Proposal for Preliminary Exploration for Bauxite, Titanium, and Associated Minerals

(G3 Stage)

HARHA PAT BLOCK

NMET Funded Project

DISTRICT – GUMLA, JHARKHAND

By

JHARKHAND EXPLORATION AND MINING CORPORATION LIMITED, RANCHI

Place: Ranchi
Date: 15.07.2024

Summary of the Block for Reconnaissance Survey (G3 Stage)
GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	JEMCL/NMET/06/2023
	Exploration Agency	Jharkhand Exploration and Mining Corporation Limited (JEMCL)
	Commodity	Bauxite, Titanium & Associated Minerals
	Mineral Belt	Chattisgarh – Jharkhand Bauxite Belt (Chotanagpur Granite Gneiss)
	Completion Period with the entire time schedule to complete the project	16 Months
	Objectives	JEMCL, Ranchi has proposed exploration for Bauxite in the Harhapat area of Gumla district based on previously available baseline geoscience data supported with preliminary field investigation and sampling. The exploration programme was then submitted to the **"27th Jharkhand State Geological Programming Board Meeting"** held on 29.09.2023 in which the exploration programme in the proposed area was unanimously approved by the programming board consisting of members such as GSI, DMG, GoJ, MECL, CMPDI, etc. Hence, the objectives of the current exploration program would be: **i)** Surface Geological mapping in 1:4,000 scale. **ii)** To prove the occurrences of Bauxite zone(s) adjacent to the running Serendag Bauxite Mine (M/s Hindalco) **iii)** To check the Bauxite occurrence up to the vertical depth of 30m below ground level. **iv)** Two bore holes will be drilled upto the basement or 50m depth (whichever is

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v) To assess the quality and the thickness of Bauxite horizons in order to upgrade the Bauxite resources at G-3 (333) level in the block as per UNFC norms.
vi) Along with Bauxite, resources of Titanium and Associated Minerals will be also reported if encouraging values are encountered.
vii) To carry out exploration as per Minerals (Evidence of Mineral Contents) Rules, 2015 (as amended), Mineral Auction Rule – 2015 and MMDR Act – 2015 as to facilitate the Government of Jharkhand for auctioning of the Bauxite Block.</td></tr>
<tr><td></td><td>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</td><td>i) Surface geological Mapping, Sampling, Pitting-Trenching and Geological report preparation will be done by JEMCL.
ii) However, works such as Drilling, Topographic/DGPS Surveying and Laboratory studies (petrographic, SEM, XRD studies and chemical analysis) will be carried out by the empaneled agencies.</td></tr>
<tr><td></td><td>Name/ Number of Geoscientists</td><td>Monitoring of the project will be done by 02 number of Geologists (Geoscientists)</td></tr>
<tr><td></td><td>Expected field days (Geology, geophysics, surveyor)</td><td>i) Geologist party days: 180
ii) Surveyor party Days: 60</td></tr>
<tr><td>1.</td><td>Location</td><td></td></tr>
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		30	23° 21' 51.956" N	84° 28' 17.913" E
		31	23° 21' 43.590" N	84° 28' 28.868" E
	Villages	Harha Pat village of Ghaghara Block		
	Tehsil/Taluk	Ghaghara		
	District	Gumla		
	State	Jharkhand		
2.	**Area (hectares/ square kilometers)**			
	Block Area	77.66 hectares (0.776 Km^2)		
	Forest Area	-		
	Government Land Area	~17.66 hectares		
	Private Land Area	~ 60 hectares		
3.	**Accessibility**			
	Nearest Rail Head	Lohardaga Railway Station (situated at about 50 km from the area).		
	Road	SH-09 is situated at about 15 km from the area		

		under investigation.
	Airport	Birsa Munda Airport, Ranchi is situated at about 150 km from the area.
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Gumla district is drained by the tributaries of three major rivers of the state viz. North Koel, South Koel and Damodar. The plateau region in the west of Lohardaga town is the major water divide for the north and south Koel River. The plateau region of the district is highly dissected by down cutting of the tributaries of these rivers. A few natural springs are noted in the area.
	Rivers/ Streams	No major river exists in the area.
5.	**Climate**	
	Mean Annual Rainfall	About 1137 mm of average annual rainfall
	Temperatures (December) (Minimum) Temperatures June) (Maximum)	Maximum temperature: ~ 40^{o}C Minimum temperature: ~4^{o}c
6.	**Topography**	
	Toposheet Number	Toposheet no.: 72 A/7 (OSM no.: F45A7)
	Morphology of the Area	Harha Pat Plateau is a tableland located in the Chota Nagpur plateau forming the watershed between the North and South Koel rivers. The Bauxite deposit under reference is characterized by the extensive blanket of plateau laterite on an almost flat topography, locally known as “pat”. The flatness of the plateau together with well-defined steep scarp faces gives a distinct feature to the topography of the deposits with a gentle slope towards the south-west. The range of elevation of varies approximately between 960 to 1060 meters in plateau regions.

7	**Availability of baseline geoscience data**	
	Geological Map (1:50K/ 25K)	Regional geological map of GSI in 1:50, 000 (Source: Bhukosh portal of GSI)
	Geochemical Map	Not applicable.
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Not applicable.
8.	**Justification for taking up ReconnaissanceSurvey / Regional Exploration**	**i)** The proposed Harha Pat Block (G3) lies in the Bauxite bearing plateaus of Chhattisgarh-Jharkhand belt forming a part of the PreCambrian shield of the Indian Peninsula. They consist mainly of Chhotanagpur Granite Gneiss. **ii)** Preliminary geological work has been carried out by GSI as well as DMG, Jharkhand in the area. MECL & CMPDI has also carried out exploration (G3/G2) in around the adjoining areas which has established occurrence of Bauxite with thickness varying from 4 to 6 m. **iii)** The JEMCL team visited the Harha Pat Block and nearby mine areas. The pits in the existing mines have bauxite occurrences up to 25m depth. The outcrops of Bauxite are observed in the field and the exposed pits in the proposed block have confirmation of the Laterite / Bauxite profile in the above said area. **iv)** Bauxite samples were collected from the block showing encouraging results of high Alumina (Al_2O_3) and Titanium (TiO_2) with low Silica (SiO_2) in the range of 46-54%, 10-15% and 0.86-3.58%. Respectively. **v)** Considering similar geological setup with known deposits, available literature and previous worker's recommendations, the area hold potential to explore in detail with holistic

		exploration approach. Hence, preliminary exploration at G3 stage in the proposed area to be taken up to ascertain the exact potentiality of the prospect for Laterite/Bauxite. **vi)** Existing running Serendag Bauxite Mine by M/s Hindalco Industries Ltd lying in the south of the proposed block. **vii)** After discussion with the State Government, JEMCL decided to take up the exploration work of Bauxite Titanium & Associated minerals in the Harha Pat Block, District – Gumla, Jharkhand through NMET funding. The positive outcome of the present exploration would be helpful and facilitate the Govt. for auctioning of the block.

