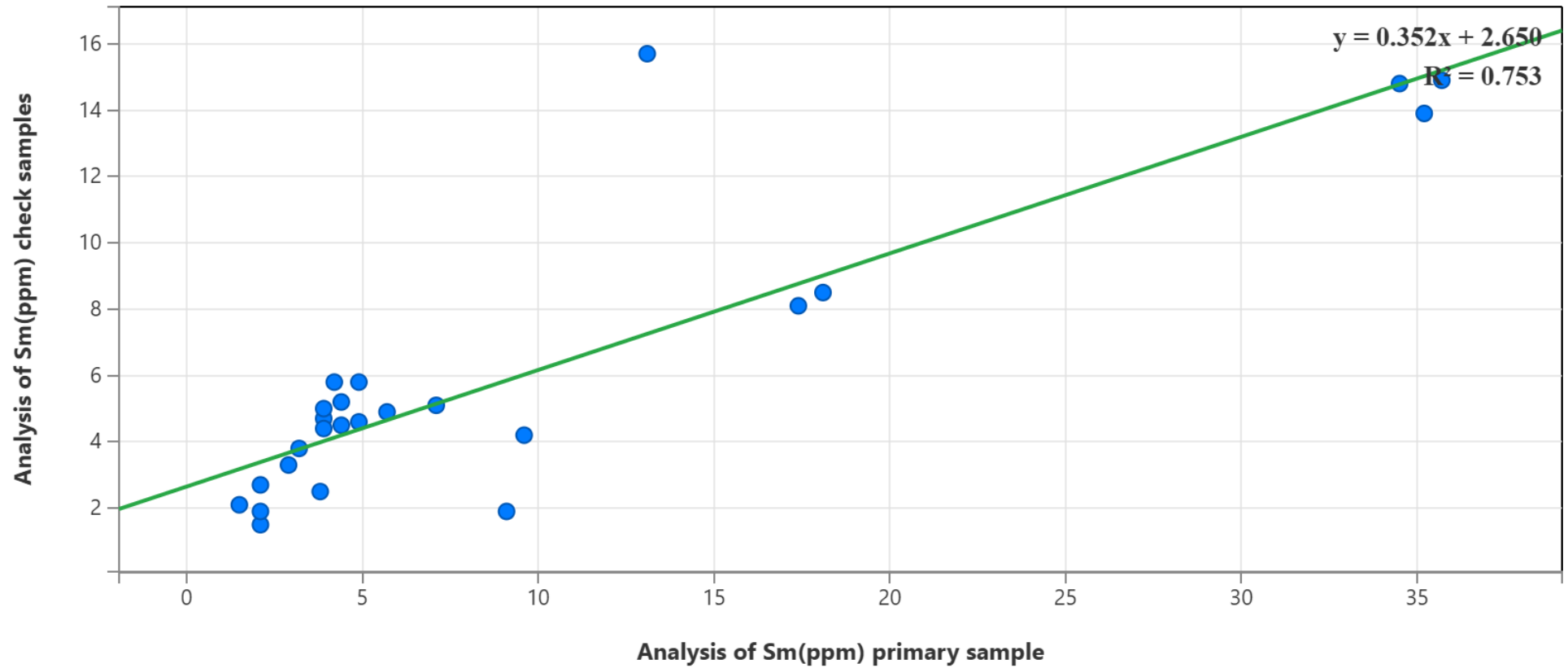
Text fig - 46

Scatter Plot with Linear Regression



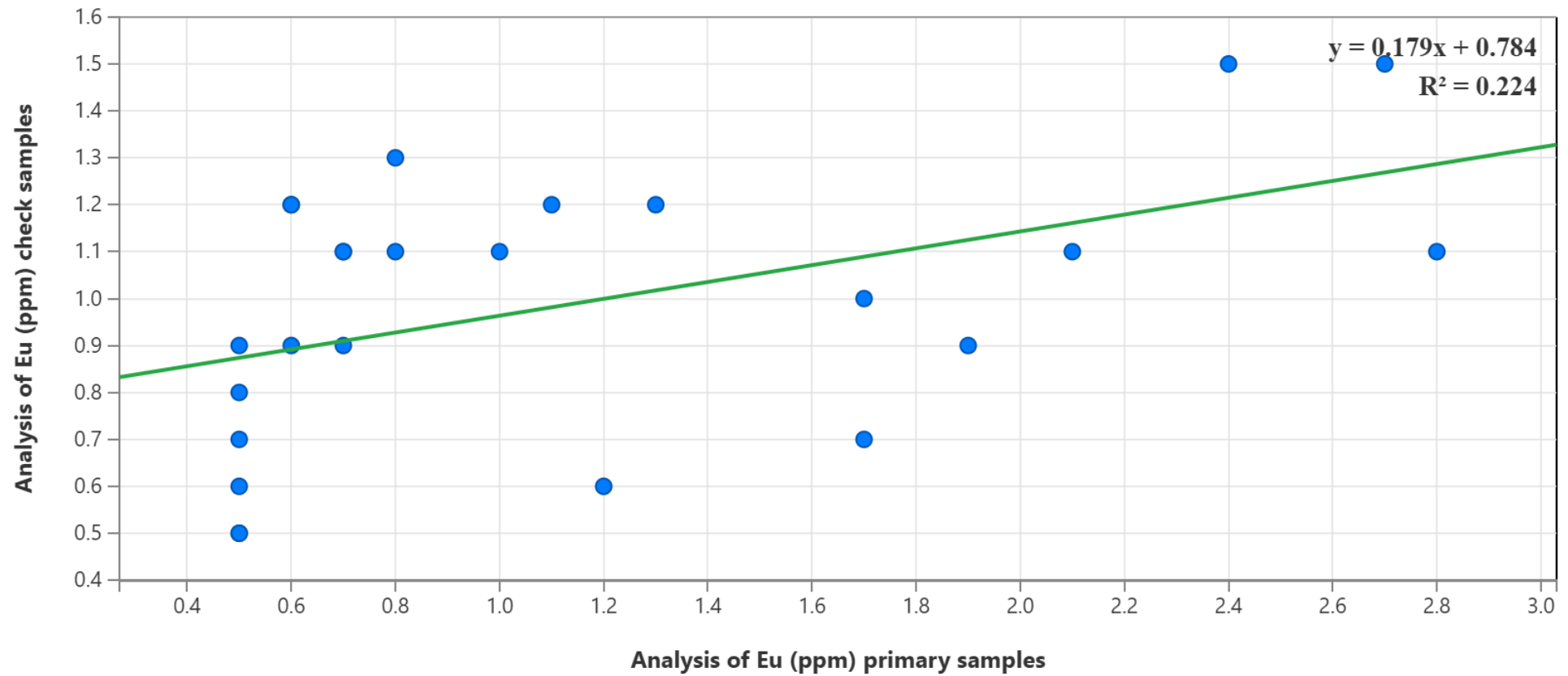
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Scatter Plot with Linear Regression



