

01/11/2025

To

The Director
National Mineral Exploration Trust
Ministry of Mines
F-114, Shastri Bhawan,
New Delhi-110001

Subject: Submission of Detailed Project Report G-4 Stage Reconnaissance survey for Aluminous Laterite and associated minerals, Umroli Block, Ratnagiri District, Maharashtra



Reference: In Principal approval of TCC NMEDT

Dear Sir,

We are a NABET Accredited Notified Private Exploration Company under the Ministry of Mines, Government of India, Vide Notification SR No. 528 dated 14th September, 2023 under Category-A.

Please refer to the meeting under reference we hereby submitting the detail project report on the above subject to NMEDT (as project approved in principal by TCC NMEDT). It is requested that to kindly consider our DPR for further necessary action.

Regards,

Nitin Kohad
DGM (Business Development/ Geology)

**PROPOSAL FOR RECONNAISSANCE SURVEY (G4 STAGE) FOR
ALUMINOUS LATERITE AND ASSOCIATED MINERALS IN UMROLI
BLOCK, RATNAGIRI DISTRICT, MAHARASHTRA (UNFC: G4)**

COMMODITY: ALUMINOUS LATERITE AND ASSOCIATED MINERALS

BY

**KARTIKAY EXPLORATION AND MINING SERVICES
PRIVATE LIMITED**

PLACE: NAGPUR

DATE: 01.11.2025

Summary of the Block for Reconnaissance survey(G4 Stage)

General/Basic Information about the Proposed Block

Features	Details
Block Name	Umroli block
Exploration Agency	Kartikay Exploration and Mining Services Pvt. Ltd, Nagpur
Commodity	Aluminous Laterite& Associated Minerals
Mineral Belt	Western Ghat(Sahyadri)
Completion period with entire Time Schedule to complete the project	10 Months
Objectives	<p>The area was explored by the Geological Survey of India (GSI) in 2022-23, and the Aluminous laterite reported in the area along with associated critical minerals.Thefollowingobjectivesare to be taken up during the UNFC G4 stage.</p> <ol style="list-style-type: none"> 1.The Geology of the area to be updated at 1:12,500 scale and demarcating the Aluminous Lateritewithstructuralfeatures, i.e.strike,dip,Lineation/foliationetc., 2. The block to be explored by extensive Sampling, Pitting and drilling components based on Geological mapping. 3. Chemical analysis of core samples and surface samples. 4. If, above Exploration strategy is successful, then further course of action will be proposed,i.e demarcation of Aluminous Laterite body and estimation of resources along with associated Minerals as per UNFC norms and Minerals (Evidence of Mineral Content) Rules-2015at the G4level.
Whether the work will be carried out by the proposed agency or through outsourcing, and details thereof. Components to be outsourced and name of the outsource agency	Work will be carried out by the proposed agency (Kartikay Exploration and Mining Services Pvt. Ltd.)
Number of Geoscientists	In Field: 02 Geologists and In Headquarter: 01Geologists

	Expected Field days (Geology, Surveyor)	Details given in the cost sheet		
1.	Location			
	Longitude-Latitude			
		Pillar No	LAT	LONG
		A	17.47627324	73.4260369
		B	17.47606323	73.38789737
		C	17.43860671	73.38839307
		D	17.40115005	73.38888858
		E	17.40113534	73.36400404
		F	17.36719936	73.36525245
		G	17.33326325	73.3665004
		H	17.29932702	73.3677479
		I	17.29913947	73.40829457
		J	17.29894372	73.44884117
		K	17.33713394	73.44853352
		L	17.33678957	73.40726334
		M	17.37365482	73.40693938
		N	17.41051993	73.40661528
		O	17.4105941	73.42908608
		P	17.44343373	73.42756177
	Villages	Umroli		
	District	Ratnagiridistrict		
	State	Maharashtra		
2.	Area (hectares/square kilometres)			
	Block Area	100.63 sq.km		
	Forest Area	Yes		
	Government Land Area	Yes		
	Private Land Area	Yes		
3.	Accessibility			
	Nearest Rail Head	The nearest railway station is Chiplun, which is about 27 km from the Area.		
	Road	The block area is connected by metallic roads and non-metallic roads, and a train. Most of the villages in the area are connected to each other. The nearest railhead is Chiplun and Sindhudurg. The nearest airport to the block is Sindhudurg.		