Proposal for G3 Level of Exploration for Bauxite, Titanium & Associated Minerals in the Harha Pat Bauxite Block, District – Gumla, Jharkhand

1. Introduction

1.1. The Bauxite-an ore of Aluminium (non-ferrous metal), is a naturally occurring, heterogeneous material composed primarily of one or more aluminum hydroxide minerals, along with various proportions of silica, iron oxide, titanium, alumino-silicate, and other impurities in minor or trace amounts. *Recently in February'2023, GSI has announced the discovery of 5.9 million tonnes of inferred lithium resources in Salal-Haimana area of Reasi district, Jammu and Kashmir associated with inferior grade of bauxite formations*. The principal aluminum hydroxide minerals found in varying proportions with bauxites are gibbsite and the polymorphs boehmite and diaspore. Bauxites are typically classified according to their intended commercial application: abrasive, cement, chemical, metallurgical, refractory, etc. The bulk of world bauxite production (approximately 85%) is used as feed for the manufacture of alumina through a wet chemical caustic leach method commonly known as the 'Bayer process'. Subsequently, the majority of the resulting alumina produced from this refining process is in turn employed as the feedstock for the production of aluminum metal by the electrolytic reduction of alumina in a molten bath of natural or synthetic cryolite (Na_3AlF_6), called 'Hall-Héroult process'.

Orissa (Kalahandi, Koraput, and Baragarh districts) is the largest producer, which produces about 50% of the total bauxite production of the country. Gujarat (Gulf of Kachchh and the Arabian Sea through Bhavnagar, Junagadh, and Amreli districts) is the second-largest producer and produces over 15 percent of the total bauxite of India. Jharkhand (Ranchi, Lohardaga, Palamu, and Gumla districts) has reserves of all grades of recoverable bauxite estimated at 63.5 million tonnes. Other states producing bauxite are Maharashtra, Chhattisgarh, Tamil Nadu, Madhya Pradesh, Andhra Pradesh, Kerala, Rajasthan (Kota), Uttar Pradesh (Banda, Lalitpur and Varanasi), Jammu and Kashmir (Jammu, Poonch, Udhampur) and Goa.

As much as 80 percent of the bauxite is used for producing aluminum. India's exports of bauxite have been reduced considerably due to increasing demand in the home market. Still, India manages to export small quantities of bauxite. The main buyers of Indian bauxite are Italy (60%), U.K. (25%), Germany (9%), and Japan (4%). As per Indian Mineral Year Book, 2021 published by IBM, the production of bauxite at 20.37

million tonnes in 2020-21 decreased by 7% as compared to the previous year. During 2021-22, Odisha accounted for 76% of the total output followed by Gujarat and Jharkhand (7% each). The remaining production was reported from Chhattisgarh, Maharashtra, Madhya Pradesh, and Tamil Nadu.

2. Location and Communication

The area of investigation falls under Survey of India Toposheet number 73A/7 and OSM number F45A7. The area under investigation is situated at about 150 Km southwest of the capital city Ranchi, about 43 Km north of district headquarter-Gumla. The area is well connected through an all-weather road. It can be approached through Ranchi-Gumla Road (SH No.-09).

Table 1:
Harha Pat proposed Block Boundary Coordinates.

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2.1. Physiography and Drainage

The area is characterized by undulating topography with flat-topped hills called "pat". The average elevation is about 1060 meters above Mean Sea Level. The area exhibits a dendritic to sub-dendritic drainage pattern. South-Koel, Sankh, and North Karo Rivers mainly drain the area, which have many small tributaries.

2.2. Climate and Rainfall

2.2.1. Climate

The district experiences a warm humid climate with three well-defined seasons i.e. Summer, Winter and Monsoon. The winters commence from the middle of November and extend up to the middle of March. December is the coldest month. During winter the temperature goes down to 40^0 C. Summer starts in the middle of March and continues up to the middle of June when the temperature shoots up to 42^0 C.

2.2.2. Rainfall

The monsoon sets in by the middle of June and continues till the middle of October. The annual normal rainfall in the district is 1137 mm. 83.5% of total rainfall occurs during the monsoon months only.

3. Previous Work

The first account of the Bauxite and the aluminous laterite of India was given by Sir C.S. Fox in 1923 (Mem. Geol. Survey of India, XLIX,1923). The discovery of a large number of Bauxite deposits in erstwhile Bihar, now Jharkhand came to light in 1943- 47 as a result of the fieldwork carried out by Dr. M.K. Roy Chowdhury of G.S.I. Subsequently, Dr. Roy Chowdhury (1958, 1965) presented a detailed account of the geology and the economic aspect of the individual deposits of Bauxite of Jharkhand and M.P. The results of his work are well documented in the Memoirs of the Geological Survey of India, Volume 85, published in 1958. Bauxite deposits of the Lohardaga, Gumla, Jharkhand erstwhile Bihar, were investigated during the field season 1961-62 by N. Majumdar of GSI and a report titled "Report on the Bauxite Deposits near Lohardaga, Gumla Area Ranchi District, Bihar" was published in 1963. Existing running Serendag Bauxite Mine by M/s Hindalco Industries Ltd lying in the south of the proposed block.

DMG, Govt. of Jharkhand is also doing exploration works for Bauxite and associated minerals in and around Gumla District, Jharkhand on regular basis. Geologically, the Bauxite formation of the area belongs to the early Tertiary period (upper Cretaceous to Eocene). These Bauxite formations are mainly overlain by lateritic soil/cap rock.

4. Regional Geology

4.1. Regional Geology

The Lohardaga district is a part of the Chhotanagpur plateau. The district is divided into two major physical division viz. the hilly tract and the plateau region. The hilly tract is extended in the west and north western part of the district, which includes part of Kisko, Senha and Kuru development blocks. This plateau region is the part of the Gumla plateau comprised with entire part of Lohardaga and some part of Senha, Kisko and Kuru development blocks. The general slope of the district is from west to east. Geologically the area is comprised of Precambrian Granites and Gneisses. In the uplands, considerable thickness of laterite of Pleistocene age is found in the Granite and Gneisses tracts. Alluvium of recent to sub-recent age is found in the river valley.

The General Geological succession is as given below:

Table 2:
Geological Succession of the Area.
(after Roy & Choudhary, 1958)

Age	Formation
Recent	Alluvium, Conglomerate & Carbonaceous Shale
Late Tertiary	Laterite, Bauxite and Lithomarge
Upper Cretaceous, Deccan Trap Intra Trappean (Lameta)	Basaltic lavas, Calcified-Silicified rocks and grit
Chotanagpur Granite Gneiss	Vein rocks,Pegmatite or Graphic granite, Aplite, Quartzveins and quartz-tourmaline rock, Psuedo –Diorite
Archean	Granites and Gneisses Diorite Ultrabasic igneous rocks
Dharwar Iron Ore Series or Older metamorphics	Phyllites, Mica-schist, Quartzites, Lime-silicate rocks and Basic rocks.

4.2. Local Geology

The local geology of the area is marked by the presence of lateritic soil. No other rock types are exposed at the surface. However, old as well as working quarries and valley sections can be seen adjacent to the proposed area towards the southern boundary where Bauxite ores of variable thickness (4m to 6m) are exposed and overlain by lateritic capping (03-05m).

