PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR REE AND RARE METALS (RM) MINERALIZATION IN KHAIRLANJI BLOCK, PART OF DISTRICTS – BALAGHAT & SEONI, STATE – MADHYA PRADESH

COMMODITY: REE & RM

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED DR. BABASAHAB AMBEDKAR BHAWAN SEMINARY HILLS

PLACE: NAGPUR DATE: 19th JANUARY 2023

Summary of the Block for Reconnaissance Survey (G-4 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

Features	Details
Block ID	Khairlanji Block
Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
Commodity	REE & RARE METALS (RM)
Mineral Belt	-
Completion Period with entire	15 months
Time schedule to complete the	
project	
Objectives	Based on the evaluation of geological data available, the present
	exploration program has been formulated to fulfill the following
	objectives.
	i. To carry out Geological & Structural mapping on 1:12500
	scale for identification of REE & RM bearing formation (host
	rock) with the structural features to identify the surface
	manifestation and lateral disposition of the mineralized zones.
	ii. To collect surface (Bedrock/stream sediment) samples for
	analyses of REE & RM to decide further course of
	Exploration program.
	iii. To know the subsurface extension of ore body few scout
	boreholes of total depth 500m will be drilled based on
	analytical results of surface samples.
	iv. To estimate reconnaissance resources of REE & RM as per
	UNFC norms and Minerals (Evidence of Mineral Contents)
	Amendment Rules, 2021 at G-4 level mineral exploration.
Whether the work will be carried out	Work will be carried out by the proposed agency.
by the proposed agency or through	
outsourcing and details thereof.	
Components to be outsourced and	
name of the outsource agency	
Name/ Number of Geoscientists	Three nos. of Geoscientist (2 Field + 1 HQ)

	Expected Field days (Geology) G			eologist Party Days: 180 Days				
	Geological	Party Days	S	Survey Party	y Days: 15 Days	5		
1.	Location							
	Corner	GCS, W	GS 1984	ļ	U	ГМ]	
	Points Latitude Long		ngitude	X	Y	-		
	A	21° 39' 33.902" N	79° 30'	7.728" E	345010.933	2395877.857	-	
	В	21° 39' 35.143" N	79° 35'	20.219" E	353994.516	2395831.819	-	
	С	21° 39' 20.994" N	79° 35'	13.224" E	353789.472	2395398.542		
	D	21° 38' 56.684" N	79° 35'	37.722" E	354486.9571	2394644.587		
	E	21° 35' 53.590" N	79° 35'	37.294" E	354423.716	2389014.273		
	F	21° 36' 5.765" N	79° 41'	22.591" E	364357.0853	2389302.01		
	G	21° 35' 4.025" N	79° 41'	28.593" E	364513.7121	2387401.998		
	G-A	Madhy	a Pradesł	n- Maharash	ntra State Bound	lary		
	Villages	Villages		Bhondki	Bhondki, Goreghat, Kurwa, Heti, Khairlanji, Silari, Ambajhiri			
				etc.	etc.			
	Tehsil/ Tal	uk		Katangi	& Kurai			
	District		Balagh		& Seoni			
	State		Madhya		Pradesh			
2.	Area (hect	tares/ square kilomo	eters)					
	Block Area	a		137.3 sq	.km.			
	Forest Are	a		Reserved	l Forest (As per	the validation of	n DSS portal of	
				MoEF, tl	MoEF, the proposed block is Not Inviolate)			
	Governme	nt Land Area		Data Not	Data Not Available			
	Private La	nd Area	d Area Data		Data Not Available			
3.	Accessibil	ity						
	Nearest Ra	il Head		Tumsar I	Railway station	is 37 km SE froi	m the proposed block.	
	Road		Mansar-S	Mansar-Seoni National Highway No. 44 passes 8 km west				
				from pro	posed block, an	d Chicholi- Kata	angi state highway	
				passing f	passing from 3 km east of block boundary.			
	Airport			Nagpur I	International Air	port is 110 km s	south west from the	
				proposed	l block.			
L								

4.	Hydrography	
	Local Surface Drainage Pattern	The area is drained by Bawanthari River and its tributaries.
	(Channels)	Bawanthari River borders the area in the western and southern
		margins. In western part, the Bawanthari has an N-S course
		and in the southwestern corner, near Sitekasa, it takes a sharp
		turn, flows easterly and marks the southern margin of sharp
		turn, flows easterly and marks the southern margin of the area.
		Rajiv Sagar Dam is constructed in Bawanthari river which is
		the major tributary of Wainganga River.
	Rivers/ Streams	Bawanthari river which is perennial.
5.	Climate	
	Mean Annual Rainfall	It receives monsoon rains from July to September and
		experiences maximum rainfall during the months of July and
		august, the average annual rainfall being about 100 cm. The
		climate of the area is moderately dry and wet.
	Temperatures (December) (Minimum)	Minimum temperatures 6°C (winter),
	Temperatures (June) (Maximum)	Maximum temperatures up to 47°C (summer)
6.	Topography	
	Toposheet Number	550/10
	Morphology of the Area	The area mapped is a gently undulating plain with a gentle
		easterly slope. The river Amaravathi meanders through the
		southeastern portion of the proposed block. The average
		elevation ranges from 310 m to 400 m above sea level with
		occasional knolls and hillocks of granites and quartz
		muscovite schist.
7	Availability of baseline geosciences	
	data	
	Geological Map (1:50K/ 25K)	1:50000 (Bhukosh)
	Geochemical Map	NGCM (raw) data from Bhukosh was downloaded, stream
		sediment sample results from NGCM was used to compute
		LREE, HREE & Total REEs and accordingly geochemical

