

**PROPOSAL FOR REGIONAL EXPLORATION (G-3) OF BAUXITE IN SENDURKHAR
BLOCK, TEHSIL- PANDARIA, DISTRICT - KABIRDHAM, CHHATTISGARH
SYNOPSIS**

Mineral	Bauxite																																					
Location	The proposed area is located at about 6 km north of Amaniya village, in the northern part of Pandaria Tehsil of Kabirdham district of Chhattisgarh. The block is included in the Survey of India Toposheet No. 64 F/7. The proposed area is connected to the state capital, Raipur by the National Highway No. 12A and to Kawardha, District headquarters, by state highway, the Pandaria-Kui-Kakdur road. Raipur is the nearest railway station of the busy Mumbai-Howrah Railway route of the South Eastern Railway which is about 86 kms from Pandaria town.																																					
Bounding coordinates	The block limits with Latitude and Longitude as under <table><tr><td rowspan="2">Block Boundary Points</td><td colspan="2">WGS-84</td></tr><tr><td>Longitude</td><td>Latitude</td></tr><tr><td>A</td><td>81° 18' 03.1300" E</td><td>22° 29' 11.6118" N</td></tr><tr><td>B</td><td>81° 18' 25.8100" E</td><td>22° 28' 53.8718" N</td></tr><tr><td>C</td><td>81° 18' 58.2300" E</td><td>22° 28' 58.7018" N</td></tr><tr><td>D</td><td>81° 18' 55.4600" E</td><td>22° 29' 16.4518" N</td></tr><tr><td>E</td><td>81° 19' 14.6500" E</td><td>22° 29' 10.0018" N</td></tr><tr><td>F</td><td>81° 19' 05.9000" E</td><td>22° 29' 39.0318" N</td></tr><tr><td>G</td><td>81° 19' 09.0400" E</td><td>22° 30' 00.0018" N</td></tr><tr><td>H</td><td>81° 19' 46.0400" E</td><td>22° 30' 00.0018" N</td></tr><tr><td>I</td><td>81° 19' 46.0400" E</td><td>22° 28' 21.6118" N</td></tr><tr><td>J</td><td>81° 18' 03.1300" E</td><td>22° 28' 21.6118" N</td></tr></table>			Block Boundary Points	WGS-84		Longitude	Latitude	A	81° 18' 03.1300" E	22° 29' 11.6118" N	B	81° 18' 25.8100" E	22° 28' 53.8718" N	C	81° 18' 58.2300" E	22° 28' 58.7018" N	D	81° 18' 55.4600" E	22° 29' 16.4518" N	E	81° 19' 14.6500" E	22° 29' 10.0018" N	F	81° 19' 05.9000" E	22° 29' 39.0318" N	G	81° 19' 09.0400" E	22° 30' 00.0018" N	H	81° 19' 46.0400" E	22° 30' 00.0018" N	I	81° 19' 46.0400" E	22° 28' 21.6118" N	J	81° 18' 03.1300" E	22° 28' 21.6118" N
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Total area	2.90 sq. Km																																					
Background information	The Sendurkhar plateau constitutes a part of the table land of basaltic lava flows of the Archaean-Cainozoic age. The major part of the blocks is covered by lateritic soil/laterite and sometimes with morrum, except the scarp and edges of the plateau where bauxite and aluminous/ferruginous laterite are exposed. Laterite along with Bauxite occurs at plateau top in the block. Laterite overlies lithomargic clay, sandstone which in turn unconformably overlies Chhattisgarh Super group of rocks. The bauxite/laterite profile is the outcome of prolonged weathering of the basaltic rocks. Bauxite occurs as segregations and patches /pockets with various dimensions within laterite capping over the plateau. Bauxite is pisolitic to massive in nature and exhibits various colours like pale yellow, cream to brown.																																					
Objectives	Objectives for G-3 level exploration - To prove existence of bauxite both along the longer axis and the shorter axis of the plateau at right angle to each other by drilling boreholes at 400 X 400m grid. - To know the quality and the thickness of Bauxite Horizons to upgrade the Bauxite resources at G-3 level in the block both quantitatively & qualitatively. - To carry out exploration as per Minerals (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015 and MMDR Act-2015 as to facilitate the State Government of Chhattisgarh in auctioning of the block.																																					
Time schedule	7 months																																					
Cost estimate	94.43 Lakhs																																					
Exploration Agency	Mineral Exploration Corporation Limited																																					

PROPOSAL FOR REGIONAL EXPLORATION (G-3) OF BAUXITE IN SENDURKHAR BLOCK, TEHSIL- PANDARIA, DISTRICT - KABIRDHAM, CHHATTISGARH