4.2.1. Occurrence of Bauxite in the Area

The occurrence of Bauxite in the lateritic sequence is mainly boulder/pocket type, consisting of Bauxite cobbles, boulders, and pebbles with interbinding material of ferruginous laterite, morrum, and clays. Closed-spaced Bauxite boulders are also seen spreading over a short distance. Lensoidal, pinch & swell types of structures are observed in the cross section nearby Serendag Bauxite Block, Gumla district, and as such there is

no significant pattern found in the occurrence of Bauxite boulders within the zone of bauxitization. Narrow and impersistent bands and patches of non-ore intervene in the Bauxite zone. Hence, the occurrence of Bauxite in the area is erratic in nature. Harha Pat plateau is the southern extension of Serendag Pat. In old abandoned pits 2m – 4m of Bauxite has been observed.

5. Proposed Exploration Programme

5.1. Objectives

a. Surface Geological mapping in 1:4,000 scale.
b. To prove the occurrences of Bauxite zone(s) adjacent to the running Serendag Bauxite Mine (M/s Hindalco Industries)
c. To check the Bauxite occurrence up to the vertical depth of 30m below ground level.
d. Two boreholes will be drilled up to the basement or 50m depth (whichever is earlier).
e. To assess the quality and the thickness of Bauxite horizons in order to upgrade the Bauxite resources at the G-3 (333) level in the block as per UNFC norms.
f. Along with Bauxite, resources of Titanium and Associated Minerals will be also reported if encouraging values are encountered.
g. To carry out exploration as per Minerals (Evidence of Mineral Contents) Rules, 2015, Mineral Auction Rule – 2015, and MMDR Act – 2015 (as amended) as to facilitate the Government of Jharkhand for auctioning of the Bauxite Block.

5.2. Exploration Scheme

5.2.1. Topographic Survey

Surveying will be carried out by lying down a triangulation network and as per prevailing rules. Contouring will be done on a 1:4000 scale at a 2m contour interval. The borehole will be fixed on the ground at a specified grid interval/borehole spacing. RL and co-ordinates of survey and exploration points will be determined by DGPS. The block boundary will be surveyed by DGPS or Total Station in WGS-84 Datum.

5.2.2. Detailed Geological Mapping

The detailed surface geological mapping would be done in 1:4000 scale. Accordingly, a surface geological map will be prepared containing all lithological attributes, structural features, and sample and borehole locations. This map will be used as base map for future work.

5.2.3. Drilling

The present exploration programme has been prepared by proposing total dry core drilling of 430 m in 13 boreholes (PBH-1 to PBH-13). Out of 13 proposed boreholes, the

depth of boreholes will be kept at 30m for 11 holes and 50m for 2 holes. As the Bauxite deposits in the area under investigation mostly occurs as bedded/tabular deposits, vertical boreholes have been proposed to be drilled in the area (annexed as Plate-I). Borehole spacing has been planned with 200mx200m of grid interval in accordance with the Minerals (Evidence of Mineral Contents) Rules 2015 & its amendments.

PROPOSED BOREHOLE POINTS				
Sl. No.	**Name**	**Latitude**	**Longitude**	**Proposed Depth**
1	PBH-01	23° 21' 54.69" N	84° 28' 6.67" E	50
2	PBH-02	23° 21' 48.16" N	84° 28' 3.36" E	30
3	PBH-03	23° 21' 48.19" N	84° 28' 10.44" E	30
4	PBH-04	23° 21' 48.17" N	84° 28' 17.49" E	30
5	PBH-05	23° 21' 45.04" N	84° 27' 56.30" E	30
6	PBH-06	23° 21' 45.05" N	84° 28' 24.55" E	30
7	PBH-07	23° 21' 41.68" N	84° 28' 3.38" E	30
8	PBH-08	23° 21' 41.69" N	84° 28' 10.44" E	30
9	PBH-09	23° 21' 41.68" N	84° 28' 17.50" E	30
10	PBH-10	23° 21' 37.79" N	84° 28' 24.56" E	30
11	PBH-11	23° 21' 35.20" N	84° 28' 10.46" E	50
12	PBH-12	23° 21' 35.19" N	84° 28' 17.50" E	30
13	PBH-13	23° 21' 28.72" N	84° 28' 13.65" E	30
	Total meterage (m)			**430**

Note: *The location and depth of the proposed boreholes are tentative and may be subject to change as per actual geological and field conditions.*

5.2.4. Geological Core Logging

Detailed drill core logging will be done with consideration for weathering, grain size, colour and nature of various rock formations, structural features, and presence of ore/mineral grains. On the basis of these parameters, the grade of Bauxite and associated minerals (if any) can be broadly presented and will also be helpful in sampling. Primary samples will be drawn at 1m intervals subject to changes in lithology and core recovery.

5.2.5. Core Sampling

Borehole cuttings, the material that will be obtained by dry drilling, will be dried in sunlight and sampled for a uniform length of 1.00m so that each sample falls between fixed reduced levels in all the boreholes. But the top and the bottom samples will usually be less than 1.00m in length as the R.L of the collar of the borehole and the floor of the Bauxite zone will be in a fraction of the whole number. Later, keeping in view the boulder/ pocket nature of the deposit, the sampling will be carried out according to lithological changes. In Bauxite zone, the sample length will be reduced from 1m to 0.50m if required, while in the transition zone / Laterite and clay zone the length of

sample may increase. Each sample thus obtained, will be crushed to (-) 60 mesh size and its quantity will be further reduced to 500 grams by coning and quartering. The material will be further crushed to (-) 120 mesh size. Two representative samples weighing about 100 grams each will be taken from this, one of which will be sent for primary analysis for five radicals, i.e., Al_2O_3, SiO_2, Fe_2O_3, TiO_2 & LOI, and others samples need to be kept for the purpose of check analysis. The remaining 300-gram sample will be kept for preparation of composite samples for analysis of spectroscopic, XRD, total available alumina and reactive silica, other elements and REE, etc.

5.2.6. Check Samples

10% of the total primary samples shall be analyzed for 5 radicals as internal check analysis and 5% of the total primary samples will be analyzed from another NABL accredited laboratory as external checks to test the reliability of sampling and analytical data.

5.2.7. Borehole Composite Samples

After receipt of analytical results of primary samples of the borehole core, Bauxite zones will be marked at $\geq 30\%$ Al_2O_3 & $< 5\%$ SiO_2 and $\geq 30\%$ Al_2O_3 & $< 8\%$ SiO_2 for each of the boreholes. For each of the Bauxite zones encountered in boreholes, composite samples shall be prepared by mixing each primary sample within the respective zone in their length proportions and reducing the sample by coning and quartering method for drawl of final sample to be analyzed for 7 radicals viz. Al_2O_3, SiO_2, Fe_2O_3, TiO_2, V_2O_5, P_2O_5 & LOI respectively. Borehole core composite samples will also be analyzed for 14 radicals viz. Al_2O_3, SiO_2, Fe_2O_3, TiO_2, V_2O_5, P_2O_5, LOI, MnO, MgO, CaO, Na_2O, K_2O, SO_3, & Organic Carbon. However, provision for analysis of 86 nos. of composite sample for 07 radicals and 37 nos. of composite sample for 14 radicals has been made in the proposal which may vary depending upon the actual no. of Bauxite zone encountered in the boreholes.