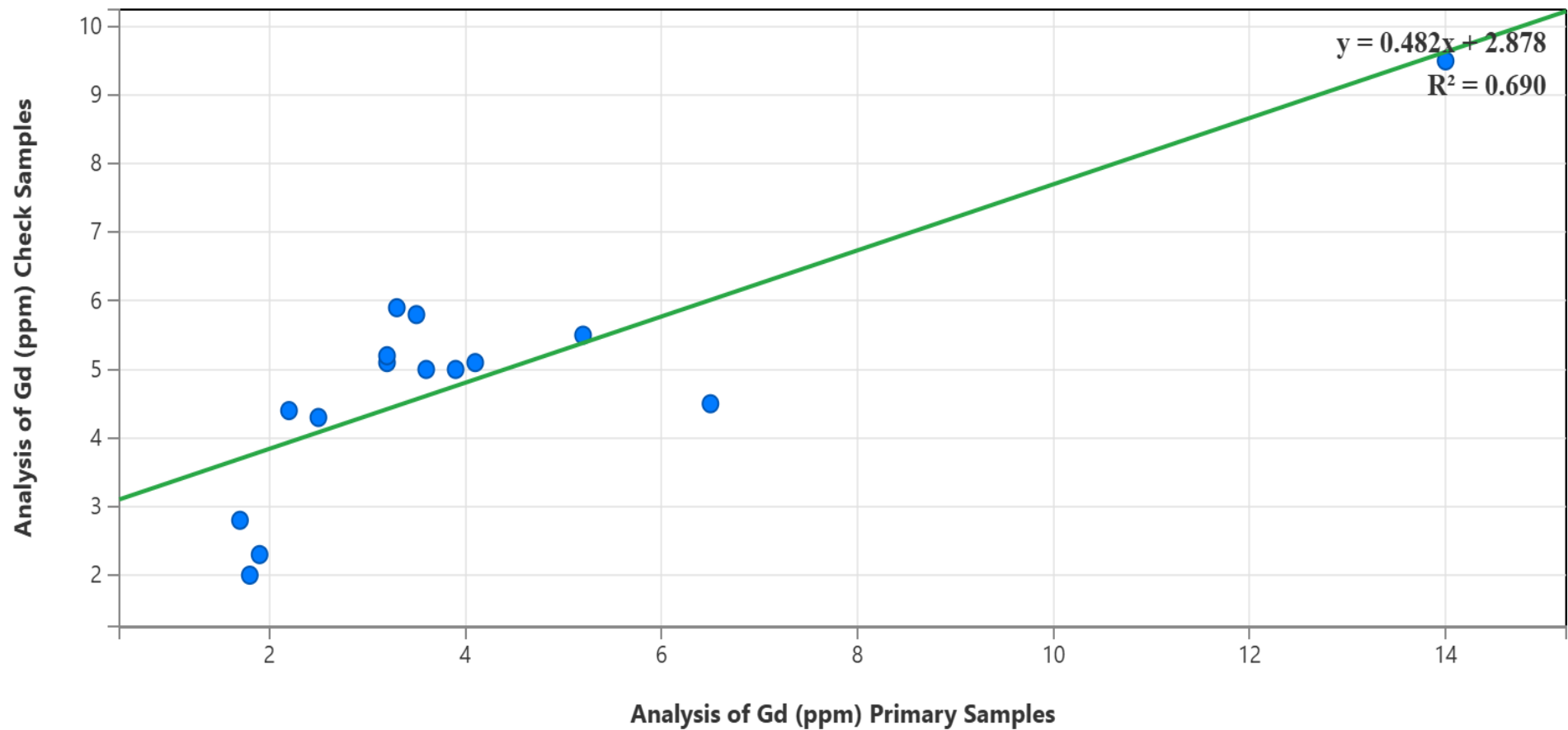
Text fig - 48

Scatter Plot with Linear Regression



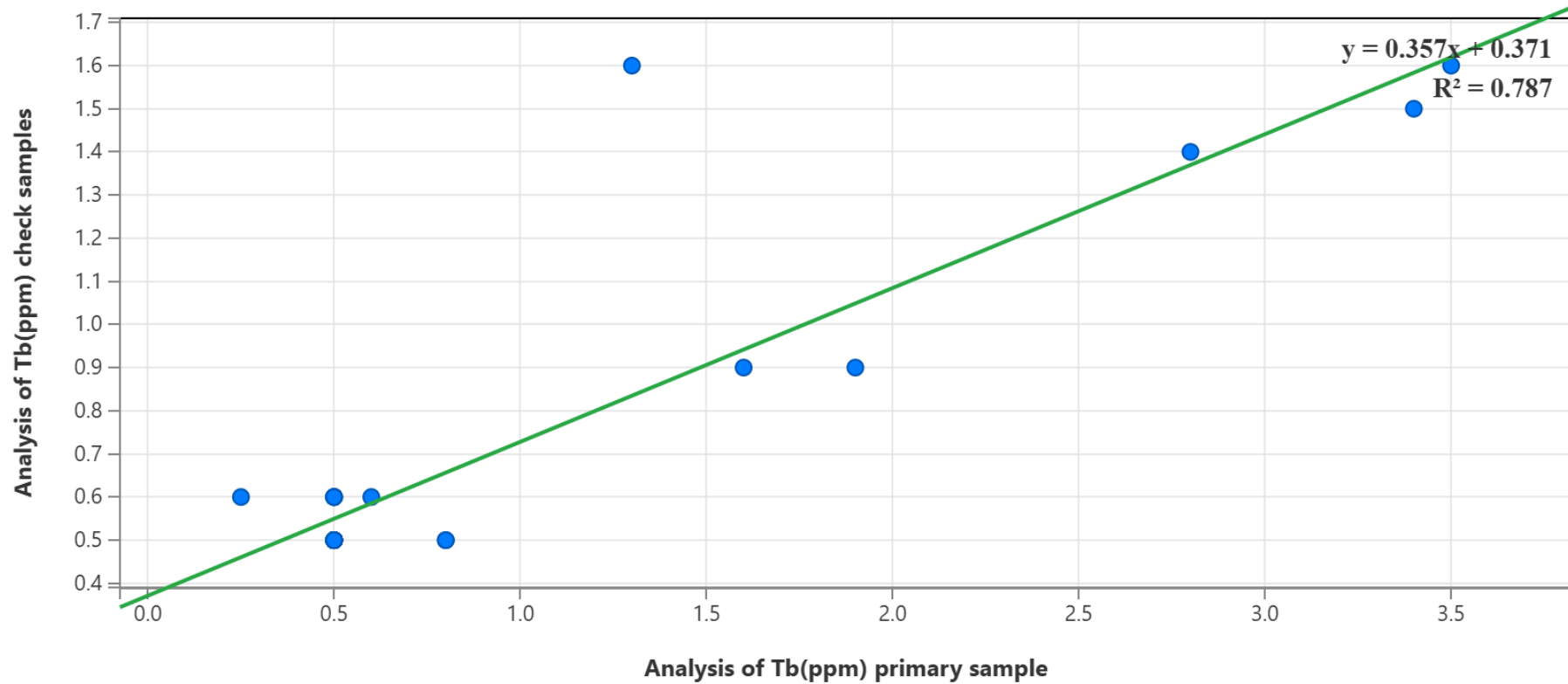
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Scatter Plot with Linear Regression