		anomaly map is prepared and presented as plates in this			
		proposal.			
	Geophysical Map	Not Available			
8.	Justification for taking up	i). The National Geochemical Mapping (NGCM) was taken			
	Reconnaissance Survey / Regional	up during the Field Season 2017- 2018, in parts of 55O/10 and			
	Exploration	64C/01, in Balaghat and Seoni district, Madhya Pradesh. the			
		geochemical distribution pattern shown in study area of			
		550/10 have indicated that REE's are more concentrated over			
		Tirodi Biotite Gneiss (TBG) in north of Deori Buzurg village			
		and in north Khanditola village with maximum values of La			
		and Ce analysed are 492 ppm and 763 ppm respectively. Also,			
		it was observed that numbers of pegmatite veins were intruded			
		all through the studied area. Out of which most of the veins			
		contain Mica books along with tourmaline. Hence, further			
		study recommended for pegmatite mapping in view of REE			
		and RM exploration.			
		ii). NGCM raw data from Bhukosh was downloaded and			
		stream sediment sample results from that was used for			
		creating LREE, HREE & Total REE geochemical anomaly			
		map which is presented as plates with this proposal. A clear			
		high geochemical anomaly has been observed in those plates.			
		In the proposed block 36 stream sample were collected by			
		GSI, out of 36 samples 10 stream samples shows Total REE			
		(TREE) of more than 1000 ppm. The TREE value in the			
		proposed block varies from 393.4 to 2151 ppm . HREE and			
		LREE values vary from 71.34 ppm to 211.07 ppm and 321.59			
		ppm to 1939.93 ppm respectively. The concentration of			
		HREE is lesser than that of LREE in the proposed block.			
		iii). GSI had carried out regional assessment (G4 Exploration)			
		for REE & RM in the pegmatite bodies in Sausar Mobile Belt			
		and Tirodi Biotite Gneiss, Nagpur District, Maharashtra, part			
		of Toposheet No. 550/06 & 550/07 which is the adjacent of			

proposed Khairlanji Block. In SEM- EDX studies LREE
bearing monazite and HREE bearing xenotime, and crystals of
columbite have been identified. The analytical results of bed
rock samples reveal the concentration of rare earth elements
within the pegmatites and granite. The chemical analysis
result shows that the highest concentration of $\Sigma REE 6147.23$
ppm is in the talus from southeast of Ramzan village.
GSI Recommendation: The study indicates good potentiality
for REE and RM concentration in pegmatite, hence the
adjoining areas with similar setup should be taken up, for
similar investigation.
iv). Based on the result of NGCM data and G4 exploration
carried out in the adjacent block, same litho unit is continuing
in the study area. Hence, proposed block may be taken for
Reconnaissance Survey (G-4 Stage) to identify the source for
REE and to be establish the resources for auction this block.

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1.0.0 INTRODUCTION

- 1.0.1 Rare earths are characterized by high density, high melting point, high conductivity and high thermal conductance. These unique properties i.e., distinctive electrical, metallurgical, catalytic, nuclear, magnetic and luminescent properties make them indispensable for a variety of emerging high end and critical technology applications relevant to India's energy security i.e., clean energy technology, defense, civilian application, environment and economic areas. Demand for REE is expected to continue to grow, especially because of their use in low carbon technology. The ever-increasing demand for these Rare Metals and REE necessitates a concerted effort to augment the resource position of our country.
- 1.0.2 A study, conducted by the Council on Energy Environment and Water, identified 12 minerals out of 49 that were evaluated as 'most critical' for India's manufacturing sector by Vision 2030 which makes more thrust for exploration in Strategic Mineral, Precious Metals, Platinum Group of Elements by Government of India.

1.1.0 BACKGROUND

1.1.1 The Exploration for strategic, critical, rare metals, rare earths elements, PGE and precious metals is given top priority by Govt. of India after amendment of MMDR act 2015. Keeping this in view, the present proposal is being put up for Reconnaissance Survey (G-4) for REE & RM in Khairlanji Block.

1.2.0 LOCATION AND ACCESSIBILITY

1.2.1 The proposed Khairlanji Block area lies in Katangi Tehsil of Balaghat, and Kurai tehsil of Seoni district Madhya Pradesh and falls in the Survey of India Toposheet No 55O/10. Bhondki, Goreghat, Kurwa, Heti, Khairlanji, Silari, Ambajhiri are the villages falling in the proposed area. Mansar- Seoni National Highway no. 44 is passes 8 km west from the block and Chicholi- Katangi state highway passing from 3 km eastern part of proposed block boundary. Khairlanji village is situated about 16 km in west direction from the National Highway (No.44). All the villages in the area are well connected to each other and to the highways by motorable roads and tracks. The nearest Railway Station is Tumsar about 37

km SE from the proposed block. The nearest airport is Nagpur International Airport at 110 km from the block.

1.3.0 PHYSIOGRAPHY, DRAINAGE AND CLIMATE:

- 1.3.1 The area presents a low rugged topography with some low linear ridges. The maximum and minimum elevation of the area is 410m (Hathigarh ridge) and 304m (Bawanthari River south of Musalkhapa) respectively. The general slope of the area is towards south.
- 1.3.2 The area is drained by Bawanthari River and its tributaries. Bawanthari River borders the area in the western and southern margins. In western part, the Bawanthari has an N-S course and in the southwestern corner, near Sitekasa, it takes a sharp turn, flows easterly and marks the southern margin of sharp turn, flows easterly and marks the southern margin of sharp turn, flows easterly and marks the southern margin of sharp turn, flows easterly and marks the southern margin of sharp turn, flows easterly and marks the southern margin of the area. Rajiv Sagar Dam is constructed in Bawanthari river which is the major tributary of Wainganga River.
- 1.3.3 The climate of the area is moderately dry and wet. It receives monsoon rains from July to September and experiences maximum rainfall during the months of July and august, the average annual rainfall being about 100 cm. The winter season is quite pleasant and starts from November and lasts up to February. The day temperature during winter ranges from 18° to 25°C, whereas night temperature ranges from 6° to 12°C. From March, summer commences and it becomes very hot during the months of April and May with temperatures rising upto 47° C. The night temperature falls appreciably. The night temperature during summer ranges from 25 to 30°C.

1.4.0 FLORA & FAUNA:

Most of the area under the study has thick forest cover comes under North Bawanthari Reserved Forest and Hathigarh Reserved Forest. Forests have been classified as dense mixed jungle with mainly teak plantations and support various species of plants and animals. The forests are tropic mixed and deciduous and include the plant species like Bhora, Bija, Teak, Babool, Kher, Mohua and Bamboo. Apart from this, there are varieties of grass and creepers. The wildlife in the area is confined mostly to reserve forests with Tigers, Leopards, wild boar, Chitals, Bison, Nilgai, spotted deer, Barking deer, red and black faced Monkey and Snakes also inhabitation. Bird varieties including Peacock, wild pigeon, wild duck, Owl, species of sparrows are also found in the area.