5.2.8. Analysis for Reactive Silica and "Total Available Alumina" Content

35 No's of composite samples will be analyzed for "Total available alumina" and Reactive Silica content. The samples should be selected in such a manner that the entire Bauxite bearing areas are represented by them.

5.2.9. Specific Gravity and Porosity Determination

Specific Gravity will be determined on 10 nos. of drill core samples.

5.2.10. Determination of Bond Work Index

10 Nos of samples (-150) mesh size will be subjected for determination of Bond work Index to know the nature & grindability properties of Bauxite ore.

5.2.11. Pitting for Bulk Density

Bulk density will be determined in field by putting 1m X 1m X 1m pit. Two pits will be taken up for determination of bulk density.

5.2.12. Spectroscopic Studies

The drill core samples need to be studied for 34 elements distribution by Emission Spectroscope. Semi-quantitative analysis for sample package i.e. 16 other elements viz. Li, Ga, In, Be, Ge, Mo, Cr, Ta, W, Ba, Co, Rb, Sr, Zr, Pm, Nb, Ni ;16 REE viz. La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Sc, Y; 02 Actinides viz. U, Th, needs to be carried out by mass spectroscopic studies ICP-AES/ICP-MS (sequential technique).

5.2.13. Mineragraphic and Petrographic Studies

To know about the mineralogical composition and interrelation among the constituent minerals 10 rock specimens from the area will be taken up for Petrographic studies. 10 nos. of ore specimens from the Bauxite zones will also be studied in the polished section to know about the constituent ore minerals, their mode of occurrence, textures, and other mineragraphic characteristics of Bauxite.

5.2.14. X-Ray Diffraction Studies

A total of 10 Nos Bauxite samples representing the Harha Pat Block deposit will be subjected to X-ray diffraction studies to know about the general distribution pattern of the constituent minerals of the ore. The samples should be selected from the borehole composite samples in a pattern to represent the Bauxite ore of the Harha Pat deposit.

5.2.15. Quantum of Work

The proposed quantum of exploratory work (G3) in the Harhapat Block is given in Table – 3.

Table – 3: Proposed Quantum of Work, G3 Stage Exploration in Harha Pat Bauxite Block

Sl. No.	Item Details	Unit	Quantum
1	Topographic Survey (Contour interval 2m) & Geological Mapping 1:4000 scale	Sq. Km.	0.776
2	Bore Hole Fixation and determination of co-ordinates & Reduced Level (RL) of the boreholes and demarcation of lease hold boundary points by DGPS	Nos.	46
3	Core drilling (200m x 200 grid) 13 boreholes. Out of 13 BHs,11 BHs of 30 m depth to be drilled up to lithomarge and 02 borehole are proposed to be drilled upto 50m or basement (whichever is earlier)	m	430
4	Pitting for determination of Bulk density (1mX1mXlm) - 2Nos.	Cum	2
5	Sampling & Chemical Analysis		

	A	Primary samples to be analyzed for 5 radicals viz. Al_2O_3, SiO_2, Fe_2O_3, TiO_2 & LOI		
	i.	Borehole Core samples	Nos.	430
	ii.	Check samples (10% internal)	Nos.	43
	iii.	Check samples (5% external)	Nos.	22
	B	Composite samples	Nos.	
	i.	Borehole Core samples, (to be analyzed for 7 radicals, viz. Al_2O_3, SiO_2, Fe_2O_3, TiO_2, V_2O_5, P_2O_5 & LOI)	Nos.	86
	ii.	Composite Core samples (14 radicals, viz. Al_2O_3, SiO_2, Fe_2O_3, TiO_2, V_2O_5, P_2O_5, LOI, MnO, CaO, MgO, K_2O, Na_2O, SO_3 & Organic carbon	Nos.	37
	iii.	Total available Alumina and Reactive Silica content	Nos.	35
6		Physical Studies		
	a	ICP-AES/ICPMS (sequential technique) for 34 elements i.e. 16 other elements viz. Li, Ga, In, Be, Ge, Mo, Ni, Cr, Ta, W, Ba, Co, Rb, Sr, Zr, Nb;16 REE viz. La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Sc, Y; 02 Actinides viz. U, Th.	Nos.	35
	b	X-RD studies	Nos.	10
7		Petrographic Studies	Nos.	10
8		Mineragraphic Studies	Nos.	10
9		Preparation of Polished Section & Thin Section (05+05)	Nos.	20
10		Sp. Gravity & porosity determination	Nos.	10
11		Determination of Bond Work Index	Nos.	10
12		Geological Report Preparation {As per Mineral (Evidence of mineral contents) Rule-2015 (as amended)}	Nos.	1

6. Time Schedule and Cost Estimation

6.1. Time Schedule

The fieldwork will take 04 months to complete. The laboratory studies will take an additional 2 months from the date of completion of fieldwork again drilling will take 04 months followed by laboratory studies of 2 months. Preparation of the Geological report will take 03 months and the project will be of 16 months.

Time Schedule																		
Sl. No.	**Activities**	**Unit**	**Months**															**Total (Days)**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	
1	Camp Mobilization	Days	30					Review											30
2	Geological Mapping & Sampling	Days		30															30
3	Lab Analysis-Samples (bed rock, soil, stream sediment)	Days			30	30													60
4	Pitting, Trenching & Sampling	Days				30													30
5	Lab Analysis of Pit-Trench Samples	Days				30	30												60
6	Survey (topographic & borehole demarcation)	Days							15										15
7	Drilling (1 rig)	Days							15	30	30	30							105
8	Sample preparation for drill core samples	Days								15	30	30	30						105
9	Lab Analysis of Drill core samples	Days											30	30					60
10	Camp Demobilization	Days											30	15					45
11	Geological Report	Days													30	30	30		90
12	Peer review	Days																30	30
Note:																			
1. *Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.*																			
2. *Time loss on account of monsoon/agricultural activity/forest clearance/local law & order problem may be additional to above time line.*																			

6.2. Cost Estimates

Tentative cost has been estimated based on Schedule of Charges (SoC) of projects funded by National Exploration Trust (NMET). The total cost estimate of Rs. 158.00 Lakhs is being proposed for completion of exploratory work up to G3 level. Activity wise break-ups of the same are furnished below:

Table 3:

Cost Summary

Cost Summary		
Sl. No.	**Item**	**Estimated Cost (Rs.)**
1	Geology & Survey	32,27,730
2	Drilling	59,91,700
3	Laboratory	32,62,330
4	**Sub Total (1+2+3)**	**1,24,81,760**
5	Exploration Report	6,24,088
6	Proposal Preparation	2,49,635
7	Peer Review Charges	30,000
8	**Grand Total**	**1,33,85,483**
9	GST (18%)	24,09,387
Total		**1,57,94,870**
Say Rs. in Lakhs		**158**

7. Justifications

Preliminary geological work has been carried out by GSI as well as DMG, Jharkhand in the area. MECL & CMPDI have also carried out exploration in and around the adjoining area which has established the occurrence of Bauxite with thickness varying from 4 to 6 m. The outcrops of Bauxite are observed in the field and the exposed pits in the proposed area have confirmation of the Laterite / Bauxite profile in the block. The above fact signifies that the plateau is potential Bauxite bearing and may have a good prospect to be explored to the G3 level.