1.0.0 INTRODUCTION

- 1.1.0 Bauxite is the rock formed by the weathering of aluminium rich rocks that have been severely leached of silica and other soluble materials in a wet tropical or subtropical climate. Bauxite is usually classified according to its intended commercial application: abrasive, cement, chemical, metallurgical and refractory. Approximately 85% of the world's bauxite production is for metallurgical use and is the world's principal source of aluminium. Metallic aluminium; being good conductor, light weight and amenable to get moulded in various shapes and sizes; is very useful and important for various domestic and industrial consumptions. It has wide application in various areas such as transport, building, architectural sectors, food packaging, chemical industries, consumer durables, electrical sectors, machinery & equipment, solar panels, lithographic (offset) plates as required in printing technology, car industry and so on.
- 1.2.0 Bauxite forms from breakdown of clays when large amounts of rainfall leach away the more mobile elements in the host rock leaving the relatively immobile aluminium with some silicon, iron and titanium. Hence, major deposits of bauxite are generally close to the surface. Bauxite is a mixture of aluminium minerals, clay minerals, and insoluble materials. Three hydrated oxide aluminium minerals can occur in bauxite: gibbsite ($\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ (Al_2O_3 -65.4%; Al-34.6%)), boehmite and diaspora ($\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (Al_2O_3 -85%; Al-45%)). It is basically an aluminous rock containing the said hydrated aluminous oxides as the main constituents along with iron oxides like haematite and or goethite, silica as clay and or free quartz and titanium as leucoxene or rutile in various proportions.
- 1.3.0 Resources of bauxite in India as on 1.4.2015 as per NMI database, based on UNFC system stand at 3896 m.t. including 656 m.t. as bauxite reserves. Odisha alone accounts for 51% of the country's total Bauxite resources, followed by Andhra Pradesh (16%), Gujarat (9%), Jharkhand (6%), Maharashtra (5%) and Madhya Pradesh & Chhattisgarh (4% each). The production of bauxite is placed at 24.665 m.t. in 2016-17, 12% less than that of previous year. Out of 70, ten principal producers having 50 mines, contributed 86% of the total production. Odisha is the leading producing state accounting for about 49% of the total production followed by Gujarat (24%), Jharkhand (9%), Chhattisgarh and Maharashtra (8% each). The share of public sector mines was about 31% of the total national production.
- 1.4.0 Directorate of Geology and Mines, Chhattisgarh surveyed the Sendurkhar Block at G4 level and proposed for G2 level of exploration through NMET Fund as per the Minerals (Evidence of Mineral Contents) Rules, 2015 to facilitate State Government of Chhattisgarh, for auctioning of the property.

- 1.5.0 The proposal of Sendurkhar Block, Tehsil-Pandaria, District-Kabirdham, Chhattisgarh was put up for Technical Evaluation in the 1st Meeting of Technical Committee of NMET held on 01-04-2016 & 02-04-2016 at GSI, Central Region, Nagpur. The Committee discussed the proposal in detail and in view of insufficient data, suggested that G-4 exploration should be taken up instead of G-2 level with Geological Mapping & Topographical Survey on 1: 10000 scale, collection of surface samples and drilling five scout boreholes to know the presence of Bauxite Zones and its quality. The future course of exploration in the block will be decided based on the outcome of G-4 level exploration. MECL accordingly modified the proposal and put up for approval in the 2nd meeting of TCC held on 5th May 2016 at GSI, Hyderabad. On recommendations of TCC the proposal was approved in the 2nd Executive Committee held on 09.05.2016 at Ministry of mines, New Delhi.
- 1.6.0 On receipt of financial sanction for Rs 45.13 Lakh from National Mineral Exploration Trust, Ministry of Mines vide letter no F.No.6/1/NMET-2015 dated 18/08/2016, MECL commenced the investigation in Sendurkhar Block including survey, geological mapping, exploratory drilling, sampling etc. in July-2016 and geological report was submitted to DGM, Chhattisgarh in August-2017.
- 1.7.0 As an outcome of (G-4) exploration, it is evident that the bauxite of Sendurkhar block occurs as irregular, discontinuous lenses & pockets and bouldery in nature. In such type of irregular deposit, the continuity of Bauxite zone from one exploration point to adjacent point is not certain even for short distance. Therefore, on request of DGM, Chhattisgarh, to confirm the continuity of bauxite zone in the block & to upgrade the Bauxite resource at G3 level, Regional exploration (G-3) with borehole spacing at 400 m X 400 m grid interval is recommended and the proposal for G3 level exploration has been put up in the meeting of the Technical Committee of NMET.

2.0.0 LOCATION AND COMMUNICATION

- 2.1.0 The proposed area is located in the northern part of Pandaria Tehsil of Kabirdham (Kawardha) district of Chhattisgarh. The block is included in the Survey of India Toposheet No. 64 F/7 and the block boundary is marked by the coordinates given below.