4.	Hydrography	
	Local Surface Drainage Pattern (Channels)	The Konkan coastal region, stretching about 530 km between the Arabian Sea and the Western Ghats, features rugged terrain with flat-topped hills (210–329 m) and west-flowing streams like the Kapashi River forming a dendritic drainage pattern. The Ratnagiri area has five main soil types: Coarse Shallow Soils on slopes supporting cashew and mango; Medium Deep Soils used for paddy and pulses; fertile Deep Soils in valleys for areca and coconut; Coastal Alluvial Soils, ideal for coconut; and Coastal Saline Soils affected by seawater. The region is rich in vegetation with teak, nilgiri, cashew, mango, and jambhul trees, while major crops include mango, coconut, rice, and jackfruit. The Sahyadri forests and plateaus provide habitats for diverse wildlife such as deer, leopards, boars, and monkeys, forming a balanced and vibrant ecosystem.
	Rivers/Streams	The Kapashi River flows from east to west through the area.
5	Climate	
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	Mean Annual Rainfall	The normal annual rainfall for the districts is 2657.8 mm to 3973.4 mm.
	Temperatures	The annual temperature varies from 15°C in winter to below 45°C in summer.
6	Topography	
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	Topo sheet Number	SOI47G/7
	Morphology of the Area	Physiographically, the study area lies within the Konkan coastal region and is characterised by a rugged landscape consisting of low-lying hillocks and plateaus. The terrain is dissected by deep, narrow streams that flow westward into the Arabian Sea. Most hillocks are flat-topped, aligned in a NW–SE direction, with elevations ranging from 210 to 329 m above mean sea level (MSL).
7	Availability of baseline geoscience	
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	data	
	Geological Map (1:50K/25K)	Bhukosh Portal (available map 1:50,000 scale) NGCM Stage GSI Report
	Geochemical Map	GSI collected samples inthe area in FS 2022-23
	Geophysical Map (Aeromagnetic, ground geophysical, and Regional as well Also calibrated scale maps)	NA

<p>8 .</p>	<p>Justification for taking up Preliminary Exploration.</p>	<p>GSI has carried out the NGCM programme during 2022-23 in 1392 sq km in toposheet no 47G/7 & 08 (1: 50,000) has shown good potential for aluminous laterite along with associated REE and critical minerals V, Ga, TiO₂, Sc, Ba, Ni, Co, Be & Sn.</p> <p>The Geological Survey of India (GSI) has recommended further investigation into the concentrations of tin (Sn) in the Study area, specifically over the basalts of the Purandargarh and Diveghat Formations. Additionally, there are elevated values of vanadium (V) observed in the southern part of Basani, particularly over alluvium and laterite.</p> <p>The team of Geologists of KEMSPL has visited the proposed area, collected samples and observed encouraging analytical results.</p> <p>It will help for a complete reassessment of the entire area for aluminous laterite and associated critical minerals.</p>
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DETAILED PROPOSAL PROPOSAL FOR RECONNAISSANCE SURVEY (G4 STAGE) FOR ALUMINOUS LATERITE AND ASSOCIATED MINERALS BLOCK IN UMROLI BLOCK, RATNAGIRI DISTRICT, MAHARASHTRA (UNFC: G4)

Introduction

1.1.0 In view of the auction policy of the Government of India and demand of more explored blocks Government of India amended the MM (D & R), 1957 in 2021 allowing Private Agencies to be stakeholders in the exploration of major minerals in a time-bound manner, in which the funds will be provided by the NMET instituted by Govt. Of India (Notification, NPEA, 2021). Major thrust given for the exploration of critical minerals, which is essential for the techno-economic growth of the nation. It enhances the nation's position in the global supply chain.