The JEMCL team visited the Harha Pat bock and nearby mine areas. The pits in the existing mines have bauxite occurrences up to 20m depth. The outcrops of Bauxite are observed in the field and the exposed pits in the proposed block have confirmation of the Laterite / Bauxite profile in the Harha Pat block. The team collected Bauxite samples from the block showing encouraging results of high Alumina (Al_2O_3) and Titanium (TiO_2) with low Silica (SiO_2) in the range of 46-54%,10-14% and 0.86-3.58%.

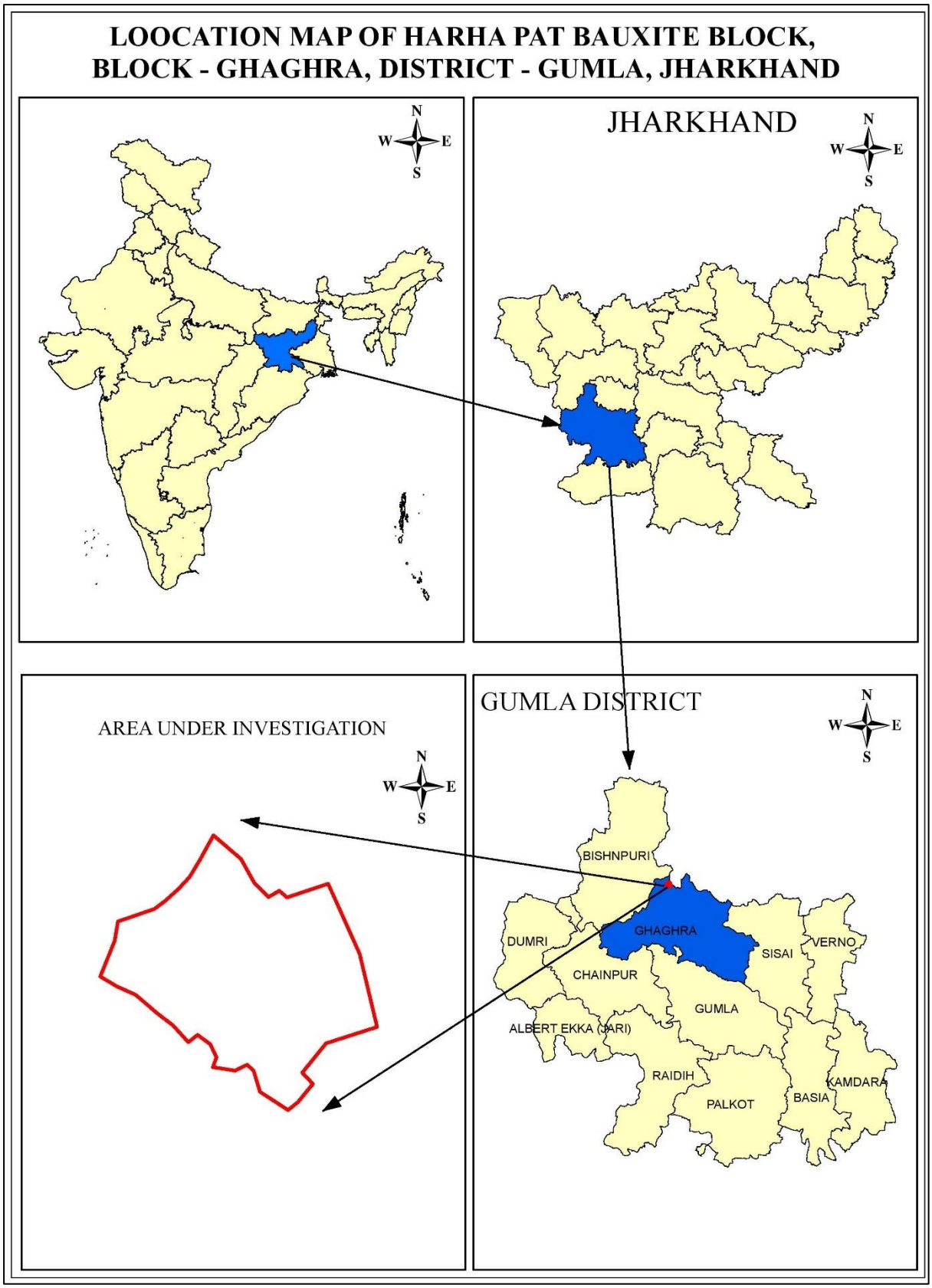
respectively. Results are given below for the reference:

Sample Id	**Al_2O_3(%)**	**SiO_2(%)**	**TiO_2(%)**	**V_2O_5(%)**	**Fe_2O_3(%)**
G/SD-II/01	54.51	0.86	10.37	0.17	9.11
G/SD-II/02	46.59	3.45	10.03	0.16	14.42
G/SD-II/03	47.76	3.58	11.59	0.16	14.37
G/SD-II/04	54.54	2.07	11.43	0.11	5.78
G/SD-II/05	53.01	1.12	13.08	0.12	8.03
G/SD-II/06	50.98	2.56	12.47	0.14	9.36
G/SD-II/07	55.04	0.83	11.08	0.13	5.89
G/SD-II/08	53.82	1.52	11.52	0.13	7.96
G/SD-II/09	52.50	1.03	14.93	0.12	4.61
G/SD-II/10	50.52	1.24	10.61	0.20	11.36
G/SD-II/11	52.20	1.00	14.93	0.14	4.51
G/SD-II/12	50.55	1.41	10.62	0.19	11.44

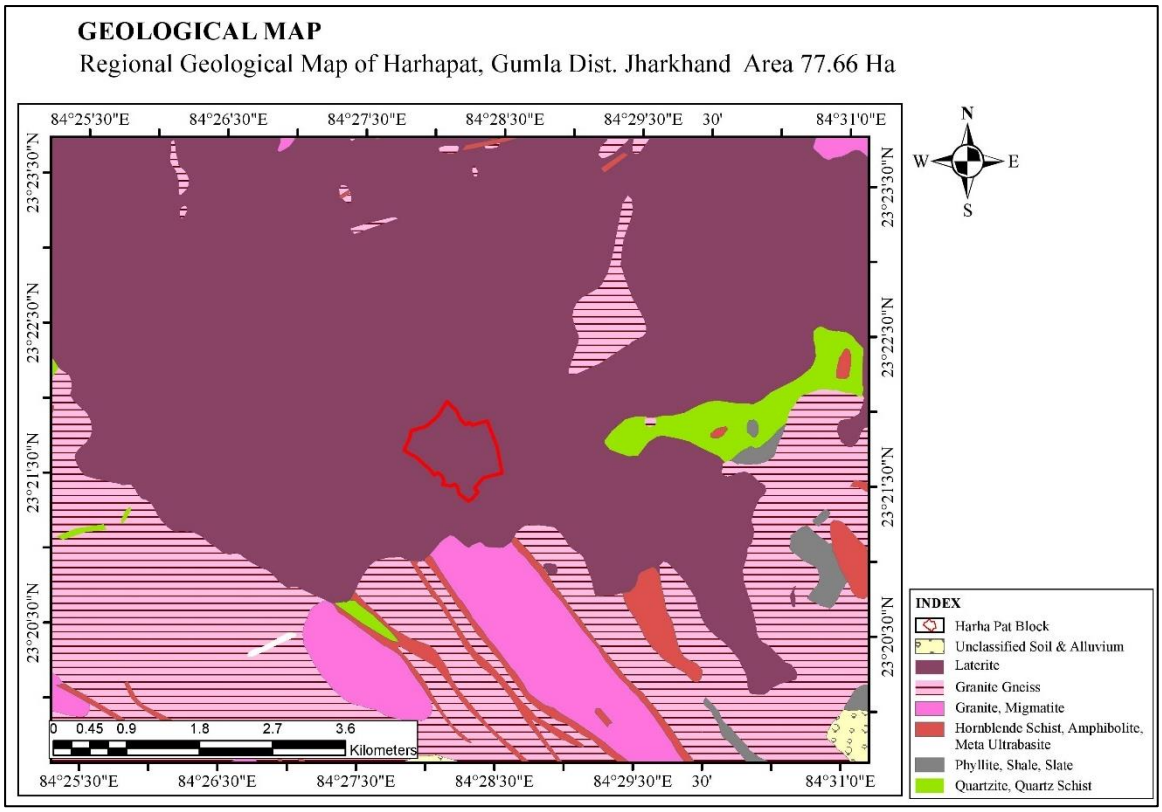
List of Plates:

1. Location Map
2. Field Sample Location Map
3. Regional Geological Map
4. Proposed Borehole plan map
5. Field Photographs

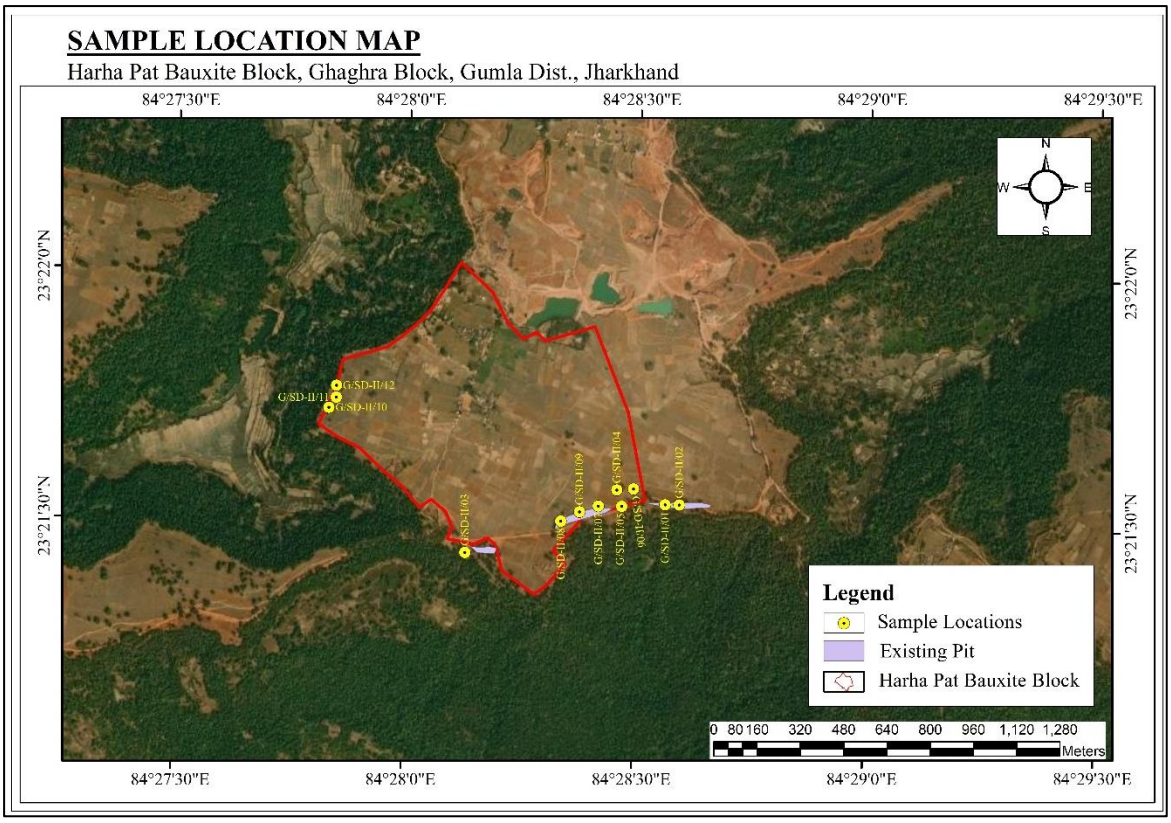
Location Map



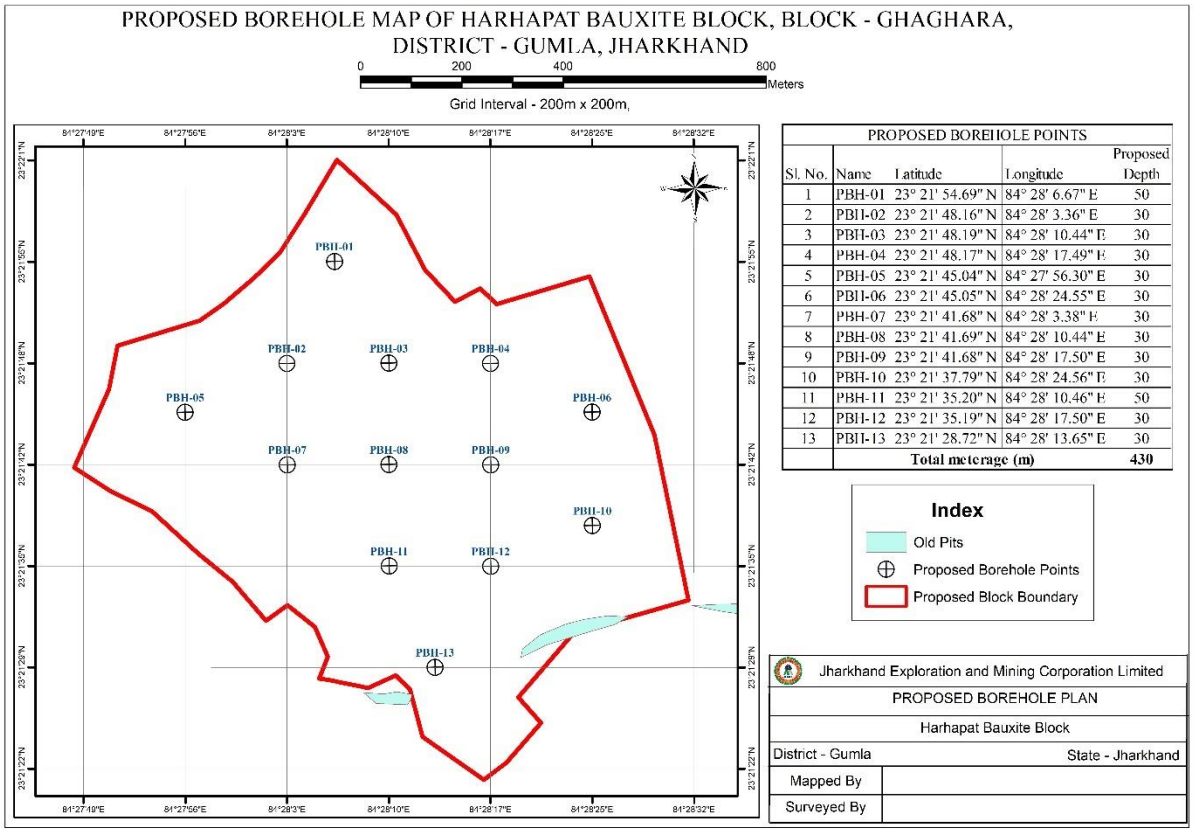
Geological Map



Sample Location Map



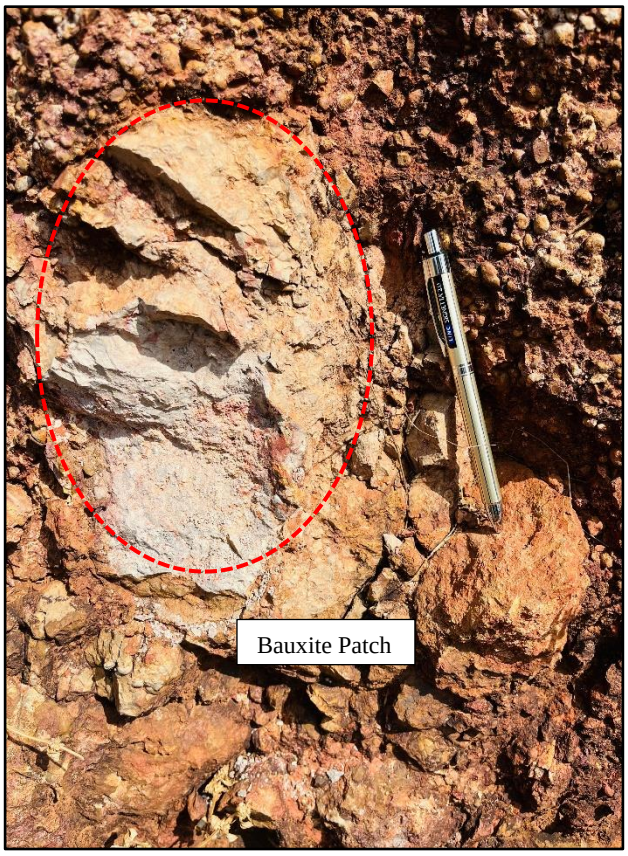
Proposed Borehole Plan



PROPOSED BOREHOLE POINTS

Sl. No.	Name	Latitude	Longitude	Proposed Depth
1	PBH-01	23° 21' 54.69" N	84° 28' 6.67" E	50
2	PBH-02	23° 21' 48.16" N	84° 28' 3.36" E	30
3	PBH-03	23° 21' 48.19" N	84° 28' 10.44" E	30
4	PBH-04	23° 21' 48.17" N	84° 28' 17.49" E	30
5	PBH-05	23° 21' 45.04" N	84° 27' 56.30" E	30
6	PBH-06	23° 21' 45.05" N	84° 28' 24.55" E	30
7	PBH-07	23° 21' 41.68" N	84° 28' 3.38" E	30
8	PBH-08	23° 21' 41.69" N	84° 28' 10.44" E	30
9	PBH-09	23° 21' 41.68" N	84° 28' 17.50" E	30
10	PBH-10	23° 21' 37.79" N	84° 28' 24.56" E	30
11	PBH-11	23° 21' 35.20" N	84° 28' 10.46" E	50
12	PBH-12	23° 21' 35.19" N	84° 28' 17.50" E	30
13	PBH-13	23° 21' 28.72" N	84° 28' 13.65" E	30
	Total meterage (m)			**430**

Field Photographs



Estimated Cost for G-3 level of Exploration for Harha Pat Bauxite Block, Gumla District, Jharkhand							
S. N.	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Remarks
			SoC-Item -Sl No.	Rates as per SoC	Qty.	Total Amount (Rs)	
A	GEOLOGICAL MAPPING, SAMPLING AND SURVEYING DAYS						
1	Geological Mapping (1:4000), & Sampling						
a	Charges for one Geologist per day at field	day	1.3	11000	30	330000	
b	Labour for Geologist (4 Nos. i.e. 2 workers/geologist) Base rate - 427	day	5.7	427	60	25620	Amount will be reimbursed as per the notified rates by the central labour commissioner or respective state govt. whichever is higher
c	Charges for one Sampler per day (1 Party)	one sampler per day	1.5.2	5100	225	1147500	
d	Labours for sampling work (4 Nos) Base rate - Rs. 427 (Unskilled)	day	5.7	427	900	384300	Amount will be reimbursed as per the notified rates by the central labour commissioner or respective state govt. whichever is higher
2	Survey (on 1:4000 Scale)						
a	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes and pit-trench points by DGPS/Total station	Per Point of observation	1.6.2	19200	46	883200	Borehole-13, Pit & Trench - 02, Boundary Points - 31
b	Charges of one Surveyor (1 Party)	one surveyor per day	1.6.1a	8300	15	124500	
c	Labours (2 Nos) Base rate - Rs. 427 (Unskilled)	day	5.7	427	30	12810	
3	Pitting & Trenching	cu.m	2.1.3	5330	60	319800	Pitting Trenching - 02 (5mX3mX2m)
	Sub-Total A					3227730	
B	DRILLING						
a	Drilling -Medium Hard Rock	m	2.2.1.3a	10100	430	4343000	
b	Borehole Deviation Survey	m	2.2.6	330	430	141900	
c	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a	2000	13	26000	
d	Transportation of Drill Rig & Truck associated per drill	Km	2.2.8	30	400	12000	