Block Boundary Points	WGS-84		UTM (m)	
	Longitude	Latitude	Easting	Northing
A	81° 18' 03.1300" E	22° 29' 11.6118" N	530949.0446	2486714.8850
B	81° 18' 25.8100" E	22° 28' 53.8718" N	531598.2191	2486170.7262
C	81° 18' 58.2300" E	22° 28' 58.7018" N	532524.3050	2486321.1673
D	81° 18' 55.4600" E	22° 29' 16.4518" N	532444.0041	2486866.7823
E	81° 19' 14.6500" E	22° 29' 10.0018" N	532992.7572	2486669.6201
F	81° 19' 05.9000" E	22° 29' 39.0318" N	532740.8375	2487561.7099
G	81° 19' 09.0400" E	22° 30' 00.0018" N	532829.1803	2488206.6933
H	81° 19' 46.0400" E	22° 30' 00.0018" N	533886.3142	2488208.9832
I	81° 19' 46.0400" E	22° 28' 21.6118" N	533892.9675	2485183.6573
J	81° 18' 03.1300" E	22° 28' 21.6118" N	530952.1314	2485177.4739

- 2.2.0 The proposed area is located about 6 km north of Amaniya village in the Pandaria Tehsil of Kabirdham District of Chhattisgarh. The proposed area is connected to the state capital, Raipur by the National Highway No. 12A and to Kawardha, District headquarters, by state highway, the Pandaria-Kui-Kakdur road. Raipur is the nearest railway station of the busy Mumbai-Howrah Railway route of the South Eastern Railway at about 86 kms from Pandaria town. Block location map is presented as Plate- I.

3.0.0 PHYSIOGRAPHY AND DRAINAGE

- 3.1.0 The area around the block exhibit landforms of pediments/pediplain with denudational plateau & slope and regions of high level and middle level plateau of extrusive origin. The elevation of the highest point is about 955.76m (BH.No. MSDB-2) in the eastern most part and as given in topographical map the lowest elevation point is 880m contour in the northeastern part of the block. The longest axis of Sendurkhar plateau is 1000 m. in east-west direction and shortest axis is 800 m. in north-south direction. Major part on the top of the plateau is plain land and cultivated by local villagers. The south, west and east portion of the plateau is covered by shallow valley whereas the northern slope is steep and is covered by dense Bijora reserve forest. The plateau is irregular in shape and is separated from Saraipani plateau by a narrow north-south depression.
- 3.2.0 The tributaries of Seonath and Banjara rivers constitute the surface drainage system of the area. The drainage mainly consists of nalas and flows in all direction away from the plateau.

4.0.0 PREVIOUS WORK

- 4.1.0 The area has been surveyed (G-4 level) by the Directorate of Geology and Mines (DGM), Chhattisgarh during 2006-07. Bauxite is reportedly of pockety nature with various dimensions. It is pisolitic to massive in nature and occurs in various colours like pale yellow, cream, brown as reported by the DGM, Chhattisgarh. DGM also carried out surface sampling of the area and Al_2O_3 is reported to range from 40% to 60%. Bauxite of the area is of metallurgical grade as observed by the DGM during its investigation.
- 4.2.0 On the basis of above informations, DGM Chhattisgarh suggested that this area seems to be promising for further exploration work.
- 4.3.0 On request of DGM, Chhattisgarh MECL put up the proposal for G-4 level exploration for Bauxite in Sendurkhar block in the Technical Committee meeting of NMET and on approval from Technical & Executive Committee of NMET, MECL commenced G-4 level exploration in Sendurkhar Block in July-2016 and geological report was submitted to DGM, Chhattisgarh in August-2017.

- 4.4.0 As the result of reconnaissance survey (G-4), a total of 32.00 million tonnes net in-situ bauxite resource with an average grade of 34.35% Al₂O₃, 16.00% SiO₂, 26.78% Fe₂O₃, 4.03% TiO₂ & 18.51% LOI have been estimated in an area of 2.70 sq. km out of total 2.90 sq. kms area of the block.

5.0.0 GEOLOGY OF THE AREA

The Sendurkhar plateau constitutes a part of the table land of basaltic lava flows. The plateau is comprised of basaltic rocks of the Upper cretaceous to Palaeocene age. The major part of the blocks is covered by lateritic soil/laterite and sometimes with morrum, except the scarp and edges of the plateau where bauxite and aluminous/ferruginous laterite are exposed. Laterite along with Bauxite occurs at plateau top in the block. Laterite overlies lithomargic clay, sandstone which in turn unconformably overlies Chhattisgarh Super group of rocks (Raipur and Chandrapur group). The bauxite/laterite profile is the outcome of prolonged weathering of the basaltic rocks. Bauxite occurs as segregations and patches /pockets with various dimensions within laterite capping over the plateau. Bauxite is pisolitic to massive in nature and of various colours like pale yellow, cream to brown. Regional Geological map is presented as Plate- II.