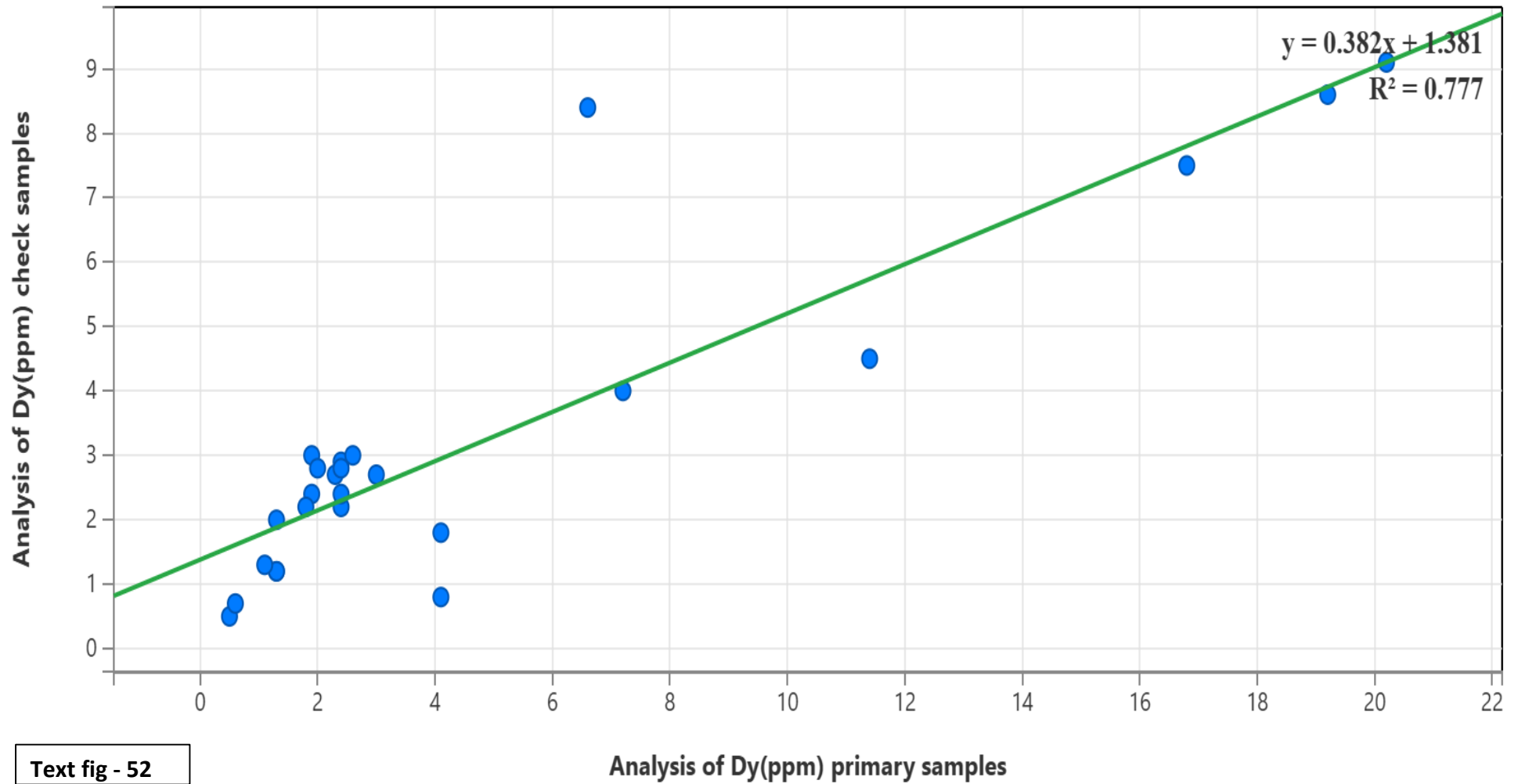
Text fig - 50

Scatter Plot with Linear Regression



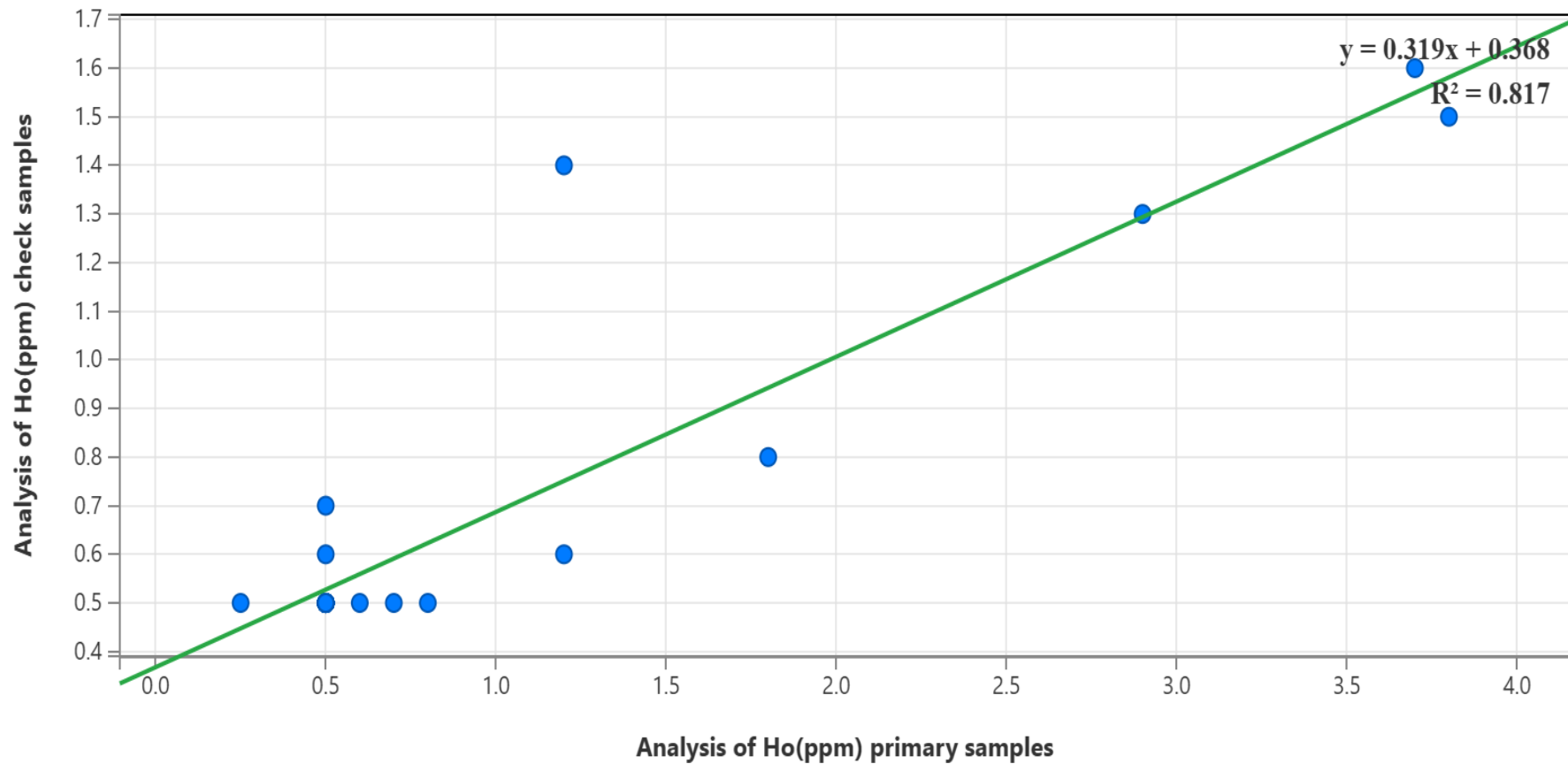
Text fig - 51

Scatter Plot with Linear Regression



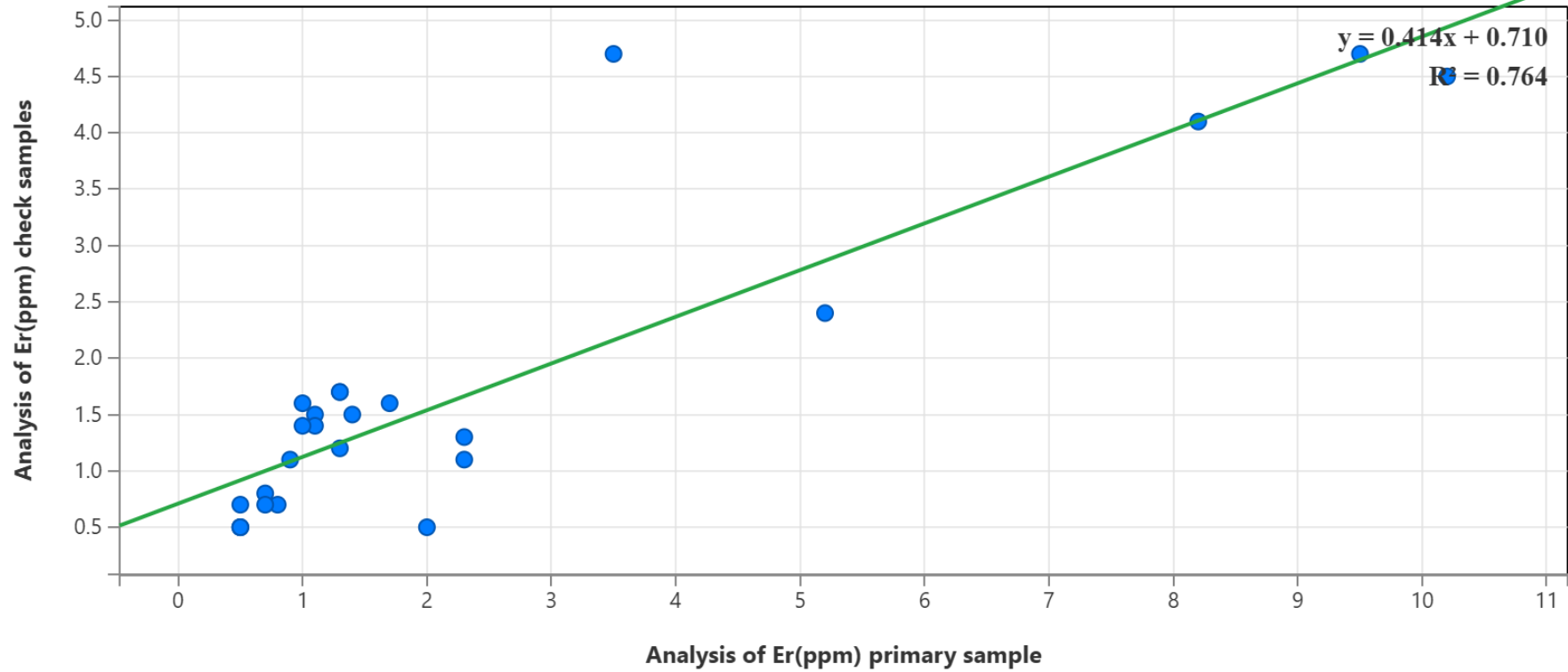
Text fig - 52

Scatter Plot with Linear Regression



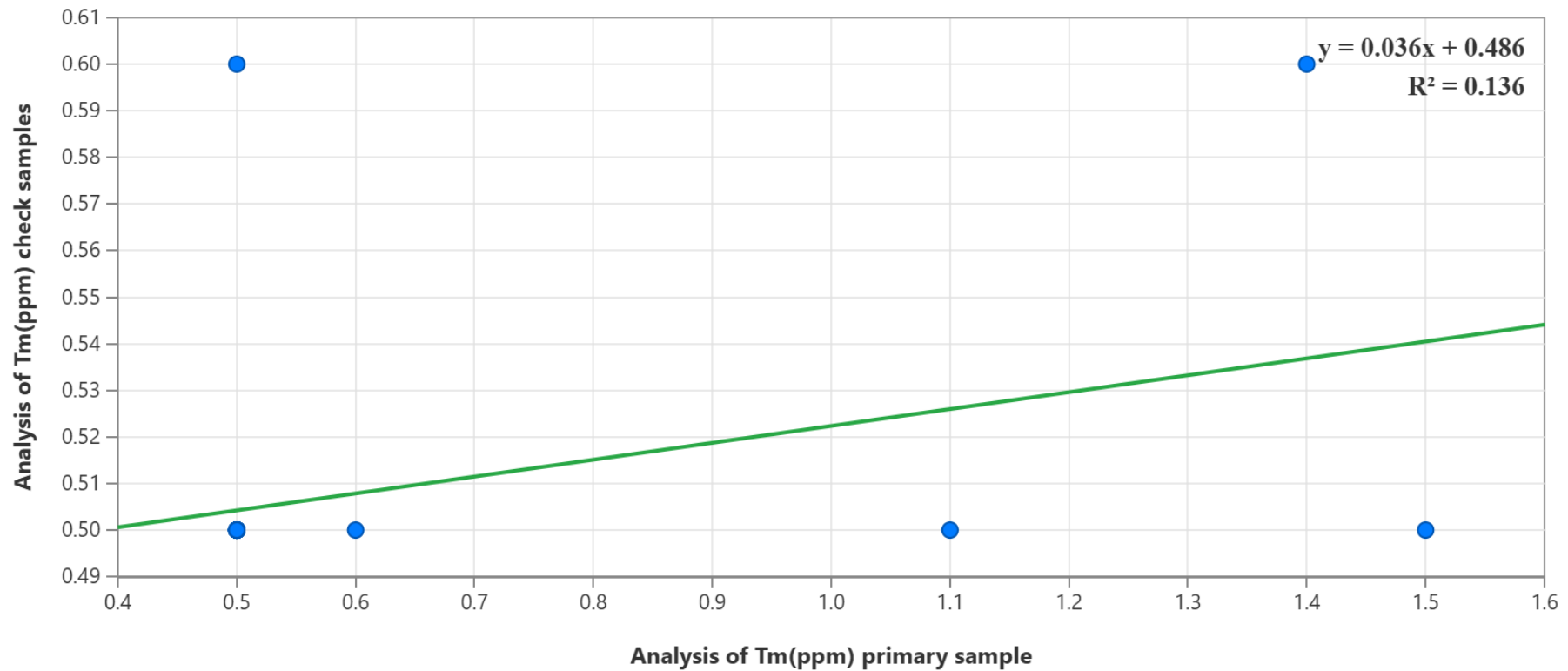
Text fig - 53

Scatter Plot with Linear Regression



Text fig - 54

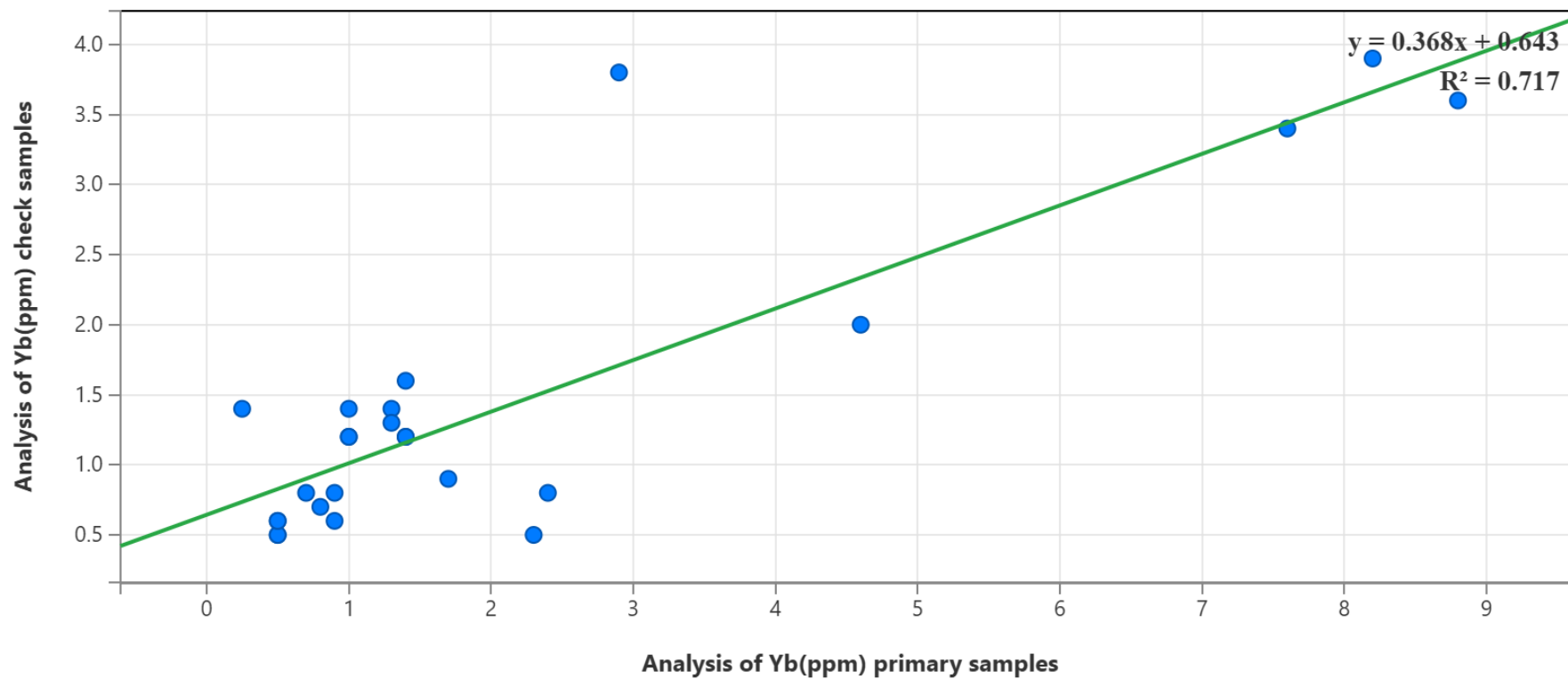
Scatter Plot with Linear Regression



Text fig - 55

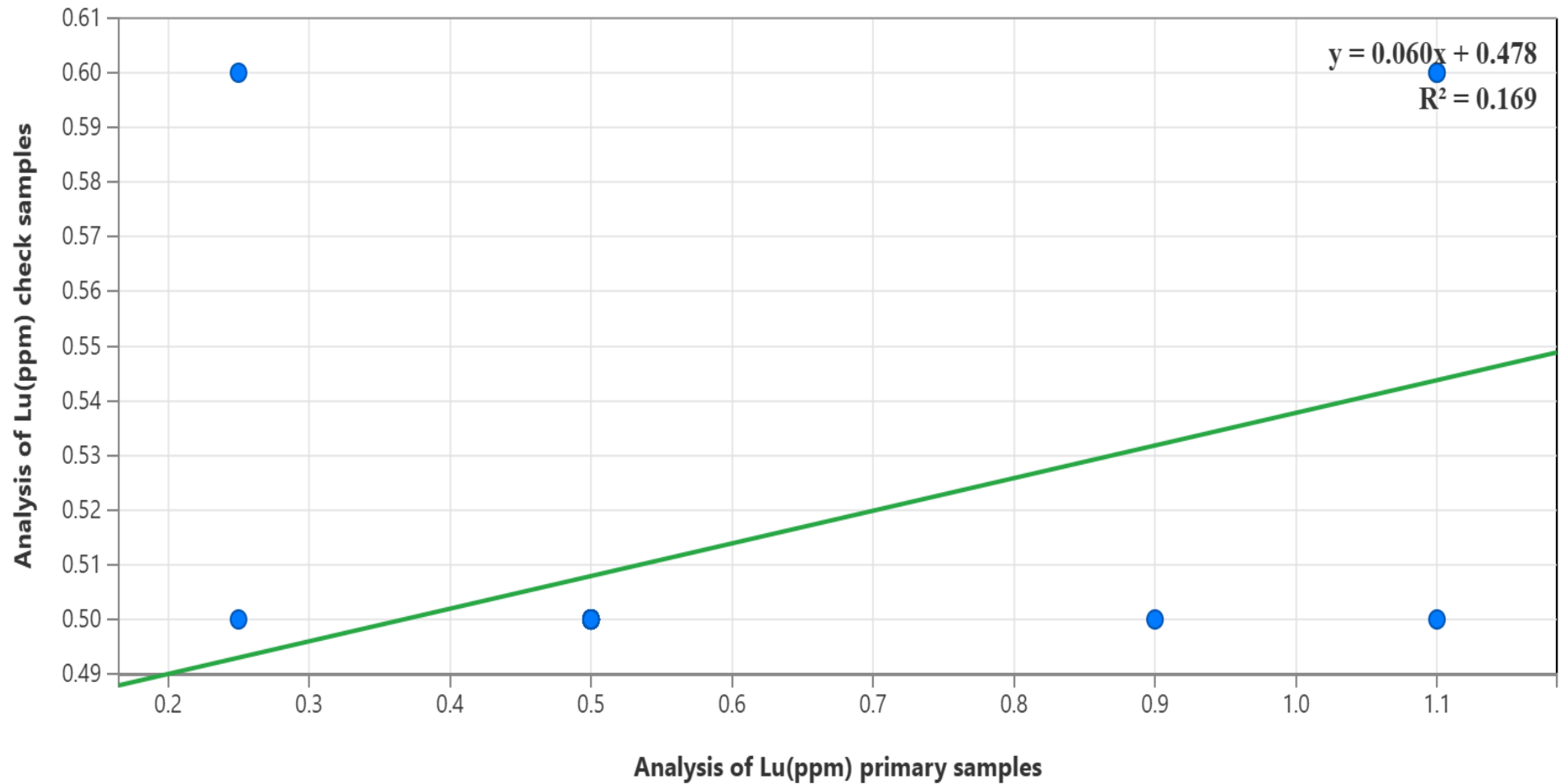
Text fig - 56

Scatter Plot with Linear Regression



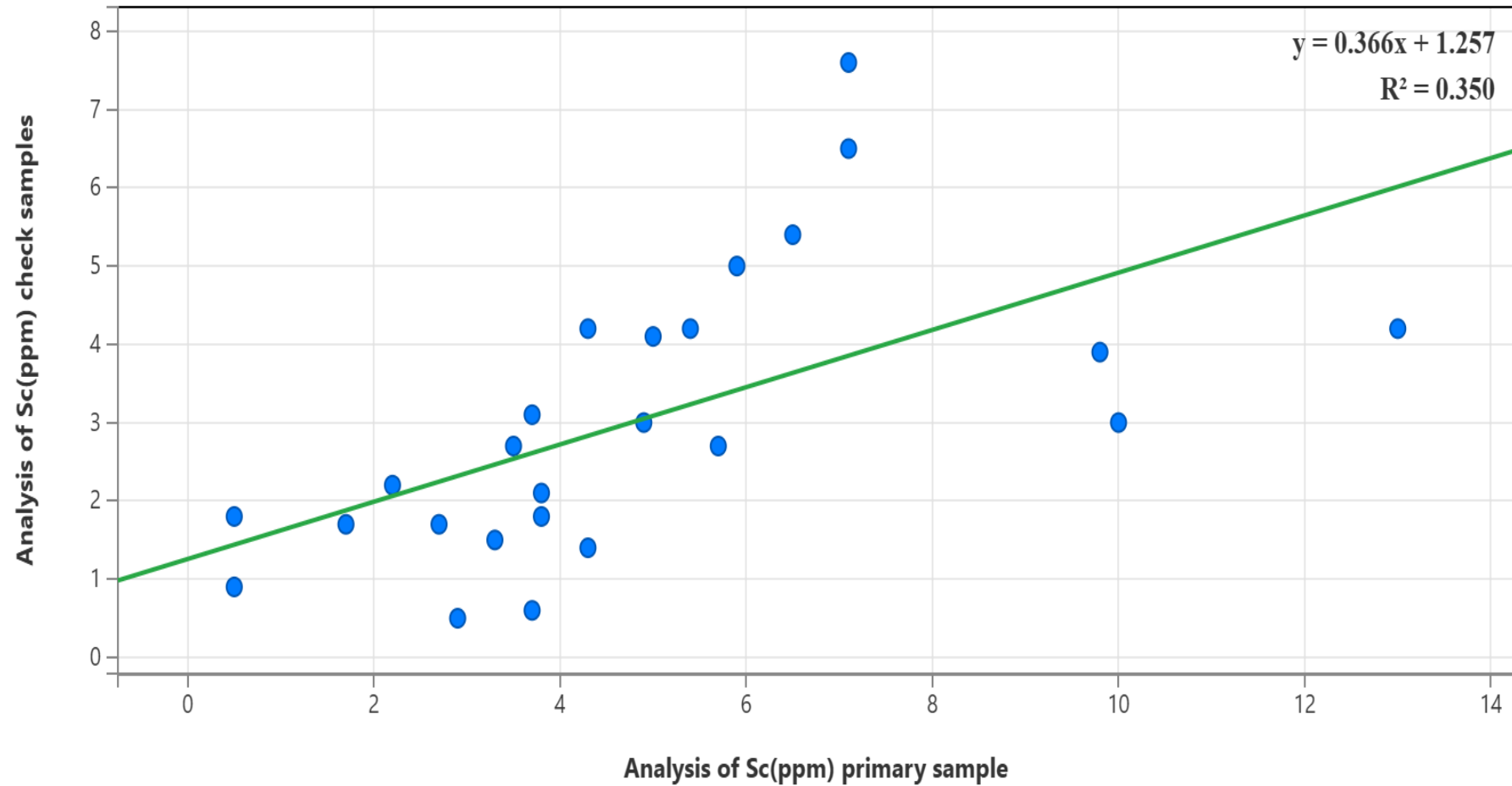
Text fig - 57

Scatter Plot with Linear Regression

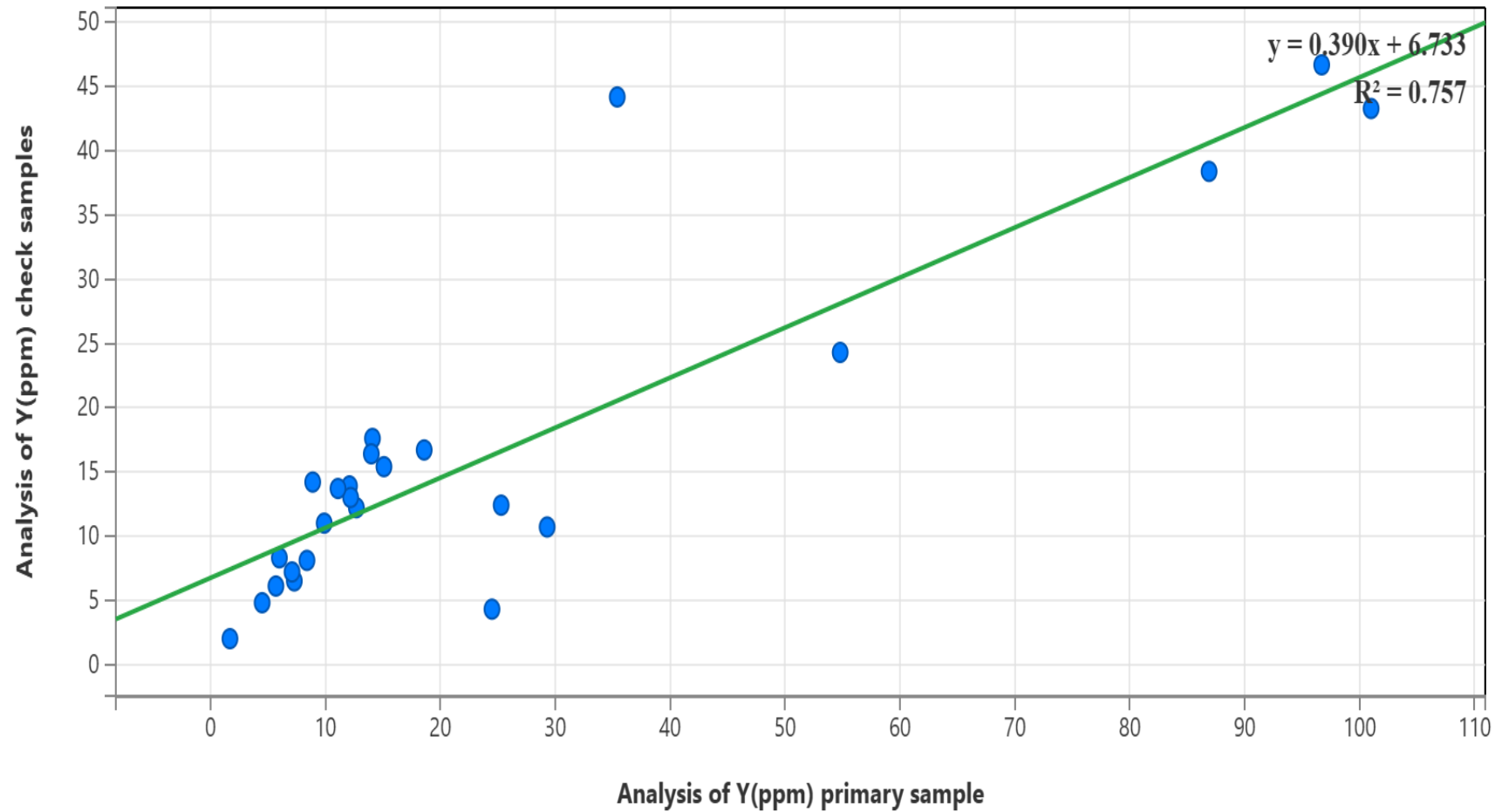


Text fig - 58

Scatter Plot with Linear Regression



Scatter Plot with Linear Regression



Text fig - 59

CHAPTER - XVI

16.0.0 MOISTURE

16.1.0 Method of determination of the moisture content.

