GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G4) FOR BAUXITE, Ga, V, Ti & REE

IN

RELDI MOTI AREA

KACHCHH DISTRICT, GUJARAT

(Under NMET Programme)

TEXT, ANNEXURE AND PLATES

CRITICAL MINERAL TRACKERS

(NATIFIED PRIVATE EXPLORATION AGENCY)

March-2026

CERTIFICATION

This is to certify that geological report has been prepared in respect of Reconnaissance Survey (G-4) for Bauxite, Ga, V. Ti and REE in RELDI MOTI AREA, District Kachchh, State: Gujarat by Critical Mineral Tackers (CMT). Hyderabad on behalf of National Mineral Exploration Trust (NMET). 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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CHAPTER – I

कार्यकारी सारांश

कच्छ ज़िले, गुजरात के रेल्डी मोटी क्षेत्र में 7.95 वर्ग किमी क्षेत्रफल में एक टोही सर्वेक्षण (G4) किया गया। यह क्षेत्र टोपोशीट संख्या 41E/16 के अंतर्गत आता है और "रेल्डी मोटी क्षेत्र, कच्छ ज़िला, गुजरात में बॉक्साइट, Ga, V, Ti एवं REE के लिए टोही सर्वेक्षण (G4)" शीर्षक वाले NMEDT परियोजना का भाग है।

इस कार्य के अंतर्गत 1:12,500 पैमाने पर विस्तृत भू-वैज्ञानिक मानचित्रण, पिटिंग, ट्रेंचिंग तथा ड्रिलिंग 14 फरवरी 2025 से 28 अगस्त 2025 के बीच की गई। यह परियोजना NMEDT कार्यक्रम के तहत Critical Mineral Trackers Pvt. Limited को OM फाइल संख्या 23/571/2025-NMET/850 दिनांक 10 फरवरी 2025 के माध्यम से प्रदान की गई, जिसे बाद में संशोधित कर Critical Mineral Trackers (An NPEA Company) के नाम से OM फाइल संख्या 23/571/2025-NMET/902 दिनांक 24 फरवरी 2025 द्वारा जारी किया गया। परियोजना की अनुमानित लागत ₹54,94,287 थी, जिसे संशोधित कर 12 सितम्बर 2025 को ₹71,53,941 (इकहत्तर लाख तिरपन हजार नौ सौ इकतालीस रुपये मात्र) किया गया।

परियोजना के अंतर्गत 7.95 वर्ग किमी क्षेत्र में विस्तृत मानचित्रण (LSM), 20 पिट तथा 5 ट्रेंच खुदाई द्वारा उपसतही अध्ययन किया गया। कुल 5 बोरहोल ड्रिल किए गए, जिनकी कुल ड्रिलिंग लंबाई 120 मीटर रही। प्रयोगशाला विश्लेषण में 90 पिट एवं ट्रेंच नमूनों, 36 बोरहोल कोर नमूनों तथा 27 REE नमूनों का XRF द्वारा विश्लेषण किया गया। इसके अतिरिक्त 2 नमूनों का MHA/THS/RS, 3 नमूनों का XRD तथा 4 नमूनों का पेट्रोग्राफिक अध्ययन किया गया।

अध्ययन क्षेत्र में प्रारंभिक क्रेटेशियस से प्लायोसीन काल की संरचनाएँ पाई जाती हैं, जिनमें भुज, अंजार ज्वालामुखीय, मातानोमाध, खारी नदी तथा सन्धान संरचनाएँ क्रमवार अध्यारोपण में उपस्थित हैं। भुज संरचना, जो सबसे प्राचीन है, फेल्डस्पैथिक एवं लौहयुक्त बलुआ पत्थर से निर्मित है और क्षेत्र के दक्षिणी भाग में स्थित है। इसके ऊपर अंजार ज्वालामुखीय संरचना स्थित है, जो मुख्यतः सूक्ष्मकणीय बेसाल्ट से बनी है।

भुज बलुआ पत्थर और अंजार ज्वालामुखीय के बीच संपर्क भ्रंशयुक्त प्रतीत होता है, जिसके प्रमाण हैं—
(i) संपर्क के निकट तीव्र झुकाव वाला बलुआ पत्थर,
(ii) बलुआ पत्थर में सिलिकीकरण एवं ब्रेक्सिएशन,
(iii) रेल्डी मोटी गाँव के पास स्तंभाकार जॉइंट्स का लगभग ऊर्ध्वाधर झुकाव,
(iv) नानी रेल्डी गाँव के पश्चिम में लगभग 0.5 किमी दूरी पर फॉल्ट गॉज की उपस्थिति।

मातानोमाध संरचना, जिसमें लेटराइट, बॉक्साइटिक मिट्टी एवं लिथोमार्जिक मिट्टी शामिल हैं, अंजार ज्वालामुखीय के ऊपर स्थित है। खारी नदी संरचना में जिप्समयुक्त शेल, मिट्टी, सिल्टस्टोन एवं जीवाश्मयुक्त मार्ल पाए जाते हैं। सन्धान संरचना, जो

सबसे नवीन है, मुख्यतः कैल्केरेनाइट, कांग्लोमरेट, बलुआ पत्थर एवं मिट्टी से बनी है तथा यह कुल क्षेत्र का लगभग 60% भाग आच्छादित करती है।

अध्ययन क्षेत्र में 20 पिट एवं 5 ट्रेंच JCB मशीन द्वारा विभिन्न संरचनाओं में बनाए गए। प्रत्येक पिट का आकार 1m × 1m × 1m था, जिससे कुल 20 घन मीटर खुदाई हुई। प्रत्येक ट्रेंच से 10 प्रतिनिधि नमूने (T*/RB/2025/1 से 10) तथा चार दीवार नमूने (A, B, C, D) लिए गए। इन परिणामों के आधार पर 5 स्काउट बोरहोल कैलिक्स रोटरी ड्रिलिंग मशीन द्वारा ड्रिल किए गए। कोर नमूनों का अध्ययन, प्रलेखन एवं GI बॉक्स में संरक्षण किया गया तथा उनका प्रमुख ऑक्साइड एवं REE विश्लेषण किया गया।

पिट नमूनों में Al_2O_3 का मान 0.2% से 32.55% (औसत 15.21%), SiO_2 33.92% से 69.26% (औसत 45.88%), तथा Fe_2O_3 1.94% से 27.44% (औसत 11.89%) पाया गया। TiO_2 0.46% से 7.37% (औसत 2.84%), वैनाडियम 25.9 से 514.3 ppm तथा गैलियम 9.28 से 42.68 ppm पाया गया। कुल REE 169.95 से 715.84 ppm (औसत 395.35 ppm) रहा।

ट्रेंच नमूनों में Al_2O_3 0.32% से 39.55% (औसत 17.38%), SiO_2 28.01% से 69.54% (औसत 49.31%), तथा Fe_2O_3 2.01% से 24.95% (औसत 9.43%) पाया गया। TiO_2 0.86% से 8.21% (औसत 3.68%), वैनाडियम 54.4 से 702.8 ppm तथा गैलियम 16.33 से 43.05 ppm पाया गया। कुल REE 246.61 से 961.28 ppm (औसत 471.67 ppm) रहा।

पाँच बोरहोलों में से RMT-BH-01 एवं RMT-BH-05 में क्लेय बॉक्साइट एवं लिथोमार्जिक मिट्टी पाई गई। RMT-BH-02 एवं RMT-BH-03 में खारी नदी संरचना के अंतर्गत मिट्टी, सिल्टस्टोन एवं जीवाश्मयुक्त मार्ल क्रमशः 30 मीटर एवं 20 मीटर तक पाए गए। RMT-BH-04 में 20 मीटर तक पेब्ली लेटराइट पाया गया।

RMT-BH-01 में Al_2O_3 30.58% से 48.76% (औसत 40.29%), SiO_2 13.8% से 36.87%, Fe_2O_3 1.23% से 18.77% (औसत 6.14%) पाया गया। TiO_2 4.66% से 7.56% (औसत 6.33%), गैलियम 48.36 से 61 ppm, वैनाडियम 247.3 से 687.9 ppm तथा कुल REE 778.1 से 1686.1 ppm (औसत 1232.1 ppm) पाया गया।

RMT-BH-05 में Al_2O_3 31.74% से 40.08% (औसत 35.88%), SiO_2 25.38% से 46.53% तथा Fe_2O_3 2.64% से 8.63% पाया गया। TiO_2 2.69% से 3.73%, गैलियम 43.15 से 58.77 ppm, वैनाडियम 144.7 से 410.10 ppm तथा कुल REE 384.9 से 647.4 ppm पाया गया।

समग्र रूप से, खनिजीकृत क्षेत्र मुख्यतः क्लेय बॉक्साइट एवं लिथोमार्ज श्रेणी में आता है। कुछ बोरहोल में Al_2O_3 30% से अधिक है, परंतु SiO_2 एवं Fe_2O_3 की उच्च मात्रा के कारण गुणवत्ता कम है। XRD अध्ययन में काओलिनाइट की अधिकता तथा गिब्साइट की कमी पाई गई। जहाँ Al_2O_3 अधिक है, वहाँ TiO_2 भी अच्छा पाया गया।

अतः अध्ययन क्षेत्र में आर्थिक दृष्टि से उपयुक्त बॉक्साइट या संबंधित महत्वपूर्ण खनिज क्षेत्र की पहचान नहीं की जा सकी, इसलिए किसी भी खनिज संसाधन/भंडार का आकलन नहीं किया गया।

ग्रेड की निरंतरता की कमी, सीमित विस्तार, प्रतिकूल खनिजीय गुण, निम्न आर्थिक मूल्य तथा संभावित क्षेत्रों में बस्तियों एवं अवसंरचना की उपस्थिति को देखते हुए इस क्षेत्र को G3 स्तर की खोज हेतु अनुशंसित नहीं किया जाता।

EXECUTIVE SUMMARY

A reconnaissance survey (G4) of an area of 7.95 sq. km was carried out in the Reldi Moti area, Kachchh district, Gujarat, falling under toposheet number 41E/16 as part of the NMEDT project entitled "***Reconnaissance survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti area, Kachchh district, Gujarat"***. Large scale geological mapping on 1:12,500 scale, pitting, trenching and drilling were carried out between 14th Feb 2025 to 28th August 2025. The project was awarded to Critical Mineral Trackers Pvt Limited under the NMEDT programme vide OM File no. 23/571/2025-NMET/850 dated 10th February,2025 and corrected version in the name of Critical Mineral Trackers (An NPEA company) was issued subsequently vide OM File no: 23/571/2025-NMET/902 dated 24th February, 2025, with an estimated cost of Rs54,94,287. Revised office memorandum was issued on 12th Sept,2025 vide File no:23/571/2025-NMET/378 with total estimated cost of Rs 71,53,941/-. (Rupees seventy-one lakhs fifty-three thousand nine hundred forty-one only)

The nature and quantum of work carried out for the project include large-scale mapping (LSM) over an area of 7.95 sq. km, along with 20 pits and 5 trenches excavated for subsurface investigation. A total of 5 boreholes were drilled, amounting to 120 meters of drilling. Laboratory analyses comprised oxide determination using XRF for 90 samples collected from pits and trenches, 36 borehole core samples, and 27 samples analyzed for rare earth elements (REE). Additionally, 2 samples were subjected to MHA/THS/RS analysis, 3 samples to XRD studies, and 4 samples underwent petrographic examination.

The area investigated is occupied by formations belonging to Early Cretaceous to Pliocene age, viz., Bhuj, Anjar Volcanics, Matanomadh, Khari Nadi, and Sandhan formations in the order of superposition. Bhuj Formation, the oldest formation, is represented by feldspathic and ferruginous sandstone and occupies the southernmost part of the area. The Bhuj Formation is overlain by the Anjar Volcanics, comprising mainly fine-grained basalt. The contact between the Bhuj sandstone and Anjar Volcanics appears to be faulted as evidenced by (i) a steeply dipping sandstone body close to the contact with basalt, (ii) silicification and brecciation seen within the feldspathic/ferruginous sandstone, (iii) near vertical tilting of columnar joints near Reldi Moti village and (iv) occurrence of fault gouge about 0.5 km west of Nani Reldi village. The Matanomadh Formation, consisting of laterite, bauxitic clay and lithomargic clay, overlies the Anjar Volcanics. The Khari Nadi Formation is represented by variegated gypseous shale, clay, siltstone, and fossiliferous marl. The Sandhan Formation, the youngest formation in the area, mainly comprises of calcarenite, conglomerate, sandstone and clay. The Sandhan

Formation occupies 60% of the mapped area and is almost a flat area comprise of thorny shrubs and devoid of vegetation.

Twenty pits and five trenches were excavated using a Mini excavator of JCB make, in the study area over different formations. A total of 20 pits each measuring 1m × 1m × 1m, resulting in a volume of 1m³ per pit and a cumulative excavated volume of 20 m³. From each trench, 10 representative samples (marked as T*/RB/2025/1 to 10) from the floor, each representing 1m in length, and four wall samples from each exposed face of the trench, marked as T*/RB/2025/A, B, C, and D, were collected. Based on the results of the pit and trench samples, five scout boreholes were planned and drilled in the block, using a Calyx rotary drilling machine. The drill core samples were studied, documented, and preserved in GI core boxes. The core samples have been analysed both for major oxides and REE and other elements.

In samples analysed from these pits, Al_2O_3 values range from 0.2 to 32.55% with an average of 15.21%, SiO_2 ranges from 33.92 to 69.26% with an average of 45.88%, and Fe_2O_3 values range from 1.94 to 27.44% with an average of 11.89%. The TiO_2 values ranges from 0.46 to 7.37% with an average of 2.84%, while the Vanadium and Gallium values ranges from 25.9 to 514.3 ppm and from 9.28 to 42.68 ppm with an average 256.61ppm and 28.61ppm respectively. The total REE (Lanthanum to Lutetium) ranges from 169.95 to 715.84 ppm with an average 395.35ppm.

In the trenches, values of Al_2O_3 ranges from 0.32 to 39.55% with an average 17.38%, values of SiO_2 ranges from 28.01 to 69.54% with an average 49.31% and Fe_2O_3 values ranges from 2.01 to 24.95%, with an average 9.43%. The TiO_2 values ranges from 0.86 to 8.21% with an average of 3.68%, while the Vanadium and Gallium values ranges from 54.4 to 702.8 ppm and from 16.33 to 43.05 ppm with an average of 239.87 and 28.81 ppm respectively. The total REE (Lanthanum to Lutetium) ranges from 246.61 to 961.28 ppm with an average of 471.67 ppm.

Of the five-borehole drilled, in RMT-BH-01 and RMT-BH-05, clayey bauxite and lithomargic clay were encountered. In RMT-BH-02 and RMT-BH-03, clay, siltstone and fossiliferous marl belonging to Khari Nadi formation was encountered up to 30m and 20m respectively. In RMT-BH-04 pebbly laterite was encountered up to a depth of 20 m. The boreholes RMT-BH-01, RMT-BH-04 and RMT-BH-05 were drilled in Matanomadh formation.

In the borehole **RMT-BH-01** the value of Al_2O_3 ranges from 30.58 to 48.76% with an average 40.29%, the SiO_2 and Fe_2O_3 values ranges from 13.8 to 36.87% and 1.23 to 18.77% with an average of 24.53 and 6.14% respectively. The TiO_2 value ranges from 4.66 to 7.56% with an average of 6.33%. The Gallium and Vanadium value ranging from 48.36 to 61.00 ppm and from 247.3 to 687.9 ppm with an

average of 54.68 and 414.3 ppm respectively. The total REE values ranges from 778.1 to 1686.1 ppm with average 1232.1 ppm.

In the bore hole **RMT-BH-05** the values of Al_2O_3 range from 31.74 to 40.08% with average of 35.88%. The SiO_2 and Fe_2O_3 values ranges from 25.38 to 46.53% and from 2.64 to 8.63% with average of 38.06% and 4.86% respectively. For the TiO_2 values ranges from 2.69 to 3.73% with average of 3.25%. The Gallium and Vanadium values ranges from 43.15 to 58.77ppm and from 144.7 to 410.10ppm with an average of 50.22 ppm and 260.4 ppm respectively. The Total REE value ranges from 384.9 to 647.4ppm with average 456.6 ppm.

In all, the mineralized zone in the area mainly falls under clayey bauxite and lithomarge clay category, although the values of Al_2O_3 is above 30% in few boreholes, as the percentage of SiO_2 and Fe_2O_3 is high. Also, XRD study reveals more Kaolinite percentage and very little of gibbsite or other alumina minerals. The TiO_2 percentage is also good in these zones where Al_2O_3 percentage is high.

Thus, no economically viable bauxite or associated critical mineral zone could be delineated in the study area. Accordingly, no mineral resource/reserve estimation has been carried out.

In view of lack of grade continuity, limited lateral persistence of mineralisation, unfavourable mineralogical characteristics, sub-economic geochemical values, and the presence of habitation and infrastructure in the few potential mineralised zones, the study area is not recommended for upgradation to G3 level exploration.

CHAPTER – II

2.0. INTRODUCTION

2.1 Details of the project

Reldi Moti block admeasuring an area of 7.95 sq. km is bounded by latitudes 23° 12′ 31.7626″N to 23° 14′ 30.0986″N, and longitudes 69° 48′ 45.4233″ Eto 69° 51′ 14.1853″E, and lies under the administrative boundary of Bhuj tehsil, Kachchh district of Gujarat. The Block is falling under the Survey of India Toposheet No. 41E/16. The coordinates of the cardinal points of the block boundary and elevation, as determined by DGPS survey, are given below in Table No. 2.1 and Annexure-I

Table No-2.1: Coordinates and elevation of cardinal points of Reldi Moti Area, Kachchh district, Gujarat (as determined by DGPS Survey)

Cardinal Points	Geographic Coordinate System in Degree Minute Seconds (WGS 1984)		UTM (WGS 1984, Zone 42N)			Area (Sq. Km)
	Latitude(N)	Longitude(E)	Elevation (m)	Northing (m)	Easting (m)	
A	23°12' 31.7626"	69° 49' 12.6025"	147.320	2566873.434	583924.141	7.95
B	23° 13' 21.5773"	69° 48' 45.4233"	136.282	2568401.042	583143.004	
C	23° 14' 30.0986"	69° 49' 49.6645"	129.642	2570518.606	584956.833	
D	23° 13' 47.5507"	69° 51' 14.1853"	147.676	2569224.055	587366.462	

2.2 DETAILS OF INVESTIGATING AGENCY

DETAILS OF THE QUALIFIED PERSON(S) / EXPLORATION AGENCY

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

Table No 2.2 Details of Qualified Person(S) / Exploration Agency

(a) Name:	**CRITICAL MINERAL TRACKERS (An NPEA company)** (Ministry of Mines, Govt. of India) HYDERABAD
(b) Address:	#306, Concourse Building, Opp Lal Bungalow, Ameerpet, Hyderabad, Pin Code – 500016. And CMT Geo Solution center, No E5, 3rd Floor, Technology Research Park, Indian Institute of Technology, Hyderabad, Kandi, Sanga Reddy – 502 284
(c) Contact Mobile No:	+914031531932
(d) E-Mail id:	criticalmineraltrackers@gmail.com director.ops@criticalmineraltrackers.co.in enquiry@criticalmineraltrackers.co.in
(e) Qualification:	Professionals with M.Sc. / MSc Tech (Geology) Qualification
(f) Experience:	Senior Professionals with 30+ years of experience and young geologists with 2 to 3 years of experience.
Date of Accreditation granted by QCI -NABET	May 20, 2024
Date of Expiry of Accreditation	May 15, 2027
Date of Notification Under the Proviso to Section 4(1) of the MMDR Act	SONO 2379(E) 20.06.2024
Date of Expiry of Notification	19.06.2027
Category of the Exploration Agency (Category A Or B) under Notification	A

2.3 Objectives of investigation

Reldi Moti area was proposed for G-4 level of exploration for Bauxite, Ga, V, Ti & REE. The exploration has been carried out as per the Minerals (Evidence of Mineral contents) Amendment Rules,2021 to achieve the following objectives - carry out Geological & Structural mapping on 1:12500 scale for identification of Bauxite, Ga, V, Ti & REE bearing formation (host rock) with the structural features to identify the surface manifestation and lateral disposition of the mineralized zones.

2.4 Basis for taking up the investigation

Mineral potentiality was based on baseline data viz. geology, geophysics, ground geochemistry of the study area. As per the compilation by the Commissioner of Geology and Mines (CGM), Gujarat, on Mineral resources of the Gujarat, the proposed block comprises of Deccan Traps, and the analysis of the satellite imagery of the proposed block seem to have indicated the presence of laterite/bauxite deposits. The previous works of GSI between 1895 and 2022 also indicated the potential occurrence of lateritic bauxite and bauxite associated with litho-units of Matanomadh Formation and Anjar volcanics of Deccan Traps in the study area.

CGM has awarded this work to Critical Mineral Trackers (CMT). CMT has undertaken pre-field work during the 3rd week of November 2024 and analysed 3 samples for Bauxite &Titanium. The Al2O3 values varies from 22.37% to 49.46%, but the respective SiO_2(5.76-63.97% and Fe_2O_3(2.39-17.98%) values are high and TiO_2 varies from 1.69 to 2.26%.CMT has prepared a proposal based on these results and submitted to NMET on 12th December 2024. During the 4th TCC-II meeting held on 26th & 27th December 2024, TCC-II opined that this area may be a potential area for minerals like Gallium, Vanadium & REE, besides bauxite and hence included them in this project for investigation.

2.5 Details, nature, and quantum of work proposed vs achievement

Table No: 2.3 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	7.95	7.95
2	**Exploratory Mining**			
a	Excavation of pits (20 nos), size: 1*1*1	Cu.m	20	20
	Pit samples collected	Nos	20	20
b	Excavation of Trenches (5 nos), Size 10*1*1	Cu.m	50	50
	Trench samples (14*5=70) collected	Nos	70	70
3	**DGPS survey (4 block boundary points & 4+1 Borehole points)**	points	8	8+1=9
4	Scout drilling: 4 boreholes of 30m depth each (4*30=120m)	meters	120	120
a	Construction of a borehole pillar	no's	4	5
b	Compensation for 4 Bhs	no's	4	1
c	Drill core preservation in GI boxes	meters	120	120
5	**Laboratory Studies**			
	Major oxides by XRF (Trench-70, pit-20, BH-40 =130 + 13 check samples)	Nos	143	143
	REE 14 Elements by ICPMS (33+ 3 check)	Nos	36	(15+2) +(12+2) =31
	Combined determination of THA, MHA and Reactive silica	Nos	4	2
7	Preparation of polished thin sections	Nos	10	4
8	Complete petrographic//ore microscopic / mineragraphic studies	Nos	10	4
9	XRD Mineral phase analysis	Nos	4	3
10	Report Preparation (5 Hard copies with a soft copy)	Nos.	5	5

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

Table No 2.4: Details of Personnel Associated with the Exploration work of Reldi Moti Area, District: Kachchh, Gujarat

1	**Overall Planning, Co-ordination & Overall supervision**	:	Shri.P.Gandhi, Principal Investigator & Technical Area Expert S.Rama murthy, Technical area Expert
3	**Project management & Field Operation**	:	S.Uma maheswara rao, Technical Area Expert
		:	V.Siva kumar Geologist
5	**Chemical Laboratory**	:	LUCID Laboratory Private Limited, Hyderabad
		:	(NABL Accredited laboratory)
6	**Petrological Laboratory,** **GSI, Hyderabad**	:	Dr.K. Krishnapriya Basak, Director, GSI, Southern Region, Hyderabad
8	**Data Processing & Documentation**	:	Shri P.Gandhi
		:	Shri S. Rama Murthy
			S.Uma Maheswara Rao
		:	Mr.V. Siva Kumar
9	**Reprography & Printing**	:	Mr.V. Siva Kumar
		:	Mr.B. Mahesh

2.7 Table No 2.5: Mode of operation of different work components and associated agency involved

Activity	Agency involve
Large-scale mapping, Pitting & trenching, and drilling	Critical mineral tracker
Chemical analysis	Lucid Laboratory Pvt. Ltd
Check samples chem	Shiva Analyticals Pvt. ltd
Petrographic studies	Geological Survey of India
XRD	Shiva Analyticals Pvt. ltd

CHAPTER – III

3.0 Property Description of Reldi Moti Area

3.1 General Location and Administration

The investigated block is geographically situated in the vicinity of Reldi Moti and Nani Reldi villages, falling administratively within the jurisdiction of Bhuj Tehsil, Kachchh District, Gujarat. The study area falls in part of the Survey of India (SoI) Toposheet No. 41 E/16. Location map given in Fig no:1

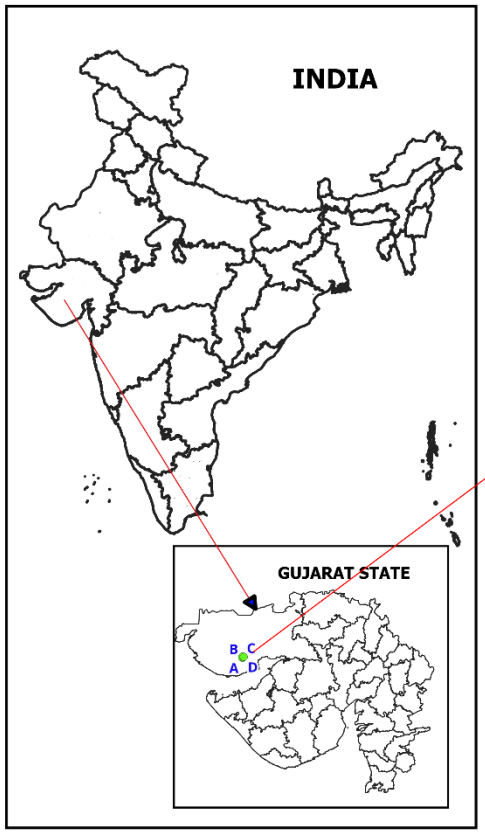
3.2 Geo-Coordinates and Boundary

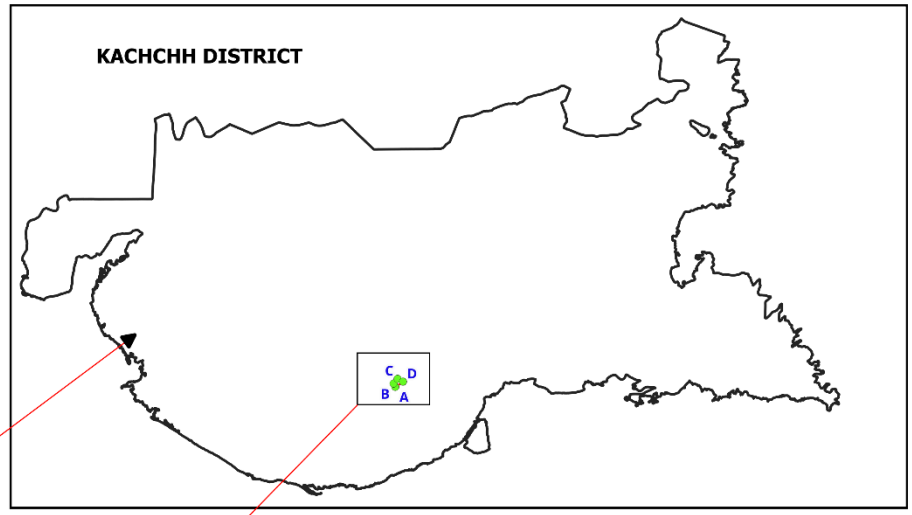
The proposed block encompasses an area of 7.95 sq. km. The boundaries of the investigated area have been surveyed utilizing a Differential Global Positioning System (DGPS) survey. The geospatial coordinates for the block's corner points are defined as follows:

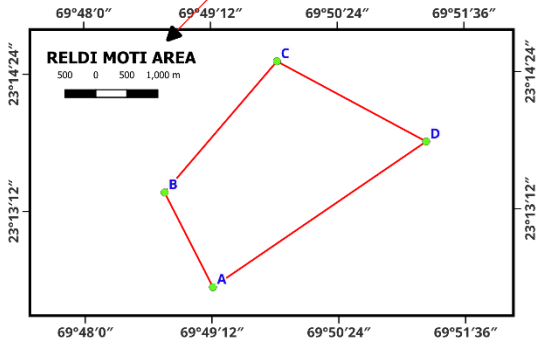
Table No 3.1 The details of coordinates and elevation of 4 cardinal points and Two bench marks as determined by DGPS Survey

Cardinal Points	Geographic Coordinate System in Degree Decimal (WGS 1984)		UTM (WGS 1984, Zone 42N)			Area in Sq. Km
	Latitude(N)	Longitude(E)	Elevation (m)	Northing (m)	Easting (m)	
A	23.2088229°	69.8201674°	147.32	2566873.434	583924.141	7.95
B	23.2226604°	69.8126176°	136.282	2568401.042	583143.004	
C	23.2416941°	69.8304624°	129.642	2570518.606	584956.833	
D	23.2298752°	69.8539404°	147.676	2569224.055	587366.462	

RECONNAISSANCE SURVEY (G4) FOR BAUXITE, Ga, V, Ti & REE IN RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT STATE. (TOPOSHEET NO: 41 E/16) BLOCK ON LOCATION MAP







Reldi Moti Block			
Boundary Points	Coordinates		Area (sp.km)
	Latitude	Longitude	
A	23°12'31.7626"	69°49'12.6025"	7.95
B	23°13'21.5773"	69°48'45.4233"	
C	23°14'30.0986"	69°49'49.6645"	
D	23°13'47.5507"	69°51'14.1853"	

Fig No: 1

3.3 Accessibility

The Reldi Moti area is well-connected by an established network of roads and railways, facilitating the efficient mobilization of personnel and heavy machinery.

Road Connectivity

The area is accessible via the Bhuj-Anjar-Gandhidham highway (NH-341). State Highway GJ - SH 42 (Bhuj – Bhachau Highway) serves as the nearest metalled road to the block. Internal access within the investigated area is provided by metalled roads and unpaved village roads.

Rail Connectivity

The nearest railway facility is the Kukma Railway Station, situated approximately 4 km from the block. Additionally, the Bhuj Railway Station (20 km) provides broad-gauge connectivity to major metropolitan cities such as Ahmedabad and Mumbai.

Air Connectivity

The nearest operational airports are Bhuj Airport, located 25 km from the site, and Kandla Airport (Gandhidham), located 44 km away.

Port Facilities

The block benefits from proximity to major logistical hubs, including the Deendayal Port (Kandla) at 95 km and the Mundra Port at 75 km, providing excellent infrastructure for potential mineral export.

3.4 Cadastral Details and Land Status

Land Use and Land Cover: The land use pattern within the investigated area is predominantly characterized as Government Waste Land, Barren Rocky terrain, and Agricultural land. A significant portion of the area comprises fallow land utilized for seasonal grazing.

Cadastral Survey Details

The block encompasses the Cadastral Survey Numbers falling within the revenue limits of Reldi Moti village (Toposheet No. 41 E/16). **Tenure and Habitation:** The area is classified under Freehold / Government Waste Land tenure. There are two small villages, namely Reldi Moti and Nani Reldi, situated within the study area towards the south, and a small portion of Padhar village towards the north is also falling within the block area

3.5 Land Use & Land Cover Pattern

The Land Use/Land Cover (LULC) map of the study area was prepared by CMT using Google imagery, based on the spectral characteristics and variations in tone and texture of the cells. The mapped area forms part of Toposheet No. 41E/16. Individual LULC units were systematically digitised, classified, and appropriately labelled.

The analysis indicates that barren land constitutes the dominant land use category, covering approximately 46.1% of the total area. This unit is primarily represented by an east–west trending ridge (photo nos:1,2,3,7) in the southern part of the study area and extensive pediplain surfaces towards the north (photo no:17,19,21,23), with sparse vegetation dominated by thorny babul trees. Plantation areas occupy about 22.67% of the area (photo no:6), comprising cultivated species such as date palm, mango, pomegranate, and dragon fruit. Agricultural land accounts for a significant portion of the study area and is subdivided into: Cropland (14.36%), and Fallow land (13.98%). The major crops cultivated include castor, bajra, jowar, wheat, groundnut, and seasonal vegetables. Habitations (photo no:12) cover approximately 2.64% of the area and include two small villages, Reldi Moti and Nani Reldi, located in the southern part, along with a portion of Padhar village in the northern sector. Water bodies, mainly represented by small ephemeral tanks, constitute a minor portion of the area, accounting for approximately 0.25%.

The LULC map prepared by CMT for the study area falling within Toposheet No. 41E/16 is presented in Figure No. 2

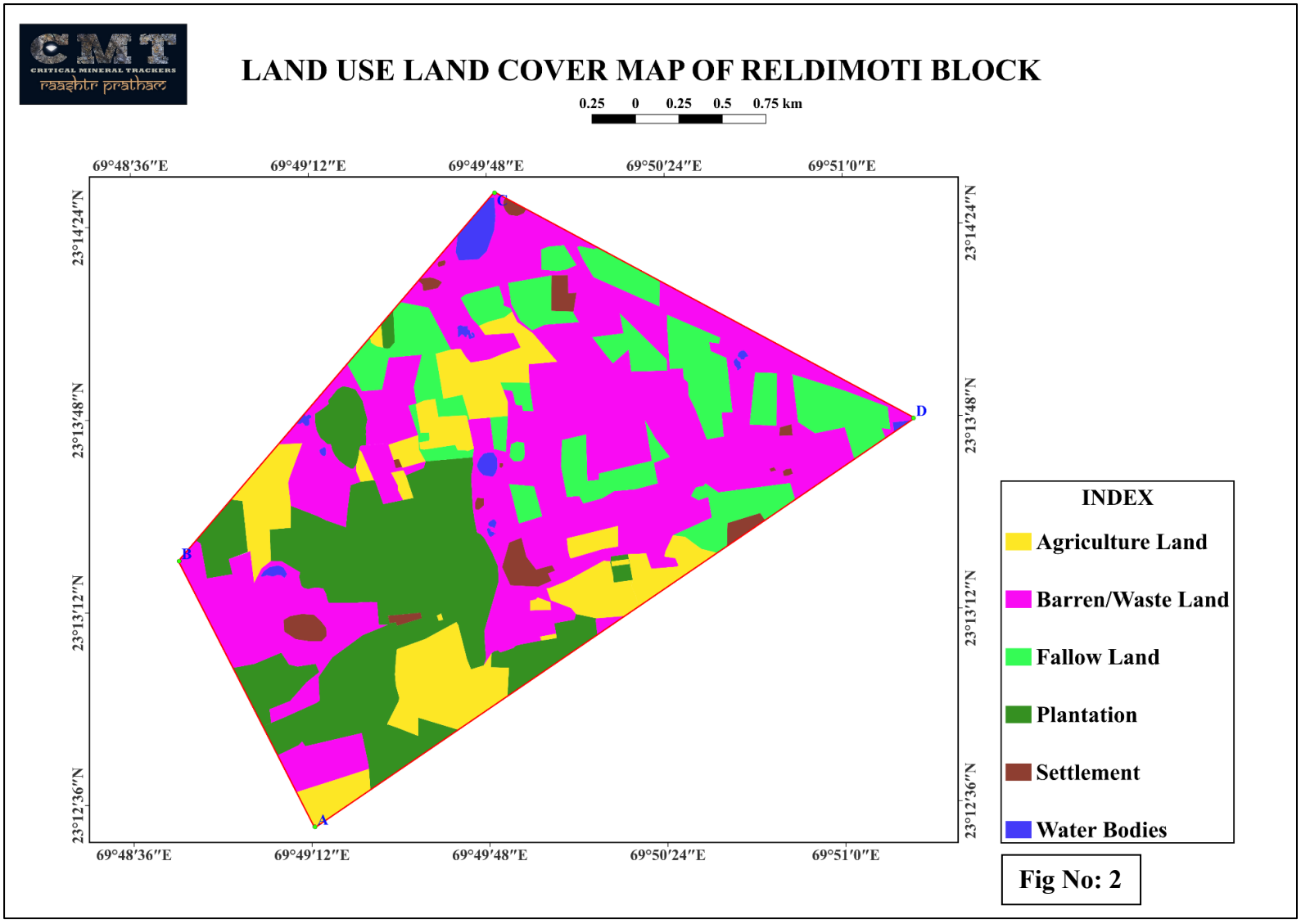

LAND USE LAND COVER MAP OF RELDIMOTI BLOCK
0.25 0 0.25 0.5 0.75 km
69°48′36″E
69°49′12″E
69°49′48″E
69°50′24″E
69°51′0″E
23°14′24″N
23°13′48″N
23°13′12″N
23°12′36″N
A
B
C
D
INDEX
Agriculture Land
Barren/Waste Land
Fallow Land
Plantation
Settlement
Water Bodies

Fig No: 2

3.6. Physiography and Geomorphology

Physiography and Relief

The investigated area exhibits an undulating to flat topography, characteristic of the Kachchh mainland terrain.

Elevation

The surface elevation in the area ranges from 130m to 162m above Mean Sea Level (MSL) and has a general slope towards the north.

Geomorphology and Drainage

Geomorphologically, the terrain is categorized as a denudational plateau, notably capped by lateritic and bauxitic horizons. The area displays a dendritic to sub-parallel drainage pattern, controlled by ephemeral streams that remain active primarily during the monsoon season.

3.7 Climate

The investigated area experiences a semi-arid to arid climatic regime, characterized by extreme temperature variations and erratic precipitation patterns.

Summer: The summer season (May to June) is intensely hot and dry, with maximum temperatures frequently soaring between 45°C and 48°C.

Winter: The winter season (December to January) ranges from mild to cold, with minimum temperatures dropping to between 5°C and 10°C.

Rainfall: The average annual rainfall is approximately 350mm to 400mm. Precipitation is primarily confined to the South-West Monsoon period, extending from July to September.

3.8 Flora and Fauna

Flora: The vegetation pattern is sparse and characteristic of a semi-arid thorn-scrub ecosystem. The area is devoid of any dense forest cover. The floral assemblage is primarily dominated by xerophytic species such as Prosopis juliflora, Acacia nilotica, and Euphorbia sp., alongside seasonal grasses that emerge post-monsoon.

Fauna: The local faunal population comprises common indigenous species. Mammals such as the Wild Boar (Sus scrofa) and various reptilian species have been observed in the vicinity. Notably, no endangered or threatened species have been sighted within the demarcation of the exploration block.

3.9 Socio-Economic Infrastructure

Population

Nani Reldi is situated in the Bhuj Tehsil of Kachchh district in Gujarat, approximately 12 km from the district and sub-district headquarters of Bhuj. Administratively, the village falls under the jurisdiction of the Kukma Gram Panchayat (based on 2009 statistics).

The village comprises approximately 98 households with a total population of 388 individuals (206 males and 182 females), resulting in a sex ratio of 883 females per 1,000 males. The population includes 20 individuals from Scheduled Tribes (ST) and 53 children aged 0–6 years. The overall literacy rate is 68.06%, with a marked difference between male literacy (76.00%) and female literacy (59.38%).

Reldi Moti is situated in the Bhuj Tehsil of Kachchh district in Gujarat, approximately 11 km from the district and sub-district headquarters of Bhuj. Administratively, the village operates under the Kukma Gram Panchayat (based on 2009 statistics).

The village comprises 58 households with a total population of 250 individuals (128 males and 122 females), resulting in a sex ratio of 953 females per 1,000 males. The demographic profile includes 54 residents belonging to Scheduled Tribes (ST) and a child population (aged 0–6 years) of 42. The literacy rate for the village stands at 41.35%, with male literacy at 50.00% and female literacy at 32.35%.

Padhar is a village situated in the Bhuj Tehsil of Kachchh district in Gujarat, India. It is located approximately 18 km from Bhuj, which serves as both the district and sub-district headquarters and is the nearest town for major economic activities. Administratively, Padhar operates as an independent Gram Panchayat (based on 2009 statistics).

According to the Census 2011, the village bears the location code 506849 and covers a total geographical area of 3,970.9 hectares. The postal code for the locality is 370105.

The village comprises 809 households with a total population of 3,726 individuals (1,857 males and 1,869 females), resulting in a sex ratio of 1,006 females per 1,000 males. The

demographic profile includes 564 children aged 0–6 years, 41 residents belonging to the Scheduled Tribes (ST), and 10 residents belonging to the Scheduled Castes (SC). The overall literacy rate stands at 69.67%, with male literacy at 79.59% and female literacy at 59.97%.

Infrastructure: Villages, which are in the study area, are equipped with basic primary schools, electricity connections, and mobile network coverage.

Water Source: Groundwater is saline to brackish. Drinking water is usually supplied via pipelines (Narmada canal network).

3.10 Environmental and Archaeological Sensitivity

Forest: The area does not fall under any Reserved Forest (RF) or Protected Forest (PF) area.

Archaeological Sites: There are no protected monuments or archaeological sites of national importance (ASI) within the block.

National Parks/Sanctuaries: The area is located outside the Eco-Sensitive Zone (ESZ) of the Kutch Desert Wildlife Sanctuary.

CHAPTER – IV

4.0 PREVIOUS EXPLORATION

4.1 General

Ghevariya et al (1984 – 1987) mapped the adjoining area of the Reldi Moti block and delineated Mesozoic rocks belonging to Chari (Jumara), Katrol (Jhuran) and Bhuj formations. As per them, the Deccan Trap is represented by an interstratified volcano-sedimentary sequence and lava flows; the Tertiary formations are represented by the Madh, Mandaviya and Antarjal formations and the Quaternary is represented by sandstone and Miliolite Limestone. B.K. Sahu et al mapped the area during 2004-2005 to study the structural setup, paleoseismicity and geomorphic changes due to 2001 Bhuj earthquake in the area, strip mapping along KMF with a width of 5km was done for 300 sq. km on 1:25000 scale

Specialized Thematic Mapping of Inter- Trappean beds of Anjar Volcanics, in an around Anjar, Kachchh District, Gujarat, with Special Investigation on Sedimentology and Vertebrate Paleontology was carried out by Shreya Basu et al during FS 2021-22. They too reported the occurrence of laterite/bauxite in association with lithounits belonging to Matanomadh Formation and Anjar volcanics in the area.

The proposed block was investigated by CGM by pitting, trenching & drilling. A pocket type of deposit was reported in the nearby Kukma area. A resource of 2342 tons of bauxite was estimated in Kukma area. The results of the chemical analysis of samples show average Al_2O_3 to be 51.29% and average SiO_2 to be 4.78%.

Geovale Services Pvt. Ltd (an NPEA company) obtained the original KGCMP dataset directly from CGM office and carried out a detailed interpretation. Their analysis revealed exceptionally high REE concentrations, with the maximum ∑LREE value of 37,959 ppm and ∑HREE value of 1,965 ppm, based on 182 stream-sediment samples collected within Survey of India Toposheet No. 41E/12. These high-grade anomalies are predominantly located along the structurally disturbed Katrol Hill Fault zone and the Median High region located south of Bhuj town.

The geochemical anomalies and associated spatial patterns were presented by Geovale in the document titled “Proposal for REE Exploration in Bhuj Clay August 2023, forming the basis for subsequent G4-level exploration for REE in the Kachchh area. The occurrence of small discontinuous pockets of bauxite in the area, as reported by CGM and GSI and the recent

exploration carried out by Geovales for REE in and around this area, could be the main reason for the present Bauxite and REE investigation in the Reldi Moti area.

4.2 Details of Aero-geophysical/Geophysical mapping

Geophysical work has not been carried out within the study area.

CHAPTER – V

5.0 REGIONAL GEOLOGY OF THE AREA

5.1 Introduction

Kachchh, the peri-cratonic rift basin of western India, represents a complete sequence of strata ranging in age from Middle Jurassic to Holocene (Fig.5.1). The Mesozoic and Cenozoic rocks of Kachchh are separated by a period of non-deposition, followed by diastrophism, erosion and volcanism during the close of Cretaceous period. The Mesozoic rocks consist of marine sediments from Bathonian to Tithonian (Portlandian) and non-marine sediments in the Cretaceous. These sediments were deposited in a sheltered gulf in sub littoral to deltaic environments in two major cycles: Middle Jurassic transgressive cycle and Late Jurassic-Early Cretaceous regressive cycle (Biswas, 1981). These sediments were laid down on a Precambrian granitic basement which is exposed only in the Nagar Parkar Hills in Pakistan. The Mesozoic sediments were uplifted, folded, intruded and covered by the Late Cretaceous-Early Palaeocene Deccan trap. The terrestrial volcano-clastic sediments represent the Palaeocene sediments while the Early Eocene transgression and subsequent Tertiary deposits filled the peripheral lows bordering the Mesozoic highs as well as the lows between them.

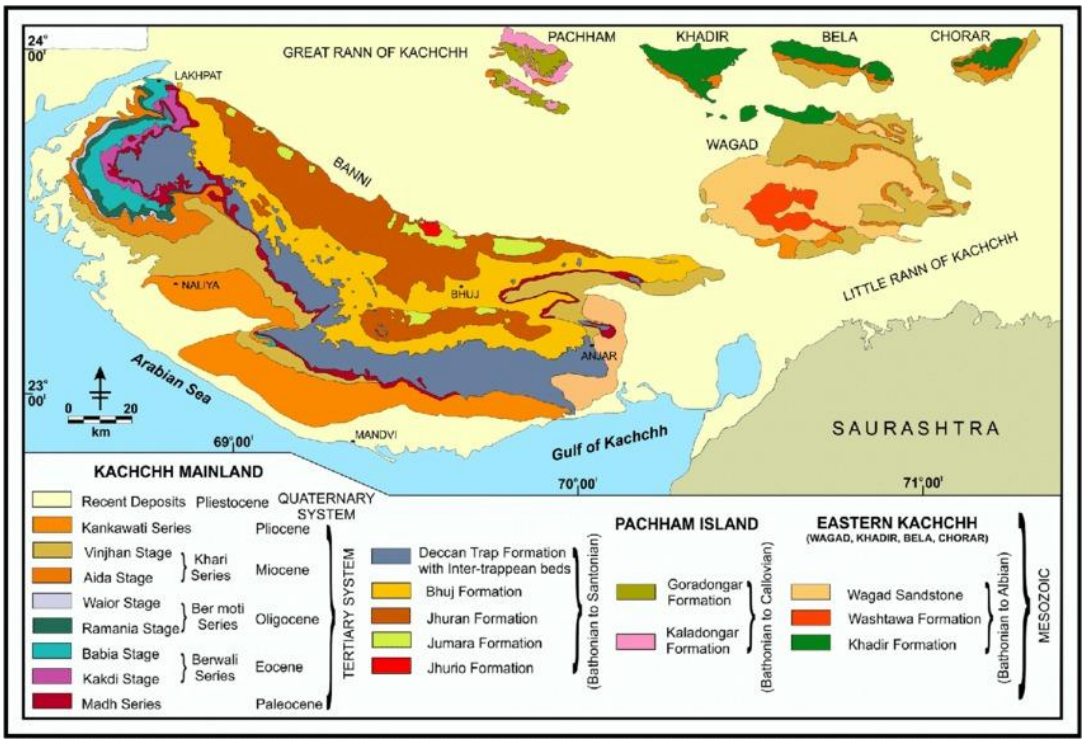
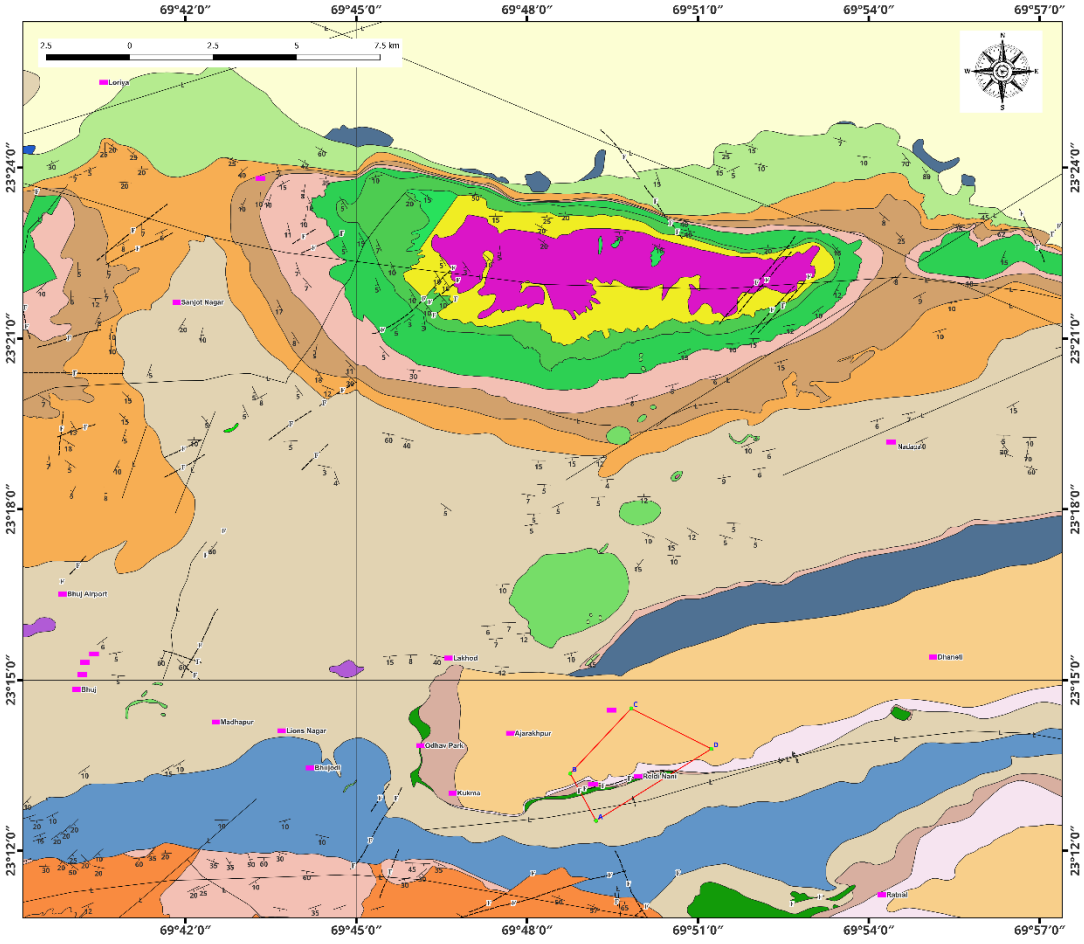


Fig. 3A: Geological map of Kachchh showing major stratigraphic units (after Biswas, 2016).

The study area was marked on the regional geological map is given below in Fig no:3B

REGIONAL GEOLOGICAL MAP OF KACHCHH BASIN (PART) WITH LOCATION OF RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT



LEGEND

LITHOLOGY	FORMATION	GROUP	SUB GROUP	AGE
AEOLIAN SAND, CLAY, MARL	RANN			HOLOCENE
CALCARENITE,CONGLOMERATE, SANDSTONE AND CLAY	SANDHAN			PLIOCENE
FOSSILIFEROUS LIMESTONE, MARL, CLAY	GAJ			MIOCENE
VARIEGATED GYPS SHALE, CLAY,SILTSTONE,FOSSIL.MARL	KHARI NADI			OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY	MATANOMADH			PALAEOCENE
LATERITE				
BASIC ROCK	ANJAR VOLCANIC	KACHCHH	DECCAN TRAP	LATE CRETACEOUS-PALAEOCENE
BASALT (UNCLASSIFIED)				
OLIVINE BASALT				
FELDSPATHIC SANDSTONE AND GRIT	BHUJ			EARLY CRETACEOUS
FERRUGINOUS SANDSTONE AND GRIT				
FERRU & FELDSPATHIC SST, SILTSTONE,PLANT FOSSIL				
SANDSTONE, SHALE, CLAY, CONGLOMERATE				
FELDSPATHIC SANDSTONE, SHALE WITH AMMONITE FOSSILS	KATROL			LATE JURASSIC-EARLY CRETACEOUS
FOSSILIFEROUS CALC SST. LIMESTONE, SILTSTONE&CONG				
GYPSEOUS SHALE, CALCAREOUS SST WITH BELEMNITES				
SHALE WITH SANDSTONE	CHARI			MIDDLE LATE JURASSIC
CALCAREOUS GRITTY SANDSTONE				
GYPSEOUS SHALE, MARL, OOLITIC LIMESTONE				
FELDSPATHIC SANDSTONE WITH CORALLINE LIMESTONE	PACHCHHAM			MIDDLE JURASSIC
SHALE WITH MICACEOUS SANDSTONE				
LIMESTONE				

STRUCTURAL INDEX
Fault
Lineament Form
Beddings

INDEX
Boundary points
Block boundary
Vilages

SOURCE BY : BHUKOSH, GSI.

Fig: 3B

Waagen et. al. (1875) subdivided the Mesozoic rocks of Kachchh into Patcham, Chari, Katrol and Umia group and correlated them with the European equivalent. Biswas (1971) while revising the stratigraphy of Kachchh proposed new nomenclature and classified the Mesozoic rocks of Kachchh into Jhurio, Jhumara, Jhuran and Bhuj formations corresponding to Patcham, Chari, Katrol, and Umia Group/Series of Waagen (1872, 1875), Rajnath (1932) and Krishnan (1982). Later, Ghevariya (1987), Ghevariya and Srikarni (1991) and Ghevariya et al. (1984), provided details on these rocks retaining nomenclature of Waagen (1872), Rajnath (1932) and Krishnan (1982). The description of each of the four different formations representing the Mesozoic rocks of Kachchh along with their broad equivalents based on the classification of Biswas (1971) is given in the following paragraphs:

Patcham Formation (Jhurio Formation)

Pachchham (also spelt as Patcham) Formation is named after the Pachchham Island in the Rann of Kachchh. This is roughly equivalent to the Jhurio Formation of Biswas (1971). It is about 400m in thickness and is exposed in parts of Pachchham (Kuar Bet, Kaladongar and Goradongar), Khadir, Bela and Chorar Islands. Pachchham Formation comprises intercalated sequence of siltstone, shale, marlite, claystone, coralline limestone, calcareous sandstone and grey to pink limestone. Small outcrops of these rocks are also seen at Jara, Keera, Jumara and Habo domes in the northern edge of Kachchh Mainland and south of Kachchh Mainland Fault. It extends from Lakhpat in the west to the north of Bhachau in the southeast.

Chari Formation (Jumara Formation)

Chari, spelt earlier as Charee, derives its name from village Chari and unconformably overlies the rocks of the Pachchham Formation. This formation is roughly equivalent to the Jumara Formation of Biswas (1971). Rocks of the Chari Formation are exposed in the southern parts of Kaladongar and Goradongar ranges in Pachchham Island, southern part of Khadir in the Rann of Kachchh and in the northern part of Wagad highland. The rocks of the Chari Formation are exposed as inliers and lenses along the axis of East-West trending domal anticlinal ridges (south of Kachchh Mainland Fault) at Jara, Jumara, Jhura, Habo and other domes (GSI, 2001, Biswas, 1974). The other lensoid outcrops occur in Charwar and in other ridges located immediately south of the Katrol Hill Fault (KHF). KHF brings the rocks of the Chari Formation in juxtaposition with the rocks of the Bhuj Formation, near Sukhpar and Madhapar. It comprises about 350m thick sequence of fossiliferous shale, golden oolite, fossiliferous limestone and calcareous sandstone containing ferruginous and calcareous nodules with ammonite fossils (Waagen, 1875).

Katrol Formation (Jhuran Formation)

The rocks of the Chari Formation are unconformably overlain by about 400m thick intercalated sequence of gypseous shale with cyclically repeated sequence of calcareous sandstone and shale, constituting the Katrol Formation, which roughly corresponds to the Jhuran Formation of Biswas (1971). Rocks of this formation are exposed in the form of two sub-parallel continuous exposures in the mainland Kachchh. The first one form a vast northwest-southeast trending outcrops from Guneri to Jhura which extends eastward up to Khirsara. The other one extends from Deshalpar to Malingara and south of Katrol Hill Fault in central part of Kachchh Mainland. These rocks are also exposed in the Wagad Mainland and in the Island belt.

Umia (Bhuj) Formation

The rocks of the Bhuj Formation include the Umia Group of Waagen (1872) and are named after Bhuj Township. It unconformably overlies the rocks of the Katrol Formation in the western Mainland Kachchh and forms a thick sequence of friable, feldspathic and ferruginous sandstone showing graded-bedding, ironstone, clays and trap pebble conglomerates with many fossiliferous horizons (Ghevariya, 1985; Singh et al., 2008). These rocks are exposed in the form of continuous outcrop in the mainland Kachchh with a maximum width between Lakhmipur and Roha. This outcrop extends from Guneri in the northwest to Deshalpar in the southeast, where it takes a turn and extends further upto Khirsara (GSI, 2001). A continuous and broadly elliptical exposure, bordering the Katrol Formation, extends from Andhon in the west to Fatehgarh and Deshalpar in the north. Besides this, small isolated outcrops occur in Pachchham Island, Goradongar and Kaladongar, Bela and Mardek Islands as inliers within younger volcanics and Tertiary rocks (GSI, 2001). In the east, a thick intervening transitional zone has developed in central Kachchh. The rocks of the Bhuj Formation contain a rich assemblage of Upper Gondwana plant fossils and many intervening fossiliferous marine bands, in the western and central parts (Rajnath, 1932).

Deccan Traps

The Deccan Traps are exposed mainly in the southern part of Kachchh along a 10-20 km wide belt trending NW-SE. They overlie the Bhuj Formation. Normally the flows are plateau type tholeiitic basalts in the west at Dayapar and Matanomadh and are alkaline at Baladia, Anjar and Bhachau. However, occurrence of highly alkaline intrusive rocks like nephelinite, essexite, olivine analcite basalt within the Mesozoic is also reported from a few places (Melluso et al., 2006; Mukherjee et al., 1988). Nine flows have been reported from southern part, where the total thickness of the trap section amounts to 140-150m (GSI, 2001). At most of the places, the

lava is of pahoehoe type. Numerous alkali-type and tholeiitic-type intrusives occur in the Mesozoic sediments and Deccan Trap flows. Gabbroic rocks and pyroxenite constitute the main alkali body at Nirwandh and Kuran with metallic sulphide disseminations. Dykes and apophyses of hornblendite, ankaramite, granophyre, trachyte, andesite and syenite are found at the outer margin of the main body. In Kachchh Mainland, mantle-derived peridotite nodules are also reported from the alkaline plugs at Bhuj, Vithoniya and Dinodhar (Mukherjee et al., 1988).

5.2 Tertiary rocks

Almost all the Mesozoic outcrops are accompanied by Tertiary sediments on their flanks in the Kachchh region. Tertiary rocks of Kachchh are well known for their rich marine fossil assemblage. The Tertiary sediments were deposited over the Mesozoic sedimentary rocks and Deccan traps along the coastal strip of the Kachchh Mainland (GSI, 2001). The first detailed study of this region was made by Wynne (1869, 1872). Wynne (1872) classified the Tertiary rocks of Kachchh mostly on the basis of abundant nummulitic fossils and lithology. The Tertiary rocks are exposed all along the western, southern and south-eastern part of the Kachchh, extending from Lakhpat in the west to Faras Vondh in the east. Some isolated outcrops of these rocks occur in the northern and eastern part of Kachchh peninsula. The Tertiary rocks overlie the denudated laterites, traps and at places they directly rest over the Mesozoic Formations (Chatterji and Mathur, 1966).

The Tertiary rocks directly overlying the Deccan Traps belongs to the Matanomadh Formation of Palaeocene age. This formation comprises laterite, lateritic conglomerate and lithomargic and bentonitic clay, followed by gypseous and pyritous sandstone. The overlying Kakdi Nadi Formation (Lower Eocene) consists of greyish to variegated clay and shale with limestone bands rich in Nummulites. The Fulra Formation (Middle to Upper Eocene) which overlies the Kakdi Nadi Formation comprises cream coloured limestone with abundant foraminifers. The Oligocene is represented by Maniyara Fort Formation, which consists of sandy limestone, coralline limestone, glauconitic clay, marl and siltstone. (Ghevariya, et al,1991).The Kharinadi Formation (Oligocene to Lower Miocene) overlies the Maniyara Fort Formation and consists of mottled siltstone, variegated clay and fossiliferous marl. The overlying Gaj Formation (Lower to Middle Miocene) comprises green siltstone and fossiliferous, gypseous marl (Biswas & Raju 1973). Gaj Formation is overlain by Sandhan Formation (Pliocene) which consists of micaceous sandstone, laminated siltstone, calcareous clay, marl and conglomerate.

5.3 Quaternary sediments

These are two principal areas of extensive Quaternary sedimentation one is the Rann areas and the other is the narrow alluvial plain bordering the coastline in southern Mainland Kachchh. The Rann, which constitute a very flat terrain with no surface exposures, are obviously the product of marine deposition. The second area is the narrow East-West trending plains of southern Mainland Kachchh which are mainly formed by fluvial processes. A narrow belt of fluvial deposits, up to 20-30 km width, is present along the southern coast of Kachchh peninsula fringing the pre-Quaternary rocks. These alluvial deposits are found to extend right up to the coast. These deposits comprise Late Quaternary fluvial deposits which are well exposed along the 10-25m incised cliffs of the Nagwanti, Rukmawati, Phot, Bhuki rivers. These deposits show extensive gullies around the river valleys.

The Miliolite Formation of Middle to Late Pleistocene age is also present in various parts of Kachchh, which is well studied and exposed in Saurashtra. Alluvium, unconsolidated sand, Rann clay and mudflats constitute the Holocene record in the region.

Regional stratigraphy

Krishnan (1982) classified the Mesozoic succession of Kachchh as tabulated below:

Table No 5.1: Jurassic succession of Kachchh (after Krishnan, 1982).

Unit	Age	Sub-division	Lithology
UMIA (1000 m)	Post-Aptian	Bhuj beds (Umia Plant beds)	Sandstone and shale
	Aptian	Ukra beds	Marine calcareous shale
	Upper Neocomian	Umia beds	Barren sandstone and shale
	Valanginian	Trigonia beds	Barren sandstone
	Upper Tithonian	Umia ammonite beds	Shale and sandstone
KATROL (300 m)	Middle Tithonian	Upper Katrol Shales	Shale
	Middle Tithonian	Gajansar beds	Shale
	Lower Tithonian	Upper Katrol (Barren)	Sandstone
	Middle Kimmeridgian	Middle Katrol	Red sandstone

	Upper Oxfordian	Lower Katrol	Sandstone, shale, marl
CHARI (360 m)	Oxfordian	Dhosa Oolite	Green and brown oolitic limestone
	U. Callovian	Athleta beds	Marl and gypseous shale
	Middle Callovian	Anceps beds	Limestone and marl
	Middle Callovian	Rehmani beds	Yellow limestone
PATCHAM (300 m)	Lower Callovian	Macrocephalus beds	Shales with calcareous bands and golden oolites
	Lower Callovian	Coral bed	Shale and limestone
	Lower Callovian to Bathonian	Patcham shell limestone Patcham basal beds (Kuar Bet beds)	Limestone, shale and marl

The succession of Tertiary rocks as exposed in Kachchh is given in Table 5.2.

Table No 5.2: Stratigraphic succession of Tertiary rocks of Kachchh (after GSI, 2001).

Age	Formation	Lithology
Pliocene	Sandhan Formation	Friable sandstone, siltstone, calcareous clay and conglomerate
Lower to Middle Miocene	Gaj Formation	Olive green shale with gypsum and marlite
Oligocene to Lower Miocene	Khari Nadi Formation	Mottled siltstone and variegated clay with marlite.
Oligocene	Maniyara Fort Formation	Sandy limestone, glauconitic clay, siltstone and coralline limestone
Middle to Upper Eocene	Fulra Formation	Cream coloured foraminiferal limestone.

Lower Eocene	Kakdi Nadi Formation	Greyish to variegated clay, carbonaceous and lignite bearing shale with fossiliferous marlite and limestone.
Palaeocene	Matanomadh Formation	Lithomarge clay, laterite and conglomerate.
Cretaceous to Eocene	Anajr Volcanics	Basalt

The quaternary geology of coastal area of Kachchh is given in Table 5.3.

Table No 5.3: Quaternary Geology and stratigraphy of coastal area of Kachchh. (Source: DRM of Kachchh district, GSI).

Age	Formation	Lithology
Holocene to Recent	Rann Formation	Sand, silt, clay, Fluvio-marine
	Mahuva Formation	Sand, silt, clay, Younger tidal flat
	Fulai Formation	Sand, silt, clay, Older tidal flat
Late Pleistocene to Middle Pleistocene	Miliolite Formation	Oolitic calc-arenite and micrite

5.4 Tectonic framework

The Kachchh basin is a western margin peri-cratonic rift basin (basin formed at the boundary of continental crust and oceanic crust) of India bounded by Nagar Parkar uplift in the north and Kathiawar uplift (Saurashtra horst) in the south respectively along Nagar Parkar (NPF) and North Kathiawar faults (NKF) (Fig 5.2). The Radhanpur – Barmer basement arch limits the rift extension to the east. The rift is open to the west, merging with the continental shelf. The graben between them (NPF & NKF) is asymmetric, with a tilt to the south along the North Kathiawar fault accommodating thicker sediments towards the Kathiawar block. The basin is characterised by the development of several intra-basinal, sub parallel strike faults forming half grabens. The uplifts are bounded by five parallel faults from north to south. These faults are Nagar Parkar Fault (NPF), Island Belt Fault (IBF), Kachchh Mainland Fault (KMF), Katrol Hill Fault (KHF) and North Kathiawar Faults (NKF). Block tilting along these faults during rift phase extension gave rise to four sub-parallel linear ridges; Nagar Parkar Uplift (NPU), Island Belt Uplift (IBU), Wagad Uplift (WU), and Kachchh Mainland Uplift (KMU). The IBU is broken into four individual uplifts

viz. Pachchham (PU), Khadir (KU), Bela (BU) and Chorar (CU), probably by unexposed transverse wrench faults as evidenced by relative displacements and orientations. These uplifts appear as a chain of islands and hence are collectively called "Island Belt". The KMF marks the northern limit of the Kachchh mainland, and beyond this fault, Banni plain is present with four islands/uplift.

The Kachchh rift evolved within the Mid-Proterozoic-Aravalli-Delhi fold belt by reactivation of pre-existing faults along the NE-SW trend of the Delhi fold belt that swings to E-W in Kachchh region. The Kachchh rift was initiated during the Late Triassic breakup of the Gondwanaland. The rifting was aborted during Late Cretaceous pre-collision stage of the Indian plate. During post-collision compressive regime of the Indian plate, the Kachchh rift basin became a shear zone with strike-slip movements along sub-parallel rift faults. The Kachchh Mainland Fault along the rift axis became the active principal fault.

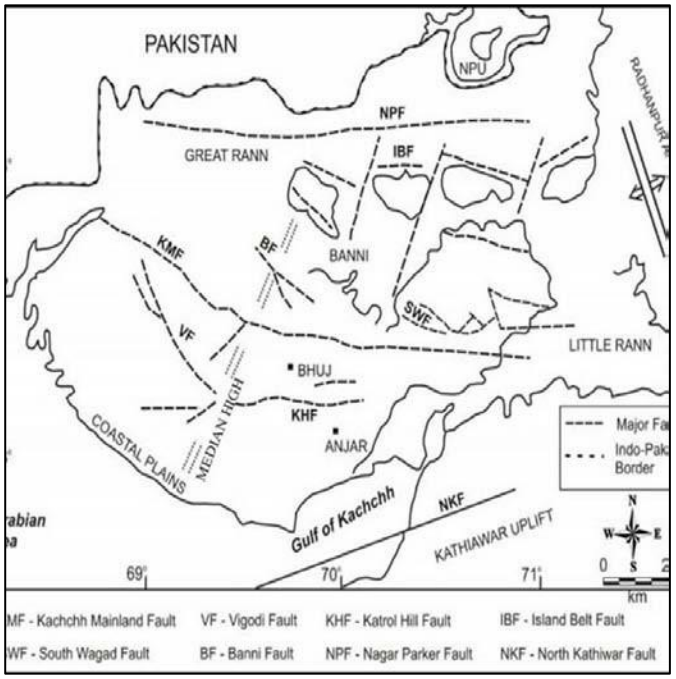


Fig.4: Tectonic map of Kachchh (after Shukla, 2011).

5.5 Metamorphism

The area comprises sedimentary rocks and volcanic flows. Regional metamorphism is absent in the study area. The lithounits have not undergone significant metamorphic recrystallization. However, intense chemical weathering (supergene alteration) is observed, particularly in the basaltic traps. This process has resulted in the physical and chemical weathering of basalts and the extensive lateritization responsible for the formation of the bauxite deposits. This should be distinguished from metamorphic alteration.

Host Rock for Mineralisation

Primary Host: The host rock is the Anjar Volcanics of Deccan trap.

Parent Rock: The bauxite/laterite is derived from the in-situ chemical weathering (lateritization) of the underlying Deccan Trap Basalts (Anjar Volcanics). In some sections, reworked laterites are associated with tuffaceous shales and sandstones.

Disposition: The mineralised bauxite horizon typically occurs between the ferruginous laterite cap at the top and the lithomargic clay/weathered basalt at the bottom.

CHAPTER – VI

6.0 Activity during the period (Geoscience investigation)

As per NQT, Critical Mineral Trackers has undertaken the following activities in an area of 7.95 Sq. Km in Reldi Moti area, Kachchh district, Gujarat, from 14 Feb 2025 and completed all field investigations by 30th April,2025.

1.Large scale geological mapping on a 1:12500 scale
2. Pitting and Trenching
3. Sample collection & Preparation
4. Scout drilling
5. Chemical analysis
6. Complete Petrography study

6.1 Large scale geological mapping

Large Scale Geological mapping (LSM) was carried out in an area of 7.95 sq. km on a 1:12500 scale in the part of the Survey of India Toposheet No. 41E/16. A Survey of India toposheet, which has been enlarged to 1:12500 scale in a GIS environment, was used to understand the topography, roads, and drainage of the study area and also used as a base map for the LSM.

For recording precise sample location and to carry out a geological survey, a handheld GPS (Garmin 12 H model) has been used. The coordinates had been recorded in geographic coordinate system with the WGS 1984 datum. Variation of lithologies along with the structural elements were systematically recorded and the geological map was prepared.

Different lithological units belonging to the Bhuj, Anjar Volcanics, Matanomadh, Khari Nadi and Sandhan formations were systematically documented. The lithologies include ferruginous gritty sandstones, fine-grained friable sandstones, siltstones, basalt, laterite/bauxite, tuffaceous clay, calcareous clay, calcarenite and grey clay horizons. The attitude of beds was measured using a Brunton compass, and several primary sedimentary structures such as cross-bedding, graded bedding, columnar joints were recorded.

Table No 6.1: Lithostratigraphy of Reldi Moti block

Age	Formation	Lithology
Pliocene	Sandhan formation	Calcarenite, conglomerate, sandstone, clay
Oligocene - Miocene	Khari Nadi formation	Variegated gypseous shale, clay, siltstone, fossiliferous marl
Palaeocene	Matanomadh formation	Laterite/bauxite with clay
Late Creataceous -Palaeocene	Anjar Volcanics formation	Basalt (unclassified)
Early Creataceous	Bhuj	Feldspathic sandstone and grit

6.1.1 Description of lithology

Bhuj formation

The Bhuj Formation occurs predominantly in the southern part of the Reldi Moti area. In the study area, it is prominently represented by a central ridge trending N80°E–S80°W, with strata dipping 5°-10° northward. The ridge comprises hard, reddish brown ferruginous, silicified, recrystallized, feldspathic sandstone towards south (photo no-1) and medium to fine grained deccan basalt towards north. The contact between Bhuj formation and deccan trap is sharp (photo no:3) and appears to be faulted also as evidenced by silicification, fault breccia and also subvertical to vertical dips of sandstone of Bhuj and vertical tilt of columnar joints of Anjar Volcanics etc. Near the contact with the Deccan basalt, it is recrystallized and almost quarzitic (photo no:2). At places near Nani Reldi village, it is pinkish to yellowish-white friable gritty sandstone.

Photomicrograph (3B) of silicified sandstone shows a medium grained clastic sedimentary rock consisting only of quartz as framework as well as matrix mineral. Subangular to subrounded clasts of quartz form the framework of the rock.

Description of various lithological units encountered in the Bhuj formation with field Photographs are given below:

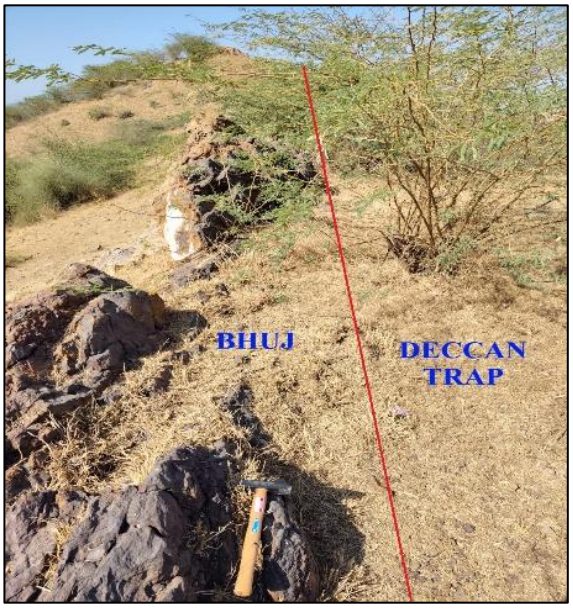
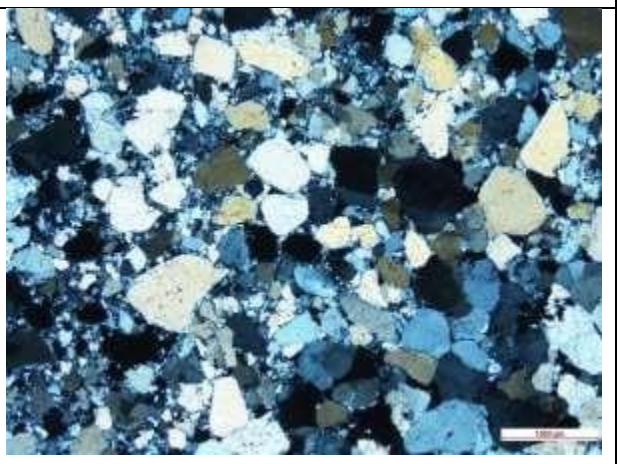
<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Photo 1: Hard compact, silicified Bhuj sandstone (Bhuj Fm), trending N80°E-S80W° and dipping subvertical to vertical</td><td>Photo 2: Sharp contact between Bhuj formation and the Deccan trap along the ridge lying south of Reldimoti village</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Photo 3A: Feldspathic sandstone (Bhuj Fm) is recrystallised into Quartzitic.</td><td>Photo 3B: Angular to subrounded frame working grains of quartz in cherty cement and fine-grained matrix of quartz; frame working grains dominated sandstone</td></tr>
</table>

	
Photo 4: Friable sandstone (Bhuj Fm), about 400m south-west of Laxmi paper mill showing vertical dips	**Photo 5:** Hard compact ferruginous sandstone of Bhuj formation with iron banding
	
Photo 6: Date Palm plantation, southwest of Reldi Moti village over Bhuj formation	**Photo 7:** Thorny shrubs southwest of Reldi Nani village over Bhuj formation

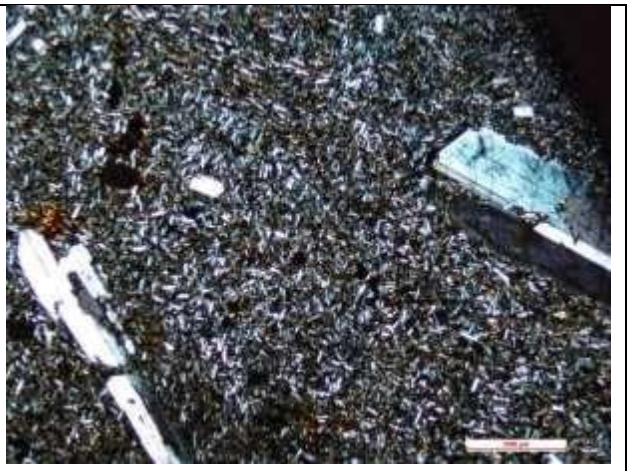
Anjar Volcanics Formation

The Anjar Volcanics Formation overlies the Bhuj Formation, forming a narrow stretch extending from the Reldi Moti area to east of Nani Reldi village. In the study area, it runs along with the Bhuj sandstone ridge trending N80°E–S80°W. The contact between Bhuj Fm and Anjar Volcanics appears to be faulted, as evidenced by (i) steeply dipping sandstone near its contact with basalt, (ii) silicification seen within the feldspathic/ferruginous sandstone, (iii) fault gouge seen 0.5km west of Nani Reldi village and (iv) sub vertical to vertical tilting of columnar joints near Reldi Moti village.

The basalt is dark grey, fine grained and highly fractured. At places, it shows well developed columnar joints but tilted towards the north. Volcanic tuffs, yellowish to pink coloured, were observed west of Reldi Moti village (photo no: 8,9,10,11).

Photo 8: Basaltic stone quarry (Anjar Volcanics), west of Reldi Moti village.

Photo 9: Basalt with tilted columnar joints near Reldi Moti village in Anjar Volcanics

	
Photo 10: Fine grained basaltic rock with very few zeolites and phenocrysts	**Photo 11:** Plagioclase feldspar phenocrysts within basalt matrix

Photomicrographs (photo nos:10 & 11) show very fine-grained basaltic rock containing haphazardly oriented plagioclase microlites, very fine magnetite grains and clinopyroxene in matrix. Brown coloured, non- pleochroic and isotropic volcanic glass with very thin crystals indicate devitrified nature of the glass. Few euhedral shaped, coarse plagioclase grains occur as phenocrysts within the fine-grained matrix. Yellow coloured zeolite also presents within the matrix.

Descriptions of various lithological units encountered in the Anjar Volcanics formation, with field photographs, are given below:

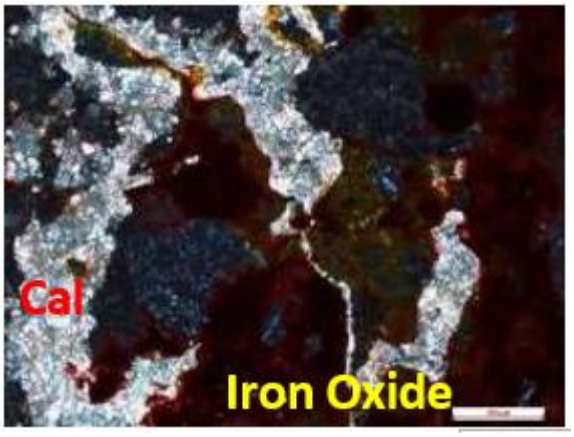
Matanomadh Formation

The Matanomadh Formation overlies the Anjar Volcanic Formation and is represented by laterite, bauxitic clay and lithomargic clay. The Reldi Moti and Nani Reldi village settlements are mostly situated over this formation. In and around Reldi Moti village, gritty or pebbly laterite is seen at the surface and also in borehole RMT-BH-04 up to a depth of 20m. The laterite pebbles are reddish to dark brown in colour. Further eastwards, the lateritic zone is less conspicuous and the bauxitic clay/ lithomargic clay unit is exposed at the surface near Nani Reldi village.

Photomicrographs of clayey bauxite (Photo nos: 14 & 15) show iron oxides are abundant and form the fundamental matrix of the sample, visible throughout as a reddish-brown, microcrystalline groundmass. These likely represent goethite, hematite, or a mixture of both,

which develop under intense chemical weathering conditions typical of tropical lateritic profiles. Calcite (Cal), shown in bright birefringence under polarized light, appears as secondary infilling material along fractures and pore spaces.