The area is well known for the occurrence of aluminium laterite in the Western Ghats. Worldwide laterite is targeted for significant occurrence and a secondary potential source for chromium, Nickel, Cobalt, Titanium, Vanadium, Gallium, Lithium, REE & so more. The laterite deposits may be named as the occurrence of dominant minerals like: a. Aluminous laterite (Bauxite) b. Ferruginous laterite (Iron ore) c. Manganiferous laterite (Mn ore) d. Nickeliferous laterite (Ni ore) e. Chromium laterite (Chromium ore).

1.1.2 The weathering process leaches these metals from the rocks and deposits them in the laterite profile, which can have having thickness in meters and can be targeted and extracted easily from the profile section. The laterisation process often produces a concentration of these metals with a factor of 3 to 30 times the metal content. The proposed area has the Aluminium Laterite, which is known for Bauxite ore as well as the potential host for the critical minerals like Cobalt, Vanadium, Gallium, Hafnium, Chromium, niobium etc.

1.1.3 Accordingly, Kartikay Exploration and Mining Services Private Limited has formulated the exploration proposal Umroli Block for aluminous laterite and Associated minerals and is being put up to the TCC meeting for Technical evaluation.

1.2.0 Previous work

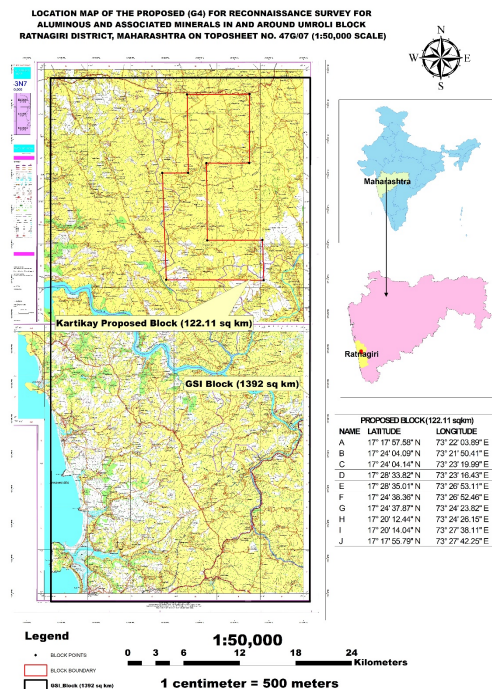
The area covered under T.S. No. 47G/07 was initially mapped by A. R. Patil during the field season 1967–68 on a 1:50,000 scale. Subsequent geological investigations were carried out by B. Sen during the field season 2005–06, who reported that the region is predominantly occupied by aa-type basaltic lava flows. These flows were grouped into four units, namely B, C, D, and E, belonging to the Diveghat

Based on the lithostratigraphic classification proposed by Godbole et al. (1996), a total of four distinct lava flows are recognised in the area, all assigned to the Diveghat Formation. The exposed flows consist of both aa and pahoehoe types and form a 307 m thick lava pile. The pahoehoe flows are compound in nature, characterised by multiple flow lobes, each with well-developed chilled margins. These features reflect multiple eruptive episodes and help in establishing stratigraphic correlations within the formation.

During the Field season program 2022–23, the Geological Survey of India (GSI) conducted geochemical mapping over a total area of 1,392 sq km, covering the regions represented in toposheet numbers 47G/07 and 47G/08 at a scale of 1:50,000. The primary objective of this project was to generate a comprehensive geochemical database for degree sheet 47G of Maharashtra State, utilising multi-elemental analyses to document the spatial distribution and concentration of various elements across the study area.