e	Monthly Accomodation Charges for drilling Camp (up to 2 Rigs)	month	2.2.9	50000	3.5	175000	
f	Drilling Camp Setting Cost	Nos	2.2.9a	250000	1	250000	
g	Drilling Camp Winding up Cost	Nos	2.2.9b	250000	1	250000	
h	Road Making (Flat Terrain)	Km	2.2.10a	22020	5	110100	Road making will be considered as per the requirement and Road making charges will be reimbursed accordingly
e	Drill Core Preservation	per m	5.3	1590	430	683700	
	Sub Total B					5991700	
C	LABORATORY STUDIES						
i)	Chemical Analysis						
a	Primary Samples						
1	Analysis for 5 radicals i.e, Al2O3, SiO2, Fe2O3, TiO2 & LOI	Nos	4.1.15a	4200	430	1806000	
b	Check samples Internal (5%) and External(10%)						
1	Analysis for 5 radicals i.e, Al2O3, SiO2, Fe2O3, TiO2 & LOI	Nos	4.1.15a	4200	65	270900	
c	Composite Samples						
1	Analysis of 7 radicals viz Al2O3, SiO2, Fe2O3, TiO2, P2O5, V2O5 & LOI	Nos	4.1.15a	4200	86	361200	
2	Analysis of 14 radicals viz Al2O3, SiO2, Fe2O3, TiO2, P2O5, V2O5, LOI, MnO, CaO, MgO, K2O, Na2O, SO3 & Organic Carbon	Nos	4.1.15a	4200	37	155400	
d	Analysis of Bauxite						
1	Combined determination of Tri hydrate Alumina (THA-40 c) and Mono hydrate Alumina (MHA - 240 c) & reactive silica	Nos	4.1.17a	6700	35	234500	
2	Determination of Bond Work Index	Nos	4.1.17e	10000	10	100000	
	Sub Total - i					2928000	
ii)	Petrological/Mineralogical studies						
a	XRD studies for identification of minerals (Random)	Nos	4.5.1	4000	10	40000	
b	ICP-AES/ICP-MS (sequential technique) sample package for 34 elements i.e. 16 other elements viz. Li,Ga,In,Be,Ge,Mo,Cr,Ta,W,Ba,Co,Rb,Sr,Zr,Nb,Ni ;16 REE viz. La,Ce, Pr,Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu,Sc,Y; 02 Actinides viz. U,Th.	Nos	4.1.14	7731	20	154620	
c	Preparation of thin section	Per Samples	4.3.1	2353	10	23530	
d	Study of Thin Section	Per Samples	4.3.4	4232	10	42320	
e	Preparation of polish section	Per Samples	4.3.2	1549	10	15490	
f	Study of polish Section	Per Samples	4.3.4	4232	10	42320	
	Sub Total - ii					318280	
iii	Geotechnical Laboratory						
	Specific Gravity determination	Nos	4.8.1	1605	10	16050	
	Sub Total - iii					16050	
	Total - C					3262330	
D	Sub Total (A to C)					12481760	
E	Geological Report Preparation		5.2	For the projects exceeding Rs. 50 Lakhs but less than 150 lakhs: A Minimum of Rs. 2.5 lakhs or 5% of the work whichever is more and Rs. 3000/- per each additional copy		624088	
F	Preparation of Exploration Proposal	5 Hard copies with a soft copy	5.1	2% of the Cost or Rs. 3.8 Lakhs whichever is lower		249635	
G	Peer review Charges		As per EC decision			30000	
H	Total Estimated Cost without GST	Approx.				13385483	
I	Provision for GST (18% of H)	%				2409387	
J	Total Estimated Cost with GST					15794870	
				or Say Rs. In Lakhs		158	