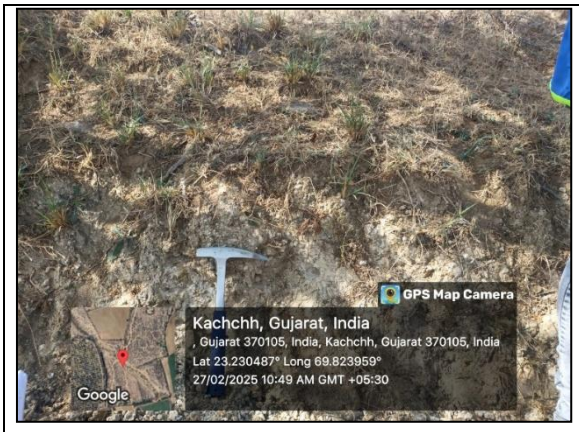
Description of various lithological units encountered in the Matanomadh formation, with field photographs are given below:

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Photo 12: Clayey bauxite exposed along flank of Anjar volcanics, east of Reldi Nani village.</td><td>Photo 13: Clayey bauxite/ Lithomargic clay near Reldi Nani village.</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Photo 14: Photomicrograph of clayey bauxite showing presence of iron oxide under transmitted light XPL (2X).</td><td>Photo 15: Photomicrograph showing presence of iron oxide and Calcite (Cal) under transmitted light XPL (10X).</td></tr>
</table>

Khari Nadi Formation

The Khari Nadi Formation overlies the Matanomadh Formation and consists mainly gypseous clay, siltstone and fossiliferous marl. The area occupied by Khari Nadi formation is mostly covered by plantations and thorny shrubs. The gypseous clay is mostly dirty to greenish grey in colour and is interspersed with fine to medium gypsum flakes. The siltstone is dirty grey coloured and friable in nature. The marl is light yellow coloured and gives good effervescence with dilute HCl.

Descriptions of various lithological units encountered in the Khari Nadi formation, with field photographs, are given below

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Photo 16: Grey to khaki coloured clay of Khari Nadi Fm, north of Reldi Nani village.</td><td>Photo 17: The Khari Nadi Formation is entirely obscured by a soil cover in this area.</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Photo 18: Khaki grey clay (Khari Nadi Fm), near Reldi Moti village.</td><td>Photo 19: Barren land with sparse vegetation in Khari Nadi Formation, near Reldi Moti village.</td></tr>
</table>

Sandhan Formation

The Sandhan Formation is the youngest in this block, consisting mainly of calcarenite, calcareous sandstone, and grey micaceous sandstone. Most of the area within this formation appears as flat, barren land, with a few thorny bushes at few places. It occupies almost 60% of the study area. The calcarenite and calcareous sandstone are light yellow in colour and give strong effervescence with dilute HCl.

Descriptions of various lithological units encountered with field photographs are given below:

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Photo 20: Calcareous clay (Sandhan Fm) observed in a nala section, south of Padhar.</td><td>Photo 21: Calcarenite (Sandhan Fm) in a nala section, south of Padhar.</td></tr>
<tr><td>. 
</td><td>  </td></tr>
<tr><td>Photo 22: Here, a nala section shows calcarenite exposed near the northern boundary of the block</td><td>Photo 23: The surface here is covered by soil, and we observed grey clay with a calcareous nature, indicating a significant presence of calcium carbonate in the clay.</td></tr>
</table>

6.1.2 Description of rock types

The Study area comprises Bhuj, Anjar Volcanics, Matanomadh, Khari Nadi and Sandhan formations, composed of sandstone, basalt, Laterite as shown in Fig no:5 and plate no: V.

Sandstone: Medium to coarse grained yellowish-brown ferruginous sandstone and friable yellowish white sandstone are exposed along the ridge and also at few places in the south. It is a clastic sedimentary rock consisting only of quartz as framework as well as matrix mineral. Subangular to subrounded clasts of quartz from the framework of the rock. Fine-grained angular quartz grains occupy the interstitial spaces, forming a matrix. The framework and matrix minerals are cemented by chert. Few quartz grains show undulose extinction and deformation bands.

The textural immaturity is evidenced by the angularity of grains, poor sorting, polymodal grain size distribution, and grain size variation, indicating less transportation and nearby provenance.

Basalt: It is exposed along the ridge lying south of Reldi moti and Nani Reldi villages. It is a very fine-grained basaltic rock containing haphazardly oriented plagioclase microlites, very fine magnetite grains and clinopyroxene in matrix. Brown coloured, non-pleochroic and isotropic volcanic glass with very thin crystals indicate devitrified nature of the glass. Few euhedral shaped, coarse plagioclase grains occur as phenocrysts within the fine-grained matrix. Yellow coloured zeolite is also present within the matrix.

Laterite: it is exposed along foot hills of the Anjar Volcanics towards the north side of the ridge. The rock shows iron oxides are abundant and form the fundamental matrix of the sample, visible throughout as a reddish-brown, microcrystalline groundmass. These likely represent goethite, hematite, or a mixture of both, which develop under intense chemical weathering conditions typical of tropical lateritic profiles. Calcite as secondary infilling material along fractured and pore spaces.

Calcarenite: yellowish white to white, fine grained Calcarenite is exposed along the nala in the northern side of the block and give effervescence with dilute HCl

6.1.3 Structures

Bedding: The study area has scanty exposures. The area is largely covered by either thin soil cover or cultivation. Bedding has been observed in the Bhuj sandstone trending N70ºE-S70ºW/20º due NW. At places, near the faulted contact with Deccan traps, the sandstone beds dip nearly 70^0 to 75 ° due WNW.

Fault: A major fault, almost 3 km long, trending ENE-WSW, extending from west of Reldi Moti village to east of Nani Reldi village, has been observed. The fault is at the contact zone between the Anjar Volcanics from the Bhuj Formation. East of Reldi Moti village, fault gouge almost over 50m in length has been observed.

Joints: Two sets of joints are very commonly seen in basalt. Also, columnar joints have been observed in basalt near Reldi Moti village. The columnar joints have been tilted vertically due to the fault in their vicinity.

6.1.4 Metamorphism

Sedimentary rocks occupy major part of the investigated area. While the volcanic flows form a linear ridge extending from west to almost eastern part of the study area.

The rock units here have not undergone any significant metamorphic activity. However, intense chemical weathering (supergene alteration) is observed, particularly in the basaltic traps. This process has resulted in extensive lateritization responsible for the formation of the bauxite deposits. This should be distinguished from metamorphic alteration.

6.1.5 Mineralogy of the ore zones and ore textures

The laterite mainly comprises mineral hematite, goethite and ilmenite minerals, while the bauxite mineral is mainly gibbsite. The bauxite clay is predominantly kaolinite with high Al_2O_3 values. High TiO_2 value in the area is probably due to the presence of ilmenite in the basalts.

INTERPRETED LARGE SCALE GEOLOGICAL MAP OF RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT

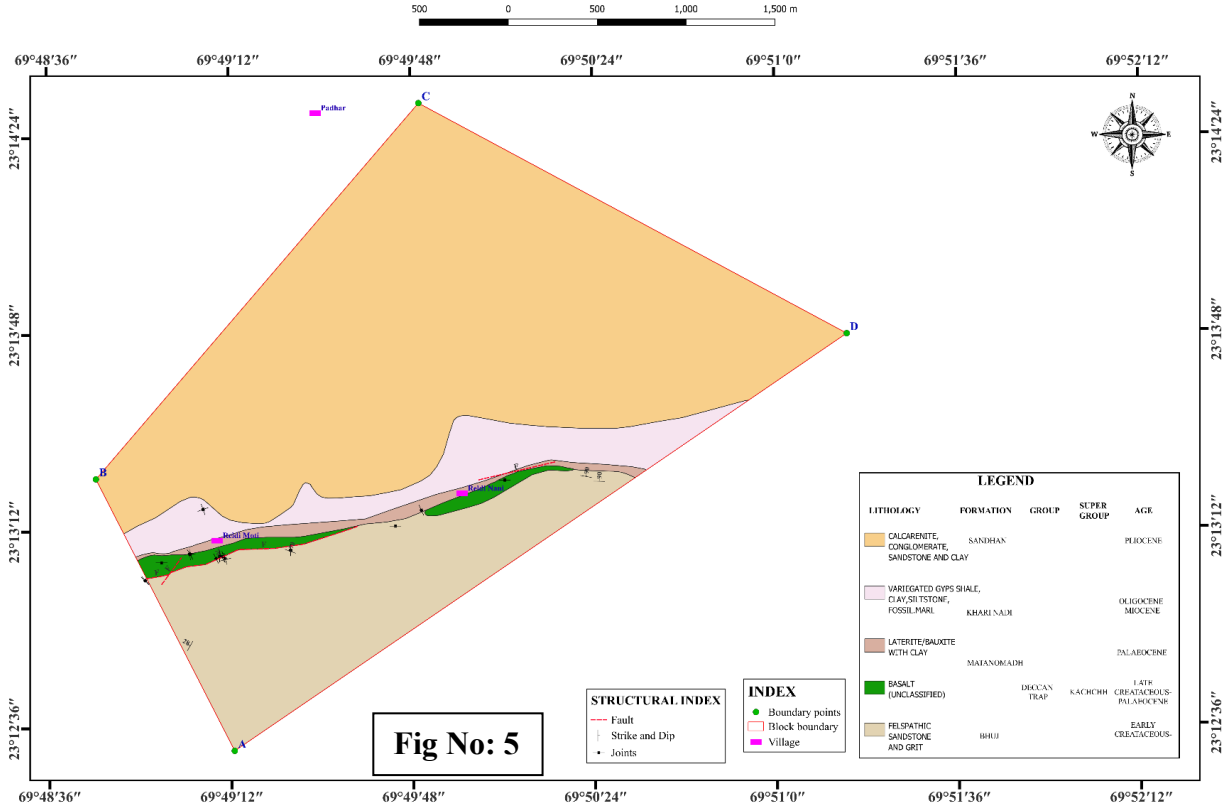


Fig No: 5

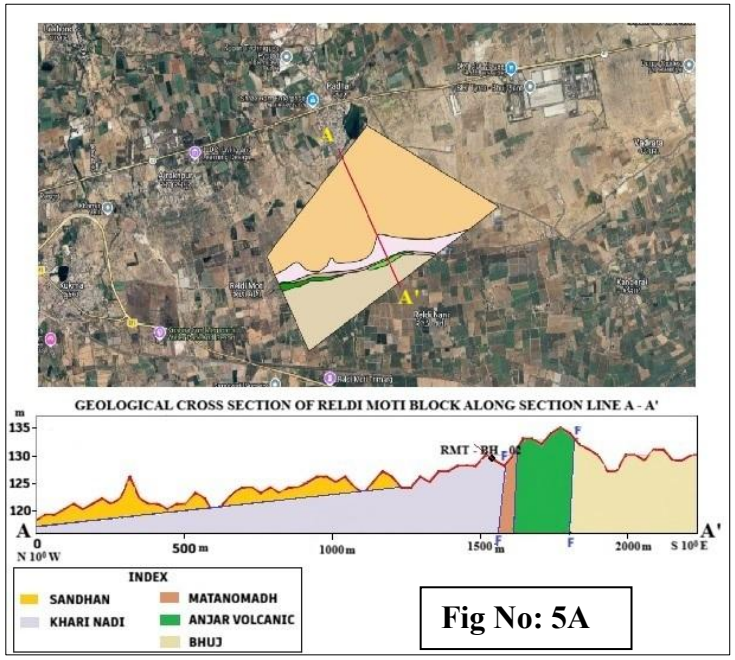
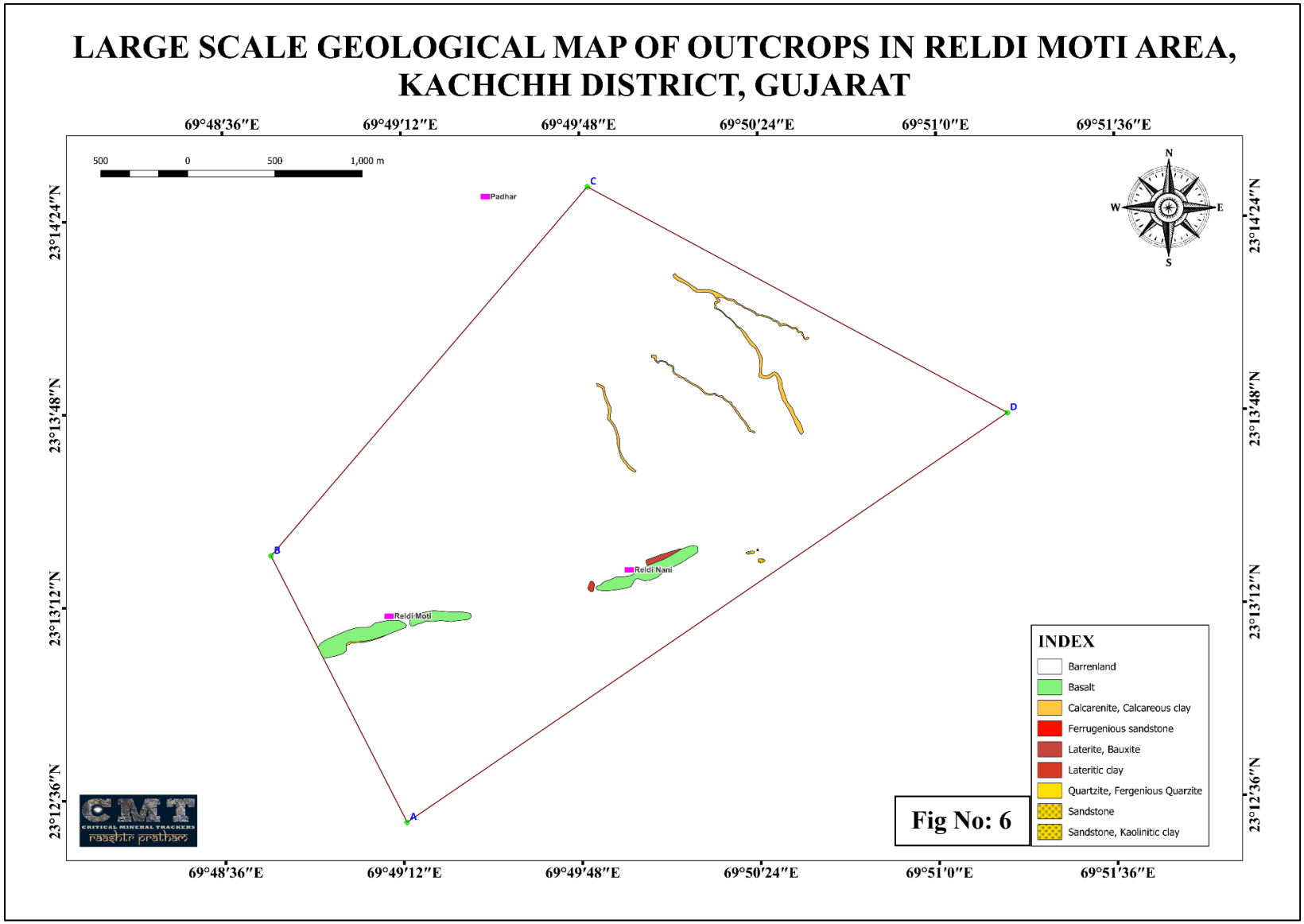


Fig No: 5A


LARGE SCALE GEOLOGICAL MAP OF OUTCROPS IN RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT
69°48′36″E
69°49′12″E
69°49′48″E
69°50′24″E
69°51′0″E
69°51′36″E
23°14′24″N
23°13′48″N
23°13′12″N
23°12′36″N
500 0 500 1,000 m
N
W
E
S
Padhar
Reldi Nani
Reldi Moti
A
B
C
D
INDEX
Barrenland
Basalt
Calcarenite, Calcareous clay
Ferrugenious sandstone
Laterite, Bauxite
Lateritic clay
Quartzite, Fergenious Quarzite
Sandstone
Sandstone, Kaolinitic clay
Fig No: 6

6.1.6 Pitting

Pitting, during the present exploration work, was undertaken to obtain fresh representative samples from a depth of 1 metre. A total of 20 pits were excavated using an excavator of JCB make, each measuring 1m × 1m × 1m, resulting in an individual volume of 1 m^3 and a cumulative excavated volume of 20 m^3. The pits provided fresh exposures of subsurface lithology and allowed for systematic sampling for subsequent geochemical analysis. Detailed litho-logs of Pits and assay values of pits are given in plates no: VII and VIII, respectively, on a 1:100 scale.

Table No:6.2

Pit locations (also shown in Annexure-11)

Sr No	Pit No	Coordinate in Degree Decimal Datum WGS-1984		No of samples collected
		Latitude(N)	Longitude(E)	1
1	P1/RB/2025	23.2188°	69.8152°	1
2	P2/RB/2025	23.2191°	69.8176°	1
3	P3/RB/2025	23.2196°	69.8144°	1
4	P4/RB/2025	23.2192°	69.8181°	1
5	P5/RB/2025	23.2207°	69.8178°	1
6	P6/RB/2025	23.2232°	69.8374°	1
7	P7/RB/2025	23.2233°	69.8378°	1
8	P8/RB/2025	23.2231°	69.8398°	1
9	P9/RB/2025	23.2234°	69.8427°	1
10	P10/RB/2025	23.221°	69.8306°	1
11	P11/RB/2025	23.2182°	69.8190°	1
12	P12/RB/2025	23.2201°	69.8312°	1
13	P13/RB/2025	23.223°	69.8337°	1
14	P14/RB/2025	23.2246°	69.8332°	1
15	P15/RB/2025	23.2241°	69.8334°	1
16	P16/RB/2025	23.2252°	69.8298°	1
17	P17/RB/2025	23.2244°	69.8370°	1
18	P18/RB/2025	23.2221°	69.8334°	1
19	P19/RB/2025	23.2197°	69.8202°	1
20	P20/RB/2025	23.219778°	69.8209°	1

LOCATION OF PIT & TRENCH ON LARGE SCALE GEOLOGICAL MAP OF RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT

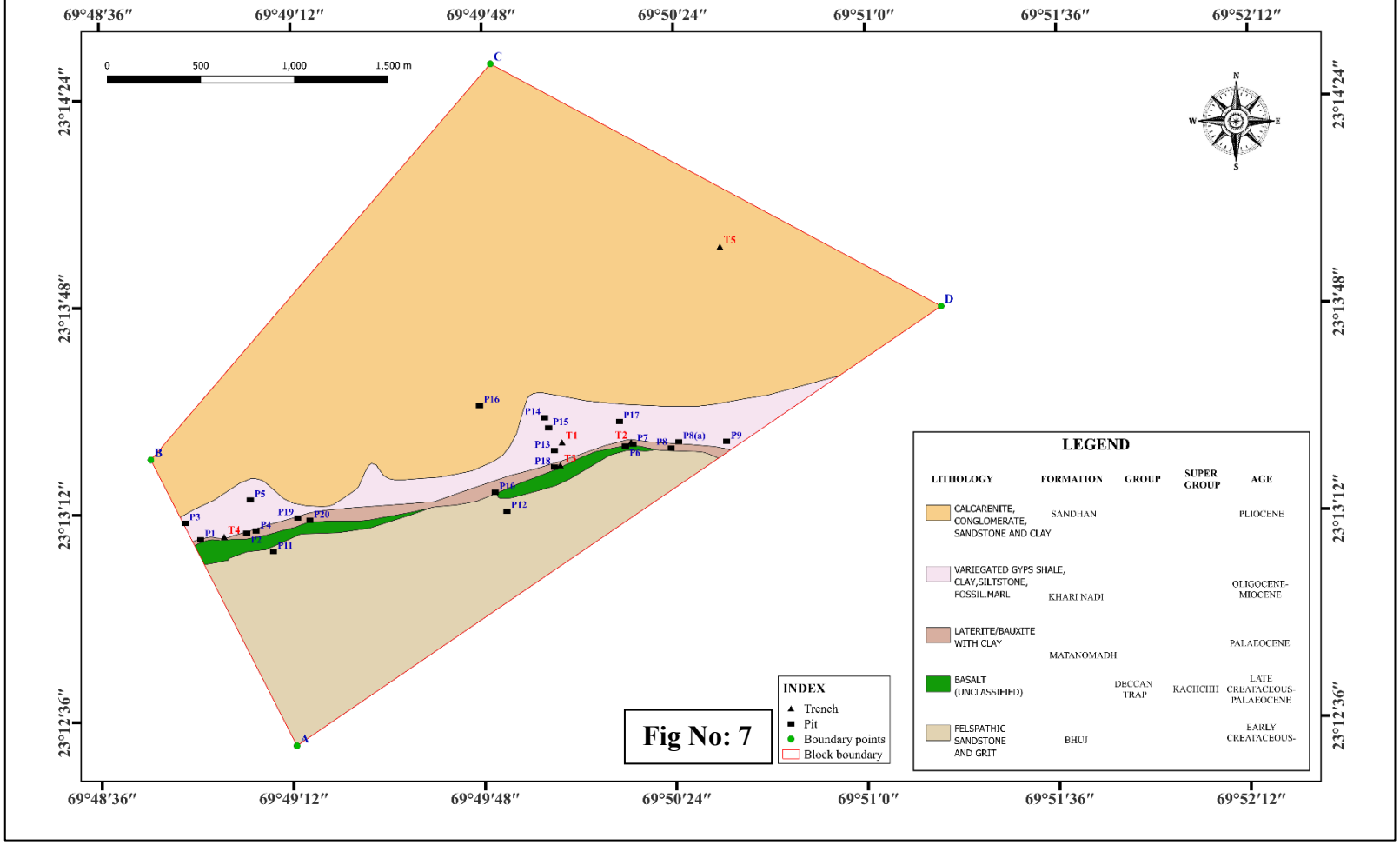
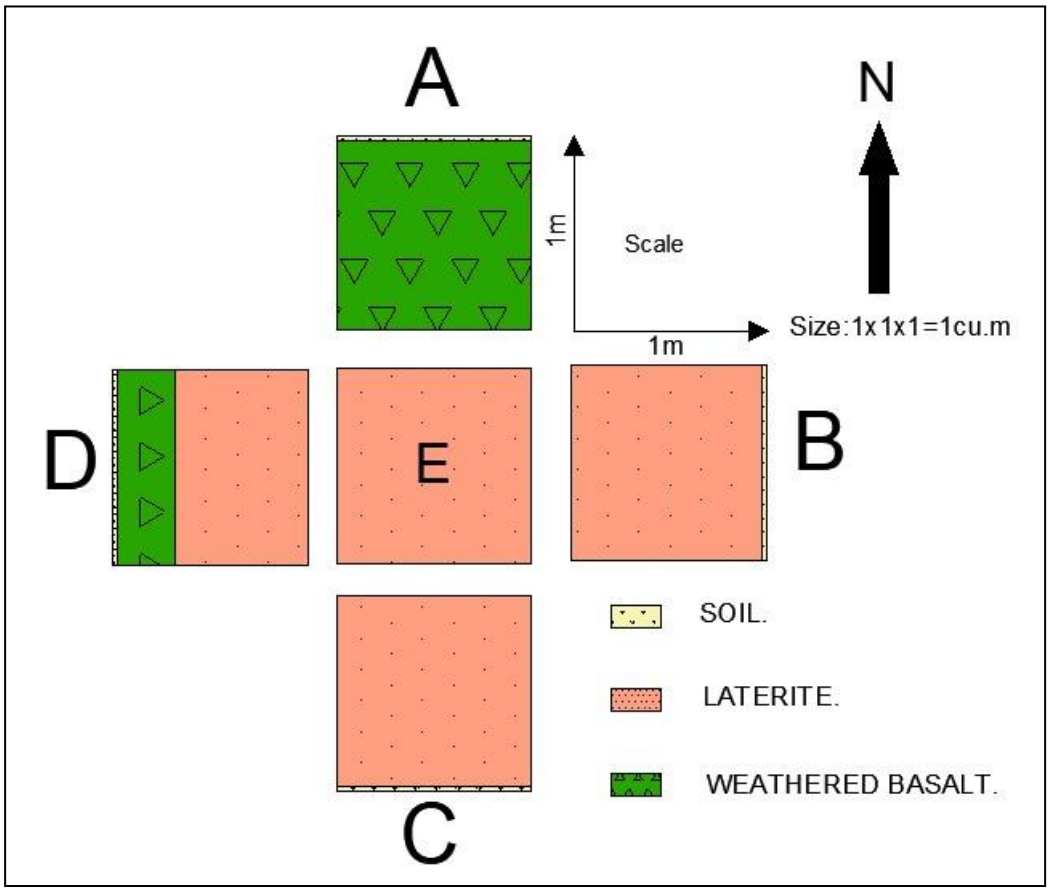


Fig No: 7

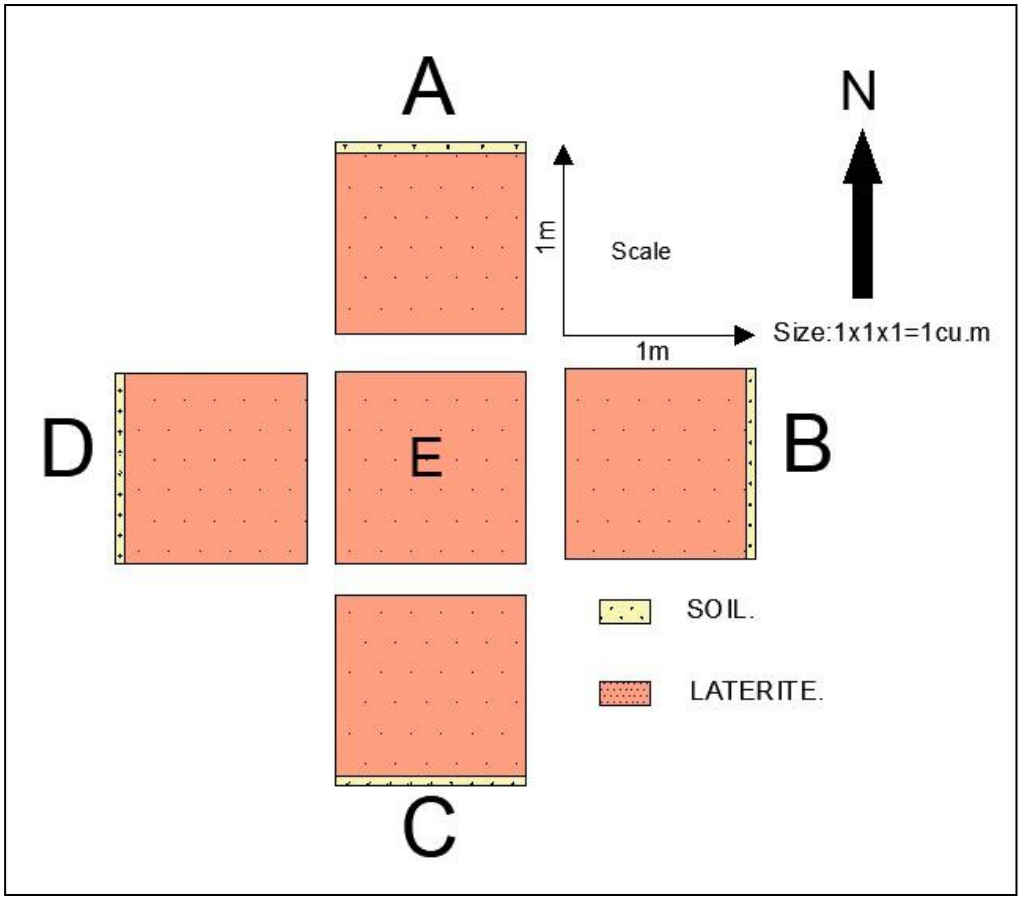
Photo 24: Photo of the Pit No. 7

A brief description of pit profiles is given below for 20 pits



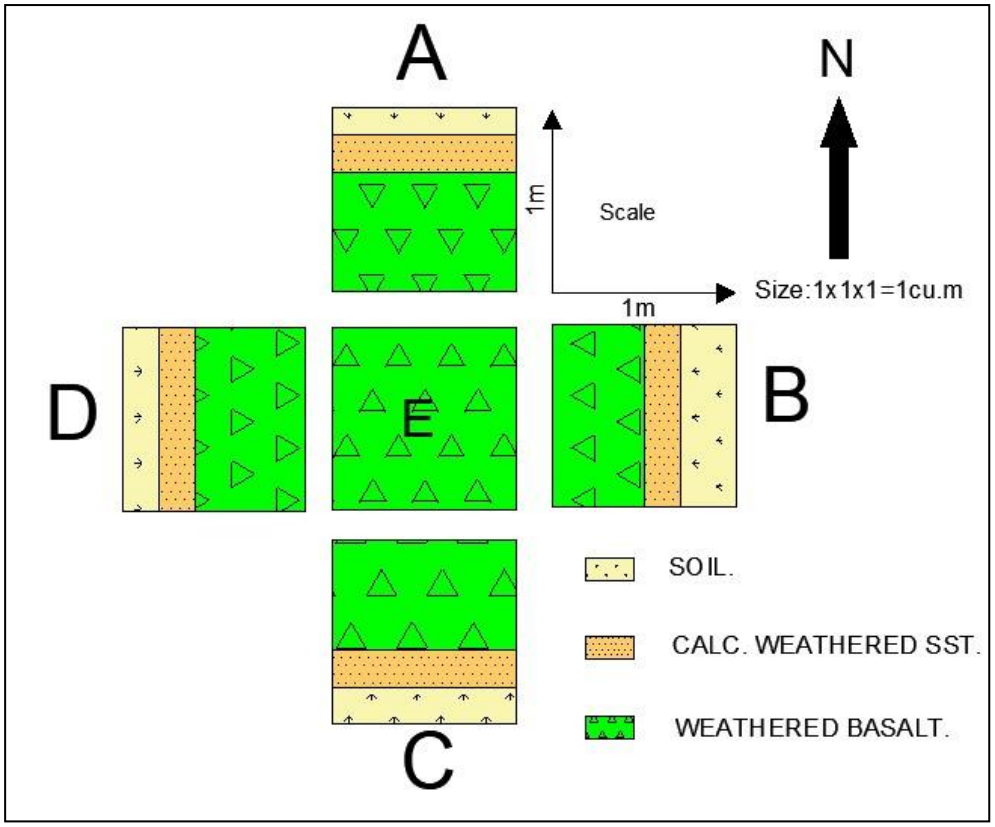
Details of Log of Pit no: P1/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P1/RB/2025	Date of closer: 03/04/2025
Location: 23.2188°N 69.8152°E	Elevation: 141m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santhosh, Geologists	
Lithology details: Laterite and Weathered basalt (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P1/RB/2025 Representative sample was collected from bottom E of Laterite.	



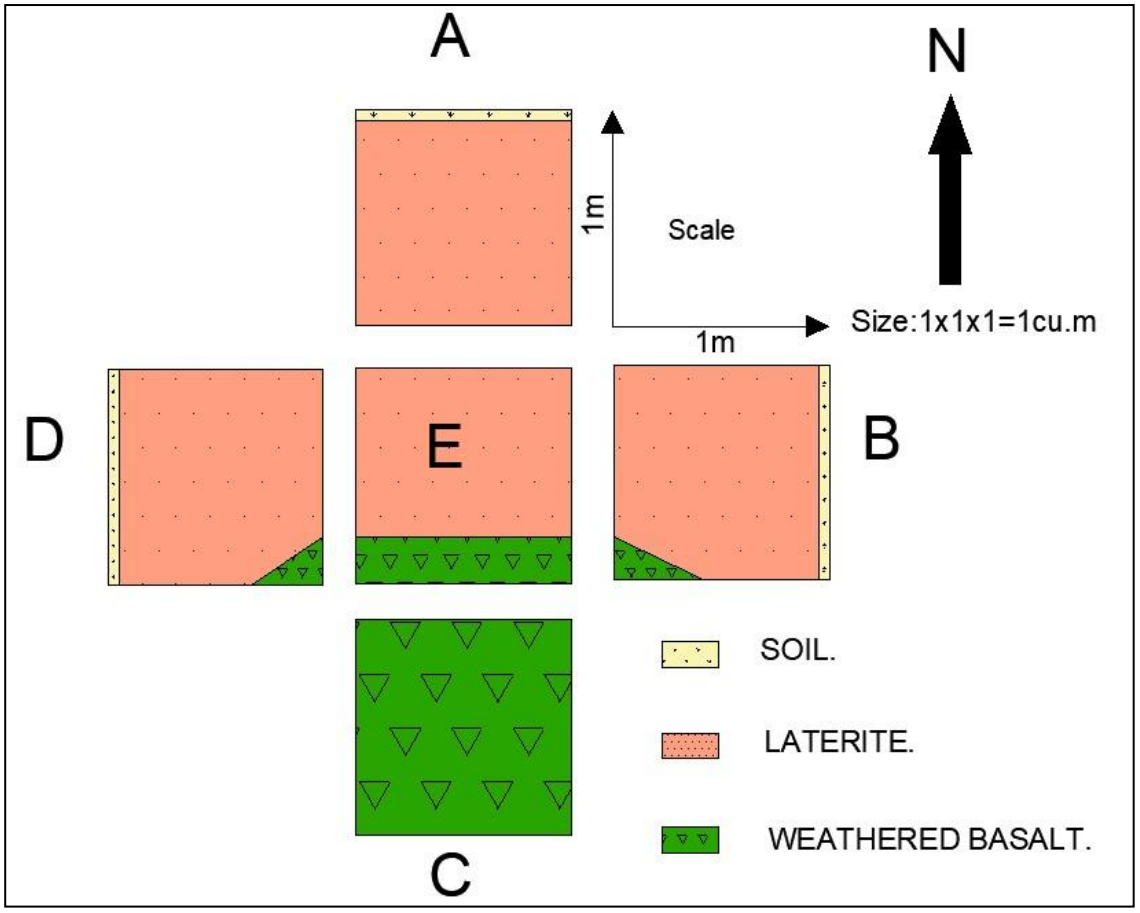
Details of Log of Pit no: P2/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P2/RB/2025	Date of closer: 03/04/2025
Location: 23.2191°N 69.8176°E	Elevation: 138m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santhosh, Geologists	
Lithology details: Dark grey laterite (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P2/RB/2025, Representative sample was collected from bottom E of Laterite.	



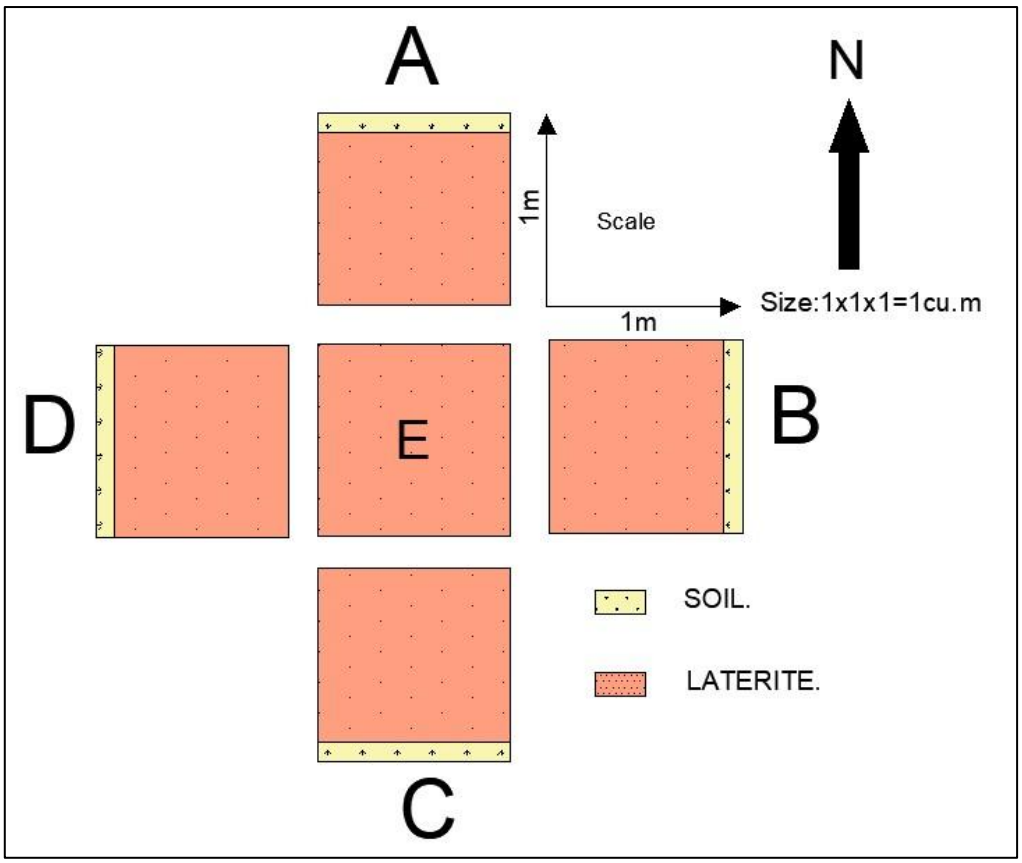
Details of Log of Pit no: P3/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P3/RB/2025	Date of closer: 03/04/2025
Location: 23.2196°N 69.8144°E	Elevation: 135m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santhosh, Geologists	
Lithology details: Calcareous sandstone and weathered basalt (Khari Nadi formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P3/RB/2025, representative sample was collected from bottom E of basalt.	



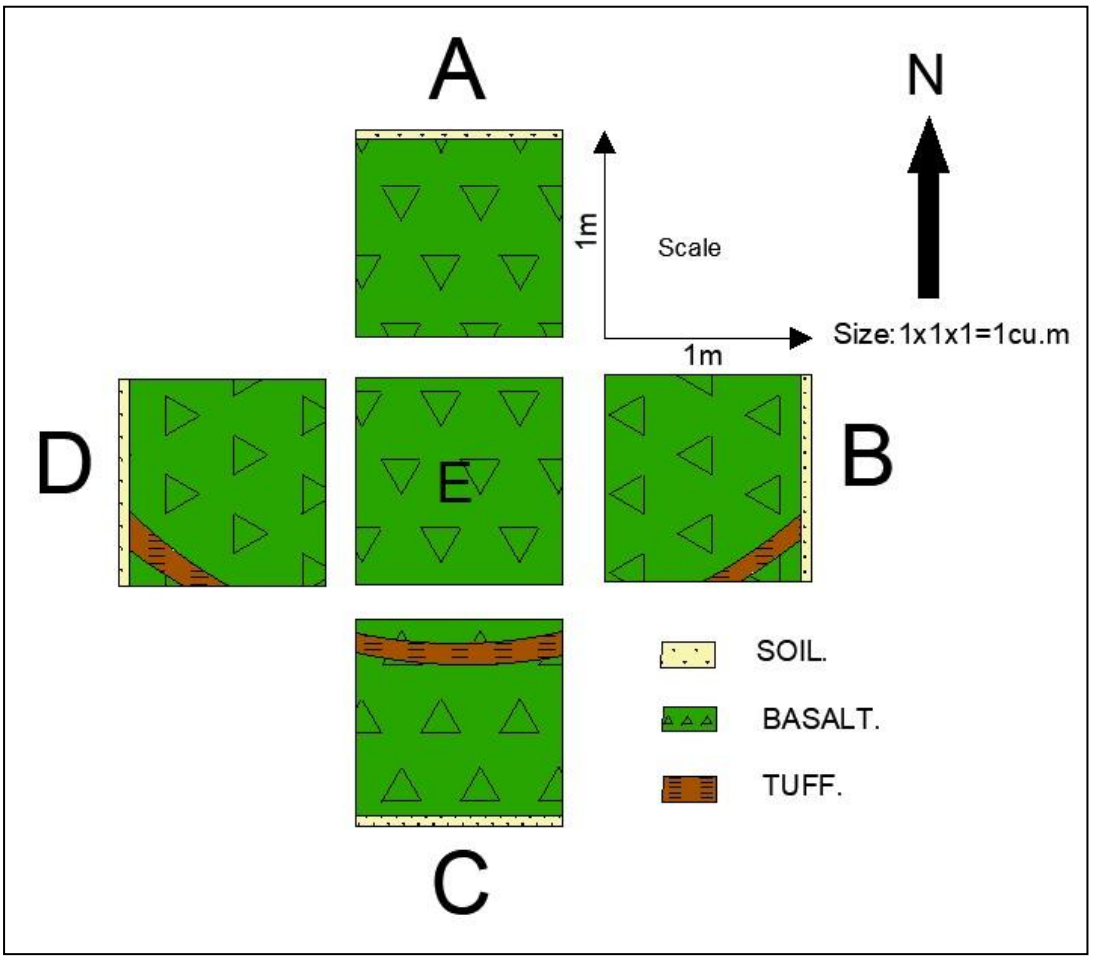
Details of Log of Pit no: P4/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P4/RB/2025	Date of closer: 03/04/2025
Location: 23.2192°N 69.8181°E	Elevation: 141m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & B. Mahesh, Geologists	
Lithology details: Red Laterite and greenish grey basalt (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P4/RB/2025, representative sample was collected from bottom E of Laterite.	



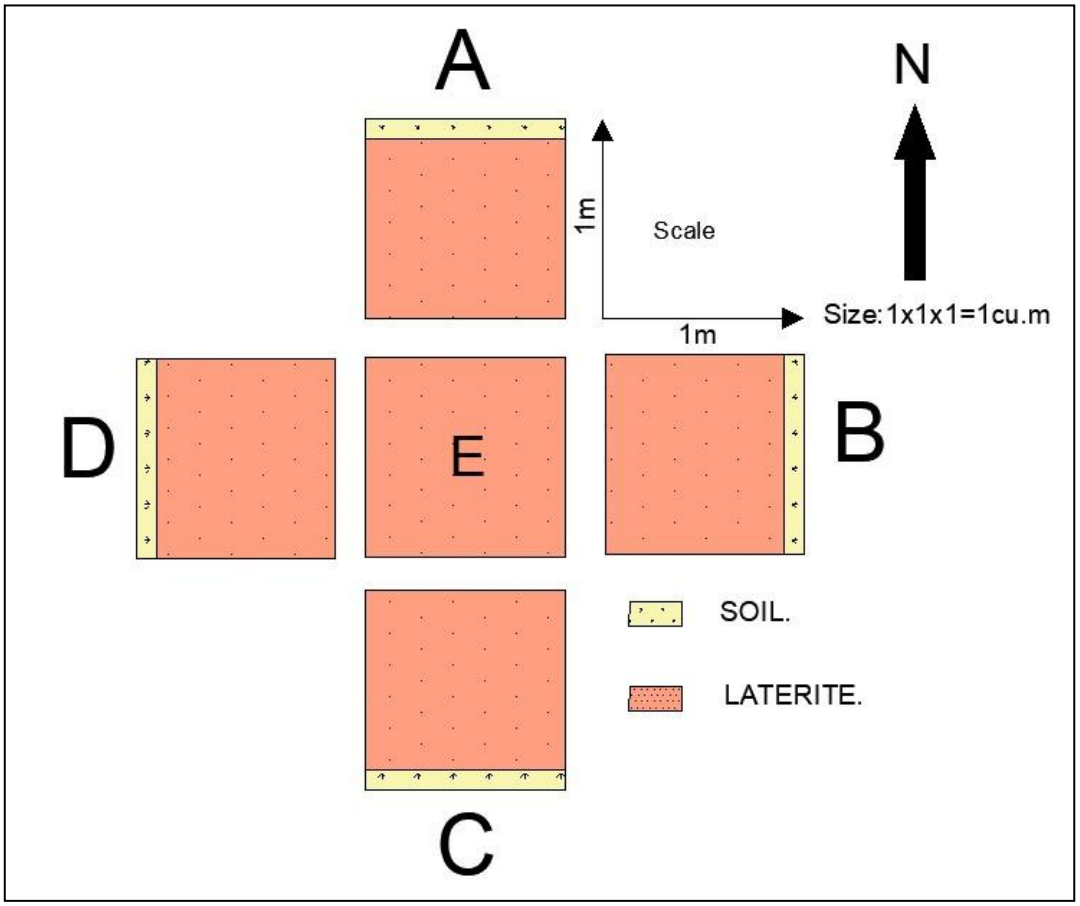
Details of Log of Pit no: P5/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P5/RB/2025	Date of closer: 03/04/2025
Location: 23.2207°N 69.8178°E	Elevation: 139m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santosh, Geologists	
Lithology details: Calcareous Sandstone (Sandhan formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P5/RB/2025, representative sample was collected from bottom E of Calcareous Sandstone	



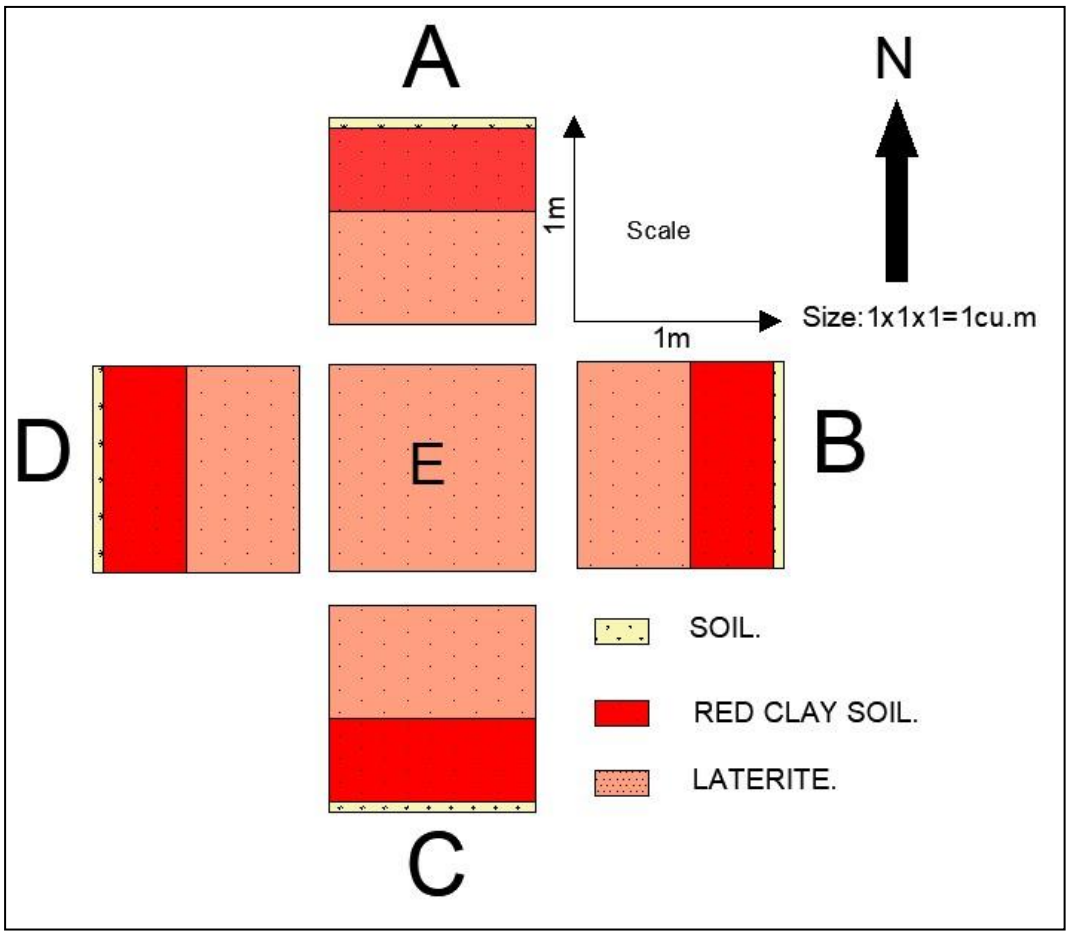
Details of Log of Pit no: P6/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P6/RB/2025	Date of closer: 03/04/2025
Location: 23.2232°N 69.8374°E	Elevation: 128m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santhosh, Geologists	
Lithology details: Basalt. (Anjar Volcanics formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P6/RB/2025, Representative sample was collected from bottom E of basalt.	



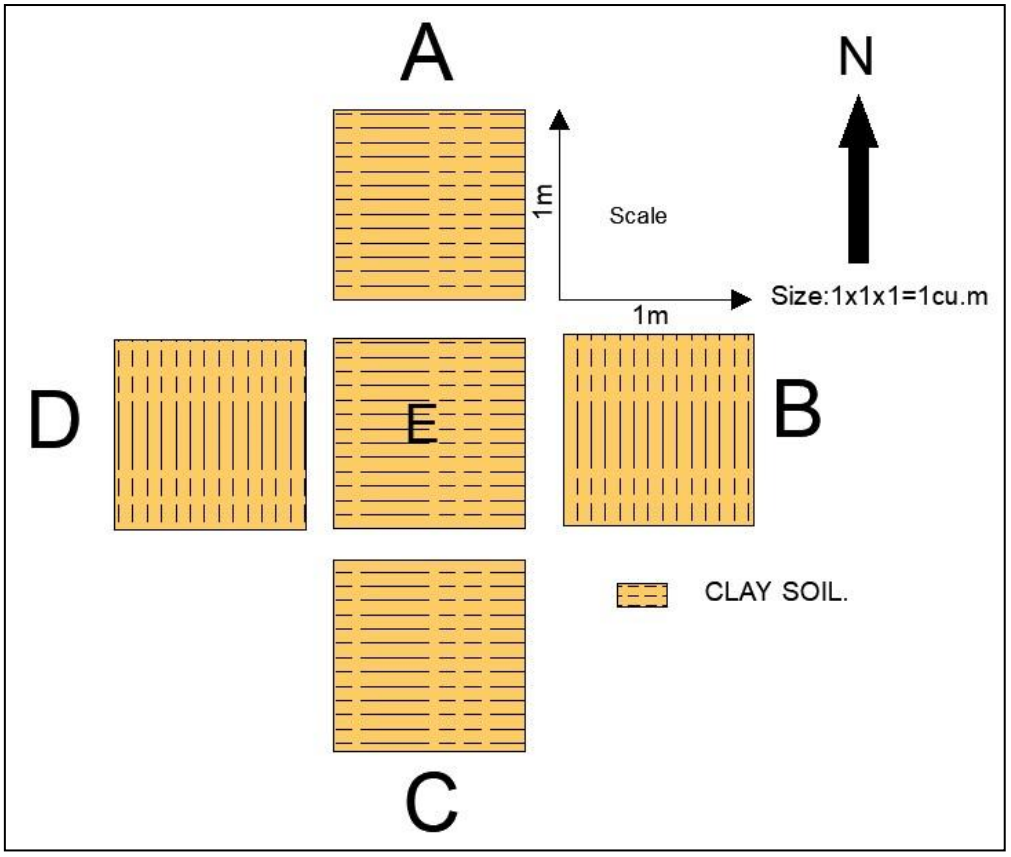
Details of Log of Pit no: P7/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P7/RB/2025	Date of closer: 03/04/2025
Location: 23.2233°N 69.8378°E	Elevation: 144.7m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santosh, Geologists	
Lithology details: Laterite (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P7/RB/2025 representative sample was collected from bottom E of siltstone yellowish white	



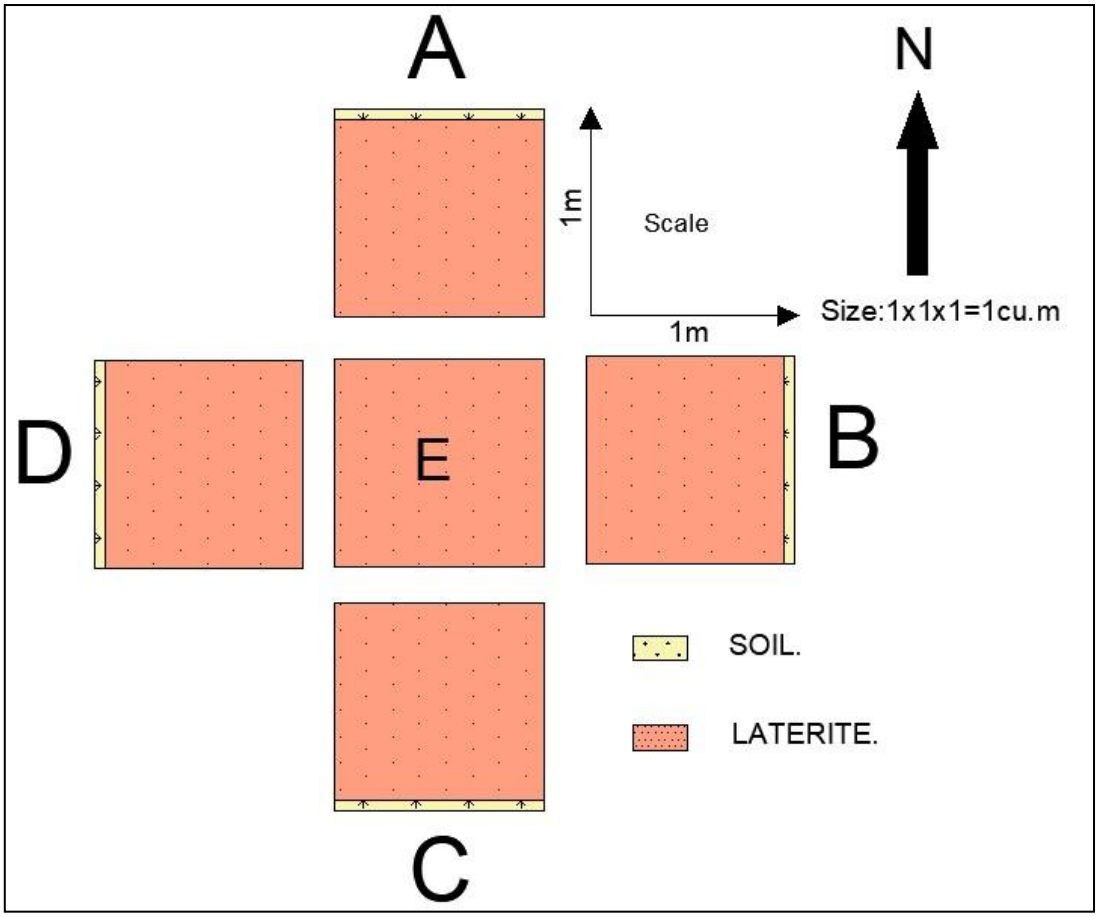
Details of Log of Pit no: P8/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P8/RB/2025	Date of closer: 03/04/2025
Location: 23.2231°N 69.8398°E	Elevation: 124m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & B. Mahesh, Geologists	
Lithology details: Aluminous laterite and red clay soil. (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P8/RB/2025 Representative sample was collected from bottom E of Aluminous laterite.	



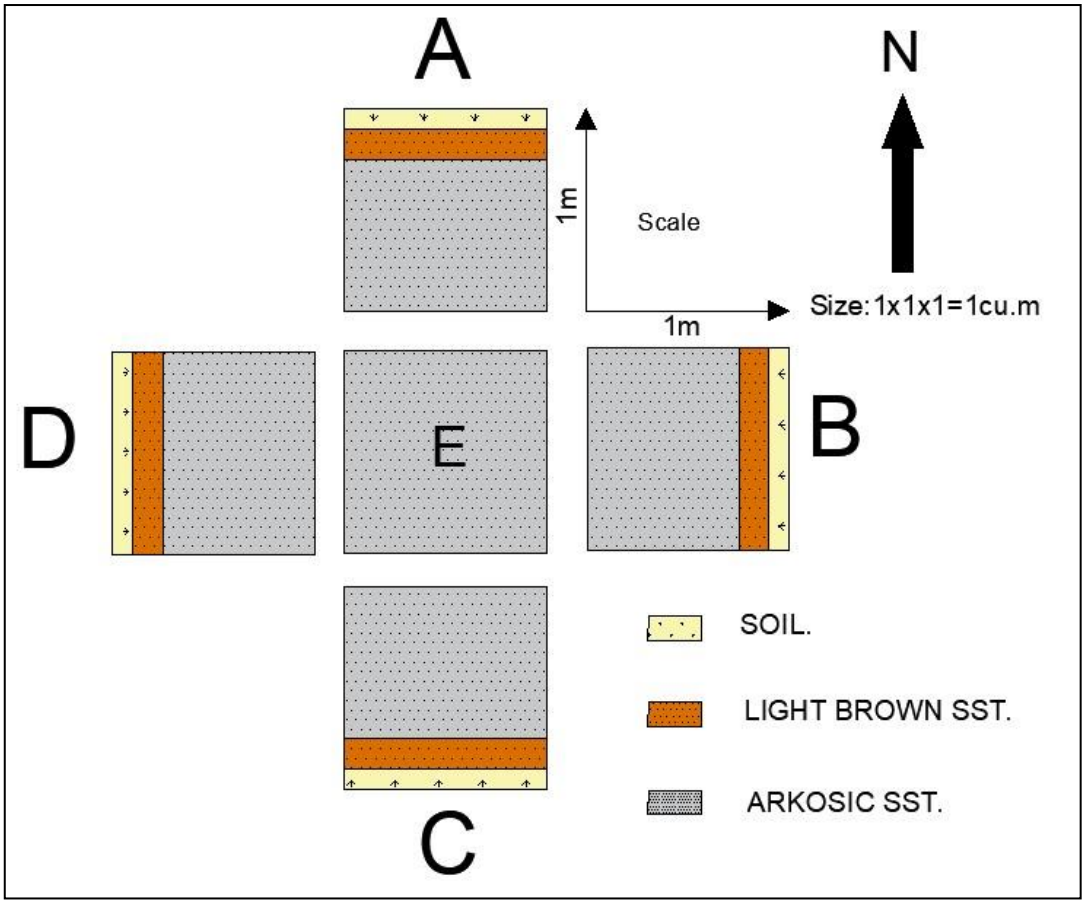
Details of Log of Pit no: P9/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 03/04/2025
Pit no: P9/RB/2025	Date of closer: 03/04/2025
Location: 23.2234°N 69.8427°E	Elevation: 129m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & B. Mahesh, Geologists	
Lithology details: Clay soil (Khari Nadi formation).	
Log of pit: A, B, C, D are the side sections and E plan view of the bottom of the pit.	
Sample no: P9/RB/2025, representative sample was collected from the bottom E of the Clay soil	



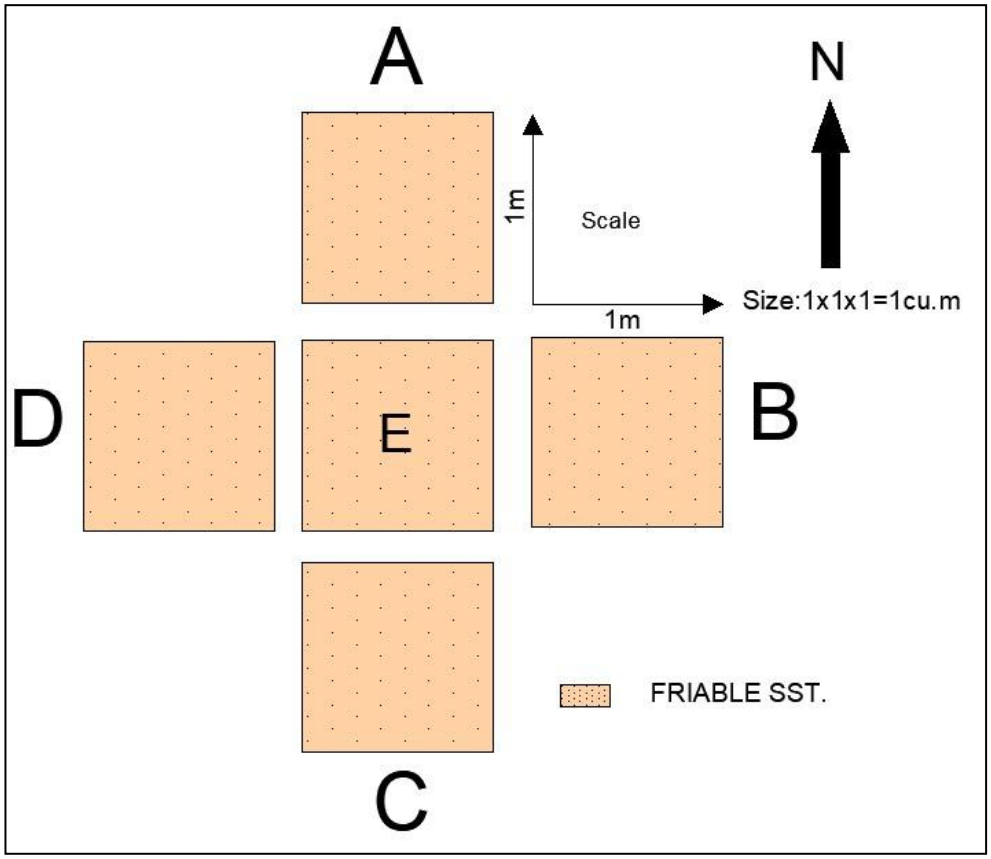
P10/RB/2025 Details of Log of Pit no:

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P10/RB/2025	Date of closer: 04/04/2025
Location: 23.2210°N 69.8306°E	Elevation: 124m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar &V. Santosh, Geologists	
Lithology details: Aluminous laterite (Matanomadh formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P10/RB/2025, representative sample was collected from bottom E of brick red Aluminous laterite	



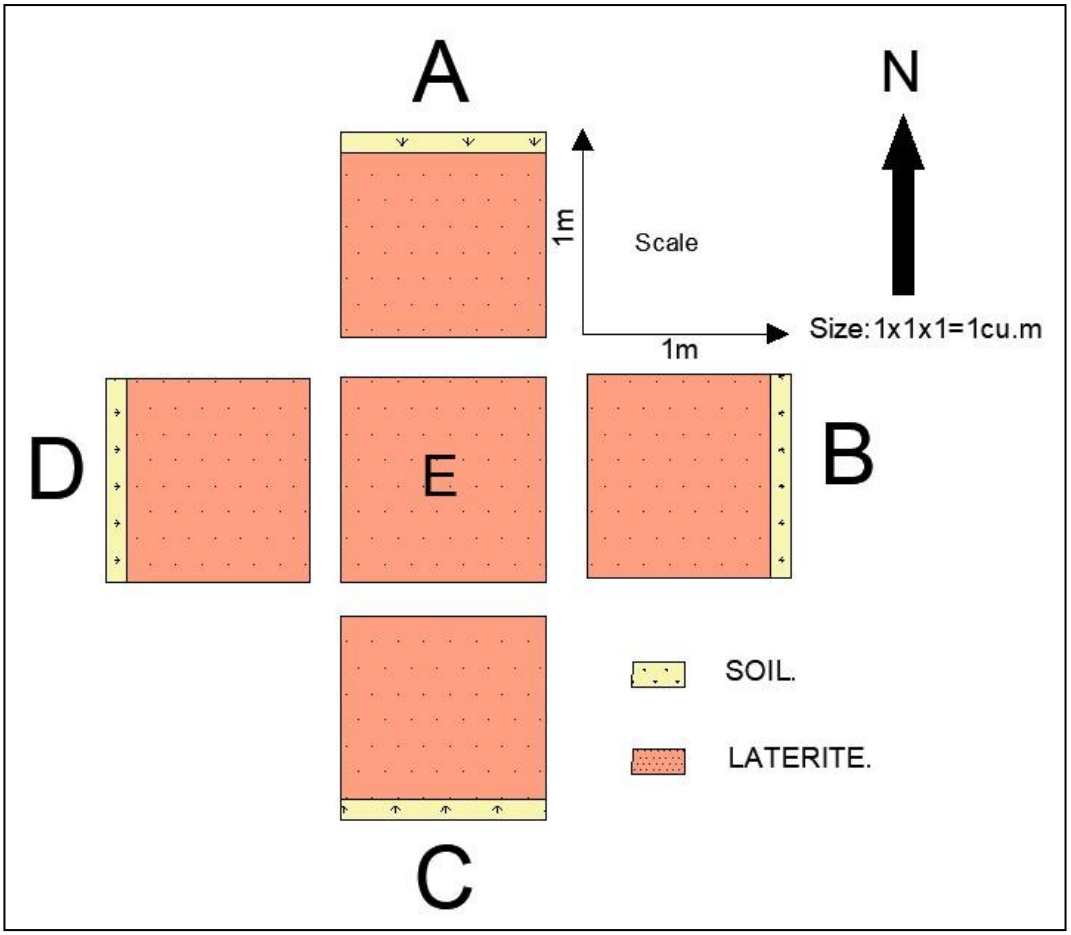
Details of Log of Pit no: P11/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P11/RB/2025	Date of closer: 04/04/2025
Location: 23.2182°N 69.8190°E	Elevation: 137m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & V. Santhosh, Geologists	
Lithology details: Light brown Sandstone and Arkosic Sandstone (Bhuj formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P11/RB/2025, representative sample was collected from bottom E of Arkosic Sandstone.	



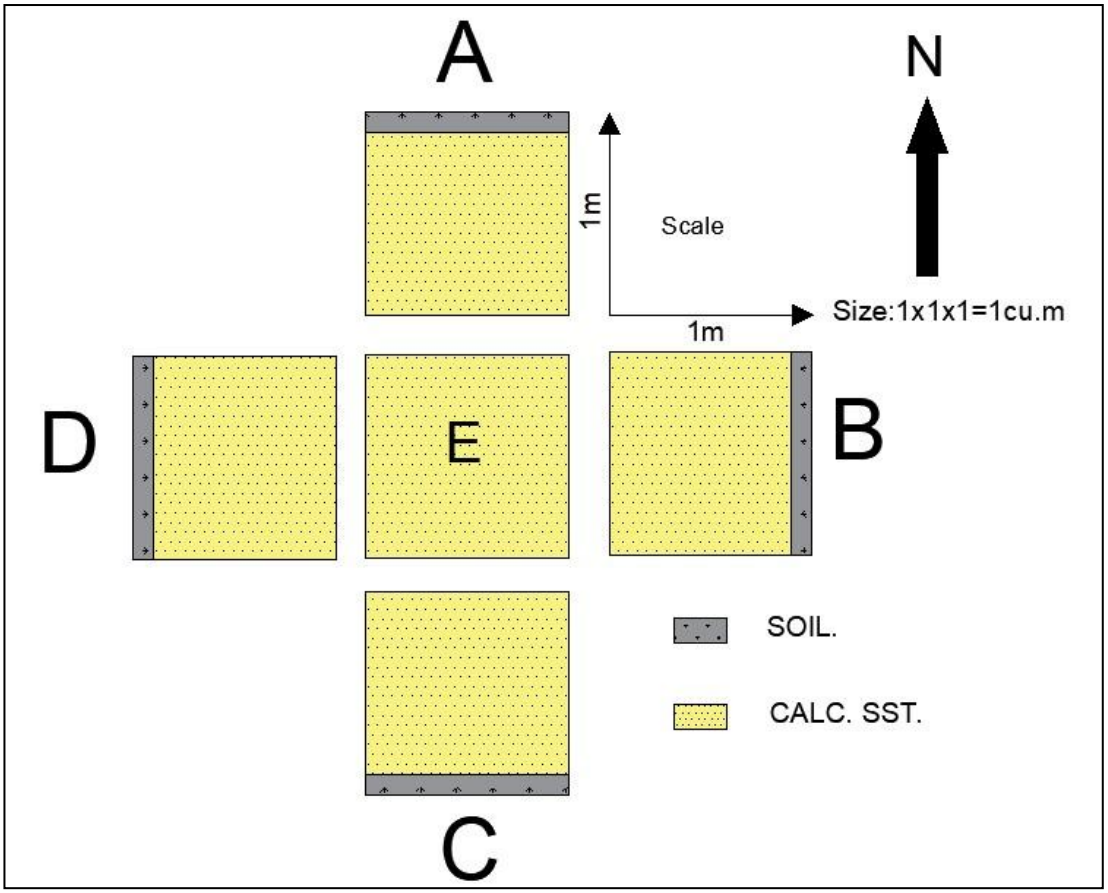
Details of Log of Pit no: P12/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P12/RB/2025	Date of closer: 04/04/2025
Location: 23.2201°N 69.8312°E	Elevation: 129m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santhosh & V. Siva Kumar, Geologists	
Lithology details: Friable Sandstone (Bhuj formation)	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P12/RB/2025, representative sample was collected from bottom E of fine-grained sandstone	



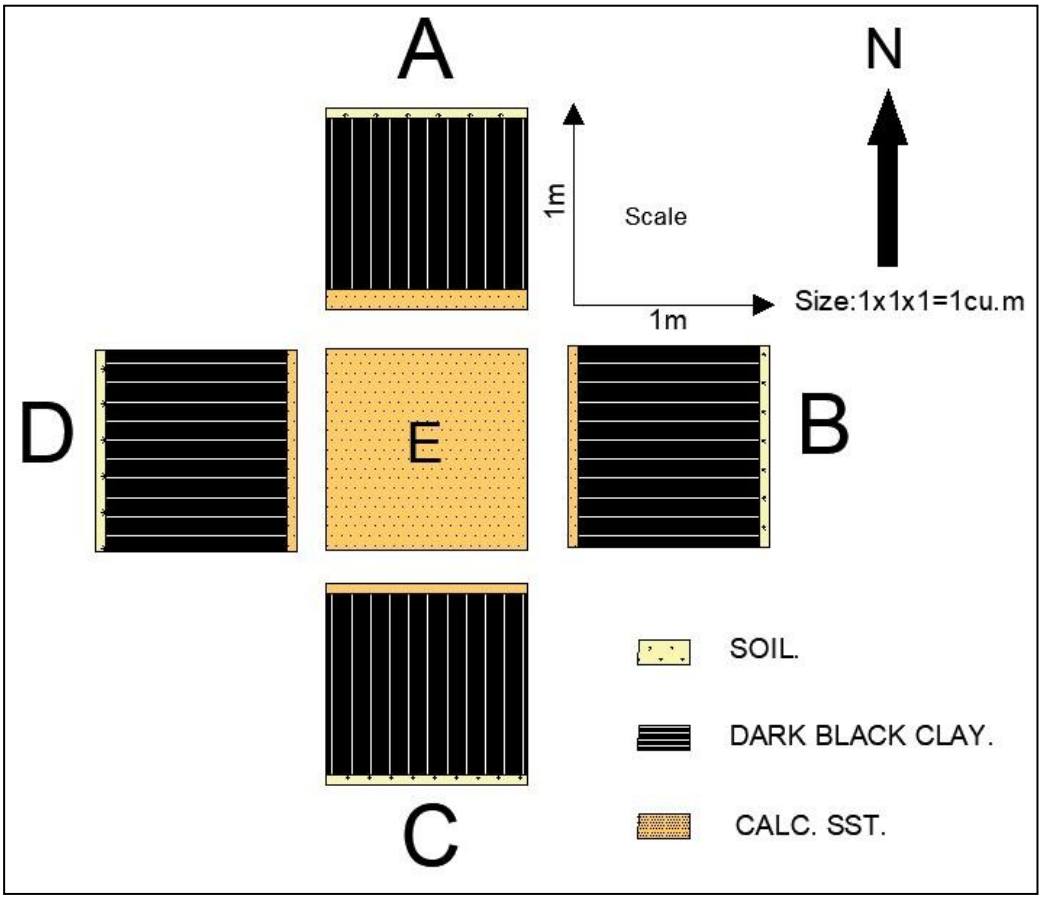
Details of Log of Pit no: P13/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P13/RB/2025	Date of closer: 04/04/2025
Location: 23.2230N° 69.8337°E	Elevation:132 m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh & V. Siva Kumar, Geologists	
Lithology details: Red Laterite (Matanomadh formation)	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P13/RB/2025, representative sample was collected from bottom E of Red Laterite	



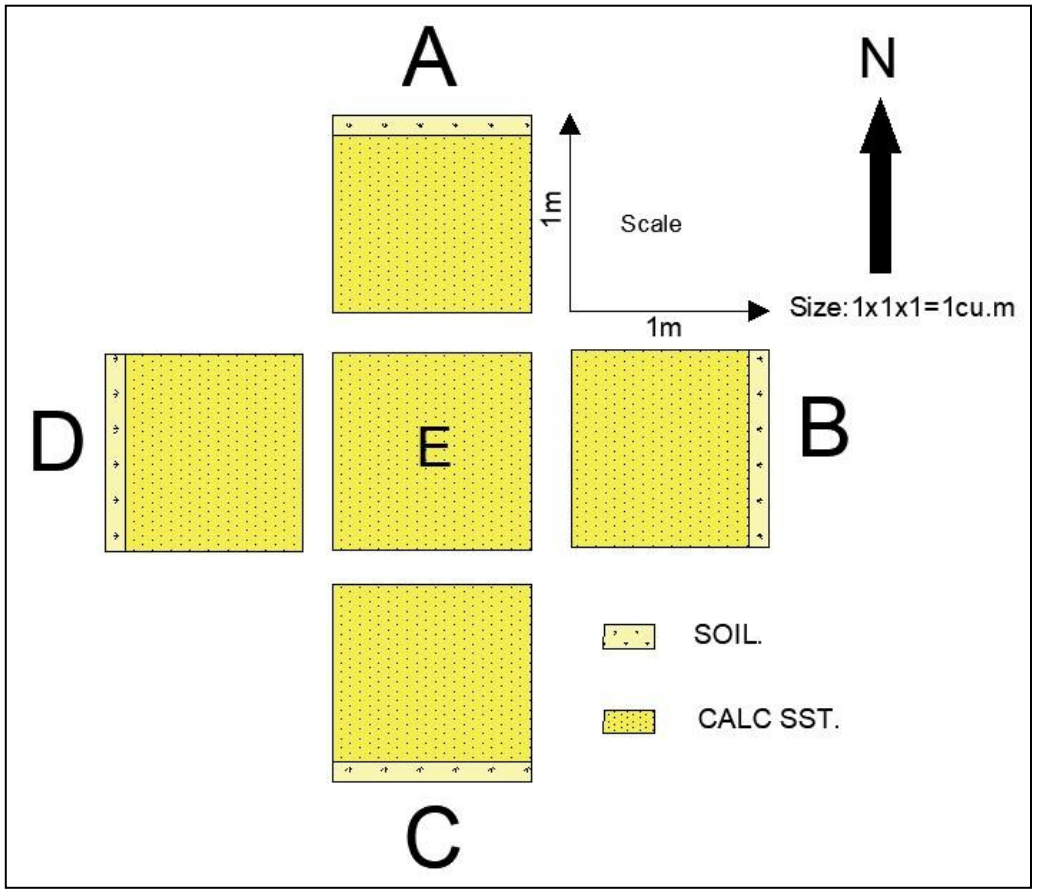
Details of Log of Pit no: P14/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P14/RB/2025	Date of closer: 04/04/2025
Location: 23.2246°N 69.8332°E	Elevation: 127m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santhosh & V. Siva Kumar, Geologists	
Lithology details: Medium to coarse grained Calcareous Sandstone yellowish white.	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P14/RB/2025, representative sample was collected from bottom E of Calcareous sandstone (Sandhan formation)	



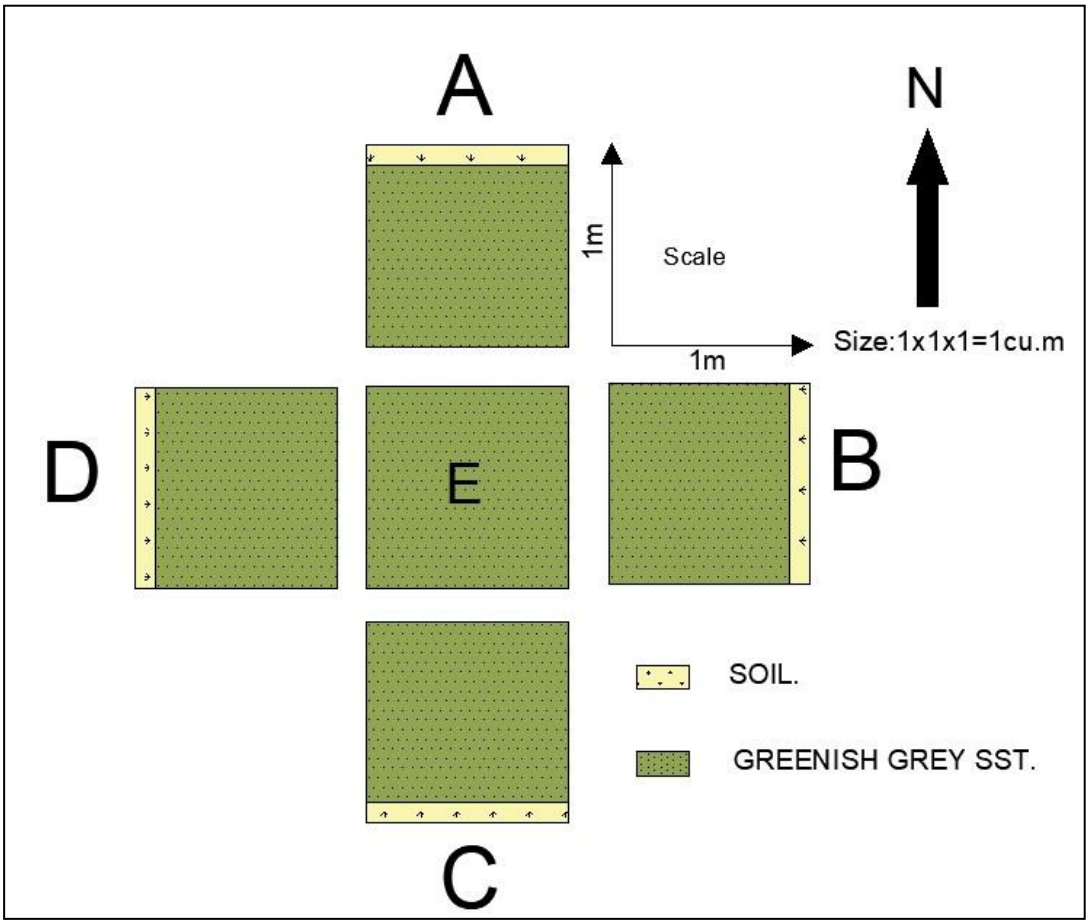
Details of Log of Pit no: P15/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 04/04/2025
Pit no: P15/RB/2025	Date of closer: 04/04/2025
Location: 23.2241°N 69.8334°E	Elevation: 127m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh & V. Siva Kumar, Geologists	
Lithology details: Dark Black sticky clay and Calcareous Sandstone. (Sandhan formation)	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P15/RB/2025, representative sample was collected from bottom E of Calcareous Sandstone.	