1.3.0 Location and Accessibility

The Umroli Block area is located near the town of Chiplun, approximately 23 to 24 kilometres east of Umroli along the Marg Thamne Road. This region is conveniently connected by state highways, linking Guhaghar directly to Chiplun, making it easily accessible for travellers. The nearest railway station, Chiplun, further enhances the area's connectivity. The landscape and features of the Umroli Block can be found on the SOI toposheet, specifically map number 47G/07, offering a detailed view of this picture of the region.



1.4.0 Physiography & Drainage

The Konkan coastal region, located between the Arabian Sea to the west and the Western Ghats to the east, extends for about 530 km from the Daman Ganga River in the north to the Terekhol River in the south. The study area is characterised by rugged terrain comprising low-lying, flat-topped hillocks and plateaus ranging in elevation from 210 to 329 m above mean sea level, dissected by deep, narrow streams flowing westward. The drainage pattern is predominantly dendritic to sub-dendritic, strongly influenced by the underlying lithology. Major rivers include Kapshi, supported by numerous tributaries and streamlets that shape the landscape.

1.5.0 Climate and Vegetations

The soils of the Ratnagiri region can be grouped into five major types. Coarse Shallow Soils, reddish brown and low in fertility, occur on hill slopes and support cashew and mango. Medium Deep Soils, reddish yellow, locally known as *Mal*, *Kuyat*, or *Panthal/Vaigan*, are used for paddy during Kharif and pulses or summer paddy in Rabi. Deep Soils, found in river valleys, are fertile and suitable for areca nut and coconut. Coastal Alluvial Soils are deep sandy loams ideal for coconut and areca nut, while Coastal Saline Soils (*Khar*, *Khajan*, *Kharvat*) occur along the coast due to sea water intrusion.

The area is largely forested with species like teak, nilgiri, cashew, mango, and jambhul. Major crops include mango, coconut, jackfruit, betel nut, rice, and ragi. Grass, shrubs, and cacti grow on hill slopes and plateaus. The Sahyadri forests and plateaus provide habitats for monkeys, deer, foxes, hyenas, bears, wild boars, leopards, pangolins, and smaller animals like shrews and mongooses, supporting a rich and balanced ecosystem.

2.0 Regional Geology and Structure

The study area is predominantly occupied by basaltic lava flows belonging to the Sahyadri Group of the Deccan Trap Supergroup. These flows are of Upper Cretaceous to Palaeocene age and are regionally overlain by laterite of Cenozoic age. Based on the lithostratigraphic classification proposed by Godbole et al. (1996), the basaltic sequence of the area has been classified into the Diveghat Formation and Purandargarh Formation.

Purandargarh Formation is represented mainly by *aa* and simple pahoehoe lava flows. This formation is prominently developed in the central and southern part of the study area and has a maximum exposed thickness of about 525 m.

Diveghat Formation consists largely of aphyric *aa* lava flows, with rare pahoehoe flows that serve as excellent marker horizons for stratigraphic correlation. The total exposed thickness of this formation reaches up to 375 m.

In toposheet 47G/07, the basaltic lava pile attains a total thickness of about 318 m, with individual flows varying in thickness from 20 m to 30 m. The pahoehoe flows

are compound in nature and consist of multiple flow lobes, each with distinct chilled margins. These flows are moderately phyric, containing medium-sized plagioclase

laths as the main phenocrystic phase. The *aa* lava flows, on the other hand, are

moderately to highly phyric and characterised by the presence of medium-sized plagioclase phenocrysts. At places, a glomerophyric texture is also observed. Some flows exhibit well-developed colonnade structures. The tops of flows are marked by the occurrence of fragmentary breccia and red boles, while flow boundaries are recognised based on morphological characteristics, megascopic features, and the presence of bole horizons.

A lateritic cover of Cenozoic age is developed extensively over the basaltic lava flows. This laterite exhibits an undulating contact with the underlying basalt and is distributed widely throughout the study area in both the toposheets. It is predominantly ferruginous in nature, with occasional aluminous streaks. The maximum thickness of the laterite is recorded near Musalmanwadi, where it reaches up to 80 m.