Note - If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SoC and Item no. 6 of NMET SoC. In case of execusion of the project by NEA on its own, a Certifiate regarding non outsourcing of any component/project is required.

MINERAL EXPLORATION AND CONSULTANCY LIMITED

A GOVT OF INDIA ENTERPRISE- CPSE MINIRATNA -I

CHEMICAL LABORATORY

ANALYTICAL REPORT

Lab No	**JEL 1-12 (12 Samples)**
Sender's Name	**महाप्रबंधक (अन्वेषण), JEMCL, रांची**
Sender's Ref No	**JEMCL/अन्वे/38-196 Dt 22/05/2024**
Sampling	**Not Done by Lab**
Environment Condition	**Ok**
Analysis Type	**Al_2O_3%, SiO_2%, TiO_2%, V_2O_5%, Fe_2O_3%**
Name of Block	**झारखंड अन्वेषण और खनन निगम लिमिटेड (JEMCL)**

Sr No	Lab No	Sender No	Al_2O_3%	SiO_2%	TiO_2%	V_2O_5%	Fe_2O_3%
1	JEL-1	G/SD-II/01	54.51	0.86	10.37	0.17	9.11
2	JEL-2	G/SD-II/02	46.59	3.45	10.03	0.16	14.42
3	JEL-3	G/SD-II/03	47.76	3.58	11.59	0.16	14.37
4	JEL-4	G/SD-II/04	54.54	2.07	11.43	0.11	5.78
5	JEL-5	G/SD-II/05	53.01	1.12	13.08	0.12	8.03
6	JEL-6	G/SD-II/06	50.98	2.56	12.47	0.14	9.36
7	JEL-7	G/SD-II/07	55.04	0.83	11.08	0.13	5.89
8	JEL-8	G/SD-II/08	53.82	1.52	11.52	0.13	7.96
9	JEL-9	G/SD-II/09	52.50	1.03	14.93	0.12	4.61
10	JEL-10	G/SD-II/10	50.52	1.24	10.61	0.20	11.36
11	JEL-11	G/SD-II/11	52.20	1.00	14.93	0.14	4.51
12	JEL-12	G/SD-II/12	50.55	1.41	10.62	0.19	11.44

नोट :- सभी नमूनों को विश्लेषणात्मक रिपोर्ट प्रस्तुत करने की तारीख से एक महीने के बाद नष्ट किया जाएगा।

१ महाप्रबंधक (अन्वेषण), JEMCL, रांची

२ Sr. Manager(F)

३ GM(EXPLORATION)

दिनांक 20.06.2024

HEAD(LAB)

Ashish Kumar Sharma
Head (Lab)
Chemical Lab, MECL, Nagpur-06

JHARKHAND EXPLORATION AND MINING CORPORATION LIMITED (JEMCL)
(A Government of Jharkhand Undertaking)
CIN:U14200JH2022SGC017995

Letter No. :- 303 ..... Ranchi, Date: - 16.07.2024

To,
The Director & HOD
National Mineral Exploration Trust (NMET)
Ministry Of Mines
F-114, Shastri Bhavan
New Delhi-110001

It is certified that:

The project titled 'Proposal for "Harha Pat Bauxite Block" situated in Ghaghra Block, Gumla District, Jharkhand for Reconnaissance Survey (G3 Stage) under NMET' along with an estimated cost Rs. 1.57 crores is submitted for consideration of NMET funding.

1. The project proposal is prepared following the guidelines prescribed in Minerals (Evidence of Mineral Contents) Rules, 2015 in case of mineral exploration project proposals.
2. The proposal has been duly examined and concurred by associate finance in accordance with canons of financial propriety.
3. The same project proposal or project proposal with similar objectives has not been submitted to any other funding agency by this organization. The proposal bears no duplication with existing work/ongoing projects undertaken by this agency.

Yours faithfully,

16.07.24

(Vijay Kumar Ojha)
GM, Exploration
JEMCL, Ranchi

MINERAL EXPLORATION AND CONSULTANCY LIMITED

A GOVT OF INDIA ENTERPRISE- CPSE MINIRATNA -I

CHEMICAL LABORATORY

ANALYTICAL REPORT

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Analysis Type	**Al_2O_3%, SiO_2%, TiO_2%, V_2O_5%, Fe_2O_3%**
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11	JEL-11	G/SD-II/11	52.20	1.00	14.93	0.14	4.51
12	JEL-12	G/SD-II/12	50.55	1.41	10.62	0.19	11.44

नोट :- सभी नमूनों को विश्लेषणात्मक रिपोर्ट प्रस्तुत करने की तारीख से एक महीने के बाद नष्ट किया जाएगा।

१ महाप्रबंधक (अन्वेषण), JEMCL, रांची

२ Sr. Manager(F)

३ GM(EXPLORATION)

दिनांक 20.06.2024

HEAD(LAB)

Ashish Kumar Sharma
Head (Lab)
Chemical Lab, MECL, Nagpur-06