Stratigraphic Sequence in Sendurkhar Block

Age	Super group	Group	Litho units
Cainozoic	-	-	Laterite with Bauxite
Upper Cretaceous to Palaeocene	Deccan Trap	Linga Formation	Basalt Flow (4 flows)
		Unclassified	Basalt Flows
Cretaceous	-	Lameta Group	Limestone, Arkosic Sandstone, Calcareous and Conglomeratic sandstone and clay at places

6.0.0 PROPOSED EXPLORATION PROGERAMME

- 6.1.0 The exploration for G-3 level will be carried out by exploratory drilling, logging, geological mapping, sampling and subsequently on the basis of results, Geological Report will be prepared. Based on the outcome, next level exploration programme will be put up to the NMET committee.

6.2.0 Objectives for G-3 level exploration

1. To prove existence of bauxite both along the longer axis and the shorter axis of the plateau at right angle to each other by drilling boreholes at 400 X 400m grid.

2. To know the quality and the thickness of Bauxite Horizons to upgrade the Bauxite resources at G-3 level (333) in the block both quantitatively & qualitatively.
3. To carry out exploration as per Minerals (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015 and MMDR Act-2015 as to facilitate the State Government of Chhattisgarh in auctioning of the block.

7.0.0 EXPLORATION SCHEME

7.1.0 Topographic Survey: The proposed area of the Sendurkhar Block (2.90 sq. km Area) will be covered by fixing survey stations by DGPS in a triangulation network. Contouring will be carried out at 2m interval on 1:2000 scale. Reduced level of the various stations and boreholes will be determined with reference to the Survey of India “Bench Mark” available at the plateau top and/or that of the DGPS survey stations fixed by MECL. All the boreholes will be connected with the survey triangulation network. Boreholes proposed will be fixed on the cross section lines at required interval. The coordinates and reduced level of all the boreholes and triangulation stations will also be determined. The Block Boundary will be surveyed with DGPS & Total Station in WGS-84 datum.

7.2.0 Detailed Geological Mapping: Geological mapping has been carried out on 1:5000 scale in the block during G-4 reconnaissance survey. The geological mapping will be further carried out in details prior to the remaining exploration activities. The available rock exposures of laterite bauxite, basalt of smaller dimension will be mapped and updated carefully with details of foliation, joints etc. marked on a plan before taking up further exploration activities like detail drilling. A representative geological map superimposed on a topographical plan on 1:2000 scale will be prepared.

7.3.0 Drilling: The thickness of the bauxite zone show wide variation and exhibit pockety/bouldery type of irregular and discontinuous deposit. The continuity of Bauxite zone from one exploration point to adjacent point is not certain even for the shorter distance because of the irregular type (pockety/bouldery) Bauxite deposit. Therefore, to confirm the presence of bauxite zone in the block & to upgrade the Bauxite resource of entire block at G-3 level, the Regional exploration (G-3) with borehole spacing at 400 m X 400 m grid interval is envisaged.

Total 23 no vertical Boreholes, involving 345.00 m, at 400m X 400m grid interval will be drilled. All the boreholes will be closed after drilling 3m of non-bauxite zone/ lithomarge clay, after intersection of complete bauxite horizon. Thus the total meterage in present G-3 level exploration will be approximately 345.00 m in 23 no vertical boreholes along with associated geological & laboratory studies. Borehole location plan is presented as Plate- III.

7.4.0 Geological core logging: Geological core logging will be carried out to differentiate the overburden from the bauxite zones encountered in the borehole as well as to mark the floor of the Bauxite zone at the bottom. The overburden is generally marked by presence of soil / alluvium, laterite or ferruginous rock rich in haematite/goethite; while the bottom is marked by the weathered basement rock i.e. basalt or lithomarge. While carrying out geological core logging, colour, physical nature, lithology, structural details, mineralogy etc. need to be carefully recorded. Visual estimates for the ore zones encountered are to be labeled for each drill run so that primary delineation of the roof and floor of the bauxite zones can be ascertained for each borehole.

7.5.0 Core Sampling:

(Primary, Internal & External Check): The drilled cores and cuttings of every “drilled run” need to be sampled after marking the different litho units. Except the visually confirmed overburden in the form of soil or alluvium at the top as well as the basement rock or lithomarge at the bottom of the borehole, nearly the entire drilled cores/cuttings are to be crushed to (-) 120mesh initially and thereafter the crushed (-) 120 mesh materials should be reduced to 300gm representative homogenous sample by gradual coning & quartering method. A packet of primary representative sample weighing about 100 gm will be collected by coning & quartering method and sent to chemical laboratory in an air-tight double polythene bag packing for quantitative determination of five radicals. Another packet of 100gm will be used for check analysis while the third packet has been preserved for preparation of composite samples. The left out sample of (-) 120 mesh will be stored as duplicate sample.