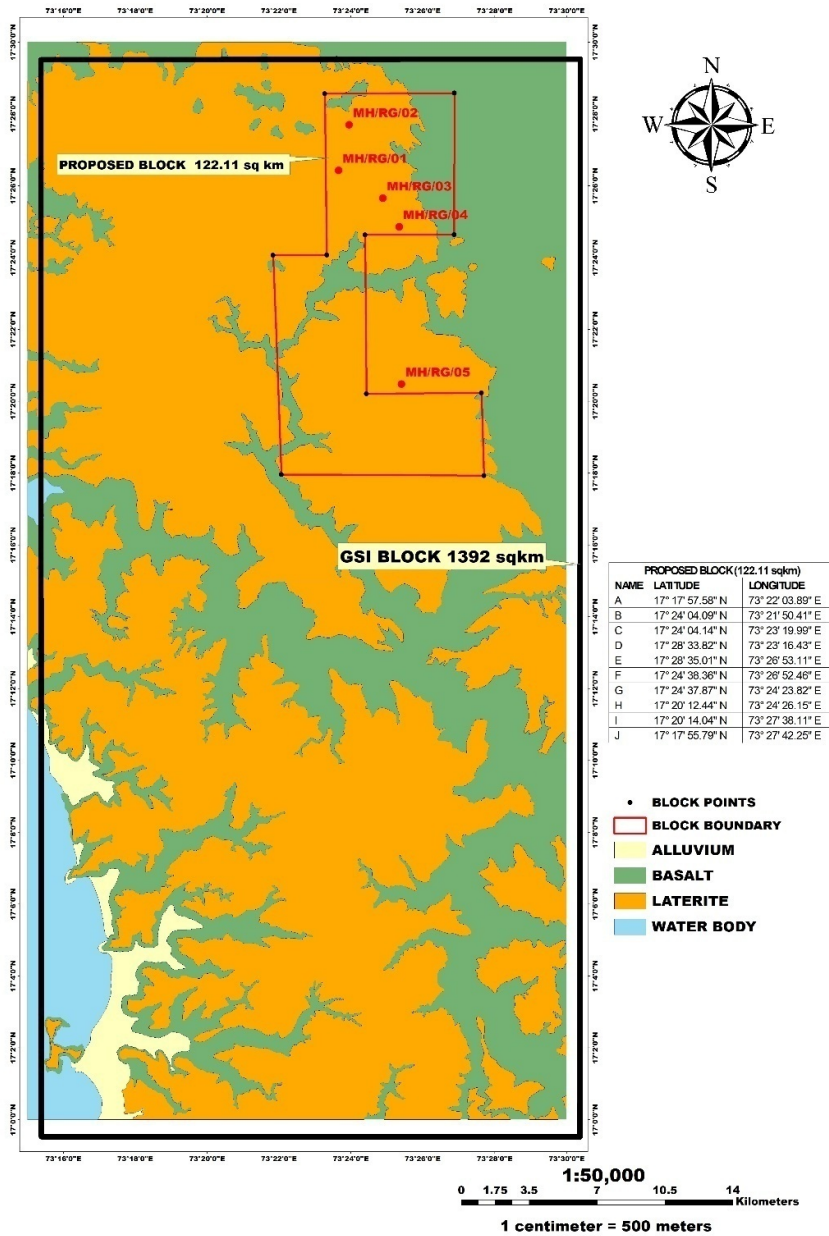
Structurally, the basaltic flows of the region exhibit a gentle westerly dip with a gradient of approximately 1:130. A minor fault trending north–south is inferred near Kharviwada, with a throw of less than 10 m. Numerous fractures are observed within the basalt, showing prominent trends in NNW–SSE, N–S, and E–W directions. These structural features, along with the flow morphology and lateritic capping, provide significant insight into the volcanic and post-volcanic history of the area.