2.0.0 REGIONAL GEOLOGY

2.0.1 The area is part of Tirodi Biotite gneissic basement complex and a litho pack of Proterozoic metasedimentary rocks to which Fermor gave the name Sausar Group, which itself is a part of Sausar Belt. The Proterozoic Sausar Belt is located along the southern margin of the Central Indian Tectonic Zone (CITZ) in the Nagpur area, trending in the E-W to ENE-WSW direction with about 20 to 40 km wide and 300 to 350km long. The belt is made up of four major geologic components, from south to north; the southern granulite belt, the supra-crustal metasedimentary rocks of the Sausar Group, reworked inliers of the Tirodi gneiss and the northern granulite belt. The central domain between two granulite belts is composed of the Sausar Group, highly tectonized gneissic rocks and several intrusive granites. Major rock types of these Group/ Super Groups are described in table -1 and for Regional geological map for proposed Khairlanji block, Dist- Balaghat & Seoni, Madhya Pradesh is given as Plate-II.



Fig:1 Geological Map of the Sausar Mobile Belt (After Bhowmik & Pa 2000)

2.0.2 The Sausar Group is divided into six Formations, in ascending order; the Sitasaongi, Lohangi, Mansar, Chorbaoli, Junewani, and Bichua Formations (Narayanaswami et al., 1963; Bandyopadhyay et al, 1995). The Sausar Group comprises of quartzite, pelite and carbonate associations, containing stratiform manganese deposits which form the largest manganese reserves in India (e.g. Dasgupta et al, 1984; Bhowmik et al, 1997). The rocks

are regionally metamorphosed and folded under the upper amphibolite to granulite facies condition, and intercalate tectonized gneissic rocks, which are probably derived from the reworked basements. The basement gneissic rocks, called the Tirodi Gneiss, include mostly tonalitic gneiss and to lesser extent pelitic to psammitic gneisses, calc-silicate gneiss and amphibolite.

2.1.0 STRATIGRAPHY:

2.1.1 The stratigraphic succession proposed for the Sausar Mobile Belt is uncertain to some extent due to absence of any basement-cover relationship and structural and metamorphic complexities. Narayanswami et.al, considered Tirodi gneiss as the basement of the Sausar Group. The contact between Tirodi gneiss and the Sausar Group is mostly tectonised at most places. Recently polymictic conglomerate has been reported at the contact of Tirodi gneiss and the Sausar Group from the locality of Mansar (Mohanty 1993) conforming that Tirodi gneiss is the basement of the Sausar Group. Recent workers (Pal and Bhowmik, 1998; Khan et al., 2000 and Chatopadhyay et al., 2001) on the basis of structural evidences have argued that the TBG is a complex medley of different type of gneisses i.e. biotite gneiss, granite gneiss, migmatite gneiss and patches of older supracrustals forming the crystalline basement. The latest stratigraphy of the area was proposed by Khan et al. (2002) after STM on 1:25,000 scales as given below.

Age	Stratigraphy	Formation	Lithology
	Recent		Alluvium and soil
	Quaternary		Laterite
	Sausar Group	Intrusives	Massive potassic granite, pegmatite, aplite and quartz veins Foliated potassic granite, occasionally rich in biotite and/or fibrolite
		Bichhua Formation	Pure and impure dolomitic marble with subordinate red, yellow and grey chert
(Mesoproterozoic)	Sausar Group	Chorbahuli Formation	Coarse grained, garnetiferous quartz mica schist with local development of magnetite and staurolite: Micaceous and/or cherty ferruginous quartzite and meta-arkose with local development of magnetite and/or garnet

Table- 1The general Stratigrpahic sequence (After, Khan et al. GSI, 2002)

Age	Age Stratigraphy Formation		Lithology		
		Mansar Formation	Biotite (\pm fibrolite) - muscovite-quartz schist with thin bands of quartzite and dolomitic marble and thick horizons of Mn- ore and gondite.		
		Lohangi Formation	Calc silicate rocks, calc-gneiss with subordinate pink calcitic marble and minor Mn ore horizons.		
Sitasaongi Formation		Sitasaongi Formation	Coglomerate, quartzite, quartz mica schist		
Tectonised			Contact		
Archaean)	Pre- Sausar Basement	Tirodi biotite gneiss (TBG)	Multicomponent gneiss e.g. biotite gneiss, migmatite gneiss, quartzo-feldspathic gneiss, felsic gneiss, tonalite-gneiss, cordierite-gneiss etc with small metabasic and mafic granulite enclaves; often highly deformed and converted to biotite-fibrolite-schist		

2.2.0 GEOLOGY OF THE BLOCK

Geologically, the study area is covered by rocks of Tirodi Gneissic Complex Group and 2.2.1 Sausar Group. Tirodi Gneissic Complex Group consist of gneiss of Archaean age whereas Sausar Group of Palaeoproterozoic age is represented by quartz muscovite schist and quartzite of Sitasaongi Formation and calc gneiss and marble of Lohangi Formation, biotite schist, muscovite schist, phyllite, Manganese ore and gondite of Mansar Formation. Intrusive granite of Neoproterozoic age is also present in the study area. Tirodi Biotite gneiss is exposed with continuous outcrop and this is major lithological unit in the study area. These biotite rich quartzo-feldspathic granitic gneisses are intimately associated with the metasediments of the Sausar Group. Quartz Muscovite Schist of Sitasaongi formation belong to Sausar group is exposed in northern and estern part of proposed block. Calcsillicates are mainly exposed in the south western part of the area as linear strike ridges and a few thin bands are exposed 1 km north of Barpani village. The rock is dark colouredmesocratic to melanocratic and mostly massive in character. In outcrop scale, they often show coarse color banding either due to compositional layering or later metamorphic differentiation. Lithology of Mansar formation i.e. muscovite schist and schist are exposed in southern and estern part of block respectively. Marble rock is exposed in north west and north east corner of proposed block which is pure and impure in nature and associated with

subordinate red, yellow and grey chert. In southwestern part of the area, a few small bodies of light coloured foliated granite are exposed. this granite occurs 0.5 km east of Khairlanji, in the Bawanthari River 3 km south of Khairlanji and on the southern bank of Bawanthari River (in Maharashtra) 0.5 km north of Sitakasa. It shows discordant as well as concordant relationship with all the rock units excepting pink pegmatites/granite.