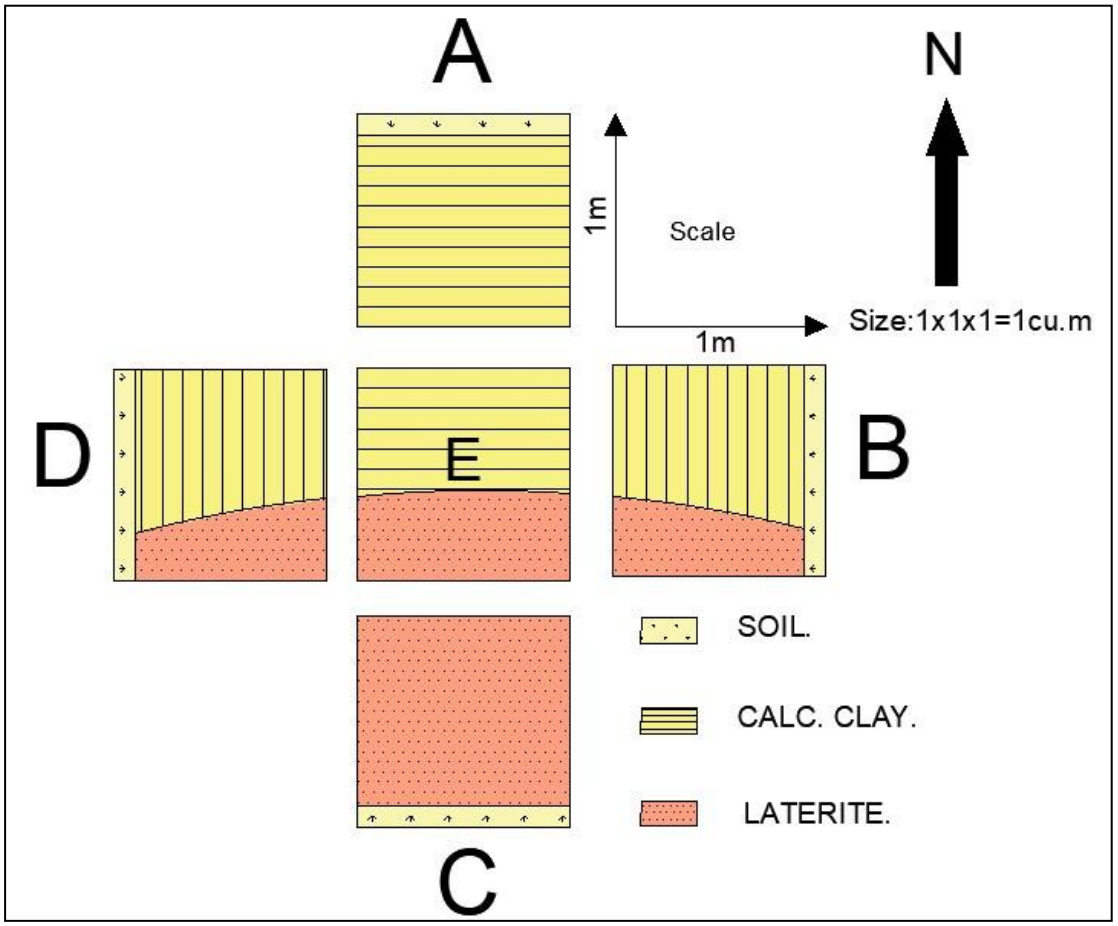
Details of Log of Pit no: P16/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 05/04/2025
Pit no: P16/RB/2025	Date of closer: 05/04/2025
Location: 23.2252°N 69.8298°E	Elevation: 120m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh & V. Siva Kumar, Geologists	
Lithology details: Sandy soil Calcareous in nature (Sandhan formation).	
Log of pit: A, B, C, D are side sections and E plan view is bottom of the pit.	
Sample no: P16/RB/2025, a representative sample was collected from bottom E of Calcareous Sandstone.	



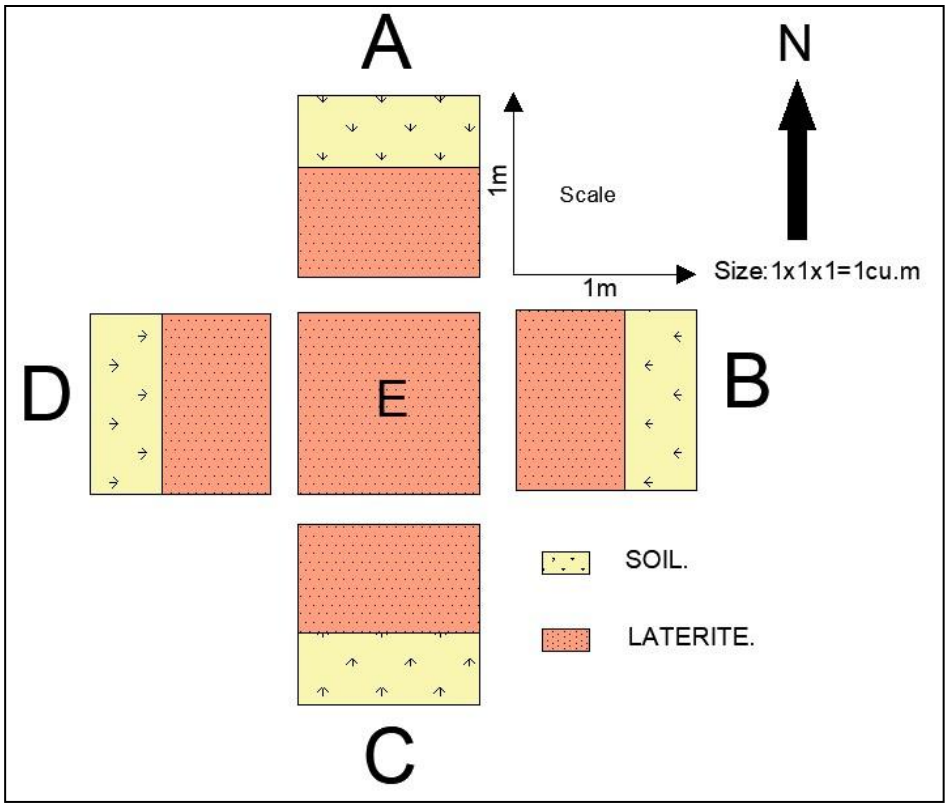
Details of Log of Pit no: P17/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 05/04/2025
Pit no: P17/RB/2025	Date of closer: 05/04/2025
Location: 23.2244°N 69.8370°E	Elevation: 123m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Siva Kumar & B. Mahesh, Geologists	
Lithology details: Greenish Grey Sandstone (Khari Nadi formation).	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P17/RB/2025, representative sample was collected from bottom E of Sandstone	



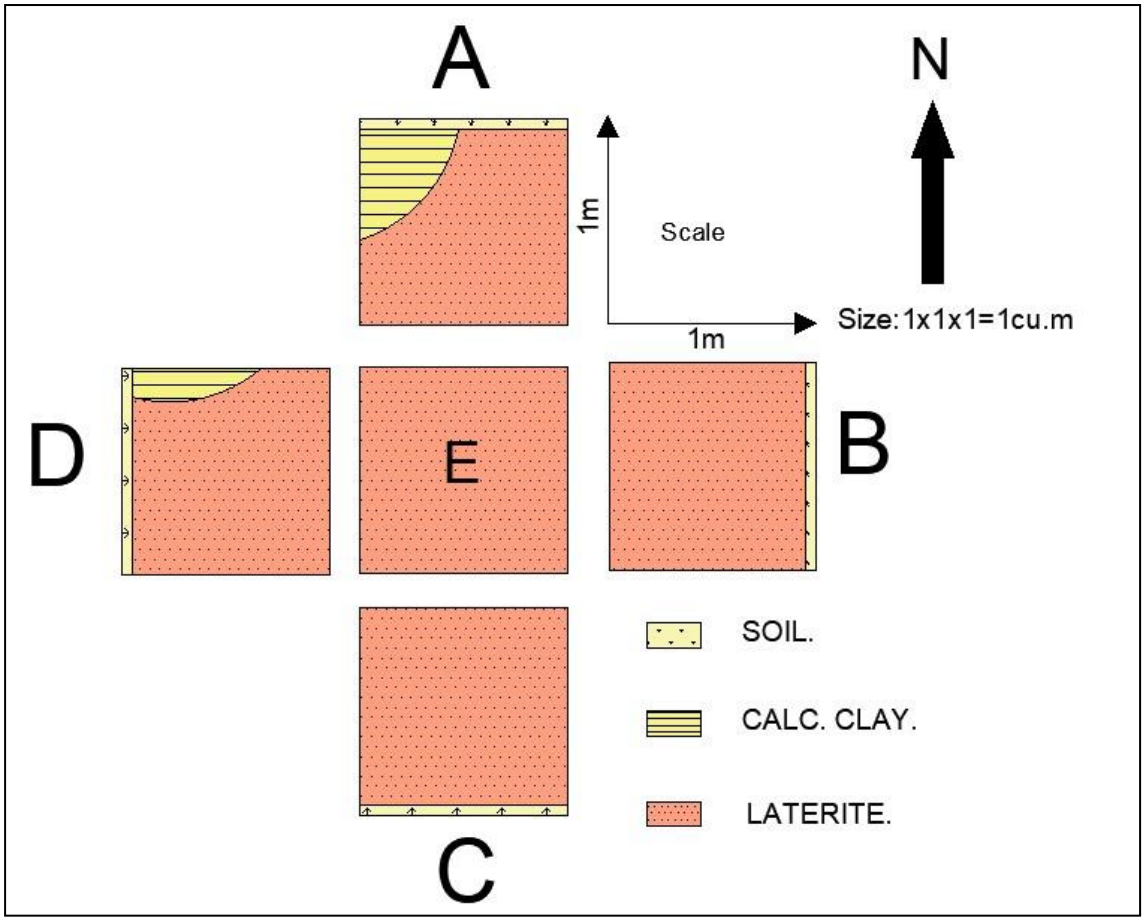
Details of Log of Pit no: P18/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 06/04/2025
Pit no: P18/RB/2025	Date of closer: 06/04/2025
Location: 23.2221°N 69.8334°E	Elevation: 140m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh & V. Siva Kumar, Geologists	
Lithology details: Calcareous Clay and Laterite (Matanomadh formation)	
Structural details:	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P18/RB/2025, representative sample was collected from bottom E of Calcareous Clay and Laterite	



Details of Log of Pit no: P19/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 07/04/2025
Pit no: P19/RB/2025	Date of closer: 07/04/2025
Location: 23.2198°N 69.8202°E	Elevation: 129m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh &V. Siva Kumar, Geologists	
Lithology details: Laterite (Matanomadh formation)	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P19/RB/2025, representative sample was collected from bottom E of Laterite.	



Details of Log of Pit no: P20/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti & REE.	Date of start: 07/04/2025
Pit no: P20/RB/2025	Date of closer: 07/04/2025
Location: 23.2197°N 69.8209°E	Elevation: 128m
Pit top measurement: a. Length: 1m b. Breadth: 1m	Pit bottom measurement: a. Length: 1m b. Breadth: 1m c. Depth: 1m
Recorded by: V. Santosh & V. Siva Kumar, Geologists	
Lithology details: Calcareous clay and Laterite.	
Log of pit: A, B, C, D are side section and E plan view is bottom of the pit.	
Sample no: P20/RB/2025, representative sample was collected from bottom E of Laterite.	

6.1.7 Trenching:

A total of five trenches were excavated in the study area, each measuring 10m in length, 1m in width, and 1m in depth, amounting to a cumulative excavated volume of 50 m^3. After excavation, the trench walls and floor were thoroughly cleaned to expose fresh, undisturbed lithology. From each trench, 10 representative channel samples (marked as T3/RB/2025/1 to 10) were collected systematically from the floor (E) at 1-metre intervals. In addition, four wall samples were obtained—one from each exposed face of the trench—labelled as A, B, C, and D (marked as T3/RB/2025/A, B, C, and D). This sampling approach ensured comprehensive coverage of both lateral and vertical lithological variations within the trench. Detailed litho-logs of trenches and assay values of trenches are given in plate no: IX,X respectively on 1:100 scale

Table No: 6.3

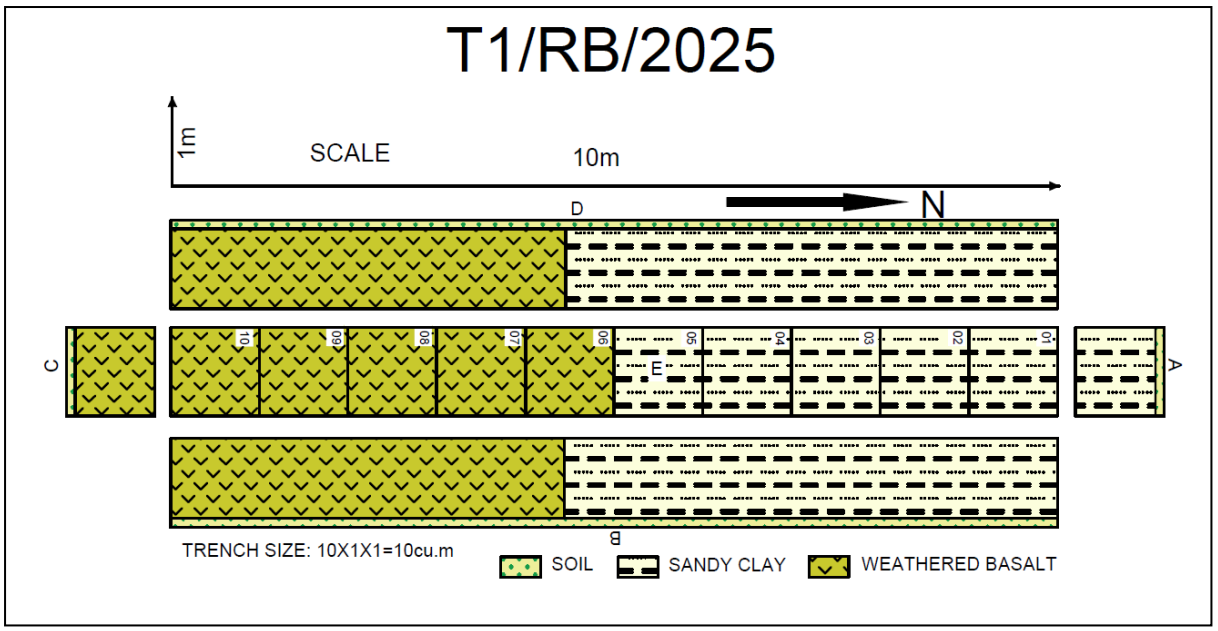
The location of the trenches

Sr No	Trench	Coordinate in Degree Decimal Datum WGS-1984		No of Samples Collected
		Longitude	Latitude	
1	T1/RB/2025	23.2234°	69.8340°	14
2	T2/RB/2025	23.2234°	69.8377°	14
3	T3/RB/2025	23.2224°	69.8340°	14
4	T4/RB/2025	23.2189°	69.8164°	14
5	T5/RB/2025	23.2328°	69.8424°	14

Photo 25: Image showing trench No T3/RB/2025 in the study area (Size 10*1*1m)

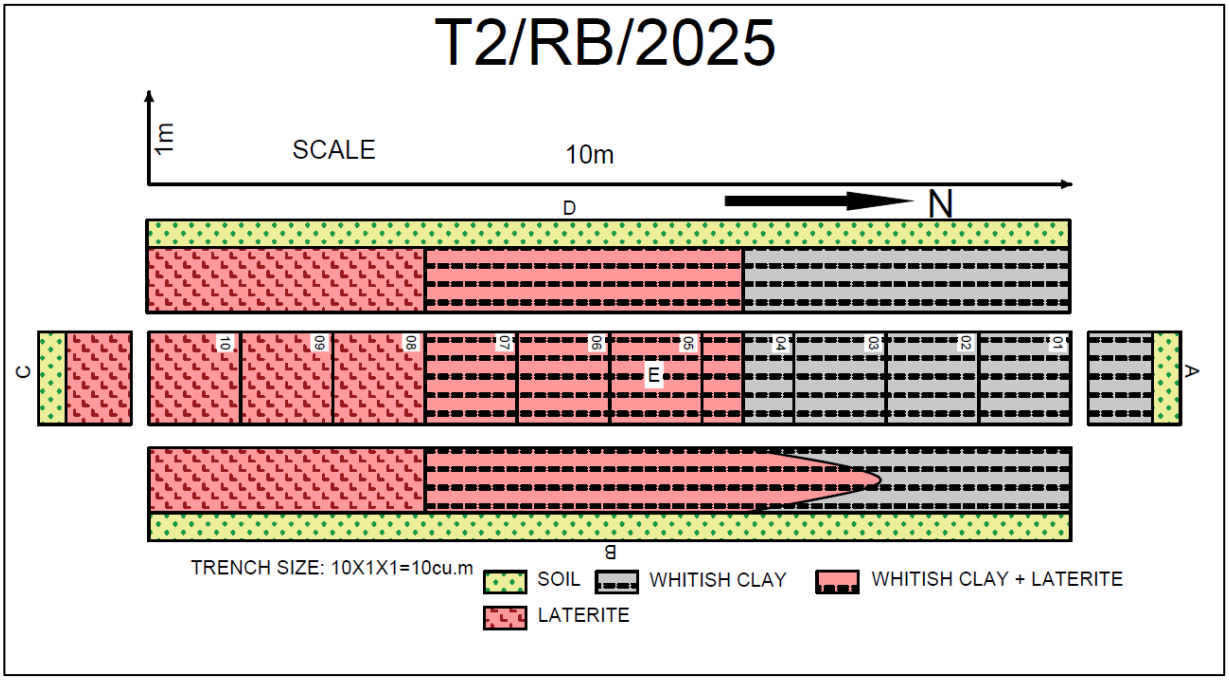
Brief description of trench profiles is given below for 5 trenches:

Name of the investigation: Bauxite, Ga, V, Ti, REE	Date of commencement: 05/04/2025
Trench No: T1/RB/2025	Date of completion: 05/04/2025
Location: 23.2234°N, 69.8340°E	Elevation: 125m
a. Length: 10m b. Breadth: 1m c. Depth: 1m volume: (10Cu.m)	
Recorded by: V. Siva Kumar and B. Mahesh	
Lithology details: Whitish yellow Sandy clay and greenish brown weathered Basalt (Khari Nadi formation)	
Log of Trench: Side walls represented by north by A, east by B, South by C and west by D and bottom of the pit by E. long axis direction of trench is marked.	
Samples: 10 representative samples were collected from bottom of E at 1m interval (T1/RB/2025/01 to T1/RB/2025/10 and 4 samples from four side walls. (T1/RB/2025-A, B, C, D respectively). Total 14 samples were collected from this trench.	



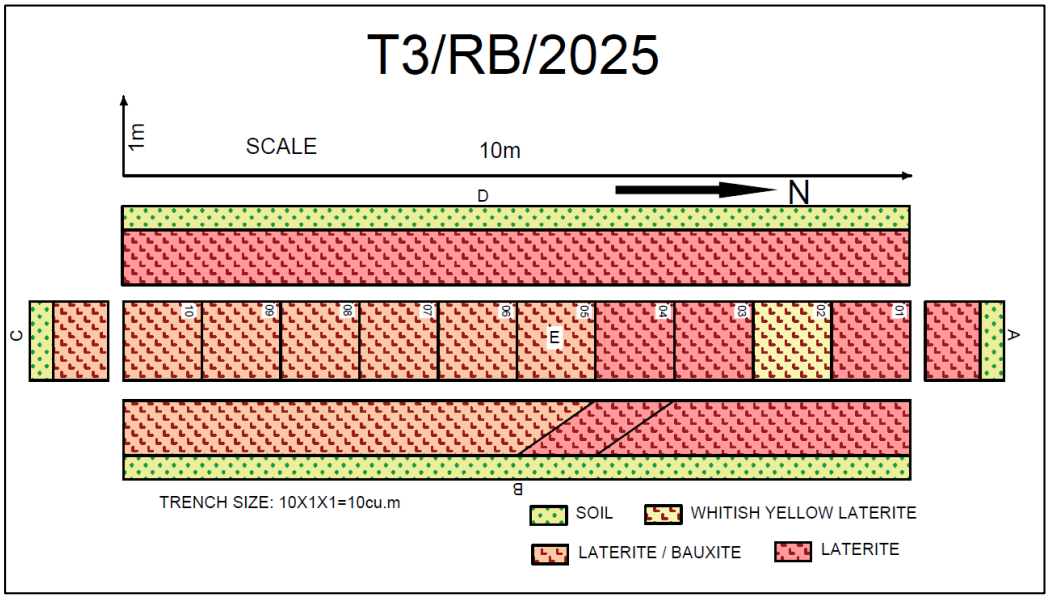
Details of Log of Trench no: T1/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti, REE	Date of commencement: 06/04/2025
Trench No: T2/RB/2025	Date of completion: 06/04/2025
Location: 23.2234°N, 69.8377°E	Elevation: 129m
a. Length: 10m b. Breadth: 1m c. Depth: 1m volume: (10Cu.m)	
Recorded by: V. Siva Kumar and V. Santosh	
Lithology details: Whitish Clay and Laterite (Matanomadh formation)	
Log of Trench: Side walls represented by north by A, east by B, South by C and west by D and bottom of the pit by E. long axis direction of trench is marked.	
Samples: 10 representative samples were collected from bottom of E at 1m interval (T2/RB/2025/01 to T2/RB/2025/10 and 4 samples from four side walls. (T2/RB/2025-A, B, C, D respectively). Total 14 samples were collected from this trench.	



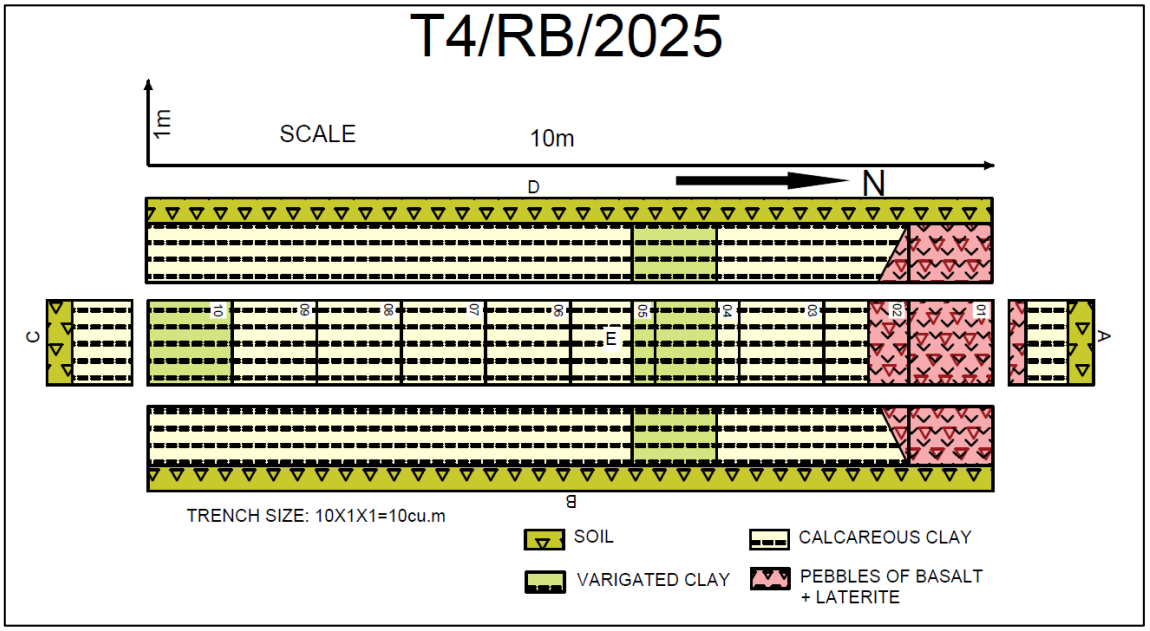
Details of Log of Trench no: T2/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti, REE	Date of commencement: 06/04/2025
Trench No: T3/RB/2025	Date of completion: 06/04/2025
Location: 23.2224°N, 69.8340°E	Elevation: 135m
a. Length: 10m b. Breadth: 1m c. Depth: 1m volume: (10Cu.m)	
Recorded by: V. Siva kumar and B. Mahesh	
Lithology details: Reddish Brown Laterite (Matanomadh formation)	
Log of Trench: Side walls represented by north by A, east by B, South by C and west by D and bottom of the pit by E. long axis direction of trench is marked.	
Samples: 10 representative samples were collected from bottom of E at 1m interval (T3/RB/2025/01 to T3/RB/2025/10 and 4 samples from four side walls. (T3/RB/2025-A, B, C, D respectively). Total 14 samples were collected from this trench.	



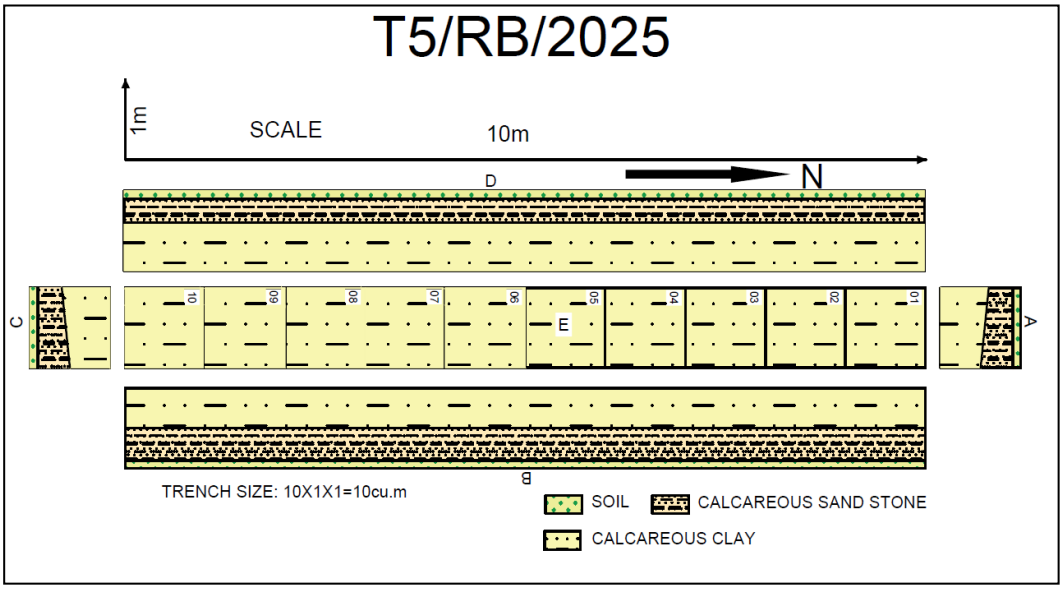
Details of Log of Trench no: T3/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti, REE	Date of commencement: 07/04/2025
Trench No: T4/RB/2025	Date of completion: 07/04/2025
Location: 23.2189°N, 69.8164°E	Elevation: 129m
a. Length: 10m b. Breadth: 1m c. Depth: 1m volume: (10Cu.m)	
Recorded by: V. Siva Kumar and V. Santosh	
Lithology details: Pebbles of Basalt, Calcareous clay, Conglomerate (pebbles of Laterite and basalt) and Variegated clay (Khari Nadi formation)	
Log of Trench: Side walls represented by north by A, east by B, South by C and west by D and bottom of the pit by E. long axis direction of trench is marked.	
Samples: 10 representative samples were collected from bottom of E at 1m interval (T4/RB/2025/01 to T4/RB/2025/10 and 4 samples from four side walls. (T4/RB/2025-A, B, C, D respectively). Total 14 samples were collected from this trench.	



Details of Log of Trench no: T4/RB/2025

Name of the investigation: Bauxite, Ga, V, Ti, REE	Date of commencement: 08/04/2025
Trench No: T5/RB/2025	Date of completion: 08/04/2025
Location: 23.2328 °N, 69.8424°E	Elevation: 133m
a. Length: 10m b. Breadth: 1m c. Depth: 1m volume: (10Cu.m)	
Recorded by: V. Siva Kumar and B. Mahesh	
Lithology details: Calcareous Sandstone and Calcareous Clay (Sandhan formation)	
Log of Trench: Side walls represented by north by A, east by B, South by C and west by D and bottom of the pit by E. long axis direction of trench is marked.	
Samples: 10 representative samples were collected from bottom of E at 1m interval (T5/RB/2025/01 to T5/RB/2025/10 and 4 samples from four side walls. (T5/RB/2025-A, B, C, D respectively). Total 14 samples were collected from this trench.	



Details of Log of Trench no: T5/RB/2025

6.1.8 Sampling

A total of 20 pit samples and 70 trench samples were collected through systematic pitting and trenching activities within the study area. Sampling methodology adopted for pitting and trenching has been discussed in subsequent paragraphs. Thus, a total of 90 samples were collected systematically from pits and trenches in the study area.

Sample collection

A representative sample (2–3 kg) was collected from the pits and trenches using a pickaxe and spade, placed in a properly labelled sample bag, and assigned a unique sample number written clearly with a permanent marker. The lithological details of all the pits and trenches were systematically recorded.

Sample preparation:

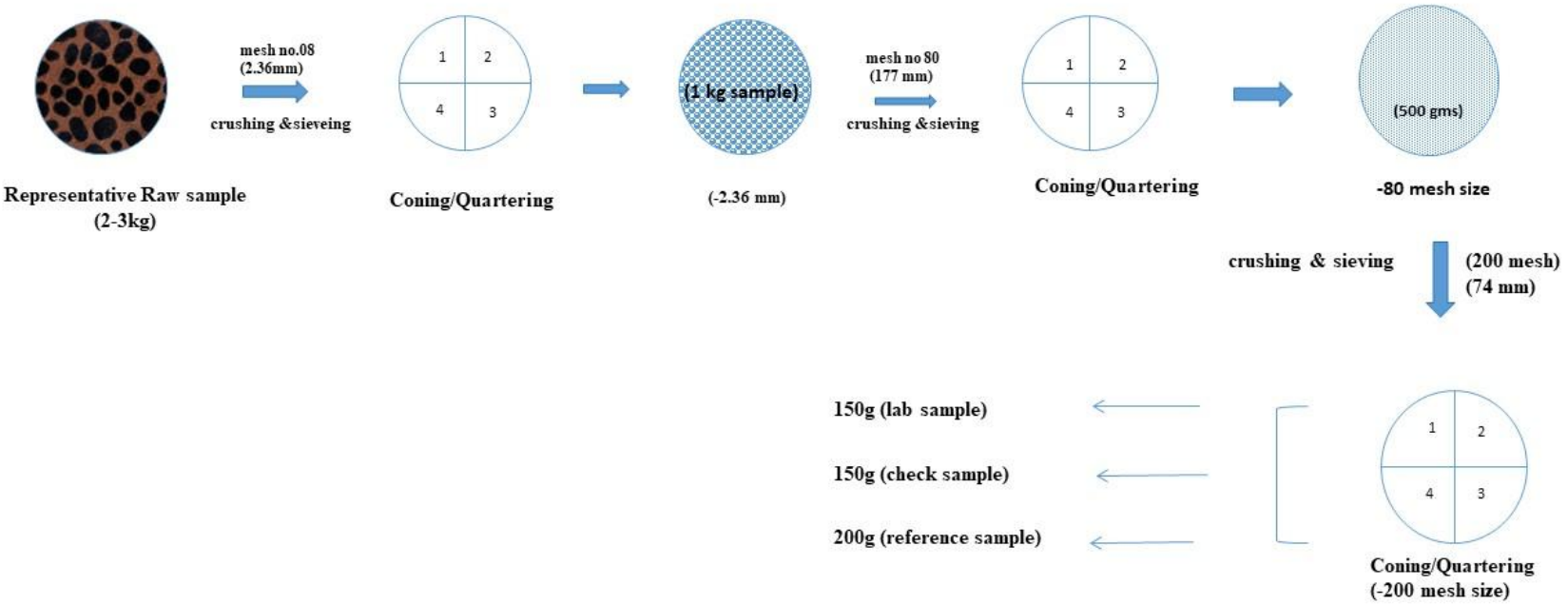
The sample preparation followed a multi-stage crushing, grinding, and sieving protocol

1. **Initial Crushing & Sieving:** Mesh No. 8 (2.36 mm) The entire bulk sample was crushed and sieved. The oversize was further crushed to pass through the mesh no:08 completely. The sieved material of (-8 mesh size) was reduced to 1 kg by Coning and Quartering, ensuring homogeneity.
2. **Second Stage:** Mesh No. 80 (177 μm): The 1 kg sample of -8 mesh size was further crushed, ground, and sieved through 80 no mesh. The sieved fraction was reduced to 500 g by Coning and Quartering.
3. **Final Stage:** Mesh No. 200(74 μm): The 500 g sample of -80 mesh size was again crushed, ground, and passed completely through mesh No. 200.This -200-mesh fraction constituted the final laboratory sample. From this, 100 g of the prepared lab sample was dispatched to the analytical laboratory, while the remaining portion was stored as a reference sample. At every stage of preparation, strict care was taken to maintain sample integrity and homogeneity, in accordance with NQT guidelines

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

Schematic Diagram showing Sampling preparation Procedure



Note: In all the above stages of sample preparation, proper care is taken to maintain the homogeneity of the sample and preserve different fractions with proper packing and labelling. We use steel pistol & mortar for crushing and grinding purposes.

Fig No: 8

Photos showing different activities of sample preparation: (Photos: 27 to 33)

Photo 26: Sampling shed, CMT, Bhuj-Gujarat

Photo 27: Recording the details of the sample

Photo 28: Crushing and sieving of samples

Photo 29: Coning and Quartering

Sieves used:

Photo 30: Sieve no: 8 mesh (2.36mm)

Photo 31: Sieve no: 80 mesh (180 micron)

Photo 32: Sieve no 200 mesh (75 micron) and packing of the final sample

6.1.9 Chemical Analysis discussion

Geochemistry of the Bhuj formation

A total of 2 pits (P11 and P12), were excavated within the Bhuj Formation, and the values of Al_2O_3 range from 12.44 to 18.63% with an average of 15.53%. values of SiO_2 range from 66.79 to 69.262% with an average of 68.03%, and Fe_2O_3 values range from 1.94 to 9.32% with an average of 5.63%. The TiO_2 values range from 0.80 to 1.68% with an average of 1.24%. The Vanadium values range from 67.80 to 80.10 ppm with an average of 73.95 ppm. While the gallium value is 13.63 ppm. The total REE value is 293.55 ppm. Analytical results of Major oxides and REE of the Bhuj formation are given in Annexure-IVA & VA, respectively.

Table No 6.4**:** Summary of major oxide values (pit samples) of Bhuj formation

Bhuj Formation			
	min	**max**	**Average**
SiO2(%)	66.79	69.26	68.03
Al2O3(%)	12.44	18.63	15.53
Fe2O3(%)	1.94	9.32	5.63
MnO(%)	0.01	0.03	0.02
MgO(%)	0.39	0.68	0.53
CaO(%)	0.44	3.37	1.91
Na2O(%)	0.11	0.19	0.15
K2O(%)	0.11	1.11	0.61
TiO2(%)	0.80	1.68	1.24
P2O5(%)	0.09	0.12	0.11
LOI(%)	4.57	7.62	6.10
Total(%)	99.85	99.86	99.85
V(ppm)	67.80	80.10	73.95

Table No 6.5: Summary of REE and Gallium values of (pit samples) Bhuj formation

Bhuj Fm.	
Lanthanum (La)	54.10
Cerium (Ce)	112.08
Praseodymium (Pr)	14.35
Neodymium (Nd)	86.95
Samarium (Sm)	8.25
Europium (Eu)	1.60
Gadolinium (Gd)	6.43
Terbium (Tb)	0.50
Dysprosium (Dy)	2.55
Holmium (Ho)	0.50
Erbium (Er)	3.78
Thulium (Tm)	0.50
Ytterbium (Yb)	1.53
Lutetium (Lu)	0.43
Total REE	**293.55**
Scandium (Sc)	10.60
Yttrium(Y)	12.25
Total (REE +Sc+Y)	**316.40**
Thorium (Th)	37.08
Uranium (U)	0.00
Gallium (Ga)	13.63
Vanadium (ppm)	249.10

Geochemistry of Anjar Volcanics formation

A pit (P6) is excavated within the Anjar Volcanics Formation. In this formation, the value of Al_2O_3 is 12.02 %, the value of SiO_2 is 47.0%, the value of Fe_2O_3 is 6.81%, the value of TiO_2 is 4.13%. Analytical results of Major oxides of Anjar Volcanic Formation is given in Annexure-IVB

Geochemistry of Matanomadh formation

Total of 10 pits (P1, P2, P4, P7, P8, P10, P13, P18, P19 and P20) and 2 trenches (T2 and T3) were excavated and collected 10 samples from pits and 28 samples from trenches within the Matanomadh Formation, all samples (38) were analyzed for major oxides including TiO2, Vanadium and 8 samples for REE and Gallium. The summary of the results are listed in the following tables. Analytical results of Major oxides and REE of Matanomadh formation are given in Annexure-IVC & VB, respectively.

Table No 6.6: Summary of major oxide values (pit &trench samples) of Matanomadh formation

Matanomadh formation			
	min	**max**	**Average**
SiO2(%)	28.01	42.90	36.72
Al2O3(%)	14.52	39.55	28.75
Fe2O3(%)	2.01	27.44	9.92
MnO(%)	0.02	0.19	0.04
MgO(%)	0.07	1.07	0.24
CaO(%)	0.88	5.04	1.80
Na2O(%)	0.07	0.88	0.31
K2O(%)	0.05	0.79	0.18
TiO2(%)	**2.22**	**8.21**	**6.13**
P2O5(%)	0.11	0.45	0.26
LOI(%)	12.01	21.68	15.52
Total(%)	99.71	99.96	99.84
V(ppm)	196.20	702.80	398.93

Table No 6.7: Summary of REE and Gallium values of (pit & trench samples) of Matanomadh formation

Matonomadh Formation			
	min	**max**	**Average**
Lanthanum (La)	34.78	103.83	58.67
Cerium (Ce)	62.00	236.93	123.04
Praseodymium (Pr)	17.48	50.75	31.23
Neodymium (Nd)	123.38	408.18	263.80
Samarium (Sm)	5.30	28.88	12.61
Europium (Eu)	1.58	7.83	3.52
Gadolinium (Gd)	9.10	30.50	20.03
Terbium (Tb)	0.50	0.50	0.50
Dysprosium (Dy)	1.13	6.83	3.12
Holmium (Ho)	0.50	0.50	0.50
Erbium (Er)	10.35	31.68	21.23
Thulium (Tm)	0.50	0.50	0.50
Ytterbium (Yb)	0.50	10.23	3.11
Lutetium (Lu)	1.05	3.60	2.17
Total REE	**318.96**	**905.72**	**544.04**
Scandium (Sc)	15.58	50.95	30.83
Yttrium(Y)	7.48	20.43	13.24
Total (REE +Sc+Y)	**364.59**	**963.28**	**588.11**
Thorium (Th)	59.88	141.25	101.95
Uranium (U)	0.50	140.28	29.97
Gallium (Ga)	33.75	43.05	38.71
Vanadium (ppm)	126.60	638.60	359.14

Geochemistry of Khari Nadi formation

Total of 6 pits (P3,P5,P9,P14,P15,P17) and 2 trenches (T1 and T4) were excavated and collected 10 samples from pits and 28 samples from trenches within the Khari Nadi Formation, all samples(34) were analyzed for major oxides including TiO2, Vanadium and 4 samples for REE and Gallium. The summary of the results are listed in the following tables. Analytical results of Major oxides and REE of Khari Nadi formation are given in Annexure-IVD & VC respectively

Table No 6.8: Summary of major oxides values of (pit &trench samples) Khari Nadi formation

Khari Nadi formation			
	min	**max**	**Average**
SiO2(%)	33.93	69.54	57.80
Al2O3(%)	0.20	14.49	9.83
Fe2O3(%)	2.70	24.95	11.66
MnO(%)	0.02	0.31	0.09
MgO(%)	0.98	4.97	2.04
CaO(%)	0.68	26.80	3.68
Na2O(%)	0.16	1.97	0.99
K2O(%)	0.16	1.25	0.74
TiO2(%)	0.46	3.60	1.72
P2O5(%)	0.04	0.19	0.08
LOI(%)	6.97	29.83	11.19
Total(%)	99.72	99.96	99.82
V(ppm)	32.60	483.70	154.6

Table No 6.9: Summary of REE and Gallium values of (pit & trench samples) Khari Nadi formation.

Khari Nadi Fm.			
	min	**max**	**Average**
Lanthanum (La)	29.85	43.48	37.55
Cerium (Ce)	50.78	100.23	68.49
Praseodymium (Pr)	13.58	24.88	18.73
Neodymium (Nd)	68.98	142.93	99.29
Samarium (Sm)	4.20	8.93	6.62
Europium (Eu)	1.00	2.40	1.75
Gadolinium (Gd)	8.33	19.85	14.42
Terbium (Tb)	0.50	0.50	0.50
Dysprosium (Dy)	1.63	5.68	3.35
Holmium (Ho)	0.50	0.50	0.50
Erbium (Er)	5.68	11.35	8.25
Thulium (Tm)	0.50	0.50	0.50
Ytterbium (Yb)	2.70	6.05	4.02
Lutetium (Lu)	0.93	2.13	1.59
Total REE	**189.56**	**366.34**	**265.54**
Scandium (Sc)	9.38	19.63	16.18
Yttrium(Y)	13.38	29.13	19.69
Total (REE +Sc+Y)	**213.02**	**408.15**	**301.41**
Thorium (Th)	22.83	74.15	48.94
Uranium (U)	20.05	46.38	31.96
Gallium (Ga)	12.15	27.18	20.32
Vanadium (ppm)	25.90	228.00	106.63

Geochemistry of Sandhan formation

Total of 6 pits (P16) and 1 trench (T5) were excavated and collected 1 sample from pits and 14 samples from trenches within the Khari Nadi Formation, all samples (15) were analyzed for major oxides including TiO2, Vanadium and 2 samples for REE and Gallium. The summary of the results are listed in the following tables. Analytical results of Major oxides and REE of Sandhan formation are given in Annexure-IVE & VD respectively.

Table No 6.10: Summary of major oxides values of (pit &trench samples) Sandhan formation

Sandhan Fm.			
	min	**max**	**Average**
SiO2(%)	34.20	59.75	54.27
Al2O3(%)	0.25	6.94	4.25
Fe2O3(%)	3.32	9.36	7.10
MnO(%)	0.04	0.12	0.08
MgO(%)	4.05	6.59	4.86
CaO(%)	5.02	25.44	9.50
Na2O(%)	0.19	1.43	0.71
K2O(%)	0.53	0.71	0.63
TiO2(%)	0.47	1.39	1.10
P2O5(%)	0.02	0.05	0.03
LOI(%)	12.79	30.36	17.28
Total(%)	99.73	99.94	99.83
V(ppm)	25.9	88.5	69.3

Table No 6.11: Summary of REE and Gallium values of (pit & trench samples) of Sandhan formation

Sandhan Fm.			
	min	**max**	**Average**
Lanthanum (La)	30.70	39.35	35.03
Cerium (Ce)	44.13	69.13	56.63
Praseodymium (Pr)	16.20	17.28	16.74
Neodymium (Nd)	53.88	79.45	66.67
Samarium (Sm)	4.63	6.33	5.48
Europium (Eu)	1.20	1.50	1.35
Gadolinium (Gd)	7.38	11.18	9.28
Terbium (Tb)	0.50	0.50	0.50
Dysprosium (Dy)	2.60	3.30	2.95
Holmium (Ho)	0.50	0.50	0.50
Erbium (Er)	4.30	6.38	5.34
Thulium (Tm)	0.50	0.50	0.50
Ytterbium (Yb)	2.73	4.65	3.69
Lutetium (Lu)	0.70	1.15	0.93
Total REE	**168.45**	**239.70**	**204.08**
Scandium (Sc)	7.18	12.95	10.07
Yttrium(Y)	17.28	19.73	18.51
Total (REE +Sc+Y)	**192.91**	**272.38**	**232.65**
Thorium (Th)	17.58	29.85	23.72
Uranium (U)	13.58	16.88	15.23
Gallium (Ga)	9.28	16.33	12.81
Vanadium (ppm)	70.60	80.10	75.35

Statistical analysis of geochemical data

In the study area, the Matanomadh Formation hosts the laterite/bauxite, hence the statistical analysis of the major oxides of the samples collected from the Matanomadh Formation has been dealt herewith.

Table No 6.12: Statistical analysis of geochemical data

	SiO_2 (%)	Al2O3(%)	Fe2O3(%)	TiO2(%)
Mean	48.545	16.897	9.980	3.496
Median	48.395	12.714	8.787	2.151
Std.Dev	12.015499	11.0514885	5.574868269	2.5885179
Min	28.012	0.2	1.94	0.464
Max	69.535	39.546	27.435	8.213
Count	90	90	90	90

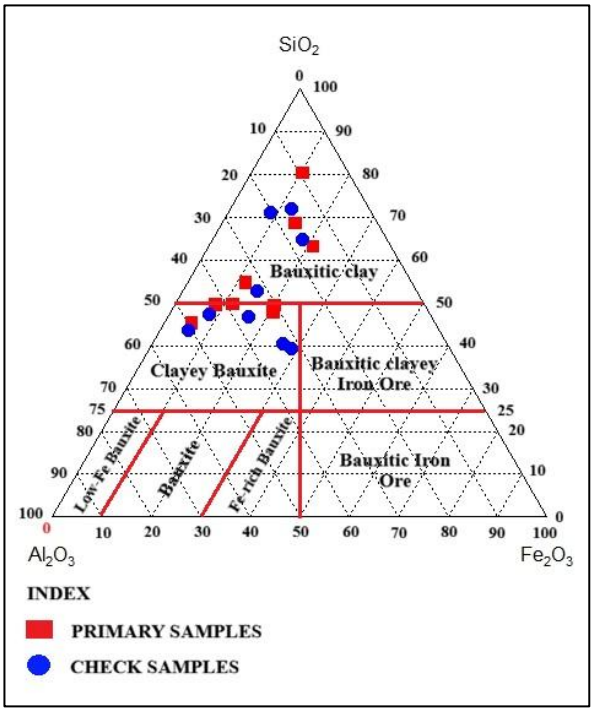


Fig no:9: primary & check samples plotted on Ternary diagram(after Bardoshshi,1981)

The values of primary and check samples of pit & trench plotted in Ternary diagram are matching and falling under Bauxitic clay and clayey bauxite categories.

Table No 6.13: Statement showing analysis of External check samples for major oxides and their comparison with primary samples of Reldi Moti area, Kachchh district, Gujarat

S.No	Primary /check	Sample name	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Remarks
			(%)											
1	Primary	P8/RB/2025	41.389	25.285	8.910	0.027	0.180	4.202	0.119	0.167	5.211	0.156	14.270	Lucid Lab Hyderabad
1	Check	P30/RB/2025	38.07	23.19	10.77	<0.05	0.30	6.13	<0.08	0.24	4.94	0.20	15.82	Shiva lab Bangalur
2	Primary	P20/RB/2025	38.440	23.650	15.720	0.028	0.169	1.090	0.118	0.046	6.687	0.416	13.400	Lucid Lab Hyderabad
2	Check	P31/RB/2025	31.38	25.78	20.39	<0.05	0.35	1.47	<0.08	<0.05	5.17	0.62	14.23	Shiva lab Bangalur
3	Primary	T1/RB/2025/09	56.130	13.456	12.287	0.138	1.502	0.924	1.120	0.896	2.082	0.093	11.270	Lucid Lab Hyderabad
3	Check	T20/RB/2025/09	60.41	13.09	10.31	0.13	1.09	0.96	1.07	1.08	1.66	0.09	9.35	Shiva lab Bangalur
4	Primary	T2/RB/2025/07	37.132	28.812	8.824	0.015	0.070	1.046	0.159	0.070	8.213	0.352	15.130	Lucid Lab Hyderabad
4	Check	T21/RB/2025/07	35.18	27.79	12.29	<0.05	0.26	2.65	<0.08	0.12	6.19	0.38	14.53	Shiva lab Bangalur
5	Primary	T2/RB/2025/A	31.569	34.246	3.908	0.043	0.177	2.210	0.271	0.525	6.469	0.329	19.960	Lucid Lab Hyderabad
5	Check	T22/RB/2025/A	29.36	33.97	3.77	<0.05	0.58	3.02	0.22	0.68	5.65	0.31	20.31	Shiva lab Bangalur
6	Primary	T3/RB/2025/01	35.530	30.189	5.958	0.030	0.105	2.290	0.435	0.261	7.891	0.165	17.040	Lucid Lab Hyderabad
6	Check	T23/RB/2025/01	33.71	31.59	5.70	<0.05	0.49	2.94	0.37	0.40	5.96	0.15	17.37	Shiva lab Bangalur
7	Primary	T3/RB/2025/C	36.930	24.150	16.090	0.038	0.183	2.646	0.240	0.060	6.487	0.208	12.810	Lucid Lab Hyderabad
7	Check	T24/RB/2025/C	29.51	23.94	21.59	<0.05	0.47	3.65	0.16	0.07	5.27	0.25	14.73	Shiva lab Bangalur
8	Primary	T4/RB/2025/02	52.580	13.028	17.680	0.311	1.210	0.858	0.807	0.252	3.600	0.106	9.520	Lucid Lab Hyderabad
8	Check	T25/RB/2025/02	53.62	13.95	15.07	0.25	1.18	0.64	0.73	0.27	2.79	0.11	11.03	Shiva lab Bangalur
9	Primary	T5/RB/2025/03	58.680	6.680	7.690	0.122	4.350	5.620	0.851	0.713	1.390	0.033	13.600	Lucid Lab Hyderabad
9	Check	T26/RB/2025/03	58.17	16.51	7.02	<0.05	0.49	1.15	0.37	0.58	2.35	<0.05	13.07	Shiva lab Bangalur

Table No 6.14: Summarised table showing statistical analyses of Primary Vs. External Check sample assay of SiO2, Al2O3, Fe2O3, MnO and MgO

Sr. No	Comparison Parameter	SiO_2(%)		Al_2O_3 (%)		Fe_2O_3(%)		MnO (%)		MgO (%)	
		PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK
1	No. of sample pairs	9		9		9		9		9	
2	Arithmetic mean	43.15	41.05	22.17	23.31	10.79	11.88	0.08	0.06	0.88	0.58
3	Standard Deviation	9.94	12.68	9.15	7.48	4.87	6.21	0.10	0.08	1.40	0.33
4	Standard error of mean	3.31	4.23	3.05	2.49	1.62	2.07	0.03	0.03	0.47	0.11
5	Variance	98.87	160.81	83.69	55.88	23.73	38.54	0.01	0.01	1.97	0.11
6	Mean of deviation	2.11		-1.15		-1.09		0.02		0.30	
7	Standard Deviation (Error)	3.67		3.50		2.92		0.03		1.36	
8	Correlation Coefficient	0.98		0.93		0.89		0.94		0.26	
9	Mean absolute error	3.29		2.03		2.35		0.02		0.65	

Table No: 6.15 Summarised table showing statistical analyses of Primary Vs. External Check sample assay of CaO, Na2O, K2O, TiO2, and P2O5

Sr. No	Comparison Parameter	CaO (%)		Na_2O (%)		K_2O (%)		TiO_2(%)		P_2O_5(%)	
		PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK	PRIMARY	CHECK
1	No. of sample pairs	9		9		9		9		9	
2	Arithmetic mean	2.32	2.51	0.46	0.34	0.33	0.39	5.34	4.44	0.21	0.24
3	Standard Deviation	1.65	1.72	0.37	0.35	0.31	0.34	2.46	1.70	0.13	0.18
4	Standard error of mean	0.55	0.57	0.13	0.12	0.10	0.11	0.82	0.57	0.04	0.06
5	Variance	2.72	2.96	0.14	0.13	0.10	0.12	6.05	2.89	0.02	0.03
6	Mean of deviation	-0.19		0.12		-0.05		0.89		-0.03	
7	Standard Deviation (Error)	1.88		0.14		0.10		0.93		0.07	
8	Correlation Coefficient	0.38		0.93		0.96		0.97		0.95	
9	Mean absolute error	1.23		0.12		0.09		1.11		0.04	

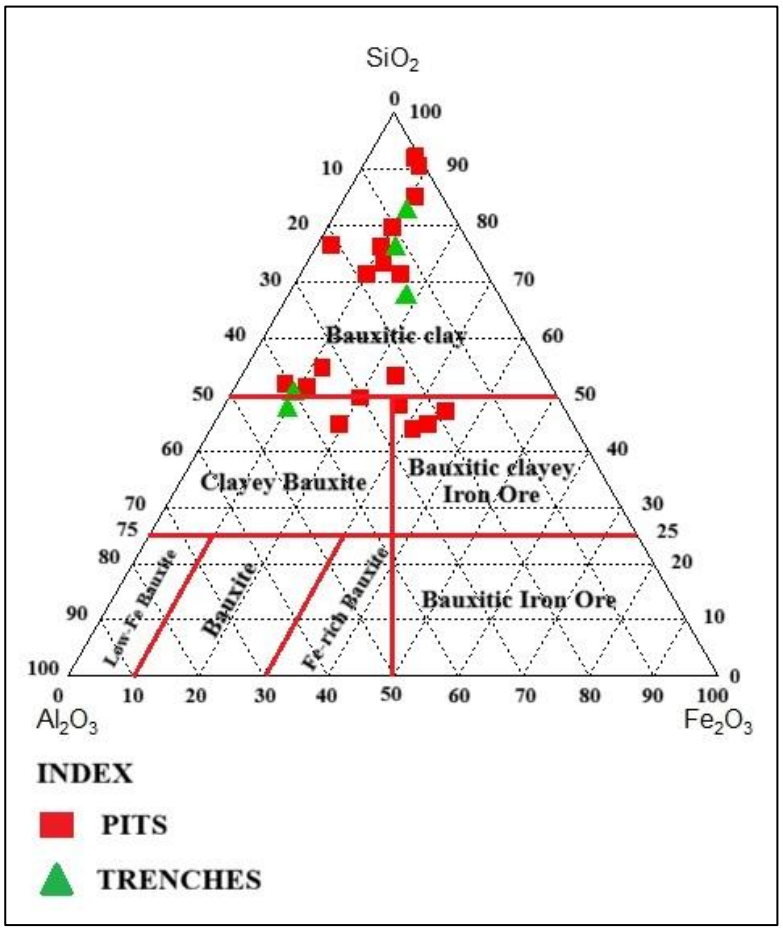


Fig No 10: Ternary plot of pit & trench samples(after Bardoshshi,1981)

The Ternary plot of geochemical data of pits & trenches indicate, that the sampled materials from pits and trenches are best classified as “Bauxitic clay”, “Clayey Bauxite”, and “Bauxite clay iron ore”. This classification reflects intense weathering and the concentration of aluminium oxides alongside significant silica presence, consistent with the characteristic TiO_2 content typically observed in lateritic soils and clays of this region.

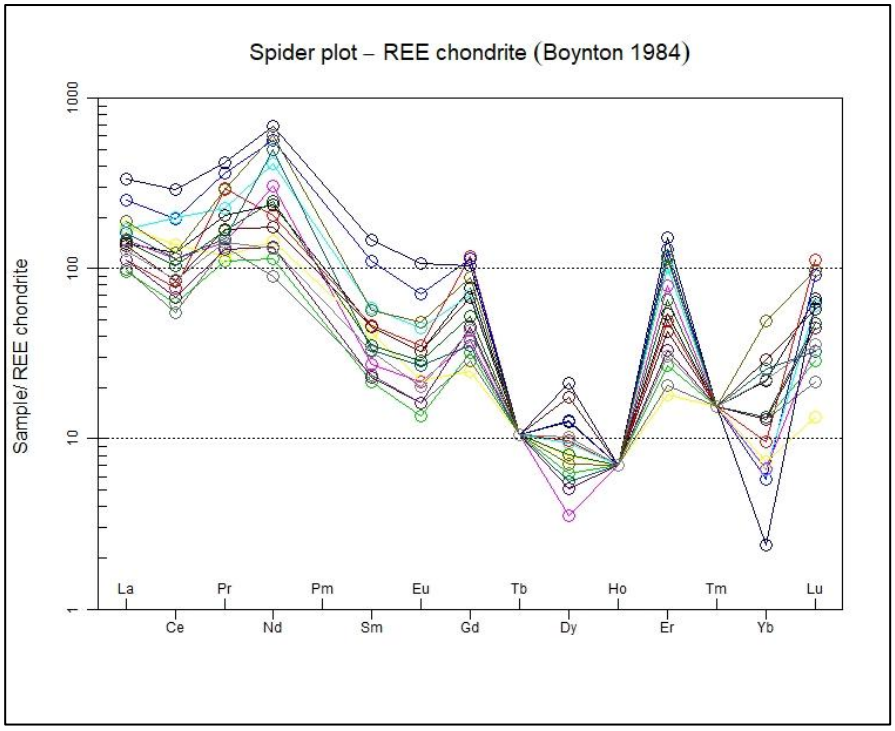


Fig No 11: Spider plot of REE of pit and trench samples

The chondrite-normalized REE patterns of pit and trench samples show LREE enrichment, pronounced negative Eu anomaly, and depleted HREE, indicating derivation from felsic continental sources and subsequent modification by weathering processes, with no evidence of economically significant REE mineralization.

6.1.10 DGPS survey

The present exploration for Bauxite, Ga, V, Ti, and REE was carried out at the G-4 stage. To ensure precise documentation of sample locations and geological features, a handheld GPS device (Garmin 12H model) was used for recording the Geographic coordinates and elevation of all pit and trench sites, as well as for outcrop mapping across the study area.
This DGPS survey was conducted to establish accurate ground control points and record precise coordinates for block boundary points and borehole locations in the study area.

Coordinates, in both, the Geographic Coordinate System (with WGS 1984 datum) and UTM coordinate system (Zone 42N, WGS 1984 datum), were recorded during the DGPS survey enabling accurate integration of field data with GIS-based mapping and interpretation. The Reduced level (RL) was to carry forward from Kukma railway station, where the MSL value is 122.82m. The four boundary corner points of the study area were determined using DGPS

(E-Survey instruments: E-800 Base and E600-H Rover) to achieve high-precision spatial control. The system provided a static accuracy of Horizontal: 2.5 mm + 0.1 ppm and Vertical: 3.5 mm + 0.4 ppm, while RTK mode offered Horizontal: 8 mm + 1 ppm and Vertical: 15 mm + 1 ppm accuracy. As part of the survey control framework, two temporary benchmarks were established within the study area and designated as RMT-TBM-1 and RMT-TBM-2. These temporary benchmarks may be used as reference points for subsequent mapping and geospatial integration.

Photo 33: Temparory bench mark (RMT-TBM-1)

Photo 34: Temparory bench mark (RMT-TBM-2)

Boreholes pillars

On completion of all the 5 drilled boreholes, borehole pillars (RMT-BH-01, RMT-BH-02, RMT-BH-03, RMT-BH-04, RMT-BH-05) indicating the borehole numbers have been erected at the drill site for future reference and identification.

Photo 35: RMT-BH-01 borehole pillar

Photo 36: RMT-BH-02 borehole pillar

Photo 37: RMT-BH-03 borehole pillar

Photo 38: RMT-BH-04 borehole pillar

Photo 39: RMT-BH-05 borehole pillar

The details of RL,Co-ordinates of Block boundary points, borehole points and temporary bench marks are given in the following table no: 6.16.

Table No 6.16: RL, Coordinates of Cardinal points, boreholes and Temporary bench marks in Reldi Moti Area, District: Kachchh, Gujarat (as Determined by DGPS Survey)

Cardinal Points	Geographic Coordinate System in Degree minutes seconds (WGS 1984)		UTM (WGS 1984, Zone 42N)			Area in Sq. Km
	Latitude	Longitude	Elevation (m)	Northing (m)	Easting (m)	
A	23°12'31.7626"	69°49'12.6025"	147.320	2566873.434	583924.141	7.95
B	23°13'21.5773"	69°48'45.4233"	136.282	2568401.042	583143.004	
C	23°14'30.0986"	69°49'49.6645"	129.642	2570518.606	584956.833	
D	23°13'47.5507"	69°51'14.1853"	147.676	2569224.055	587366.462	
Borehole points						
RMT-BH-01	23°13'24.3677"	69°50'15.662"	142.214	2568501.422	585707.293	
RMT-BH-02	23°13'21.3361"	69°50'02.3700"	143.601	2568406.016	585330.042	
RMT-BH-03	23°13'09.8879"	69°49'03.7273"	145.000	2568044.478	583665.267	
RMT-BH-04	23°13'08.6738"	69°49'03.4221"	147.084	2568007.092	583656.803	
RMT-BH-05	23°13'15.7708"	69°49'49.6492"	138.551	2568232.798	584969.798	
Temporary bench marks						
RMT-TBM-1	23°13'12.0486"	69°49'01.6915"	142.189	2568110.599	583607.029	
RMT-TBM-2	23°13'11.9701"	69°49'00.8395"	142.131	2568108.049	583582.826	

6.2 Geophysical exploration

Not carried out in the study area (NOT APPLICABLE)

6.3 Geochemical exploration

Geochemistry of pit and trench Samples:

A total of 90 pit and trench samples were analysed for major oxides, including TiO_2 and V, while 15 selected samples were analysed for Rare Earth Elements (14 elements) and Gallium (Ga). The geochemical results indicate that the concentrations of bauxite indicators (Al_2O_3) and associated TiO_2 values are fairly good in Matanomadh Formation but no sign of Bauxitisation found in Bhuj, Khari Nadi and Sandhan formations. The REE, Gallum and Vanadium are low to moderate fall below the threshold limits required for economic significance. The analysed samples do not display any anomalous enrichment or geochemical signatures suggestive of mineralisation for the targeted commodities. Therefore, the investigated area does not demonstrate favourable potential Ga, V, Ti, or REE mineralization at the scale explored. The spatial distribution of major oxides and REE elements is presented and interpreted in the following sections through major oxide distribution maps and elemental distribution maps.

Aluminium oxide (Al_2O_3) is the major constituent of bauxite. Matanomadh Formation is the host rock for bauxite mineralisation and composed of lithomargic clay, clayey bauxite encountered in 10 pits and 2 trenches, the analysed samples show Al_2O_3 values ranging from 14.52 to 39.55%, SiO_2 ranges from 28.01 to 42.90 %, TiO_2 range from 2.22 to 8.21% , Vanadium range from 196.2 to 702.8ppm, Gallium range 33.75 to 43.05 ppm and Total REE range from 318.96 to 905.72ppm in Matanomadh Formation. Where as in other formations which are devoid of bauxitisation like Bhuj Formation in which Al_2O_3 ranges from 12.44 to 18.63%, SiO_2 ranges from 66.79 to 69.26 %, TiO2 range from 0.79 to 1.68%, Vanadium ranges from 67.8 to 80.1ppm, Gallium 13.63ppm and Total REE 293.55ppm, in Khari Nadi, Al_2O_3 values range from 0.20 to 14.49%, SiO_2 ranges from 33.93 to 69.54%, TiO_2 range from 0.46 to 3.60%, Vanadium range from 32.60 to 483.70ppm, Gallium range 12.15 to 27.18ppm and Total REE range from 189.56 to 366.34ppm, and in Sandhan formation Al_2O_3 ranges from 0.25 to 6.93%, SiO2 ranges from 34.20 to 59.75%, Vanadium range from 25.9 to 88.5ppm, Gallium range 9.28 to 16.33 ppm and Total REE range from 168.45 to 239.70ppm and the values of other critical minerals are significantly low in these formations.

Ternary plot of Al_2O_3–SiO_2–Fe_2O_3, further reveals that the majority of Matanomadh formation falls under the clayey bauxite category, whereas other non-bauxitic formations fall under the Bauxitic clay category, respectively.

Elemental Distribution maps of Al_2O_3, TiO_2, Gallium, Vanadium and Total REE are prepared based on analytical results. Since there is not much variation laterally in the analytical values of trench samples, an average of all 14 sample values in a trench was taken for plotting purposes.

Distribution maps of Al_2O_3%, SiO_2, TiO_2%, Vanadium(ppm), Gallium(ppm), and Total REE are given below in fig nos: 11,12,13,14,15 and 16, respectively.

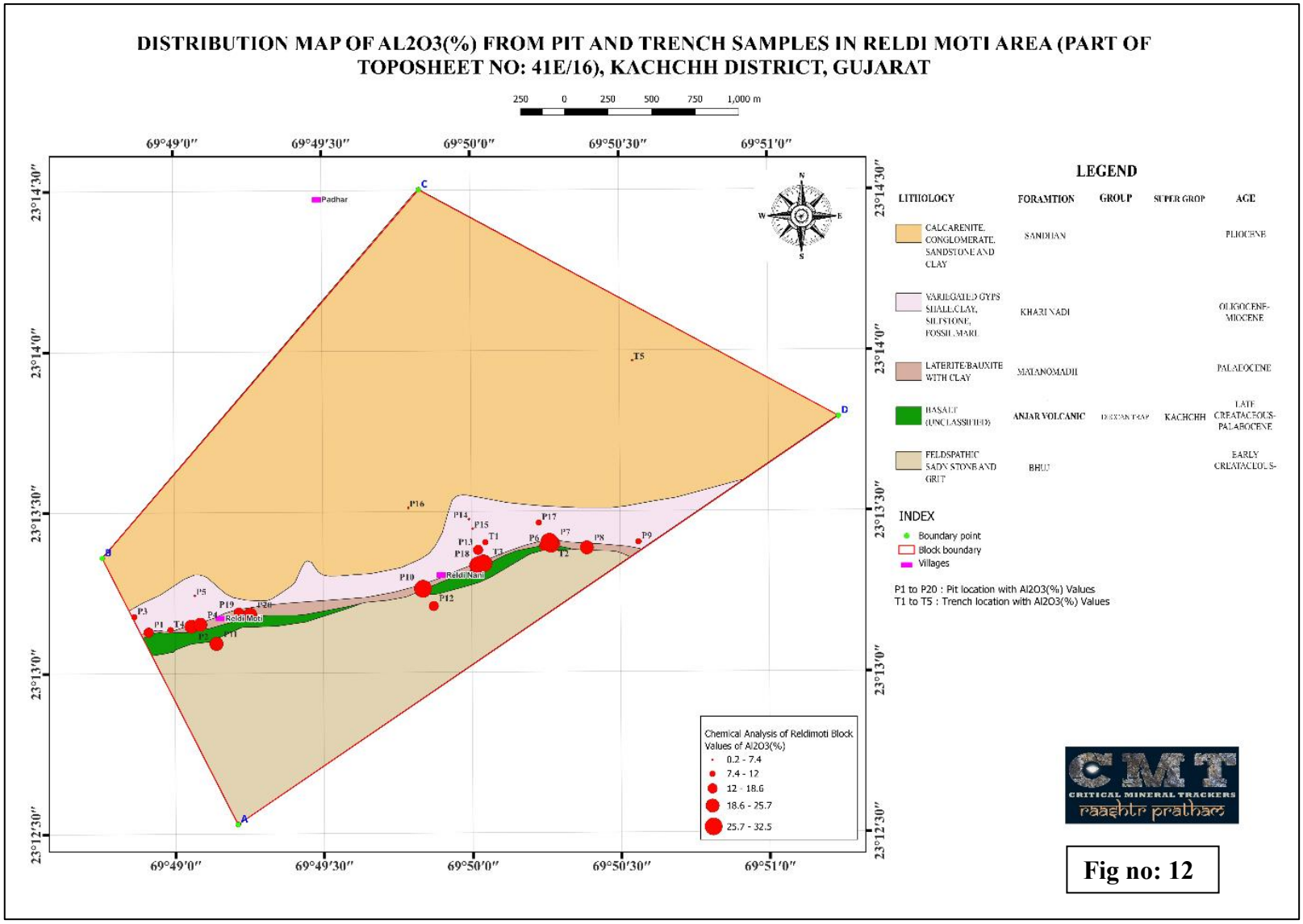

DISTRIBUTION MAP OF AL2O3(%) FROM PIT AND TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
250 0 250 500 750 1,000 m
69°49'0" 69°49'30" 69°50'0" 69°50'30" 69°51'0"
23°14'30" 23°14'0" 23°13'30" 23°13'0" 23°12'30"
Padhar
Reldi Moti
Reldi Nani
A
B
C
D
LEGEND
LITHOLOGY FORAMTION GROUP SUPER GROP AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY SANDHAN PLIOCENE
VARIEGATED GYPS SHALE,CLAY, SILTSTONE, FOSSIL MARL KHARI NADI OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY MATANOMADH PALAEOCENE
BASALT (UNCLASSIFIED) ANJAR VOLCANIC DECCAN TRAP KACHCHH LATE CREATACEOUS-PALAEOCENE
FELDSPATHIC SADN STONE AND GRIT BHUJ EARLY CREATACEOUS-
INDEX
Boundary point
Block boundary
Villages
P1 to P20 : Pit location with Al2O3(%) Values
T1 to T5 : Trench location with Al2O3(%) Values
Chemical Analysis of Reldimoti Block
Values of Al2O3(%)
0.2 - 7.4
7.4 - 12
12 - 18.6
18.6 - 25.7
25.7 - 32.5

Fig no: 12

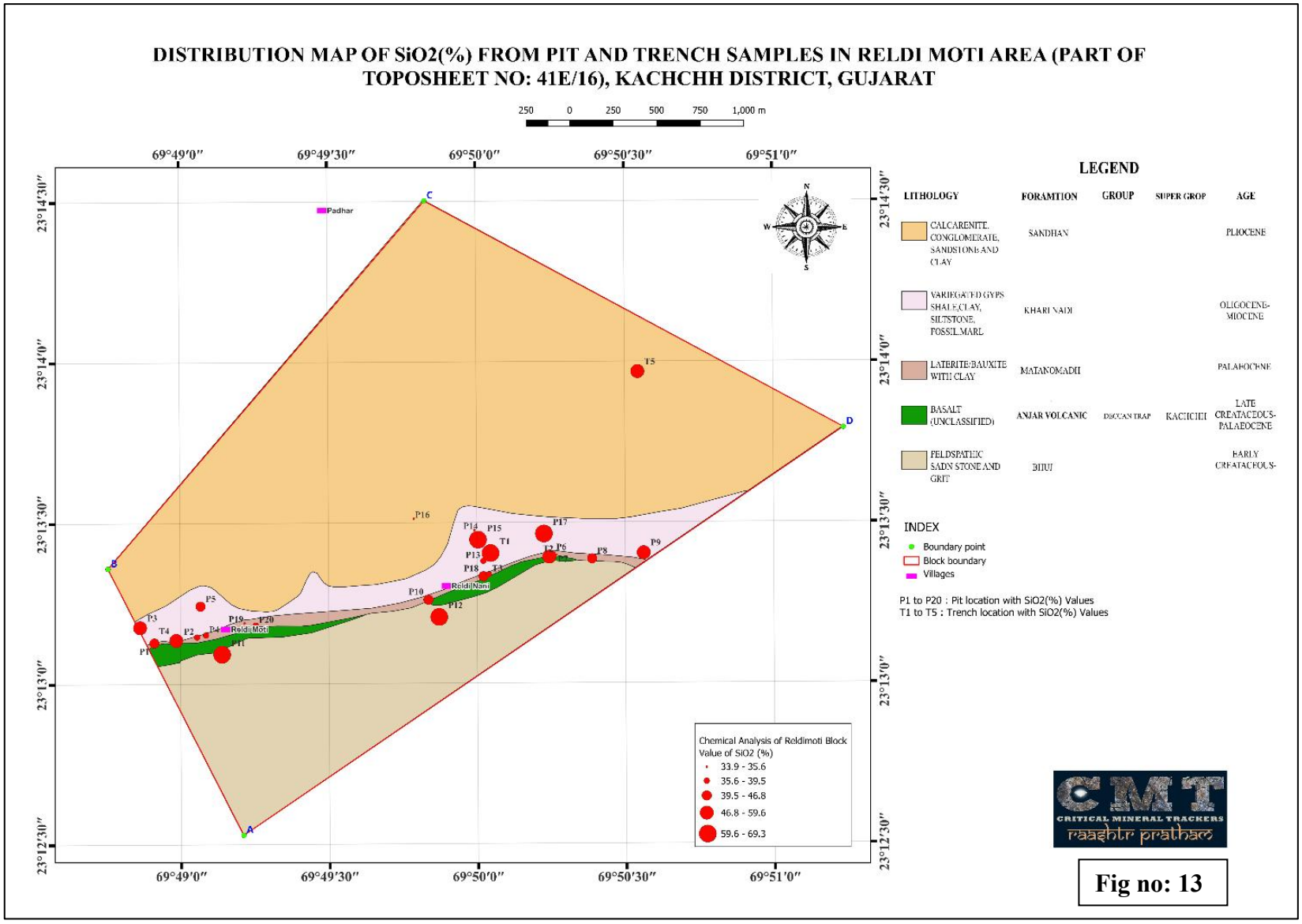

DISTRIBUTION MAP OF SiO2(%) FROM PIT AND TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
250 0 250 500 750 1,000 m
69°49'0" 69°49'30" 69°50'0" 69°50'30" 69°51'0"
23°14'30" 23°14'0" 23°13'30" 23°13'0" 23°12'30"
Padhar
Reldi Nani
Reldi Moti
A
B
C
D
T1
T2
T3
T4
T5
P1
P2
P3
P4
P5
P6
P8
P9
P10
P11
P12
P13
P14
P15
P16
P17
P18
P19
P20
N
S
E
W
LEGEND
LITHOLOGY
FORAMTION
GROUP
SUPER GROP
AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY
SANDHAN
PLIOCENE
VARIEGATED GYPS SHALE,CLAY, SILTSTONE, FOSSIL MARL
KHARI NADI
OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY
MATANOMADH
PALAEOCENE
BASALT (UNCLASSIFIED)
ANJAR VOLCANIC
DECCAN TRAP
KACHCHH
LATE CRETACEOUS-PALAEOCENE
FELDSPATHIC SADN STONE AND GRIT
BHUJ
EARLY CRETACEOUS-
INDEX
Boundary point
Block boundary
Villages
P1 to P20 : Pit location with SiO2(%) Values
T1 to T5 : Trench location with SiO2(%) Values
Chemical Analysis of Reldimoti Block
Value of SiO2 (%)
33.9 - 35.6
35.6 - 39.5
39.5 - 46.8
46.8 - 59.6
59.6 - 69.3

Fig no: 13

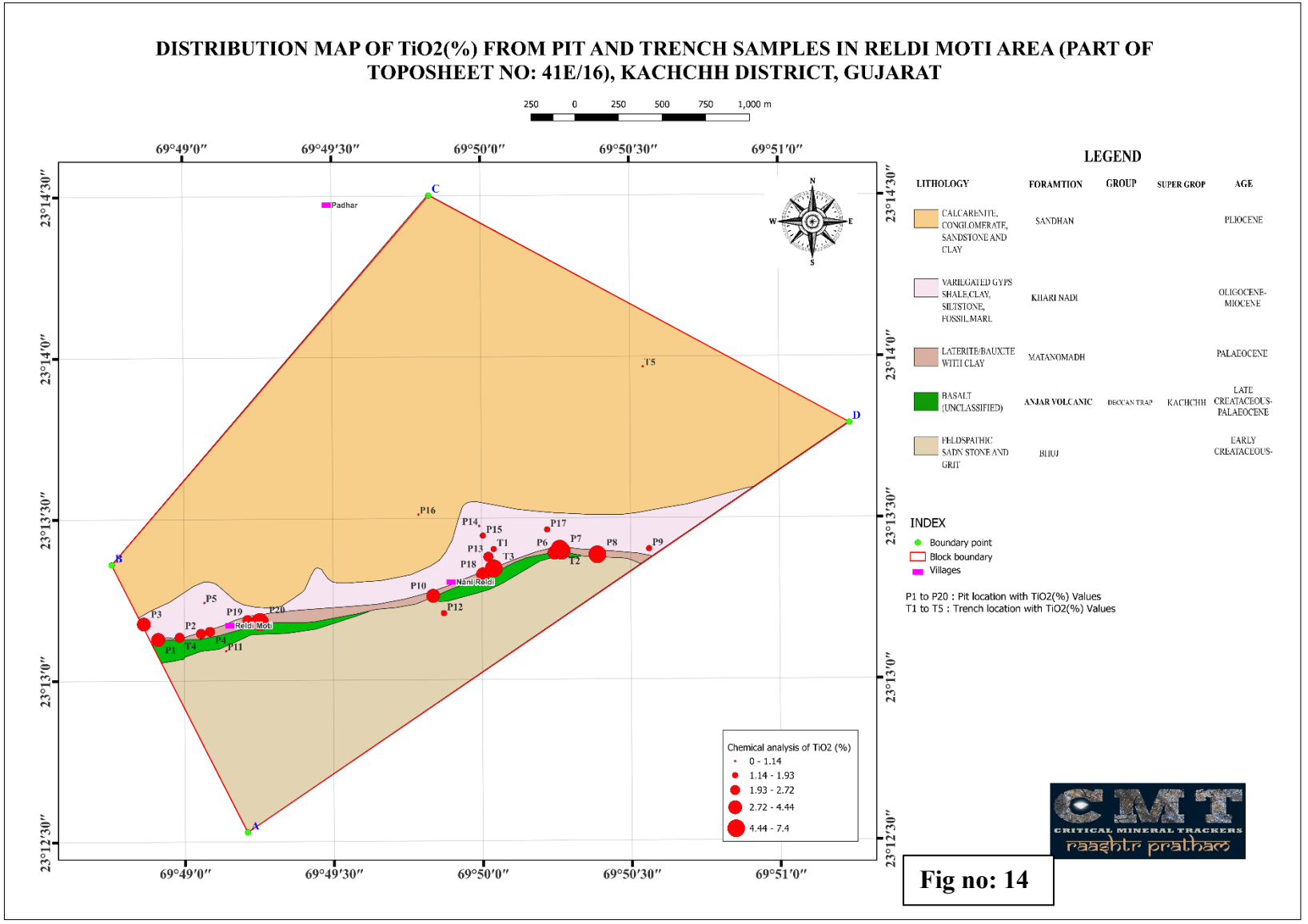

DISTRIBUTION MAP OF TiO2(%) FROM PIT AND TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
250 0 250 500 750 1,000 m
69°49'0" 69°49'30" 69°50'0" 69°50'30" 69°51'0"
23°14'30" 23°14'0" 23°13'30" 23°13'0" 23°12'30"
Padhar
Reldi Moti
Nani Reldi
A
B
C
D
T1 T2 T3 T4 T5
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17 P18 P19 P20
N
S
E
W
LEGEND
LITHOLOGY
FORAMTION
GROUP
SUPER GROP
AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY
SANDHAN
PLIOCENE
VARIEGATED GYPS SHALE,CLAY, SILTSTONE, FOSSIL MARL
KHARI NADI
OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY
MATANOMADH
PALAEOCENE
BASALT (UNCLASSIFIED)
ANJAR VOLCANIC
DECCAN TRAP
KACHCHH
LATE CRETACEOUS-PALAEOCENE
FELDSPATHIC SADN STONE AND GRIT
BHUJ
EARLY CRETACEOUS-
INDEX
Boundary point
Block boundary
Villages
P1 to P20 : Pit location with TiO2(%) Values
T1 to T5 : Trench location with TiO2(%) Values
Chemical analysis of TiO2 (%)
0 - 1.14
1.14 - 1.93
1.93 - 2.72
2.72 - 4.44
4.44 - 7.4