Stratigraphy of the Area

Supergroup	Group	Formation	Lithology	Age
			Alluvium	Holocene
			Laterite	Cenozoic
Deccan Trap	Sahyadri	Purandargarh	Basalt	Upper Cretaceous to Paleocene
			Basalt	
			Basalt	
			Basalt	
		Devi ghat	Basalt	
			Basalt	
			Basalt	

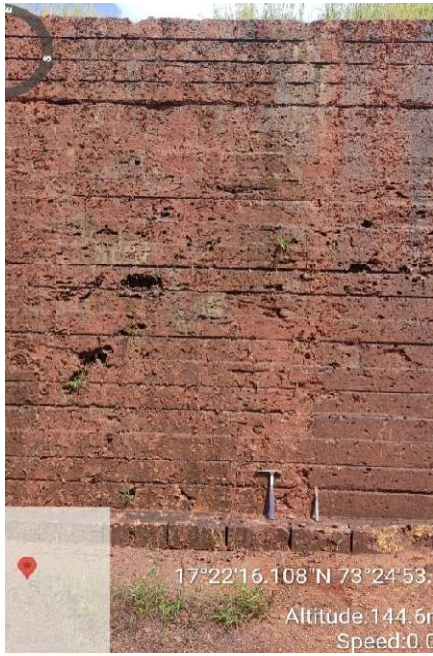
Source from GSI

GEOLOGICAL MAP OF THE PROPOSED (G4) FOR RECONNAISSANCE SURVEY FOR ALUMINOUS AND ASSOCIATED MINERALS IN AND AROUND UMROLI BLOCK RATNAGIRI DISTRICT, MAHARASHTRA

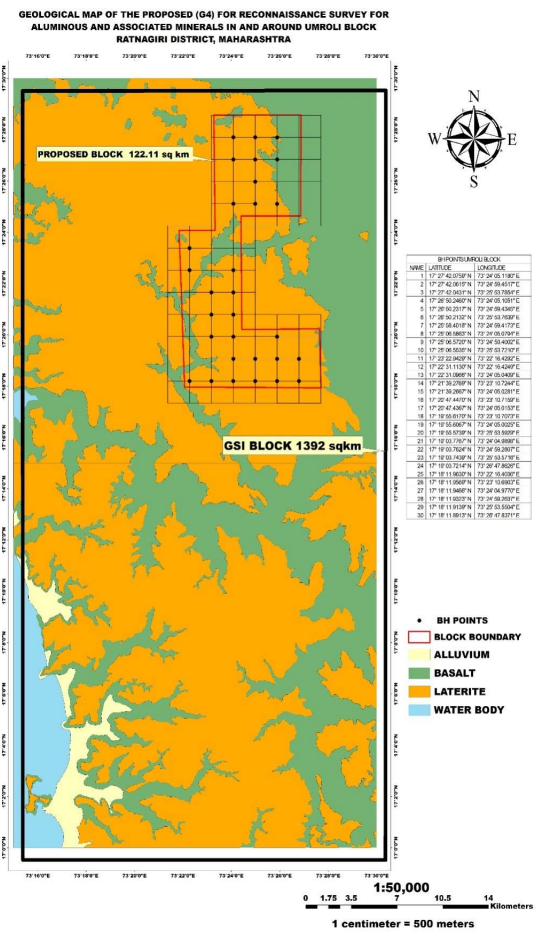


Geology of the Umroli block Prospect:

The study area features basaltic lava flows from the Sahyadri group of the Deccan Trap Supergroup, dating to the Upper Cretaceous to Paleocene period. Cenozoic age laterite has developed as a capping layer over these basaltic lava flows.



Field Photograph showing exposures of Aluminous Laterite



Tentative Borehole Locations on Proposed Area

Description of lithology

Laterite:

Laterite in the area forms a capping over the basalt flows and exhibits an undulating contact. It is extensively present throughout the study area, as indicated in both toposheets. The laterite is highly ferruginous, with some aluminous streaks. The maximum thickness of the laterite reaches approximately 80 meters, particularly near Musalmanwadi.