Table - 2

The generalized stratigraphic succession of the proposed block is as follows (After,

GSI)
00-	• /

Age	Age Stratigraphy Formation		Lithology	
		Intrusives	Granite, Pegmatite	
		Bichhua Formation	Marble	
(Masaprotorozoia)	Sausar Group	Mansar Formation	Schist, Muscovite Schist	
(Mesoproterozoic)		Lohangi Formation	calc-gneiss	
		Sitasaongi Formation	Quartz Muscovite Schist	
Tectonised Contact				
Archaean) Pre- Sausar Basement (TBG)		Tirodi Biotite Gneiss (TBG)	Gneiss/Migmatite	

2.3.0 STRUCTURE OF SAUSAR GROUP

2.3.1 Four phases of deformation are associated with the events of metamorphism (D1, D2, D3 and D4) as observed in the rocks of Sausar Group. During first phase of deformation, D1, NNW- SSE trending steep to moderate southwesterly dipping regional pervasive cleavage planes (S1), related to steeply plunging tight isoclinal folds (F1) was formed. During the second phase of deformation, D2, open, upright folds (F2) with nearly E-W to WNW-ESE striking axial planes (S2) were formed. The second phase of deformation, D3 is not well developed and is not associated with any discernible cleavage and/or metamorphic fabric (S3). Fourth generation planar fabric (SS4) has developed only at a few places, mostly in the form of widely spaced fractures and/or solution seams, axial planar to the broad SF4 warps. Pre-Sausar structures are confined within the TBG that structurally underlies the Sausar Group of rocks (SSG). Gneissosity is well developed and represented by penetrative

planar fabric in Tirodi Gneiss. The alternate light and dark coloured fine layers define gneissosity. The light-coloured bands (leucosomes) are predominantly composed of quartz and feldspars whereas the dark-coloured bands (mesosome) are rich in biotite. The bands are 1mm to as much as 6mm in thickness. Banding in migmatite is defined by the alternate leucosomes and mesosome layers. The porphyroblasts of the gneisses are also parallel to gneissosity. Pre- Sausar fold structures are very scanty. A brief description of all the types is given below.

- 2.3.2 **Foliation:** The most prominent planar structure is foliation, present in all the rock types excepting the pink pegmatites. It is well defined by the parallel arrangement of flaky and platy minerals.
- 2.3.3 **Gneissosity:** This structural feature is observed in biotite gneiss and calcsilicates/ amphibolites the gneissosity is developed due to alternate layering of mafic and felsic components.
- 2.3.4 **Crenulation cleavages:** These are noticed within muscovite schists and biotite rich pale somatic patches of biotite gneiss. Down dip lineation is also observed defining the crenulation axis.
- 2.3.5 **Joints:** Two prominent sets of joints are observed affecting all the rock types. Trends of the joints are NW-SE having vertical to subvertical dips, and NE-SW also having vertical dips.
- 2.3.6 **Shear zones:** small shear zones all trending WNW-ESE is noticed near Nangdev and SW of Kosamba. Near Nangdev (0.5 km east) shearing of biotite gneiss is accompanied by intense silicification and pulverization of feldspars. Quartz reefs are highly silicified and brecciated with Recrystallisation of long quartz crystals along some planes, 2.5 km SW of Kosamba. This form a wider zone as the 3 km long quartz reef/pegmatite, exposed along the Kanhargaon-Mahakepar road is completely affected by shearing. Few more quartz reefs present within 1 km north of the major ref also show shearing effects. This area is largely covered by soil and hence effect of shearing on country rock could not be studied.
- 2.3.7 **Folds:** The area has undergone polyphase deformation. Based on direct and indirect evidences, three phases of folding have been recognised. Field evidences, study of aerial photographs and imagery all point to the presence of "S" shaped flexure folds on regional scale, covering the entire area. Imprints of these folds are available on mesoscopic scale in all the rock types.

2.4.0 METAMORPHISM

2.4.1 The Sausar Group of rocks are generally considered as high-grade metamorphic rocks and it has been suggested that partial melting of the metasediments of the Sausar Group has given rise to part of the gneisses (para-gneiss) intimately associated with it. This has created a controversy on the stratigraphic position of "Tirodi Gneiss" vis-a-vis Sausar Group (Phadke 1990). In general, metamorphic grade is highest in the northwestern part of Sausar Fold Belt and. gradually lowers towards east (Narayanswami et. al. 1963). Patches of granulitic rocks are also found in close proximity of the Sausars in Ramakona area (Brown & Phadke 1983).

3.0.0 PREVIOUS WORK - OBSERVATION AND RECOMMENDATIONS

3.1.0 Field Season 2017- 2018: The National Geochemical Mapping (NGCM) was taken up, vide item no. 044/GCM/CR/MH/2017/039, in parts of 55O/10 and 64C/01, in Balaghat and Seoni district, Madhya Pradesh by GSI. Geochemical mapping was taken up for execution in FS: 2017-18 in parts of toposheet no. 550/10(Quadrants: A1,B1,B2,C1,C2) and in parts of toposheet 64C/01(Quadrants: A1,A2,B2,B3) summing to total 728 sq km. The main objective of the field work was to collect stream sediment samples from 1st or 2nd order streams as per availability and soil samples from R and C- soil profile horizons along with water samples for correlation of secondary dispersion with the abundance of elements in the top surface in the study area area. A total of 195 composite samples were collected from part of toposheet no 55O/10(A1, B2, B3, C1, C2 quadrants). and part of toposheet 64C/01 (A1, A2, B2, B3 quadrants), out of which 110 composite samples represent 422 sq km area of toposheet no. 550/10 and 85 composite samples represent 306 sq km area of toposheet no. 64C/01. Apart from this 05 nos. of Regolith and 05 no's C-horizon soil sample on 5'x 5'grid, 05 water samples, 05 samples for XRD and 05 samples for heavy minerals analysis were collected from study area of toposheet 550/10 while 04 nos. of Regolith and 04 nos. C-horizon soil sample on 5' x 5' grid and 04 water samples, 04 samples for XRD and 04 samples for heavy minerals analysis were collected from the study area of toposheet no.64C/01. Geologically, the study area covered by rocks of Tirodi Gneissic Complex Group and Sausar Group. In part of toposheet 550/10, geochemical distribution pattern shows concentration of all trace elements are above average upper continental crust value except Cu, Th and Rb. A high concentration of Ba, Nb, Pb, Sr, V and Ge is marked over Gondite vein and Mica schist of Mansar Formation near Tirodi village. Also, high anomalous zone of Co, Cr and Ni is observed over Tirodi Biotite Gneiss

exposed near Agri village. A high concentration of Zr, Sn, Hf and Ta is seen over granite of Neoproterozoic age exposed near Ashti village. Uranium and Arsenic high concentration is observed over Tirodi Biotite Gneiss exposed near Deori Buzurg village. In the area falling in toposheet no 550/10 the concentration of REE is more prudent over TBG in north of Deori Buzurg village and in north Khanditola village with values of La and Ce going upto 492 ppm and 763 ppm respectively.