All the analysis has been carried out with natural moisture. Moisture content has not been determined.

CHAPTER - XVII

17.0.0 BULK DENSITY

17.1.0 Method of determination and result

The present exploration has been carried out at G-4 level, i.e., reconnaissance survey with an objective to identify prospective areas of further mineral exploration. Hence, only surface sampling has been carried out. Drilling of scout boreholes was not approved by the TCC therefore it was not carried out. As a result, bulk density or specific gravity has not been determined.

CHAPTER – XVIII

18.0.0 BENEFICIATION STUDIES AS MAY BE REQUIRED

18.1.0 Details of beneficiation studies

Beneficiation studies have not been carried out in the present exploration as it was out of the scope of the approved quantum of work.

CHAPTER – XIX

19.0.0 RESOURCE ESTIMATION TECHNIQUES

The test drilling was not approved by the TCC therefore resource estimation was not done. However, Lakkayapalli, Pallerla zones for REE and Nandipad zone for As, Au, Sb, Bi can be explored further as they have the potential. The details of the zones and their potential have been discussed in mineralization (Chapter VII).

CHAPTER – XX

20.0.0 REPORTING RESOURCE

As mentioned in the Chapter – XIX, resource has not been estimated in the present stage of exploration

CHAPTER - XXI

21.0.0 SUMMARY AND RECOMMENDATIONS

21.1.0 Summary

Geological mapping on 1:12,500 scale was initiated in the 1st week of October 2025 in Maddur block area and by the end of April 2026. AND the assigned target 160 sq km and completed. Collection of 115 bed Nos bed rock samples 150 pit samples were collected and submitted to chemical lab for analysis.

The analytical data of 115 bed rock samples and 150 pit samples received end of the may. The interpreted litho contacts have been drawn and the analytical data of bed rock samples and pit samples received has plotted on the map, the lithological contacts and structural data has been digitized.