Fig no: 14

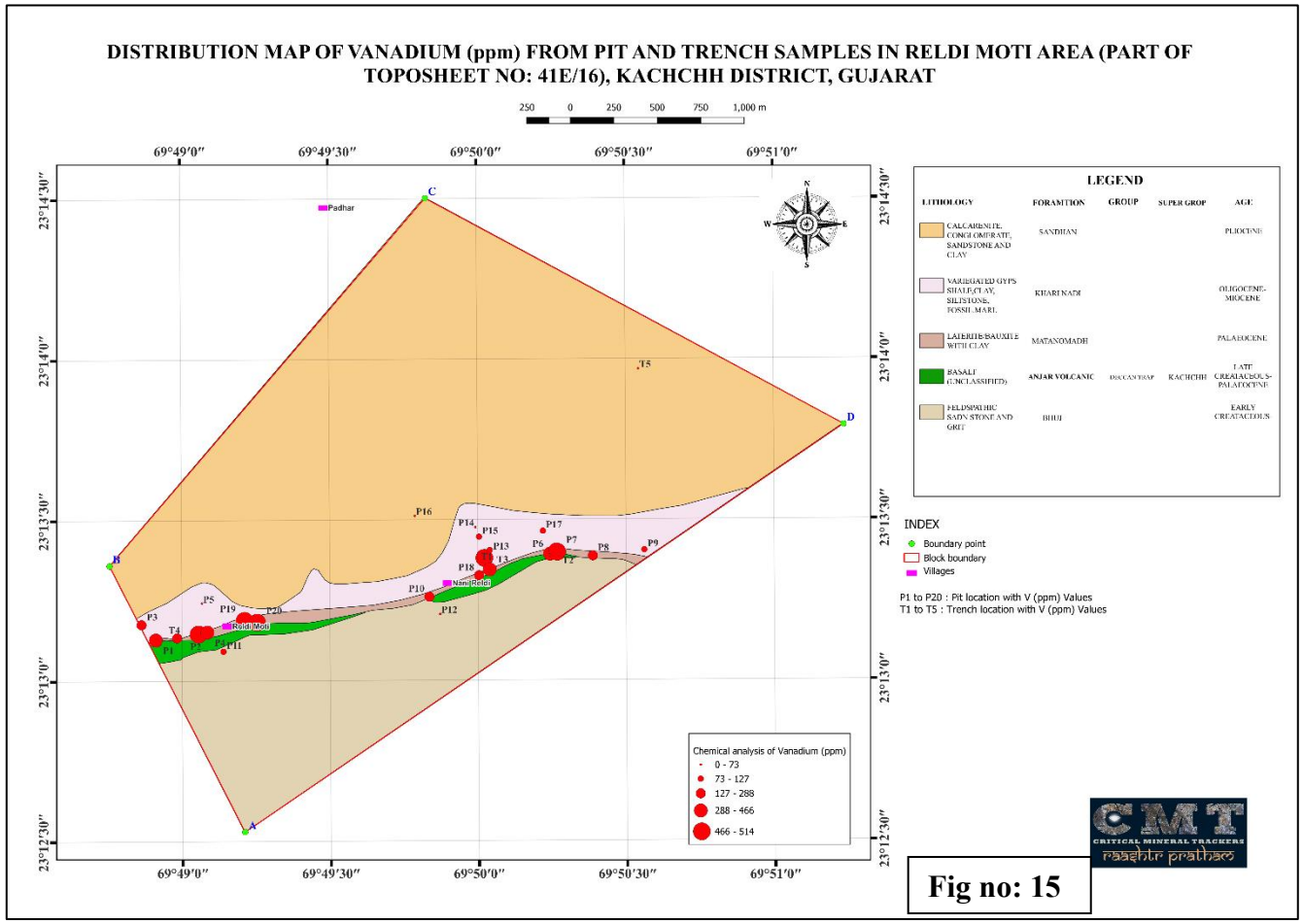

DISTRIBUTION MAP OF VANADIUM (ppm) FROM PIT AND TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
250 0 250 500 750 1,000 m
69°49'0" 69°49'30" 69°50'0" 69°50'30" 69°51'0"
23°14'30" 23°14'0" 23°13'30" 23°13'0" 23°12'30"
Padhar
Reldi/Moti
Mani/Reldi
A
B
C
D
T1 T2 T3 T4 T5
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17 P18 P19 P20
N S E W
LEGEND
LITHOLOGY FORAMTION GROUP SUPER GROP AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY SANDHAN PLIOCENE
VARIEGATED GYPS SHALE,CLAY, SILTSTONE, FOSSIL MARL KHARI NADI OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY MATANOMADH PALAEOCENE
BASALT (UNCLASSIFIED) ANJAR VOLCANIC DECCAN TRAP KACHCHH LATE CREATACEOUS-PALAEOCENE
FELDSPATHIC SADN STONE AND GRIT BHUJ EARLY CREATACEOUS
INDEX
Boundary point
Block boundary
Villages
P1 to P20 : Pit location with V (ppm) Values
T1 to T5 : Trench location with V (ppm) Values
Chemical analysis of Vanadium (ppm)
0 - 73
73 - 127
127 - 288
288 - 466
466 - 514

Fig no: 15

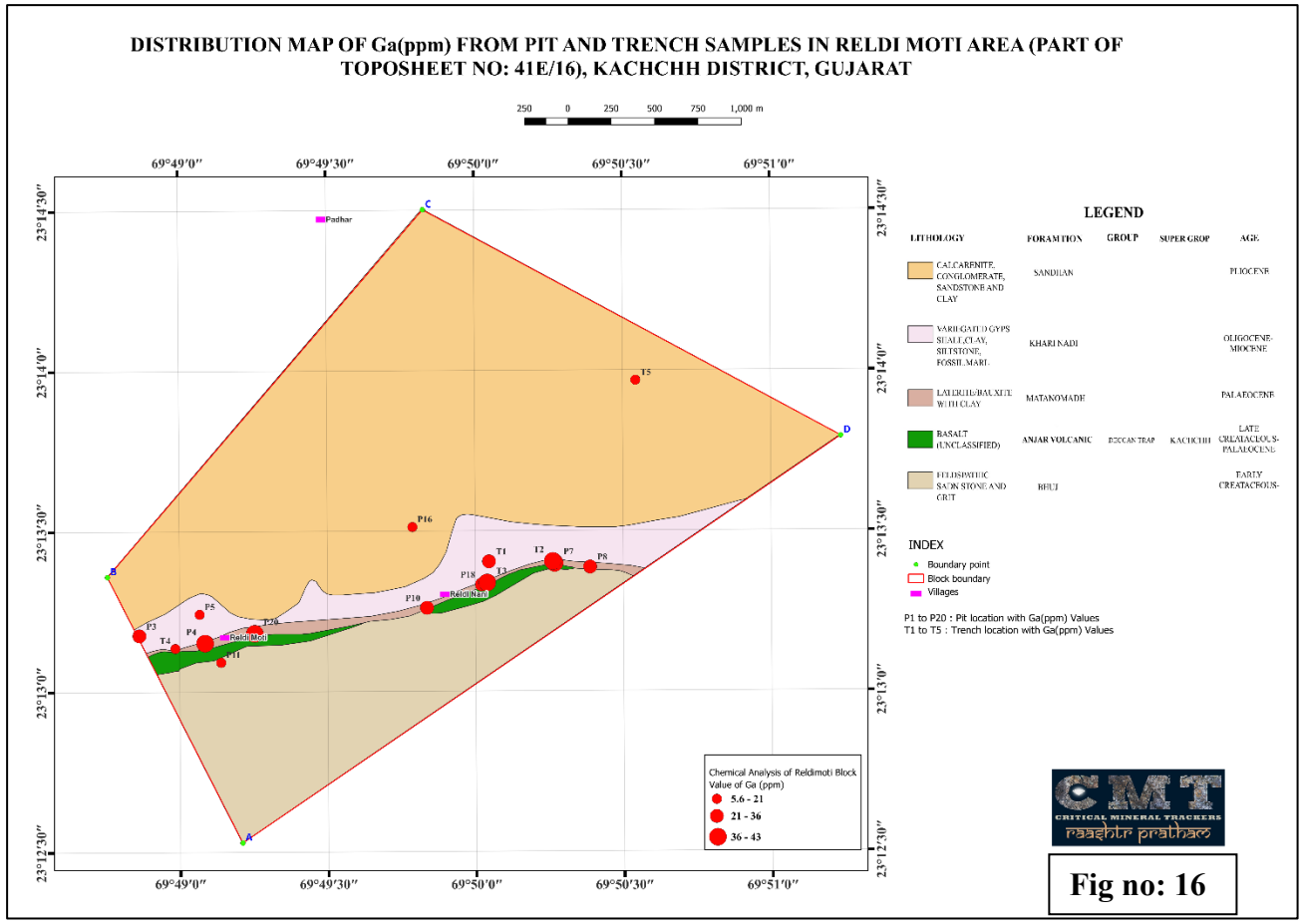
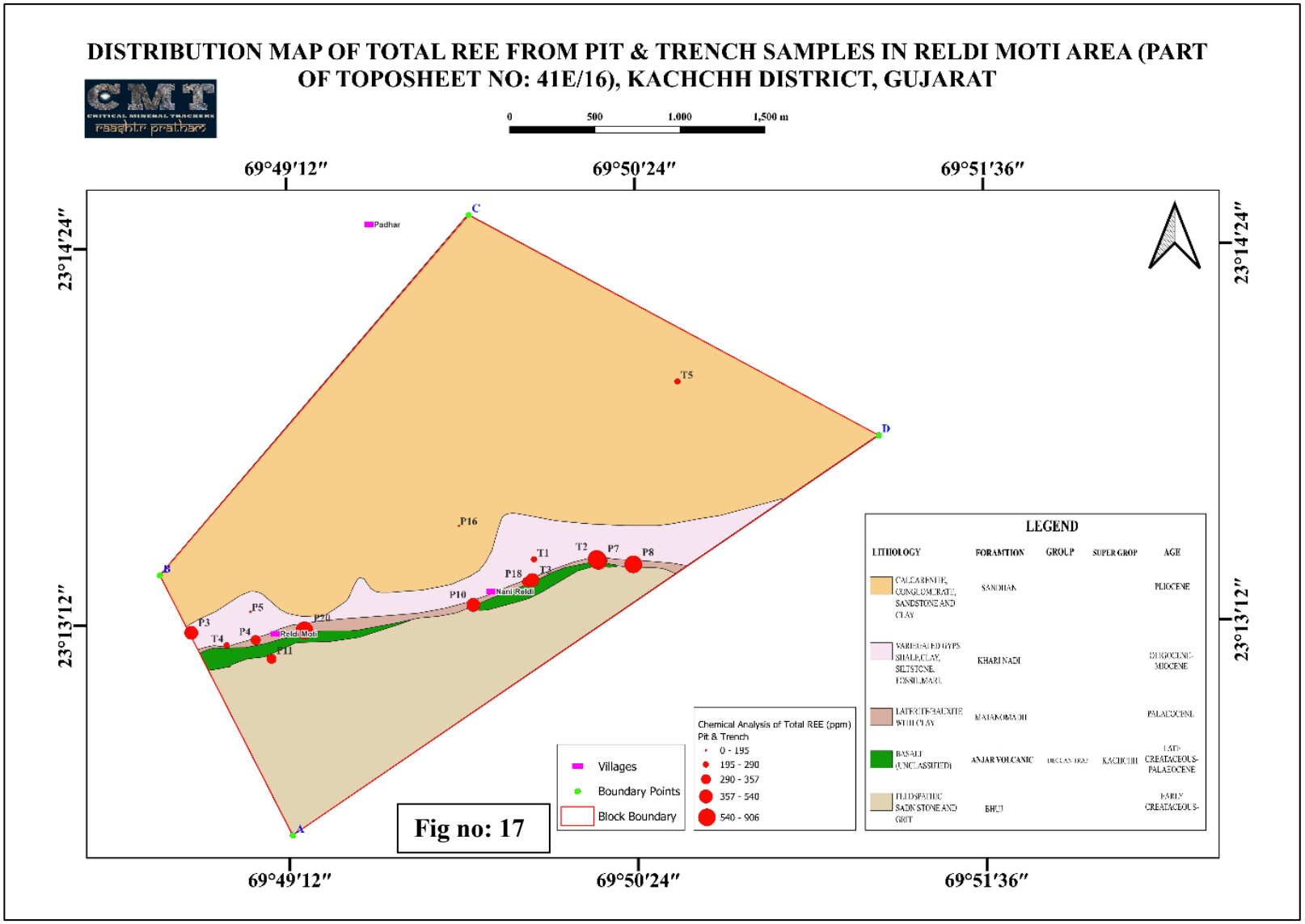

DISTRIBUTION MAP OF Ga(ppm) FROM PIT AND TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
250 0 250 500 750 1,000 m
69°49'0" 69°49'30" 69°50'0" 69°50'30" 69°51'0"
23°14'30" 23°14'0" 23°13'30" 23°13'0" 23°12'30"
Padhar
Reldi Moti
Reldi Nano
A
B
C
D
P1
P2
P3
P4
P5
P6
P7
P8
P10
P11
P16
P18
T1
T2
T3
T4
T5
Chemical Analysis of Reldimoti Block
Value of Ga (ppm)
5.6 - 21
21 - 36
36 - 43
LEGEND
LITHOLOGY
FORAMTION
GROUP
SUPER GROP
AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY
SANDHAN
PLIOCENE
VARIEGATED GYPSUM SHALE,CLAY, SILTSTONE, FOSSIL MARL
KHARI NADI
OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY
MATANOMADH
PALAEOCENE
BASALT (UNCLASSIFIED)
ANJAR VOLCANIC
DECCAN TRAP
KACHCHH
LATE CRETACEOUS-PALAEOCENE
FELDSPATHIC SAUNSTONE AND GRIT
BHUJ
EARLY CRETACEOUS-
INDEX
Boundary point
Block boundary
Villages
P1 to P20 : Pit location with Ga(ppm) Values
T1 to T5 : Trench location with Ga(ppm) Values

Fig no: 16


DISTRIBUTION MAP OF TOTAL REE FROM PIT & TRENCH SAMPLES IN RELDI MOTI AREA (PART OF TOPOSHEET NO: 41E/16), KACHCHH DISTRICT, GUJARAT
0 500 1,000 1,500 m
69°49′12″
69°50′24″
69°51′36″
23°14′24″
23°13′12″
Padhar
Reldi Moti
Nanu Reldi
A
B
C
D
T1
T2
T3
T4
T5
P3
P4
P5
P7
P8
P10
P11
P16
P18
P20
Villages
Boundary Points
Block Boundary
Chemical Analysis of Total REE (ppm)
Pit & Trench
0 - 195
195 - 290
290 - 357
357 - 540
540 - 906
LEGEND
LITHOLOGY
FORAMTION
GROUP
SUPER GROP
AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY
SANDHAN
PLIOCENE
VARIEGATED GYPS SHALE,CLAY, SILTSTONE, FOSSILIFAROUS
KHARI NADI
OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY
MATANOMADH
PALAEOCENE
BASALT (UNCLASSIFIED)
ANJAR VOLCANIC
DECCAN TRAP
KACHCHH
LATE CRETACEOUS-PALAEOCENE
FELDSPATHIC SADN STONE AND GRIT
BHUJ
EARLY CRETACEOUS-
Fig no: 17

6.4 XRD Analysis

XRD analysis of three samples were carried out at Shiva Laboratory, Bengaluru to understand the mineral composition of the samples. The XRD study reveals that the Lithomargic clay is enriched in Kaolinite. Hematite is present as the main phase of iron oxides. TiO2 is present in the form of Ilmenite in the samples. The ratio of the minor minerals varies from sample to sample. The analytical results of the 3 samples are given in Table 6.

Table No 6.17: XRD analytical results of samples

Sl.No.	Sample No.	Mineral Phases	Approximate %
1	P31/RB/2025 (Original no: P2O/RB/2025)	Kaolinite	39.11
		Hematite	8.97
		Calcium carbonate	3.61
		Ilmenite	5.41
2	T21/RB/2025/07 (Original no: T2/RB/2025/07)	Kaolinite	47.64
		Hematite	3.93
		Calcium carbonate	4.24
		Ilmenite	7.58
3	T23/RB/2025/01 (Original no: T3/RB/2025/01)	Kaolinite	46.2
		Gibbsite	8.65
		Mg-Calcite	8.15
		Ilmenite	7

CHAPTER - VII

7.0 Integration of geology, geophysics

This chapter is not applicable for stratiform type deposits like bauxite.

CHAPTER - VIII

8.0 Mineral Prospect

8.1 Surface Indication

The laterite/bauxite in the area, is mostly covered by a thin layer of soil. The trend of the Matanomadh Formation is WSW-ENE in the study area. The Matanomadh Formation comprises mainly laterite, bauxite, bauxitic clay, and lithomarge. The laterite is mainly reddish to dark brown in colour, while bauxite clay/lithomarge is light pink to whitish in colour.

8.2 Mode of Occurrence

In this study area, laterite/bauxite is present in the form of a linear band that is underlain by the weathered basalt of the Anjar Volcanics and overlain by the Khari Nadi Formation, thus forming a strata bound type deposit. The laterite/bauxite band is trending in WSW-ENE. The Matanomadh Formation exists west of Reldi Moti to east of Nani Reldi, about 3 km. The mineralized zone laterite/bauxite with Al_2O_3 content exceeding 30% occurs between borehole RMT-BH-01 and RHMT-BH-05 located in Nani Reldi, and is about 800 m. The Matanomadh Formation comprised of laterite -bauxite-bauxitic clay from top to bottom. In this mineralised zone, laterite forms in a thin layer about 1 meter, followed by bauxite/bauxitic clay to a depth of 30 m west of Reldi Moti, in borehole RMT-BH-05. The laterite/bauxite body is formed due to in-situ weathering and leaching of the parent basaltic rock.

8.3 Nature of mineralisation

Laterite/bauxite is formed due to residual weathering, laterization, and bauxitization of Anjar Volcanics. In the area, lateritic bauxite forms a linear band trending in WSW-ENE. N-S to E-W direction with laterite mainly occurs in the west of the Reldi Moti, and bauxite and clayey bauxite in the east of the Nani Reldi. The lateritic bauxite band is present between the older Anjar Volcanic Formation and the younger Khari Nadi Formation, indicating its strata bound nature. Gibbsite is the dominant mineral phase in the bauxite and kaolinite in the bauxitic clay, as per the XRD study.

Profile Zonation: The vertical profile typically follows this sequence (from top to bottom):

Aluminous Laterite / Bauxite (Ore Zone)

Lithomargic Clay (Saprolite)

Altered Basalt

Parent Basalt (Anjar Volcanics)

Strike Length and Width of anomalies

The anomalous zones identified during the preliminary survey are defined as follows:

Confining lithological Unit: The lateritic deposit is continuous, like a patch in Mathnomadh Formation

Strike Length: The cumulative strike length of the exposed laterite bodies is 3 km, trending generally ENE-WSW.

Width: The width of the outcrop varies from 20 m to 30 m, with an average width of 25 m.

Geochemical Anomalies

Geochemical sampling has delineated high-alumina zones (>30% Al_2O_3) within the geological boundaries.

These anomalies generally coincide with the aluminous laterite. The width of the high-grade geochemical anomaly is typically narrower than the geological outcrop, averaging 25 m.

Geophysical Anomalies:

No geophysical survey was conducted.

8.4 Alteration Zone

The alteration zone represents the transition from fresh parent rock to the ore body. Kaolinization: The most prominent alteration is the formation of the Lithomarge Zone (Saprolite) at the base of the profile. This zone is characterized by the alteration of feldspars in the basalt into kaolinite (white/pink clay).

Desilicification: The removal of silica from the parent rock, leading to the concentration of alumina.

Ferruginization: Secondary enrichment of iron oxides (hematite/goethite) in the upper crust and cavities.

8.5 Genesis of Mineralisation

Aluminous laterite/Bauxite is formed in tropical to sub-tropical climatic conditions under intense weathering, heavy rainfall, and in situ leaching of the pre-existing source rocks. The bauxitization process is the extreme case of lateritization due to strong leaching and removal of soluble materials.

Process

Leaching: Under tropical/sub-tropical climatic conditions with alternating wet and dry seasons, meteoric water leached mobile elements (Silica, Sodium, Potassium, Calcium, Magnesium) from the parent basalt.

Enrichment: The immobile elements (aluminium, Iron, and titanium) were residually concentrated in situ.

Bauxitisation: As the process continued, further leaching of iron and silica led to the enrichment of aluminium hydroxides (Gibbsite/Boehmite), forming bauxite pockets.

CHAPTER – IX

9.0 EXPLORATION BY SCOUT DRILLING

After reviewing the geochemical analytical results of pit and trench samples, the 9th TCC-II of NMEDT approved four scout boreholes (each borehole 30m depth) with a total planned meterage of 120.00 m. Accordingly, Critical Mineral Trackers planned the boreholes and mobilized a Calyx type drilling machine equipped with a double tube core barrel, having a drilling capacity of up to 50 m depth (Coring).

Exploratory core drilling was carried out in the Reldi Moti area during the period from 21.07.2025 to 28.08.2025. A total of five boreholes, namely RMT-BH-01, RMT-BH- 02, RMT-BH-03, RMT-BH-04, and RMT-BH-05, were drilled, achieving a total meterage of 120.00 m.

Photo 40 & 41: Calyx rotary drilling machine used for drilling in Reldi Moti Area, Kachchh District, Gujarat

9.1 Stage of exploration: G4 stage of exploration. Guidelines followed as per the **MEMC Rule, 2015,** are in compliance with.

9.2 Methodology of drilling

Drilling is a critical component of mineral exploration as it helps to understand the subsurface geological conditions and structure of potential mineral deposits. It provides essential information for evaluating the mineralization potential of a target area and plays a decisive role in assessing its viability as a mineable prospect.

In the Reldi Moti block, drilling was carried out using a Calyx type drill machine equipped with a double-tube core barrel and diamond bit. In this method, a diamond-tipped drill bit penetrates the litho-units and retrieves cylindrical core samples. The double-tube core barrel system helps in preserving the core and improving recovery by minimizing disturbance to the core during drilling.

The boreholes were drilled vertically in NX size (54.7 mm core diameter) using the double tube core barrel to enhance core recovery. The diameter of the borehole was 75.7 mm, while the core diameter obtained was 54.7 mm. Short drilling runs were maintained to ensure optimum core recovery and better preservation of the core samples.

9.3 Borehole planning

Boreholes were strategically planned to intersect the bauxite/laterite horizon with the objective of determining its thickness and lateral extension. Based on the Large scale geological mapping, pitting, trenching and the geochemical results obtained from pit and trench samples, a total of five vertical boreholes were planned across the block.

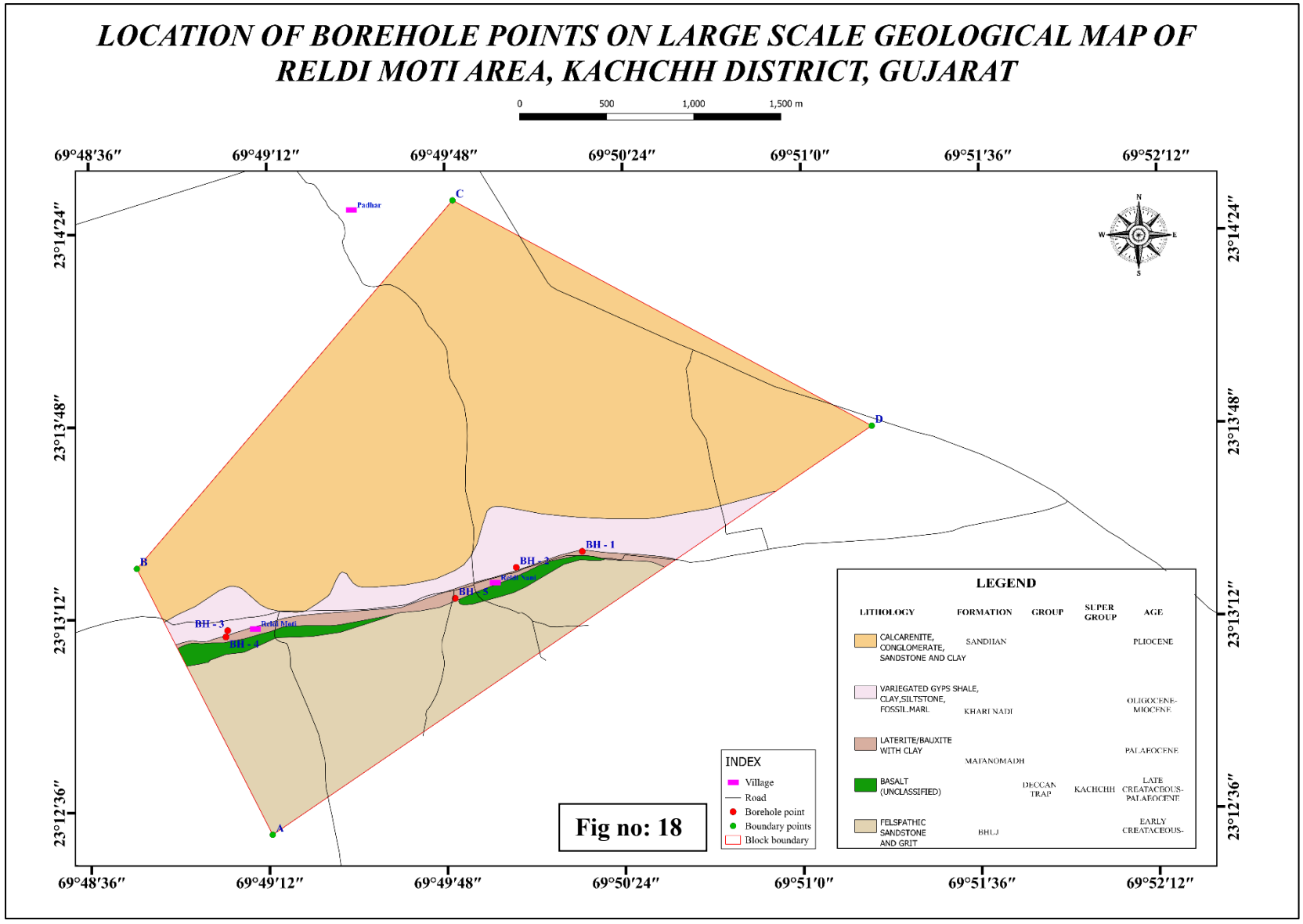
Drilling was carried out using a Calyx rotary drilling machine equipped with a double tube core barrel and diamond bit to ensure good core recovery. The coordinates and Reduced Levels (RLs) of the boreholes were determined through a DGPS survey. After completion of drilling, standard size borehole pillars were erected at each location for proper identification and future reference.

9.4 Borehole Summary

Table no. 9.1 showing Coordinates, RL, Total depth, core recovery, date of commencement and closure (as determined by DGPS Survey)**.**

Table No 9.1: Details of boreholes drilled

Bore Hole No.	Latitude (N) (DD)	Longitude(E) (DD)	RL Collar (m)	Total depth (m)	Core recovery (%)	Date of Commencement	Date of closure
RMT - BH - 01	23.22344	69.83768	142.21	20	67.31%	21.07.2025	31.07.2025
RMT - BH - 02	23.22259	69.83399	143.6	30	93.60%	03.08.2025	09.08.2025
RMT - BH - 03	23.21941	69.8177	145	20	90.00%	11.08.2025	14.08.2025
RMT - BH - 04	23.21908	69.81762	147.08	20	86.17%	15.08.2025	19.08.2025
RMT - BH - 05	23.22105	69.83046	138.55	30	94.04%	21.08.2025	28.08.2025


LOCATION OF BOREHOLE POINTS ON LARGE SCALE GEOLOGICAL MAP OF RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT
0
500
1,000
1,500 m
69°48′36″
69°49′12″
69°49′48″
69°50′24″
69°51′0″
69°51′36″
69°52′12″
23°14′24″
23°13′48″
23°13′12″
23°12′36″
N
S
E
W
Padhar
Reldi Moti
A
B
C
D
BH - 1
BH - 2
BH - 3
BH - 4
BH - 5
INDEX
Village
Road
Borehole point
Boundary points
Block boundary
LEGEND
LITHOLOGY
FORMATION
GROUP
SUPER GROUP
AGE
CALCARENITE, CONGLOMERATE, SANDSTONE AND CLAY
SANDIIAN
PLIOCENE
VARIEGATED GYPS SHALE, CLAY,SILTSTONE, FOSSIL.MARL
KHARI NADI
OLIGOCENE-MIOCENE
LATERITE/BAUXITE WITH CLAY
MATANOMADH
PALAEOCENE
BASALT (UNCLASSIFIED)
DECCAN TRAP
KACHCHH
LATE CREATACEOUS-PALAEOCENE
FELSPATHIC SANDSTONE AND GRIT
BHUJ
EARLY CREATACEOUS-
Fig no: 18

9.5 Borehole logging

The drill cores were systematically preserved in GI core boxes in a book pattern from left to right, with proper orientation arrows and depth markings indicated on steel plates. Detailed core logging was carried out to study the lithological variations, colour, grain size, nature of the rock, and structural features encountered in the boreholes.

The lithologs of the boreholes are presented in summarized form in Annexure-VII, while the graphical lithologs are provided in Plate-X1. A brief description of all five boreholes is given below. Geophysical logging is not recommended for these boreholes. As the boreholes were short and vertical, a borehole deviation test is not required.

9.6 Core Recovery

All necessary precautions were taken to achieve good core recovery during drilling operations, including the use of a double tube core barrel, diamond bit, slow rotation, and short drilling runs. The overall core recovery is + 90% in boreholes RMT-BH-02, RMT-BH-03, and RMT-BH-05, which were drilled in the Matanomadh and Khari Nadi formations, except in structurally disturbed zones.

In RMT-BH-01, the overall core recovery is 67% due to the presence of structural disturbances such as fracturing, broken cores, shearing, and faulting observed within the drill cores. The reduced recovery is attributed to these structurally weak zones.

In the case of RMT-BH-04, pebbly laterite was encountered from 0.00 to 10.00 m, where the core recovery was relatively good (92.7%). However, in the subsequent runs, the recovery decreased due to the presence of pebbly laterite mixed with soft clay, which could not be recovered fully. Consequently, the overall core recovery in this borehole, including sludge, is 86.17%.

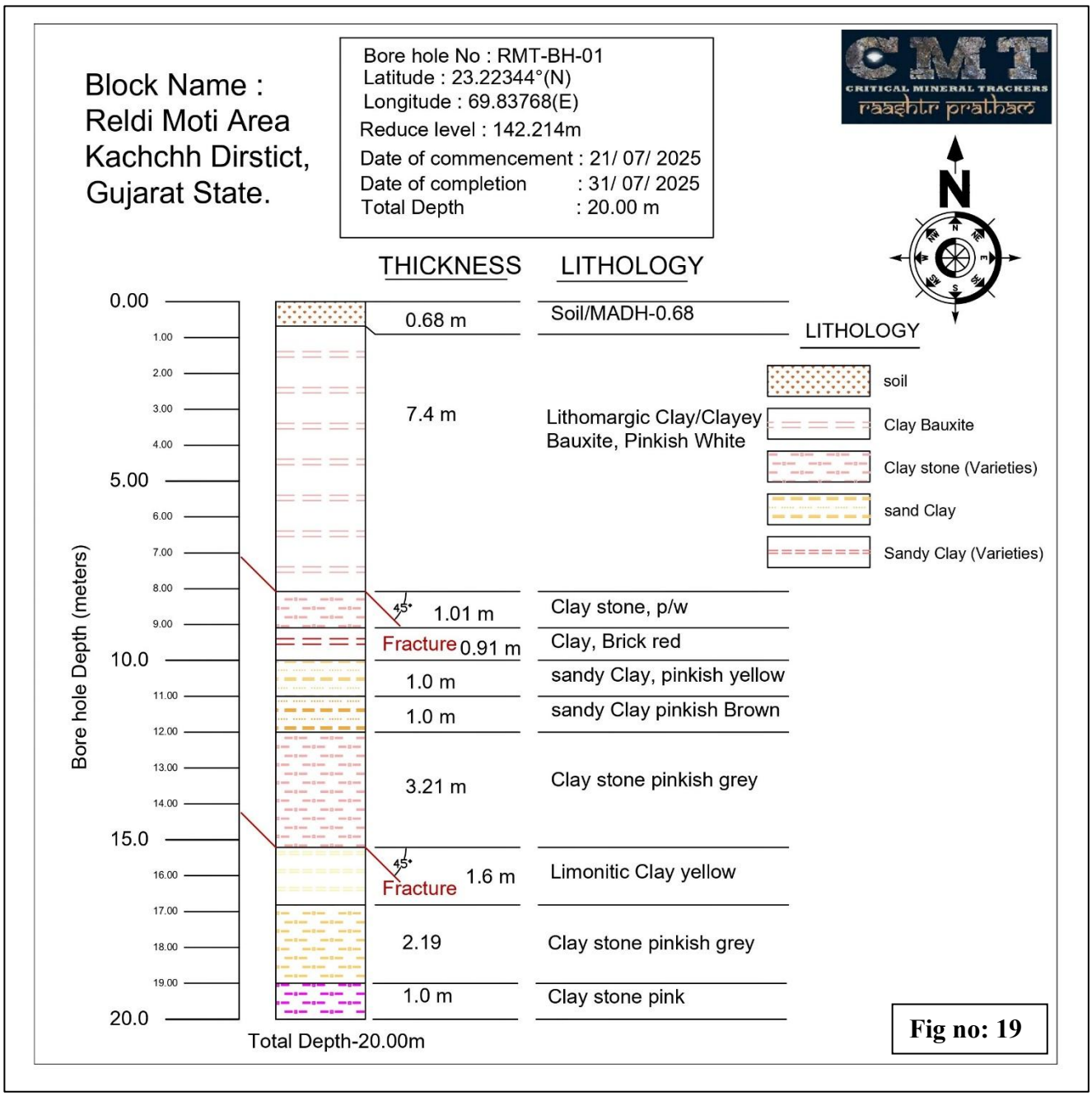
9.7 Description of Boreholes: Out of total Five boreholes, 3 were drilled in Matanomadh Formation (RMT-BH-01,04 & 05) and 2 in Khari Nadi Formation (RMT-BH-02,03).

RMT–BH–01

Based on the analytical results of Trench T2, which exposed highly porous laterite/bauxite with average grades of Al_2O_3 – 31.29%, SiO_2 – 34.56%, Fe_2O_3 – 7.36% and

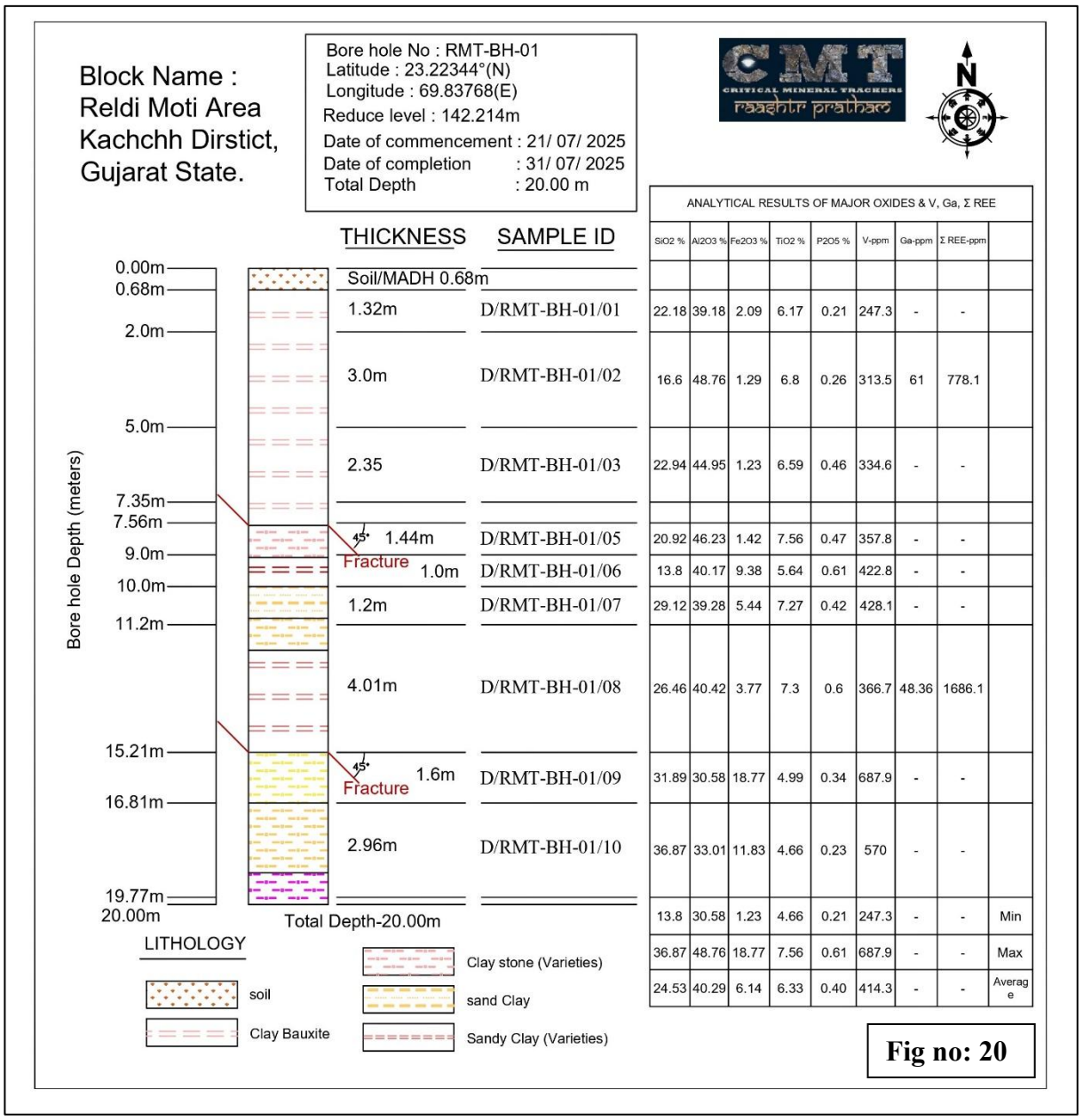
TiO_2 – 7.40%, borehole RMT–BH–01 was drilled in close proximity to ascertain the depth continuity and subsurface characteristics of the clayey bauxite horizon.

Graphic litholog and Assay values of borehole RMT-BH-01 are given below in fig nos: 18 & 19.



The borehole intersected pinkish-white, soft clayey bauxite/lithomargic clay from 0.00 m to 8.00 m depth. This was followed by pink, yellow, grey, and variegated claystone along with limonitic clay from 8.00 m to 20.00 m depth.

The recovered core was highly broken, fractured, and sheared, indicating disturbed ground conditions. Notably, fault zones/fracture planes were encountered at depths of 8.00 m and 15.21 m, suggesting structural disturbance, likely due to the borehole's proximity to a fault zone.



ANALYTICAL RESULTS OF MAJOR OXIDES & V, Ga, Σ REE

	SiO2 %	Al2O3 %	Fe2O3 %	TiO2 %	P2O5 %	V-ppm	Ga-ppm	Σ REE-ppm	
D/RMT-BH-01/01	22.18	39.18	2.09	6.17	0.21	247.3	-	-	
D/RMT-BH-01/02	16.6	48.76	1.29	6.8	0.26	313.5	61	778.1	
D/RMT-BH-01/03	22.94	44.95	1.23	6.59	0.46	334.6	-	-	
D/RMT-BH-01/05	20.92	46.23	1.42	7.56	0.47	357.8	-	-	
D/RMT-BH-01/06	13.8	40.17	9.38	5.64	0.61	422.8	-	-	
D/RMT-BH-01/07	29.12	39.28	5.44	7.27	0.42	428.1	-	-	
D/RMT-BH-01/08	26.46	40.42	3.77	7.3	0.6	366.7	48.36	1686.1	
D/RMT-BH-01/09	31.89	30.58	18.77	4.99	0.34	687.9	-	-	
D/RMT-BH-01/10	36.87	33.01	11.83	4.66	0.23	570	-	-	
	13.8	30.58	1.23	4.66	0.21	247.3	-	-	Min
	36.87	48.76	18.77	7.56	0.61	687.9	-	-	Max
	24.53	40.29	6.14	6.33	0.40	414.3	-	-	Averag e

Fig no: 20

Drilling was terminated at a depth of 20.00 m due to complete loss of circulation, indicating highly porous and permeable subsurface conditions. A total of nine (9) samples were prepared and analysed for major oxide analysis and two (2) samples for REE studies.

Summary of chemical analysis results of borehole RMT-BH-01 is given below

Table No 9.2: Summary of Chemical Analysis Results of RMT-BH-01

Oxides/element	Minimum	Maximum	Mean
SiO2 %	13.80	36.87	24.53
Al2O3 %	**30.58**	**48.76**	**40.29**
Fe2O3%	1.23	18.77	6.14
TiO2%	4.66	7.56	6.33
P205%	0.21	0.61	0.41
Vanadium(ppm)	247.3	687.9	414.3
Gallium (ppm)	48.36	61.00	54.68
Total REE (ppm)	**778.1**	**1686.0**	**1232.1**
(TREE+Sc+Y)	**813.8**	**1761.2**	**1287.5**

The geochemical evaluation of the interval from 0.68 m to 20.00 m (excluding soil cover) indicates that the lithounit is predominantly *clayey bauxite*, as inferred from the ternary plot, and corresponds to aluminous laterite as per IBM classification.

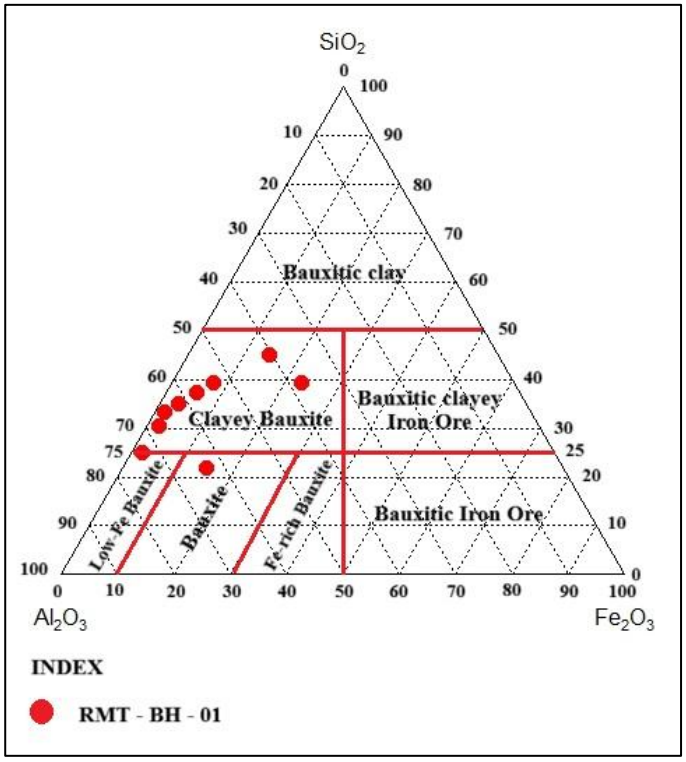


Fig no 21: Ternary plot of RMT-BH-01(after Bardoshshi,1981)

Geochemically, the borehole shows relatively high average Al2O3 values of 40.29%, but the corresponding average SiO2 value is 24.53%, indicating low grade *Clayey bauxite* in Ternary plot.

The average chemical composition of the studied interval is as follows:

The comparatively high Al_2O_3 content, along with moderate silica, suggests a clayey nature of bauxite, which is substantiated by XRD studies carried out on sample T2/RB/2025/07. The mineralogical assemblage comprises Kaolinite (47.64 wt%), Hematite (3.93 wt%), Calcium carbonate (4.24 wt%), Ilmenite (7.58 wt%), and amorphous material (36.60 wt%), indicating incomplete lateritization and dominance of clay minerals.

Further, the presence of very high reactive silica (32.44%) along with low MHA (4.24%) and THA (19.56%) values in sample P7/RB/2025 indicates that the deposit is low-grade in nature with significant clay content. The moderate TiO_2 values (6.33%) suggest the presence of titanium-bearing minerals like ilmenite.

The concentration of Vanadium and Gallium is relatively low, whereas Total REE values are moderate, possibly due to their association with clay minerals and amorphous phases of phosphates. Although enrichment of critical elements such as REE is moderate, the overall grade and quality of bauxite are not favourable for economic exploitation under present conditions.

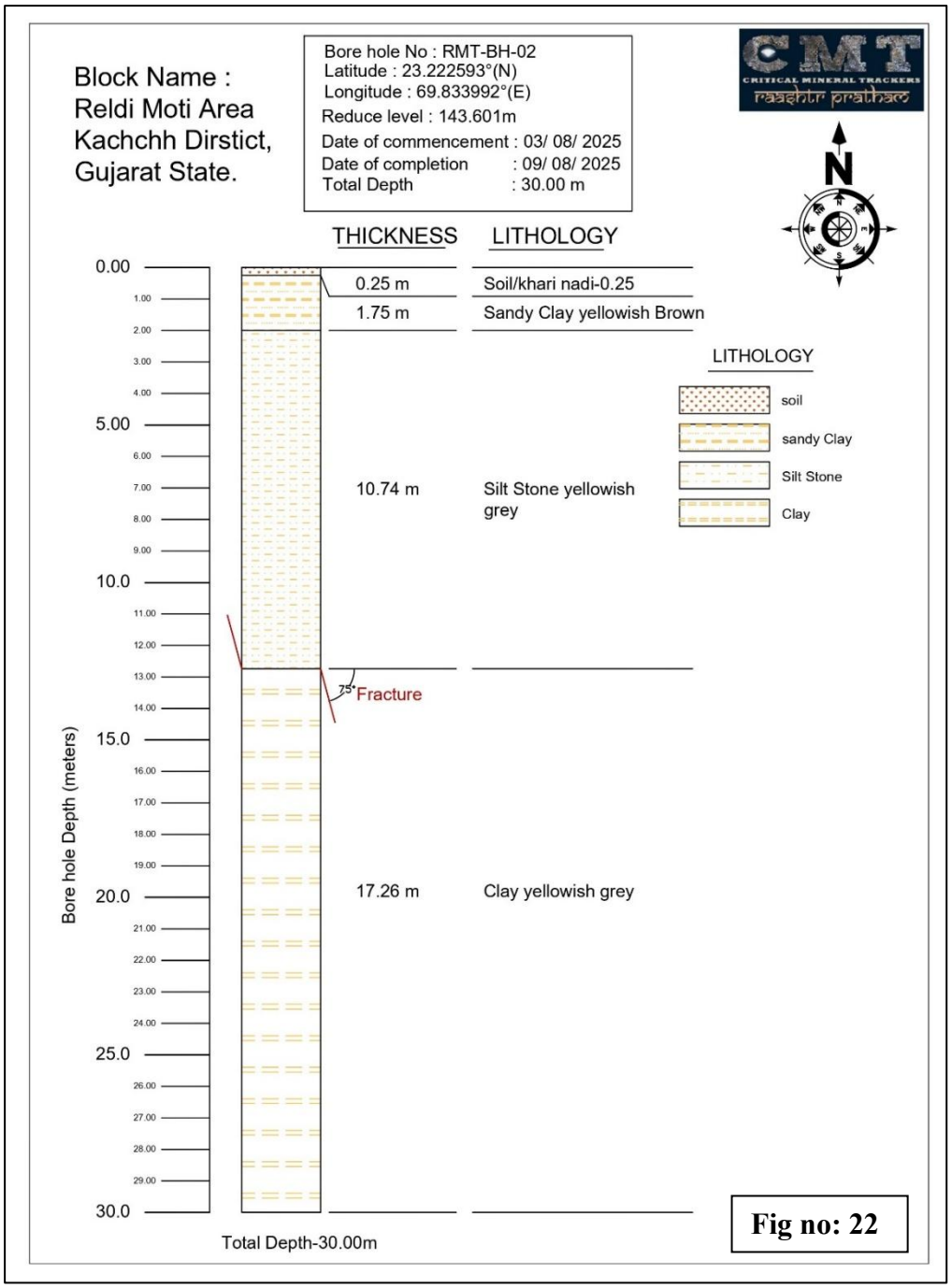
Detailed lithological logs of the boreholes are furnished in Annexure–VII, while the corresponding graphic litho-logs are presented in Plate No. XI. The assay results of the boreholes are provided in Annexure VIII and IX, and are also depicted in Plate No. XII.

RMT-BH-02

Based on the analytical results of Trench T3, excavated east of Nani Reldi village, where soft white clayey bauxite with iron oxide patches was encountered (Al_2O_3 – 29.56%, SiO_2 – 38.66%, Fe_2O_3 – 7.26% and TiO_2 – 6.38%), borehole RMT–BH–02 was drilled approximately 25 m north of the trench to assess the depth continuity of the laterite/bauxitic horizon.

However, contrary to expectations, the borehole intersected the younger Khari Nadi Formation instead of the Matanomadh Formation, which hosts bauxite mineralization in the area.

Graphic litholog and Assay values of borehole RMT-BH-02 are given below in fig nos: 21 & 22.



Lithologically, the borehole comprises of Yellow, friable siltstone and Yellowish-grey, soft clay

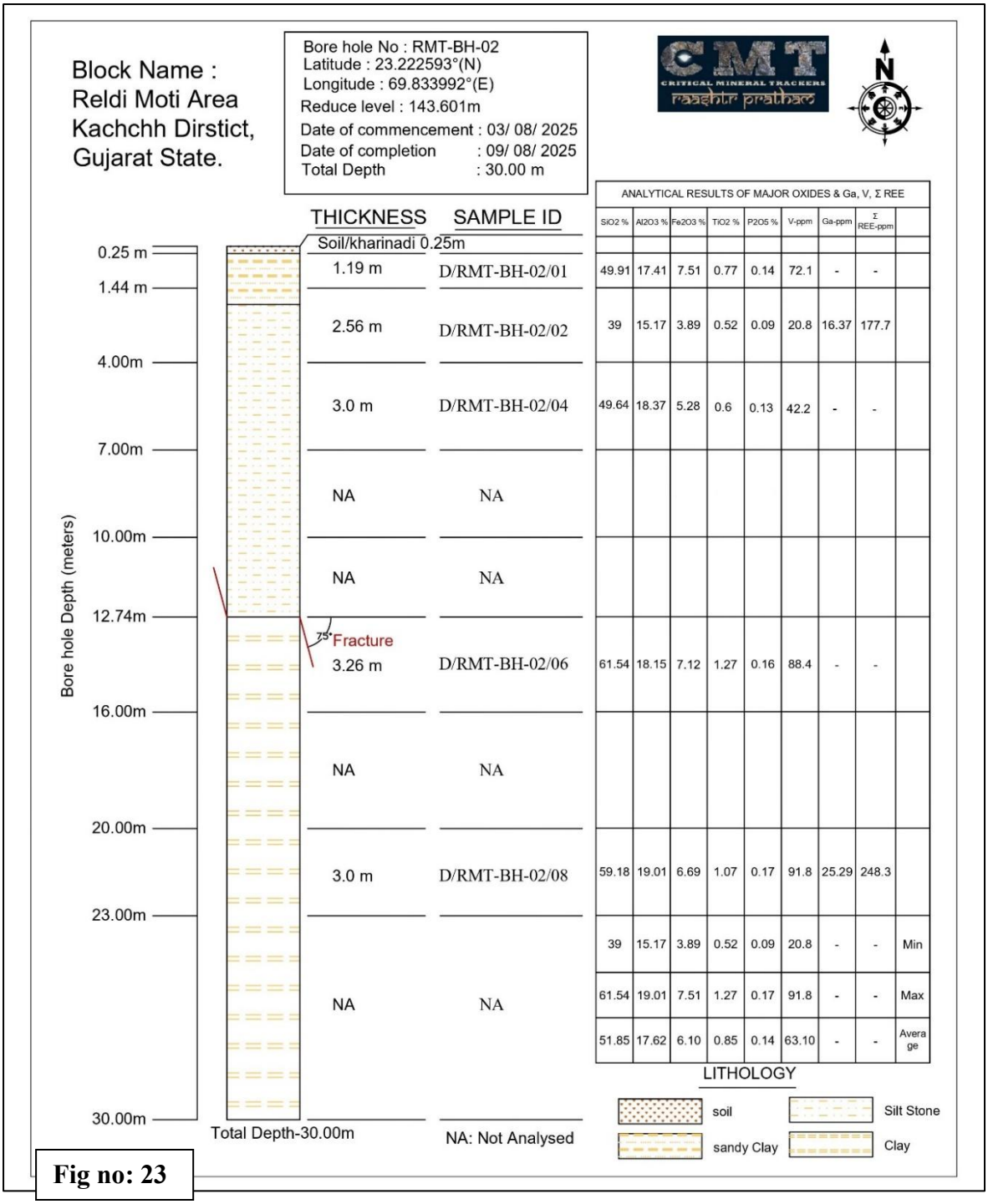


Fig no: 23

Extending from the surface down to a depth of 30.00 m. A total of five (5) core samples were analysed for major oxides, and two (2) samples for REE and Gallium.

Brief summary of chemical analysis results of borehole RMT-BH-02 is given below

Table No 9.3: Summary of Chemical Analysis Results of RMT-BH-02

Oxides/element	Minimum	Maximum	Mean
SiO2 %	39.00	61.54	51.85
Al2O3 %	15.17	19.01	17.62
Fe2O3%	3.89	7.51	6.10
TiO2%	0.52	1.27	0.85
P205%	0.09	0.17	0.14
Vanadium(ppm)	20.8	91.8	63.1
Gallium (ppm)	16.37	25.29	20.83
Total REE (ppm)	**177.70**	**248.30**	**213.00**
TREE+Sc+Y(ppm)	**206.1**	**291.0**	**246.5**

Geochemical analysis indicates non-bauxitic characteristics throughout the borehole, with an average composition of: Al_2O_3: 17.62% (low), SiO_2: 51.85% (high),Fe_2O_3: (moderate),TiO_2: 0.85% (low),Vanadium (V): 63.06 ppm, Gallium (Ga): 20.83 ppm, Total REE (TREE): 213.00ppm

These values clearly indicate the absence of bauxitic enrichment and confirm that the intersected sequence does not belong to the mineralized horizon.

A sharp lithological contact between siltstone and clay was observed at 12.74 m depth, accompanied by a fracture plane with an angle of ~75°, suggesting structural disturbance. This supports the interpretation that the contact between the Matanomadh Formation and Khari Nadi Formation is structurally controlled (faulted) in this area. The borehole was terminated at 30.00 m depth.

Although bauxite mineralization was not encountered, the borehole provides important geological insight by demarcating the dip-side limit due to the WNW-ESE trending major fault passing through the Matanomadh Formation and underlyting Anjar Volcanics and Bhuj Formation, which resulted in constraining the down-dip lateral extent of bauxitic horizons in the study area.

Detailed lithological logs of the boreholes are furnished in Annexure–VII, while the corresponding graphic lithologs are presented in Plate No. XI. The assay results of the boreholes are provided in Annexure–VIII and IX, and are also depicted in Plate No. XII.

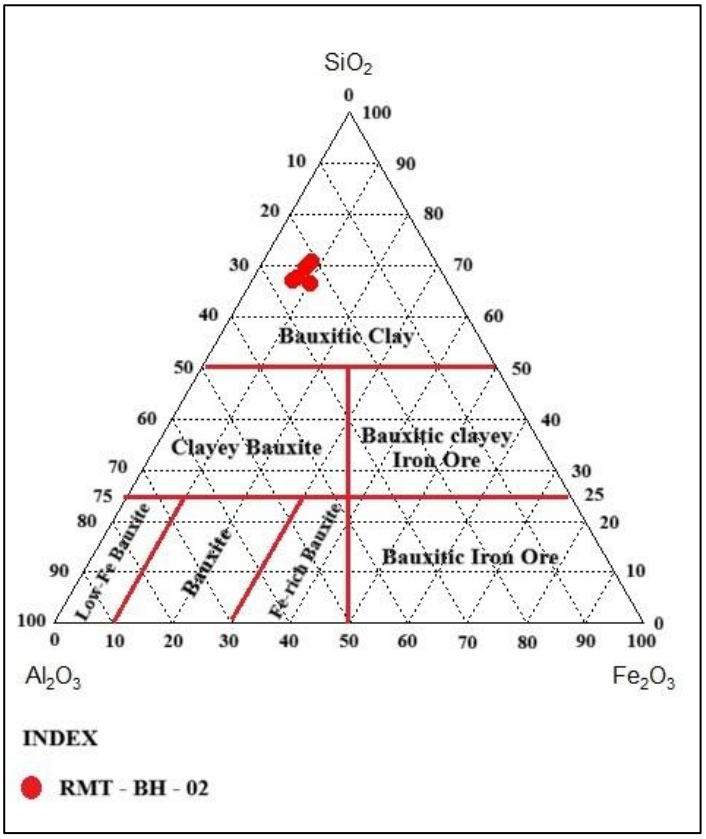


Fig no 24: Ternary plot of borehole RMT-BH-02(after Bardoshshi,1981)

Khari Nadi formation is composed of siltstone and Calcareous clays, not showing any sign of bauxitisation. Geochemically, the average values of Al2O3 are 17.62 (low) and corresponding SiO2 is 51.85% (high), hence falling under the *Bauxitic clay* category.

RMT-BH-03:

The Matanomadh Formation exposed in Pit P4 exhibits a lateritic composition characterized by low Al_2O_3 (19.03%), high SiO_2 (36.60%), high Fe_2O_3 (20.59%), and low TiO_2 (2.43%), indicating a ferruginous and silica-rich lateritic profile. To evaluate the dip-side continuity of this formation, borehole RMT–BH–03 was drilled approximately 35 m north of Pit P4.

Graphic litholog and Assay values of borehole RMT-BH-03 are given below in fig nos: 24 & 25

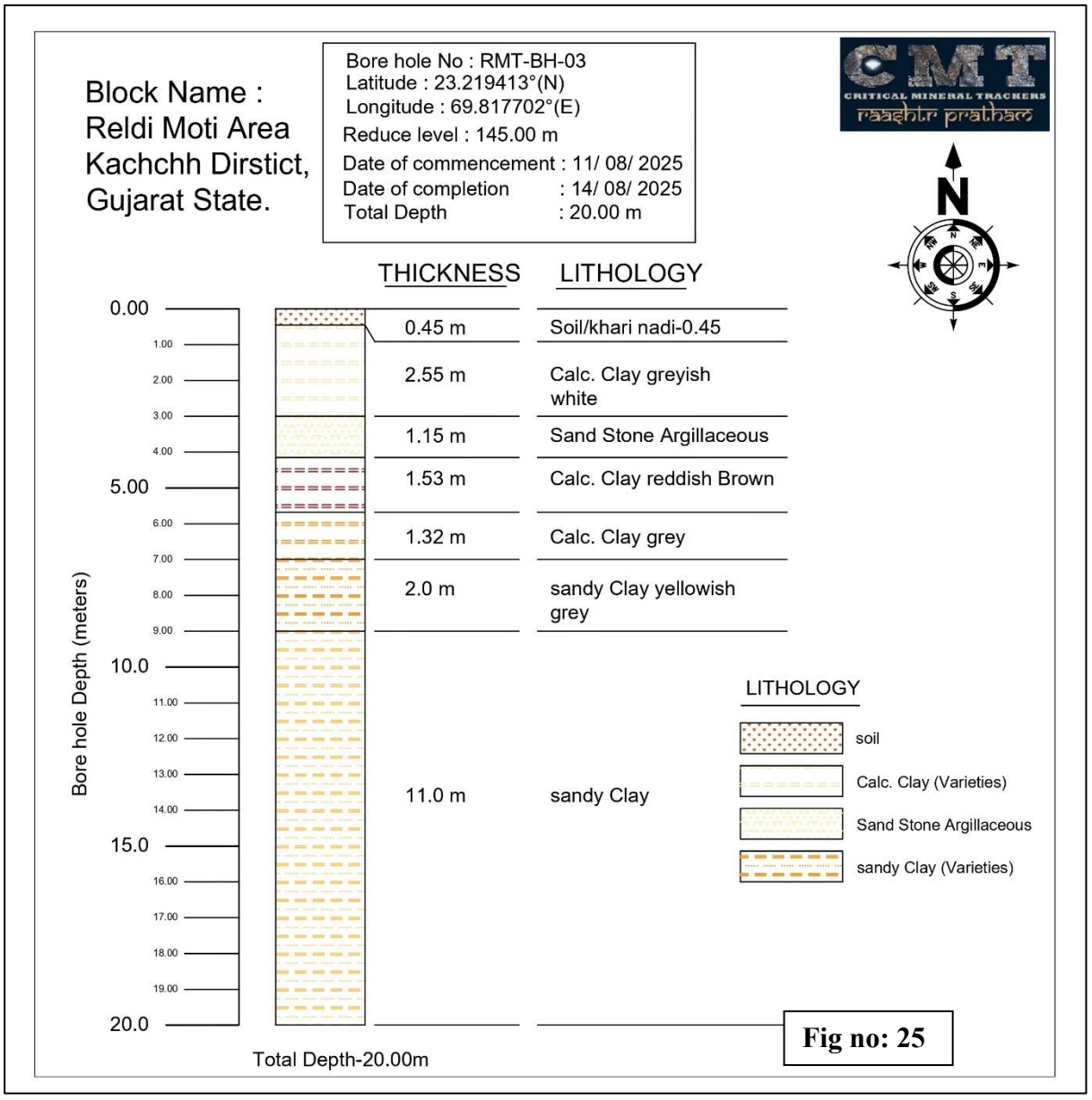


Fig no: 25

Lithologically, the borehole comprises: Yellowish-grey calcareous clay, Yellowish to brownish-grey sandy clay, interspersed with patches of calcarenite and marl. These lithologies are consistent with sedimentation under shallow marine to marginal marine conditions, typical of the Khari Nadi Formation.

Block Name :
Reldi Moti Area
Kachchh Dirstict,
Gujarat State.

Bore hole No : RMT-BH-03
Latitude : 23.219413°(N)
Longitude : 69.817702°(E)
Reduce level : 145.00 m
Date of commencement : 11/ 08/ 2025
Date of completion : 14/ 08/ 2025
Total Depth : 20.00 m

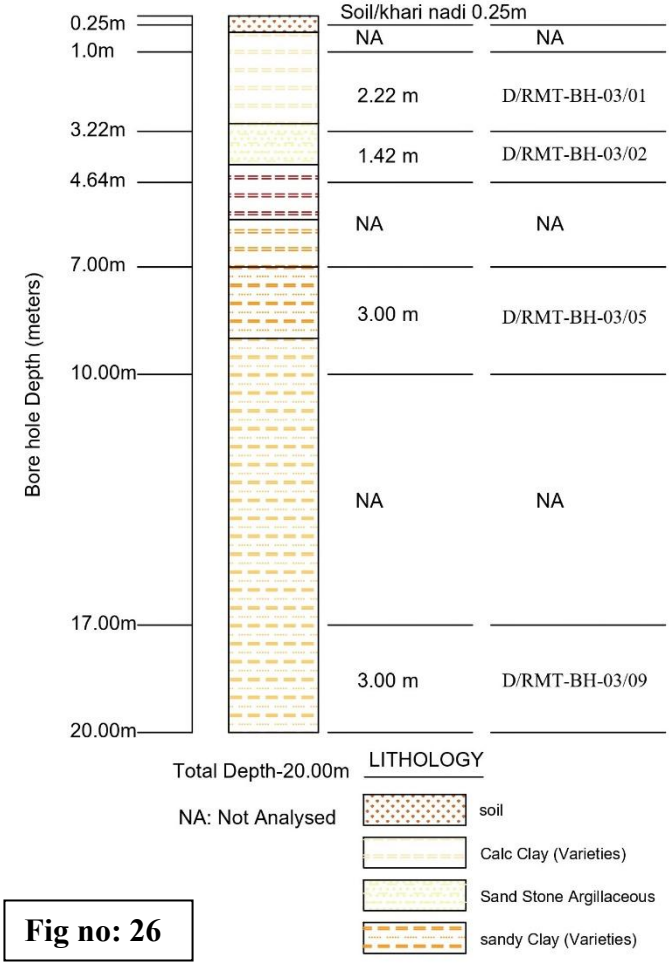


Fig no: 26

ANALYTICAL RESULTS OF MAJOR OXIDES & Ga, V, Σ REE

SiO2 %	Al2O3 %	Fe2O3 %	TiO2 %	P2O5 %	V-ppm	Ga-ppm	Σ REE-ppm	
39.12	11.88	6.65	1.35	0.05	61.8	-	-	
46.99	16.41	22.29	1.96	0.2	503.7	-	-	
58.21	14.35	7.1	1.68	0.06	85.5	0.5	277.2	
51.72	14.33	7.03	1.53	0.07	90.4	12.65	274.4	
39.12	11.88	6.65	1.35	0.05	61.8	-	-	Min
58.21	16.41	22.29	1.96	0.2	503.7	-	-	Max
49.01	14.24	10.77	1.63	0.10	185.4	-	-	Aver age

A total of four (4) core samples were analysed for major oxides, and two (2) samples for REE and Gallium.

Brief summary of chemical analysis results of borehole RMT-BH-03 is given below

Table No: 9.4: Summary of Chemical analysis results of RMT-BH-03

Oxides/element	Minimum	Maximum	Mean
SiO2 %	39.12	58.21	49.01
Al2O3 %	11.88	16.41	14.24
Fe2O3%	6.65	22.29	10.77
TiO2%	1.35	1.96	1.63
P205%	0.05	0.20	0.10
Vanadium(ppm)	61.8	503.7	185.35
Gallium (ppm)	<1.0	12.65	6.32
Total REE (ppm)	272.20	274.40	273.30
TREE+Sc+Y	307.2	309.3	308.25

Geochemical results indicate non-bauxitic composition throughout the borehole, with an average composition of Al_2O_3: 14.24% (low), SiO_2: 49.01% (high), TiO_2: 1.63% (low), Vanadium (V): 185.35 ppm, Gallium (Ga): 6.32 ppm, Total REE (TREE): 273.30 ppm These values clearly indicate the absence of bauxitic enrichment and also reflect poor concentration of associated critical minerals (Ga, V, REE) in the subsurface at this location.The borehole was terminated at a depth of 20.00 m.

Although bauxitic material was not encountered, the borehole provides important subsurface control and helps to demarcate the dip-side limit of the Matanomadh Formation, thereby constraining the extent of the prospective horizon.

Detailed lithological logs of the boreholes are furnished in Annexure–VII, while the corresponding graphic litho-logs are presented in Plate No. XI. The assay results of the boreholes are provided in Annexure–VIII and IX, and are also depicted in Plate No. XII.

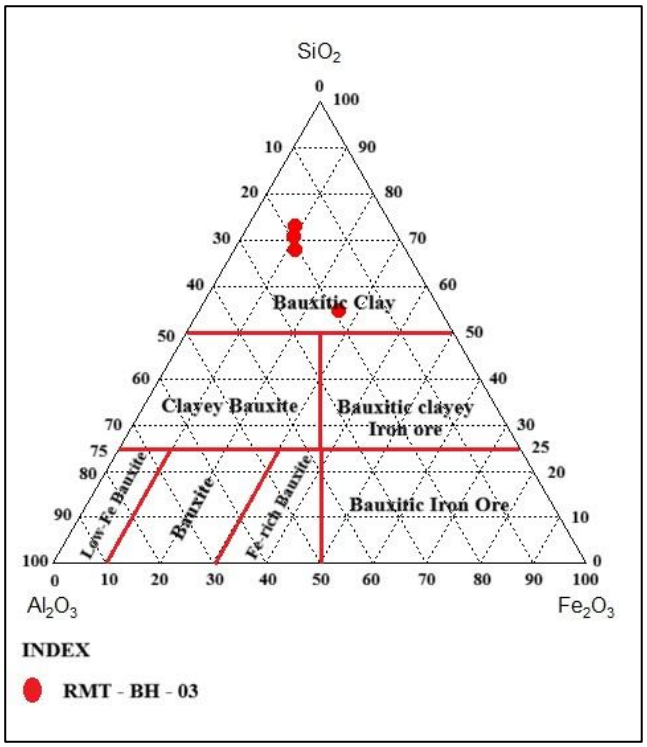


Fig no 27: Ternary plot of RMT-BH-3(after Bardoshshi,1981)

This borehole was drilled in the Khari Nadi formation which is devoid of any bauxite mineralisation show low Al2O3 values of 14.24% and corresponding high SiO2 values of 49.01%. Hence it represents bauxitic clay under Ternary plot

RMT-BH-04:

Following is the non-intersection of the Matanomadh Formation in borehole RMT–BH–03, borehole RMT–BH–04 was drilled in close proximity to Pit P4 to ensure interception of the targeted horizon.

Graphic litholog and Assay values of borehole RMT-BH-04 are given below in fig nos: 27 & 28

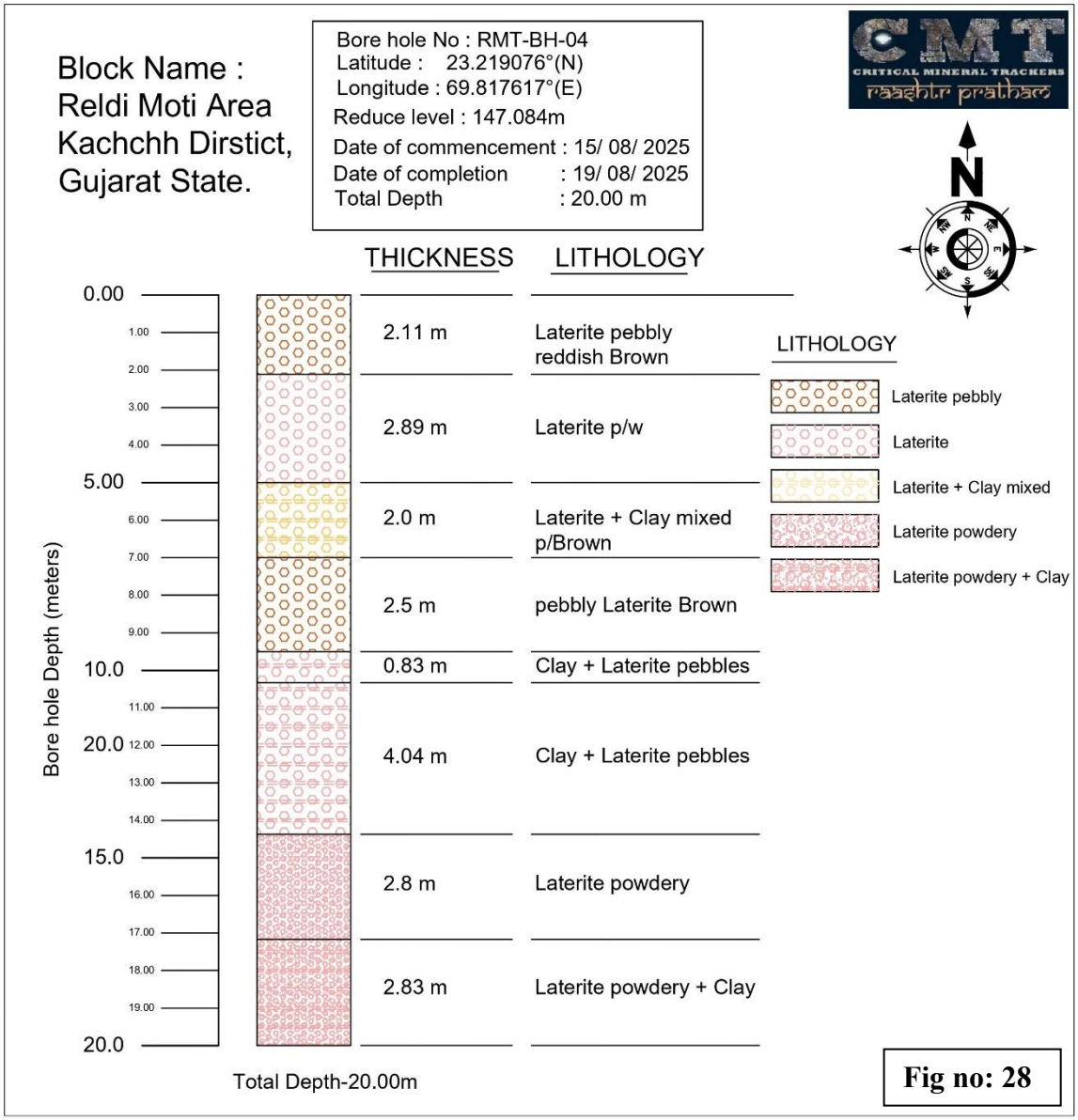
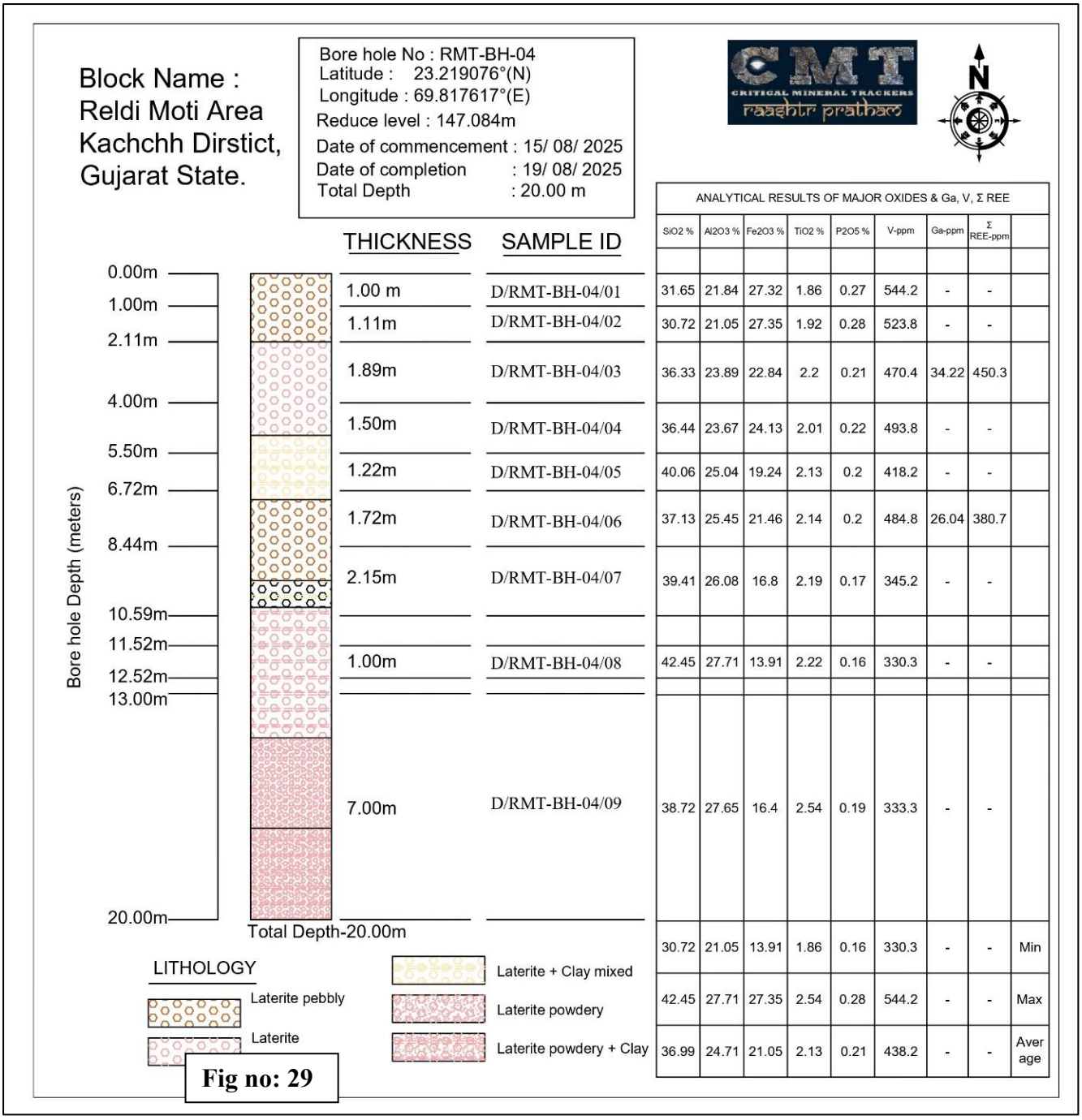


Fig no: 28

The borehole was drilled up to a depth of 20.00 m and intersected porous brown pebbly laterite along with pinkish-white clay admixed with lateritic material, confirming the presence of a lateritic profile in the vicinity of Pit P4.



ANALYTICAL RESULTS OF MAJOR OXIDES & Ga, V, Σ REE

SiO2 %	Al2O3 %	Fe2O3 %	TiO2 %	P2O5 %	V-ppm	Ga-ppm	Σ REE-ppm	
31.65	21.84	27.32	1.86	0.27	544.2	-	-	
30.72	21.05	27.35	1.92	0.28	523.8	-	-	
36.33	23.89	22.84	2.2	0.21	470.4	34.22	450.3	
36.44	23.67	24.13	2.01	0.22	493.8	-	-	
40.06	25.04	19.24	2.13	0.2	418.2	-	-	
37.13	25.45	21.46	2.14	0.2	484.8	26.04	380.7	
39.41	26.08	16.8	2.19	0.17	345.2	-	-	
42.45	27.71	13.91	2.22	0.16	330.3	-	-	
38.72	27.65	16.4	2.54	0.19	333.3	-	-	
30.72	21.05	13.91	1.86	0.16	330.3	-	-	Min
42.45	27.71	27.35	2.54	0.28	544.2	-	-	Max
36.99	24.71	21.05	2.13	0.21	438.2	-	-	Aver age

Fig no: 29

A total of nine (9) core samples were analysed for major oxides, and two (2) samples for REE and Gallium.

Brief summary of the chemical analysis results of borehole RMT-BH-04 is given below in

Table No 9.5: Summary of Chemical Analysis Results of RMT-BH-04

Oxides/element	Minimum	Maximum	Mean
SiO2 %	30.72	42.45	36.99
Al2O3 %	21.05	27.71	24.71
Fe2O3%	13.91	27.35	21.05
TiO2%	1.86	2.54	2.13
P205%	0.16	0.28	0.21
Vanadium(ppm)	330.3	544.2	438
Gallium (ppm)	26.04	34.22	30.1
Total REE (ppm)	380.7	450.3	415.5
TREE+Sc+Y(ppm)	420.1	498.1	459.1

The borehole samples exhibit an average composition of Al_2O_3: 24.71% (low to moderate), SiO_2: 36.99% (high), Fe_2O_3: 21.05% (high), and TiO_2: 2.13% (low). The concentrations of associated elements are Vanadium (V): 438.22 ppm, Gallium (Ga): 30.13 ppm, and Total REE (TREE): 415.5 ppm, indicating poor enrichment of critical elements.

XRD studies carried out on a representative sample, P20/RB/2025/, collected near Reldimoti village (western part of the study area), indicate an iron-rich clayey bauxite composition. The mineral assemblage comprises Kaolinite (39.11 wt%), Hematite (8.97 wt%), Calcium carbonate (3.61 wt%), Ilmenite (5.41 wt%), and amorphous material (42.90 wt%), suggesting dominance of clay minerals along with moderate presence of detrital heavy minerals such as ilmenite.

The overall geochemical signature characterized by moderate alumina, high silica, and elevated iron content—is indicative of a ferruginous lateritic composition rather than true bauxitic enrichment.

Hence, the borehole is not considered for the delineation of the ore zone.

Detailed lithological logs of the boreholes are furnished in Annexure–VII, while the corresponding graphic litho-logs are presented in Plate No. XI. The assay results of the

boreholes are provided in Annexure VIII and IX, and are also depicted in Plate No. XII.