At the top as well as in the bottom of the ore zones, length of samples needs to be adjusted according to the length of overburden in the form of soil / laterite. However, the zones of different grade as per the concentration of ore minerals like boehmite etc. may be sampled separately when the length may differ. The sample length should not exceed 1m in any other condition. In case of a non-bauxite zone encountered within an ore zone, similar adjustment will have to be made to sample the non-ore zone separately. The other packet of 100gm may be used for check analysis while the remaining (third part) will be preserved for preparation of composite samples. The left out sample of (-) 120 mesh will be stored as duplicate sample. A total 275 nos primary drill core samples are likely to be generated and analyzed for five radicals during the G3 level exploration. Around 15 nos and 30 nos primary drill core samples (5% and 10% of the total primary samples) will be selected randomly from the primary drill core samples and analyzed as internal and external check samples for five radicals at MECL, Chemical Laboratory, Nagpur and any NABL accredited Laboratory respectively.

7.6.0 Composite Samples: For each of the bauxite horizons of the boreholes, composite sample will be prepared by combining all the constituent primary samples in proportion of their lengths they represent. A total 23 nos of composite samples will be generated.

8.0.0 CHEMICAL ANALYSIS

8.1.0 Primary Samples: All the drill core primary samples (275 Nos) from boreholes will be subjected to analysis of 5 radicals viz. Al_2O_3 , SiO_2 , Fe_2O_3 , TiO_2 & LOI at MECL, Chemical Laboratory, Nagpur.

8.2.0 Check Samples (Internal & External Check): Around 15 nos primary drill core samples (5% of the total primary samples) selected randomly from the primary drill core samples will be analyzed for five radicals in the Chemical Laboratory, MECL, Nagpur.

30 nos total primary drill core samples (10% of Total primary samples) selected randomly will be analyzed by a third party NABL accredited or Department of Science & Technology (DST)/ BIS recognized laboratories or government laboratories for assessing the acceptable levels of accuracy as per the Minerals (Evidence of Mineral contents) Rules, 2015.

8.3.0 Composite Samples: All the composite samples (around 23 Nos) will be prepared by combining the primary samples in their length proportions for each of the bauxite zones encountered in boreholes and will be analyzed for 14 radicals viz. CaO , MgO , Al_2O_3 , SiO_2 , Fe_2O_3 , TiO_2 , SO_3 , P_2O_5 , V_2O_5 , Na_2O , K_2O , Mn_2O_3 , Organic carbon & LOI.

8.4.0 Analysis for Reactive Silica and “Total Available Alumina” Content: A total of 23 Nos of composite samples will be analyzed for “Total available alumina” and Reactive Silica content. The samples should be selected from zones where SiO_2 is >5%, in such a manner that the entire bauxite bearing areas are represented by them.

8.5.0 X-Ray Diffraction Studies: A total of 23 No bauxite samples representing the Sendurkhar Bauxite 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 deposit.

8.6.0 Trace Element Studies by ICP-MS: The distribution of trace element in bauxite zones will be studied by ICP-MS method. Fourteen number trace elements i.e. Pb, Zn, Ni, Co, Mo, Sn, V, Ga, Zr, Cr, As, Sb, Bi, Ge will be quantitatively estimated for the same set of samples as selected for analysis for Total Available Alumina & Reactive Silica content as mentioned in para 8.4.0.

8.7.0 REE Studies: The samples from lithomarge clay will be subjected to REE studies which includes fourteen REE elements for which provision of 23 samples has been done in the block.

8.8.0 Petrographic Studies: To know about the mineralogical composition and interrelation among the constituent minerals 10 rock specimens from the block will be taken up for Petrographic studies.

8.9.0 Specific Gravity determination: A total of 20 samples will be drawn from the bauxite zone for determination of Specific gravity.

9.0.0 QUANTUM OF WORK

Proposed exploration work has been quantified in the table below:

**TABLE SHOWING DETAILS OF PROPOSED QUANTUM OF WORK IN
SENDURKHAR BLOCK, KABIRDHAM, CHHATTISGARH**

Sl. No.	Item of Work	Unit	Quantum of Proposed Work in G3 level
1.	Topographic Survey in 2m contour interval	Sq. Km.	2.90
2.	Geological mapping on 1: 2000 scale	Sq. Km	2.90
3.	Core drilling	m	345 (23 BHs)
4.	Laboratory Studies		
	A. Chemical Analysis		
	a) Drill Core Primary samples for 5 radicals viz. Al ₂ O ₃ , SiO ₂ , Fe ₂ O ₃ , TiO ₂ , LOI	Nos	275
	b) Internal Check samples for 5 radicals viz., Al ₂ O ₃ , SiO ₂ , Fe ₂ O ₃ , TiO ₂ , LOI. (approximately 10% of Primary Samples)	Nos	15
	c) External Check Samples from NABL Labs for 5 radicals viz Al ₂ O ₃ , SiO ₂ , Fe ₂ O ₃ , TiO ₂ , LOI (approximately 5% of Primary Samples)	Nos	30
	d) Composite samples for 14 radicals viz. CaO, MgO, Al ₂ O ₃ , SiO ₂ , Fe ₂ O ₃ , TiO ₂ , SO ₃ , P ₂ O ₅ , V ₂ O ₅ , Na ₂ O, K ₂ O, Mn ₂ O ₃ , Organic carbon & LOI	Nos	23
	e) Composite samples for TAA (Total Available Alumina) and Reactive Silica	Nos.	23
	f) REE Analysis of primary samples (16 elements)	Nos.	23
	B. Physical Analysis		
	a) Trace Element studies of Composite Samples for 14 trace elements viz. Pb, Zn, Ni, Co, Mo, Sn, V, Ga, Zr, Cr, As, Sb, Bi, Ge, by ICP-MS method	Nos	23
	b) XRD Studies on Composite samples	Nos	23
	C. Petrographic Studies	Nos	10
	D. Specific gravity determination	Nos	20
5.	Geological Report preparation {As per Minerals (Evidence of mineral contents) Rule-2015} in digital format	Nos	1