The Maddur block area is located in Narayanpet district of Telangana and geologically part of the Narayanpet Kimberlite belt within the Eastern Dharwar Craton. The block area is 160 sq.kms and is part of the toposheet 56 H/09.

The block area is composed of grey biotite granite occupying the central part of the block which is mostly a Pediment- Pedi plain complex with ground level outcrops whereas the northern part and the southern part of the block is occupied by fine grained pink granite which is more aplitic in nature with almost negligible mafics and forms hills extending in NW-SE direction. In the northern part of the block a major shear/fault zone passes through the block in a NW-SE direction which is occupied by the Quartz reef. One sample of this collected prior to submission of proposal analysed 82 ppm As, 7.5ppm Sb and 0.29 ppm Au and the granitic variants gave encouraging values for REE.

The whole rock analysis was done for 12 samples of the granitic variants and the data was plotted on the variation diagrams which revealed that they are Granodiorite to quartzolite suits of rocks, Silica saturated, ferro magnesium and mantle fractionates, calc alkaline to tholeiitic, in nature.

When plotted the analytical data in QAPF diagrams they plotted predominantly in quartzolite and Granodiorite fields The feldspar triangle of O Connor (1965) indicated them to be Granodiorite to tonalite in composition. The R1—R2 plot of De La Roche et al (1980) suggested these to be predominantly granodiorite and couple of them granite composition. Which are highly alkali rich. The data plotted on Middlemost (1994) diagram reflected them to be predominately quartzolite except one plot fell granite field.