Basalt:

The basalt flows consist of both "aa" and pahoehoe types and are part of a lava pile that is 318 meters thick. Individual flows vary in thickness from 20 to 30 meters. The pahoehoe flows are compound in nature, comprising several flow lobes, each with its own chilled margin. These flows are moderately phyric, featuring medium-sized plagioclase laths as the primary phenocryst. In contrast, the basalt of the "aa" flows is moderately to highly phyric and also contains medium-sized plagioclase phenocrysts. At times, a glomerophyric texture can be observed. Some of the flows exhibit well-developed colonnade structures. The tops of the flows are characterised by the presence of fragmentary breccia and red boles. Flow contacts are identified

based on flow morphologies, megascopic features, and the occurrence of bole formations.

3.0 Mineral Potentiality based on Geology and Ground Survey

GSI has carried out the NGCM programme during 2022-23 in and around 1320 sq km in toposheet no 47G/7 & 08 (1: 50,000) as shown good potential for aluminous laterite along with associated REE and critical minerals V, Ga, TiO₂, Sc, Ba, Ni, Co, Be & Sn.

The Geological Survey of India (GSI) has recommended further investigation into the concentrations of tin (Sn) in the Study area, specifically over the basalts of the Purandargarh and Diveghat Formations. Additionally, there are elevated values of vanadium (V) observed in the southern part of Basani, particularly over alluvium and laterite.

In the Laterites and basalt, GSI examined geochemical mapping in Ratnagiri

District, Maharashtra for the year 2022-23, where various base metals and critical minerals are showing values exceeding the threshold.

According to NGCM data, various minerals such as Aluminium, Titanium,

Vanadium, Gallium, Nickel, and Cobalt show significant potential in the proposed area.

Based on the field observation, laterite in the quarry profile section is highly ferruginous, with notable white patches. The top layer of the laterite is highly oxidised, limonitized, and exhibits significant hardness.

Analytical result Samples are collected by KEMSPL are as Below:

SI No.				1	2	3	4	5
Customer Code				MH/RG/01	MH/RG/02	MH/RG/03	MH/RG/04	MH/RG/05
Sample Description				Rock	Rock	Rock	Rock	Rock
Lab Code				G2840-1	G2840-2	G2840-3	G2840-4	G2840-5
Characteristics	Units	LOQ	Method	Test Results				
Alumina as Al ₂ O ₃	%	0.05	SOP/OM/105	25.71	26.75	27.91	30.69	32.86
Silica as SiO ₂	%	0.05	SOP/OM/105	11.76	12.22	15.26	12.78	2.96
Iron as Fe ₂ O ₃	%	0.05	SOP/OM/105	43.08	37.64	34.59	35.16	40.48
Titanium as TiO ₂	%	0.05	SOP/OM/105	2.45	2.28	2.79	2.50	2.88
Calcium as CaO	%	0.05	SOP/OM/105	0.16	1.88	0.99	<0.05	<0.05
Potassium as K ₂ O	%	0.05	SOP/OM/105	0.44	0.44	0.33	0.45	0.09
Sodium as Na ₂ O	%	0.08	SOP/OM/105	<0.08	<0.08	<0.08	<0.08	<0.08
Magnesium as MgO	%	0.05	SOP/OM/105	0.16	0.23	0.18	0.17	0.07
Manganese as MnO	%	0.05	SOP/OM/105	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphorus as P ₂ O ₅	%	0.05	SOP/OM/105	0.21	0.29	0.15	0.20	0.14
Sulphur as SO ₃	%	0.05	SOP/OM/105	0.09	0.12	0.09	0.09	0.09
Loss on Ignition (LOI)	%	0.10	SOP/OM/103	15.56	17.68	17.36	17.58	20.02
Vanadium as V	ppm (mg/kg)	5	SOP/OM/051	964	830	842	873	977
Gallium as Ga	ppm (mg/kg)	10	SOP/OM/051	45	44	44	43	52
Scandium as Sc	ppm (mg/kg)	5	SOP/OM/051	38	38	39	38	51
Chromium as Cr	ppm (mg/kg)	5	SOP/OM/051	571	847	526	487	669
Cobalt as Co	ppm (mg/kg)	5	SOP/OM/051	22	27	14	20	9
Nickel as Ni	ppm (mg/kg)	5	SOP/OM/051	57	75	53	64	19