10.0.0 TIME SCHEDULE AND COST ESTIMATE

10.1.0 Time Schedule: The proposed exploration programme is planned such a way that the activities like, camp setting, topographical survey, geological Mapping, core sampling, drilling, laboratory work, environmental studies & camp winding will be completed within 5 months' time for G3 level exploration. Report writing (including Peer Review) will take another 3 months' time with overlapping of one month laboratory studies. Thus the total duration of the project shall be 7 months from the date of commencement of the project.

10.2.0 Cost Estimate: Cost has been estimated based on actual and provisional escalation as per RBI indices as on 31-03-18 and same has been considered for the subsequent years. The total estimated cost for G3 level exploration is **Rs. 94.43 Lakhs**.

Summary of Cost Estimates

Sl. No.	Item	Estimated Cost (Rs.) of G-3 level Exploration
1	Drilling	5141662/-
2	Geological Work	1265130/-
3	Laboratory Studies	1262389/-
4	Preservation of Core	203000/-
	Sub Total (1+2+3+4)	7872181/-
7	Exploration Report	120000/-
8	Peer Review	10000/-
	SubTotal	8002181/-
9	GST @ 18%	1440393/-
Total		9442574/-
		Say- Rs. 94.43 Lakhs

11.0.0 JUSTIFICATION

11.1.0 As suggested by The Technical Committee of NMET, MECL carried out G4 level exploration in Sendurkhar Block including survey, geological mapping, exploratory drilling of five scout boreholes, surface sampling etc. in July-2016 and geological report was submitted to DGM, Chhattisgarh in August-2017.

11.2.0 The findings of (G-4) exploration reveals that the bauxite of Sendurkhar block occurs as irregular, discontinuous lenses & pockets and bouldery in nature. In such type of irregular deposit, the continuity of Bauxite zone from one exploration point to adjacent point is not certain even for short distance. Only five scout boreholes had been drilled in G4 level

exploration. It is difficult to decipher the potential ore body and estimate resources with much confidence, based on limited data.

- 11.3.0 Therefore, on request of DGM, Chhattisgarh, to confirm, with greater confidence, the continuity of bauxite zone in the block & to upgrade the Bauxite resource at G3 level, the Regional exploration (G-3) with borehole spacing at 400 m X 400 m grid interval is envisaged.
- 11.4.0 The exploration in the mineralized area of the block will be helpful in estimation of Bauxite resource at higher confidence level i.e. G-3 which in turn will facilitate the Government of Chhattisgarh for further upgrading the block and make it auctionable.