- 3.2.0 GSI Recommendation on NGCM: Deori Buzurg village and in north Khanditola village where high values of La 492ppm and Ce 763ppm reported needs to be studied in detail regarding the source for REE and its further economic potential. A high concentration of Zr, Sn, Hf and Ta is seen over granite of Neoproterozoic age exposed near Ashti village a further detailed study in this is required. A number of pegmatite veins are intruded all through the studied area. Out of which most of the veins contain Mica sheets along with tourmaline. So further study may be advisable for pegmatite mapping in view of REE and RM exploration. The area also has potential of dimension stones mining. There are several active and inactive opencast dolomite mines in western part of toposheet no. 550/10. High concentration of CaO value at these places is also observed.
- 3.3.0 Adjacent to the present proposed area i.e area falling in part of toposheet no. 550/6 and 55O/7 GSI had carried out Reconnaissance Survey (G4) during the field season 2013-14 for regional assessment of REE and RM. The work included delineation of pegmatite bodies within the Sausar Mobile Belt and to know the Petro-mineralogical characterization of the mapped pegmatites with reference to their REE and RM potentiality. Large scale mapping on 1:10000 scale was done in an area of 150 sq.km in selected sectors of Sausar Mobile Fold Belt and Tirodi Biotite gneiss (TBG) in Nagpur district, toposheet number 55O/6 and 7 which was followed by detailed mapping on 1:1000 scale in an area of 0.32 The quantum of work includes 52 no. stream sediment sampling, 200 bed rock sq.km. sampling, 25 cu.m of pitting/trenching, 20 nos. pitting/trenching samples, 50 nos. PS, 30 Nos. Om, 20 nos. SEM-EDX, 10 nos. XRD and 250 nos. channel samples. In SEM- EDX studies LREE bearing monazite and HREE bearing Xenotime, and crystals of columbite have been identified. The geochemical analysis of 203 bed rock samples, 52 stream sediment sample and talus samples shows good concentration of REE and RM in some samples. The highest concentration of $\Sigma REE 6147.23$ ppm is in the talus sample collected near weathered pegmatite located south of Ramzan. SREE 3970.57 ppm and SREE

2470.08 ppm is recorded from the stream sediment samples collected from the same location.

- 3.4.0 MECL has amalgamated the NGCM data downloaded from Bhukosh website of GSI and previous exploration work carried out by GSI and calculated TREE, HREE & LREE for a total 36 no of stream sediment samples falling in proposed area and seeing the potentiality of the area the present proposed block is submitted to TCC, NMET for approval.
- 3.5.0 Calculated LREE, HREE and TREE values for 36 no of stream sediments from NGCM data whose range are given in table below, anomaly maps are prepared and submitted as annexures III and IV

Table-3

Data showing NGCM Stream Sediment results for TS No. 550/10 from Bhukosh of GSI

	SI	Element	RANGE (PPM)		Average crustal abundance	
Item	No.		MIN	MAX	values are from Lide (2004, p.17); REE, rare earth element	
	1	Lanthanum(La)	79.97	442.09	39	
	2	Cerium(Ce)	136.62	830.69	66.5	
	3	Praseodymium (Pr)	17.1	107.72	9.2	
IDFF	4	Neodymium(Nd)	63.91	479.04	41.5	
LALL	5	Promethium (Pm)				
	6	Samarium (Sm)	11.47	80.3	7.05	
	7	Europium(Eu)	1.87	7.96	2	
	8	Gadolinium(Gd)	9.96	66.8	6.2	
		LREE	321.59	1939.93		
	9	Yttrium (Y)	44	116	33	
	10	Terbium(Tb)	1.59	8.9		
	11	Dysprosium(Dy)	8.48	43.45	5.2	
UDEE	12	Holmium(Ho)	1.52	7.18	1.3	
пкее	13	Erbium(Er)	4.32	19.1	3.5	
	14	Thulium (Tm)	0.69	2.92	0.52	
	15	Ytterbium(Yb)	4.3	17.36	3.2	
	16	Lutetium(Lu)	0.66	2.6	0.8	
		HREE	71.34	211.07		
		TREE	393.4	2151		
	17	Hafnium(Hf)	12.47	61.88		
Dara	18	Tantalum (Ta)	1.2	2.49		
Floments	19	Rubidium (Rb)	104	203		
Elements	20	Zirconium (Zr)	425	1529		
	21	Germanium (Ge)	1.2	2.99		
Radioactive	22	Uranium(U)	4.64	31.79		
Elements	23	Thorium(Th)	24	169		
Other	24	Strontium (Sr)	39	189		
elements	25	Barium(Ba)	245	735		
elements	26	Scandium (Sc)	13	20		

4.0.0 SCOPE FOR PROPOSED EXPLORATION.

4.0.1 The Reconnaissance survey at G-4 stage exploration program proposed comprises, Geological mapping (1:12,500 scale), Surface sampling (Bedrock, Soil, Stream Sediments), pitting/trenching, drilling of 5 Nos of scout boreholes involving about 500m with associated survey, chemical analysis, physical analysis and geological report preparation.

4.1.0 JUSTIFICATION

- 4.1.1 The National Geochemical Mapping (NGCM) was taken up during the Field Season 2017-2018, in parts of 55O/10 and 64C/01, in Balaghat and Seoni district, Madhya Pradesh. the geochemical distribution pattern shown in study area of 55O/10 the REE's are more concentrated over TBG in north of Deori Buzurg village and in north Khanditola village with values of La and Ce going upto.492ppm and 763ppm respectively and also it was observed that number of pegmatite veins are intruded all through the NGCM studied area, out of which most of the veins contain Mica books along with tourmaline. Hence, further study was recommended by GSI for pegmatite mapping in view of REE and RM exploration.
- 4.1.2 GSI had carried out G4 exploration in the adjacent area of proposed block where good potential zones for REE and RM have been identified in pegmatite, hence adjacent areas with similar setup should be taken up for REE and RM investigation
- 4.1.3 NGCM raw data was downloaded from Bhukosh portal of GSI and a total 36 no of stream sediment sample (SSS) were collected by GSI and these 36 no of sample of SS were calculated for LREE, HREE & Total REE, upon preparation of geochemical anomaly map the area is promising for REE mineralization was identified and presented to TCC of NMET for approval, Geochemical anomaly map are enclosed as plate IV, V, VI.
- 4.1.4 With above study, the current proposed block may be studied for REE & RM mineralization at G4 level of exploration.