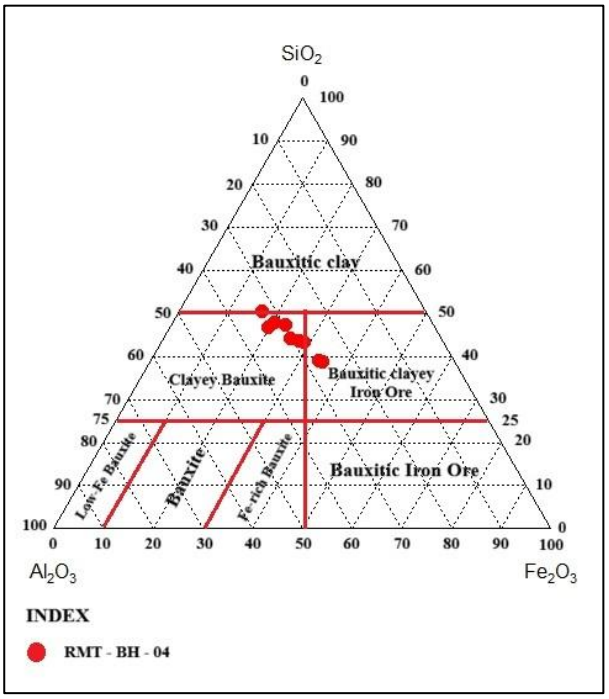


Fig no 30: Ternary plot of RMT-BH-04 (after Bardoshshi,1981)

This borehole was drilled west of Reldi Moti village in the Matanomadh formation, intersected pebbly laterite and shows an average Al2O3 value of 24.71%, relatively high SiO2 & F2O3 values of 36.99% &21.05% respectively. Hence, this borehole is falling at the margin of *Bauxitic clay with iron ore category*

RMT-BH-05

After obtaining necessary approval from NMET officials to drill an additional borehole in lieu of the four boreholes originally sanctioned under the NQT—without exceeding the total approved meterage of 120.00 m—borehole RMT–BH–05 was drilled near Pit P10, approximately 300 m west of Nani Reldi village, along a nala.

Graphic litholog and Assay values of borehole RMT-BH-05

are given below in fig no's: 30 & 31.

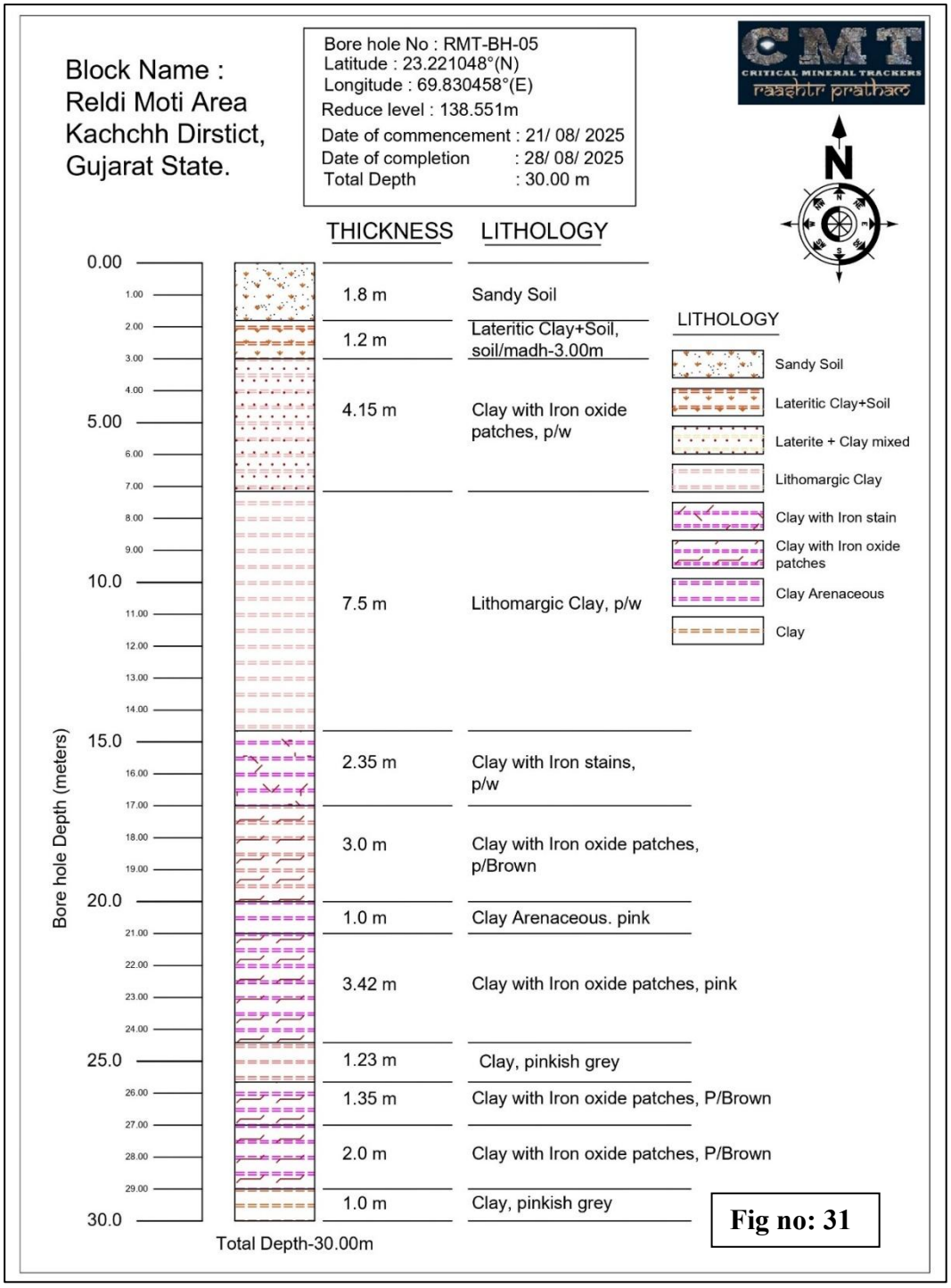
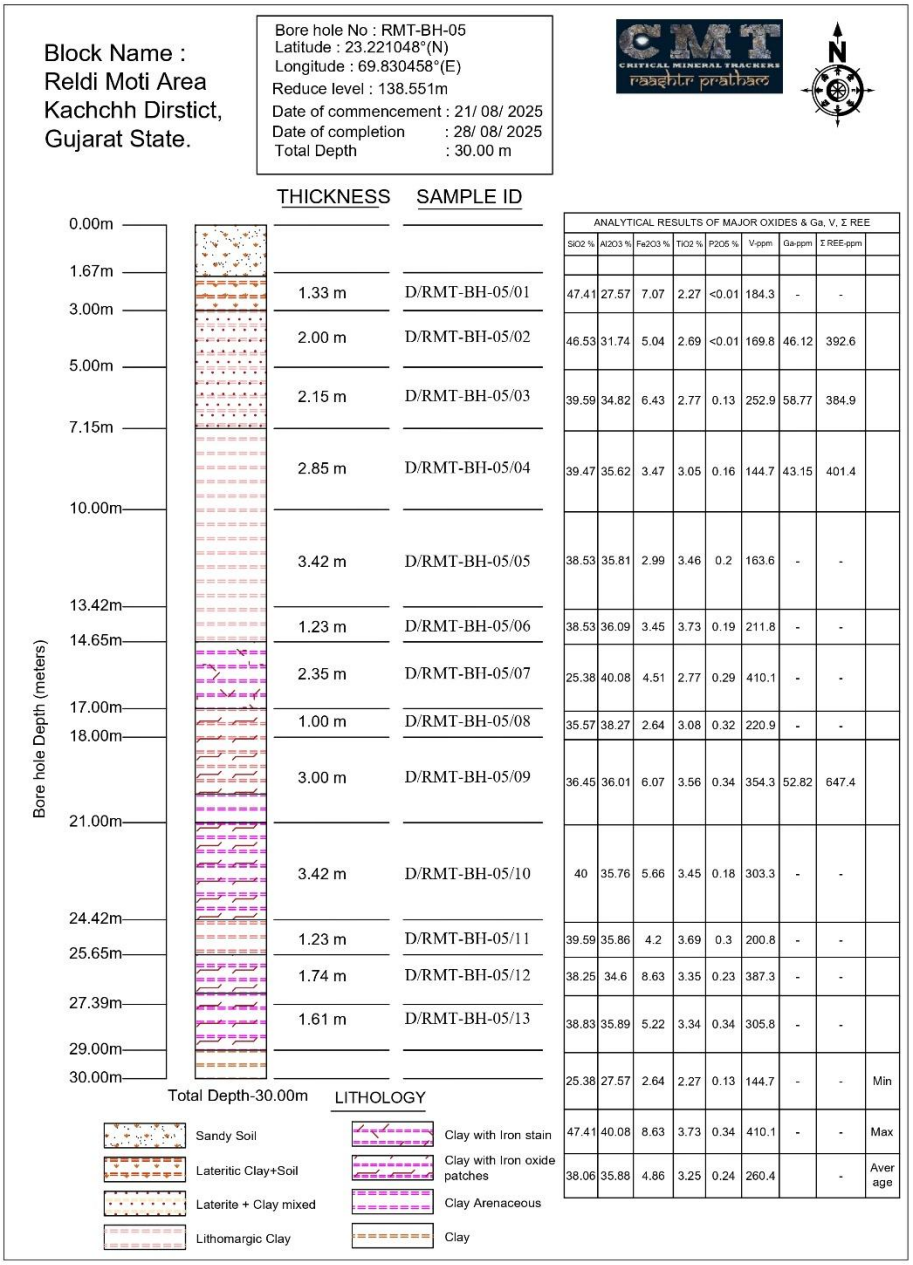


Fig no: 31

Lithologically, the borehole intersected Pinkish-white lateritic clay with brown iron oxide patches, formed due to leaching,pinkish-white lithomargic clay,Pinkish to brownish clay with iron oxide enrichment patches

A thin layer of sandy soil admixed with clay occurs from surface to 3.00 m depth, underlain by a 27.00 m thick horizon (3.00–30.00 m) of clayey bauxite. The borehole was terminated at a depth of 30.00 m.



ANALYTICAL RESULTS OF MAJOR OXIDES & Ga, V, Σ REE

	SiO2 %	Al2O3 %	Fe2O3 %	TiO2 %	P2O5 %	V-ppm	Ga-ppm	Σ REE-ppm	
D/RMT-BH-05/01	47.41	27.57	7.07	2.27	<0.01	184.3	-	-	
D/RMT-BH-05/02	46.53	31.74	5.04	2.69	<0.01	169.8	46.12	392.6	
D/RMT-BH-05/03	39.59	34.82	6.43	2.77	0.13	252.9	58.77	384.9	
D/RMT-BH-05/04	39.47	35.62	3.47	3.05	0.16	144.7	43.15	401.4	
D/RMT-BH-05/05	38.53	35.81	2.99	3.46	0.2	163.6	-	-	
D/RMT-BH-05/06	38.53	36.09	3.45	3.73	0.19	211.8	-	-	
D/RMT-BH-05/07	25.38	40.08	4.51	2.77	0.29	410.1	-	-	
D/RMT-BH-05/08	35.57	38.27	2.64	3.08	0.32	220.9	-	-	
D/RMT-BH-05/09	36.45	36.01	6.07	3.56	0.34	354.3	52.82	647.4	
D/RMT-BH-05/10	40	35.76	5.66	3.45	0.18	303.3	-	-	
D/RMT-BH-05/11	39.59	35.86	4.2	3.69	0.3	200.8	-	-	
D/RMT-BH-05/12	38.25	34.6	8.63	3.35	0.23	387.3	-	-	
D/RMT-BH-05/13	38.83	35.89	5.22	3.34	0.34	305.8	-	-	
	25.38	27.57	2.64	2.27	0.13	144.7	-	-	Min
	47.41	40.08	8.63	3.73	0.34	410.1	-	-	Max
	38.06	35.88	4.86	3.25	0.24	260.4		-	Aver age

Fig no: 32

A total of thirteen (13) samples were analysed for major oxides and four (4) samples for REE analysis.

Brief summary of the chemical analysis results of borehole RMT-BH-05 is given below

Table No 9.6: Summary of Chemical Analysis Results of RMT-BH-05

Oxides/element	Minimum	Maximum	Mean
SiO2 %	25.38	46.53	38.06
Al2O3 %	31.74	40.08	35.88
Fe2O3%	2.64	8.63	4.86
TiO2%	2.69	3.73	3.25
P205%	0.16	0.28	0.24
Vanadium(ppm)	144.7	410.10	260.4
Gallium (ppm)	43.15	58.77	50.22
Total REE (ppm)	**384.9**	**647.4**	**456.6**
TREE+Sc+Y	**384.9**	**647.4**	**485.6**

The clayey bauxite horizon is characterized by an average chemical composition of Al_2O_3: 35.88%, SiO_2: 38.06% (high), Fe_2O_3: 4.86% (low to moderate), and TiO_2: 3.25% (moderate). The variation in Fe_2O_3 is attributed to the presence of localized iron oxide patches within the horizon. The concentrations of associated elements are Vanadium (V): 260.44 ppm, Gallium (Ga): 50.22 ppm, and Total REE (TREE): 456.6 ppm.

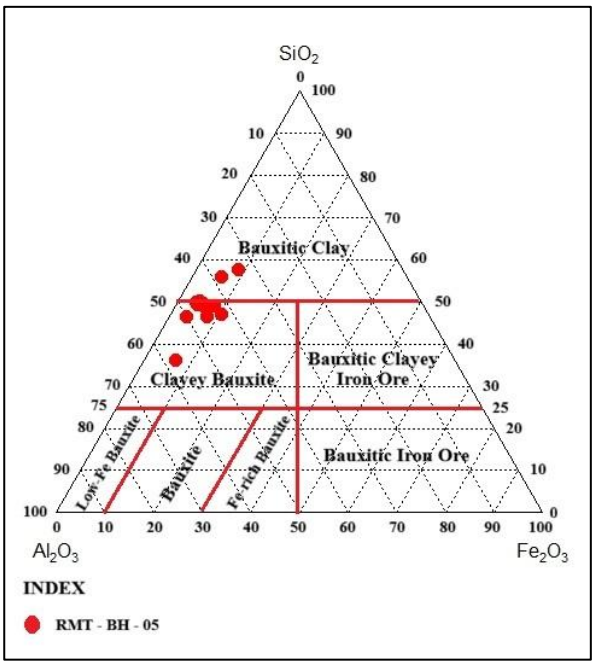


Fig No 33: Ternary plot of RMT-BH-05 (after Bardoshshi,1981)

The borehole RMT-BH-05 drilled in Matanomadh Formation composed of lithomargic clay and clay with iron oxide patches and the average values of Al_2O_3-35.88% but the corresponding high SiO_2 value 38.06% and the moderate TiO_2 value-3.25%

XRD studies carried out on a representative sample T3/RB/2025/01, located near Nani Reldi village (eastern part of the study area), indicate a clay-rich bauxite composition. The mineral assemblage comprises Kaolinite (46.20 wt%), Gibbsite (8.65 wt%), Mg- calcite (8.15 wt%), Ilmenite (7.00 wt%), and amorphous material (30 wt%), suggesting dominance of clay minerals with subordinate gibbsite. Further, the analytical results of sample T3/RB/2025/D reveal high reactive silica (32.79%), coupled with low MHA (6.29%) and THA (25.74%) values. These parameters indicate that the bauxitic material is of poor grade, exhibiting a predominantly clayey character and low metallurgical suitability. The analytical results confirm the presence of clayey bauxite, wherein the high silica content and moderate alumina values indicate poor bauxitization. The relatively low to moderate concentrations of associated critical elements (V, Ga & REE) further reduce the economic significance of the horizon.

Therefore, this horizon is not considered a potential ore zone for bauxite or associated critical mineral enrichment.

Detailed lithological logs of the boreholes are furnished in Annexure–VII, while the corresponding graphic litho-logs are presented in Plate No. XI. The assay results of the boreholes are provided in Annexure–VIII and IX, and are also depicted in Plate No. XII.

9.8 Mineralogy of Ore Zone:

The Matanomadh Formation is exposed in the study area as a narrow, elongated, discontinuous patch (~2900 m length and ~30 m average width) along the northern flank of the Anjar Volcanics. This formation is known to host bauxite mineralisation in the region.

Out of the five boreholes drilled in the area, three boreholes (RMT–BH–01, RMT–BH–04, RMT–BH–05) intersected the Matanomadh Formation. The other two boreholes (RMT–BH–02 and RMT–BH–03) intersected the younger Khari Nadi Formation, which does not exhibit any potential for bauxitisation.

9.9 Petrographic studies

Mineralogy and Texture:

The laterite is dominated by iron oxide minerals, primarily hematite and goethite, which impart characteristic reddish-brown to yellowish hues. The presence of goethite (Gth) is characterized by distinct yellow-brown pleochroism and an earthy texture. Secondary mineralization includes calcite (Cal), occurring as vein and pore-space infillings, exhibiting strong birefringence. The matrix is described as having a cryptocrystalline to fine-grained earthy texture, indicating intense chemical weathering and mineral reprecipitation.

Borehole-wise Mineralisation Characteristics:

The borehole **RMT–BH–01** exhibits comparatively higher alumina values (Al_2O_3: 40.29%) with moderate silica (SiO_2: 24.53%) and significant TiO_2 (6.33%), indicating a clayey bauxite composition. However, XRD studies reveal that the sample is dominated by Kaolinite (47.64 wt%), along with Hematite (3.93 wt%), Calcium carbonate (4.24 wt%), Ilmenite (7.58 wt%), and amorphous material (36.60 wt%), with a notable absence of gibbsite, which is essential for good-quality bauxite.

Further, the presence of very high reactive silica (32.44%) significantly reduces the metallurgical grade of the material.

RMT–BH–04 Shows ferruginous lateritic composition with high Fe_2O_3 (~21–24%), indicating laterite rather than bauxite, and hence not considered within the ore zone.

RMT–BH–05 Represents clayey bauxite with moderate Al_2O_3 (35.88%), but high silica (38.06%) and moderate TiO_2 (3.25%), making it sub-economic in nature.

XRD studies of trench samples (T2 and T3) indicate that the material is predominantly kaolinite-rich (39.11-47.64 wt%) clayey bauxite, rather than gibbsite-rich bauxite. The presence of detrital heavy mineral ilmenite contributes to the elevated TiO_2 values observed in some samples.

The bauxite is predominantly clayey and kaolinitic, with high silica content, which is undesirable for metallurgical-grade bauxite. Gibbsite (high-grade bauxite mineral) is largely absent. Only **RMT–BH–01** shows comparatively better values, but mineralisation is not laterally persistent. Other boreholes either show lateritic composition or sub-economic clayey bauxite.

Additionally, associated critical minerals like Vanadium (V), Gallium (Ga) & REE show low to moderate values, not sufficient for economic consideration.

Titanium (TiO_2) shows moderate enrichment but is likely associated with detrital ilmenite, not forming an economic concentration.

Further, Reldi Moti and Nani Reldi villages are situated over the Matanomadh Formation, and a village road also passes through the formation, indicating significant surface habitation and infrastructure presence. This imposes additional constraints on exploration and mining, including land access limitations, environmental considerations, and socio-economic challenges.

9.10 Methodology of ore zone sampling & sample preparation

As no continuous ore zone was delineated within the study area, closely spaced sampling was carried out in drill core samples within the Matanomadh Formation (host rock for bauxite mineralisation) to assess any localized enrichment. In addition, a few samples from the Khari Nadi Formation were also collected, based on similarity in lithology, texture, and colour for comparative evaluation.

The sampling depths were carefully demarcated in the core boxes, and the corresponding cores were longitudinally split using a core splitter. One-half of the core was used for sample preparation and geochemical analysis, while the remaining half was systematically preserved in GI core boxes for record and future reference.

All collected samples were analysed for major oxides, while selected representative samples were analysed for REE and Gallium, in accordance with the provisions of the NQT.

9.11 Chemical analysis and laboratory procedures

9.11.1 Discussion on chemical analysis

A total of 40 borehole core samples were selected for chemical analysis of major oxides,12 samples for REE, including samples of laterite/lateritic bauxite, clay, siltstone, saprolite, and sandstone.

In the borehole RMT-BH-01**,** the value of Al_2O_3 ranges from 30.58 to 48.76% with an average 40.286%, the SiO_2 and Fe_2O_3 value ranges from 13.8 to 36.87% and 1.23 to 18.77% with an average 24.53% and 6.135%, respectively. The TiO_2 value ranges from 4.66 to 7.56% with an average 6.33%. The Gallium and Vanadium value ranging from 48.36 to 61 ppm and from 314 to 367 ppm, with an average of 54.68 ppm and 340.5 ppm, respectively. The total REE (including Sc+Y) values range from 813.8 to 1761.2 ppm with average of 1287.5ppm.

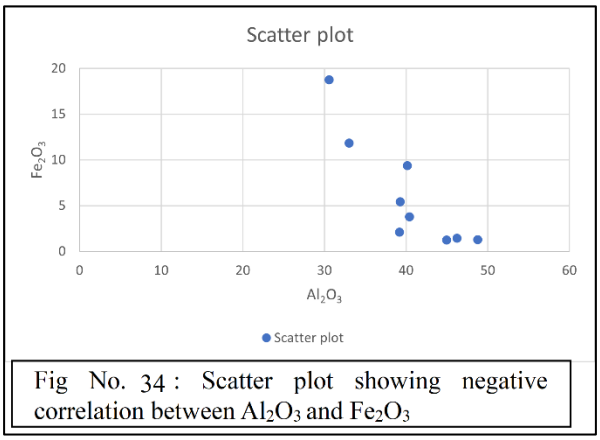


Fig No. 34 : Scatter plot showing negative correlation between Al_2O_3 and Fe_2O_3

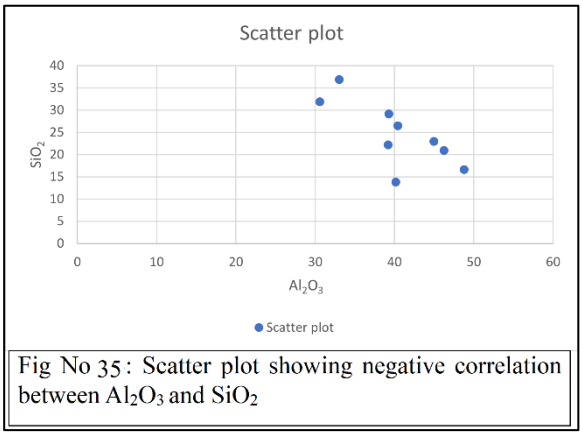


Fig No 35: Scatter plot showing negative correlation between Al_2O_3 and SiO_2

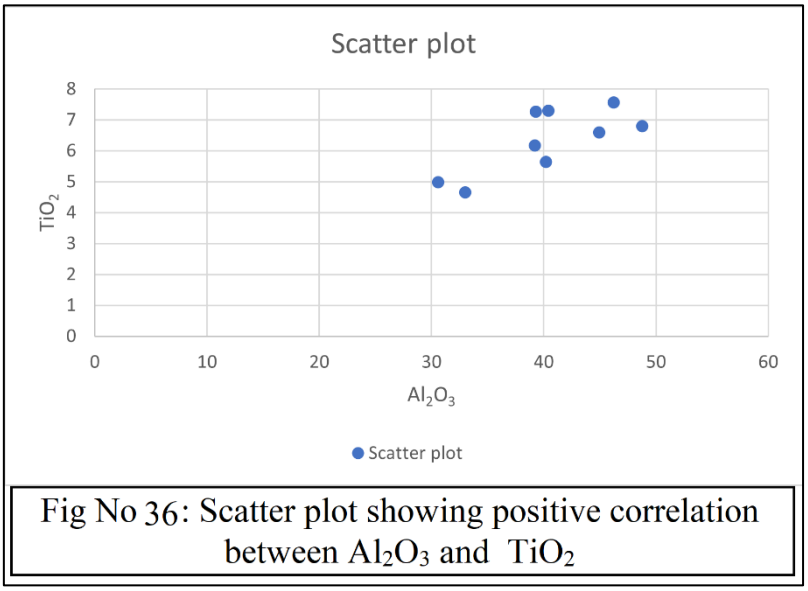


Fig No 36: Scatter plot showing positive correlation between Al_2O_3 and TiO_2

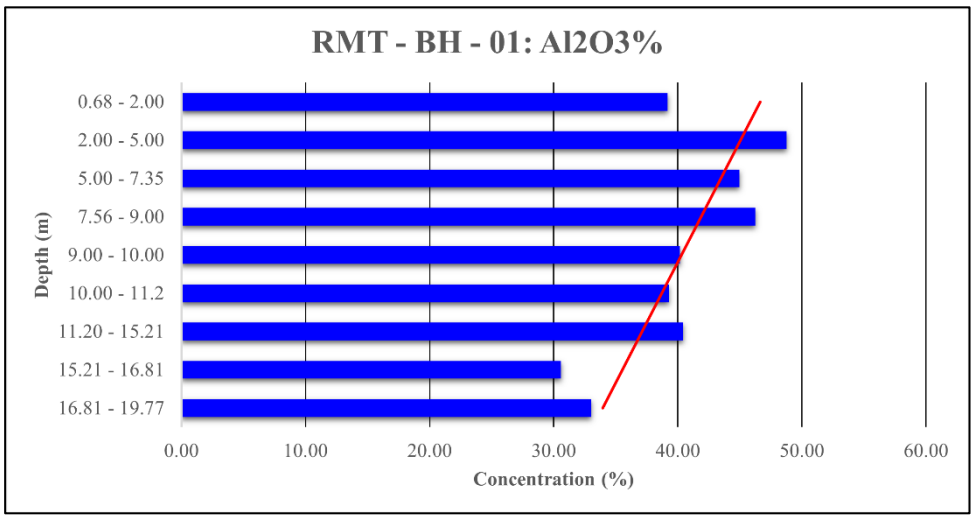


Fig No 37: Graphical representations of RMT-BH-01 borehole core samples showing the gradual depletion of TiO_2 with depth.

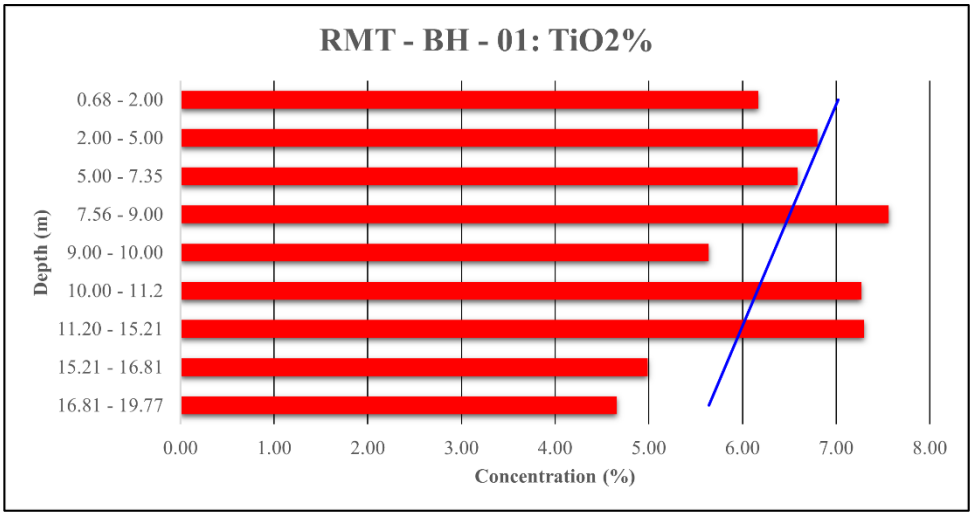


Fig No 38: Graphical representations of RMT-BH-01 borehole core samples showing the trend of Al_2O_3 with depth.

In the borehole RMT-BH-02**,** the value of Al_2O_3 ranges from 15.17 to 19.01% with an average of 17.62%. The SiO_2 and Fe_2O_3 values range from 39.0 to 61.54% and from 3.89 to 7.52 %, with an average 51.854% and 6.098%, respectively. The TiO2 value ranges from 0.52 to 1.27 % with an average of 0.846%. For the Gallium and Vanadium values ranging from 16.37 to 25.29 ppm and from 42 to 92 ppm, with an average of 20.83 ppm and 67 ppm, respectively. The Total REE (including Sc+Y) values range from 206.1 to 291.0 ppm with an average of 248.5 ppm.

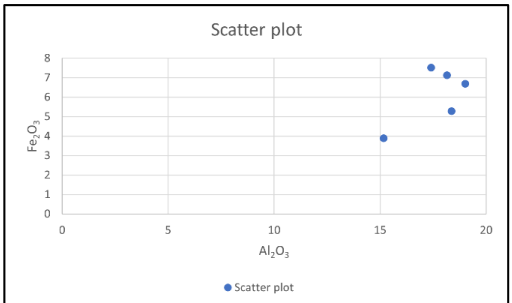


Fig No 39: Scatter plot showing positive correlation between Al_2O_3 and Fe_2O_3

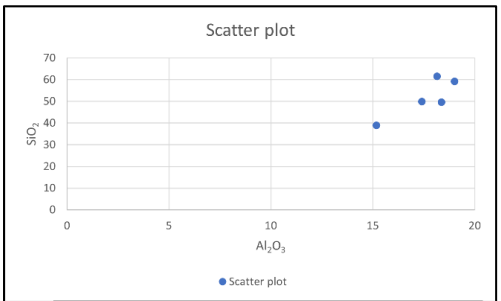


Fig No 40: Scatter plot showing positive correlation between Al_2O_3 and SiO_2

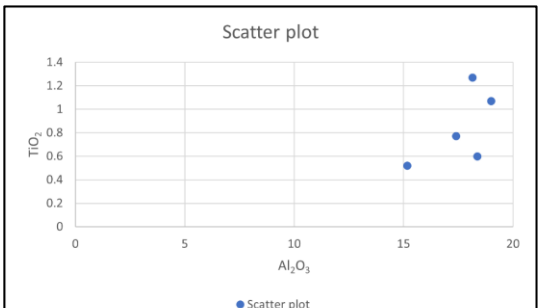


Fig No 41: Scatter plot showing positive correlation between Al_2O_3 and TiO_2

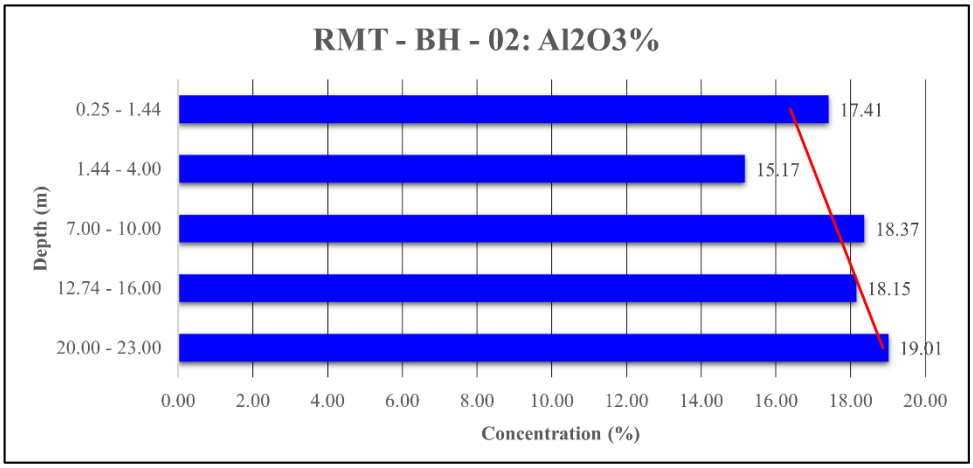


Fig No 42: Graphical representations of RMT-BH-02 borehole core samples showing values between 15 and 18% of Al_2O_3.

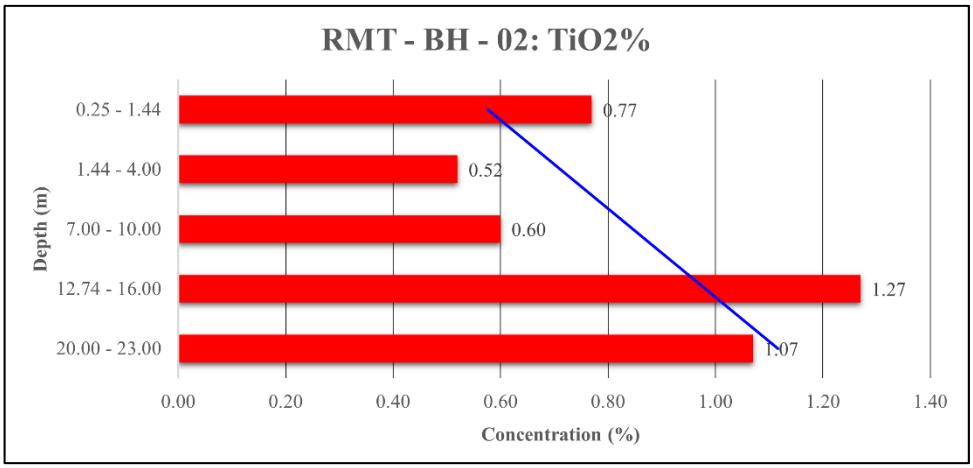


Fig No 43: Graphical representations of RMT-BH-02 borehole core samples showing the gradual depletion of TiO_2 up to 4m depth and an upward trend beyond that.

In bore hole RMT-BH-03, the values of Al_2O_3 ranges from 11.88 to 16.41% with an average of 14.2425%. The SiO_2 and Fe_2O_3 values range from 39.12 to 58.21% and from 6.65 to 22.29%, with averages of 49.01% and 10.7675%, respectively. The TiO_2 value ranges from 1.35 to 1.96% with an average of 1.63%. The Gallium and Vanadium values range from 0 to 12.65 ppm and from 86 to 90 ppm, with averages of 12.65 ppm and 88 ppm, respectively. The Total REE value (including Sc+Y) ranges from 309.3 to 307.2 ppm with an average 308.2 ppm.

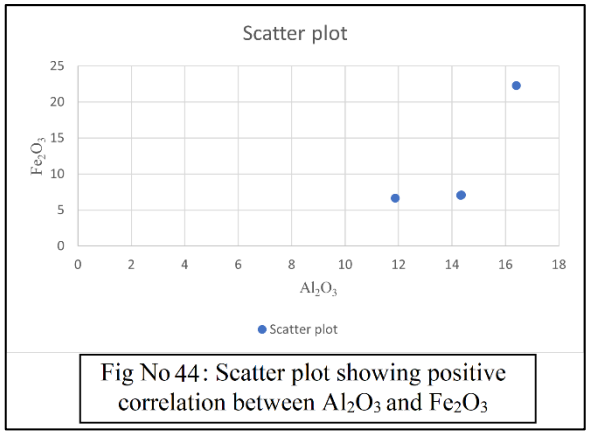


Fig No 44: Scatter plot showing positive correlation between Al_2O_3 and Fe_2O_3

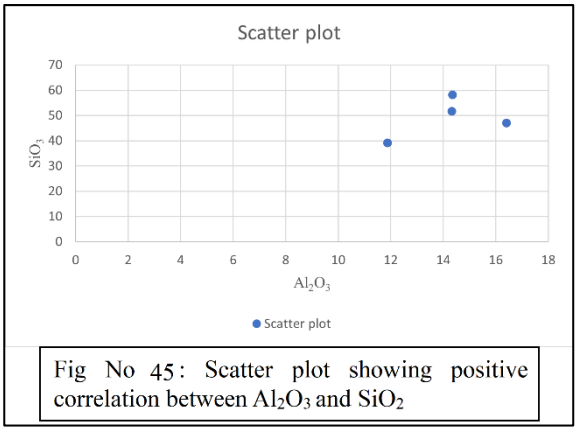


Fig No 45: Scatter plot showing positive correlation between Al_2O_3 and SiO_2

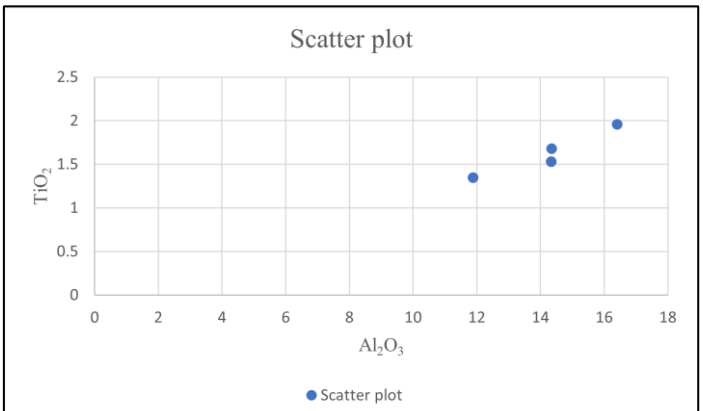


Fig No 46: Scatter plot showing positive correlation between Al_2O_3 and TiO_2

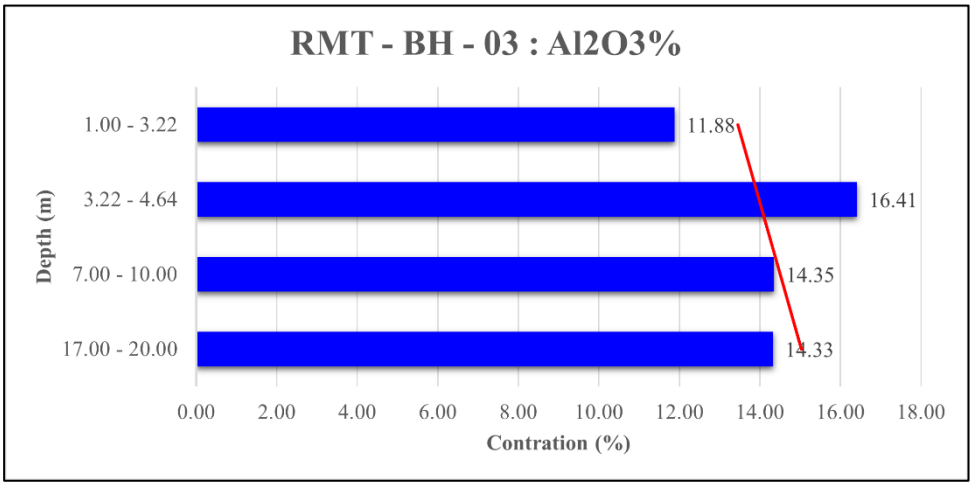


Fig No 47: Graphical representations of RMT-BH-03 borehole core samples showing the gradual depletion of Al_2O_3 with depth.

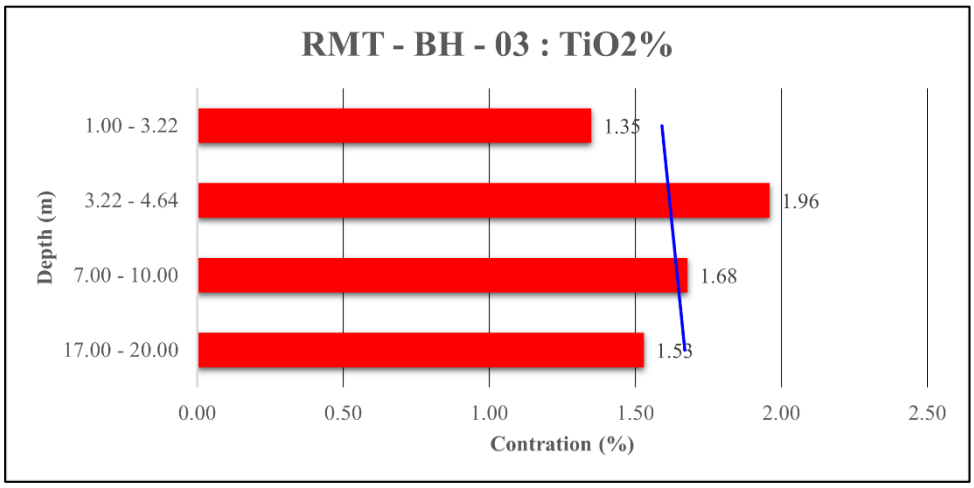


Fig No 48: Graphical representations of RMT-BH-03 borehole core samples showing the gradual depletion of TiO_2 with depth.

In borehole no. RMT-BH-04 The values of Al_2O_3 range from 21.05 to 27.71% with an average of 24.71%. The SiO_2 and Fe_2O_3 values range from 30.72 to 42.45% and from 13.91 to 27.35%, with an average of 36.99% and 21.05%, respectively. The TiO_2 value ranges from 1.86 to 2.54% with an average of 2.13%. The Gallium and Vanadium value ranges from 26.04 to 34.22ppm and from 470 to 485ppm with an average of 30.13 ppm and 477.5 ppm, respectively. The Total REE value (including Sc+Y) ranges from 420.1 to 498.1 ppm with an average of 459.1 ppm.

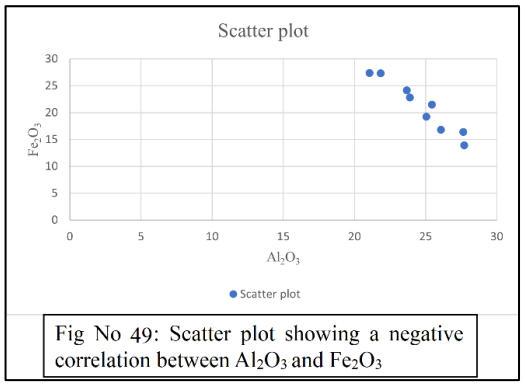


Fig No 49: Scatter plot showing a negative correlation between Al_2O_3 and Fe_2O_3

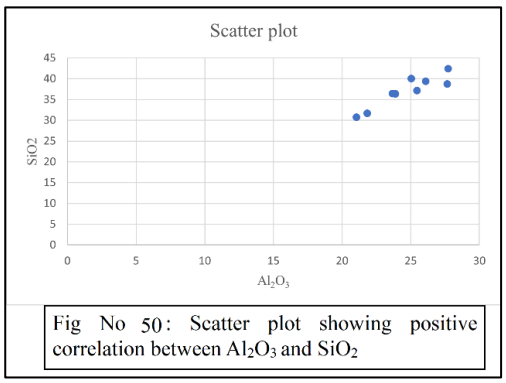


Fig No 50: Scatter plot showing positive correlation between Al_2O_3 and SiO_2

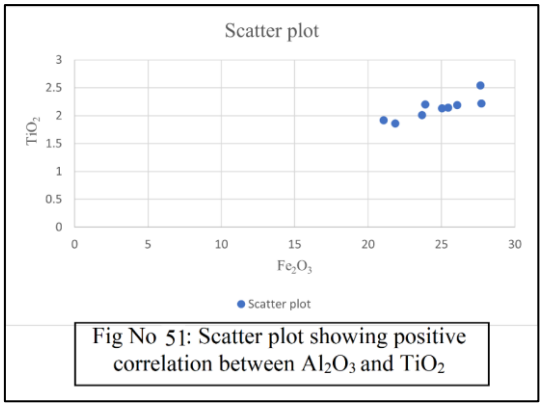


Fig No 51: Scatter plot showing positive correlation between Al_2O_3 and TiO_2

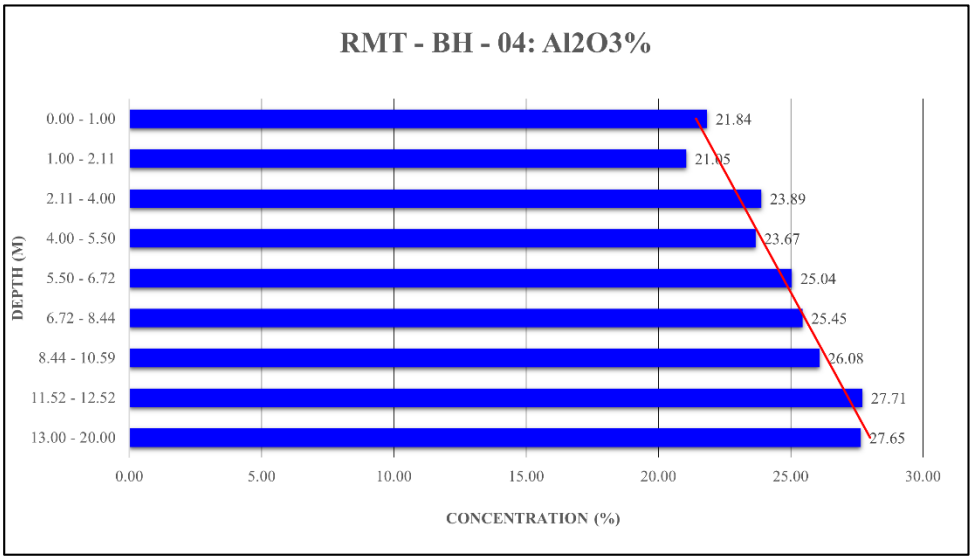


Fig No 52: Graphical representations of RMT-BH-04 borehole core samples showing the gradual increasing of Al_2O_3 with depth.

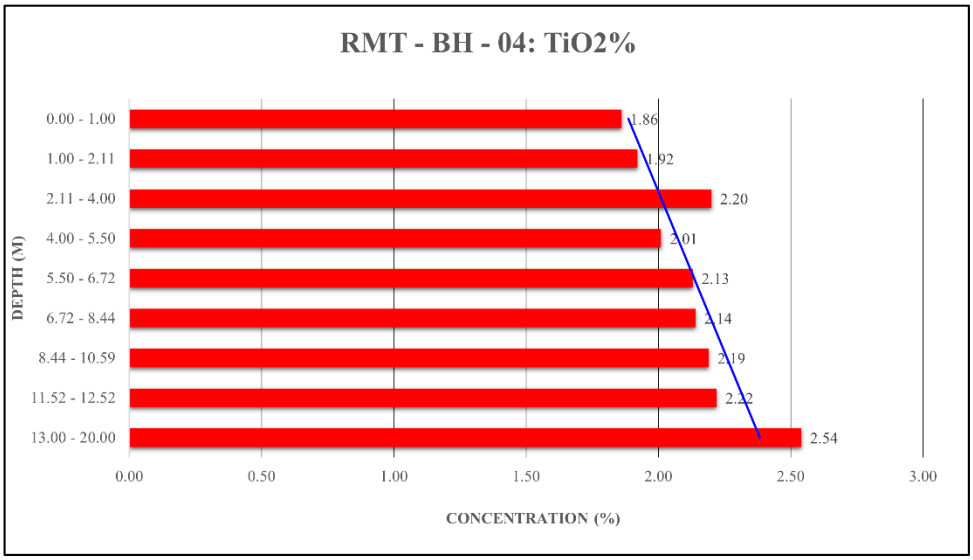


Fig No 53: Graphical representations of RMT-BH-04 borehole core samples showing the consistency in the TiO_2 with depth.

In the borehole no. RMT-BH-05, the value of Al_2O_3 ranges from 11.88 to 48.76% with an average of 28.37%. The SiO_2 and Fe_2O_3 values range from 13.8 to 61.54% and from 1.23 to 27.35%, with an average of 38.4% and 10.17%, respectively. The TiO_2 value ranges from 0.52 to 7.56% with an average of 3.092%. The Gallium and Vanadium value ranges from 43.15 to

46.12ppm and from 145 to 354ppm with an average of 50.215ppm and 230.5ppm respectively. The Total REE values (including Sc+Y) ranges from 410.6 to 681.5 ppm with an average of 485.5ppm.

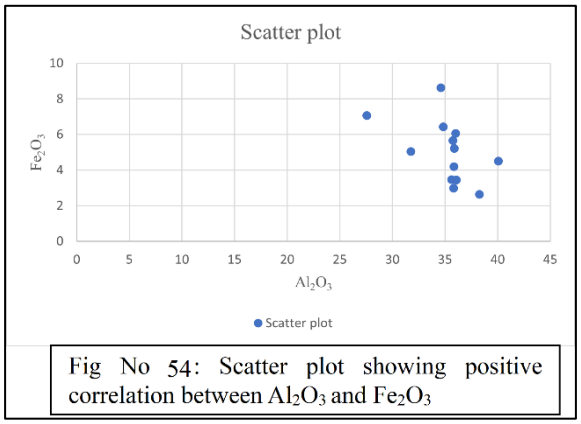


Fig No 54: Scatter plot showing positive correlation between Al_2O_3 and Fe_2O_3

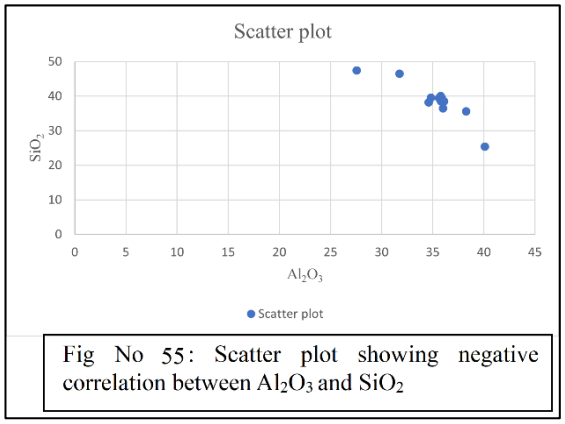


Fig No 55: Scatter plot showing negative correlation between Al_2O_3 and SiO_2

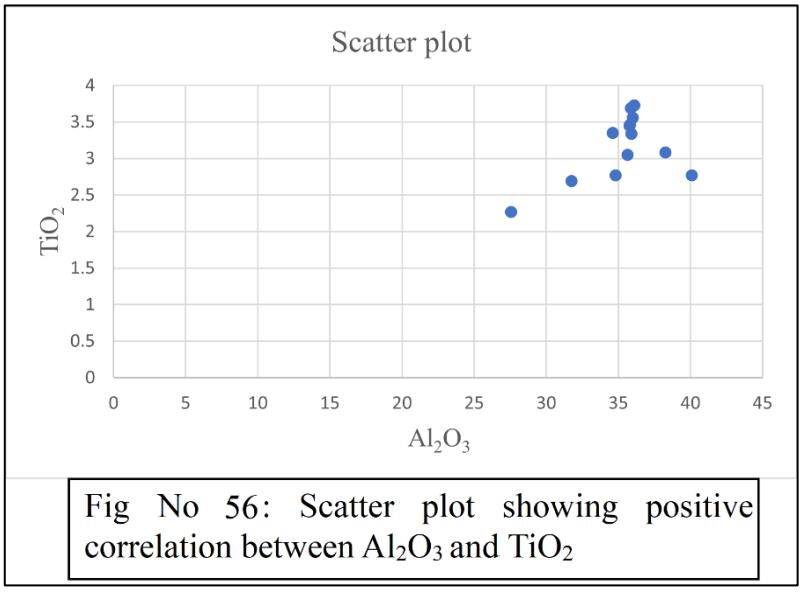


Fig No 56: Scatter plot showing positive correlation between Al_2O_3 and TiO_2

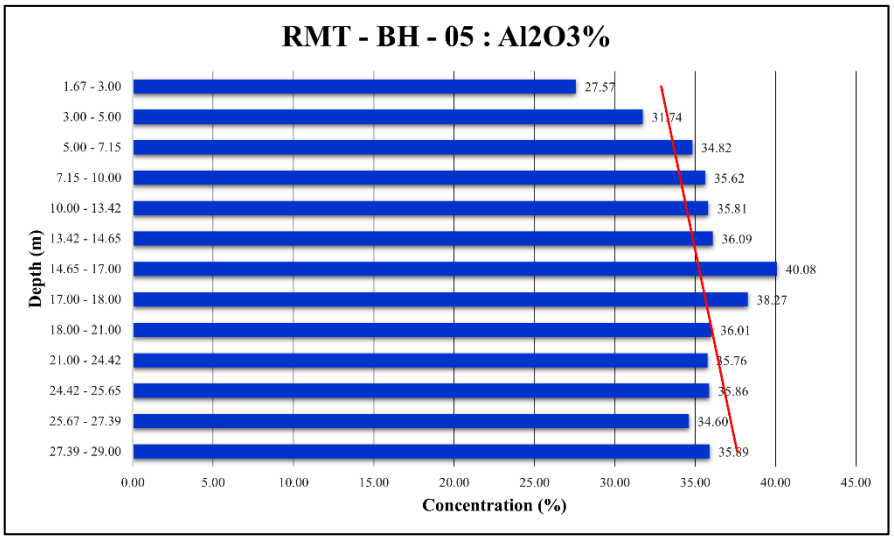


Fig No 57: Graphical representations of RMT-BH-05 borehole core samples showing the gradual increase of Al_2O_3 up to 17m depth and gentle decrease thereafter with depth.

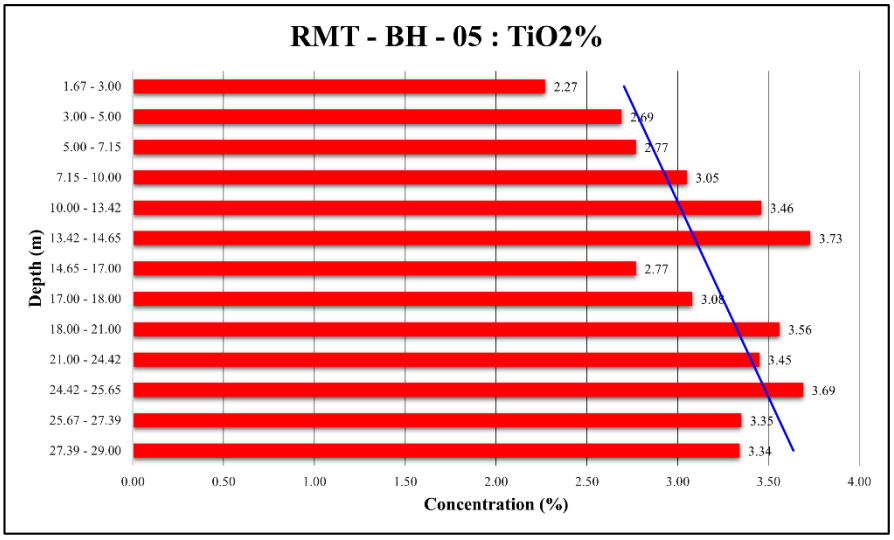


Fig No 58: Graphical representations of RMT-BH-05 borehole core samples showing the trend of of TiO_2 with depth.

REE values of the boreholes

The Total REE (TREE) values of Khari Nadi Formation (RMT-BH-02 & 03) are low and insignificant ranges from 177.7 to 277.2 ppm, no characterisation is attempted. Whereas the other three boreholes (RMT-BH-01, RMT-BH-04 and RMT-BH-05), which were drilled in the Matanomadh Formation has given moderate values of TREE from the 8 samples analysed for REE.

Characterisation of TREE (Lanthanum to Lutetium) of drill core samples analysed in Matanomadh Formation:

Table No 9.7: Summary statistics of the analytical data relevant to TREE characterisation

Parameter	Min. value (ppm)	Max value (ppm)	Mean
ΣLREE	313	1573	582
ΣHREE	24	114	58
ΣREE	381	1686	640
ΣREE+Sc+Y	411	1761	679
ΣLREE/ ΣHREE	4.41	15.94	10.44
LREE%	81.52	94.1	89.68
HREE%	5.9	18.48	10.32
Nd% in TREE	36.42	57.38	42.91
La/Yb	7.53	59.08	26.93

The studied samples exhibit moderate to high total REE concentrations (ΣREE: 381–1686 ppm; avg. 640 ppm) with pronounced enrichment of LREE (81.52–94.1%) over HREE (5.9–18.48%). The elevated ΣLREE/ΣHREE ratios (4.41–15.94; avg. 10.44) and high La/Yb values (7.53–59.08; avg. 26.93) indicate strong fractionation and derivation from a felsic upper continental crustal source. The significant contribution of Nd (36.42–57.38% of TREE) may indicate alkali basalts of Anjar Volcanics as the source. These relatively high values of Nd and TREE are confined to Borehole RMTBH-01 and does not have lateral continuity. Incidentally the location of borehole in the fault zone parallel to regional Katrol Hill Fault which passes through south of the study area. Overall, the REE distribution pattern reflects intense weathering, sedimentary sorting, and residual enrichment processes, typical of clay-rich or lateritic environments.

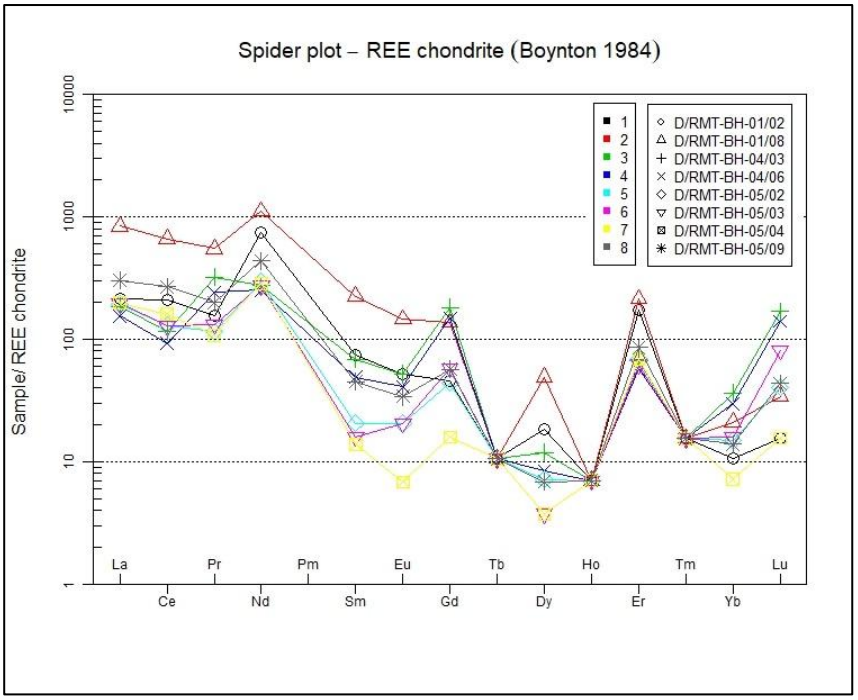


Fig No 59: Spider plot of REE of three borehole samples

The chondrite-normalized REE patterns of the studied samples exhibit pronounced LREE enrichment (~89.68%) and relatively flat HREE profiles (~10.32%), along with well-developed negative Eu anomalies. The sub-parallel nature of the REE patterns suggests derivation from a common felsic source, most likely the upper continental crust. The significant LREE/HREE fractionation (4.41–15.94; avg. 10.44) and elevated $(La/Yb)_n$ ratios (ranging from 7.53 to 59.07 with an average of 26.93) indicate strong chemical weathering and sedimentary recycling.

Minor positive Ce anomalies in some samples indicate oxidizing depositional conditions. Overall, the REE signatures indicate mature, weathered sediments deposited in a tectonically stable setting, with localized enrichment due to secondary processes.

Among the boreholes, RMT-BH-01 shows moderate TREE enrichment; however, this enrichment lacks lateral continuity in RMT-BH-04 and RMT-BH-05.

Vertical variation of TREE values with depth does not exhibit any systematic trend, nor does it show consistent correlation with CaO, Na_2O, or K_2O. However, iron-rich clayey horizons (pink and pinkish-brown clays/claystones) show moderate enrichment in TiO_2 and TREE, indicating localized geochemical concentration under favourable depositional or post-depositional conditions. However, borehole-wise scatter plots showing the relation between TREE & Sc vs CaO, Na2O, and K2O are as follows:

RMT -BH-01: The scatter plots of TREE & Sc are showing positive correlation with CaO and Na_2O, but K_2O shows negative correlation.

RMT -BH-04: The scatter plots of TREE & Sc are showing negative correlation with CaO and N_2O, but K_2O shows positive correlation.

RMT -BH-05: The scatter plots of TREE & Sc are showing positive correlation with Na2O, but K2O and CaO show negative correlation.

SCATTER PLOTS INDICATING THE ENRICHMENT/DEPLETION OF TREE & Sc IN RELATION TO CaO, Na2O and K2O (Fig No: 60, 61 and 62)

RMT-BH-01

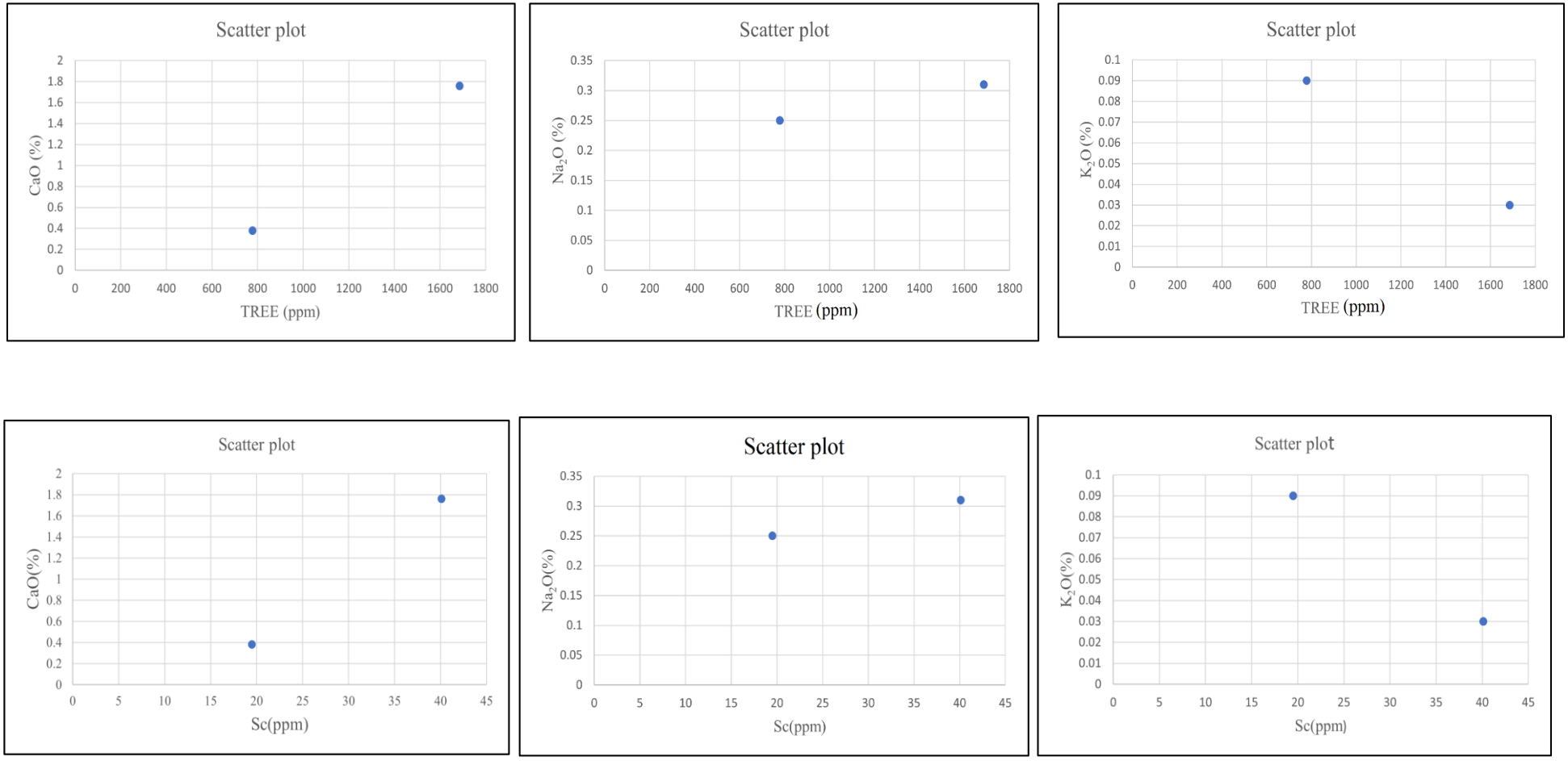


Fig No: 60

RMTBH-04

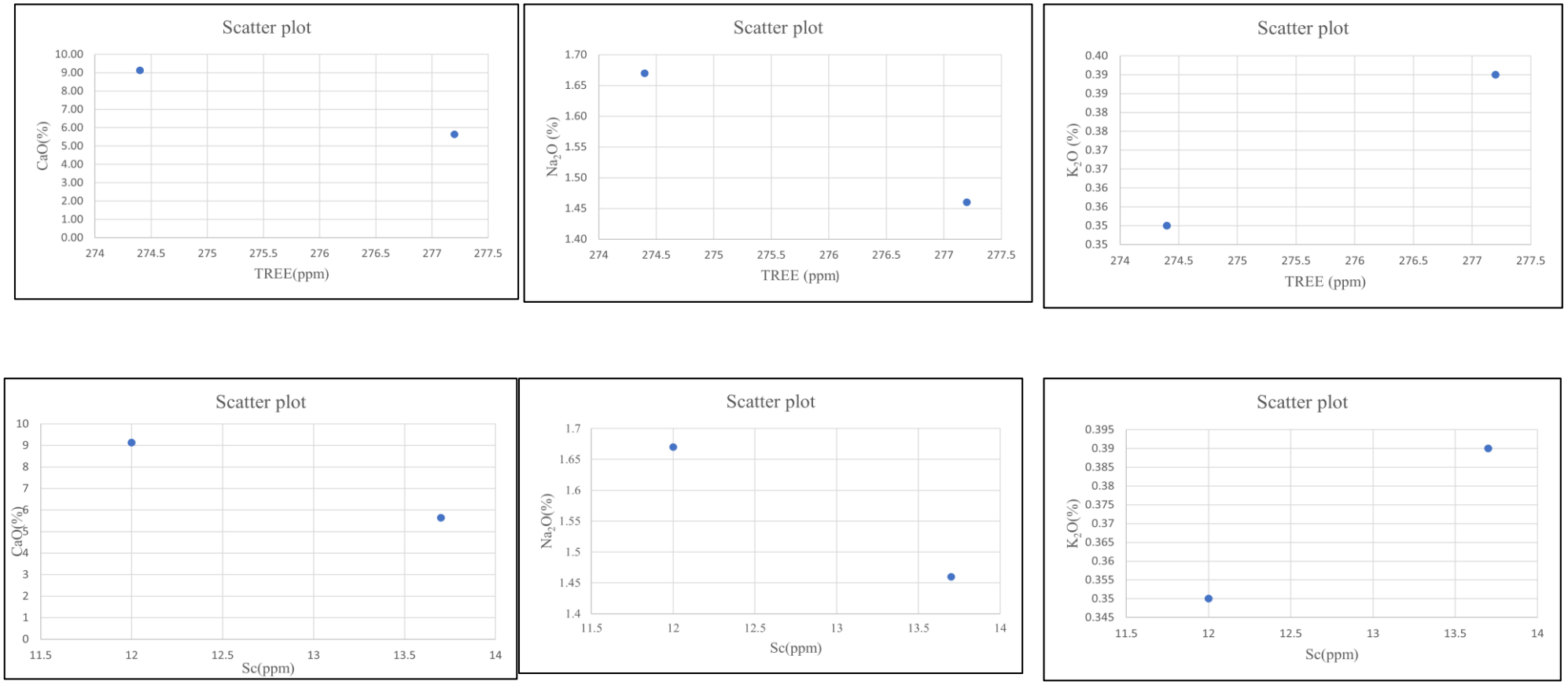


Fig No: 61

RMTBH-05

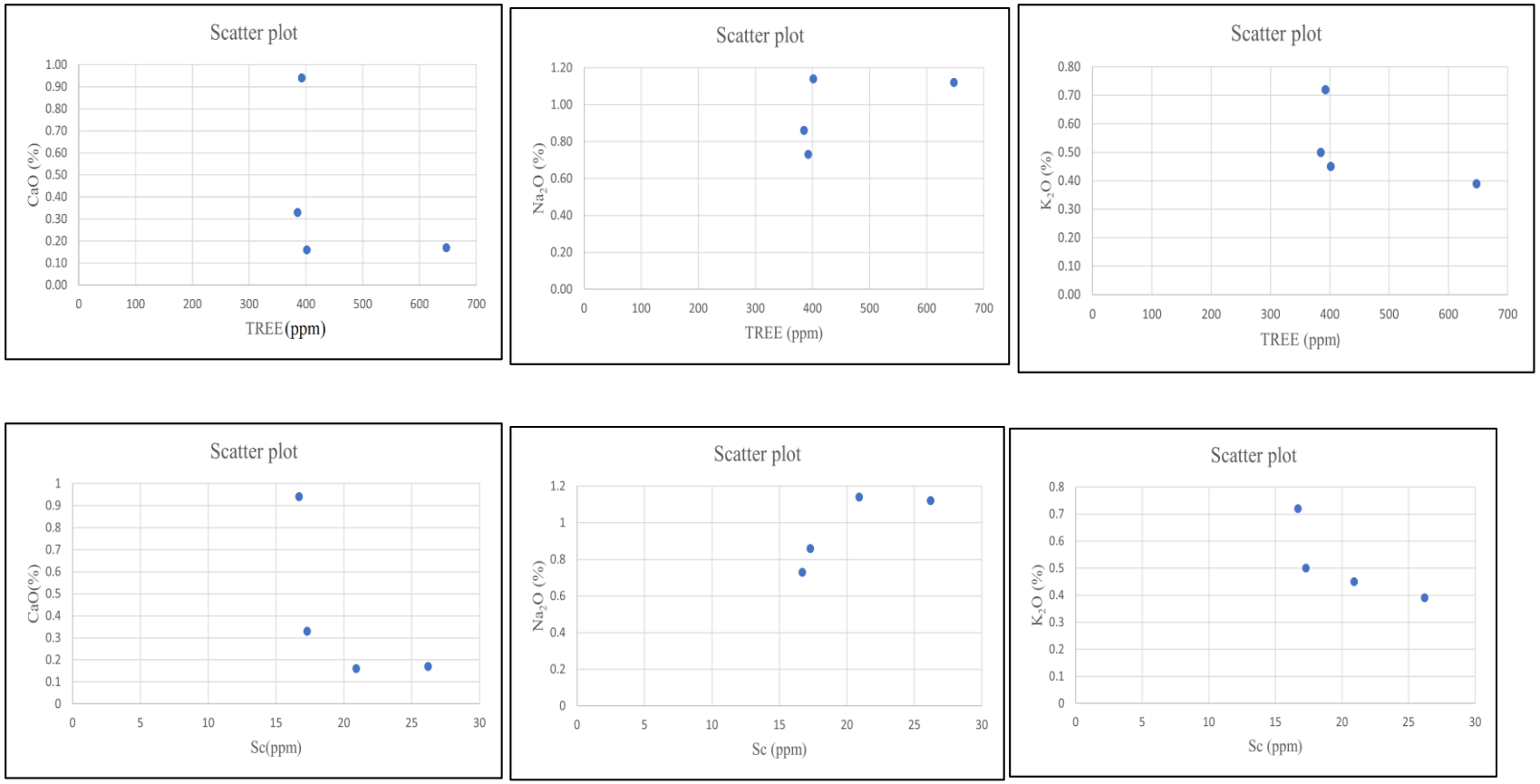


Fig No: 62

9.11.2 Laboratory procedures

Laboratory Details

The chemical analysis of the geological samples was carried out at Lucid Laboratories Pvt. Ltd., located in Balanagar, Hyderabad. The laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with ISO/IEC 17025:2017 standards (Certificate No. TC-5918) for the chemical testing of ores and minerals.

Analysis of Major Oxides by X-Ray Fluorescence (XRF)

The major oxides (SiO_2, Al2O3, Fe2O3, TiO2, CaO, MgO, Na2O, K2O, MnO, P2O5) were determined using Wavelength Dispersive X-Ray Fluorescence (WD-XRF) spectrometry.

Loss on Ignition (LOI)

Prior to XRF analysis, a known weight of the sample (approx. 1 g) was heated in a muffle furnace at 1000°C for 1 hour. The weight loss was recorded to determine the Loss on Ignition (LOI), representing volatile components such as moisture, organic matter, and carbonate content.

Fused Bead Preparation

To eliminate particle size effects and mineralogical heterogeneity, the samples were prepared as fused glass beads:

Weighing: The calcined sample was weighed and mixed with a borate flux (Lithium Tetraborate/Lithium Metaborate ratio 66:34) in a platinum crucible.

Fusion: The mixture was fused at a temperature of 1100°C – 1200°C in an automated fusion machine.

Casting: The molten material was cast into a homogeneous glass disc (bead) with a flat surface suitable for X-ray irradiation.

Instrumental Analysis

The fused beads were analysed using a WD-XRF spectrometer. The instrument measured the intensity of secondary X-rays emitted by the sample, which were converted to concentration values (Weight %) using calibration curves derived from Certified Reference Materials (CRMs).

Analysis of Rare Earth Elements (REE) by ICP-MS

The determination of Rare Earth Elements (La to Lu) plus Yttrium (Y) and Scandium (Sc) was carried out using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) to ensure low detection limits (ppb levels).

Sample Decomposition (Digestion)

To ensure the complete release of REEs from resistant mineral phases (such as zircon or monazite, often found in laterites/bauxite), a rigorous digestion method was employed:

Method: Open Acid Digestion (Four-Acid Method) or Fusion.

Procedure: A 0.1 g to 0.2 g sub-sample was treated with a combination of Hydrofluoric (HF), Nitric (HNO_3), Perchloric ($HClO_4$), and Hydrochloric (HCl) acids in Teflon beakers. The mixture was heated on a hot plate to fume off the acids and break down the silicate lattice.

Final Solution: The residue was dissolved in dilute Nitric Acid (HNO_3) to make up the final volume for aspiration into the instrument.

Instrumental Analysis

The sample solution was nebulized into the ICP-MS plasma torch (Argon plasma). The ions were extracted into the mass spectrometer, separated by their mass-to-charge ratio (m/z), and detected.

Internal Standards: Elements such as Rhodium (Rh) or Indium (In) were used as internal standards to correct for instrumental drift and matrix suppression.

External Check Analysis

To evaluate the accuracy and bias of the primary analytical results, a program of external check analysis was implemented. This process involves the re-analysis of a selected 10% of samples at an independent, NABL-accredited third-party laboratory.

Sample Selection

In accordance with standard geological exploration norms, 10% of the total samples from the Reldi Moti block were selected for check analysis.

Selection Method: Samples were selected randomly from the mineralized zones to cover the full range of grade variation high-grade bauxite/laterite.

Sample Type: Duplicate samples (homogenized -200 mesh powder) were used to eliminate variance caused by sample preparation, focusing purely on analytical precision.

Third-Party Laboratory Details

The duplicate samples were dispatched to Shiva Analyticals Pvt. ltd, which holds a valid NABL accreditation (ISO/IEC 17025:2017). This laboratory is entirely independent of the primary laboratory (Lucid Laboratories Pvt. ltd) and the exploration agency.

Analytical Methodology for Check Samples

The check samples were analysed using the identical methodology employed by the primary laboratory to ensure direct comparability:

Major Oxides: Analysed by X-Ray Fluorescence (XRF) using the Fused Bead method.

REE: Analysed by ICP-MS following acid digestion/fusion.

9.12 Statistical Analysis of Check Samples

The results received from the primary laboratory and the check laboratory were subjected to statistical comparison to quantify precision and identify any systematic bias.

Table No 9.8: Statement showing drill core analysis of External check samples for major oxides and their comparison with primary samples of Reldi Moti area, Kachchh district, Gujarat

Sample name	Type of sample	SiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	LOI	Remarks
		In (%)											
D/RMT/BH-01/01	Primary	22.18	39.18	2.09	0.03	2.07	3	0.39	0.16	6.17	0.21	23.8	Lucid Laboratory
D/RMT-BH-01/51	Check	14.23	49.44	1.81	<0.05	0.23	0.33	<0.08	0.09	6.8	0.24	26.3	Shiva Analyticals
D/RMT/BH-01/07	Primary	29.12	39.28	5.44	0.01	0.2	0.31	0.31	0.03	7.27	0.42	17.11	Lucid Laboratory
D/RMT-BH-01/52	Check	28.19	36.72	6.3	<0.05	0.16	0.27	<0.08	<0.05	7.85	0.49	19.45	Shiva Analyticals
D/RMT/BH-05/05	Primary	38.53	35.81	2.99	0.01	0.2	0.17	1.2	0.42	3.46	0.2	16.37	Lucid Laboratory
D/RMT-BH-05/53	Check	36.44	33.52	1.48	<0.05	0.28	0.15	0.73	0.44	3.78	0.19	19.43	Shiva Analyticals
D/RMT/BH-04/03	Primary	36.33	23.89	22.84	0.05	0.51	1.92	0.27	0.23	2.2	0.21	11.33	Lucid Laboratory
D/RMT-BH-04/03	Check	33.13	18.78	28.55	<0.05	0.47	1.56	0.15	0.2	2.28	0.28	14.29	Shiva Analyticals

For the reliability of analytical data, 10% of duplicate samples from various borehole samples were sent to NABL-accredited laboratories for cross-checking and correlation of assay values. The samples analysed by Shiva Analyticals (India) Private Limited and Lucid Laboratories Private Limited were interchanged with each other. The analytical report indicates that the variation of values of both original and check samples for Al_2O_3 concentrations are not much.

The following graphs represent Al_2O_3% deviation for original and check samples from 2 different labs.

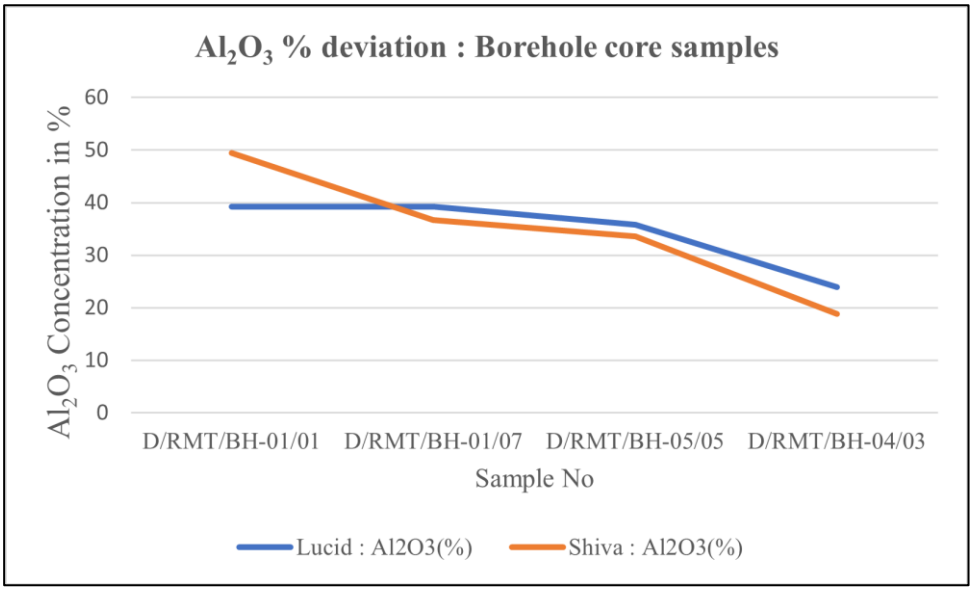


Fig No 63: Al_2O_3% deviation graphs for original and check samples of Borehole Core.

CHAPTER – X

10.0 Resource estimation

Out of the three boreholes drilled within the Matanomadh Formation, only RMT–BH–01 exhibits comparatively better alumina values. However, even in this borehole, the reactive silica content remains relatively high (32.44%), affecting its suitability as metallurgical-grade bauxite.

The other two boreholes: RMT–BH–04 represent ferruginous laterite, and RMT–BH– 05 comprises high-silica clayey bauxite, both of which are sub-economic in nature and not favourable for ore delineation.

Overall, the deposit is characterized as low-grade, clayey bauxite with high silica content, lacking the grade, thickness, and lateral continuity required for resource estimation.

Additionally, the presence of Reldi Moti and Nani Reldi villages over the deposit area, along with a village road traversing the formation, imposes significant land-use and infrastructural constraints, further limiting the feasibility of any potential mining activity.

In view of the above geological, geochemical, and socio-environmental constraints, no mineral resource has been estimated in the study area.

CHAPTER – XI

11.0 Conclusion and Recommendation

The G4 level exploration carried out in the Reldi Moti block aimed to evaluate the potential for bauxite and associated critical minerals (Ga, V, Ti, and REE) within the Matanomadh Formation.