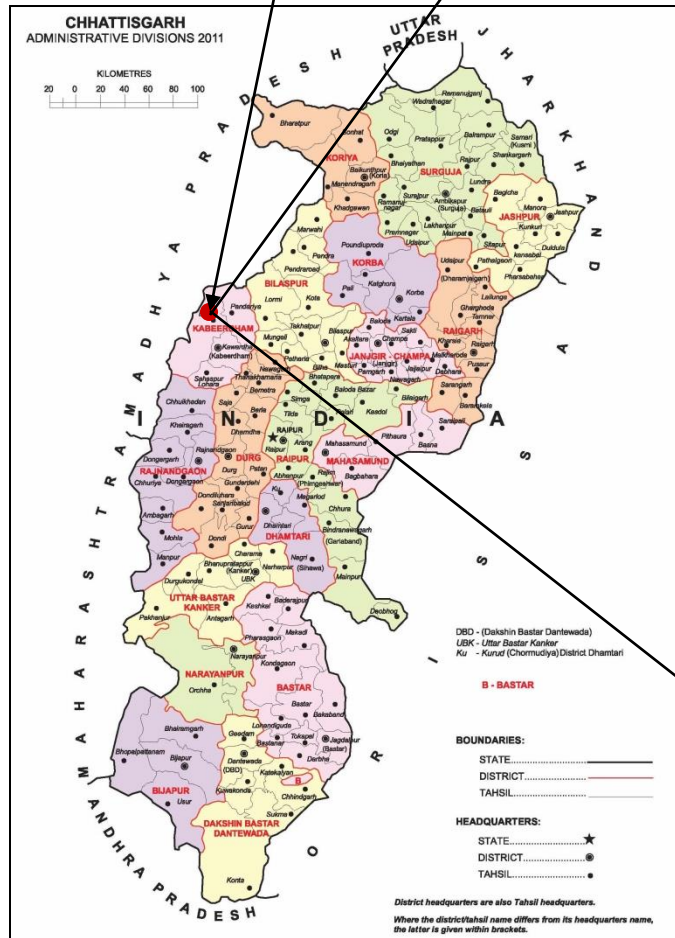
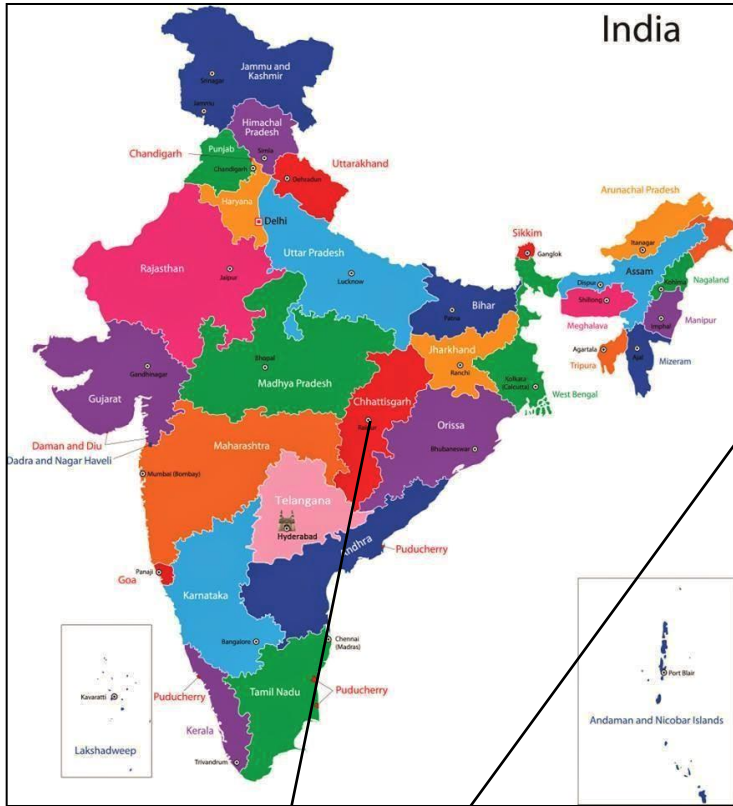
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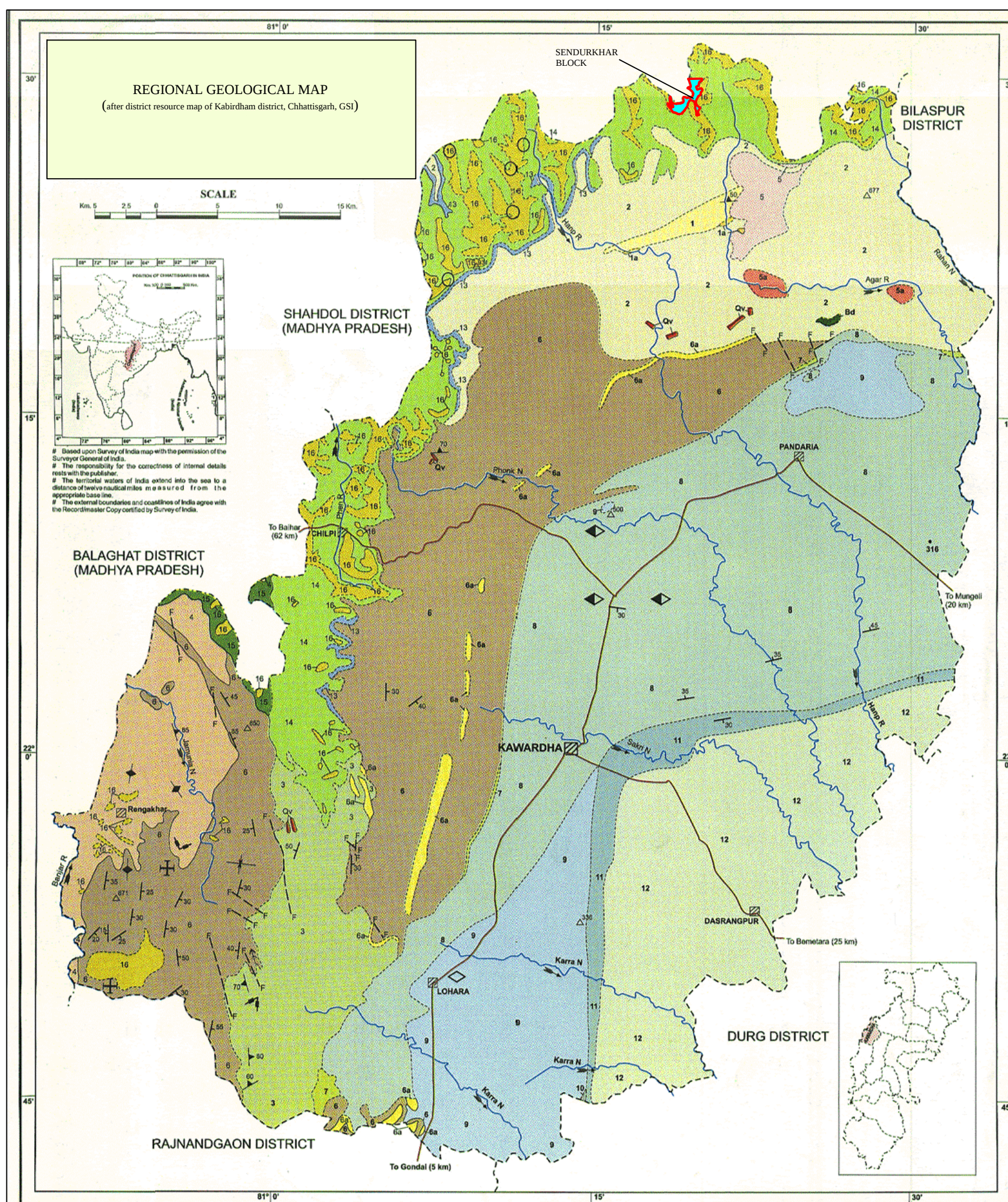
**Table:6.1 TIME SCHEDULE FOR EXPLORATION (G-3) OF BAUXITE IN SENDURKHAR BLOCK,
DISTRICT- KABIRDHAM, CHHATTISGARH**