4.2.0 BLOCK DESCRIPTION

4.2.1 The Khairlanji Block falls in Survey of India Toposheet No 550/10 and covers 137.3 sq.km in around villages of, Bhondki, Goreghat, Kurwa, Heti, Khairlanji, Silari, Ambajhiri of Balaghat & Seoni District, State-Madhya Pradesh. The block location in topo sheet is given in **PLATE-I.** The Co-ordinates of the corner points of the block area both geodetic and UTM are given in **Table No.- 4**.

Table- 4

Corner	GCS, W	GS 1984	U	A	
Points	Latitude	Longitude	X	Y	Area
А	21° 39' 33.902" N	79° 30' 7.728" E	345010.933	2395877.857	
В	21° 39' 35.143" N	79° 35' 20.219" E	353994.516	2395831.819	
С	21° 39' 20.994" N	79° 35' 13.224" E	353789.472	2395398.542	
D	21° 38' 56.684" N	79° 35' 37.722" E	354486.9571	2394644.587	137.3
E	21° 35' 53.590" N	79° 35' 37.294" E	354423.716	2389014.273	sy. km.
F	21° 36' 5.765" N	79° 41' 22.591" E	364357.085	2389302.01	
G	21° 35' 4.025" N	79° 41' 28.593" E	364513.712	2387401.998	
G-A	Madhya Pradesh- Maharashtra State Boundary				

Co-ordinates of the Corner points of the Khairlanji Block

5.0.0 PLANNED METHODOLOGY

5.0.1 The exploration program is proposed in accordance to the objective set for reconnaissance survey (G-4) of the block. The Exploration shall be carried out as per Minerals (Evidence of Mineral Contents) Amendment Rules, 2021. Accordingly, the following scheme of exploration is formulated in order to achieve the objectives. The details of different activities to be carried out are presented in subsequent paragraphs.

5.1.0 GEOLOGICAL MAPPING

5.1.1 Geological mapping will be done in the entire 137.3sq.km area on 1:12,500 scale. Rock types, their contact, structural features will be mapped. Surface manifestations of the mineralisation available along with their surface disposition will be marked on map. 30 nos. of surface samples and borehole samples of various lithounits for petrological studies and 20 nos. of surface samples and borehole samples of various lithounits for mineragraphic studies.

5.2.0 GEOCHEMICAL SAMPLING

5.2.1 Bed Rock Sampling and Soil Sampling:

5.2.1.1 During the course of Geological mapping the bed rock samples shall be collected from the outcrops. A total 200nos. bed rock/Soil/Stream samples will be collected for assay 34 elemental package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES / ICPMS (sequential technique). Also, total 30 nos. check samples [5% internal (10) + 10% External (20)] will be analyzed for same. Thus, a total 230 no of geo chemical samples will be take out.

5.3.0 SURVEYING:

5.3.1 DGPS survey will be carried out for drilled boreholes and block boundary will be demarcated using handheld GPS.

5.4.0 EXPLORATORY MINING (PITTING/TRENCHING):

- 5.4.1 Shallow trenching (Excavation) shall be carried out in the potential zones identified based on the results of geological mapping and geochemical sampling. A provision of shallow trenching on mineralized zones (if any) (1m wide X 2m deep) with 200 cubic meters is kept. Trenching will be carried out on surface up to a depth of 1 m (maximum 2 m depth from surface) after removal of soil/weathered column in the area. Locations of trenches on ground will be decided by field geologist based on field observations (positive outcome of the bedrock sampling). A provision of 230 no of primary & check (5% internal+10% External) trench/channel samples each is kept for analysis for REE & RM.
- 5.4.2 The trench walls will be mapped on 1:200 scale.

5.5.0 CORE DRILLING:

5.5.1 Based on Geological Mapping, Geochemical Sampling, the extension of the mineralized zones (ore bodies) will be marked. To find out the potentiality of mineralized zones in strike & dip direction, a few no of scout boreholes involving 500m of drilling will be carried out for upper (first) level of intersection of mineralized zones. The azimuth and angle of inclination of the proposed boreholes will be decided by the field geologist once the attitude (strike & dip) of mineralized zones (host rock) is deciphered after geological mapping.

5.6.0 DRILL CORE LOGGING:

5.6.1 The drill core will be logged for rock types, structural features, textures, intersection of mineralization/ore zones, types of mineralization and occurrence of various ore minerals. Rock quality designation (RQD) will also be undertaken.

5.7.0 DRILL CORE SAMPLING:

5.7.1 During geological logging of drill core, mineralized zone will be marked on the basis of concentration of ore minerals and lithology. Total 50 no of primary and 8 nos check (5% Internal Check+10% External Check) samples each will be analysed for assay 34 elemental package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES / ICPMS (sequential technique). If surface samples for REE assay give positive result then four boreholes each will be drilled for REE. 5 nos. of composite samples each will be analyzed for REE

5.8.0 CHEMICAL ANALYSIS

5.8.1 WHOLE ROCK ANALYSIS:

5.8.1.1 Whole Rock analysis for SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, H₂O, P₂O₅, CO₂, & S radicals will be carried out on 15 nos. of rock samples to check the rock types, their variation in chemical composition.

5.9.0 PETROLOGICAL & MINERAGRAPHIC STUDIES:

5.9.1 During the course of Geological mapping and core logging 30 nos. of samples from various lithounits from outcrop and borehole core will be studied for petrography and 20 nos. of samples from mineralized zones will be studied for the ore mineral assemblages and their distribution, alteration, enrichment etc in polished sections (Mineragraphic studies).