Geological mapping and drilling indicate that the Matanomadh Formation occurs as a narrow, elongated patch (~2900 m length and ~30 m width) along the northern flank of the Anjar volcanics. Out of five boreholes drilled, only three intersected this formation, while the remaining two encountered the younger Khari Nadi Formation, which is devoid of bauxitic mineralisation.

The intersected bauxitic material is predominantly clayey and kaolinitic in nature, as confirmed by XRD studies, with a notable absence of gibbsite-rich (metallurgical-grade) bauxite.

Geochemically, based on the analytical results of RMT–BH–01 and RMT–BH–05, the deposit is characterized by an average composition of Al_2O_3: 37.47%, SiO_2: 33.19% (relatively high), Fe_2O_3: 5.30% (variable), and TiO_2: 4.47% (moderate), calculated on a weighted average basis. Among the boreholes, RMT–BH–01 shows relatively better alumina values but high reactive silica (32.44%), and no gibbsite was found in XRD studies.

RMT–BH–04 represents ferruginous laterite and is non-bauxitic.

RMT–BH–05 contains high-silica clayey bauxite of sub-economic grade.

The mineralisation is patchy and laterally restricted, with no persistent bauxite horizon established across the study area.

Associated critical minerals (Ga, V, REE) show low to moderate concentrations, which are not economically viable. Although TiO_2 values are moderate, they are primarily related to detrital ilmenite and do not constitute an ore-grade concentration.

Further, Reldi Moti and Nani Reldi villages are situated over the Matanomadh Formation, and a village road also passes through the formation, indicating significant surface habitation and infrastructure presence. This imposes additional constraints on further exploration and mining, including land access limitations, environmental considerations, and socio-economic challenges.

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Ameerpet, Hyderabad, Telangana – 500016

Thus, no economically viable bauxite or associated critical mineral zone could be delineated in the study area. Accordingly, no mineral resource/reserve estimation has been carried out.

In view of the lack of grade continuity, limited lateral persistence of mineralisation, unfavourable mineralogical characteristics, sub-economic geochemical values, and presence of habitation and infrastructure, the study area is **not recommended for upgradation to G3 level exploration.**

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CHAPTER – XII

12.0 Expenditure

The total expenditure incurred for execution of the project "Reconnaissance survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh district, Gujarat" is Rs. 68.82 lakhs (Sixty-eight lakhs eighty-two thousand only), including GST. This has been approved by the 25th TCC-II held on 17nd & 18th March 2026 and also in the 7th PSC held 27th March of NMEDT (Vide No: 117/1/2025-NMET/SO-16 dated: 08-04-2026)

Agenda 25.3.4 Preliminary Exploration (G3) of Ion-Adsorption and Laterite Hosted Supergene Enriched REE Deposits in Sung Valley block, East Khasi and West Jaintia Hills districts, Meghalaya.

[Implementing Agency: DMR Meghalaya]

a) DMR Meghalaya informed that the bidding process for outsourced drilling under this project is currently in progress. The process has been delayed, as only a single bidder participated in each of the three previous tendering attempts. The Committee advised the agency to expedite the tendering process and provide a firm timeline for completion of the project work.

Recommendation TCC

The Committee advised the agency to expedite the tendering process and provide a firm timeline for completion of the project work.

Agenda 25.3.5 Reconnaissance survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti area Kachchh District, Gujarat.

[Implementing Agency: M/s Critical Mineral Trackers]

a) The project was recommended in 4th meeting of TCC-II held on 26th and 27th December 2024 and approved in the 39th EC Meeting held on 24th January 2025. The Sanction Order was issued on 10th February 2025 for scheduled timeline of 10 months up to 09th December 2025 with approved cost of ₹ 54.94/- Lakh (including GST). The project was reviewed in 9th meeting of TCC-II held on 29th & 30th May 2025. In that meeting the committee recommended the revised cost of ₹71.54/- Lakh (including GST) due to the change from outsourced drilling to in-house drilling in the project. The proposed revised cost was approved in 43rd meeting of EC held on 14th August 2025. During the project review in 23rd TCC-II meeting held on 16th and 17th February 2026 the committee recommended timeline extension up to 31st March 2026 for GR submission.
b) M/s Critical Mineral Trackers informed that the final geological report has been prepared and submitted for Peer Review.
c) The TCC-II advised that, characterization of TREE and the enrichment/depletion of Sc in relation to Na, K, and Ca in drill core sample chemistry should be undertaken. Thin-section studies of REE mineral phases in enriched zones are also required. The geological report should include a detailed discussion on the variation of TREE and other critical mineral contents, their controlling factors with respect to the chemical environment, and insights into potential new prospective areas.
d) The revised cost sheet of the project has been evaluated and recommended by the committee for approval of PSC, as there is reduction in quantum of approved work viz. approach road making, drill core preservation, sample analysis etc.

Recommendation TCC

- ***The Committee recommended the proposal for approval of PSC for "revised cost ₹71.54 Lakh (including GST) against the approved cost of ₹68.82 Lakh (Including GST) as per Annexures 5, due to reduction in quantum of approved work viz. approach road making, drill core preservation, sample analysis etc. & timeline extension of 3 months up to 31st March 2026 for GR submission".***
- ***The Committee advised characterization of TREE and the enrichment/depletion of Sc in relation to Na, K, and Ca in drill core sample chemistry; thin-section studies of REE mineral phases in enriched zones and detailed discussion on the variation of TREE and other critical mineral contents, their controlling factors with respect to the chemical environment, and insights into potential new prospective areas in final geological report.***

Annexure-5

Estimated cost of Reconnaissance Survey (G4) for Bauxite,Ga,V,Ti, & REE in Reldi moti Area, Kachchh District, Gujarat
Total Area -7.95sq.km ; No of Boreholes- 4+1=5 , 120m Completion Time -10 months ,review: 4 months
Exploration Agency – Critical Mineral Trackers, Hyderabad

S.No	Item of Work	Unit	Rates as per NMEDT SoC		Estimated Cost of the Proposal		Revised Cost of the Proposal		Revised cost sheet/ actual expenses			Remarks
			SoC-Item-Sl No.	Rates as per SOC	Qtm	Total Amount (Rs)	Qtm	Total Amount (Rs)	Rates as per SOC	Qtm	Total Amount (Rs)	
A	**Geological Work**											
1	Geological Mapping (1:12,500)& sampling – Geologist field-days	7.95 Sq.km	1.2	11000	170	18,70,000	170	18,70,000	11,000	170	18,70,000	man days
2	Geologists (HQ)days, pre & post field interpretation 15 +20 days	One Geologist Per Day	1.2	9000	35	3,15,000	35	3,15,000	9,000	35	3,15,000	man days (including Remote sensing studies
3	Pitting-20nos each one size 1*1*1m (1 Cu. m each)	Per Cu. m	2.1.2	3800	20	76,000	20	76,000	3,800	20	76,000	20 cu. m
4	Trenching-5 nos., each one size 10*1*1(10 cu. m each)	Per Cu. m	2.1.1	3300	50	1,65,000	50	1,65,000	3,300	50	1,65,000	50 cu. m
5	sampler	45 days	1.5.2	5100	23	1,17,300	23	1,17,300	5,100	23	1,17,300	man days
6	Labour(2 labour) attached to sampler	90 labour days	1.5.2	526	92	48,392	92	48,392	526	92	48,392	labour days
7	Labour (100Field days) per team:2 workers: 100*4 for two geologist teams	Per Team of 2 Geologists (2*2=4) Labour/Field workers	5.7	526	340	1,78,840	340	1,78,840	526	340	1,78,840	labour days
	Sub-Total -A					**27,70,532**		**27,70,532**			**27,70,532**	
B	**Survey Work:**											
1	Surveyor: Fixation & connection of boundary points (4 nos.), 4 BH by Total station/DGPS	One surveyor	1.6.2	19,200	8	1,53,600	8	1,53,600	19,200	9	1,72,800	4 Boundary Points & 5 Boreholes

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	Sub-total-B					**1,53,600**		**1,53,600**			**1,72,800**	
C	**Core Drilling - Oral Permission obtained on 13.08.2025 from the NMEDT Official to drill additional 5th BH without exceeding total 120.00 m**											
1	Scout drilling(coring) :4 points (each 30m deep) 4*30	Per meter	2.2.1.1b	7,168	120	8,60,160	120	8,60,160	7,168	120	8,60,160	120m soft rock-MoC rate
2	Construction of BH pillar (12"*12"*30")	Per pillar	2.2.7a	2000	0	0	4	8,000	2,000	5	10,000	5 Pillars
3	**Mob & demob drilling machine & iner BH shifting	1500km*2=3000km	2.2.8	3000	0	0	36	1,08,000	3,000	36	1,08,000	3000km
4	Monthly accommodation charges for drilling camp	Rs50,000/month		50,000	0	0	1	50,000	50,000	1	50,000	one month
5	Drilling camp setting cost	lumpsum	2.2.9a	2,50,000	0	0	1	2,50,000	2,50,000	1	2,50,000	Fixed cost
6	Drilling camp winding cost	lumpsum	2.2.9b	2,50,000	0	0	1	2,50,000	2,50,000	1	2,50,000	fixed cost
7	Approach road making		2.2.10a	22020	0	0	1	22,020	2,20,220	0	0	no road making
8	Compensation for 4 Bhs		5.6	20,000	0	0	4	80,000	10,000	1	10,000	RMT-BH-03
9	Drill core preservation in GI boxes	Per meter	5.3	1590	120	1,90,800	120	1,90,800	1,590	115	1,82,850	23 core boxes
	Sub total-C					**10,50,960**		**18,18,980**			**17,21,010**	
D	**Laboratory Studies**											
1	Trench Samples (5*5=25nos):by AAS method	First five radicals+2	4.1.7a &7b	4181	0	0	0	0				
2	Pitting Sample: (20*1=20nos)-AAS method	First five radicals+2 radicals	4.1.7a &7b	4181	0	0	0	0				
3	Core drilling Samples-4*60=180 Total depth 30m each, samples will be collected at every 0.5m interval. AAS method	First five radicals+2 radicals	4.1.7a &7b	4181	0	0	0	0				

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	XRF-Major Oxide		4.1.15 a	4200	143	6,00,600	143	6,00,600	4,200	130	5,46,000	90+40Drill
4	Analysis for REE(14 elements/radicals) by ICP-MS	14 elements/radicals	4.1.13	5380	36	1,93,680	36	1,93,680	5,380	27	1,45,260	15+12 Drill
5	Combined determination of THA, MHA and Reactive silica		4.1.17 a	6700	4	26,800	4	26,800	6,700	2	13,400	2 samples
6	Preparation of polished thin section	Per sample	4.3.2	1549	10	15,490	10	15,490	3,080	4	12,320	4 thin sections & complete petrographic studies at GSI, HYD
7	Complete petrographic/ ore-microscopic /mineragraphic studies		4.3.4	4232	10	42,320	10	42,320				
8	XRD analysis for identification of minerals(random)	Per sample	4.5.1	4000	4	16,000	4	16,000	4,000	3	12,000	4 samples
	Check sample analysis-Shiva lab											
	XRF-Major oxides								1,500	13	19,500	9+4Drilling
	REE by ICPMS								2,500	4	10,000	2+2 drilling
	Sub-total-D					**2,51,970**		**8,94,890**			**7,58,480**	
E	**Surface Geophysical Survey**		**Not recommended**									
1	Electrical resistivity	Per Station										
2	gravity surveys	Per station										
3	Geo Physicist Man days (Field Man-days)											
4	Geo Physicist Man days (HQ)											
	Sub-total-E											
	TOTAL (A+B+C+D)					**42,27,062**		**56,38,002**			**54,22,822**	
F	**Preparation of Exploration Proposal** (5 Hard copies with a soft copy)		5.1	2% of the project cost subject to a	1	84,541	1	1,12,760			1,08,456	2% of the Project cost.

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				maximum of 5 lakhs								
G	**Geological Report** (5 Hard copies with a soft copy)		5.2	5% of the Project cost		2,11,353		2,81,900			2,71,141	5% of the Project Cost.
	operational charges		6.0			86016		0				
	Tender process cost		2.3			17203		0				
	peer review					30,000		30,000			30,000	
	Additional Copy			1000	0	0	0	0				
	Project Cost without GST					**46,56,175**		**60,62,662**			**58,32,420**	
	18% GST					**8,38,112**		1091279.185			1049836	
	Total Project Cost					**54,94,287**		**71,53,941**			**68,82,255**	

Note	
1	Strict adherence to the ministry of finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule-21
2	In case of delay/non-performance, the appropriate action will be taken by competent authority against delinquent agency as per prevailing govt of India rules/guidelines on procurement.
3	If any of the project is outsourced, the amount will be reimbursed as per the paragraph 3 of NMEDT SoC and item no:6 of NMEDT SoC In case of execution of the project by NEA on its own, a certificate regarding non-outsourcing of any component/project is required
4	Necessary efforts should be made to minimise any adverse impact on the environment during exploration activities
5	Any item of work not mentioned above shall be added as per SoC
6	All the Geological Reports and data are to be uploaded on NGDR as per MERT template by the agency

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CHAPTER – XIII

13.0 Reference

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The company gratefully acknowledges the financial assistance and guidance provided by National Mineral Exploration and Development Trust (NMEDT) for successful implementation of the project.

The support and cooperation extended by the local residents of Reldi Moti village during field investigations are also sincerely appreciated.

CHAPTER – XIV

14.0 Locality index

Location of villages/ factories/Railway stations/airports around Reldi Moti Area

Table no. 14.1 Locality index

Locality	Latitude (Degree decimal)	Longitude (Degree decimal)
Bhuj Airport	23.275506°	69.663865°
Bhuj city	23.242572°	69.664388°
Bhuj Railway station	23.265908°	69.678027°
Kukma village	23.216733°	69.777743°
Padhar village	23.240591°	69.824396°
Reldi Moti village (but shown as Moti Reldi in toposheet no: 41E/16.	23.2191667°	69.8197223°
Reldi Nani village (but shown as Nani Reldi in toposheet no: 41E/16.	23.22204°	69.83193°

LIST OF ANNEXTURES

Annexure-I: RL,Coordinates of Cardinal points, boreholes and Temporary bench marks in Reldi moti Area, Kachchh District, Gujarat (Determined by DGPS Survey)						
Cardinal Points	**Geographic Coordinate System in Degree decimal (WGS-84)**		**UTM (WGS-84, Zone 42N)**			**Area (Sq. Km)**
	Latitude (N)	**Longitude (E)**	**Reduced level (m)**	**Northing (m)**	**Easting (m)**	
A	23.2088229	69.8201674	147.320	2566873.434	583924.141	7.95
B	23.2226604	69.8126176	136.282	2568401.042	583143.004	
C	23.2416941	69.8304624	129.642	2570518.606	584956.833	
D	23.2298752	69.8539404	147.676	2569224.055	587366.462	
Borehole points						
RMT-BH-01	23.223435	69.837684	142.214	2568501.422	585707.293	
RMT-BH-02	23.222593	69.833992	143.601	2568406.016	585330.042	
RMT-BH-03	23.219413	69.817702	145.000	2568044.478	583665.267	
RMT-BH-04	23.219076	69.817617	147.084	2568007.092	583656.803	
RMT-BH-05	23.221048	69.830458	138.551	2568232.798	584969.798	
Temporary bench marks						
RMT-TBM-1	23.2200135	69.8171365	142.189	2568110.599	583607.029	
RMT-TBM-2	23.2199917	69.8168999	142.131	2568108.049	583582.826	

Annexure-II: Elevation, co-ordinates of Pits and Trenches excavated in Reldi moti Area, Kachchh District, Gujarat

Sr.No	*Sample No*	*Formation*	*Coordinates (Degree decimal) Datum WGS-84*		*Elevation (m)*	*Size*	*Excavation (Cu.m)*	*Samples collected*
	Pits		***Latitude***	***Longitude***				
1	P1/RB/2025	Madh	23.2188°	69.8152°	141	1m*1m*1m	1 Cu.m	1
2	P2/RB/2025	Madh	23.2191°	69.8176°	138	1m*1m*1m	1 Cu.m	1
3	P3/RB/2025	Kharinadi	23.2196°	69.8144°	135	1m*1m*1m	1 Cu.m	1
4	P4/RB/2025	Madh	23.2192°	69.8181°	141	1m*1m*1m	1 Cu.m	1
5	P5/RB/2025	Kharinadi	23.2207°	69.8178°	138	1m*1m*1m	1 Cu.m	1
6	P6/RB/2025	Anjar	23.2232°	69.8374°	128	1m*1m*1m	1 Cu.m	1
7	P7/RB/2025	Madh	23.2233°	69.8378°	144	1m*1m*1m	1 Cu.m	1
8	P8/RB/2025	Madh	23.2231°	69.8398°	124	1m*1m*1m	1 Cu.m	1
9	P9/RB/2025	Kharinadi	23.2234°	69.8427°	129	1m*1m*1m	1 Cu.m	1
10	P10/RB/2025	Madh	23.221°	69.8306°	124	1m*1m*1m	1 Cu.m	1
11	P11/RB/2025	Bhuj	23.2182°	69.819°	137	1m*1m*1m	1 Cu.m	1
12	P12/RB/2025	Bhuj	23.2201°	69.8312°	129	1m*1m*1m	1 Cu.m	1
13	P13/RB/2025	Madh	23.223°	69.8337°	132	1m*1m*1m	1 Cu.m	1
14	P14/RB/2025	Kharinadi	23.2246°	69.8332°	127	1m*1m*1m	1 Cu.m	1
15	P15/RB/2025	Kharinadi	23.2241°	69.8334°	127	1m*1m*1m	1 Cu.m	1
16	P16/RB/2025	Sandhan	23.2252°	69.8298°	120	1m*1m*1m	1 Cu.m	1
17	P17/RB/2025	kharinadi	23.2244°	69.8370°	123	1m*1m*1m	1 Cu.m	1
18	P18/RB/2025	Madh	23.2221°	69.8334°	140	1m*1m*1m	1 Cu.m	1
19	P19/RB/2025	Madh	23.2198°	69.8202°	129	1m*1m*1m	1 Cu.m	1
20	P20/RB/2025	Madh	23.2197°	69.8209°	128	1m*1m*1m	1 Cu.m	1
	Trenches							
1	T1/RB/2025/	Kharinadi	23.223464°	69.834089°	125	10m*1m*1m	10 Cu.m	14
2	T2/RB/2025/	Madh	23.223431°	69.837744°	129	10m*1m*1m	10 Cu.m	14
3	T3/RB/2025/	Madh	23.222414°	69.834081°	135	10m*1m*1m	10 Cu.m	14
4	T4/RB/2025/	Kharinadi	23.218931°	69.816428°	129	10m*1m*1m	10 Cu.m	14
5	T5/RB/2025/	Sandhan	23.232845°	69.842452°	133	10m*1m*1m	10 Cu.m	14
	Total samples						***70 Cu.m***	***90***
	Note: Elevation and coordinates were determined by DPS(Garmin)							

Annexure-III Statement showing analytical details of major oxides (by XRF) of 20 pit samples in Reldimoti Area, Kachchh District, Gujarat

Sr. no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
1	P1/RB/2025	LL/1202/01	Madh	Laterite	42.90	18.53	19.30	0.13	0.78	2.80	0.11	0.23	3.00	0.11	12.01	99.90	342.50
2	P2/RB/2025	LL/1202/02	Madh	Laterite	35.85	20.53	25.55	0.05	0.33	0.96	0.12	0.22	2.66	0.20	13.29	99.75	475.50
3	P3/RB/2025	LL/1202/03	Kharinadi	Weathered basalt (Transported)	53.80	9.88	11.78	0.10	2.30	1.50	1.24	0.49	2.88	0.17	15.71	99.83	228.50
4	P4/RB/2025	LL/1202/04	Madh	Laterite	36.60	19.03	20.59	0.10	1.07	2.21	0.83	0.16	2.43	0.15	16.64	99.81	381.90
5	P5/RB/2025	LL/1202/05	Kharinadi	Calc..Sandy clay	46.68	0.20	3.80	0.04	2.98	20.07	0.16	0.50	0.97	0.06	24.44	99.90	47.70
6	P6/RB/2025	LL/1202/06	Anjar	Basalt	47.00	12.02	6.81	0.05	1.55	6.01	0.35	0.29	4.13	0.27	21.40	99.88	320.10
7	P7/RB/2025	LL/1202/07	Madh	Laterite	34.02	27.39	14.91	0.02	0.10	1.02	0.15	0.12	7.37	0.34	14.42	99.87	514.30
8	P8/RB/2025	LL/1202/08	Madh	Clayey bauxite	41.39	25.29	8.91	0.03	0.18	4.20	0.12	0.17	5.21	0.16	14.27	99.92	252.60
9	P9/RB/2025	LL/1202/09	Kharinadi	Clayey soil	59.00	11.89	9.61	0.08	1.51	4.79	1.33	0.39	1.79	0.08	9.36	99.82	126.60
10	P10/RB/2025	LL/1202/10	Madh	Clayey bauxite	41.39	32.55	6.05	0.04	0.32	1.08	0.17	0.26	4.44	0.15	13.44	99.90	249.10
11	P11/RB/2025	LL/1202/11	Bhuj	Arkosic sandstone	66.79	18.63	1.94	0.01	0.39	3.37	0.11	0.11	0.80	0.09	7.62	99.86	80.10
12	P12/RB/2025	LL/1202/12	Bhuj	Feld.Sandstone	69.26	12.44	9.32	0.03	0.68	0.44	0.19	1.11	1.68	0.12	4.57	99.85	67.80

Sr. no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
13	P13/RB/2025	LL/1202/13	Madh	Laterite	37.25	14.52	27.44	0.19	0.84	1.45	0.46	0.17	2.22	0.13	15.24	99.89	507.10
14	P14/RB/2025	LL/1202/14	Kharinadi	Calc..Sandy clay	33.93	0.24	2.70	0.04	4.97	26.80	0.40	0.42	0.46	0.04	29.83	99.81	32.60
15	P15/RB/2025	LL/1202/15	Kharinadi	Calc..Sandy clay	61.89	2.91	7.97	0.10	2.80	5.75	0.75	0.44	1.59	0.04	15.69	99.92	84.80
16	P16/RB/2025	LL/1202/16	Sandhan	clay+ calcarenite	34.20	0.25	3.32	0.04	4.90	25.44	0.19	0.53	0.47	0.04	30.36	99.74	25.90
17	P17/RB/2025	LL/1202/31	kharinadi	Sandy clay (regolith)	63.17	8.14	8.15	0.16	1.49	3.70	0.43	0.32	1.93	0.06	12.31	99.84	111.80
18	P18/RB/2025	LL/1202/32	Madh	Clayey bauxite	40.05	29.16	8.73	0.06	0.72	2.25	0.44	0.79	3.43	0.17	14.10	99.88	287.70
19	P19/RB/2025	LL/1202/61	Madh	Laterite	33.92	16.98	25.22	0.08	0.53	5.04	0.07	0.17	2.72	0.22	14.83	99.77	485.30
20	P20/RB/2025	LL/1202/76	Madh	Lateritic bauxite	38.44	23.65	15.72	0.03	0.17	1.09	0.12	0.05	6.69	0.42	13.40	99.76	510.20

Annexure-IV: Statement showing analytical details of major oxides (by XRF) of 70 trench samples in Reldimoti Area, Kachchh District,Gujarat																	
Sr.no	**Sample No**	**lab code**	**Formation**	**Lithology**	**SiO2 (%)**	**Al2 O3 (%)**	**Fe2O3 (%)**	**MnO (%)**	**MgO (%)**	**CaO (%)**	**Na2O (%)**	**K2O (%)**	**TiO2 (%)**	**P2O5 (%)**	**LOI (%)**	**Total (%)**	**V (ppm)**
Trench-1																	
1	T1/RB/2025/01	LL/1202/17	kharinadi	sandy clay,	69.28	7.98	8.62	0.03	1.79	1.23	1.38	1.08	1.09	0.05	7.32	99.84	57.9
2	T1/RB/2025/02	LL/1202/18	kharinadi	sandy clay,	67.87	9.19	8.28	0.03	1.81	1.27	1.41	1.07	1.16	0.05	7.74	99.87	68.9
3	T1/RB/2025/03	LL/1202/19	kharinadi	sandy clay,	66.50	9.09	9.37	0.03	1.82	1.14	1.45	1.13	1.12	0.05	8.16	99.84	68.2
4	T1/RB/2025/04	LL/1202/20	kharinadi	sandy clay,	67.43	7.61	9.58	0.03	1.76	1.59	1.36	1.07	1.08	0.05	8.23	99.78	69.4
5	T1/RB/2025/05	LL/1202/21	kharinadi	sandy clay,	63.67	8.20	10.89	0.04	1.76	1.77	1.28	1.05	1.17	0.07	10.00	99.88	96.1
6	T1/RB/2025/06	LL/1202/22	kharinadi	Plus Weathered basalt	58.21	10.93	10.85	0.08	1.74	2.94	1.19	0.99	1.41	0.10	11.42	99.87	145.5
7	T1/RB/2025/07	LL/1202/23	kharinadi	plus Weathered basalt	58.21	12.73	11.19	0.08	1.63	1.23	1.20	0.99	1.66	0.08	10.75	99.74	138.3
8	T1/RB/2025/08	LL/1202/24	kharinadi	plus Weathered basalt	57.48	12.70	11.72	0.11	1.53	0.81	1.14	0.93	1.87	0.08	11.46	99.82	157.4
9	T1/RB/2025/09	LL/1202/25	kharinadi	plus Weathered basalt	56.13	13.46	12.29	0.14	1.50	0.92	1.12	0.90	2.08	0.09	11.27	99.90	188.2
10	T1/RB/2025/10	LL/1202/26	kharinadi	plus Weathered basalt	55.83	10.93	14.71	0.19	1.58	1.28	1.06	0.91	1.83	0.13	11.33	99.77	217.8
11	T1/RB/2025/A	LL/1202/27	kharinadi	Sandy clay	69.54	7.40	9.52	0.04	1.68	0.68	1.97	0.91	1.10	0.05	6.99	99.88	57.0
12	T1/RB/2025/B	LL/1202/28	kharinadi	Sandy clay/Weathered basalt	66.08	9.51	9.43	0.04	1.80	1.26	1.43	1.07	1.26	0.07	7.85	99.80	85.8
13	T1/RB/2025/C	LL/1202/29	kharinadi	Weathered basalt	65.29	9.24	8.84	0.06	2.21	1.35	1.27	1.25	1.10	0.08	9.10	99.77	71.8
14	T1/RB/2025/D	LL/1202/30	kharinadi	Sandy clay/Weathered basalt	65.98	9.33	9.44	0.04	1.72	1.56	1.38	1.01	1.25	0.06	8.18	99.96	91.1
	Average				**63.39**	**9.88**	**10.34**	**0.07**	**1.74**	**1.36**	**1.33**	**1.02**	**1.37**	**0.07**	**9.27**	**99.84**	**108.1**

Trench-2

Sr.no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
1	T2/RB/2025/01	LL/1202/33	Madh	Whitish clay	29.06	36.83	2.11	0.03	0.12	2.04	0.20	0.24	7.27	0.33	21.68	99.89	280.3
2	T2/RB/2025/02	LL/1202/34	Madh	Whitish clay	28.12	39.55	2.01	0.03	0.14	1.15	0.18	0.20	7.13	0.26	21.20	99.96	291.7
3	T2/RB/2025/03	LL/1202/35	Madh	Whitish clay	28.01	39.28	2.24	0.03	0.11	1.04	0.17	0.20	6.79	0.39	21.60	99.87	314.1
4	T2/RB/2025/04	LL/1202/36	Madh	Whitish clay/Laterite	36.09	30.34	5.09	0.03	0.13	1.60	0.16	0.13	7.17	0.45	18.62	99.81	438.7
5	T2/RB/2025/05	LL/1202/37	Madh	Whitish clay/Laterite	39.68	31.93	2.43	0.02	0.09	1.04	0.17	0.09	8.11	0.18	16.01	99.75	456.9
6	T2/RB/2025/06	LL/1202/38	Madh	Whitish clay/Laterite	37.59	30.00	8.14	0.02	0.08	1.04	0.11	0.05	7.81	0.28	14.69	99.81	702.8
7	T2/RB/2025/07	LL/1202/39	Madh	Whitish clay/Laterite	37.13	28.81	8.82	0.02	0.07	1.05	0.16	0.07	8.21	0.35	15.13	99.82	638.6
8	T2/RB/2025/08	LL/1202/40	Madh	Laterite/Bauxite	34.85	27.01	13.01	0.02	0.10	1.00	0.12	0.09	7.69	0.36	15.48	99.73	672.2
9	T2/RB/2025/09	LL/1202/41	Madh	Laterite/Bauxite	39.17	25.00	14.13	0.02	0.09	1.69	0.15	0.09	7.03	0.35	12.17	99.90	613.1
10	T2/RB/2025/10	LL/1202/42	Madh	Laterite/Bauxite	36.02	28.46	13.01	0.02	0.10	1.06	0.13	0.07	7.39	0.38	13.25	99.89	462.9
11	T2/RB/2025/A	LL/1202/43	Madh	Whitish clay	31.57	34.25	3.91	0.04	0.18	2.21	0.27	0.53	6.47	0.33	19.96	99.71	288.6
12	T2/RB/2025/B	LL/1202/44	Madh	Whitish clay/Laterite	32.64	32.68	5.94	0.02	0.09	1.95	0.14	0.11	7.25	0.36	18.70	99.88	433.3
13	T2/RB/2025/C	LL/1202/45	Madh	Laterite	37.57	24.47	14.70	0.02	0.10	1.97	0.12	0.06	7.23	0.38	13.15	99.79	459.9
14	T2/RB/2025/D	LL/1202/46	Madh	Whitish clay/Laterite	36.28	29.50	7.48	0.02	0.08	1.83	0.15	0.10	8.01	0.34	16.09	99.87	475.0
	Average				**34.56**	**31.29**	**7.36**	**0.02**	**0.10**	**1.48**	**0.16**	**0.14**	**7.40**	**0.34**	**16.98**	**99.83**	**466.3**

Sr.no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
Trench-3																	
1	T3/RB/2025/01	LL/1202/47	Madh	Clayey Bauxite white	35.53	30.19	5.96	0.03	0.11	2.29	0.44	0.26	7.89	0.17	17.04	99.89	453.4
2	T3/RB/2025/02	LL/1202/48	Madh	Clayey Bauxite white	30.78	36.57	3.56	0.02	0.09	1.02	0.42	0.16	7.58	0.21	19.43	99.83	366.8
3	T3/RB/2025/03	LL/1202/49	Madh	Clayey Bauxite white	37.58	33.19	4.30	0.03	0.18	1.39	0.54	0.18	6.38	0.22	15.97	99.94	318.0
4	T3/RB/2025/04	LL/1202/50	Madh	Clayey Bauxite white	39.54	28.77	9.37	0.06	0.36	1.87	0.61	0.28	4.78	0.28	14.04	99.95	379.3
5	T3/RB/2025/05	LL/1202/51	Madh	Clayey Bauxite white	35.72	29.48	10.17	0.03	0.23	1.64	0.88	0.24	5.54	0.42	15.39	99.74	424.7
6	T3/RB/2025/06	LL/1202/52	Madh	Clayey Bauxite white	40.31	29.31	5.09	0.02	0.13	1.31	0.84	0.23	6.84	0.31	15.41	99.80	250.0
7	T3/RB/2025/07	LL/1202/53	Madh	Clayey Bauxite white	39.74	30.78	7.20	0.02	0.15	0.88	0.56	0.17	6.41	0.21	13.75	99.86	286.4
8	T3/RB/2025/08	LL/1202/54	Madh	Clayey Bauxite white	40.95	30.28	6.94	0.02	0.19	1.14	0.48	0.16	5.89	0.18	13.55	99.78	211.5
9	T3/RB/2025/09	LL/1202/55	Madh	Clayey Bauxite white	39.87	30.86	6.88	0.02	0.19	1.49	0.45	0.14	5.96	0.17	13.73	99.75	211.8
10	T3/RB/2025/10	LL/1202/56	Madh	Clayey Bauxite white	41.00	29.95	6.33	0.02	0.16	1.68	0.38	0.08	6.39	0.14	13.63	99.77	196.2
11	T3/RB/2025/A	LL/1202/57	Madh	Clayey Bauxite white	38.55	28.76	6.40	0.04	0.15	2.54	0.43	0.29	7.30	0.16	15.30	99.92	481.3
12	T3/RB/2025/B	LL/1202/58	Madh	Clayey Bauxite white	39.50	30.92	5.62	0.03	0.24	1.54	0.47	0.19	6.22	0.22	14.85	99.79	306.4
13	T3/RB/2025/C	LL/1202/59	Madh	Clayey Bauxite white	36.93	24.15	16.09	0.04	0.18	2.65	0.24	0.06	6.49	0.21	12.81	99.84	447.8
14	T3/RB/2025/D	LL/1202/60	Madh	Clayey Bauxite white	33.93	33.73	7.68	0.03	0.10	4.28	0.32	0.19	5.68	0.17	15.47	99.81	291.3
	Average				**37.85**	**30.50**	**7.26**	**0.03**	**0.17**	**1.84**	**0.50**	**0.19**	**6.38**	**0.22**	**15.03**	**99.83**	**330.4**

Trench-4

Sr. no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
1	T4/RB/2025/01	LL/1202/62	Kharinadi	Calc.Sandy clay, khaki	38.03	14.49	24.95	0.31	0.98	3.87	0.60	0.16	2.76	0.19	13.47	99.80	483.7
2	T4/RB/2025/02	LL/1202/63	Kharinadi	Calc.Sandy clay, khaki	52.58	13.03	17.68	0.31	1.21	0.86	0.81	0.25	3.60	0.11	9.52	99.95	333.2
3	T4/RB/2025/03	LL/1202/64	Kharinadi	Calc.Sandy clay, khaki	48.52	10.25	18.82	0.14	1.26	4.29	0.76	0.21	2.94	0.11	12.43	99.72	324.3
4	T4/RB/2025/04	LL/1202/65	Kharinadi	Calc.Sandy clay, khaki	58.76	8.13	8.75	0.08	3.66	6.21	0.96	0.76	1.05	0.04	11.36	99.77	91.8
5	T4/RB/2025/05	LL/1202/66	Kharinadi	Calc.Sandy clay, khaki	61.00	11.81	9.38	0.04	3.69	2.09	1.15	0.85	1.38	0.04	8.32	99.75	90.9
6	T4/RB/2025/06	LL/1202/67	Kharinadi	Calc.Sandy clay, khaki	56.12	11.89	12.24	0.06	2.98	3.04	0.76	0.85	1.83	0.08	9.88	99.73	159.7
7	T4/RB/2025/07	LL/1202/68	Kharinadi	Calc.Sandy clay, khaki	42.85	11.86	23.33	0.16	1.30	3.47	0.58	0.36	2.50	0.15	13.26	99.81	385.9
8	T4/RB/2025/08	LL/1202/69	Kharinadi	Calc.Sandy clay, khaki	50.02	10.14	19.30	0.14	1.58	3.77	0.56	0.54	2.01	0.16	11.54	99.75	275.1
9	T4/RB/2025/09	LL/1202/70	Kharinadi	Calc.Sandy clay, khaki	60.91	11.94	10.97	0.04	2.61	1.97	0.67	1.06	1.70	0.09	7.84	99.80	118.7
10	T4/RB/2025/10	LL/1202/71	Kharinadi	Calc.Sandy clay, khaki	67.27	11.28	8.60	0.02	1.43	1.17	0.61	0.71	1.72	0.05	6.97	99.84	96.3
11	T4/RB/2025/A	LL/1202/72	Kharinadi	Calc.Sandy clay, khaki	48.27	13.20	18.30	0.11	1.42	3.25	0.86	0.16	2.82	0.11	11.41	99.91	306.1
12	T4/RB/2025/B	LL/1202/73	Kharinadi	Calc.Sandy clay, khaki	56.15	11.09	12.81	0.08	2.26	3.97	0.76	0.71	1.68	0.08	10.14	99.74	160.6
13	T4/RB/2025/C	LL/1202/74	Kharinadi	Calc.Sandy clay, khaki	59.80	12.85	9.95	0.04	1.67	3.10	0.68	0.94	1.93	0.09	8.76	99.81	124.9
14	T4/RB/2025/D	LL/1202/75	Kharinadi	Calc.Sandy clay, khaki	58.89	10.79	12.81	0.10	2.77	2.60	0.89	0.65	1.78	0.07	8.42	99.77	158.8
	Average				**54.23**	**11.62**	**14.85**	**0.12**	**2.06**	**3.12**	**0.76**	**0.59**	**2.12**	**0.10**	**10.24**	**99.80**	**222.1**

Sr.no	Sample No	lab code	Formation	Lithology	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	MnO (%)	MgO (%)	CaO (%)	Na2O (%)	K2O (%)	TiO2 (%)	P2O5 (%)	LOI (%)	Total (%)	V (ppm)
Trench-5																	
1	T5/RB/2025/01	LL/1202/77	Sandhan	White Calc. clay	58.99	3.90	7.30	0.11	4.80	7.10	1.28	0.64	1.26	0.03	14.39	99.79	75.4
2	T5/RB/2025/02	LL/1202/78	Sandhan	White Calc. clay	59.75	4.92	7.92	0.09	4.50	6.18	0.95	0.67	1.33	0.03	13.52	99.86	82.7
3	T5/RB/2025/03	LL/1202/79	Sandhan	White Calc. clay	58.68	6.68	7.69	0.12	4.35	5.62	0.85	0.71	1.39	0.03	13.60	99.73	88.5
4	T5/RB/2025/04	LL/1202/80	Sandhan	White Calc. clay	58.44	6.83	6.97	0.12	4.05	6.55	0.69	0.68	1.20	0.03	14.34	99.90	84.3
5	T5/RB/2025/05	LL/1202/81	Sandhan	White Calc. clay	53.57	6.43	7.58	0.11	4.94	8.61	0.54	0.70	1.18	0.05	16.02	99.73	79.3
6	T5/RB/2025/06	LL/1202/82	Sandhan	White Calc. clay	54.40	5.68	7.82	0.08	4.36	8.47	0.61	0.64	1.09	0.03	16.64	99.81	70.6
7	T5/RB/2025/07	LL/1202/83	Sandhan	White Calc. clay	54.82	1.92	5.89	0.07	4.83	11.24	0.55	0.61	0.97	0.03	18.90	99.82	62.8
8	T5/RB/2025/08	LL/1202/84	Sandhan	White Calc. clay	53.54	0.32	6.00	0.05	5.11	12.93	0.52	0.57	0.90	0.03	19.95	99.91	56.9
9	T5/RB/2025/09	LL/1202/85	Sandhan	White Calc. clay	53.40	5.98	7.52	0.08	5.09	8.29	0.62	0.64	1.09	0.03	17.08	99.80	65.2
10	T5/RB/2025/10	LL/1202/86	Sandhan	White Calc. clay	55.79	4.56	9.16	0.07	4.79	7.04	0.58	0.61	1.05	0.03	16.22	99.89	65.6
11	T5/RB/2025/A	LL/1202/87	Sandhan	White Calc. clay	57.44	6.94	9.36	0.08	4.65	5.02	1.43	0.66	1.35	0.03	12.79	99.74	84.5
12	T5/RB/2025/B	LL/1202/88	Sandhan	White Calc. clay	55.03	6.51	7.77	0.07	4.83	7.51	0.76	0.68	1.28	0.03	15.42	99.89	79.0
13	T5/RB/2025/C	LL/1202/89	Sandhan	White Calc. clay	50.11	0.32	5.72	0.05	6.59	13.03	0.45	0.55	0.86	0.02	22.23	99.94	54.4
14	T5/RB/2025/D	LL/1202/90	Sandhan	White Calc. clay	55.91	2.59	6.49	0.07	5.17	9.52	0.67	0.62	1.04	0.03	17.76	99.86	65.1
	Average				**55.70**	**4.54**	**7.37**	**0.08**	**4.86**	**8.36**	**0.75**	**0.64**	**1.14**	**0.03**	**16.35**	**99.83**	**72.5**

Annexure-IV-A: Analytical results of Major oxides in Bhuj formation (Pit samples)

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
			all values in (%)												
1	P11/RB/2025	Bhuj	66.79	18.63	1.94	0.01	0.39	3.37	0.11	0.11	0.80	0.09	7.62	99.86	80.1
2	P12/RB/2025	Bhuj	69.26	12.44	9.32	0.03	0.68	0.44	0.19	1.11	1.68	0.12	4.57	99.85	67.8
		Max	**66.79**	**12.44**	**1.94**	**0.01**	**0.39**	**0.44**	**0.11**	**0.11**	**0.80**	**0.09**	**4.57**	**99.85**	**67.80**
		Max	**69.26**	**18.63**	**9.32**	**0.03**	**0.68**	**3.37**	**0.19**	**1.11**	**1.68**	**0.12**	**7.62**	**99.86**	**80.10**
		Average	**68.03**	**15.53**	**5.63**	**0.02**	**0.53**	**1.91**	**0.15**	**0.61**	**1.24**	**0.11**	**6.10**	**99.85**	**73.95**

Annexure-IV-B: Analytical results of Major oxides in Anjar Volcanics formation (Pit sample)

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
			All values in (%)												
1	P6/RB/2025	Anjar	47.00	12.02	6.81	0.05	1.55	6.01	0.35	0.29	4.13	0.27	21.40	99.88	320.10

Annexure-IV-C: Analytical results of Major oxides in Matanomadh formation (Pit & Trench samples)

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
			all values in (%)												
1	P1/RB/2025	Madh	42.90	18.53	19.30	0.13	0.78	2.80	0.11	0.23	3.00	0.11	12.01	99.90	342.5
2	P2/RB/2025	Madh	35.85	20.53	25.55	0.05	0.33	0.96	0.12	0.22	2.66	0.20	13.29	99.75	475.5
3	P4/RB/2025	Madh	36.60	19.03	20.59	0.10	1.07	2.21	0.83	0.16	2.43	0.15	16.64	99.81	381.9
4	P7/RB/2025	Madh	34.02	27.39	14.91	0.02	0.10	1.02	0.15	0.12	7.37	0.34	14.42	99.87	514.3
5	P8/RB/2025	Madh	41.39	25.29	8.91	0.03	0.18	4.20	0.12	0.17	5.21	0.16	14.27	99.92	252.6
6	P10/RB/2025	Madh	41.39	32.55	6.05	0.04	0.32	1.08	0.17	0.26	4.44	0.15	13.44	99.90	249.1
7	P13/RB/2025	Madh	37.25	14.52	27.44	0.19	0.84	1.45	0.46	0.17	2.22	0.13	15.24	99.89	507.1
8	P18/RB/2025	Madh	40.05	29.16	8.73	0.06	0.72	2.25	0.44	0.79	3.43	0.17	14.10	99.88	287.7
9	P19/RB/2025	Madh	33.92	16.98	25.22	0.08	0.53	5.04	0.07	0.17	2.72	0.22	14.83	99.77	485.3
10	P20/RB/2025	Madh	38.44	23.65	15.72	0.03	0.17	1.09	0.12	0.05	6.69	0.42	13.40	99.76	510.2
11	T2/RB/2025/01	Madh	29.06	36.83	2.11	0.03	0.12	2.04	0.20	0.24	7.27	0.33	21.68	99.89	280.3
12	T2/RB/2025/02	Madh	28.12	39.55	2.01	0.03	0.14	1.15	0.18	0.20	7.13	0.26	21.20	99.96	291.7
13	T2/RB/2025/03	Madh	28.01	39.28	2.24	0.03	0.11	1.04	0.17	0.20	6.79	0.39	21.60	99.87	314.1
14	T2/RB/2025/04	Madh	36.09	30.34	5.09	0.03	0.13	1.60	0.16	0.13	7.17	0.45	18.62	99.81	438.7
15	T2/RB/2025/05	Madh	39.68	31.93	2.43	0.02	0.09	1.04	0.17	0.09	8.11	0.18	16.01	99.75	456.9
16	T2/RB/2025/06	Madh	37.59	30.00	8.14	0.02	0.08	1.04	0.11	0.05	7.81	0.28	14.69	99.81	702.8
17	T2/RB/2025/07	Madh	37.13	28.81	8.82	0.02	0.07	1.05	0.16	0.07	8.21	0.35	15.13	99.82	638.6
18	T2/RB/2025/08	Madh	34.85	27.01	13.01	0.02	0.10	1.00	0.12	0.09	7.69	0.36	15.48	99.73	672.2
19	T2/RB/2025/09	Madh	39.17	25.00	14.13	0.02	0.09	1.69	0.15	0.09	7.03	0.35	12.17	99.90	613.1
20	T2/RB/2025/10	Madh	36.02	28.46	13.01	0.02	0.10	1.06	0.13	0.07	7.39	0.38	13.25	99.89	462.9
21	T2/RB/2025/A	Madh	31.57	34.25	3.91	0.04	0.18	2.21	0.27	0.53	6.47	0.33	19.96	99.71	288.6
22	T2/RB/2025/B	Madh	32.64	32.68	5.94	0.02	0.09	1.95	0.14	0.11	7.25	0.36	18.70	99.88	433.3

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
23	T2/RB/2025/C	Madh	37.57	24.47	14.70	0.02	0.10	1.97	0.12	0.06	7.23	0.38	13.15	99.79	459.9
24	T2/RB/2025/D	Madh	36.28	29.50	7.48	0.02	0.08	1.83	0.15	0.10	8.01	0.34	16.09	99.87	475.0
25	T3/RB/2025/01	Madh	35.53	30.19	5.96	0.03	0.11	2.29	0.44	0.26	7.89	0.17	17.04	99.89	453.4
26	T3/RB/2025/02	Madh	30.78	36.57	3.56	0.02	0.09	1.02	0.42	0.16	7.58	0.21	19.43	99.83	366.8
27	T3/RB/2025/03	Madh	37.58	33.19	4.30	0.03	0.18	1.39	0.54	0.18	6.38	0.22	15.97	99.94	318.0
28	T3/RB/2025/04	Madh	39.54	28.77	9.37	0.06	0.36	1.87	0.61	0.28	4.78	0.28	14.04	99.95	379.3
29	T3/RB/2025/05	Madh	35.72	29.48	10.17	0.03	0.23	1.64	0.88	0.24	5.54	0.42	15.39	99.74	424.7
30	T3/RB/2025/06	Madh	40.31	29.31	5.09	0.02	0.13	1.31	0.84	0.23	6.84	0.31	15.41	99.80	250.0
31	T3/RB/2025/07	Madh	39.74	30.78	7.20	0.02	0.15	0.88	0.56	0.17	6.41	0.21	13.75	99.86	286.4
32	T3/RB/2025/08	Madh	40.95	30.28	6.94	0.02	0.19	1.14	0.48	0.16	5.89	0.18	13.55	99.78	211.5
33	T3/RB/2025/09	Madh	39.87	30.86	6.88	0.02	0.19	1.49	0.45	0.14	5.96	0.17	13.73	99.75	211.8
34	T3/RB/2025/10	Madh	41.00	29.95	6.33	0.02	0.16	1.68	0.38	0.08	6.39	0.14	13.63	99.77	196.2
35	T3/RB/2025/A	Madh	38.55	28.76	6.40	0.04	0.15	2.54	0.43	0.29	7.30	0.16	15.30	99.92	481.3
36	T3/RB/2025/B	Madh	39.50	30.92	5.62	0.03	0.24	1.54	0.47	0.19	6.22	0.22	14.85	99.79	306.4
37	T3/RB/2025/C	Madh	36.93	24.15	16.09	0.04	0.18	2.65	0.24	0.06	6.49	0.21	12.81	99.84	447.8
38	T3/RB/2025/D	Madh	33.93	33.73	7.68	0.03	0.10	4.28	0.32	0.19	5.68	0.17	15.47	99.81	291.3
		Min	**28.01**	**14.52**	**2.01**	**0.02**	**0.07**	**0.88**	**0.07**	**0.05**	**2.22**	**0.11**	**12.01**	**99.71**	**196.20**
		Max	**42.90**	**39.55**	**27.44**	**0.19**	**1.07**	**5.04**	**0.88**	**0.79**	**8.21**	**0.45**	**21.68**	**99.96**	**702.80**
		Average	**36.72**	**28.75**	**9.92**	**0.04**	**0.24**	**1.80**	**0.31**	**0.18**	**6.13**	**0.26**	**15.52**	**99.84**	**398.93**

Annexure-IV-D:Analytical results of Major oxides in Khari Nadi formation (Pit & Trench samples)

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
			All values in (%)												
1	P3/RB/2025	Kharinadi	53.80	9.88	11.78	0.10	2.30	1.50	1.24	0.49	2.88	0.17	15.71	99.83	228.5
2	P5/RB/2025	Kharinadi	46.68	0.20	3.80	0.04	2.98	20.07	0.16	0.50	0.97	0.06	24.44	99.90	47.7
3	P9/RB/2025	Kharinadi	59.00	11.89	9.61	0.08	1.51	4.79	1.33	0.39	1.79	0.08	9.36	99.82	126.6
4	P14/RB/2025	Kharinadi	33.93	0.24	2.70	0.04	4.97	26.80	0.40	0.42	0.46	0.04	29.83	99.81	32.6
5	P15/RB/2025	Kharinadi	61.89	2.91	7.97	0.10	2.80	5.75	0.75	0.44	1.59	0.04	15.69	99.92	84.8
6	P17/RB/2025	kharinadi	63.17	8.14	8.15	0.16	1.49	3.70	0.43	0.32	1.93	0.06	12.31	99.84	111.8
7	T1/RB/2025/01	kharinadi	69.28	7.98	8.62	0.03	1.79	1.23	1.38	1.08	1.09	0.05	7.32	99.84	57.9
8	T1/RB/2025/02	kharinadi	67.87	9.19	8.28	0.03	1.81	1.27	1.41	1.07	1.16	0.05	7.74	99.87	68.9
9	T1/RB/2025/03	kharinadi	66.50	9.09	9.37	0.03	1.82	1.14	1.45	1.13	1.12	0.05	8.16	99.84	68.2
10	T1/RB/2025/04	kharinadi	67.43	7.61	9.58	0.03	1.76	1.59	1.36	1.07	1.08	0.05	8.23	99.78	69.4
11	T1/RB/2025/05	kharinadi	63.67	8.20	10.89	0.04	1.76	1.77	1.28	1.05	1.17	0.07	10.00	99.88	96.1
12	T1/RB/2025/06	kharinadi	58.21	10.93	10.85	0.08	1.74	2.94	1.19	0.99	1.41	0.10	11.42	99.87	145.5
13	T1/RB/2025/07	kharinadi	58.21	12.73	11.19	0.08	1.63	1.23	1.20	0.99	1.66	0.08	10.75	99.74	138.3
14	T1/RB/2025/08	kharinadi	57.48	12.70	11.72	0.11	1.53	0.81	1.14	0.93	1.87	0.08	11.46	99.82	157.4
15	T1/RB/2025/09	kharinadi	56.13	13.46	12.29	0.14	1.50	0.92	1.12	0.90	2.08	0.09	11.27	99.90	188.2
16	T1/RB/2025/10	kharinadi	55.83	10.93	14.71	0.19	1.58	1.28	1.06	0.91	1.83	0.13	11.33	99.77	217.8
17	T1/RB/2025/A	kharinadi	69.54	7.40	9.52	0.04	1.68	0.68	1.97	0.91	1.10	0.05	6.99	99.88	57.0
18	T1/RB/2025/B	kharinadi	66.08	9.51	9.43	0.04	1.80	1.26	1.43	1.07	1.26	0.07	7.85	99.80	85.8
19	T1/RB/2025/C	kharinadi	65.29	9.24	8.84	0.06	2.21	1.35	1.27	1.25	1.10	0.08	9.10	99.77	71.8
20	T1/RB/2025/D	kharinadi	65.98	9.33	9.44	0.04	1.72	1.56	1.38	1.01	1.25	0.06	8.18	99.96	91.1
21	T4/RB/2025/01	Kharinadi	38.03	14.49	24.95	0.31	0.98	3.87	0.60	0.16	2.76	0.19	13.47	99.80	483.7
22	T4/RB/2025/02	Kharinadi	52.58	13.03	17.68	0.31	1.21	0.86	0.81	0.25	3.60	0.11	9.52	99.95	333.2
23	T4/RB/2025/03	Kharinadi	48.52	10.25	18.82	0.14	1.26	4.29	0.76	0.21	2.94	0.11	12.43	99.72	324.3
24	T4/RB/2025/04	Kharinadi	58.76	8.13	8.75	0.08	3.66	6.21	0.96	0.76	1.05	0.04	11.36	99.77	91.8

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
25	T4/RB/2025/05	Kharinadi	61.00	11.81	9.38	0.04	3.69	2.09	1.15	0.85	1.38	0.04	8.32	99.75	90.9
26	T4/RB/2025/06	Kharinadi	56.12	11.89	12.24	0.06	2.98	3.04	0.76	0.85	1.83	0.08	9.88	99.73	159.7
27	T4/RB/2025/07	Kharinadi	42.85	11.86	23.33	0.16	1.30	3.47	0.58	0.36	2.50	0.15	13.26	99.81	385.9
28	T4/RB/2025/08	Kharinadi	50.02	10.14	19.30	0.14	1.58	3.77	0.56	0.54	2.01	0.16	11.54	99.75	275.1
29	T4/RB/2025/09	Kharinadi	60.91	11.94	10.97	0.04	2.61	1.97	0.67	1.06	1.70	0.09	7.84	99.80	118.7
30	T4/RB/2025/10	Kharinadi	67.27	11.28	8.60	0.02	1.43	1.17	0.61	0.71	1.72	0.05	6.97	99.84	96.3
31	T4/RB/2025/A	Kharinadi	48.27	13.20	18.30	0.11	1.42	3.25	0.86	0.16	2.82	0.11	11.41	99.91	306.1
32	T4/RB/2025/B	Kharinadi	56.15	11.09	12.81	0.08	2.26	3.97	0.76	0.71	1.68	0.08	10.14	99.74	160.6
33	T4/RB/2025/C	Kharinadi	59.80	12.85	9.95	0.04	1.67	3.10	0.68	0.94	1.93	0.09	8.76	99.81	124.9
34	T4/RB/2025/D	Kharinadi	58.89	10.79	12.81	0.10	2.77	2.60	0.89	0.65	1.78	0.07	8.42	99.77	158.8
		Min	**33.93**	**0.20**	**2.70**	**0.02**	**0.98**	**0.68**	**0.16**	**0.16**	**0.46**	**0.04**	**6.97**	**99.72**	**32.60**
		Max	**69.54**	**14.49**	**24.95**	**0.31**	**4.97**	**26.80**	**1.97**	**1.25**	**3.60**	**0.19**	**29.83**	**99.96**	**483.70**
		Average	**57.80**	**9.83**	**11.66**	**0.09**	**2.04**	**3.68**	**0.99**	**0.74**	**1.72**	**0.08**	**11.19**	**99.82**	**154.57**

Annexure-IV-E: Analytical results of Major oxides in Sandhan formation (Pit & Trench samples)

S.No	Sample No	Formation	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	V(ppm)
			all values in (%)												
1	P16/RB/2025	Sandhan	34.20	0.25	3.32	0.04	4.90	25.44	0.19	0.53	0.47	0.04	30.36	99.74	25.90
2	T5/RB/2025/01	Sandhan	58.99	3.90	7.30	0.11	4.80	7.10	1.28	0.64	1.26	0.03	14.39	99.79	75.40
3	T5/RB/2025/02	Sandhan	59.75	4.92	7.92	0.09	4.50	6.18	0.95	0.67	1.33	0.03	13.52	99.86	82.70
4	T5/RB/2025/03	Sandhan	58.68	6.68	7.69	0.12	4.35	5.62	0.85	0.71	1.39	0.03	13.60	99.73	88.50
5	T5/RB/2025/04	Sandhan	58.44	6.83	6.97	0.12	4.05	6.55	0.69	0.68	1.20	0.03	14.34	99.90	84.30
6	T5/RB/2025/05	Sandhan	53.57	6.43	7.58	0.11	4.94	8.61	0.54	0.70	1.18	0.05	16.02	99.73	79.30
7	T5/RB/2025/06	Sandhan	54.40	5.68	7.82	0.08	4.36	8.47	0.61	0.64	1.09	0.03	16.64	99.81	70.60
8	T5/RB/2025/07	Sandhan	54.82	1.92	5.89	0.07	4.83	11.24	0.55	0.61	0.97	0.03	18.90	99.82	62.80
9	T5/RB/2025/08	Sandhan	53.54	0.32	6.00	0.05	5.11	12.93	0.52	0.57	0.90	0.03	19.95	99.91	56.90
10	T5/RB/2025/09	Sandhan	53.40	5.98	7.52	0.08	5.09	8.29	0.62	0.64	1.09	0.03	17.08	99.80	65.20
11	T5/RB/2025/10	Sandhan	55.79	4.56	9.16	0.07	4.79	7.04	0.58	0.61	1.05	0.03	16.22	99.89	65.60
12	T5/RB/2025/A	Sandhan	57.44	6.94	9.36	0.08	4.65	5.02	1.43	0.66	1.35	0.03	12.79	99.74	84.50
13	T5/RB/2025/B	Sandhan	55.03	6.51	7.77	0.07	4.83	7.51	0.76	0.68	1.28	0.03	15.42	99.89	79.00
14	T5/RB/2025/C	Sandhan	50.11	0.32	5.72	0.05	6.59	13.03	0.45	0.55	0.86	0.02	22.23	99.94	54.40
15	T5/RB/2025/D	Sandhan	55.91	2.59	6.49	0.07	5.17	9.52	0.67	0.62	1.04	0.03	17.76	99.86	65.10
		Min	**34.20**	**0.25**	**3.32**	**0.04**	**4.05**	**5.02**	**0.19**	**0.53**	**0.47**	**0.02**	**12.79**	**99.73**	**25.90**
		Max	**59.75**	**6.94**	**9.36**	**0.12**	**6.59**	**25.44**	**1.43**	**0.71**	**1.39**	**0.05**	**30.36**	**99.94**	**88.50**
		Average	**54.27**	**4.25**	**7.10**	**0.08**	**4.86**	**9.50**	**0.71**	**0.63**	**1.10**	**0.03**	**17.28**	**99.83**	**69.35**

Annexure-V: Statement showing analytical values of REE,Ga,V,Ti from pits & trenches samples in Reldi Moti Area,Dist: Kachchh,Gujarat

S.no	Sample name	Lab no	Formation	Lithology	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Total REE	Sc	Y	Total REE +(Sc+Y)	Th	U	Ga	V
					In ppm																					
1	P3/RB/2025	LL/1202/03	Kharinadi	Weathered basalt	43.48	100.23	24.88	142.93	8.93	2.40	19.85	0.5	4.08	0.5	11.35	0.5	4.58	2.13	**366.34**	19.63	22.18	**408.15**	74.15	46.38	27.18	228.00
2	P4/RB/2025	LL/1202/04	Madh	Laterite	34.78	62.00	36.05	123.38	9.05	2.60	30.50	0.5	3.15	0.5	10.35	0.5	2.00	3.60	**318.96**	25.20	20.43	**364.59**	123.93	140.28	36.90	381.90
3	P5/RB/2025	LL/1202/05	Kharinadi	Calc..Sandy clay	29.85	50.78	13.58	68.98	4.20	1.00	8.33	0.5	2.00	0.5	5.68	0.5	2.73	0.93	**189.56**	9.38	14.08	**213.02**	22.83	20.05	12.15	47.70
4	P7/RB/2025	LL/1202/07	Madh	Laterite	78.83	158.20	44.13	341.23	21.63	5.23	29.40	0.5	4.13	0.5	27.43	0.5	1.20	2.93	**715.84**	41.05	15.18	**772.07**	141.25	33.25	42.68	514.30
5	P8/RB/2025	LL/1202/08	Madh	Clayey bauxite	52.25	159.58	27.35	245.88	11.45	3.28	18.03	0.5	3.05	0.5	21.38	0.5	1.38	1.95	**547.08**	33.28	11.28	**591.64**	83.00	3.30	35.75	252.60
6	P10/RB/2025	LL/1202/10	Madh	Clayey bauxite	45.70	91.78	17.48	182.38	5.30	1.58	9.78	0.5	1.13	0.5	16.73	0.5	1.40	1.15	**375.91**	18.70	7.48	**402.09**	83.70	0.00	33.98	126.60
7	P11/RB/2025	LL/1202/11	Bhuj	Arkosic SST.	54.10	112.08	14.35	86.95	8.25	1.60	6.43	0.5	2.55	0.5	3.78	0.5	1.53	0.43	**293.55**	10.60	12.25	**316.40**	37.08	0.00	13.63	249.10
8	P16/RB/2025	LL/1202/16	Sandhan	clay+ calcarenite	30.70	44.13	16.20	53.88	4.63	1.20	7.38	0.5	2.60	0.5	4.30	0.5	2.73	0.70	**169.95**	7.18	17.28	**194.41**	17.58	13.58	9.28	80.10
9	T1/RB/2025/08	LL/1202/24	Khari Nadi	Weathered basalt	41.88	68.48	20.73	104.38	8.85	2.38	17.65	0.5	5.68	0.5	9.00	0.5	6.05	1.85	**288.43**	18.70	29.13	**336.26**	52.88	38.43	21.03	25.90
10	P18/RB/2025	LL/1202/32	Madh	Clayey bauxite	44.83	83.28	20.25	148.83	6.90	2.10	13.55	0.5	2.58	0.5	13.73	0.5	2.80	1.53	**341.88**	15.58	14.28	**371.74**	59.88	10.83	33.75	157.40
11	T2/RB/2025/07	LL/1202/39	Madh	clay+ laterite	103.83	236.93	50.75	408.18	28.88	7.83	26.78	0.5	6.83	0.5	31.68	0.5	0.5	2.03	**905.72**	38.48	19.08	**963.28**	106.60	5.70	43.05	638.60
12	T3/RB/2025/D	LL/1202/60	Madh	Clayey Bauxite	50.48	92.48	18.38	299.23	6.50	1.98	9.10	0.5	1.80	0.5	24.63	0.5	5.40	1.05	**512.53**	23.43	8.78	**544.74**	83.55	0.5	42.75	291.20
13	T4/RB/2025/C	LL/1202/74	Khari Nadi	Calc.Sandy clay	35.00	54.48	15.73	80.88	4.48	1.20	11.83	0.5	1.63	0.5	6.95	0.5	2.70	1.43	**217.81**	17.00	13.38	**248.19**	45.90	22.98	20.90	124.90
14	P20/RB/2025	LL/1202/76	Madh	Lateritic bauxite	58.63	100.10	35.48	361.28	11.13	3.58	23.10	0.5	2.30	0.5	23.93	0.5	10.23	3.15	**634.41**	50.95	9.38	**694.74**	133.65	45.88	40.78	510.50
15	T5/RB/2025/06	LL/1202/82	Sandhan	clay + calcarenite	39.35	69.13	17.28	79.45	6.33	1.50	11.18	0.5	3.30	0.5	6.38	0.5	4.65	1.15	**241.20**	12.95	19.73	**273.88**	29.85	16.88	16.33	70.60

Note: Values having <1.0 ppm are taken as 0.5 ppm

Annexure-V-A: Analytical results of REE,Gallium in Bhuj Formation (Pit sample)

S.no	Sample name	Formation	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Total REE	Sc	Y	Total (REE +Sc+Y)	Th	U	Ga	V
			all values in ppm																					
1	P11/RB/2025	Bhuj	54.10	112.08	14.35	86.95	8.25	1.60	6.43	0.50	2.55	0.50	3.78	0.50	1.53	0.43	293.55	10.60	12.25	316.40	37.08	0.00	13.63	249.1

Annexure-V-B: Analytical results of REE, Gallium in Matanomadh formation (pits & trench samples)

S.no	Sample name	Formation	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Total REE	Sc	Y	Total REE +Sc+Y)	Th	U	Ga	V
			all values in ppm																					
1	P4/RB/2025	Madh	34.78	62.00	36.05	123.38	9.05	2.60	30.50	0.5	3.15	0.5	10.35	0.5	2.00	3.60	**318.96**	25.20	20.43	**364.59**	123.93	140.28	36.90	381.90
2	P7/RB/2025	Madh	78.83	158.20	44.13	341.23	21.63	5.23	29.40	0.5	4.13	0.5	27.43	0.5	1.20	2.93	**715.84**	41.05	15.18	**772.07**	141.25	33.25	42.68	514.30
3	P8/RB/2025	Madh	52.25	159.58	27.35	245.88	11.45	3.28	18.03	0.5	3.05	0.5	21.38	0.5	1.38	1.95	**547.08**	33.28	11.28	**591.64**	83.00	3.30	35.75	252.60
4	P10/RB/2025	Madh	45.70	91.78	17.48	182.38	5.30	1.58	9.78	0.5	1.13	0.5	16.73	0.5	1.40	1.15	**375.91**	18.70	7.48	**402.09**	83.70	0.00	33.98	126.60
5	P18/RB/2025	Madh	44.83	83.28	20.25	148.83	6.90	2.10	13.55	0.5	2.58	0.5	13.73	0.5	2.80	1.53	**341.88**	15.58	14.28	**371.74**	59.88	10.83	33.75	157.40
6	P20/RB/2025	Madh	58.63	100.10	35.48	361.28	11.13	3.58	23.10	0.5	2.30	0.5	23.93	0.5	10.23	3.15	**634.41**	50.95	9.38	**694.74**	133.65	45.88	40.78	510.50
7	T2/RB/2025/07	Madh	103.83	236.93	50.75	408.18	28.88	7.83	26.78	0.5	6.83	0.5	31.68	0.5	0.5	2.03	**905.72**	38.48	19.08	**963.28**	106.60	5.70	43.05	638.60
8	T3/RB/2025/D	Madh	50.48	92.48	18.38	299.23	6.50	1.98	9.10	0.5	1.80	0.5	24.63	0.5	5.40	1.05	**512.53**	23.43	8.78	**544.74**	83.55	0.5	42.75	291.20
		Min	**34.78**	**62.00**	**17.48**	**123.38**	**5.30**	**1.58**	**9.10**	**0.50**	**1.13**	**0.50**	**10.35**	**0.50**	**0.50**	**1.05**	**318.96**	**15.58**	**7.48**	**364.59**	**59.88**	**0.00**	**33.75**	**126.60**
		Max	**103.83**	**236.93**	**50.75**	**408.18**	**28.88**	**7.83**	**30.50**	**0.50**	**6.83**	**0.50**	**31.68**	**0.50**	**10.23**	**3.60**	**905.72**	**50.95**	**20.43**	**963.28**	**141.25**	**140.28**	**43.05**	**638.60**
		Average	**58.67**	**123.04**	**31.23**	**263.80**	**12.61**	**3.52**	**20.03**	**0.50**	**3.12**	**0.50**	**21.23**	**0.50**	**3.11**	**2.17**	**544.04**	**30.83**	**13.24**	**588.11**	**101.95**	**29.97**	**38.71**	**359.14**

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Annexure-V-C: Analytical results of REE, Gallium in Khari Nadi formation (pits & trenche samples)

S.no	Sample name	Formation	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Total REE	Sc	Y	Total REE +Sc+Y)	Th	U	Ga	V
			all values in ppm																					
1	P3/RB/2025	Kharinadi	43.48	100.23	24.88	142.93	8.93	2.40	19.85	0.5	4.08	0.5	11.35	0.5	4.58	2.13	**366.34**	19.63	22.18	**408.15**	74.15	46.38	27.18	228.00
2	P5/RB/2025	Kharinadi	29.85	50.78	13.58	68.98	4.20	1.00	8.33	0.5	2.00	0.5	5.68	0.5	2.73	0.93	**189.56**	9.38	14.08	**213.02**	22.83	20.05	12.15	47.70
3	T1/RB/2025/08	kharinadi	41.88	68.48	20.73	104.38	8.85	2.38	17.65	0.5	5.68	0.5	9.00	0.5	6.05	1.85	**288.43**	18.70	29.13	**336.26**	52.88	38.43	21.03	25.90
4	T4/RB/2025/C	Kharinadi	35.00	54.48	15.73	80.88	4.48	1.20	11.83	0.5	1.63	0.5	6.95	0.5	2.70	1.43	**217.81**	17.00	13.38	**248.19**	45.90	22.98	20.90	124.90
		Min	**29.85**	**50.78**	**13.58**	**68.98**	**4.20**	**1.00**	**8.33**	**0.50**	**1.63**	**0.50**	**5.68**	**0.50**	**2.70**	**0.93**	**189.56**	**9.38**	**13.38**	**213.02**	**22.83**	**20.05**	**12.15**	**25.90**
		Max	**43.48**	**100.23**	**24.88**	**142.93**	**8.93**	**2.40**	**19.85**	**0.50**	**5.68**	**0.50**	**11.35**	**0.50**	**6.05**	**2.13**	**366.34**	**19.63**	**29.13**	**408.15**	**74.15**	**46.38**	**27.18**	**228.00**
		Average	**37.55**	**68.49**	**18.73**	**99.29**	**6.62**	**1.75**	**14.42**	**0.50**	**3.35**	**0.50**	**8.25**	**0.50**	**4.02**	**1.59**	**265.54**	**16.18**	**19.69**	**301.41**	**48.94**	**31.96**	**20.32**	**106.63**

Annexure-V-D: Analytical results of REE, Gallium in Sandhan formation (pit & trench samples)

S.no	Sample name	Formation	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Total REE	Sc	Y	Total REE +Sc+Y)	Th	U	Ga	V
			all values in ppm																					
1	P16/RB/2025	Sandhan	30.70	44.13	16.20	53.88	4.63	1.20	7.38	0.5	2.60	0.5	4.30	0.5	2.73	0.70	**168.45**	7.18	17.28	**192.91**	17.58	13.58	9.28	80.1
2	T5/RB/2025/06	Sandhan	39.35	69.13	17.28	79.45	6.33	1.50	11.18	0.5	3.30	0.5	6.38	0.5	4.65	1.15	**239.70**	12.95	19.73	**272.38**	29.85	16.88	16.33	70.6
		Min	**30.70**	**44.13**	**16.20**	**53.88**	**4.63**	**1.20**	**7.38**	**0.50**	**2.60**	**0.50**	**4.30**	**0.50**	**2.73**	**0.70**	**168.45**	**7.18**	**17.28**	**192.91**	**17.58**	**13.58**	**9.28**	**70.60**
		Max	**39.35**	**69.13**	**17.28**	**79.45**	**6.33**	**1.50**	**11.18**	**0.50**	**3.30**	**0.50**	**6.38**	**0.50**	**4.65**	**1.15**	**239.70**	**12.95**	**19.73**	**272.38**	**29.85**	**16.88**	**16.33**	**80.10**
		Average	**35.03**	**56.63**	**16.74**	**66.67**	**5.48**	**1.35**	**9.28**	**0.50**	**2.95**	**0.50**	**5.34**	**0.50**	**3.69**	**0.93**	**204.08**	**10.07**	**18.51**	**232.65**	**23.72**	**15.23**	**12.81**	**75.35**

Annexure-VI: Reduced level, co-ordinates, Total depth, Recovery%, Date of commencement & closure of Boreholes drilled in Reldimoti Area, Kachchh District, Gujarat

Borehole No	Latitude (N) (Degree decimal)	Longitude(E) (Degree decimal)	Reduced level (m)	Total depth (m)	Core recovery %	Date of Commencement	Date of closure
RMT BH-01	23.223435	69.837684	142.214	20.00	67.00%	21.07.2025	31.07.2025
RMT BH-02	23.222593	69.833992	143.601	30.00	93.60%	03.08.2025	09.08.2025
RMT BH-03	23.219413	69.817702	145.00	20.00	90.00%	11.08.2025	14.08.2025
RMT BH-04	23.219076	69.817617	147.084	20.00	86.00%	15.08.2025	19.08.2025
RMT BH-05	23.221048	69.830458	138.551	30.00	94.40%	21.08.2025	28.08.2025

Annexure VII-Borehole lithologs Boreholes drilled in Reldi Moti area, Kachchh district, Gujarat

Title of the Project	Reconnaissance Survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh District, Gujarat.
Filed Season:	**2025**
Borehole No	**RMT - BH - 01**
Location	**Reldi Nani, Gujarat**
Latitude	**23.223435(N)**
Longitude	**69.837684(E)**
Angle	**Vertical**
Collar Rl	**142.214**
Date of Commencement	**21-07-2025**
Date of Closing	**31-07-2025**
Total Depth	**20.00**
TOTAL CORE BOXES	**3 Boxes**

Core Box No	From	To	Length	Rec. Length	Rec. %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	0.00	1.00	1.00	0.63	63%	37%	0.43	0.68	0.68	Soil clayey khaki Brown.Soil/Madh 0.68m
							0.20	0.32	1.00	Lithomargic clay pinkish white
CB-01	1.00	2.00	1.00	0.90	90%	10%	0.90	1.00	2.00	DO- Broken Fractured
CB-01	2.00	3.00	1.00	0.90	90%	10%	0.90	1.00	3.00	DO- Broken Fractured
CB-01	3.00	4.00	1.00	0.93	93%	7%	0.93	1.00	4.00	DO- Broken Fractured
CB-01	4.00	5.00	1.00	0.95	95%	5%	0.95	1.00	5.00	DO- Broken Fractured

Core Box No	From	To	Length	Rec. Length	Rec. %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	5.00	6.00	1.00	0.50	50%	50%	0.50	1.00	6.00	DO- Broken Fractured
CB-01	6.00	7.00	1.00	0.44	44%	56%	0.44	1.00	7.00	DO- Broken Fractured
CB-02	7.00	8.00	1.00	0.97	97%	3%	0.34	0.35	7.35	DO- Sheared zone
							0.20	0.21	7.56	Sludge grey colour
							0.43	0.44	8.00	clay yellow, Brecciated at Bottom. Sheared zone
CB-02	8.00	9.00	1.00	0.75	75%	25%	0.75	1.00	9.00	claystone, dirty white, hard.
CB-02	9.00	10.00	1.00	0.92	92%	8%	0.08	0.09	9.09	clay stone Pink- white clay lenses; fracture angle 45°, calc. veins.
							0.84	0.91	10.00	Clay Brick Red. Powdered.
CB-02	10.00	11.00	1.00	0.84	84%	16%	0.34	0.40	10.40	Sandy clay, pinkish white, hard fractured VFR Sheared
							0.30	0.36	10.76	-DO-pinkish yellow. friable. Broken fractured
							0.20	0.24	11.00	sludge sandy clay, pinkish yellow
CB-02	11.00	12.00	1.00	0.66	66%	34%	0.13	0.20	11.20	Sandy clay stone.f.g. (dirty white. and silkensides.

Core Box No	From	To	Length	Rec. Length	Rec. %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
							0.53	0.80	12.00	sandy clay pinkish Brown. highly broken fractured
CB-03	12.00	13.00	1.00	0.93	93%	7%	0.24	0.26	12.26	Claystone Pink. Broken, crushed, Sheared
							0.34	0.36	12.62	Claystone Pinkish white, Broken, some flow structures.
							0.35	0.38	13.00	Claystone Pink broken powdered.
CB-03	13.00	14.00	1.00	0.34	34%	66%	0.34	1.00	14.00	Claystone Pinkish Grey, SilkenSided.
CB-03	14.00	15.00	1.00	0.50	50%	50%	0.50	1.00	15.00	Claystone Pinkish White Broken fractured. and brecciated.
CB-03	15.00	16.00	1.00	0.48	48%	52%	0.10	0.21	15.21	Claystone Pink.Vertical fracture
							0.38	0.79	16.00	limonitic clay yellow, light weight, iron stains.
CB-03	16.00	17.00	1.00	0.37	37%	63%	0.30	0.89	16.81	Do-pink at Bottom, Fractured.
							0.07	0.19	17.00	Claystone Pink light weight.

Core Box No	From	To	Length	Rec. Length	Rec. %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour, texture structure)
CB-03	17.00	18.00	1.00	0.28	28%	72%	0.28	1.00	18.00	Claystone Pinkish Grey, highly fractured and highly broken powdered
CB-03	18.00	19.00	1.00	0.51	51%	49%	0.51	1.00	19.00	Pinkish grey clay stone Broken, highly broken, fractured,VFR, powdered
CB-03	19.00	20.00	1.00	0.62	62%	38%	0.48	0.77	19.77	Claystone pink, highly broken fractured and powdered, Vertical fracture
							0.14	0.23	20.00	Ferrugenous sandstone, hard, fractured

The bore hole was closed at depth of 20.00m on 14-08-2025.