4.0 Scope of proposed exploration

Geological Mapping: The total block area will be mapped at 1:12,500 scale, highlighting the outcrops of Laterite or Aluminous Laterite in the block area along with the structural details on a plan before commencement of activities like drilling, sampling, and trenching. A geological plan featuring topographical contours, borehole points, surface features, etc., at a 1:12,500 scale is to be prepared. About 125 Nos Bed rock samples will be collected and analysed.

Topographical Survey: The topographical survey in the block will be carried out in a 1:12,500 scale. The survey work will be carried out to fix the boreholes and determine the coordinates of block boundaries and other topographical features, including contouring of roads, water bodies, Village boundaries, etc., within the block during the entire exploration program. A DGPS survey will be conducted to determine the coordinates and reduced levels (RL) of all block boundary coordinates and borehole locations, along with base points. The data collected during the exploration Program will be used in the preparation of the Topographical Map on a 1:12,500 scale.

Shallow Pitting: A Total of 50 shallow pits are proposed in the area to access the soil cover and collection of samples.

Drilling: Based on the outcome of the geological mapping (1:12,500 scale), analytical results of surface and pitting samples, 28 nos. of boreholes at 1600m x 1600m grid to be drilled 50 meters each i.e. a total of 1400m (50mts x 28bhs), core drilling is proposed over the area to intersect the mineralised zone. The boreholes will be judiciously closed by the field geologist after encountering a non-mineralised zone. The proposed locations and depths of the boreholes are tentative, with the final decisions on their placement and closure to be made by the field geologist based on site conditions. Tentative locations and depths have been provided for each block, but these parameters may vary depending on the geological and drilling conditions encountered in the study area.

Core Logging: Geological core logging will be carried out systematically by recording the lithological and structural characters of the formations, with its colour, grain size, core recovery, banding, mineralogical composition, microstructural/structural details, lithological variations, along with a visual estimate in respect of iron ore encountered in the boreholes.

Core Sampling:

Core sampling will obtain continuous subsurface records of the Aluminous Laterite by drilling a grid of boreholes. Cores will be logged systematically with respect to lithology, photographed, and sampled at regular intervals for petrographic, geochemical and basic engineering tests. Standard QA/QC will be applied.

Laboratory Studies: Primary and check samples generated from pits, drill core, and bedrock will be subjected to chemical analysis, Fe₂O₃, MnO, Al₂O₃, P₂O₅, CaO, SiO₂, TiO₂ & LOI with V & Ga, two additional elements. All the samples will be analysed for 34 elements by ICP-MS.

Petrography & Minerography: Study 10. Several samples will be subjected to petrography and minerography studies. 5 Nos will be subjected to XRD minerals phase analysis.

Bulk Density:

Bulk density determinations for limestone will be conducted on intact core samples to provide reliable in-situ mass values for tonnage estimation and block modelling. We will primarily use the water-displacement (Archimedes) method or the sealed-core volume method on undisturbed cores. For highly weathered or broken cores, sealed-container or wax-coating techniques and gamma-density logging will be employed. Bulk density are to be carried out on 25 samples.

Both wet (field/moist) bulk density and dry bulk density (after drying at approximately 105°C) will be reported, along with particle density and calculated porosity when relevant. At least one density determination will be made per lithological unit per borehole, with additional tests at 2 to 5 meter intervals in heterogeneous areas.

QA/QC procedures will include field duplicates, lab blanks and standards, instrument calibration, and using an ISO/IEC 17025-accredited laboratory when possible. The results will support volume-to-mass conversions for resource calculations and assist in mine planning and material handling estimates.