TAS Diagram of Cox et al. (1979 indicated them to be highly acidic and predominately granite in composition except one which plotted in the marginal zone of granite – granodiorite. Taking into consideration all above plots these granitic variants can be geochemically classified as Granite -granodiorite – quartzolite suits, (GGQ)

The SiO_2 - K_2O plot of peccerillo and Taylor 1976 indicates that these granitic variants are calc alkaline to tholeiitic in nature.

As per the tectonic discrimination diagram of Frost – frost diagram (2008) these are ferromagnesian, calcic, strongly peraluminous, and silica saturation in nature,

As per the tectonic discrimination diagram of Major and piccolo (1989) these granitic variants fall in the borderline [of IAG-CAG-CCD and RRG- CEUG. According to the R1-R2 plot of Batchelor and bowden (1985) These are mantle fractionates in nature.

As per the tectonic discrimination diagram of Maniar and Piccolli (1989) these granitic variants fall in the IAG-CAG-CCG field whereas they are more peraluminous and marginally metaluminous, ferro-magnesian, Calcic and silica saturated.

as per Frost and Frost (2008) tectonic discrimination diagram. According to the R₁—R₂ plot of Batchelor (1985), these are mantle fractionates.

The analytical data was interpreted and the mineralized zones have been demarcated and details of each are follows six mineralized zones have been delineated within the block area, namely Lakkayapalli Zone, Pallerla Zone, Nandipad zone -A, Nandipad zone – B, Pedripad, Jadavaraopalli, The REE values recorded in Pallerla Zone-A range from 150 ppm to 1,682 (ppm). Lakkayapalli zone – 0.845Sq.km – TREE- 359.1-1600 (ppm)Pallerla zone - 0.837Sq.km – TREE – 462 -1682 ppm
Nandipad zone – A (2.8 – TREE – 141 – 1182.8ppm)

Nandipad zone – B (Precious metals)

As – 1.1 to 82.2ppm, Au – 0.02 – to 1.4 ppm

Sb -1.3 – to 9.4 ppm

Bi - <0.5 to 1.3 ppm

Ag- 0.4to 43.5

Pedripad zone - 0.233 Sq.km – TREE - 89.7 -1529ppm

Jadavaraopalli Zone – 1.05 Sq. km – TREE196.1 to 1426 ppm

Petrographic studies thin section 30 thin sections of different granitic variants pertaining to the block area was carried out by GSI, SR petrological division which rewid presence of allanite apatite biotite alkali feldspars which host rare earth elements. Beside these zircon was also identified which host zirconium and hafnium, Titanite a titanium bearing mineral was also identified and reported. Ten (10) thin sections were selected submitted to lucid laboratories for SEM studies for mineral characterizes the results show presence of allanite, biotite apatite alkali feldspars, zircon, and titanite, Which corrobated with analytical data and petrographic studies where high values of TREE 1682 ppm which includes values are Ce, La, Nd, Pr, Gd, Sm, Dy, The Project work was reviewed by the TCC-I committee on 26th May,2026 and during the review the entire data pertaining to the geological setup of the block, the analytical data of bed rock and pit samples, petrographic study results photomicrographs the mineral characterization corroborated by the SEM study were presented The members after detailed discussion did not approve test drilling and asked us to submit the Geological Report before the completion of the timeline

21.2.0 Recommendations:

Five zones of REE Mineralization and one zone of precious minerals such as arsenic, antimony, gold, silver, bismuth have been identified and demarcated out of which the Pallerla zone and Lakkaypalli zone are more potential ones within the block which have given the TREE values above 1600 ppm with the maximum of value 1682. Among the REE besides Lanthanum, Cerium, Neodymium, certain uncommon elements like, Praseodymium, Samarium, Gadolinium, have analyzed higher values. Pallerla zone has the TREE maximum value is 1682 ppm and in Lakkaypalli zone the maximum value is more than 1600 ppm--n aerial extent.

Since these are values recorded in an younger intrusive alkali feldspar granite, seen bordering the major shear zone and as per the Bachelor and Bowden 1985 plot they are considered as mantle fractionates which is also substantiated by the petrographic studies.

Therefore, it is strongly opined that one borehole in Pallerla zone and one bore hole in Lakkayapalli zone may be drilled to ascertain the depth persistence of the mineralization.

Besides these along the quartz reef which has emplaced within the major shear zone / fault zone trending NW-SE direction is observed to be highly sheared. The bed rock samples of these quartz analyzed gave for arsenic, Au, As, Ag, Bi, Sb, the maximum value of arsenic as 82.2ppm, the maximum value of gold (Au)– 1.4ppm, the maximum value (Bi) -1.3ppm, and maximum value of antimony (Sb) 19.5ppm, and the maximum value of silver (Ag) 43.5ppm.

LOCATION INDEX

21.3.0

Table No: 21.1

S. NO	villages	Latitude	Longitude
1	Lakkayapalli	16.929596	77.620625
2	Nandipad	16.934755	77.638315
3	Pallerla	16.912098	77.617186
4	jadavarao palli	16.897487	77.640232
5	Hanmanayak Tanda	16.895931	77.651504
6	Chintaldinne	16.885594	77.619646
7	Dorepalli	16.873192	77.650299
8	Dorepalli Tanda	16.865911	77.642717
9	Nagireddipalli	16.886523	77.596876
10	Maddur	16.862924	77.614449
11	Bhimpur	16.853786	77.598332
12	Erragutta Tanda	16.845828	77.624177
13	Rallabai	16.827426	77.623299
14	Renuvatla	16.825944	77.608211
15	Achchampalli	16.817007	77.629537
16	Appareddipalli	16.821375	77.631621
17	Chennaram	16.811371	77.650236
18	Bandakonda	16.796308	77.64514
19	Basannapalli	16.791789	77.631031
20	Abhangapur	16.771831	77.633592
21	Nemillapalli	16.768868	77.616395
21	Kotakonda	16.757797	77.645366
22	Narsampalli	16.755236	77.659475
23	Monapuram	16.804748	77.614211

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24.0.0 ANY OTHER INFORMATION

24.1.0 Any other information may be available or required by any authority as prescribed.

24.1.1 References

GSI's online data portal – Bhukosh (for NGCM raw data source, Block Geology and Regional Geology)

Geological quadrangle map 1:50K scale FS 1972-73 by. B.K. Ranganath, in FS 197374 by S. Narsimha and S.K Bhattacharya.

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25.0.0 CERTIFICATION

This is to certify that geological report has been prepared in respect of Reconnaissance Survey (G-4) for REE and Associated minerals in Maddur Block, Narayanpet, District, Telangana State by CRITICAL MINERAL TRACKERS on behalf of National Mineral Exploration and Development Trust (NMEDT). The report has been prepared in accordance with the Minerals (Evidence of Mineral Contents) Rule 2015 specified under Mineral Auction Rule, 2015 and amended up to 2021.



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