Weathered Zone 1.00m

Run Length: = 1.00 - 20.00 m (19m) (Excluding weathered zone)

Recovered Length: = 12.79 m

Recovery Percentage: = 67.31%

No. of core BOX:- 03

Title of the Project	Reconnaissance Survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh District, Gujarat.
Filed Season:	**2025**
Borehole No	**RMT - BH - 02**
Location	**Reldi Nani, Gujarat**
Latitude	**23.222593(N)**
Longitude	**69.833992(E)**
Angle	**Vertical**
Collar Rl	**143.601m**
Date of Commencement	**08/03/2025**
Date of Closing	**08/09/2025**
Total Depth	**30.00**
TOTAL CORE BOXES	**6 Boxes**

Box No	FROM	TO	Length	Core Rec. Length	Rec.%	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	0.00	1.00	1.00	0.72	72.00%	28%	0.18	0.25	0.25	Soil yellowish browm, soil/khari nadi 0.25m
							0.54	0.75	1.00	Sandy clay ,Calcareous, highly friable yellowish brown. Weathered
CB-01	1.00	2.00	1.00	0.81	81%	19%	0.36	0.44	1.44	Sandy clay/sst ,Calcareous, highly friable yellowish brown weathered zone.
							0.45	0.56	2.00	Sandy clay or Silt stone highly friable W.Z=2.00m
CB-01	2.00	3.00	1.00	0.86	86%	14%	0.86	1.00	3.00	Siltstone highly friable having mica , dirty White colour

Box No	FROM	TO	Length	Core Rec. Length	Rec.%	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	3.00	4.00	1.00	0.85	85%	15%	0.85	1.00	4.00	Siltstone highly friable, dirty yellow/ White colour
CB-01	4.00	5.00	1.00	0.95	95%	5%	0.95	1.00	5.00	DO-
CB-02	5.00	6.00	1.00	0.9	90%	10%	0.90	1.00	6.00	DO-
CB-02	6.00	7.00	1.00	0.94	94%	6%	0.94	1.00	7.00	DO-
CB-02	7.00	8.00	1.00	0.97	97%	3%	0.97	1.00	8.00	DO-
CB-02	8.00	9.00	1.00	0.97	97%	3%	0.97	1.00	9.00	DO-
CB-02	9.00	10.00	1.00	0.9	90%	10%	0.90	1.00	10.00	DO-
CB-03	10.00	11.00	1.00	0.9	90%	10%	0.90	1.00	11.00	Siltstone highly friable with dirty white colour
CB-03	11.00	12.00	1.00	0.93	93%	7%	0.93	1.00	12.00	DO-
CB-03	12.00	13.00	1.00	0.88	88%	12%	0.55	0.62	12.62	Friable siltstone dirty white colour
							0.10	0.12	12.74	Sharp contact of siltstone/clay , fracture angle -75°
							0.23	0.26	13.00	Yellowish grey clay soft
CB-03	13.00	14.00	1.00	0.9	90%	10%	0.90	1.00	14.00	Clay grey pink tint.
CB-03	14.00	15.00	1.00	0.96	96%	4%	0.96	1.00	15.00	Clay soft grey with yellow and pink tint
CB-04	15.00	16.00	1.00	0.97	97%	3%	0.97	1.00	16.00	Clay yellowish grey soft
CB-04	16.00	17.00	1.00	0.97	97%	3%	0.97	1.00	17.00	DO-
CB-04	17.00	18.00	1.00	0.98	98%	2%	0.98	1.00	18.00	DO-
CB-04	18.00	19.00	1.00	0.97	97%	3%	0.97	1.00	19.00	DO-
CB-04	19.00	20.00	1.00	0.97	97%	3%	0.97	1.00	20.00	DO-
CB-05	20.00	21.00	1.00	0.91	91%	9%	0.91	1.00	21.00	DO-
CB-05	21.00	22.00	1.00	0.9	90%	10%	0.90	1.00	99.00	DO-

Box No	FROM	TO	Length	Core Rec. Length	Rec.%	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-05	22.00	23.00	1.00	0.9	90%	10%	0.90	1.00	23.00	DO-
CB-05	23.00	24.00	1.00	0.94	94%	6%	0.94	1.00	24.00	DO-
CB-05	24.00	25.00	1.00	0.95	95%	5%	0.95	1.00	25.00	DO-
CB-06	25.00	26.00	1.00	0.97	97%	3%	0.97	1.00	26.00	DO-
CB-06	26.00	27.00	1.00	0.98	98%	2%	0.98	1.00	27.00	DO-
CB-06	27.00	28.00	1.00	0.97	97%	3%	0.97	1.00	28.00	DO-
CB-06	28.00	29.00	1.00	0.97	97%	3%	0.97	1.00	29.00	DO-
CB-06	29.00	30.00	1.00	0.95	95%	5%	0.95	1.00	30.00	DO-
			The bore hole was closed at depth of 20.00m on 14-08-2025.							
			Weathered Zone 2.00m							
			Run Length: = 2.00 - 30.00 m (28m) (Excluding weathered zone)							
			Recovered Length: = 26.21 m							
			Recovery Percentage: = 93.60%							
			No. of core BOX:- 06							

Title of the Project	**Reconnaissance Survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh District, Gujarat.**
Filed Season:	**2025**
Borehole No	**RMT - BH - 03**
Location	**Reldi Moti, Gujarat**
Latitude	**23.219413(N)**
Longitude	**69.817702(E)**
Angle	**Vertical**
Collar Rl	**145.00m**
Date of Commencement	**08/11/2025**
Date of Closing	**14/8/2025**
Total Depth	**20.00**
TOTAL CORE BOXES	**4 Boxes**

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	0.00	1.00	1.00	0.61	0.61	39%	0.27	0.45	0.45	soil Khaki grey, Soil / Kharinadi 0.45m
							0.34	0.55	1.00	Calcareous clay dirty yellow
CB-01	1.00	2.00	1.00	0.82	0.82	18%	0.82	1.00	2.00	Calcareous clay grey-white weathered zone-2.00m
CB-01	2.00	3.00	1.00	0.86	0.86	14%	0.28	0.32	2.32	Calcareous clay grey-white
							0.23	0.27	2.59	Sludge (sandy clay fine to medium grained)
							0.35	0.41	3.00	Calcareous clay white
CB-01	3.00	4.00	1.00	0.86	0.86	14%	0.19	0.22	3.22	Sludge (sandy clay fine to medium grained)

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
							0.67	0.78	4.00	Gritty Sandstone Argillaceous with giving efferevence with dilute Hcl acid
CB-01	4.00	5.00	1.00	0.91	0.91	9%	0.13	0.15	4.15	Sludge (Sand) whitish - yellow
							0.45	0.49	4.64	Calcareous sandy clay with hard marl patches
							0.33	0.36	5.00	Reddish-brown gypseceous clay with hard marl patches
CB-02	5.00	6.00	1.00	0.86	0.86	14%	0.26	0.30	5.30	Sludge-sandy clay Y/B
							0.33	0.38	5.68	Reddish-brown gypseceous clay with hard marl patches
							0.27	0.32	6.00	Khaki grey calcareous clay with hard marl bands
CB-02	6.00	7.00	1.00	0.93	0.93	7%	0.30	0.32	6.32	Sludge-sandy clay Y/B
							0.63	0.68	7.00	Khaki grey calcarious clay hard marl bands.
CB-02	7.00	8.00	1.00	0.98	0.98	2%	0.98	1.00	8.00	Grey clay with patches of calcarenite fine to medium sand grainds, and hard marl patches.
CB-02	8.00	9.00	1.00	0.90	0.90	10%	0.90	1.00	9.00	Grey clay with patches of calcarenite fine to medium sand grains, with marl patches
CB-02	9.00	10.00	1.00	0.98	0.98	2%	0.98	1.00	10.00	yellowish grey, calcariuos, sandy clay with white marl patches
CB-03	10.00	11.00	1.00	0.96	0.96	4%	0.96	1.00	11.00	-DO-

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-03	11.00	12.00	1.00	0.93	0.93	7%	0.93	1.00	12.00	-DO-
CB-03	12.00	13.00	1.00	0.94	0.94	6%	0.94	1.00	13.00	-DO-
CB-03	13.00	14.00	1.00	0.96	0.96	4%	0.96	1.00	14.00	-DO-
CB-03	14.00	15.00	1.00	0.80	0.80	20%	0.80	1.00	15.00	DO-
CB-04	15.00	16.00	1.00	0.92	0.92	8%	0.92	1.00	16.00	do
CB-04	16.00	17.00	1.00	0.92	0.92	8%	0.92	1.00	17.00	Sandy clay with patches of calcarenite fine to medium grained, with hard marl patches
CB-04	17.00	18.00	1.00	0.90	0.90	10%	0.90	1.00	18.00	yellowish Grey Sandy Clay with patches of calcarenite fine to medium grained, with hard marl
CB-04	18.00	19.00	1.00	0.80	0.80	20%	0.80	1.00	19.00	yellowish Grey Sandy clay coarse grained with patches of calcarenite and marl
CB-04	19.00	20.00	1.00	0.78	0.78	22%	0.78	1.00	20.00	yellowish Grey Sandy clay coarse grained with patches of calcarenite and marl .

The bore hole was closed at depth of 20.00m on 14-08-2025.
Weathered Zone 2.00m
Run Length: = 2.00 - 20.00 m (18m) (Excluding weathered zone)
Recovered Length: = 2.00 - 20.00 m = 16.19 m
Recovery Percentage: = 90%
No. of core BOX:- 04

Title of the Project	**Reconnaissance Survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh District, Gujarat.**
Filed Season:	**2025**
Borehole No	**RMT - BH - 04**
Location	**Reldi Moti, Gujarat**
Latitude	**23.219076(N)**
Longitude	**69.817617(E)**
Angle	**Vertical**
Collar Rl	**147.084m**
Date of Commencement	**15/8/2025**
Date of Closing	**19/8/2025**
Total Depth	**20.00**
TOTAL CORE BOXES	**4 Boxes**

Box No	**FROM**	**TO**	**Length**	**Core Rec. Length**	**Rec %**	**Core loss(%)**	**Unit Length**	**Ext. Length**	**Floor Depth**	**Description (Lithology, colour,texture structure)**
CB-01	0.00	1.00	1.00	0.98	98%	2%	0.98	1.00	1.00	Reddish brown pebbly laterite
CB-01	1.00	2.00	1.00	0.97	97%	3%	0.97	1.00	2.00	Reddish brown pebbly laterite.
CB-01	2.00	3.00	1.00	0.90	90%	10%	0.10	0.11	2.11	DO-
							0.80	0.89	3.00	pinkish white weathered laterite
CB-01	3.00	4.00	1.00	0.92	92%	8%	0.92	1.00	4.00	pinkish brown weathered laterite
CB-01	4.00	5.00	1.00	0.90	90%	10%	0.90	1.00	5.00	pinkish brown weathered laterite
CB-02	5.00	6.00	1.00	0.95	95%	5%	0.48	0.50	5.50	Laterite with iron concretion
							0.47	0.50	6.00	Laterite with pink clay mixed

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-02	6.00	7.00	1.00	0.91	91%	9%	0.65	0.72	6.72	Laterite with pink clay mixed
							0.26	0.28	7.00	laterite brown with clay matrix
CB-02	7.00	8.00	1.00	0.96	96%	4%	0.50	0.52	7.52	Bauxite /Laterite pink colour
							0.46	0.48	8.00	pebbly laterite + pink clay
CB-02	8.00	9.00	1.00	0.94	94%	6%	0.42	0.44	8.44	DO-
							0.30	0.32	8.76	sludge laterite brown
							0.22	0.24	9.00	pebbly laterite + pink clay
CB-02	9.00	10.00	1.00	0.91	91%	9%	0.46	0.50	9.50	Sludge laterite brown
							0.45	0.50	10.00	clay+laterite pebbles
CB-03	10.00	11.00	1.00	0.97	97%	3%	0.32	0.33	10.33	Clay with lateritic pebbles Pinkish/brown soft
							0.26	0.26	10.59	pebbly laterite brown
							0.39	0.41	11.00	Sludge-laterite powdered R brown
CB-03	11.00	12.00	1.00	0.92	92%	8%	0.48	0.52	11.52	Sludge-laterite powdered R brown
							0.44	0.48	12.00	pinkish white soft clay with lateritic pebbles
CB-03	12.00	13.00	1.00	0.91	91%	9%	0.47	0.52	12.52	pinkish white soft clay with lateritic pebbles
							0.44	0.48	13.00	Sludge-laterite powdered R brown
CB-03	13.00	14.00	1.00	0.78	0.78	22%	0.26	0.33	13.33	pinkish white soft clay with lateritic pebbles
							0.52	0.67	14.00	Sludge-laterite powdered R brown
CB-03	14.00	15.00	1.00	0.78	0.78	22%	0.29	0.37	14.37	pinkish white soft clay with lateritic pebbles

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
							0.49	0.63	15.00	Sludge-laterite powdered R brown
CB-04	15.00	16.00	1.00	0.65	0.65	35%	0.65	1.00	16.00	Sludge-laterite powdered R brown
CB-04	16.00	17.00	1.00	0.72	0.72	28%	0.42	0.68	16.68	Sludge-laterite powdered R brown
							0.30	0.32	17.00	pinkish white soft clay with lateritic pebbles
CB-04	17.00	18.00	1.00	0.78	0.78	22%	0.13	0.17	17.17	pinkish white soft clay with lateritic pebbles
							0.65	0.83	18.00	Sludge-laterite powdered R brown
CB-04	18.00	19.00	1.00	0.83	0.83	17%	0.55	0.66	18.66	Sludge-laterite powdered R brown
							0.28	0.34	19.00	pinkish white soft clay with lateritic pebbles
CB-04	19.00	20.00	1.00	0.78	0.78	22%	0.45	0.57	19.57	Sludge-laterite powdered R brown
							0.33	0.32	20.00	pinkish white soft clay with lateritic pebbles

The bore hole was closed at depth of 20.00m on 14-08-2025.

Weathered Zone 2.00m

Run Length: = 2.00 - 20.00 m (18m) (Excluding weathered zone)

Recovered Length: 15.51 m

Recovery Percentage: = 86.17%

No. of core BOX:- 04

Title of the Project	**Reconnaissance Survey (G4) for Bauxite, Ga, V, Ti & REE in Reldi Moti Area, Kachchh District, Gujarat.**
Filed Season:	**2025**
Borehole No	**RMT - BH - 05**
Location	**Reldi Nani, Gujarat**
Latitude	**23.221048(N)**
Longitude	**69.830458(E)**
Angle	**Vertical**
Collar Rl	**138.551m**
Date of Commencement	**21/8/2025**
Date of Closing	**28/8/2025**
Total Depth	**30.00**
TOTAL CORE BOXES	**6 Boxes**

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	0.00	1.00	1.00	1.00	100%	0%	1.00	1.00	1.00	yellow sandy soil
CB-01	1.00	2.00	1.00	0.98	98%	2%	0.34	0.34	1.34	yellow sandy soil
							0.33	0.33	1.67	Sandy clay yellowish brown with relicts of clay,
							0.32	0.33	2.00	Lateritic clay pinkish grey mixed with soil sandy patches
CB-01	2.00	3.00	1.00	1.00	100%	0%	1.00	1.00	3.00	Lateritic clay pinkish grey mixed with soil sandy patches soil/Madh 3.00m
CB-01	3.00	4.00	1.00	0.97	97%	3%	0.97	1.00	4.00	pinkish white clay with brown iron oxide patches

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss(%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-01	4.00	5.00	1.00	0.99	99%	1%	0.99	1.00	5.00	DO-
CB-02	5.00	6.00	1.00	0.98	98%	2%	0.98	1.00	6.00	DO-
CB-02	6.00	7.00	1.00	0.98	98%	2%	0.98	1.00	7.00	DO-
CB-02	7.00	8.00	1.00	0.98	98%	2%	0.15	0.15	7.15	DO-
							0.83	0.85	8.00	clayey bauxite/ lithomargic clay ,pinkish grey
CB-02	8.00	9.00	1.00	0.98	98%	2%	0.98	1.00	9.00	clayey bauxite/lithomargic clay , greyish white
CB-02	9.00	10.00	1.00	0.98	98%	2%	0.98	1.00	10.00	DO-
CB-03	10.00	11.00	1.00	0.90	90%	10%	0.90	1.00	11.00	do
CB-03	11.00	12.00	1.00	0.95	95%	5%	0.95	1.00	12.00	clayey bauxite/lithomargic clay , pinkish grey
CB-03	12.00	13.00	1.00	0.94	94%	6%	0.94	1.00	13.00	clayey bauxite/lithomargic clay , greyish white
CB-03	13.00	14.00	1.00	0.95	95%	5%	0.40	0.42	13.42	DO-
							0.55	0.58	14.00	Clayey bauxite, pinkish brown with iron oxide patches
CB-03	14.00	15.00	1.00	0.92	92%	8%	0.60	0.65	14.65	clayey bauxite pinkish grey
							0.32	0.35	15.00	Clayey bauxite, pinkish brown with iron oxide patches
CB-04	15.00	16.00	1.00	0.94	94%	6%	0.81	0.85	15.85	clay pinkish white
							0.13	0.15	16.00	clay Pink/White
CB-04	16.00	17.00	1.00	0.90	90%	10%	0.63	0.70	16.70	clay Pink/White
							0.27	0.30	17.00	pinkish brown clay with iron oxide patches

Box No	FROM	TO	Length	Core Rec. Length	Rec %	Core loss (%)	Unit Length	Ext. Length	Floor Depth	Description (Lithology, colour,texture structure)
CB-04	17.00	18.00	1.00	0.98	98%	2%	0.98	1.00	18.00	clay pinkish white,soft
CB-04	18.00	19.00	1.00	0.97	97%	3%	0.97	1.00	19.00	pinkish brown clay with iron oxide patches
CB-04	19.00	20.00	1.00	0.93	95%	5%	0.93	1.00	20.00	pinkish brown clay with iron oxide patches
CB-05	20.00	21.00	1.00	0.90	90%	10%	0.40	0.47	20.47	Clay areaceous, pinkish-white, friable
							0.50	0.53	21.00	clay arenaceous pinkish white
CB-05	21.00	22.00	1.00	0.90	90%	10%	0.90	1.00	22.00	clay pinkish white with iron oxides
CB-05	22.00	23.00	1.00	0.95	95%	5%	0.95	1.00	23.00	clay pinkish white with iron oxides
CB-05	23.00	24.00	1.00	0.97	97%	3%	0.97	1.00	24.00	clay pinkish brown with iron oxides
CB-05	24.00	25.00	1.00	0.90	90%	10%	0.38	0.42	24.42	clay pinkish brown
							0.52	0.58	25.00	clay pinkish grey
CB-06	25.00	26.00	1.00	0.90	90%	10%	0.60	0.65	25.65	clay pinkish grey
							0.30	0.35	26.00	laterite redish brown
CB-06	26.00	27.00	1.00	0.90	90%	10%	0.20	0.22	26.22	sludge sandy clay brown
							0.7	0.73	27.00	clay pinkish brown with iron oxides
CB-06	27.00	28.00	1.00	0.90	90%	10%	0.35	0.39	27.39	sludge sandy clay brown
							0.55	0.61	28.00	clay pinkish
CB-06	28.00	29.00	1.00	0.93	93%	7%	0.25	0.27	28.27	sludge sandy clay brown
							0.30	0.32	28.59	clay with pebbly latrite grains
							0.38	0.41	29.00	pinkish brown clay with iron oxide patches
CB-06	29.00	30.00	1.00	0.90	90%	10%	0.20	0.22	29.22	Sludge-sandy clay brown
							0.70	0.78	30.00	Pinkish white clay

→ **The bore hole was closed at a depth of 30m on 28-08-2025**
Run Length: ·3.00-30.00=27.00 m (excluding soil)
Recovery length: · 25.39m
Recovery percentage: · 94.04%
No. of Core box: · 06

Annexure: VIII: Statement showing analytical details of major oxides (by XRF) of 40 drill core samples in Reldimoti Area,Dist: Kachchh,Gujarat

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
Borehole no: RMT-BH-01						%											
1	0.68	2.00	1.32	lithomargic clay pinkish white	D/RMT-BH-01/01	22.18	39.18	2.09	0.03	2.07	3.00	0.39	0.16	6.17	0.21	23.80	247.3
2	2.00	5.00	3.00	do	D/RMT-BH-01/02	16.60	48.76	1.29	0.01	0.21	0.38	0.25	0.09	6.80	0.26	24.41	313.5
3	5.00	7.35	2.35	do	D/RMT-BH-01/03	22.94	44.95	1.23	0.01	0.26	1.04	0.28	0.16	6.59	0.46	21.54	334.6
4	7.56	9.00	1.44	Claystone dirty white hard	D/RMT-BH-01/05	20.92	46.23	1.42	0.01	0.27	0.18	0.24	0.08	7.56	0.47	22.23	357.8
5	9.00	10.00	1.00	clay brick/red fractured,powdered	D/RMT-BH-01/06	13.80	40.17	9.38	0.01	0.40	5.30	0.25	0.15	5.64	0.61	23.94	422.8
6	10.00	11.20	1.20	Sandy claystone pinkish white hard	D/RMT-BH-01/07	29.12	39.28	5.44	0.01	0.20	0.31	0.31	0.03	7.27	0.42	17.11	428.1
7	11.20	15.21	4.01	claystone pink, Broken, powdered	D/RMT-BH-01/08	26.46	40.42	3.77	0.01	0.24	1.76	0.31	0.03	7.30	0.60	18.74	366.7
8	**15.21**	**16.81**	**1.60**	**limonitic clay yellow**	**D/RMT-BH-01/09**	**31.89**	**30.58**	**18.77**	**0.01**	**0.13**	**0.26**	**0.35**	**0.04**	**4.99**	**0.34**	**12.47**	**687.9**
9	16.81	19.77	2.96	Claystone pinkish grey	D/RMT-BH-01/10	36.87	33.01	11.83	0.01	0.25	0.43	0.41	0.04	4.66	0.23	12.05	570.0
					Average	24.53	40.29	6.14	0.01	0.45	1.41	0.31	0.09	6.33	0.40	19.59	414.3

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
Borehole no: RMT-BH-02						%											
1	0.25	1.44	1.19	Sandy clay calcareous	D/RMT-BH-02/01	49.91	17.41	7.51	0.08	2.64	7.87	1.09	1.63	0.77	0.14	10.20	72.1
2	1.44	4.00	2.56	Siltstone highly friable yellowish white	D/RMT-BH-02/02	39.00	15.17	3.89	0.09	2.50	17.63	1.09	1.07	0.52	0.09	18.70	20.8
3	7.00	10.00	3.00	Siltstone highly friable, dirty yellow	D/RMT-BH-02/04	49.64	18.37	5.28	0.08	3.21	8.43	1.57	1.48	0.60	0.13	10.94	42.2
4	12.74	16.00	3.26	Yellowish grey clay soft with pink tint	D/RMT-BH-02/06	61.54	18.15	7.12	0.07	2.18	0.82	1.22	1.62	1.27	0.16	5.45	88.4
5	20.00	23.00	3.00	clay yellowish grey soft	D/RMT-BH-02/08	59.18	19.01	6.69	0.06	2.75	0.67	1.41	2.48	1.07	0.17	5.18	91.8
					Average	51.85	17.62	6.10	0.08	2.66	7.08	1.28	1.66	0.85	0.14	10.09	63.1

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
Borehole no: RMT-BH-03						%											
1	1.00	3.22	2.22	Calc.sandy clay white	D/RMT-BH-03/01	39.12	11.88	6.65	0.15	2.33	19.09	1.08	0.40	1.35	0.05	18.27	61.8
2	3.22	4.64	1.42	Sst argil yellowish grey	D/RMT-BH-03/02	46.99	16.41	22.29	0.33	1.30	1.89	1.14	0.20	1.96	0.20	7.89	503.7
3	7.00	10.00	3.00	Grey clay with patches of calcarenite and marl	D/RMT-BH-03/05	58.21	14.35	7.10	0.12	2.13	5.64	1.46	0.39	1.68	0.06	9.48	85.5
4	17.00	20.00	3.00	do	D/RMT-BH-03/09	51.72	14.33	7.03	0.12	2.44	9.13	1.67	0.35	1.53	0.07	12.41	90.4
					Average	49.01	14.24	10.77	0.18	2.05	8.94	1.34	0.34	1.63	0.10	12.01	185.4

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
Borehole no: RMT-BH-04						%											
1	0.00	1.00	1.00	Reddish brown lateritic soil	D/RMT-BH-04/01	31.65	21.84	27.32	0.44	0.66	2.86	0.22	0.28	1.86	0.27	12.18	544.2
2	1.00	2.11	1.11	pebbly laterite R/brown	D/RMT-BH-04/02	30.72	21.05	27.35	0.07	0.64	4.22	0.23	0.25	1.92	0.28	12.92	523.8
3	2.11	4.00	1.89	pebbly laterite pinkish/brown	D/RMT-BH-04/03	36.33	23.89	22.84	0.05	0.51	1.92	0.27	0.23	2.20	0.21	11.33	470.4
4	4.00	5.50	1.50	Laterite with iron concretions	D/RMT-BH-04/04	36.44	23.67	24.13	0.04	0.58	1.45	0.41	0.22	2.01	0.22	10.64	493.8
5	5.50	6.72	1.22	Laterite mixed with pink clay	D/RMT-BH-04/05	40.06	25.04	19.24	0.03	0.52	1.13	0.60	0.24	2.13	0.20	10.56	418.2
6	6.72	8.44	1.72	pebbly laterite + pink clay mixture	D/RMT-BH-04/06	37.13	25.45	21.46	0.04	0.45	0.96	0.64	0.22	2.14	0.20	11.12	484.8
7	8.44	10.59	2.15	Clay with laterite pebbles	D/RMT-BH-04/07	39.41	26.08	16.80	0.04	0.58	1.94	0.85	0.28	2.19	0.17	11.33	345.2
8	11.52	12.52	1.00	pinkish white soft clay	D/RMT-BH-04/08	42.45	27.71	13.91	0.02	0.51	0.65	1.03	0.27	2.22	0.16	10.75	330.3
9	13.00	20.00	7.00	Laterite mixed with pink clay	D/RMT-BH-04/09	38.72	27.65	16.40	0.03	0.63	0.97	0.96	0.24	2.54	0.19	11.29	333.3
					Average	36.99	24.71	21.05	0.08	0.56	1.79	0.58	0.25	2.13	0.21	11.35	438.2

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
Borehole no: RMT-BH-05						%											
1	1.67	3.00	1.33	soil mixed with Pinkish grey laterite clay with iron oxide patches	D/RMT-BH-05/01	47.41	27.57	7.07	0.05	0.52	2.68	0.38	0.83	2.27	<0.01	10.67	184.3
				Soil/Madh 3.00m													
2	3.00	5.00	2.00	pinkish white clay +iron oxide patches	D/RMT-BH-05/02	46.53	31.74	5.04	0.04	0.47	0.94	0.73	0.72	2.69	<0.01	10.64	169.8
3	5.00	7.15	2.15	do	D/RMT-BH-05/03	39.59	34.82	6.43	0.03	0.50	0.33	0.86	0.50	2.77	0.13	13.23	252.9
4	7.15	10.00	2.85	clayey Bauxite/ lithomarge clay	D/RMT-BH-05/04	39.47	35.62	3.47	0.01	0.03	0.16	1.14	0.45	3.05	0.16	15.68	144.7
5	10.00	13.42	3.42	do	D/RMT-BH-05/05	38.53	35.81	2.99	0.01	0.20	0.17	1.20	0.42	3.46	0.20	16.37	163.6
6	13.42	14.65	1.23	do	D/RMT-BH-05/06	38.53	36.09	3.45	0.01	0.30	0.16	1.11	0.31	3.73	0.19	15.70	211.8
7	14.65	17.00	2.35	clay pinkish white	D/RMT-BH-05/07	25.38	40.08	4.51	0.01	0.23	0.24	2.77	0.35	2.77	0.29	22.63	410.1
8	17.00	18.00	1.00	clay pinkish white	D/RMT-BH-05/08	35.57	38.27	2.64	0.01	0.20	0.17	1.40	0.48	3.08	0.32	17.11	220.9
9	18.00	21.00	3.00	Clay arenaceous p/brown+ iron oxide	D/RMT-BH-05/09	36.45	36.01	6.07	0.01	0.18	0.17	1.12	0.39	3.56	0.34	15.16	354.3

S.No	From	To	Thickness	Lithology	Sample ID	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	V(ppm)
10	21.00	24.42	3.42	clay p/white + iron oxide	D/RMT-BH-05/10	40.00	35.76	5.66	0.01	0.22	0.13	0.74	0.30	3.45	0.18	12.98	303.3
11	24.42	25.65	1.23	clay pinkish grey	D/RMT-BH-05/11	39.59	35.86	4.20	0.01	0.31	0.18	1.01	0.37	3.69	0.30	13.76	200.8
12	25.65	27.00	1.35	clay p/brown + iron oxide	D/RMT-BH-05/12	38.25	34.60	8.63	0.01	0.23	0.38	0.72	0.23	3.35	0.23	12.89	387.3
13	27.39	29.00	1.61	pinkish brown clay + iron oxides	D/RMT-BH-05/13	38.83	35.89	5.22	0.01	0.24	0.24	0.94	0.32	3.34	0.34	14.24	305.8
					Average	38.06	35.88	4.86	0.01	0.26	0.27	1.15	0.40	3.25	0.24	15.03	260.4

Annexure-IX: Statement showing valuers of REE ,Gallium,Thorium,uranium(by ICPMS) in drill core samples of Reldimoti, Dist:Kachchh,Gujarat

S.No	From	To	Thickness	Sample no	Lithology	Formation	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	ΣREE	Sc	Y	ΣREE+Sc+Y)	U	Th	Ga
							All Values in PPM																				
Borehole no: RMT-BH-01																											
1	2.00	5.00	3.00	D/RMT-BH-01/02	lithomargic clay pinkish white	Matan omadh	66.8	169.1	18.8	446.5	14.5	3.8	11.9	0.5	5.9	0.5	36.6	0.5	2.2	0.5	778.1	19.5	16.2	813.8	0.5	28.9	61.00
2	11.20	15.21	4.01	D/RMT-BH-01/08	claystone pink, Broken, powdered	Matan omadh	259.9	534.4	67.1	667.5	43.7	10.7	35.5	0.5	15.7	0.5	44.6	0.5	4.4	1.1	1686.1	40.1	35	1761.2	0.5	52.5	48.36
Borehole no: RMT-BH-02																											
3	7.00	10.00	3.00	D/RMT-BH-02/04	Siltstone highly friable ,dirty yellow	Khari Nadi	31.1	47.1	10.2	57.7	5.3	0.5	12.6	0.5	3.2	0.5	4.6	0.5	2.6	1.3	177.7	12.6	15.8	206.1	36.6	52.6	16.37
4	20.00	23.00	3.00	D/RMT-BH-02/08	clay yellowish grey soft	Khari Nadi	36.3	67.2	13.4	88	7.3	1.7	15.9	0.5	4.9	0.5	7	0.5	3.6	1.5	248.3	14.7	28.0	291	36.4	61.0	25.29
Borehole no: RMT-BH-03																											
5	7.00	10.00	3.00	D/RMT-BH-03/05	Grey clay with patches of calcarenite and marl	Khari Nadi	38.2	70.1	14.3	114.4	6	1.2	14.2	0.5	3.9	0.5	9	0.5	3	1.4	277.2	13.7	18.4	309.3	18.5	63.9	0.5
6	17.00	20.00	3.00	D/RMT-BH-03/09	do	Khari Nadi	40.7	73.8	11.4	107.4	6.6	1.2	14.7	0.5	4.3	0.5	8.3	0.5	3	1.5	274.4	12	20.8	307.2	35.4	59.6	12.65
Borehole no: RMT-BH-04																											
7	2.11	4.00	1.89	D/RMT-BH-04/03	pebbly laterite pinkish/brown	Matan omadh	57.2	93.4	39.1	164	13.4	3.8	47	0.5	3.8	0.5	14.1	0.5	7.6	5.4	450.3	28.7	19.1	498.1	207.9	231.6	34.22
8	6.72	8.44	1.72	D/RMT-BH-04/06	pebbly laterite + pink clay mixure	Matan omadh	48	74.6	29.4	151	9.5	3	38.3	0.5	2.7	0.5	12	0.5	6.2	4.5	380.7	24.3	15.1	420.1	192.1	192.1	26.04
Borehole no: RMT-BH-05																					0						
9	3.00	5.00	2.00	D/RMT-BH-05/02	pinkish white clay +iron oxide patches	Matan omadh	59.7	103.7	14	175.9	4	1.5	11.4	0.5	2.3	0.5	14.2	0.5	3.1	1.3	392.6	16.7	12.6	421.9	0.5	71.8	46.12
10	5.00	7.15	2.15	D/RMT-BH-05/03	do	Matan omadh	60.3	103.1	16.1	164.2	3.1	1.5	15	0.5	1.2	0.5	13	0.5	3.3	2.6	384.9	17.3	8.4	410.6	9.4	97.3	58.77
11	7.15	10.00	2.85	D/RMT-BH-05/04	clayey Buxite/lithomargic clay	Matan omadh	61.4	129.7	13.2	170.7	2.7	0.5	4.1	0.5	1.2	0.5	14.4	0.5	1.5	0.5	401.4	20.9	5.9	428.2	0.5	43.1	43.15
12	18.00	21.00	3.00	D/RMT-BH-05/09	Clay arenaceous p/brown+ iron oxide	Matan omadh	93.6	217.0	24.4	260.5	8.8	2.5	14.7	0.5	2.2	0.5	17.9	0.5	2.9	1.4	647.4	26.2	7.9	681.5	0.5	92.9	52.82

Note: Values having < 1.0 ppm are taken as 0.5 ppm

Annexure-X: Analytical results of THA, MHA and Reactive silica in Reldi Moti area, Kachchh district, Gujarat				
S.no	Sample no	%THA	%MHA	% Reactive SiO2
1	P7/RB/2025	19.56	4.24	32.44
2	T3/RB/2015/D	25.74	6.29	32.79

Annexure-XI: Analytical results of Primary & check samples of Pit & Trench (Oxides) in Reldimoti area, Kachchh District, Gujarat

S.no	Reg No	Sample name	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Remarks
			(%)												
1	1202/08	P8/RB/2025	41.389	25.285	8.910	0.027	0.180	4.202	0.119	0.167	5.211	0.156	14.27	99.92	Lucid lab
1	G2296-1	P30/RB/2025	38.07	23.19	10.77	<0.05	0.30	6.13	<0.08	0.24	4.94	0.20	15.82	99.73	Shiva lab
2	1202/76	P20/RB/2025	38.440	23.650	15.720	0.028	0.169	1.090	0.118	0.046	6.687	0.416	13.40	99.76	Lucid lab
2	G2296-2	P31/RB/2025	31.38	25.78	20.39	<0.05	0.35	1.47	<0.08	<0.05	5.17	0.62	14.23	99.78	Shiva lab
3	1202/25	T1/RB/2025/09	56.130	13.456	12.287	0.138	1.502	0.924	1.120	0.896	2.082	0.093	11.27	99.90	Lucid lab
3	G2296-3	T20/RB/2025/09	60.41	13.09	10.31	0.13	1.09	0.96	1.07	1.08	1.66	0.09	9.35	99.81	Shiva lab
4	1202/39	T2/RB/2025/07	37.132	28.812	8.824	0.015	0.070	1.046	0.159	0.070	8.213	0.352	15.13	99.82	Lucid lab
4	G2296-4	T21/RB/2025/07	35.18	27.79	12.29	<0.05	0.26	2.65	<0.08	0.12	6.19	0.38	14.53	99.79	Shiva lab

S.no	Reg No	Sample name	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Remarks
5	1202/43	T2/RB/2025/A	31.569	34.246	3.908	0.043	0.177	2.210	0.271	0.525	6.469	0.329	19.96	99.71	Lucid lab
5	G2296-5	T22/RB/2025/A	29.36	33.97	3.77	<0.05	0.58	3.02	0.22	0.68	5.65	0.31	20.31	99.79	Shiva lab
6	1202/47	T3/RB/2025/01	35.530	30.189	5.958	0.030	0.105	2.290	0.435	0.261	7.891	0.165	17.04	99.89	Lucid lab
6	G2296-6	T23/RB/2025/01	33.71	31.59	5.70	<0.05	0.49	2.94	0.37	0.40	5.96	0.15	17.37	99.77	Shiva lab
7	1202/59	T3/RB/2025/C	36.930	24.150	16.090	0.038	0.183	2.646	0.240	0.060	6.487	0.208	12.81	99.84	Lucid lab
7	G2296-7	T24/RB/2025/C	29.51	23.94	21.59	<0.05	0.47	3.65	0.16	0.07	5.27	0.25	14.73	99.86	Shiva lab
8	1202/63	T4/RB/2025/02	52.580	13.028	17.680	0.311	1.210	0.858	0.807	0.252	3.600	0.106	9.52	99.95	Lucid lab
8	G2296-8	T25/RB/2025/02	53.62	13.95	15.07	0.25	1.18	0.64	0.73	0.27	2.79	0.11	11.03	99.79	Shiva lab
9	1202/79	T5/RB/2025/03	58.680	6.680	7.690	0.122	4.350	5.620	0.851	0.713	1.390	0.033	13.60	99.73	Lucid lab
9	G2296-9	T26/RB/2025/03	58.17	16.51	7.02	<0.05	0.49	1.15	0.37	0.58	2.35	<0.05	13.07	99.8	Shiva lab

Annexure: XII Analytical results of Primary and check samples in pit & Trench (REE, Gallium) in Reldimoti area, Kachchh District, Gujarat

S.No	Reg No	Sample No	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Sc	Tb	Th	Tm	Yb	Y	U	Ga	Remarks
			(ppm)																			
1	1202/76	P20/RB/2025	100.10	2.30	23.93	3.58	23.10	0.5	58.63	3.15	361.28	35.48	11.13	50.95	0.5	133.65	0.5	10.23	9.38	45.88	40.78	Lucid lab
1	G2296-2	P31/RB/2025	106.47	3.79	1.41	2.13	8.95	0.51	65.1	0.25	45.5	12.9	8.37	56.3	0.83	8.81	0.25	1.23	9.36	1.94	24.5	Shiva lab
2	1202/39	T2/RB/2025/07	236.93	6.83	31.68	7.83	26.78	0.5	103.83	2.03	408.18	50.75	28.88	38.48	0.5	106.60	0.5	0.5	19.08	5.70	43.05	Lucid lab
2	G2296-4	T21/RB/2025/07	322.21	8.02	2.97	6.27	22.3	1.07	113	0.25	135	31.5	23.6	42.3	1.93	9.70	0.25	1.81	20.7	2.72	27.3	Shiva lab

Annexure-XIII: Analytical results of Primary & check samples of drill cores (Oxides) in Reldimoti area, Kachchh District,Gujarat

Sample name	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Laboratory
	(%)											
D/RMT/BH-01/01	22.18	39.18	2.09	0.03	2.07	3	0.39	0.16	6.17	0.21	23.8	Lucid Lab
D/RMT-BH-01/51	14.23	49.44	1.81	0.25	0.23	0.33	0.04	0.09	6.80	0.24	26.30	Shiva Lab
D/RMT/BH-01/07	29.12	39.28	5.44	0.01	0.2	0.31	0.31	0.03	7.27	0.42	17.11	Lucid Lab
D/RMT-BH-01/52	28.19	36.72	6.30	0.25	0.16	0.27	0.04	0.25	7.85	0.49	19.45	Shiva Lab
D/RMT/BH-05/05	38.53	35.81	2.99	0.01	0.2	0.17	1.2	0.42	3.46	0.2	16.37	Lucid Lab
D/RMT-BH-05/53	36.44	33.52	1.48	0.25	0.28	0.15	0.73	0.44	3.78	0.19	19.43	Shiva Lab
D/RMT/BH-04/03	36.33	23.89	22.84	0.05	0.51	1.92	0.27	0.23	2.2	0.21	11.33	Lucid Lab
D/RMT-BH-04/03	33.13	18.78	28.55	0.25	0.47	1.56	0.15	0.20	2.28	0.28	14.29	Shiva Lab

Annexure-XIV: Analytical results of Primary & check samples of drill cores REE, Ga, V Values of borehole samples, Reldi Moti block																				
S.No	**Sample No**	**La**	**Ce**	**Pr**	**Nd**	**Sm**	**Eu**	**Gd**	**Tb**	**Dy**	**Ho**	**Er**	**Tm**	**Yb**	**Lu**	**Sc**	**Y**	**Th**	**U**	**Ga**	**Remark**
		(ppm)																			
1	D/RMT-BH-01/02	66.80	169.10	18.80	446.50	14.50	3.80	11.90	0.50	5.90	0.50	36.60	0.50	2.20	0.50	19.50	16.20	28.90	0.50	61.00	Lucid Lab
1	D/RMT-BH-01/51	55.33	124.22	15.49	66.26	12.76	2.86	10.84	1.14	6.08	0.74	2.13	0.14	1.27	0.07	21.49	15.17	10.16	2.64	36.36	Shiva Lab
2	D/RMT-BH-05/09	93.60	217.00	24.40	260.50	8.80	2.50	14.70	0.50	2.20	0.50	17.90	0.50	2.90	1.40	26.20	7.90	92.90	0.50	52.82	Lucid Lab
2	D/RMT-BH-05/54	120.40	282.65	27.78	81.63	10.81	1.97	8.94	0.67	3.26	0.43	1.56	0.11	1.13	0.07	34.29	10.46	30.71	1.66	47.84	Shiva Lab

Annexure-XV- Analytical results of major oxides & REE of pit & trench samples in Reldimoti Area, Kachchh district, Gujarat (As received from laboratory)

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd. — Testing to the Core

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

Report No : LL/25-26/001202 (1-90)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 05.05.2025
Date of Completing of Analysis : 29.05.2025

Sample Particulars: Bauxite Samples. **Customer Ref Letter:** CMT/Lucid/01/2025 Dated: 30.04.2025
Block Name : Reldi Moti,
Sample Qty : 500g x 90 N
Test Parameters: Silica as SiO2, Aluminium as Al2O3, Iron as Fe2O3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na2O, Potassium as K_2O, Titanium as TiO2,Phosphorus as P2O5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Vanadium as V (ppm)	Loss on Ignition (LOI) (% by mass)
01	LL/25-26/001202/01	P1/RB/2025	42.90	18.53	19.30	0.13	0.78	2.80	0.11	0.23	3.00	0.11	342.50	12.01
02	LL/25-26/001202/02	P2/RB/2025	35.85	20.53	25.55	0.05	0.33	0.96	0.12	0.22	2.66	0.20	475.50	13.29
03	LL/25-26/001202/03	P3/RB/2025	53.80	9.88	11.78	0.10	2.30	1.50	1.24	0.49	2.88	0.17	228.50	15.71
04	LL/25-26/001202/04	P4/RB/2025	36.60	19.03	20.59	0.10	1.07	2.21	0.83	0.16	2.43	0.15	381.90	16.64
05	LL/25-26/001202/05	P5/RB/2025	46.68	0.20	3.80	0.04	2.98	20.07	0.16	0.50	0.97	0.06	47.70	24.44
06	LL/25-26/001202/06	P6/RB/2025	47.00	12.02	6.81	0.05	1.55	6.01	0.35	0.29	4.13	0.27	320.10	21.40
07	LL/25-26/001202/07	P7/RB/2025	34.02	27.39	14.91	0.02	0.10	1.02	0.15	0.12	7.37	0.34	514.30	14.42
08	LL/25-26/001202/08	P8/RB/2025	41.39	25.29	8.91	0.03	0.18	4.20	0.12	0.17	5.21	0.16	252.60	14.27
09	LL/25-26/001202/09	P9/RB/2025	59.00	11.89	9.61	0.08	1.51	4.79	1.33	0.39	1.79	0.08	126.60	9.36
10	LL/25-26/001202/10	P10/RB/2025	41.39	32.55	6.05	0.04	0.32	1.08	0.17	0.26	4.44	0.15	249.10	13.44
11	LL/25-26/001202/11	P11/RB/2025	66.79	18.63	1.94	0.01	0.39	3.37	0.11	0.11	0.80	0.09	80.10	7.62
12	LL/25-26/001202/12	P12/RB/2025	69.26	12.44	9.32	0.03	0.68	0.44	0.19	1.11	1.68	0.12	67.80	4.57
13	LL/25-26/001202/13	P13/RB/2025	37.25	14.52	27.44	0.19	0.84	1.45	0.46	0.17	2.22	0.13	507.10	15.24
14	LL/25-26/001202/14	P14/RB/2025	33.93	0.24	2.70	0.04	4.97	26.80	0.40	0.42	0.46	0.04	32.60	29.83
15	LL/25-26/001202/15	P15/RB/2025	61.89	2.91	7.97	0.10	2.80	5.75	0.75	0.44	1.59	0.04	84.80	15.69
16	LL/25-26/001202/16	P16/RB/2025	34.20	0.25	3.32	0.04	4.90	25.44	0.19	0.53	0.47	0.04	25.90	30.36
17	LL/25-26/001202/17	T1/RB/2025/01	69.28	7.98	8.62	0.03	1.79	1.23	1.38	1.08	1.09	0.05	57.90	7.32
18	LL/25-26/001202/18	T1/RB/2025/02	67.87	9.19	8.28	0.03	1.81	1.27	1.41	1.07	1.16	0.05	68.90	7.74
19	LL/25-26/001202/19	T1/RB/2025/03	66.50	9.09	9.37	0.03	1.82	1.14	1.45	1.13	1.12	0.05	68.20	8.16
20	LL/25-26/001202/20	T1/RB/2025/04	67.43	7.61	9.58	0.03	1.76	1.59	1.36	1.07	1.08	0.05	69.40	8.23
21	LL/25-26/001202/21	T1/RB/2025/05	63.67	8.20	10.89	0.04	1.76	1.77	1.28	1.05	1.17	0.07	96.10	10.00
22	LL/25-26/001202/22	T1/RB/2025/06	58.21	10.93	10.85	0.08	1.74	2.94	1.19	0.99	1.41	0.10	145.50	11.42
23	LL/25-26/001202/23	T1/RB/2025/07	58.21	12.73	11.19	0.08	1.63	1.23	1.20	0.99	1.66	0.08	138.30	10.75

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

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Reviewed by

Dr.R.Krishna Moorthy
AUTHORISED SIGNATORY

Lucid Laboratories Pvt. Ltd.
Plot No. 3, IDA, Balanagar, Hyderabad - 500 037, Telangana, INDIA, Ph : .040-69042222/10 Lines
E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com **CIN No. : U24239TG2004PTC042390**

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd.
Testing to the Core

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

Report No : LL/25-26/001202 (1-90)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 05.05.2025
Date of Completing of Analysis : 29.05.2025

Sample Particulars: Bauxite Samples.
Block Name : Reldi Moti,
Sample Qty : 500g x 90 N
Customer Ref Letter: CMT/Lucid/01/2025 Dated: 30.04.2025
Test Parameters: Silica as SiO2, Aluminium as Al2O3, Iron as Fe2O3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na2O, Potassium as K_2O, Titanium as TiO2,Phosphorus as P2O5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Vanadium as V (ppm)	Loss on Ignition (LOI) (% by mass)
24	LL/25-26/001202/24	T1/RB/2025/08	57.48	12.70	11.72	0.11	1.53	0.81	1.14	0.93	1.87	0.08	157.40	11.46
25	LL/25-26/001202/25	T1/RB/2025/09	56.13	13.46	12.29	0.14	1.50	0.92	1.12	0.90	2.08	0.09	188.20	11.27
26	LL/25-26/001202/26	T1/RB/2025/10	55.83	10.93	14.71	0.19	1.58	1.28	1.06	0.91	1.83	0.13	217.80	11.33
27	LL/25-26/001202/27	T1/RB/2025/A	69.54	7.40	9.52	0.04	1.68	0.68	1.97	0.91	1.10	0.05	57.00	6.99
28	LL/25-26/001202/28	T1/RB/2025/B	66.08	9.51	9.43	0.04	1.80	1.26	1.43	1.07	1.26	0.07	85.80	7.85
29	LL/25-26/001202/29	T1/RB/2025/C	65.29	9.24	8.84	0.06	2.21	1.35	1.27	1.25	1.10	0.08	71.80	9.10
30	LL/25-26/001202/30	T1/RB/2025/D	65.98	9.33	9.44	0.04	1.72	1.56	1.38	1.01	1.25	0.06	91.10	8.18
31	LL/25-26/001202/31	P17/RB/2025	63.17	8.14	8.15	0.16	1.49	3.70	0.43	0.32	1.93	0.06	111.80	12.31
32	LL/25-26/001202/32	P18/RB/2025	40.05	29.16	8.73	0.06	0.72	2.25	0.44	0.79	3.43	0.17	287.70	14.10
33	LL/25-26/001202/33	T2/RB/2025/01	29.06	36.83	2.11	0.03	0.12	2.04	0.20	0.24	7.27	0.33	280.30	21.68
34	LL/25-26/001202/34	T2/RB/2025/02	28.12	39.55	2.01	0.03	0.14	1.15	0.18	0.20	7.13	0.26	291.70	21.20
35	LL/25-26/001202/35	T2/RB/2025/03	28.01	39.28	2.24	0.03	0.11	1.04	0.17	0.20	6.79	0.39	314.10	21.60
36	LL/25-26/001202/36	T2/RB/2025/04	36.09	30.34	5.09	0.03	0.13	1.60	0.16	0.13	7.17	0.45	438.70	18.62
37	LL/25-26/001202/37	T2/RB/2025/05	39.68	31.93	2.43	0.02	0.09	1.04	0.17	0.09	8.11	0.18	456.90	16.01
38	LL/25-26/001202/38	T2/RB/2025/06	37.59	30.00	8.14	0.02	0.08	1.04	0.11	0.05	7.81	0.28	702.80	14.69
39	LL/25-26/001202/39	T2/RB/2025/07	37.13	28.81	8.82	0.02	0.07	1.05	0.16	0.07	8.21	0.35	638.60	15.13
40	LL/25-26/001202/40	T2/RB/2025/08	34.85	27.01	13.01	0.02	0.10	1.00	0.12	0.09	7.69	0.36	672.20	15.48
41	LL/25-26/001202/41	T2/RB/2025/09	39.17	25.00	14.13	0.02	0.09	1.69	0.15	0.09	7.03	0.35	613.10	12.17
42	LL/25-26/001202/42	T2/RB/2025/10	36.02	28.46	13.01	0.02	0.10	1.06	0.13	0.07	7.39	0.38	462.90	13.25
43	LL/25-26/001202/43	T2/RB/2025/A	31.57	34.25	3.91	0.04	0.18	2.21	0.27	0.53	6.47	0.33	288.60	19.96
44	LL/25-26/001202/44	T2/RB/2025/B	32.64	32.68	5.94	0.02	0.09	1.95	0.14	0.11	7.25	0.36	433.30	18.70
45	LL/25-26/001202/45	T2/RB/2025/C	37.57	24.47	14.70	0.02	0.10	1.97	0.12	0.06	7.23	0.38	459.90	13.15
46	LL/25-26/001202/46	T2/RB/2025/D	36.28	29.50	7.48	0.02	0.08	1.83	0.15	0.10	8.01	0.34	475.00	16.09

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

Page No. 2/4

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Lucid Laboratories Pvt. Ltd.
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E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com **CIN No. : U24239TG2004PTC042390**

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd.
Testing to the Core

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

Report No : LL/25-26/001202 (1-90)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 05.05.2025
Date of Completing of Analysis : 29.05.2025

Sample Particulars: Bauxite Samples.
Customer Ref Letter: CMT/Lucid/01/2025 Dated: 30.04.2025
Block Name : Reldi Moti,
Sample Qty : 500g x 90 N
Test Parameters: Silica as SiO2, Aluminium as Al2O3, Iron as Fe2O3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na2O, Potassium as K_2O, Titanium as TiO2,Phosphorus as P2O5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Vanadium as V (ppm)	Loss on Ignition (LOI) (% by mass)
47	LL/25-26/001202/47	T3/RB/2025/01	35.53	30.19	5.96	0.03	0.11	2.29	0.44	0.26	7.89	0.17	453.40	17.04
48	LL/25-26/001202/48	T3/RB/2025/02	30.78	36.57	3.56	0.02	0.09	1.02	0.42	0.16	7.58	0.21	366.80	19.43
49	LL/25-26/001202/49	T3/RB/2025/03	37.58	33.19	4.30	0.03	0.18	1.39	0.54	0.18	6.38	0.22	318.00	15.97
50	LL/25-26/001202/50	T3/RB/2025/04	39.54	28.77	9.37	0.06	0.36	1.87	0.61	0.28	4.78	0.28	379.30	14.04
51	LL/25-26/001202/51	T3/RB/2025/05	35.72	29.48	10.17	0.03	0.23	1.64	0.88	0.24	5.54	0.42	424.70	15.39
52	LL/25-26/001202/52	T3/RB/2025/06	40.31	29.31	5.09	0.02	0.13	1.31	0.84	0.23	6.84	0.31	250.00	15.41
53	LL/25-26/001202/53	T3/RB/2025/07	39.74	30.78	7.20	0.02	0.15	0.88	0.56	0.17	6.41	0.21	286.40	13.75
54	LL/25-26/001202/54	T3/RB/2025/08	40.95	30.28	6.94	0.02	0.19	1.14	0.48	0.16	5.89	0.18	211.50	13.55
55	LL/25-26/001202/55	T3/RB/2025/09	39.87	30.86	6.88	0.02	0.19	1.49	0.45	0.14	5.96	0.17	211.80	13.73
56	LL/25-26/001202/56	T3/RB/2025/10	41.00	29.95	6.33	0.02	0.16	1.68	0.38	0.08	6.39	0.14	196.20	13.63
57	LL/25-26/001202/57	T3/RB/2025/A	38.55	28.76	6.40	0.04	0.15	2.54	0.43	0.29	7.30	0.16	481.30	15.30
58	LL/25-26/001202/58	T3/RB/2025/B	39.50	30.92	5.62	0.03	0.24	1.54	0.47	0.19	6.22	0.22	306.40	14.85
59	LL/25-26/001202/59	T3/RB/2025/C	36.93	24.15	16.09	0.04	0.18	2.65	0.24	0.06	6.49	0.21	447.80	12.81
60	LL/25-26/001202/60	T3/RB/2025/D	33.93	33.73	7.68	0.03	0.10	3.01	0.10	0.09	5.68	0.11	291.30	15.47
61	LL/25-26/001202/61	P19/RB/2025	33.92	16.98	25.22	0.08	0.53	5.04	0.07	0.17	2.72	0.22	485.30	14.83
62	LL/25-26/001202/62	T4/RB/2025/01	38.03	14.49	24.95	0.31	0.98	3.87	0.60	0.16	2.76	0.19	483.70	13.47
63	LL/25-26/001202/63	T4/RB/2025/02	52.58	13.03	17.68	0.31	1.21	0.86	0.81	0.25	3.60	0.11	333.20	9.52
64	LL/25-26/001202/64	T4/RB/2025/03	48.52	10.25	18.82	0.14	1.26	4.29	0.76	0.21	2.94	0.11	324.30	12.43
65	LL/25-26/001202/65	T4/RB/2025/04	58.76	8.13	8.75	0.08	3.66	6.21	0.96	0.76	1.05	0.04	91.80	11.36
66	LL/25-26/001202/66	T4/RB/2025/05	61.00	11.81	9.38	0.04	3.69	2.09	1.15	0.85	1.38	0.04	90.90	8.32
67	LL/25-26/001202/67	T4/RB/2025/06	56.12	11.89	12.24	0.06	2.98	3.04	0.76	0.85	1.83	0.08	159.70	9.88
68	LL/25-26/001202/68	T4/RB/2025/07	42.85	11.86	23.33	0.16	1.30	3.47	0.58	0.36	2.50	0.15	385.90	13.26
69	LL/25-26/001202/69	T4/RB/2025/08	50.02	10.14	19.30	0.14	1.58	3.77	0.56	0.54	2.01	0.16	275.10	11.54

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

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

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd.
Testing to the Core

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

Report No : LL/25-26/001202 (1-90)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 05.05.2025
Date of Completing of Analysis : 29.05.2025

Sample Particulars: Bauxite Samples.
Customer Ref Letter: CMT/Lucid/01/2025 Dated: 30.04.2025
Block Name : Reldi Moti,
Sample Qty : 500g x 90 N
Test Parameters: Silica as SiO_2, Aluminium as Al_2O_3, Iron as Fe_2O_3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na_2O, Potassium as K_2O, Titanium as TiO_2,Phosphorus as P_2O_5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Vanadium as V (ppm)	Loss on Ignition (LOI) (% by mass)
70	LL/25-26/001202/70	T4/RB/2025/09	60.91	11.94	10.97	0.04	2.61	1.97	0.67	1.06	1.70	0.09	118.70	7.84
71	LL/25-26/001202/71	T4/RB/2025/10	67.27	11.28	8.60	0.02	1.43	1.17	0.61	0.71	1.72	0.05	96.30	6.97
72	LL/25-26/001202/72	T4/RB/2025/A	48.27	13.20	18.30	0.11	1.42	3.25	0.86	0.16	2.82	0.11	306.10	11.41
73	LL/25-26/001202/73	T4/RB/2025/B	56.15	11.09	12.81	0.08	2.26	3.97	0.76	0.71	1.68	0.08	160.60	10.14
74	LL/25-26/001202/74	T4/RB/2025/C	59.80	12.85	9.95	0.04	1.67	3.10	0.68	0.94	1.93	0.09	124.90	8.76
75	LL/25-26/001202/75	T4/RB/2025/D	58.89	10.79	12.81	0.10	2.77	2.60	0.89	0.65	1.78	0.07	158.80	8.42
76	LL/25-26/001202/76	P20/RB/2025	38.44	23.65	15.72	0.03	0.17	1.09	0.12	0.05	6.69	0.42	510.20	13.40
77	LL/25-26/001202/77	T5/RB/2025/01	58.99	3.90	7.30	0.11	4.80	7.10	1.28	0.64	1.26	0.03	75.40	14.39
78	LL/25-26/001202/78	T5/RB/2025/02	59.75	4.92	7.92	0.09	4.50	6.18	0.95	0.67	1.33	0.03	82.70	13.52
79	LL/25-26/001202/79	T5/RB/2025/03	58.68	6.68	7.69	0.12	4.35	5.62	0.85	0.71	1.39	0.03	88.50	13.60
80	LL/25-26/001202/80	T5/RB/2025/04	58.44	6.83	6.97	0.12	4.05	6.55	0.69	0.68	1.20	0.03	84.30	14.34
81	LL/25-26/001202/81	T5/RB/2025/05	53.57	6.43	7.58	0.11	4.94	8.61	0.54	0.70	1.18	0.05	79.30	16.02
82	LL/25-26/001202/82	T5/RB/2025/06	54.40	5.68	7.82	0.08	4.36	8.47	0.61	0.64	1.09	0.03	70.60	16.64
83	LL/25-26/001202/83	T5/RB/2025/07	54.82	1.92	5.89	0.07	4.83	11.24	0.55	0.61	0.97	0.03	62.80	18.90
84	LL/25-26/001202/84	T5/RB/2025/08	53.54	0.32	6.00	0.05	5.11	12.93	0.52	0.57	0.90	0.03	56.90	19.95
85	LL/25-26/001202/85	T5/RB/2025/09	53.40	5.98	7.52	0.08	5.09	8.29	0.62	0.64	1.09	0.03	65.20	17.08
86	LL/25-26/001202/86	T5/RB/2025/10	55.79	4.56	9.16	0.07	4.79	7.04	0.58	0.61	1.05	0.03	65.60	16.22
87	LL/25-26/001202/87	T5/RB/2025/A	57.44	6.94	9.36	0.08	4.65	5.02	1.43	0.66	1.35	0.03	84.50	12.79
88	LL/25-26/001202/88	T5/RB/2025/B	55.03	6.51	7.77	0.07	4.83	7.51	0.76	0.68	1.28	0.03	79.00	15.42
89	LL/25-26/001202/89	T5/RB/2025/C	50.11	0.32	5.72	0.05	6.59	13.03	0.45	0.55	0.86	0.02	54.40	22.23
90	LL/25-26/001202/90	T5/RB/2025/D	55.91	2.59	6.49	0.06	5.16	9.52	0.66	0.61	1.03	0.02	65.10	17.76

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

Page No. 4/4

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LUCID Laboratories Pvt. Ltd.
Testing to the Core

TEST RESULTS OF BAUXITE SAMPLES

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

Report No : LL/25-26/001202 (1-15)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 05.05.2025
Date of Completing of Analysis : 29.05.2025

Customer Ref Letter: CMT/Lucid/01/2025 Dated: 30.04.2025

Sample Particulars: Bauxite Samples.
Block Name : Reldi Moti,
Sample Qty : 500g x 15 N
Test Parameters: Rare Earth Elements & Gallium.

Sl.No	Lab. No.	Sample No	Cerium as Ce (ppm)	Dysprosium as Dy (ppm)	Erbium as Er (ppm)	Europium as E (ppm)	Gadolinium as Gd (ppm)	Holomium as Ho (ppm)	Lanthanum as La (ppm)	Lutetium as Lu (ppm)	Neodymium as Nd (ppm)	Praseodymium as Pr (ppm)	Samerium as Sm (ppm)	Scandium as Sc (ppm)	Terbium as Tb (ppm)	Thorium as Th (ppm)	Thuliu m as Tm (ppm)	Yttrerbium as Yb (ppm)	Yttrium as Y (ppm)	Uranium as U (ppm)	Galliu m as Ga (ppm)
1	LL/25-26/001202/03	P3/RB/2025	100.23	4.08	11.35	2.40	19.85	<1.0	43.48	2.13	142.93	24.88	8.93	19.63	<1.0	74.15	<1.0	4.58	22.18	46.38	27.18
2	LL/25-26/001202/04	P4/RB/2025	62.00	3.15	10.35	2.60	30.50	<1.0	34.78	3.60	123.38	36.05	9.05	25.20	<1.0	123.93	<1.0	2.00	20.43	140.28	36.90
3	LL/25-26/001202/05	P5/RB/2025	50.78	2.00	5.68	1.00	8.33	<1.0	29.85	0.93	68.98	13.58	4.20	9.38	<1.0	22.83	<1.0	2.73	14.08	20.05	12.15
4	LL/25-26/001202/07	P7/RB/2025	158.20	4.13	27.43	5.23	29.40	<1.0	78.83	2.93	341.23	44.13	21.63	41.05	<1.0	141.25	<1.0	1.20	15.18	33.25	42.68
5	LL/25-26/001202/08	P8/RB/2025	159.58	3.05	21.38	3.28	18.03	<1.0	52.25	1.95	245.88	27.35	11.45	33.28	<1.0	83.00	<1.0	1.38	11.28	3.30	35.75
6	LL/25-26/001202/10	P10/RB/2025	91.78	1.13	16.73	1.58	9.78	<1.0	45.70	1.15	182.38	17.48	5.30	18.70	<1.0	83.70	<1.0	1.40	7.48	<1.0	33.98
7	LL/25-26/001202/11	P11/RB/2025	112.08	2.55	3.78	1.60	6.43	<1.0	54.10	0.43	86.95	14.35	8.25	10.60	<1.0	37.08	<1.0	1.53	12.25	<1.0	13.63
8	LL/25-26/001202/16	P16/RB/2025	44.13	2.60	4.30	1.20	7.38	<1.0	30.70	0.70	53.88	16.20	4.63	7.18	<1.0	17.58	<1.0	2.73	17.28	13.58	9.28
9	LL/25-26/001202/24	T1/RB/2025/08	68.48	5.68	9.00	2.38	17.65	<1.0	41.88	1.85	104.38	20.73	8.85	18.70	<1.0	52.88	<1.0	6.05	29.13	38.43	21.03
10	LL/25-26/001202/32	P18/RB/2025	83.28	2.58	13.73	2.10	13.55	<1.0	44.83	1.53	148.83	20.25	6.90	15.58	<1.0	59.88	<1.0	2.80	14.28	10.83	33.75
11	LL/25-26/001202/39	T2/RB/2025/07	236.93	6.83	31.68	7.83	26.78	<1.0	103.83	2.03	408.18	50.75	28.88	38.48	<1.0	106.60	<1.0	<1.0	19.08	5.70	43.05
12	LL/25-26/001202/60	T3/RB/2025/D	92.48	1.80	24.63	1.98	9.10	<1.0	50.48	1.05	299.23	18.38	6.50	23.43	<1.0	83.55	<1.0	5.40	8.78	<1.0	42.75
13	LL/25-26/001202/74	T4/RB/2025/C	54.48	1.63	6.95	1.20	11.83	<1.0	35.00	1.43	80.88	15.73	4.48	17.00	<1.0	45.90	<1.0	2.70	13.38	22.98	20.90
14	LL/25-26/001202/76	P20/RB/2025	100.10	2.30	23.93	3.58	23.10	<1.0	58.63	3.15	361.28	35.48	11.13	50.95	<1.0	133.65	<1.0	10.23	9.38	45.88	40.78
15	LL/25-26/001202/82	T5/RB/2025/06	69.13	3.30	6.38	1.50	11.18	<1.0	39.35	1.15	79.45	17.28	6.33	12.95	<1.0	29.85	<1.0	4.65	19.73	16.88	16.33

Test Method: SOP OM-08 & OM-12 (Instrument Used:ICP-OES)
Note : The above results are expressed as on dry basis.

Page No. 1/1

Reviewed by

Dr.R.Krishna Moorthy
AUTHORISED SIGNATORY

Lucid Laboratories Pvt. Ltd.
Plot No. 3, IDA, Balanagar, Hyderabad - 500 037, Telangana, INDIA, Ph : .040-69042222/10 Lines
E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com **CIN No. : U24239TG2004PTC042390**

ANNEXURE – XVI

Analytical results of MHA / THA and Reactive silica in Reldi Moti area, Kachchh district, Gujarat, (as received from Lucid laboratory, Hyderabad)

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd. Testing to the Core

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

Report No : LL/25-26/001202 (2)
Report Issue Date : 29.05.2025
Date of Receipt of Sample : 02.05.2025
Date of Starting of Analysis : 03.05.2025
Date of Completing of Analysis : 29.05.2025

Customer Ref Letter: CMT/Lucid/01/2025 Dated: 30.04.2025

Sample Particulars: Bauxite Samples.
Block Name : Reldi Moti
Sample Qty : 500g x 2 N
Test Parameters: THA+ MHA, Reactive SiO2

Sl.No	Lab. No.	Sample No	THA	MHA	Reactive SiO2
			%	%	%
1	LL/25-26/001202/07	P7/RB/2025	19.56	4.24	32.44
2	LL/25-26/001202/60	T3/RB/2025/D	25.74	6.29	32.79

Test Method: SOP -OM-03(Reactive SiO2) & THA.MHA by TGA
Note :The above results are expressed as on dry basis.

Reviewed by

Dr.R.Krishna Moorthy
AUTHORISED SIGNATORY

Page 1 of 1

Lucid Laboratories Pvt. Ltd.
Plot No. 3, IDA, Balanagar, Hyderabad - 500 037, Telangana, INDIA, Ph : .040-69042222/10 Lines
E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com **CIN No. : U24239TG2004PTC042390**

ANNEXURE – XVII

Statement showing Check sample analysis of Major oxides, REE and Ga (as received from Shiva Analyticals India Pvt. Ltd, Bangalore)

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(Majors) G2296

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 Powders**
Lab ID	**G2296**
Sample Receipt Date	**25-Aug-25**
Analysis Completion Date	**10-Sep-25**
Date of Reporting	**11-Sep-25**
Sample Count	**28**

S.No	Customer Code	Sample Description	Method	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM/105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM/ 105	SOP/OM/ 103
			LOQ	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10
			Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			Lab ID	Al2O3	BaO	CaO	Cr2O3	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	SiO2	SO3	SrO	TiO2	V2O5	LOI	
1	P30/RB/2025	Powder	G2296-1	23.19	<0.05	6.13	<0.05	10.77	0.24	0.30	<0.05	<0.08	0.20	38.07	0.07	<0.05	4.94	<0.05	15.82	
2	P31/RB/2025	Powder	G2296-2	25.78	<0.05	1.47	<0.05	20.39	<0.05	0.35	<0.05	<0.08	0.62	31.38	0.09	0.24	5.17	0.07	14.23	
3	T20/RB/2025/09	Powder	G2296-3	13.09	<0.05	0.96	<0.05	10.31	1.08	1.09	0.13	1.07	0.09	60.41	0.58	<0.05	1.66	<0.05	9.35	
4	T21/RB/2025/07	Powder	G2296-4	27.79	<0.05	2.65	<0.05	12.29	0.12	0.26	<0.05	<0.08	0.38	35.18	0.22	0.09	6.19	0.09	14.53	
5	T22/RB/2025/A	Powder	G2296-5	33.97	<0.05	3.02	<0.05	3.77	0.68	0.58	<0.05	0.22	0.31	29.36	1.78	0.14	5.65	<0.05	20.31	
6	T23/RB/2025/01	Powder	G2296-6	31.59	<0.05	2.94	<0.05	5.70	0.40	0.49	<0.05	0.37	0.15	33.71	1.04	0.06	5.96	<0.05	17.37	
7	T24/RB/2025/C	Powder	G2296-7	23.94	<0.05	3.65	<0.05	21.59	0.07	0.47	<0.05	0.16	0.25	29.51	0.17	<0.05	5.27	0.07	14.73	
8	T25/RB/2025/02	Powder	G2296-8	13.95	0.05	0.64	<0.05	15.07	0.27	1.18	0.25	0.73	0.11	53.62	0.12	<0.05	2.79	<0.05	11.03	
9	T26/RB/2025/03	Powder	G2296-9	16.51	<0.05	1.15	<0.05	7.02	0.58	0.49	<0.05	0.37	<0.05	58.17	0.09	<0.05	2.35	<0.05	13.07	

Mr. SATYANARAYANA - Head - 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 inany advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required,please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

Prepared by: Naveen
Verified by: Satyanarayana

Page No.1 of 1

TEST REPORT

Shiva Assay(REE)_G2296

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

Customer Name	**Critical Mineral Trackers** **an NPEA , Ministry of Mines, GOI, Concource 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 Powders**
Lab ID	**G2296**
Sample Receipt Date	**25-Aug-25**
Analysis Completion Date	**10-Sep-25**
Date of Reporting	**11-Sep-25**
Sample Count	**5**

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	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)	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	0.5	0.5	0.5	0.5	0.5
			Lab ID	**Ga**	**Sc**	**Y**	**La**	**Ce**	**Pr**	**Nd**	**Sm**	**Eu**	**Gd**	**Tb**	**Dy**	**Ho**	**Er**	**Tm**	**Yb**	**Lu**	**Th**	**U**
1	P31/RB/2025	Powder	G2296-2	24.5	56.3	9.36	65.1	106	12.9	45.5	8.37	2.13	8.95	0.83	3.79	0.51	1.41	<0.5	1.23	<0.5	8.81	1.94
2	T21/RB/2025/07	Powder	G2296-4	27.3	42.3	20.7	113	322	31.5	135	23.6	6.27	22.3	1.93	8.02	1.07	2.97	<0.5	1.81	<0.5	9.70	2.72

Abbreviations
LOQ-Limit of Quantification
SOP/OM/052-- 4 Acid digestion followed by ICPMS Finish

Mr. SATYANARAYANA - Head - 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 inany advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required,please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

Prepared by:
Verified by:

Page No.1 of 1

ANNEXURE – XVIII

Detailed report on a complete petrographic study conducted on three bedrock samples from the Reldi Moti area, Kachchh district, Gujarat (as received from the Petrology division of GSI, Southern Region, Hyderabad).

भारत सरकार
GOVERNMENT OF INDIA
खान मंत्रालय
MINISTRY OF MINES

शैललकी प्रभाग / Petrology Division
भारतीय भूवैज्ञालनक सवेक्षण / Geological Survey of India
दतक्षण क्षेत्र / Southern Region
बैंडलागुडा / Bandlaguda
हैदराबाद / Hyderabad-500068

No. 2611/TCS/GSI/Pet/EPMA/SR/2025 Date: 26/11/2025

Petrographic report

Sender details

K. Nageswar Rao, Director (G), PR & Corordination,
Critical mineralTrackers,
Hyderabad

Madam,

Please find the attached petrographic report on submitted samples (4 nos.) for your perusal.

Thanking you,

Yours sincere

K. Basak

(Dr. KRISHNAPRIYA BASAK)

कृष्णप्रिया बसाक / KRISHNAPRIYA BASAK
निदेशक / Director
क्षेत्रीय मुख्यालय / Regional Headquarter
भारतीय भूवैज्ञानिक सर्वेक्षण / Geological Survey of India
दक्षिणी क्षेत्र, हैदराबाद / Southern Region, Hyderabad-500 068

Page 1 of 9

1. Sample code: RB/TS/P20

Microscopic observations:

Microscopic study reveals that the rock shows iron oxide minerals dominate these photomicrographs, imparting a pervasive reddish-brown to yellowish hue throughout the rock. Hematite and goethite (Gth) are visible, with goethite showing its characteristic yellow-brown pleochroism and earthy appearance (Fig. 1A-1B). These iron oxides and hydroxides are major constituents of lateritic profiles, forming from the intense chemical weathering of source rocks. Calcite (Cal) is also present as secondary mineralization in discrete patches and vein-like fillings, distinguishable under cross-polarized light by its strong birefringence (Fig. 1C-1D).

The groundmass of the laterite shows a very fine-grained, earthy texture—characteristic of secondary iron oxide/hydroxide accumulation products. The granular to cryptocrystalline appearance of the matrix points to extensive chemical alteration and re-precipitation. Iron oxides display variable grain sizes and aggregate textures, with some areas showing massive accumulations and others more disseminated forms. Calcite infills pore spaces and fractures, indicating later-stage carbonate precipitation likely linked to groundwater movement.

The dominance of goethite and iron oxides marks advanced weathering in a tropical or sub-tropical climate, where leaching removes silica, alkalis, and bases, leaving behind iron and aluminum oxides. Calcite's presence as a late-stage cement or vein-filling suggests diagenetic alterations postdating primary iron oxide formation, possibly due to changes in groundwater pH levels.

Overall, a highly weathered regolith composed mainly of iron oxides/goethite with secondary re-precipitated calcite. The microtextures and diagenetic features—such as matrix-supported iron oxides and calcite veins—point to complex weathering, leaching, and secondary mineralization processes under oxidizing and seasonally wet climate conditions. This mineralogical assemblage and fabric are diagnostic for laterite profiles developed in well-drained, iron-rich weathering environments.

Rock/Mineral Name: Based on the mineral and textural characteristics, it is a Laterite.

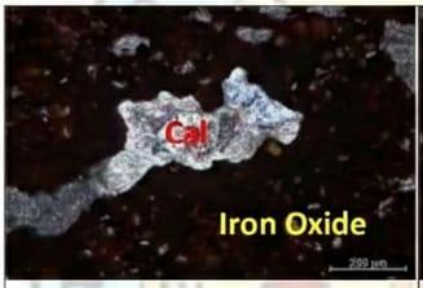


Fig. 1C. Photomicrograph showing presence of iron oxide and Calcite (Cal) under transmitted light XPL (10X).

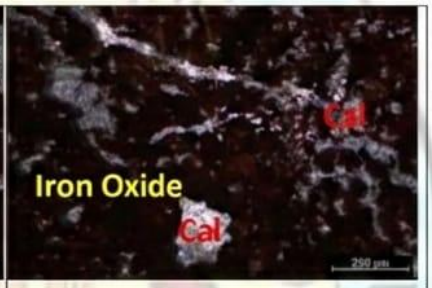


Fig. 1D. Photomicrograph showing presence of iron oxide and Calcite (Cal) under transmitted light XPL (10X).

Fig. 1A. Photomicrograph showing presence of iron oxide under transmitted light XPL (2X).

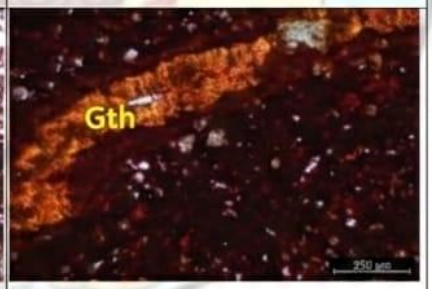


Fig. 1B. Photomicrograph showing presence Goethite (Gth) under transmitted light XPL (10X).

2. Sample code: RB/TS/T3

Microscopic observations:

Microscopic study reveals that the rock shows iron oxides are abundant and form the fundamental matrix of the sample, visible throughout as a reddish-brown, microcrystalline groundmass. These likely represent goethite, hematite, or a mixture of both, which develop under intense chemical weathering conditions typical of tropical lateritie profiles (Fig. 2A-2B). Caleite (Cal), shown in bright birefringence under polarized light, appears as secondary infilling material along fractures and pore spaces (Fig. 2C-2D).

Fine-grained aggregates of iron oxide are apparent, often surrounding or enclosing isolated patches of calcite. The calcite crystals are typically granular to subhedral and occupy interconnected pore spaces or appear as veins, suggesting that lateritic porosity was partially occluded by carbonate precipitation after initial iron oxide formation.

The iron oxide framework reflects extreme leaching and removal of silica, bases, and alkalis, while retaining and reprecipitating iron from precursor minerals. The presence of calcite as a cementing and pore-filling phase points to at least one subsequent episode of geochemical change, such as groundwater influx with dissolved carbonate, resulting in localized calcite precipitation. These processes highlight the multi-stage evolution of laterite, progressing from ferruginous enrichment to partial carbonate cementation.

This rock confirms the classic characteristics of laterite—an iron oxide-rich regolith showing intense weathering, high porosity (partly reduced by later carbonate infilling), and a lack of significant primary silicate minerals. The petrographic evidence demonstrates a highly evolved weathering profile, consistent with tropical soil-forming processes, periodically influenced by groundwater-driven diagenetic developments. Such features are diagnostic for mature laterites, commonly developed over mafic or felsic rocks in warm, humid climates with episodic hydrological changes.

Rock/Mineral Name: Based on the mineral and textural characteristics, it is a Laterite.

Fig. 2A. Photomicrograph showing presence of iron oxide under transmitted light XPL (2X).

Fig. 2B. Photomicrograph showing presence of iron oxide under transmitted light XPL (5X).

Fig. 2C. Photomicrograph showing presence of iron oxide and Calcite (Cal) under transmitted light XPL (10X).

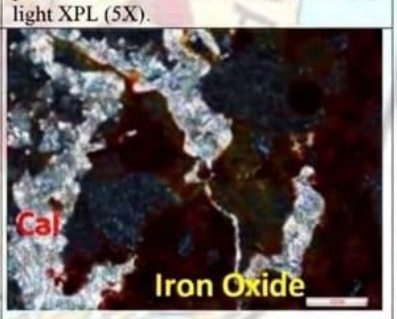


Fig. 2D. Photomicrograph showing presence of iron oxide and Calcite (Cal) under transmitted light XPL (10X).

3. Sample no: RB/TS/L-170

Mineral assemblage: Framework and matrix mineral: Quartz

Cement: Chert

Texture: It is a medium grained clastic sedimentary rock consisting only of quartz as framework as well as matrix mineral. Sub angular to subrounded clasts of quartz form the framework of the rock. The polymodal grain size distribution of quartz grains is recorded. Fine grained angular quartz grains were deposited within the interstitial spaces forming matrix. The framework and matrix mineral is cemented by chert. Few quartz grains show undulose extinction and deformation bands.

The rock is mineralogically mature indicating second cycle of deposition and the provenance must be a sandstone dominated rock. The textural immaturity is evidenced from angularity of grains, poor sorting, polymodal grain size distribution, grain size variation indicating less transportation and nearby provenance.

Name of the rock: Sandstone

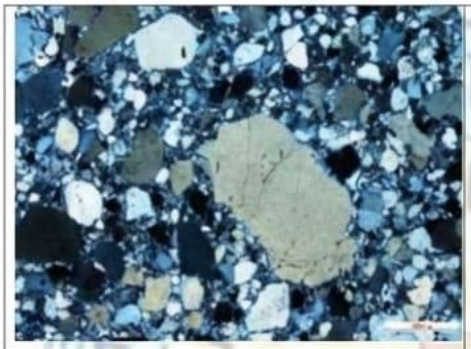


Fig.3.1 Angular to subrounded frameworking grains of quartz in cherty cement and fine grained matrix of quartz; note the polymodal grain size distribution indicating textural immaturity.

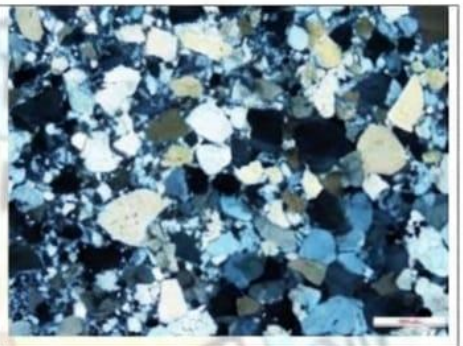


Fig.3.2 Angular to subrounded frameworking grains of quartz in cherty cement and fine grained matrix of quartz; frameworking grains dominated sandstone

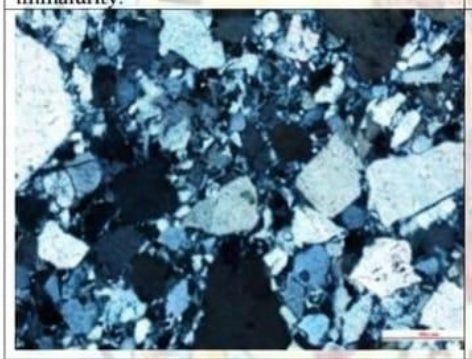


Fig. 3.3 Texturally immature grains showing angular frameworking quartz indicating very less transportation

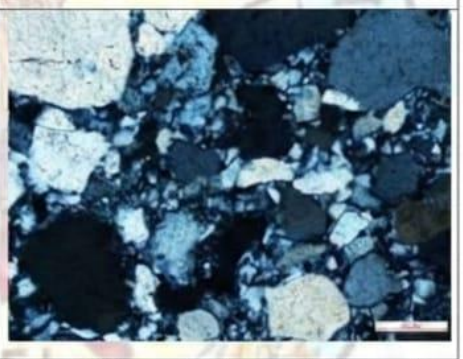
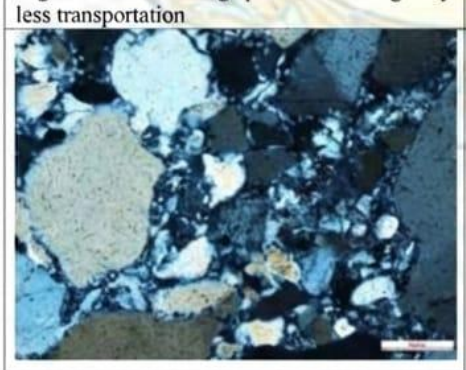
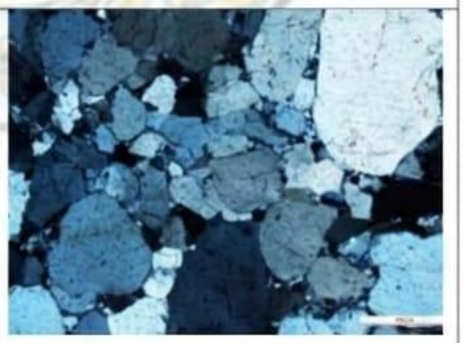


Fig. 3.4 Subrounded large grains in matrix and cement of fine grained quartz





4. Sample no: RB/TS/L-28

Mineral assemblages: Phenocrysts phase: Plagioclase

Matrix phases: Plagioclase microlites + Clinopyroxene + Devitrified glass + Zeolite + Magnetite

Texture: It is a very fine grained basaltic rock containing haphazardly oriented plagioclase microlites, very fine magnetite grains and clinopyroxene in matrix. Brown coloured, non-pleochroic and isotropic volcanic glass with very thin crystals indicate devitrified nature of glass. Few euhedral shaped, coarse plagioclase grains occur as phenocrysts within the fine grained matrix. Yellow coloured zeolite also present within the matrix.