Sl. No.	Activities	Unit	MONTHS*							Total
			1	2	3	4	5	6	7	
1	Camp setting	month	←→							1
2	Surface Drilling (2 rig)	m.		←→						345.00 (in 23 BHs)
3	Survey Party days (1 Parties)	day		←→						60
4	Geologist Party days (1 Parties)	day		←→						90
5	Sampling Party days (1 Parties)	day		←→						60
6	Laboratory Studies	Nos.		←→						475
8	Camp winding	month				←→				1
9	Report writing (including peer review)	Nos.					←→			90
Note										

* Commencement of projects will be reckoned from the day the exploration acreage is available along with all statutory clearances.

LOCATION MAP OF SENDURKHAR (BAUXITE) BLOCK DISTRICT KABIRDHAM (KAWARDHA), CHHATTISGARH





LITHOLOGY	STRATIGRAPHIC STATUS	AGE
16 Laterite with bauxite	Linga Formation	CAINOZOIC
15 Basalt Flows (4 flows)	Unclassified	UPPER CRETACEOUS TO PALAEOGENE
14 Basalt Flows		
13 Limestone, arkosic sandstone, calcareous & conglomeratic sandstone and clay	Lameta Group	CRETACEOUS
12 Shale with intercalations of dolomite, dolomitic limestone and gypsum lenses	Maniari Formation	
11 Dolomite with argillaceous dolomite	Hirri Formation	
10 Dolomitic argillite, clay stone and shale with chert intercalations	Tarenga Formation	
9 Limestone and dolomite with intercalations of shale and glauconitic sandstone	Chandi Formation	
8 Calcareous shale with limestone, dolomite and arenite intercalations	Gunderdehi Formation	
7 Glauconitic arenite, arkose and conglomerate	Chandarpur Group	
Quartz veins/reefs	Intrusives	
Basic intrusives		
6a Shale, slate, phyllite/sandstone, quartzite and conglomerate	Chipli Group	MESOPROTEROZOIC
5a Quartz diorite/Granite porphyry		
4 Hornblende bearing granodiorite, biotite granite	Malankhand Granitoids	PALAEO PROTEROZOIC
3 Meta-basalt (Pitepani Volcanics)	Nandgaon Group	
2 Granite and gneiss		
1a Mica schist, chlorite-mica schist, sillimanite-talc-chlorite-mica schist, quartz mica schist and hornblende schist/conglomerate	Bilaspur-Raigarh-Surguja Group = Bengal Group	ARCHEAN

GENERAL INDEX

- District boundary
- State boundary
- Road (metalled)
- Settlement
- Drainage with direction of flow
- Height of triangulated station
- Height of triangulated point

STRUCTURAL INDEX

- Confirmed contact
- Inferred contact
- Strike and dip of bedding
- Attitude of foliation- inferred, vertical
- Attitude of vertical joints
- Inferred fault
- Syncline
- Anticline showing plunge

MINERAL INDEX

- Bauxite
- Dolomite
- Limestone
- Ochre