6.0.0 PROPOSED QUANTUM OF WORK

6.0.1 Details of the particular, Quantum and the targets are tabulated in Table No.-V.A.

Table	No-V	7.	Α
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Envisaged Quantum of proposed work in Khairlanji Block

Sl.	Item of Work	Unit	Target
No.			
2	Geological Mapping (on 1:12,500 Scale)	Sq.km	137.30
3	Geochemical Sampling		
	a) Bedrock, soil and stream samples (assay 34 elemental package	Nos	200
	analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE		
	analysis by ICP-AES / ICPMS (sequential technique)		
	b) Bedrock soil and stream samples (assay 34 elemental package	Nos	30
	analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE		
	analysis by ICP-AES / ICPMS (sequential technique)		
4	Exploratory Mining		
	Excavation (Trenching/Pitting)	Cu.m	200
	a) Trench samples (assay 34 elemental package analysis includes	Nos	200
	Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-		
	AES / ICPMS (sequential technique)		
	b) Trench samples (assay 34 elemental package analysis includes	Nos	30
	Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-		
	AES / ICPMS (sequential technique)		
5	Drilling (coring)*	m	500
	a) Drill core samples (Primary sample for assay 34 elemental	Nos	50
	package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs,		
	LI & REE analysis by ICP-AES / ICPMS (sequential technique)		
	b) Drill core samples (Check samples for assay 34 elemental	Nos	08
	package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs,		
	LI & REE analysis by ICP-AES / ICPMS (sequential technique)		
-	Whole rock analysis	Nos	15
6	Laboratory Studies		

Sl.	Item of Work	Unit	Target
No.			
	i) Surface Sampling (Primary samples) bedrock, soil (including Check)	Nos	230
	ii) Trench Primary & Check Samples (5% Internal+10% External)	Nos	230
	v) Drill Core (Primary + check) Samples*	Nos	58
	vi) Composite Samples *	Nos	5
	vii) Specific gravity	Nos	15
7	Petrological Samples (Surface & Borehole Core Samples)	Nos	30
8	Mineragraphic Studies (Surface & Borehole Core Samples)	Nos	20
9	Whole Rock Analysis	Nos	15
10	Report Preparation (5 Hard copies with a soft copy)	Nos.	1
11	Preparation of Exploration Proposal (5 Hard copies with a soft	Nos.	1
	copy)		

6.1.0 BREAK-UP OF EXPENDITURE

6.1.1 Tentative Cost has been estimated based on Schedule of Charges (SoC) of projects funded by National Mineral Exploration Trust (NMET) w.e.f. 01/04/2020 The total estimated cost is **Rs. 195.30 Lakhs.** The summary of cost estimates for Reconnaissance Survey (G-4 Level) is given in **Table No.-VII.A** and 6.0.1 Details of the particular, Quantum is given in **Table No. –V.A.** Detail cost sheet for proposed Reconnaissance Survey (G-4) for REE & RM as annexure no. **I**

Table No-VII.A

Summary of Cost Estimates for Reconnaissance Survey (G-4 Level) Exploration

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Mapping (LSM), Other Geological Work	25,86,160
2	Trenching & Pitting	6,66,000
3	Drilling & associated works	78,32,600
4	Laboratory Studies	28,81,498
5	Geologist at HQ	5,40,000
	Sub Total (1 to 5)	1,45,06,258
6	Exploration Report Preparation	7,50,000
0	Proposal Preparation	3,05,125
7	Peer review charges	10,000
	Sub Total (1 to 7)	1,55,71,383
8	GST 18%	28,02,849
	Total:	1,83,74,232
	Say Rs. In Lakh	183.74

6.2.0 TIME SCHEDULE

6.2.1 The proposed exploration programme envisages surveying, updating of geological mapping, geochemical sampling, exploratory mining, drilling (coring), deviation survey, sample preparation and laboratory studies, which will be completed within 12 months by deploying 1 drill rigs, geological report preparation will consume 4 more months with one month overlapping. Therefore, a total of 15 months is planned for completion of the entire programme.



References

- A report on second generation mapping in Sausar belt in the area around Mahakepar-Khairlanji-Piparwahi-Tirodi Districts Balaghat and Seoni Madhya Pradesh (Field Season 1991-92) by GSI, D. C. Banerjee Geologist (Jr.) and M. Fulmari Geologist (Jr.).
- Report on Regional assessment for REE & RM in the pegmatite bodies in Sausar Mobile Belt and Tirodi Biotite Gneiss, Nagpur District, Maharashtra, (Stage- G4), Toposheet No. 550/06 & 550/07 (Field Season 2013 - 14) by GSI, Meena S. Gupta, Geologist, Remi Raj, Geologist and Ravichandran D., Geologist
- Interim Report on "Geochemical Mapping in parts of toposheet no. 550/10 and 64C/01 in Balaghat and Seoni districts of Madhya Pradesh" (Field Season 2017 - 18) by GSI, Neetu Kumari, Geologist and Shruti Shukla, Geologist
- 4. GSI's online data portal Bhukosh (for NGCM raw data source, Block Geology and Regional Geology)

List of Plates

- Plate-I: Location Map of Khairlanji Block, District Balaghat & Seoni, State Madhya Pradesh
- Plate-II: Regional Geological Map of Khairlanji Block, District Balaghat & Seoni, State Madhya Pradesh (Source: Bhukosh, GSI).
- 3. Plate-III: Geological Map of Khairlanji Block, District Balaghat & Seoni, State Madhya Pradesh (Source: Bhukosh, GSI).
- Plate IV: Kairlanji Block-NCGM anomaly map for LREE (Source: NGCM data Bhukosh, GSI).
- 5. Plate V: Kairlanji Block -NCGM anomaly map for HREE (Source: NGCM data Bhukosh, GSI).
- 6. Plate VI: Kairlanji Block -NCGM anomaly map for Total REE (Source: NGCM data Bhukosh, GSI).



REGIONAL GEOLOGICAL MAP OF KHAIRLANJI BLOCK (SOURCE: BHUKOSH, GSI 2M)