Name of the Rock: Basalt

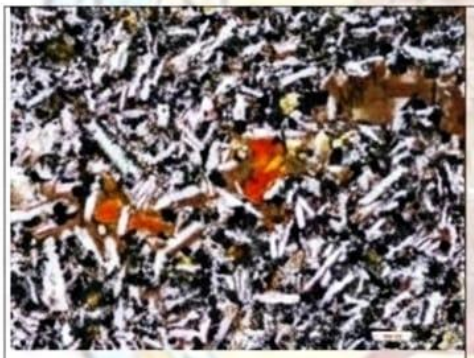


Fig..4.1 Brown and orange brown coloured glass in the interstitial spaces

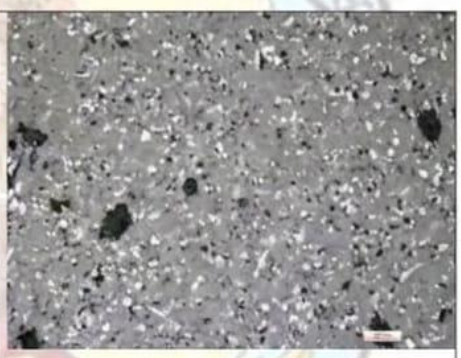


Fig.4.2 Tiny magnetites disseminated in the basaltic matrix

4. Sample no: RB/TS/L-28

Mineral assemblages: Phenocrysts phase: Plagioclase

Matris phases: Plagioclase microlites + Clinopyroxene + Devitrified glass + Zeolite + Magnetite

Texture: It is a very fine grained basaltic rock containing haphazardly oriented plagioclase microlites, very fine magnetite grains and clinopyroxene in matrix. Brown coloured, non-pleochroic and isotropic volcanic glass with very thin crystals indicate devitrified nature of glass. Few euhedral shaped, coarse plagioclase grains occur as phenocrysts within the fine grained matrix. Yellow coloured zeolite also present within the matrix.

Name of the Rock: Basalt

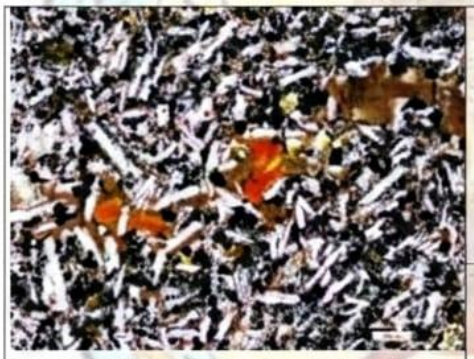


Fig. 3.1 Brown and orange brown coloured glass in the interstitial spaces

Fig.4.7 Fine grained matrix consisting of plagioclase microlite, glass and magnetite

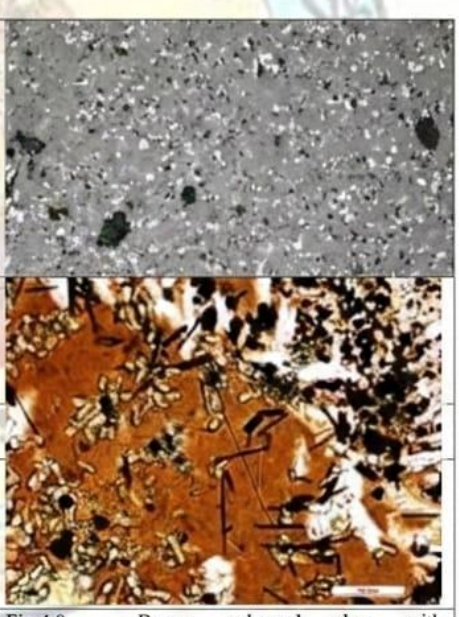


Fig.4.8 Brown coloured glass with devitrification; note the very fine needles and relatively coarser pyroxene grains within glass

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ANNEXURE – XIX : XRD studies

Sample No: P31/RB/2025 (original no: P20/RB/2025)

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Customer Address: Critical Minerals Trackers, Mineral Exploration and Geo Solution, #Concourse, No 406,7-1-58/CC/406, Opp Lal Bungalow, Greenland's, Hyderabad -500016 India.
Customer Ref : P31/RB/2025
Lab ID : G2296-2

Dates of Sample Analysis :05/09/2025
Date of Reporting :08/09/2025

MINERALOGY TEST REPORT

1.60 KW POWDER X RAY DIFRACTOMETER METHOD

INTRODUCTION: X-ray diffraction (XRD) and petrology studies are both valuable techniques used in geology and materials science for analysing minerals and rocks, but they serve different purposes and offer unique advantages. Here's how XRD is superior to petrology studies in certain aspects. XRD excels in identifying crystalline minerals present in a sample. It provides precise information about the crystal structure and lattice parameters of minerals, which can be challenging to ascertain solely through petrological observations. XRD allows for quantitative analysis of mineral phases present in a sample, providing accurate estimates of mineral composition based on peak intensities. Petrology studies, while descriptive, may not always provide quantitative data on mineral abundance. XRD is highly sensitive and can detect trace amounts of minerals present in a sample, even at concentrations as low as a few percent. Powder Diffraction (XRD) Database, contains a comprehensive collection of more than 6000 diffraction patterns for various materials. Researchers use this resource for identifying unknown substances, confirming crystal structures, and conducting material characterization. Shiva Analyticals team has decades of experience on XRD studies. Accurate chemical assay coupled with reliable mineralogy information is vital in resource characterisation.

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Sample Code: G2279-2 (P31/RB/2025)

Expert Report for Sample No. G2296-2

WDXRF Data on Elemental Composition

The WDXRF results provide a detailed oxide breakdown of Sample G2296-2

Oxide	% Composition
Al_2O_3	25.78
BaO	<0.05
CaO	1.47
Cr_2O_3	<0.05
Fe_2O_3	20.39
K_2O	0.05
MgO	0.35
MnO	<0.05
Na_2O	0.07
P_2O_5	0.62
SiO_2	31.38
SO_3	0.09
SrO	0.24
TiO_2	5.17
V_2O_5	0.07
ZrO_2	0.05
PbO	<0.05
CuO	<0.05
NiO	<0.05
ZnO	<0.05
LOI (Loss on Ignition)	14.23

These chemical compositions inform the analysis of the mineral phases and offer valuable insights into commercial and geochemical applications.

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Stoichiometric Link between WDXRF and XRD Results

Proportioned Correspondence:

The WDXRF elemental composition was mapped to the major XRD phases to validate the match, as shown below:

Mineral Phase (XRD)	Proportion (%)	Relevant Oxides (WDXRF)	Stoichiometric Match
Kaolinite	39.11	Al_2O_3 (25.78%), SiO_2 (31.38%)	Al-rich aluminosilicates; direct match to Kaolinite ($Al_2Si_2O_5(OH)_4$).
Hematite	8.97	Fe_2O_3 (20.39%)	Iron oxides primarily fit Hematite (Fe_2O_3).
Calcium Carbonate	3.61	CaO (1.47%), LOI (14.23%)	LOI suggests CO_3 volatiles matched to $CaCO_3$.
Ilmenite	5.41	TiO_2 (5.17%), Fe_2O_3 (20.39%)	Fe-Ti phases tie strongly to Ilmenite ($FeTiO_3$).
Amorphous (Unidentified)	42.9	Trace oxides: P_2O_5, MgO, V_2O_5, etc.	Uncrystallized residue and secondary traces.

Key **crystalline content is 57.1%**, while the **remaining 42.9% is amorphous**, likely comprising silica or iron phases.

Crystallinity Distribution

- **Crystalline Phase (57.1%)**: Includes Kaolinite, Hematite, Calcium Carbonate, and Ilmenite.
- **Amorphous Phase (42.9%)**: Represents silicates, secondary oxides, or poorly crystallized material.

Secondary/Minor XRD Mineral Phases

Potential unidentified phases suggested by WDXRF include:

1. **Quartz (SiO_2)**: Excess SiO_2 not accounted for by Kaolinite.
2. **Goethite (FeOOH)**: Iron oxides formed under weathered conditions.
3. **Rutile/Anatase (TiO_2)**: Ti traces could manifest in TiO_2 polymorphs.
4. **Apatite ($Ca_5(PO_4)_3$)**: Suggested by trace P_2O_5.

Probable Origin of Material

Geochemical Indicators

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- **Kaolinite & Hematite**: The weathered mineralogy suggests alteration of volcanic rocks under tropical or subtropical environments.
- **Ilmenite**: Strongly indicates a volcanic or igneous (mafic) origin, with potential hydrothermal alteration.
- **Calcium Carbonate**: Inferred as post-depositional precipitation due to interaction with carbonated waters.

Conclusion: The sample most likely originated from a weathered volcanic deposit modified by hydrothermal or tropical processes.

Potential Commercial Applications

Based on mineralogy and composition, similar materials have the following commercial uses:

Mineral Phase	Applications
Kaolinite	Ceramics, rheology modifiers in paper production, and fillers.
Hematite	Raw material for iron, abrasives, pigment manufacturing.
Ilmenite	Titanium dioxide for paints, plastics, and coatings.
Calcium Carbonate	Adhesives, cement additives, limestone derivatives, and fillers.
Amorphous Silica	Reinforcements (e.g., additives in cements, glass production).

Tabulated Summary

WDXRF and XRD Data Combined

Oxides (WDXRF)	% Composition	Major Phases (XRD)	Phase % (XRD)	Interpretation
Al_2O_3	25.78	Kaolinite	39.11	Kaolinite as the dominant aluminosilicate.
SiO_2	31.38	Kaolinite + Quartz (Trace)	39.11 + Trace	Excess SiO_2 forms quartz.
Fe_2O_3	20.39	Hematite, Ilmenite	8.97 + 5.41	Fe_2O_3 matches Hematite and Ilmenite.
TiO_2	5.17	Ilmenite	5.41	Fe-Ti association supports Ilmenite.
CaO	1.47	Calcium Carbonate	3.61	Matches $CaCO_3$ phase with LOI confirming carbonates.
P_2O_5	0.62	Apatite (minor)	Trace	P suggested formation of phosphates.

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Other Oxides	Trace	None	Amorphous Sections	Trace oxides add to unclassified amorphous materials.

XRD Mineral Phase and Oxide Assignment for Sample G2296-2

XRD Mineral Phase (with Formula)	XRD Proportion (%)	Oxides (%) Assigned from WDXRF for this Mineral Phase	Balance of Each Oxide (%) Left Over	Suggestions for Amorphous Phase Predicted Minerals
Kaolinite ($Al_2Si_2O_5(OH)_4$)	39.11	Al_2O_3: 20.09%, SiO_2: 20.95%, LOI (H_2O): 7.83%	Al_2O_3: 5.69%, SiO_2: 10.43%, LOI (H_2O): 6.4%	Excess SiO_2 suggests Quartz (SiO_2); LOI points to hydroxide formations like Goethite (FeOOH).
Hematite (Fe_2O_3)	8.97	Fe_2O_3: 8.97%	Fe_2O_3: 11.42%	Excess Fe contributes to Goethite (FeOOH) or other iron hydroxides.
Calcium Carbonate ($CaCO_3$)	3.61	CaO: 1.47%, LOI (CO_2): 2.14%	CaO: 0%, LOI: 4.26%	Remaining LOI may correspond to phases like minor Carbonates (e.g., dolomitic inclusions) or evaporite minerals.
Ilmenite ($FeTiO_3$)	5.41	TiO_2: 5.02%, Fe_2O_3: 3.93%	TiO_2: 0.15%, Fe_2O_3: 7.49%	Residual TiO_2 could form Rutile/Anatase (TiO_2) phases in the amorphous composition.
Amorphous Phases (Remaining Oxides)	42.9	(Residual oxides after assigning crystalline mineral phases):	Al_2O_3: 5.69%, SiO_2: 10.43%, Fe_2O_3: 7.49%, TiO_2: 0.15%, P_2O_5: 0.62%, and trace MgO, V_2O_5, etc.	Quartz (SiO_2), Goethite (FeOOH), Rutile/Anatase (TiO_2), and possible Phosphates (e.g., Apatite, $Ca_5(PO_4)_3$) derive from trace oxides.

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Key Observations

Oxide Assignments for Crystalline Phases:

- **Kaolinite** utilizes most of the available **Al_2O_3 (20.09%)**, **SiO_2 (20.95%)**, and a significant proportion of LOI (7.83%), leaving small balances unassigned.
- **Hematite (8.97%)** fully utilizes part of **Fe_2O_3 (8.97%)**, but **7.49% remains** available for amorphous iron phases like Goethite or ferrihydrite.
- **Calcium Carbonate** accounts for all **CaO (1.47%)** and part of the LOI, pointing to carbonate sources.
- **Ilmenite** effectively incorporates **TiO_2 (5.02%)** with minimal excess (**0.15%**) and partially utilizes **Fe_2O_3**.

Balances and Contributions to Amorphous Phase:

- The **remaining SiO_2 and Al_2O_3** likely form secondary silicate minerals or residual glassy components.
- **Unassigned Fe_2O_3** suggests amorphous Fe-hydroxides such as Goethite.
- **Residual TiO_2** could crystallize as Rutile or Anatase in poorly ordered regions.
- **Adjunct oxides (P_2O_5, V_2O_5, MgO)** might align with minor phosphates or exotic silicates.

Conclusion

- The material predominantly comprises **Kaolinite, Hematite, Ilmenite, and Calcium Carbonate**, with minor contributions from secondary quartz, goethite, and anatase.
- The probable origin points to **volcanic activity**, followed by weathering and deposition in a humid environment.
- Commercially, the material offers applications in **ceramics, pigments, and construction-related fields**.

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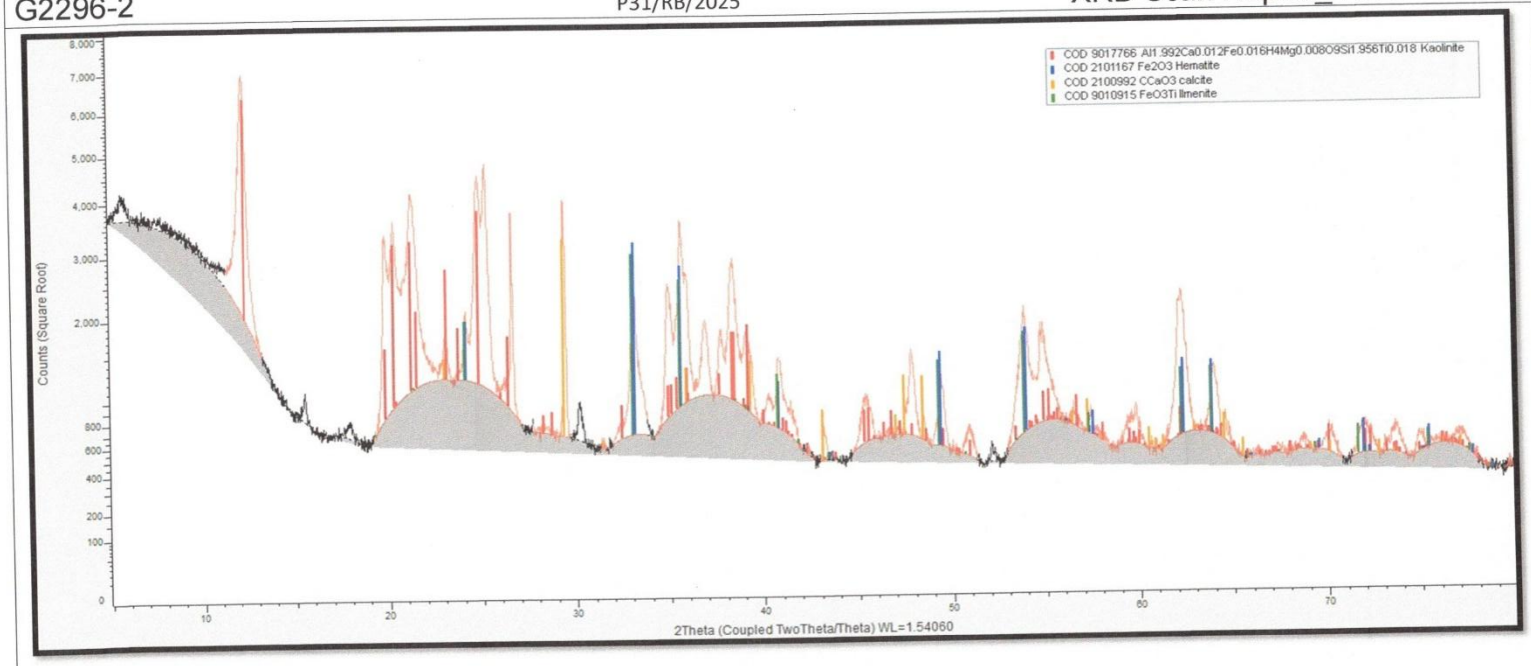
BRUKER D8 ADVANE XRD TEST DATA

G2296-2

P31/RB/2025

XRD Scan Report_1 of 2



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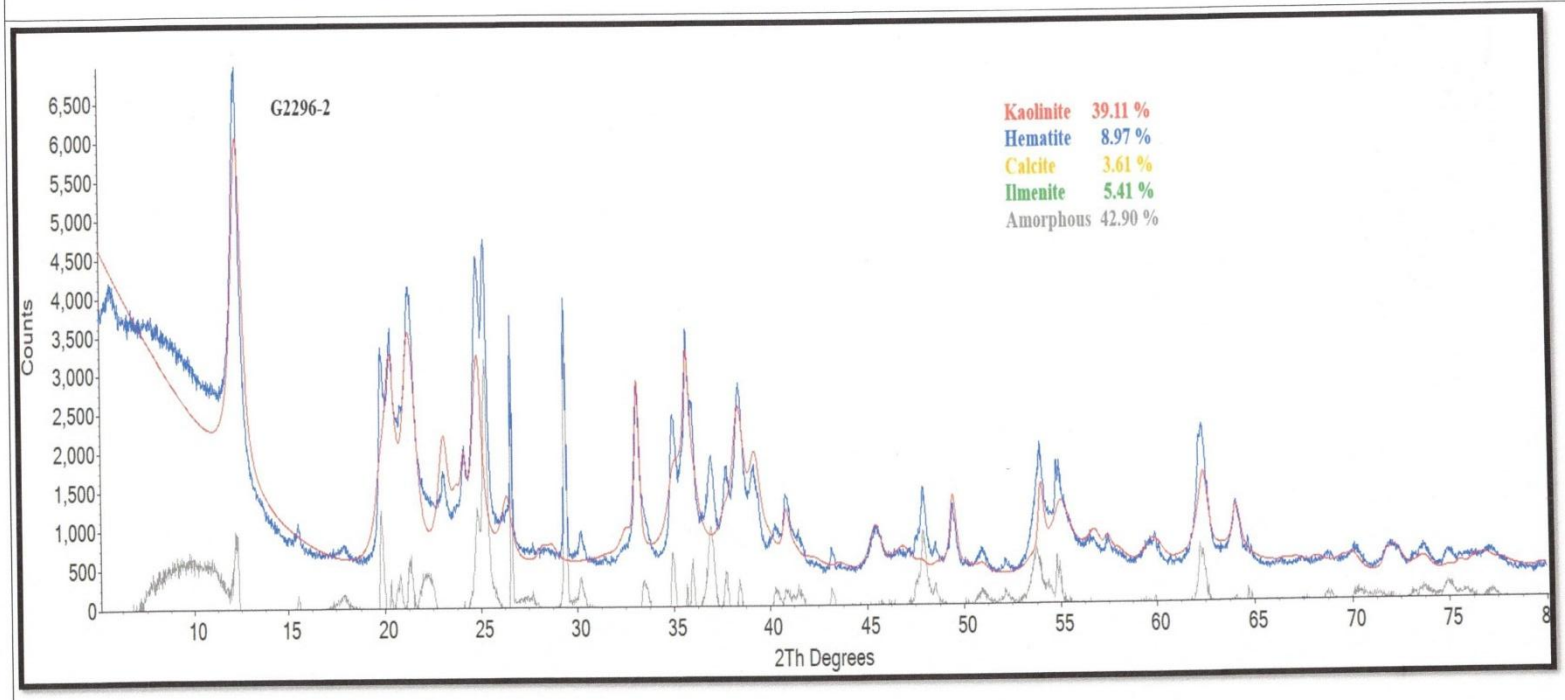
BRUKER D8 ADVANE XRD TEST DATA

G2296-2 P31/RB/2025 XRD Scan Report_2 of 2



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Sample No: T21/RB/2025/07(Original no: T2/RB/2025/07)

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Customer Ref : T21/RB/2025/07
Lab ID : G2296-4

Dates of Sample Analysis :05/09/2025
Date of Reporting :08/09/2025

MINERALOGY TEST REPORT

1.60 KW POWDER X RAY DIFRACTOMETER METHOD

INTRODUCTION: X-ray diffraction (XRD) and petrology studies are both valuable techniques used in geology and materials science for analysing minerals and rocks, but they serve different purposes and offer unique advantages. Here's how XRD is superior to petrology studies in certain aspects. XRD excels in identifying crystalline minerals present in a sample. It provides precise information about the crystal structure and lattice parameters of minerals, which can be challenging to ascertain solely through petrological observations. XRD allows for quantitative analysis of mineral phases present in a sample, providing accurate estimates of mineral composition based on peak intensities. Petrology studies, while descriptive, may not always provide quantitative data on mineral abundance. XRD is highly sensitive and can detect trace amounts of minerals present in a sample, even at concentrations as low as a few percent. Powder Diffraction (XRD) Database, contains a comprehensive collection of more than 6000 diffraction patterns for various materials. Researchers use this resource for identifying unknown substances, confirming crystal structures, and conducting material characterization. Shiva Analyticals team has decades of experience on XRD studies. Accurate chemical assay coupled with reliable mineralogy information is vital in resource characterisation.

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Sample Code: G2279-4 (T21/RB/2025/07)

Expert Report for Sample No. G2296-4

WDXRF Data on Elemental Composition

Oxide	% Composition
Al_2O_3	27.79
BaO	<0.05
CaO	2.65
Cr_2O_3	<0.05
Fe_2O_3	12.29
K_2O	0.12
MgO	0.26
MnO	<0.05
Na_2O	0.08
P_2O_5	0.38
SiO_2	35.18
SO_3	0.22
SrO	0.09
TiO_2	6.19
V_2O_5	0.09
ZrO_2	0.06
PbO	<0.05
CuO	<0.05
NiO	<0.05
ZnO	<0.05
LOI (Loss on Ignition)	14.53

This chemical analysis lays the foundation for stoichiometrically justifying the observed XRD phases.

Correlation between WDXRF and XRD Results

Proportions of Oxides for Identified XRD Phases

The following table aligns the WDXRF oxide data with the major mineral phases detected by XRD and evaluates the stoichiometric relationships:

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Phase (XRD)	Proportion (XRD %)	Relevant Oxides (WDXRF)	Stoichiometric Justification
Kaolinite ($Al_2Si_2O_5(OH)_4$)	47.64	Al_2O_3 (27.79%), SiO_2 (35.18%)	Strong match; Kaolinite is aluminosilicate-rich.
Hematite (Fe_2O_3)	3.93	Fe_2O_3 (12.29%)	Trace amounts identified align with iron oxide content.
Calcium Carbonate ($CaCO_3$)	4.24	CaO (2.65%), LOI (14.53%)	CaO aligns with carbonate phases; LOI reflects CO_2 release.
Ilmenite ($FeTiO_3$)	7.58	TiO_2 (6.19%), Fe_2O_3 (12.29%)	Ti-rich phase perfectly aligns with Ilmenite composition.
Amorphous	36.60	Residual oxides (e.g., SiO_2, P_2O_5)	Complex traces suggest amorphous silicates or secondary phases.

Crystallinity and Amorphous Content

- **Crystalline Phase:** 63.4% (Kaolinite, Hematite, Calcium Carbonate, and Ilmenite dominate).
- **Amorphous Content:** 36.6% (unclassified silicates, minor Fe, or Ti inclusions and residual phases from WDXRF).

Possible Minor or Secondary Mineral Phases

Based on WDXRF data, several **secondary or minor phases** can be proposed beyond the major mineral phases detected:

1. **Quartz (SiO_2):** High SiO_2 content (35.18%) not fully allocated to Kaolinite likely forms minor Quartz inclusions.
2. **Goethite ($FeO(OH)$):** Fe_2O_3 surplus suggests minor hydrated iron oxides under weathering conditions.
3. **Anatase or Rutile (TiO_2):** Excess TiO_2 might result in the formation of minor TiO_2 polymorphs.
4. **Phosphates:** Limited P_2O_5 (0.38%) could form trace phosphate phases like Apatite ($Ca_5(PO_4)_3F$).

Probable Origin of Material

Geochemical Indicators

- **Kaolinite and Hematite:** Weathered tropical settings with strong chemical alteration of volcanic or sedimentary deposits.
- **Ilmenite ($FeTiO_3$):** Suggests a volcanic or mafic igneous origin, possibly residual titanium minerals post-igneous crystallization.

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- **Calcium Carbonate:** Likely precipitated from secondary processes, potentially during weathering or diagenesis.

Conclusion:

The origin of this sample is likely **volcanic**, with subsequent hydrothermal and weathering modifications in a tropical-subtropical environment.

Commercial Applications

This material's mineralogical composition and properties suggest various **commercial applications**:

Mineral Phase	Applications
Kaolinite	Ceramics, paper-coating pigments, polymer fillers, refractories.
Hematite	Source of iron for steelmaking, pigments, abrasives.
Ilmenite	Titanium dioxide production for pigments and coatings.
Calcium Carbonate	Concrete, lime production, filler for construction materials.
Quartz (Secondary)	Glassmaking, silicon manufacturing for electronics.

Tabulated Results Summary

WDXRF Data with Proportioned XRD Results

Oxides (WDXRF)	% Composition	Major Phases (XRD)	Phase % (XRD)	Stoichiometric Justification
Al_2O_3	27.79	Kaolinite	47.64	Al-rich phase directly matches aluminosilicate structures.
SiO_2	35.18	Kaolinite, Quartz	47.64 + Trace	Residual SiO_2 contributes to potential Quartz phase.
Fe_2O_3	12.29	Hematite, Ilmenite	3.93 + 7.58	Fe oxides split between Hematite and titaniferous Ilmenite.
TiO_2	6.19	Ilmenite	7.58	Ti strongly supports titaniferous phases like Ilmenite.
CaO	2.65	Calcium Carbonate	4.24	Carbonates align well with CaO and LOI contributions.
P_2O_5	0.38	Minor/Secondary Phase	Trace	May contribute to minor phosphate minerals (e.g., Apatite).
Others	Trace amounts	Amorphous Materials	36.60	Likely residual silicates or poorly crystallized material.

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Crystallinity

Crystalline Content	% Contribution
Crystalline Phases	63.4%
Amorphous Phases	36.6%

XRD Mineral Phase Analysis with Chemical Formula and Remaining Oxides

XRD Mineral Phase (% with Chemical Formula)	% of Each Oxide Assigned for this Mineral Phase (WDXRF)	Amount of Each Oxide (%) Balance Left After Assignments	Amorphous Phase Predicted Minerals and Remaining Oxides Assignment (%)
Kaolinite (47.64%; $Al_2Si_2O_5(OH)_4$)	Al_2O_3 (22.55%) and SiO_2 (22.00%)	Al_2O_3 Balance: 5.24%; SiO_2 Balance: 13.18%	Remaining SiO_2 likely contributes to Quartz (SiO_2) in the amorphous phase.
	H_2O (derived from LOI; 6.28%)	LOI Balance: 8.25%	LOI remainder may form hydroxides like Goethite (FeOOH) in the amorphous phases.
Hematite (3.93%; Fe_2O_3)	Fe_2O_3 (3.93%)	Balance Fe_2O_3 left: 8.36%	Excess Fe likely contributes to Goethite (FeOOH, hydrous Fe oxides) in amorphous phase.
Calcium Carbonate (4.24%; $CaCO_3$)	CaO (2.65%) and CO_2 (from LOI; 1.59%)**	Balance CaO: 0.00%	Contribution fully accounted; no residual CaO remains.
Ilmenite (7.58%; $FeTiO_3$)	Fe_2O_3 (4.93%) and TiO_2 (5.17%)	Balance TiO_2: 1.02%; Fe_2O_3: 3.43%	Residual TiO_2 possibly forms Rutile/Anatase (TiO_2 polymorphs) in amorphous phase.
Amorphous Phases (36.60%) Predicted As...	Trace oxides, LOI residuals:		Contribution from V_2O_5, MgO, P_2O_5, Na_2O, forming Phosphates or Silicates in amorphous phase.

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Breakdown of Unallocated/Remaining Oxides and Amorphous Predictions

- **SiO_2 (Remaining 13.18%)**:
  Likely contributes to **Quartz (SiO_2)** or secondary glassy silicates in the amorphous content.
- **Fe_2O_3 (Remaining 3.43%)**:
  Likely forms **Goethite (FeOOH)** alongside residual hydroxides or trace hematite in amorphous phases.
- **TiO_2 (Remaining 1.02%)**:
  Residual Ti would crystallize as trace **Rutile/Anatase polymorphs (TiO_2)**.
- **P_2O_5, CaO, MgO, and LOI Residuals**:
  These key inputs (e.g., **LOI: 8.25%**) likely feed **phosphate or hydroxide phases** (e.g., minor Apatite or other silicates) in amorphous material.

Conclusion

- **Mineralogy (Major Phases):** The sample consists primarily of **Kaolinite (47.64%)**, followed by **Hematite (3.93%)**, **Calcium Carbonate (4.24%)**, and **Ilmenite (7.58%)**.
- **Secondary/Minor Phases:** Potential includes **Quartz, Goethite, Anatase/Rutile**, and trace **Phosphates**.
- **Probable Origin: Volcanic material** subjected to weathering and hydrothermal alteration in tropical-subtropical environments.
- **Economic Potential:** Suitable for **ceramic, pigment, refractory, and construction industries**.

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BRUKER D8 ADVANE XRD TEST DATA

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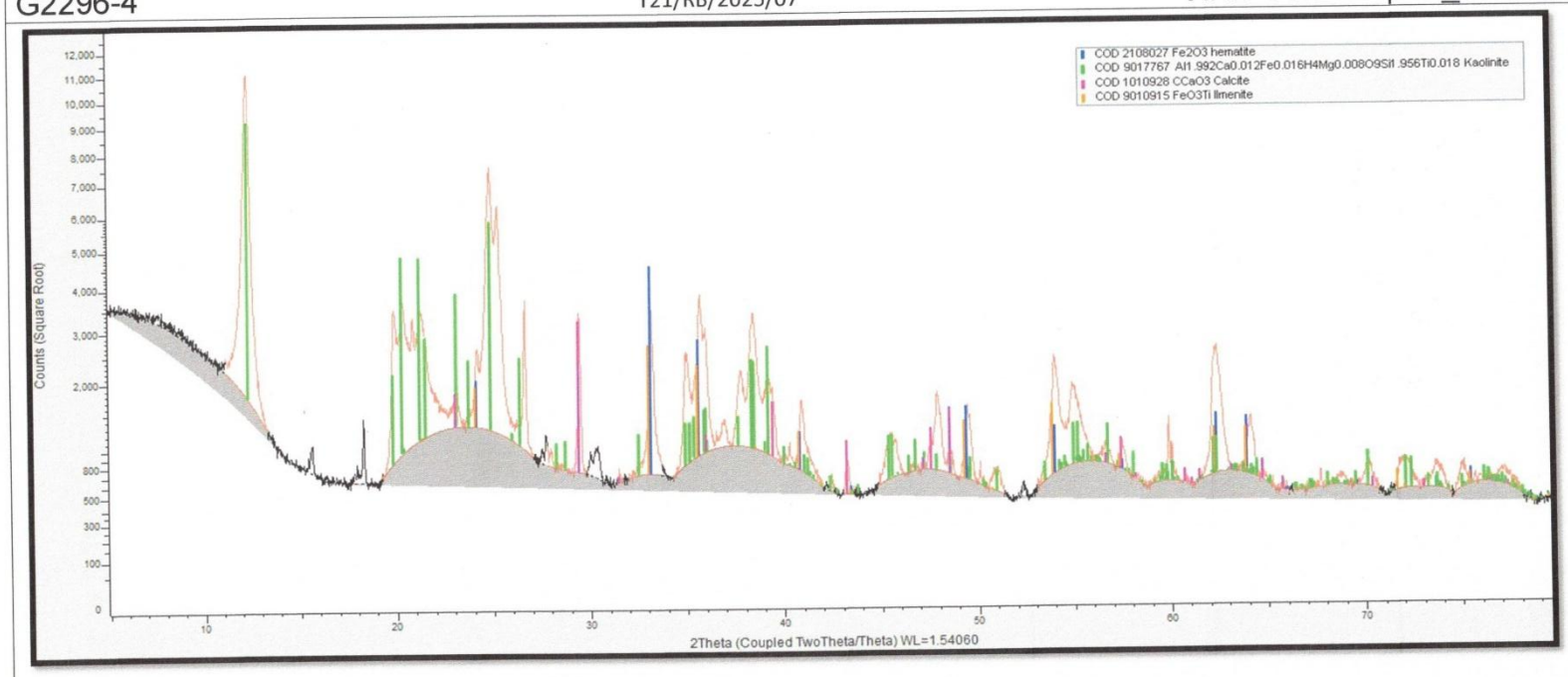

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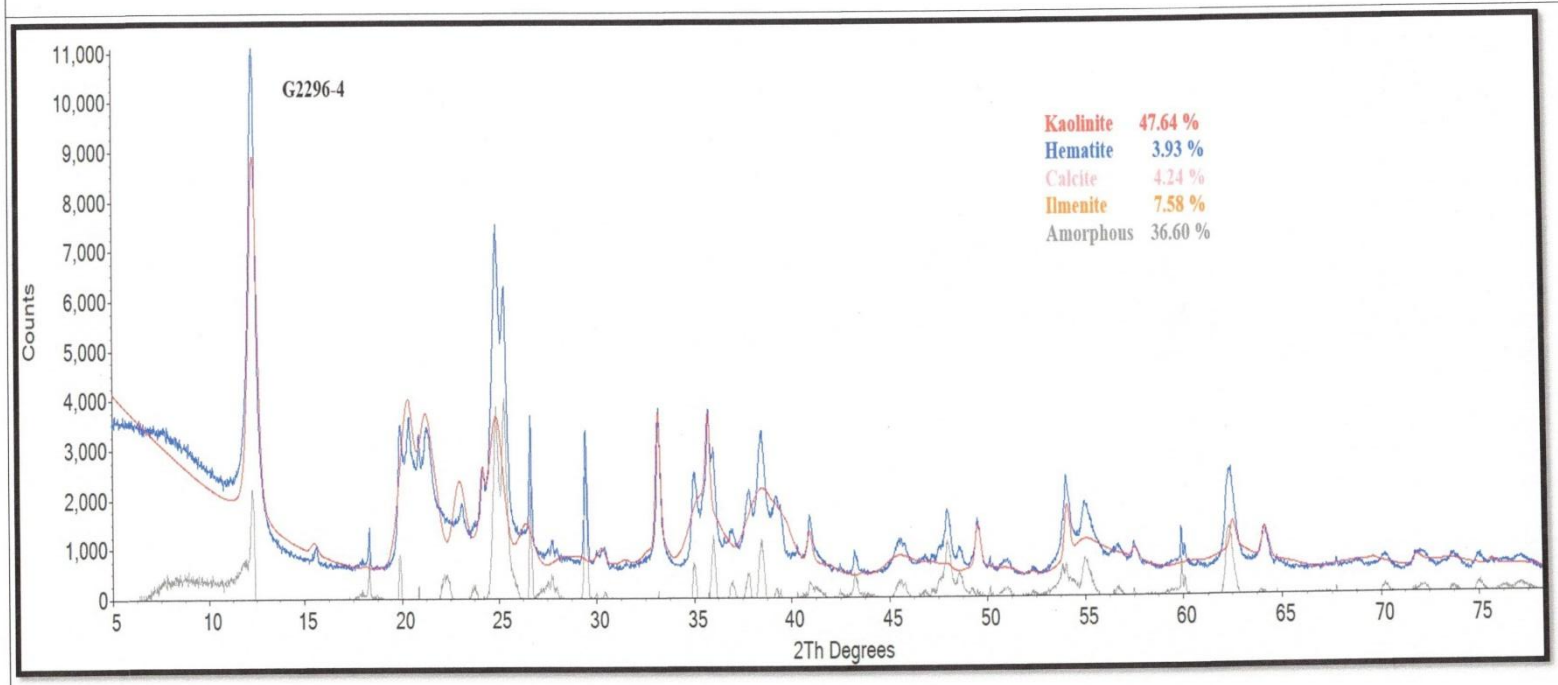
BRUKER D8 ADVANE XRD TEST DATA

G2296-4 T21/RB/2025/07 XRD Scan Report_2 of 2



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Sample No: T23/RB/2025/01(Original no: T3/RB/2025/01)

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Customer Ref : T23/RB/2025/01
Lab ID : G2296-6

Dates of Sample Analysis :05/09/2025
Date of Reporting :08/09/2025

MINERALOGY TEST REPORT

1.60 KW POWDER X RAY DIFRACTOMETER METHOD

INTRODUCTION: X-ray diffraction (XRD) and petrology studies are both valuable techniques used in geology and materials science for analysing minerals and rocks, but they serve different purposes and offer unique advantages. Here's how XRD is superior to petrology studies in certain aspects. XRD excels in identifying crystalline minerals present in a sample. It provides precise information about the crystal structure and lattice parameters of minerals, which can be challenging to ascertain solely through petrological observations. XRD allows for quantitative analysis of mineral phases present in a sample, providing accurate estimates of mineral composition based on peak intensities. Petrology studies, while descriptive, may not always provide quantitative data on mineral abundance. XRD is highly sensitive and can detect trace amounts of minerals present in a sample, even at concentrations as low as a few percent. Powder Diffraction (XRD) Database, contains a comprehensive collection of more than 6000 diffraction patterns for various materials. Researchers use this resource for identifying unknown substances, confirming crystal structures, and conducting material characterization. Shiva Analyticals team has decades of experience on XRD studies. Accurate chemical assay coupled with reliable mineralogy information is vital in resource characterisation.

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Summary

Sample G2296-6 (T23/RB/2025/01)

Sample G2296-6 was analysed by WDXRF (Bruker S8 Tiger Series) and XRD (Bruker D8 Advance). WDXRF bulk oxide results (wt%) and XRD major phase quantification (weight %) are reconciled below. XRD reports 70% crystalline phases (Kaolinite, Gibbsite, Mg□Calcite, Ilmenite) and 30% amorphous.

Analytical data

WDXRF (Bruker S8 Tiger Series) — Oxide results (wt%):

Oxide	Wt %
Al2O3	31.59
SiO2	33.71
CaO	2.94
MgO	0.49
Fe2O3	5.70
TiO2	5.96
K2O	0.40
Na2O	0.37
P2O5	0.15
SO3	1.04
LOI	17.37

XRD phases

Mineral phase	Wt % (sample)
Kaolinite	46.20
Gibbsite	8.65
Mg-Calcite	8.15
Ilmenite	7.00

Crystallinity (sum of identified phases) = 70.0 % ; Amorphous = 30.0 %.
XRD scan: 2θ = 5–80°.

Stoichiometric conversion — mineral ↔ oxide equivalents

Key calculated oxide composition (wt%) for each mineral (per 100 g of mineral):

Mineral	Formula (approx.)	Molecular mass (g/mol)	Major oxide wt% (representative)	LOI / CO2 (wt%)
Kaolinite	Al2Si2O5(OH)4	258.157	Al2O3: 39.495 SiO2: 46.548	H2O: 13.957
Gibbsite	Al(OH)3	78.002	Al2O3: 65.357	H2O: 34.643

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Mg□substituted Calcite (avg)	(Ca,Mg)CO3 (Mg frac from bulk MgO/CaO)	97.117	CaO: 46.873 MgO: 7.812	CO2: 45.315
Ilmenite	FeTiO3	151.709	FeO: 47.356 (=> Fe2O3 equiv for XRF), TiO2: 52.644	—

Proportionation: oxide contributions from identified crystalline phases

The table below shows oxide contributions (wt% of sample) predicted from the XRD-identified crystalline phases using stoichiometric conversions:

Oxide	Measured (WDXRF)	From Kaolinite	From Gibbsite	From Mg□Calcite	From Ilmenite (Fe2O3 equiv / TiO2)
Al2O3	31.59	18.24	5.65	0.00	0.00
SiO2	33.71	21.50	0.00	0.00	0.00
CaO	2.94	0.00	0.00	3.82	0.00
MgO	0.49	0.00	0.00	0.63	0.00
Fe2O3	5.70	0.00	0.00	0.00	7.36
TiO2	5.96	0.00	0.00	0.00	3.68
LOI	17.37	0.00	0.00	0.00	0.00

Predicted totals from crystalline phases and residual (measured − predicted = amorphous + mismatch):

Oxide	Measured (wt%)	Predicted from crystalline (wt%)	Residual = Meas − Pred (wt%)
Al2O3	31.59	23.90	7.68
SiO2	33.71	21.50	12.20
CaO	2.94	3.82	-0.88
MgO	0.49	0.63	-0.14
Fe2O3	5.70	7.36	-1.66
TiO2	5.96	3.68	2.27
LOI	17.37	13.13	4.23

Amorphous fraction (30%) — inferred composition

Residual oxides (measured − crystalline) are attributed primarily to the amorphous fraction. Values below are normalized to 100% of the amorphous fraction (i.e., % of the 30% amorphous mass). Negative residuals indicate a mismatch (XRD vs XRF) and are discussed in the interpretation section.

Oxide	Residual (wt% of sample)	Inferred % of amorphous fraction (residual/30 *100)
SiO2	12.20	40.68
Al2O3	7.68	25.63
LOI	4.23	14.10
TiO2	2.27	7.58

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SO3	1.0	3.46
K2O	0.40	1.33
Na2O	0.37	1.23
P2O5	0.15	0.50
ZrO2	0.08	0.26
SrO	0.06	0.20
Cr2O3	0.04	0.13
V2O5	0.04	0.13
PbO	0.04	0.13
MnO	0.01	0.03
NiO	0.01	0.03
MgO	-0.14	-0.48
CaO	-0.88	-2.93
Fe2O3	-1.66	-5.56

Interpretation & expert justification

• The four XRD-identified crystalline phases (sum = 70%) explain most of the Al2O3 and a significant portion of SiO2, TiO2 and the structural H2O/CO2 (LOI). Predicted LOI from crystalline phases ≈ 13.138 wt% compared with measured LOI 17.370 wt% — residual LOI ≈ 4.232 wt% (allocated to amorphous).

• The amorphous fraction is inferred to be rich in SiO2 (~40.68% of amorphous), Al2O3 (~25.63%), with appreciable TiO2 (~7.58%) and structural H2O/CO2 (LOI ≈ 14.11% of amorphous). This composition is consistent with amorphous aluminosilicates (allophane/opal), poorly crystalline clays, and fine Ti□oxide phases (anatase/ferrihydrite/opaline Ti phases).

• A notable mismatch: predicted CaO from the Mg□calcite amount (from XRD) is 3.820 wt% while measured CaO is 2.940 wt%. Predicted > measured suggests one or more of: (a) XRD overestimate of the Mg□calcite concentration, (b) carbonate occurs with variable Mg/Ca not captured by the bulk proxy, (c) analytical uncertainty/errors (preferred orientation, Rietveld fit, or WDXRF calibration), or (d) Ca partly present in phases below XRF detection or lost during LOI. Such mismatch warrants follow□up (see recommendations).

Minor / secondary phases likely present (not in major XRD list)

Based on residual oxides and trace elements, plausible minor/secondary phases include:
- Amorphous silica (opal-A / opal-CT) or microcrystalline quartz (accounts for extra SiO2)
- Poorly crystalline aluminosilicates (allophane, proto□imogolite), smectite (if present)
- Fine Ti□oxide phases (anatase, rutile) and leucoxene derived from ilmenite weathering
- Iron (oxy)hydroxides (goethite/ferrihydrite) as coatings — may be in amorphous fraction
- Apatite or fluorapatite (trace P2O5 = 0.15%)
- Gypsum/anhydrite (trace SO3 = 1.04%) or adsorbed sulfate
- Trace zircon (ZrO2), accessory Pb□bearing phases, Ni, V traces

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Probable origin of the material

The mineral assemblage (dominant kaolinite + gibbsite + significant LOI + some ilmenite) strongly suggests intense chemical weathering in a tropical/subtropical environment — a residual soil / lateritic horizon or bauxitic/weathered regolith. High Al2O3 (31.6%) with substantial structural water and kaolinite/gibbsite indicates leaching of mobile elements and enrichment of Al and Ti. The presence of ilmenite indicates an igneous/mafic heavy-mineral source (detrital or residual concentration).

Commercial evaluation & potential uses

- Kaolinite uses: paper/coating fillers, ceramics, refractories, filler for rubber/paint. Usable if impurities (Fe, Ti) are low — current TiO2 (~6%) and Fe2O3 (~5.7%) may limit some high-brightness uses.
- Gibbsite / Al-bearing phases: indicates potential aluminum resource (bauxite precursor) but with Al2O3 ~31.6% the sample is lower grade for direct Al production; beneficiation and silica reduction would be required.
- Ilmenite/TiO2: ilmenite is a Ti resource for pigment (TiO2) or Ti metal feed — but economic viability depends on ilmenite abundance and grain size; here ilmenite = 7% (XRD) and TiO2 = 5.96% (XRF) suggesting low-to-moderate potential.
- Mg-calcite: limited commercial value (<10%) — can be used as filler or soil amendment.

Overall: material is more suitable as industrial mineral feedstock (ceramics, filler, construction) or possibly as a low-grade bauxite/ilmenite deposit after beneficiation rather than as a primary metallurgical ore without processing.

Final Results (concise)

- XRD major phases (wt%): Kaolinite 46.20, Gibbsite 8.65, Mg-Calcite 8.15, Ilmenite 7.00 (sum = 70%). Amorphous = 30%.
- Bulk XRF (wt%): see Table in Section 2.
- Inferred amorphous composition (normalized to amorphous 100%): top components — SiO2 ~40.7%, Al2O3 ~25.6%, LOI ~14.1%, TiO2 ~7.6%.
- Interpretation: Highly weathered residual (lateritic / bauxitic) material with detrital heavy minerals (ilmenite). Follow-up recommended as above.

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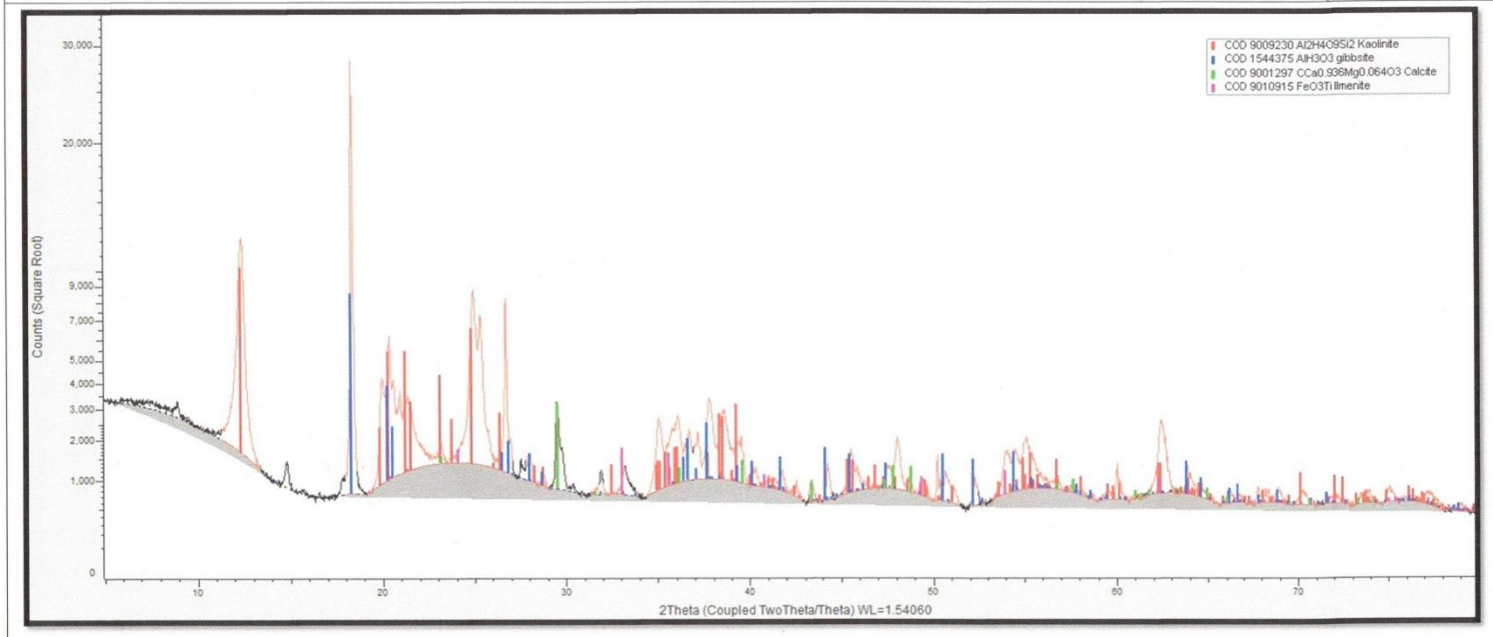
BRUKER D8 ADVANE XRD TEST DATA

G2296-6 T23/RB/2025/01 XRD Scan Report_1 of 2



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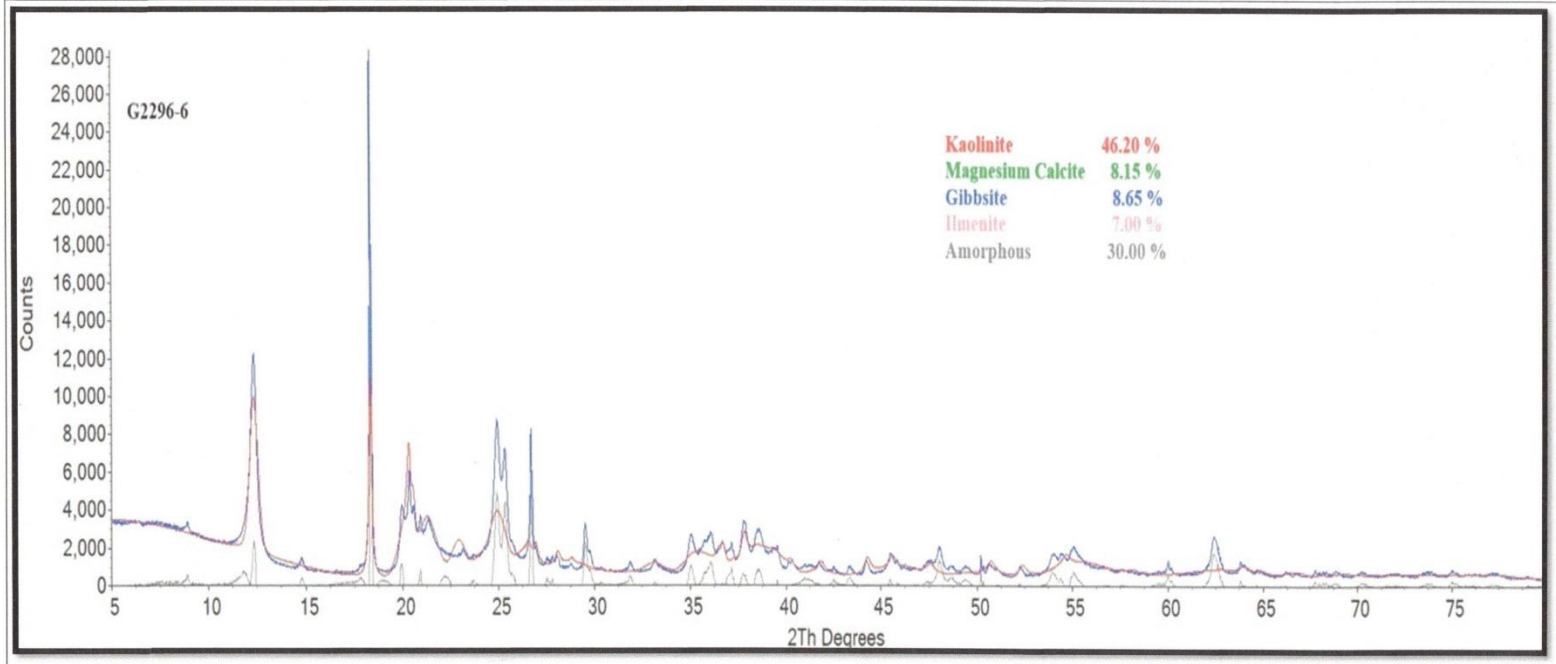
BRUKER D8 ADVANE XRD TEST DATA

G2296-6 T23/RB/2025/01 XRD Scan Report_2 of 2



Prepared by: Nagaraj Singh

Verified by: Satyanarayana

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ANNEXURE – XX

Statement showing details of drill core samples analysis of Major oxides, REE, and Ga in the Reldi Moti area, Kachchh district, Gujarat, (as received from Lucid laboratory, Hyderabad)

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd.
Testing to the Core

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

Report No : LL/25-26/006537 (1-40)
Report Issue Date : 29.09.2025
Date of Receipt of Sample : 13.09.2025
Date of Starting of Analysis : 15.09.2025
Date of Completing of Analysis : 29.09.2025

Sample Particulars: Bauxite Samples.
Sample Qty : 500g x 40 N
Test Parameters: Silica as SiO2, Aluminium as Al2O3, Iron as Fe2O3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na2O, Potassium as K_2O Titanium as TiO2,Phosphorus as P2O5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Loss on Ignition (LOI) (% by mass)	Vanadium as V (ppm)
01	LL/25-26/006537-01	D/RMT- BH- 01/01	22.18	39.18	2.09	0.03	2.07	3.00	0.39	0.16	6.17	0.21	23.80	247.3
02	LL/25-26/006537-02	D/RMT- BH- 01/02	16.60	48.76	1.29	0.01	0.21	0.38	0.25	0.09	6.80	0.26	24.41	313.5
03	LL/25-26/006537-03	D/RMT- BH- 01/03	22.94	44.95	1.23	0.01	0.26	1.04	0.28	0.16	6.59	0.46	21.54	334.6
04	LL/25-26/006537-04	D/RMT- BH- 01/05	20.92	46.23	1.42	0.01	0.27	0.18	0.24	0.08	7.56	0.47	22.23	357.8
05	LL/25-26/006537-05	D/RMT- BH- 01/06	13.80	40.17	9.38	0.01	0.40	5.30	0.25	0.15	5.64	0.61	23.94	422.8
06	LL/25-26/006537-06	D/RMT- BH- 01/07	29.12	39.28	5.44	0.01	0.20	0.31	0.31	0.03	7.27	0.42	17.11	428.1
07	LL/25-26/006537-07	D/RMT- BH- 01/08	26.46	40.42	3.77	0.01	0.24	1.76	0.31	0.03	7.30	0.60	18.74	366.7
08	LL/25-26/006537-08	D/RMT- BH- 01/09	31.89	30.58	18.77	0.01	0.13	0.26	0.35	0.04	4.99	0.34	12.47	687.9
09	LL/25-26/006537-09	D/RMT- BH- 01/10	36.87	33.01	11.83	0.01	0.25	0.43	0.41	0.04	4.66	0.23	12.05	570.0
10	LL/25-26/006537-10	D/RMT- BH- 02/01	49.91	17.41	7.51	0.08	2.64	7.87	1.09	1.63	0.77	0.14	10.20	72.1
11	LL/25-26/006537-11	D/RMT- BH- 02/02	39.00	15.17	3.89	0.09	2.50	17.63	1.07	1.07	0.52	0.09	18.70	20.8
12	LL/25-26/006537-12	D/RMT- BH- 02/04	49.64	18.37	5.28	0.08	3.21	8.43	1.48	1.48	0.60	0.13	10.94	42.2
13	LL/25-26/006537-13	D/RMT- BH- 02/06	61.54	18.15	7.12	0.07	2.18	0.82	1.62	1.62	1.27	0.16	5.45	88.4
14	LL/25-26/006537-14	D/RMT- BH- 02/08	59.18	19.01	6.69	0.06	2.75	0.67	2.48	2.48	1.07	0.17	5.18	91.8
15	LL/25-26/006537-15	D/RMT- BH- 03/01	39.12	11.88	6.65	0.15	2.33	19.09	0.40	0.40	1.35	0.05	18.27	61.8
16	LL/25-26/006537-16	D/RMT- BH- 03/02	46.99	16.41	22.29	0.33	1.30	1.89	0.20	0.20	1.96	0.20	7.89	503.7
17	LL/25-26/006537-17	D/RMT- BH- 03/05	58.21	14.35	7.10	0.12	2.13	5.64	0.39	0.39	1.68	0.06	9.48	85.5
18	LL/25-26/006537-18	D/RMT- BH- 03/09	51.72	14.33	7.03	0.12	2.44	9.13	0.35	0.35	1.53	0.07	12.41	90.4
19	LL/25-26/006537-19	D/RMT- BH- 04/01	31.65	21.84	27.32	0.44	0.66	2.86	0.28	0.28	1.86	0.27	12.18	544.2
20	LL/25-26/006537-20	D/RMT- BH- 04/02	30.72	21.05	27.35	0.07	0.64	4.22	0.25	0.25	1.92	0.28	12.92	523.8

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

Page No. 1/2

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

TEST RESULTS OF BAUXITE SAMPLES

LUCID Laboratories Pvt. Ltd.
Testing to the Core

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

Report No : LL/25-26/006537 (1-40)
Report Issue Date : 29.09.2025
Date of Receipt of Sample : 13.09.2025
Date of Starting of Analysis : 15.09.2025
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Sample Particulars: Bauxite Samples.
Sample Qty : 500g x 40 N
Test Parameters: Silica as SiO2, Aluminium as Al2O3, Iron as Fe2O3, Manganese as MnO, Magnesium as MgO ,Calcium as CaO, Sodium as Na2O, Potassium as K_2O Titanium as TiO2,Phosphorus as P2O5,Vanadium as V ,Loss on Ignition.

Sl.No	Lab. No.	Sample No	Silica as SiO_2 (% by mass)	Aluminium as Al_2O_3 (% by mass)	Iron as Fe_2O_3 (% by mass)	Manganese as MnO (% by mass)	Magnesium as MgO (% by mass)	Calcium as CaO (% by mass)	Sodium as Na_2O (% by mass)	Potassium as K_2O (% by mass)	Titanium as TiO_2 (% by mass)	Phosphorus as P_2O_5 (% by mass)	Loss on Ignition (LOI) (% by mass)	Vanadium as V (ppm)
21	LL/25-26/006537-21	D/RMT- BH- 04/03	36.33	23.89	22.84	0.05	0.51	1.92	0.27	0.23	2.20	0.21	11.33	470.4
22	LL/25-26/006537-22	D/RMT- BH- 04/04	36.44	23.67	24.13	0.04	0.58	1.45	0.41	0.22	2.01	0.22	10.64	493.8
23	LL/25-26/006537-23	D/RMT- BH- 04/05	40.06	25.04	19.24	0.03	0.52	1.13	0.60	0.24	2.13	0.20	10.56	418.2
24	LL/25-26/006537-24	D/RMT- BH- 04/06	37.13	25.45	21.46	0.04	0.45	0.96	0.64	0.22	2.14	0.20	11.12	484.8
25	LL/25-26/006537-25	D/RMT- BH- 04/07	39.41	26.08	16.80	0.04	0.58	1.94	0.85	0.28	2.19	0.17	11.33	345.2
26	LL/25-26/006537-26	D/RMT- BH- 04/08	42.45	27.71	13.91	0.02	0.51	0.65	1.03	0.27	2.22	0.16	10.75	330.3
27	LL/25-26/006537-27	D/RMT- BH- 04/09	38.72	27.65	16.40	0.03	0.63	0.97	0.96	0.24	2.54	0.19	11.29	333.3
28	LL/25-26/006537-28	D/RMT- BH- 05/01	47.41	27.57	7.07	0.05	0.52	2.68	0.38	0.83	2.27	<0.01	10.67	184.3
29	LL/25-26/006537-29	D/RMT- BH- 05/02	46.53	31.74	5.04	0.04	0.47	0.94	0.73	0.72	2.69	<0.01	10.64	169.8
30	LL/25-26/006537-30	D/RMT- BH- 05/03	39.59	34.82	6.43	0.03	0.50	0.33	0.86	0.50	2.77	0.13	13.23	252.9
31	LL/25-26/006537-31	D/RMT- BH- 05/04	39.47	35.62	3.47	0.01	0.30	0.16	1.14	0.45	3.05	0.16	15.68	144.7
32	LL/25-26/006537-32	D/RMT- BH- 05/05	38.53	35.81	2.99	0.01	0.20	0.17	1.20	0.42	3.46	0.20	16.37	163.6
33	LL/25-26/006537-33	D/RMT- BH- 05/06	38.53	36.09	3.45	0.01	0.30	0.16	1.11	0.31	3.73	0.19	15.70	211.8
34	LL/25-26/006537-34	D/RMT- BH- 05/07	25.38	40.08	4.51	0.01	0.23	0.24	2.77	0.35	2.77	0.29	22.63	410.1
35	LL/25-26/006537-35	D/RMT- BH- 05/08	35.57	38.27	2.64	0.01	0.20	0.17	1.40	0.48	3.08	0.32	17.11	220.9
36	LL/25-26/006537-36	D/RMT- BH- 05/09	36.45	36.01	6.07	0.01	0.18	0.17	1.12	0.39	3.56	0.34	15.16	354.3
37	LL/25-26/006537-37	D/RMT- BH- 05/10	40.00	35.76	5.66	0.01	0.22	0.13	0.74	0.30	3.45	0.18	12.98	303.3
38	LL/25-26/006537-38	D/RMT- BH- 05/11	39.59	35.86	4.20	0.01	0.31	0.18	1.01	0.37	3.69	0.30	13.76	200.8
39	LL/25-26/006537-39	D/RMT- BH- 05/12	38.25	34.60	8.63	0.01	0.23	0.38	0.72	0.23	3.35	0.23	12.89	387.3
40	LL/25-26/006537-40	D/RMT- BH- 05/13	38.83	35.89	5.22	0.01	0.24	0.24	0.94	0.32	3.34	0.34	14.24	305.8

Test method: SOP-OM-03,**Instrument Used :** WD-XRF
Note: The above results are expressed on dry basis.

Page No. 2/2

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

TC-5918

LUCID Laboratories Pvt. Ltd.
Testing to the Core

TEST RESULTS

Issued to:
Critical Mineral Trackers,
N.No 7-1-58/CC/406, 'Concourse ', Opp.Lal Bungalow
Greenlands,
Hyderabad-500 016

ULR : TC591825000003171F
LAB REGISTRATION NO: LL/25-26/006537(1 to 12)
Date. Of Receipt of Sample : 13.09.2025
Date. Of Starting of Analysi : 15.09.2025
Date. Of Completing of Analysis : 27.09.2025

Sample Particulars: Bauxite Samples.
Sample Qty : 500g x 12Nos

S. No	Sample ID	Reg No	Cerium as Ce (ppm)	Dysprosium as Dy (ppm)	Erbium as Er (ppm)	Europium as Eu (ppm)	Gadolinium as Gd (ppm)	Holmium as Ho (ppm)	Lanthanum as La (ppm)	Lutetium as Lu (ppm)	Neodymium as Nd (ppm)	Praseodymium as Pr (ppm)	Sameriu m as Sm (ppm)	Scandium as Sc (ppm)	Terbium as Tb (ppm)	Thorium as Th (ppm)	Thullium as Tm (ppm)	Ytterbium as Yb (ppm)	Yettrium as Y (ppm)	Uranium as U (ppm)	Gallium as Ga (ppm)	Vanadium as V (ppm)	Titanium as TiO2 (% by mass)
1	D/RMT-BH-01/02	6537/02	169.1	5.9	36.6	3.8	11.9	<1.0	66.8	<1.0	446.5	18.8	14.5	19.5	<1.0	28.9	<1.0	2.2	16.2	<1.0	61.00	314.0	7.56
2	D/RMT-BH-01/08	6537/07	534.4	15.7	44.6	10.7	35.5	<1.0	259.9	1.1	667.5	67.1	43.7	40.1	<1.0	52.5	<1.0	4.4	35.0	<1.0	48.36	367.0	8.00
3	D/RMT-BH-02/04	6537/12	47.1	3.2	4.6	<1.0	12.6	<1.0	31.1	1.3	57.7	10.2	5.3	12.6	<1.0	52.6	<1.0	2.6	15.8	36.6	16.37	42.0	0.55
4	D/RMT-BH-02/08	6537/14	67.2	4.9	7.0	1.7	15.9	<1.0	36.3	1.5	88.0	13.4	7.3	14.7	<1.0	61.0	<1.0	3.6	28.0	36.4	25.29	92.0	1.21
5	D/RMT-BH-03/05	6537/17	70.1	3.9	9.0	1.2	14.2	<1.0	38.2	1.4	114.4	14.3	6.0	13.7	<1.0	63.9	<1.0	3.0	18.4	18.5	<1.0	86.0	1.42
6	D/RMT-BH-03/09	6537/18	73.8	4.3	8.3	1.2	14.7	<1.0	40.7	1.5	107.4	11.4	6.6	12.0	<1.0	59.6	<1.0	3.0	20.8	35.4	12.65	90.0	1.61
7	D/RMT-BH-04/03	6537/21	93.4	3.8	14.1	3.8	47.0	<1.0	57.2	5.4	164.0	39.1	13.4	28.7	<1.0	231.6	<1.0	7.6	19.1	207.9	34.22	470.0	2.83
8	D/RMT-BH-04/06	6537/24	74.6	2.7	12.0	3.0	38.3	<1.0	48.0	4.5	151.0	29.4	9.5	24.3	<1.0	192.1	<1.0	6.2	15.1	192.1	26.04	485.0	2.97
9	D/RMT-BH-05/02	6537/29	103.7	2.3	14.2	1.5	11.4	<1.0	59.7	1.3	175.9	14.0	4.0	16.7	<1.0	71.8	<1.0	3.1	12.6	<1.0	46.12	170.0	3.45
10	D/RMT-BH-05/03	6537/30	103.1	1.2	13.0	1.5	15.0	<1.0	60.3	2.6	164.2	16.1	3.1	17.3	<1.0	97.3	<1.0	3.3	8.4	9.4	58.77	253.0	2.87
11	D/RMT-BH-05/04	6537/31	129.7	1.2	14.4	<1.0	4.1	<1.0	61.4	<1.0	170.7	13.2	2.7	20.9	<1.0	43.1	<1.0	1.5	5.9	<1.0	43.15	145.0	3.63
12	D/RMT-BH-05/09	6537/36	217.0	2.2	17.9	2.5	14.7	<1.0	93.6	1.4	260.5	24.4	8.8	26.2	<1.0	92.9	<1.0	2.9	7.9	<1.0	52.82	354.0	4.71

Test Method: SOP OM-8 and SOP-OM-1, Instrument Used: ICP-OES
Note 1: The above results are expressed on dry basis.

Page 1 of 1

P.V.V. Satya Kumar
Reviewed

A.L.Kanta Rao
AUTHORISED SIGNATORY

Lucid Laboratories Pvt. Ltd.
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E-mail: info@lucidlabsindia.com, website : www.lucidlabsindia.com **CIN No. : U24239TG2004PTC042390**

ANNEXURE – XXI

Statement showing Check sample analysis of Major oxides, REE and Ga (as received from Shiva Analyticals India Pvt. Ltd, Bangalore)

SHIVA
Part of the Cotecna Group

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(Majors)_G3255

Customer Name	**Critical Mineral Trackers an NPEA , Ministry of Mines, GOI, Concource 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	**G3255**
Sample Receipt Date	**27-Nov-26**
Analysis Completion Da	**05-Dec-26**
Date of Reporting	**05-Dec-26**
Sample Count	**4**

S.No	Customer Code	Sample Description	Method	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM/1 05	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM /105	SOP/OM/ 105	SOP/OM/ 103
			LOQ	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.10
			Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			Lab ID	Al2O3	BaO	CaO	Cr2O3	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	SiO2	SO3	TiO2	V2O5	LOI	
1	D/RMT-BH-01/51	Powder	G3255-10	49.44	<0.05	0.33	<0.05	1.81	0.09	0.23	<0.05	<0.08	0.24	14.23	0.26	6.80	<0.05	26.30	
2	D/RMT-BH-01/52	Powder	G3255-11	36.72	<0.05	0.27	<0.05	6.30	<0.05	0.16	<0.05	<0.08	0.49	28.19	0.13	7.85	<0.05	19.45	
3	D/RMT-BH-05/53	Powder	G3255-12	33.52	<0.05	0.15	<0.05	1.48	0.44	0.28	<0.05	0.73	0.19	36.44	3.25	3.78	<0.05	19.43	
4	D/RMT-BH-05/55	Powder	G3255-14	18.78	<0.05	1.56	<0.05	28.55	0.20	0.47	<0.05	0.15	0.28	33.13	0.10	2.28	0.08	14.29	

Abbreviations:

LOQ– Limit of Quantification
SOP/OM/105: Borate Fusion Bead followed by WDXRF Finish
SOP/OM/103: Loss On Ignition @1000°C

Mr. SATYANARAYANA - Head - 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 inany advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required,please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

Prepared by: Naveen
Verified by: Satyanarayana

Page No.1 of 1

SHIVA
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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(REE)_G3255

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	**G3255**
Sample Receipt Date	**27-Nov-25**
Analysis Completion Date	**05-Dec-25**
Date of Reporting	**05-Dec-25**
Sample Count	**5**

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	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)	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	0.5	0.5	0.5	0.5	0.5
			Lab ID	Ga	Sc	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Th	U
1	D/RMT-BH-01/51	Powder	G3255-10	36.36	21.49	15.17	55.33	124.22	15.49	66.26	12.76	2.86	10.84	1.14	6.08	0.74	2.13	<0.5	1.27	<0.5	10.16	2.64
2	D/RMT-BH-05/54	Powder	G3255-13	47.84	34.29	10.46	120.40	282.65	27.78	81.63	10.81	1.97	8.94	0.67	3.26	<0.5	1.56	<0.5	1.13	<0.5	30.71	1.66

Abbreviations
LOQ-Limit of Quantification
SOP/OM/052-- 4 Acid digestion followed by ICPMS Finish

Mr. SATYANARAYANA - Head - 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 inany advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required,please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

Prepared by: Naveen
Verified by: Satyanarayana

Page No.1 of 1

LIST OF PLATES (ENCLOSED SEPARATLY)

Plate No	Title
I	Location Map of Reconnaissance Survey G4 for Bauxite, Ga, V, Ti & REE in Reldimoti Area, Dist : Kachchh, Gujarat
II	Regional Geological Map of Kachchh basin (part) with location of Reldimoti Area, Kachchh district, Gujarat
III	Interpreted Large Scale Geological Map of Reldimoti Area, Dist: Kachchh, Gujarat (1 :12500)
IV	Land use / Land cover map of Reldimoti area, Kachchh district, Gujarat
V	Large Scale Geological Map of outcrops in Reldimoti area, Dist: Kachchh, Gujarat. (1 :12500)
VI	Location of Pits & Trenches on Large Scale Geological Map of Reldimoti Area, Dist: Kachchh, Gujarat.
VII	Lithological map of pits in Reldimoti area, Kachchh district, Gujarat (1:100)
VIII	Assay Map of pits Reldimoti area, Kachchh district, Gujarat (1:100)
IX	Lithological map of Trenches in Reldimoti area, Kachchh district, Gujarat (1:100)
X	Assay Map of Trenches in Reldimoti area, Kachchh district, Gujarat (1:100)
XI	Location of borehole points on Large Scale Geological Map of Reldimoti Area, Dist: Kachchh, Gujarat.
XII	Graphic Lithologs of Boreholes (drilled in) Reldimoti Area, Kachchh district, Gujarat (1:200)
XIII	Assay values of Boreholes (drilled in) Reldimoti Area, Kachchh district, Gujarat (1:200)

CHAPTER – XV

Peer Reviewer comments/ suggestions on "Reconnaissance survey (G4) for Bauxite, Ga, V, Ti and REE in Reldi Moti Area, Kachchh District, Gujarat

Comments on "Geological report on Reconnaissance survey (G4) for Bauxite, Ga, V, Ti, & REE in Reldi Moti area, Kachchh District, Gujarat"

1) To evaluate the potential for bauxite and associated critical minerals (Ga,V,Tiand REE) within the Matanomadh formation in the Reldi Moti block a project of G-4 level exploration was accorded by NMEDT to M/s Critical mineral trackers Ameerpet Hyderabad Telangana in feb 2025 at a cost of Rs. 5494287.

2) Occurrence of small discontinuous pockets of bauxite in the area reported by CGM and GSI are the main basis to take up G-4 level exploration in the area .

3)Major work included large scale Geological mapping on 1: 12,500 scale over an area of 7.95 sq km, pitting (20 pits), trenching (5 trenches of 10*1*1 m) and 120 mtrs of drilling (5 boreholes) .Laboratory studies included analysis of major oxides by XRF, REE elements determination by ICPMS, XRD for mineral phase analysis and petrological studies .

4)Out of 5 bore holes drilled ,only three boreholes intercepted Matanomadh formation while two boreholes encountered younger Khari Nadi formation which is devoid of Bauxite .

5)A total of 20 pit samples and 70 trench samples were collected and analysed for major oxides and 15 selected samples were analysed for Gallium and REE however no anomalous geochemical signatures were noted.

6)A total of 40 borehole core samples were taken up for chemical analysis of major oxides and 12 samples for REE estimation , however no significant anomalous values are recorded.

Following are the observations on work done and report submitted on the project :

All exploratory work like Geological mapping, drilling, Laboratory analysis and petrological studies on samples have been carried out in a systematic manner and details of work are systematically reflected in the report.

Personnel associated with the project are well qualified and experienced and exploratory / laboratory work of the project has been done in a professional manner and has been completed within the stipulated period.

In the report ,between Figure 21 to 36 , few figures are very faint ,values and text shown are not clear . Needful may be done .

Figure 38, 42,43 47.48,52,53,57 and 58 showing variation of major oxides with depth for different boreholes may be redrawn with depth values on y axis rather than on x axis .

At places few spelling mistakes , grammatical mistakes etc are noted ,marked on report which may be improved .

Report submitted on the G-4 level reconnaissance exploratory work carried out is prepared in a very systematic and scientific way which provides background of the project, details of previous work. Details of all exploratory work and laboratory work carried out under this project and their results are well described in text and maps/figures. Maps and Tables in the report are of good quality. The project has been successfully executed and a detailed report has been submitted by Critical Mineral trackers Ameerpet Hyderabad , Telangana .

(Dr AK Chaturvedi)

Additional Director (Retd)

Atomic Minerals Directorate

Deptt of Atomic Energy

PEER REVIEW COMMENTS PERTAINING TO GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G4) FOR BAUXITE, Ga, V, Ti & REE IN RELDI MOTI AREA, KACHCHH DISTRICT, GUJARAT.

S. No	Comments	Peer review comments attempt
1	To evaluate the potential for bauxite and associated critical minerals (Ga, V, Ti and REE) within the Matanomadh formation in the Reldi Moti block, a project of G-4 level exploration was accorded by NMEDT to M/s Critical Mineral Trackers, Ameerpet, Hyderabad, Telangana in Feb 2025 at a cost of Rs. 5494287.	**General observations of the Project**
2	Occurrence of small discontinuous pockets of bauxite in the area reported by CGM and GSI are the main basis to take up G-4 level exploration in the area.	**General observations of the Project**
3	Major work included large-scale geological mapping on 1:12,500 scale over an area of 7.95 sq km, pitting (20 pits), trenching (5 trenches of 10×1×1 m) and 120 mtrs of drilling (5 boreholes). Laboratory studies included analysis of major oxides by XRF, REE elements determination by ICPMS, XRD for mineral phase analysis and petrological studies.	**General observations of the Project**
4	Out of 5 boreholes drilled, only three boreholes intercepted Matanomadh formation while two boreholes encountered younger Khari Nadi formation which is devoid of bauxite.	**General observations of the Project**
5	A total of 20 pit samples and 70 trench samples were collected and analysed for major oxides and 15 selected samples were analysed for Gallium and REE; however, no anomalous geochemical signatures were noted.	**General observations of the Project**
6	A total of 40 borehole core samples were taken up for chemical analysis of major oxides and 12 samples for REE estimation; however, no significant anomalous values are recorded.	**General observations of the Project**
7	All exploratory work like geological mapping, drilling, laboratory analysis and petrological studies on samples have been carried out in a systematic manner and details of work are systematically reflected in the report.	**General observations of the Project**
8	Personnel associated with the project are well qualified and experienced, and exploratory/laboratory work of the project has been done in a professional manner and has been completed within the stipulated period.	**General observations of the Project**
9	In the report, between Figure 21 to 36, a few figures are very faint; values and text shown are not clear. Needful may be done.	**Figures 21 to 36 have been re-entered, and the text is now clearly visible**
10	Figures 38, 42, 43, 47, 48, 52, 53, 57 and 58 showing variation of major oxides with depth for different boreholes may be redrawn with depth values on Y-axis rather than on X-axis.	**Figures 38, 42, 43, 47, 48, 52, 53, 57, and 58 have been redrawn with depth on the y-axis and concentration on the x-axis.**

11	At places, a few spelling mistakes and grammatical mistakes etc. are noted and marked on the report, which may be improved.	**Spelling and grammatical mistakes have been corrected**

All suggestions and modifications indicated in the text, annexures, figures, tables and plates suggested by Peer Reviewer are attended.

CRITICAL MINERAL TRACKERS
1545
HYDERABAD

P. Gandhi

Technical Area Expert