21°32'30"N



21°32[°]30"N









Estimated cost for Reconnaissance Survey (G-4) for REE in Khairlanji Block, Balaghat & Seoni District, Madhya Pradesh Total block area- 137.3 sq km; Completion Time- 15 Months											
S.			Rates as per	_	Estimated Cost of the		Demerke				
No.	Item of Work	Unit	21 SoC- Item- S		Proposal	Total Amount					
	Large scale (LSM) Geological mapping/		No.	Rates as per SoC	Qty.	(Rs)					
1.0	Trenching/ Drilling										
1.1	Drilling a) Geologist man days (1 No) for Large scale (LSM)					-					
	Geological mapping/ Trenching/ Drilling	days	1.2	11,000	180	1,980,000					
	b) Labour (field) for (Total 4 Nos i.e. 2 workers per	per worker	57	443	360	159 480	Amount will be reimburse as per the notified rates by the Central Labour Commissioner				
	one geologist)	per worker	0.7			100,400	(Rs. 427/- per day) or respective State Govt. whichever is higher				
	c) Sampler for Suface Samples/ Trench Samples / Core Samples	day	1.5.2	5100	65	331,500					
	Labour charge not included						Amount will be reimburse as per the notified				
	d) 4 labours/ party (Rs 427/day/labour) (As per rates of Central Labour Commissioner)	day	5.7	443	260	115,180	rates by the Central Labour Commissioner (Rs. 427/- per day) or respective State Govt.				
	Sub-Total A					2 586 160	whichever is higher				
2.0	Mineral Investigation					2,300,100					
2.1	a) Excavation of trenches & pits	per cu m	2.1.1	3,330	200	666,000					
2.0						666,000					
3.1	a) Drilling up to 300m Rigs) (Very Hard	per m	2.2.1.5 a	12,650	500	6,325,000					
3.1	Rock) Borehole deviation survey Percebole pilloring	per m	2.2.6	330	500	165,000					
3.1	a) construction of concrete pillar	per	2.2.7.a	2,000	5	- 10,000					
	b) Borehole plugging by cement	per m	2.2.7.b	150	0	-					
3.4	associated per drill (To & Fro from HQ)	per km	2.2.8	36	2000	72,000					
3.5	Monthly accommodation charges for drilling camp	monthly	2.2.9	50,000	3	150,000					
3.0	b) Drilling camp setting (2 rigs)	per drill	2.2.9a 2.2.9b	250,000	1	250,000					
3.7	Approach road making in rugged- hilly terrain (Partly rugged-hilly terrain)	per km	2.2.10b	32,200	3	96,600					
3.8	Land/crop compensation	per m per borehole	5.3	20000	5	100,000					
2.40	Demarcation Fixation of borehole and determination of co-ordinates & Reduced Level (RL)	Per point of	1.00	40.000	F	00.000					
3.10	of the boreholes by DGPS (including charges for labours deployed for the work)	observation	1.6.2	19,200	5	96,000					
4.0	Sub-Total C					7,832,600					
4.0 4.1	Chemical Analysis										
	i) Surrace sampling (Bed Rock Samples/Soil/Stream Sediment)										
	a. For 34 elemental analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES	per sample	4.1.5d	7,731	200	1,546,200					
	/ ICPMS (sequential technique)	· ·									
	ii) Check Samples (Bed Rock/Soil/Stream Sediment Samples) - 5% Internal & 10%					-					
	External a. For 34 elemental analysis includes Nb, Sr, Ta, W,										
	Mo, Sn, Rb, Be, Cs, Ll & REE analysis by ICP-AES / ICPMS (sequential technique)	per sample	4.1.5d	7,731	30	231,930					
4.2	Pit & Trench, Primary Samples a. For 34 elemental analysis includes Nb, Sr, Ta, W,					-					
	Mo, Sn, Rb, Be, Cs, Ll & REE analysis by ICP-AES / ICPMS (sequential technique)	per sample	4.1.50	7,731	50	386,550					
	II) Check Samples - 5% Internal & 10% External					-					
	a. For 34 elemental analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES	per sample	4.1.14	7,731	8	61,848					
4.3	i) BH Core Sampling, Primary samples					-					
	REE analysis(14 elements) by ICP-MS Method	per sample	4.1.13	5,380	50	269,000					
	ii) Check Samples - 5% Internal & 10% External					-					
	REE analysis(14 elements) by ICP-MS Method	per sample	4.1.13	5,380	8	40,350					
4.4	iii) Composite Samples	per sample	4 1 13	5.380	5	- 26 900					
4.7	Whole rock studies	per sample	4.1.15a	4,200	15	63,000					
4.8	Petrological / Mineralographic studies a) Preparation of thin section	per sample	4.3.1	2,353	20	- 47,060					
	b) Study of thin section for petrography c) Preparation of polished section	per sample per sample	4.3.4 4.3.2	4,232 1,549	20 20	84,640 30,980					
	d) Study of polished section for mineragraphy e) Digital photomicrograph of thin polished	per sample	4.3.4	4,232	20	84,640					
	section f) Specific Gravity	per sample	4.8.1	1,605	15	24,075					
5.0	Sub-Total D Geologist man days (1 No.) for Geological	dave	1.2	9.000	60	2,881,498					
6.0	map & Report (HQ) Total (1.0 to 5.0)	uays	1.2	3,000		14,506,258					
				A Minimum of Rs			For the projects having cost up to exceeding Rs.				
7.0	Geological Report Preparation	Nos	5.2	7.5 lakhs or 3% of the	1	750 000	150 Lakhs but less than 300 Lakhs: A Minimum of Rs. 7.5				
1.0		NOS	0.2	work		100,000	lakhs or 3% of the work whichever is more and Rs.				
							3000/- per each additional				
							EA has to submit the Hard Copies and the soft copy of the final proposal along with Maps and				
8.0	Preparation of Exploration Proposal	Nos	5.1	380000	1	305,125	Plan as suggested by the TCC- NMET in its meeting while				
9.0	Report Peer Review Charges	lumpeum	As per EC	10000	1	10 000	clearing the proposal. Additional Rs.1500 as handling charges should				
10.0	Total Estimated Cost without GST (7+8+9+10)		decision			15,571,383	be added				
11.0	Provision for GST (18%)					2,802,849	GST will be reimburse as per actual and as per notified prescribed rate				
12.0	Total Estimated Cost with GST				Say, in Lakhs	18,374,232 183.74					
Note:	Marked items not indicated in SoC and required to be	taken up during the c	ourse of exploration	n shall be charged se	parately (as peractuals)						
\$ i	Trenching/Pitting dimensions are tentative may vary d Satellite imageries shall be procured from website/NF	epending upon the geo RSA as the case may b	blogy and field conc be and procurement	ditions t charges if any shall	be charged at actuals						
#	2nd level of work shall be carried out after review of	1st level work i.e. Geo	logical mapping. ge	eochemical sampling	and analysis						

S.No.	Activities		MONTHS														
		1	2	3	4	5	6	7	8	9		10	11	12	13	14	15
1	Camp setting																
2	Geological mapping & Sampling										R						
3	Sample preparation										••						
4	Analytical work										e						
5	Exploratory mining for trenching																
6	Sample preparation (Trench samples)										V						
7	Analytical work																
8	Drilling 500m										İ						
9	Sample preparation for Drill core samples																
10	Camp winding										e						
11	Analytical work drill core samples																
12	Geologist at HQ										W						
13	Geological report																
14	Peer Review																
* Com	nencement of project will be reckoned from the day the exploration acre	eage is availa	ible alor	ng with a	ll statut	ory clear	ances										
*Time	oss on account of monsoon/agricultural activity/forest clearance/ local la	aw & order p	roblem	s will be	additio	n to abov	ve time	line.									