PROPOSAL FOR KARNAPODIKONDA BAUXITE BLOCK, KORAPUT DISTRICT, ODISHA STATE FOR G-3 STAGE OF MINERAL EXPLORATION UNDER NMET

(Non- Ferrous: Bauxite)

By

Odisha Mineral Exploration Corporation Limited (OMECL)

Bhubaneswar, Odisha

Bhubaneswar

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SUMMARY OF THE KARNAPODIKONDA BAUXITE BLOCK FOR G3 STAGE EXPLORATION

GENERAL INFORMATION ABOUT THE BLOCK

Sl.No	Features	Details
	Block ID	Karnapodikonda Bauxite Block
	Current Exploration Agency	Odisha Mineral Exploration Corporation (OMECL) for G3
	Previous Exploration Agency	G4 stage GR producing agency: Geological Survey of India, Odisha
	G4 stage Geological Report	GSI Report attached as Annexure-I
	Commodity	Bauxite
	Mineral Belt	East coast bauxite belt
	Completion Period	8 months, refer to time schedule for the detail.
	Objectives	To explore the Karnapodikonda Bauxite block in detail to bring it to G3 stage of UNFC. The details are as below i) To carry out detailed geological Mapping in 1:2000scale and demarcate the rock types of Bauxite bearing formations with the structural features i.e. strike, dip etc. ii) To drill boreholes in the 400 or 200 m section interval. iii) To drill boreholes to prove depth continuity up to average of 30 m vertical depth from the surface with reference to nearby operational mines such as Panchpatmali, Baphlimali & Kodingmali however the bore holes will be drilled upto lithomarge. iv) To estimate Bauxite ore resources (333) in the block as per UNFC norms & Minerals (Evidence of Mineral. Contents) Rules- 2015.
	Name/ Number of Geoscientists	Mr Shailender Kumar Sinha (GM), Mrs Nirupama Das, AGM (Geo), Dr. P.K. Nayak, Manager (Geo), Mr Radheshyam Sahoo, Manager (Geo), Mr Umakanta Behera, Manager (Geo), Mr Dileswar Kishan, Manager(Geo)
	Expected field days	6 months

1.	**Location**	
	Commodities to be searched for	Bauxite
	Latitude	18^{o} 46’ 41” to 18^{o} 48’ 39”
	Longitude	83^{o} 03’ 21” to 83^{o} 06’ 36”
	Villages	Pindamali, Tangripadar, Domanobhadra, Ambilambahadra, Galakalima, Turli, Bhitangpadar
	Tehsil/Taluk	Narayanpatna
	District	Koraput
	State	Odisha
2.	**Area**	
	Block Area	9.062 Sq km or 906.2 Hects
	Forest Area	NA
	Government Land area	NA
	Private Land Area	NA
3.	**Accessibility**	
	Nearest Rail Head	Laxmipur Rs, Approximately 40 KM
	Road	Narayanpatna – Laxmipur – Rayagada State highway
	Airport	Bhubaneswar(500 Km)/ Visakhapatnam (330 km)
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Dendritic
	Rivers/Streams	No major streams or rivers in the block area. Only few first and second order seasonal streams
5.	**Climate**	
	Mean Annual Rainfall	1600mm
	Temperature (December-Minimum Temperature (June)-Maximum	04^{0} C 40^{0} C

6.	**Topography**	
	Toposheet No	E44L1 (65N/1)
	Morphology of the area	The area comprises of gentle sloping plateaus and valleys. The maximum height of the plateau is 1521m and minimum height of the valley is 1000 m above MSL
7.	**Availability of baseline Geoscience data**	
	Geological Map (1:50000)	Available
	Geochemical Map	Not Available
	Geophysical Map	Not Available
8.	**Justification for taking up G3 stage mineral exploration**	The Karnapodikonda deposit has been explored by Geological survey of India in 1978 with a possible resource of 17 million tonnes. Bauxite resource has been estimated by the surface area method at cut of grade of + 40% Total Al2O3and 5% Total SiO2 with an average thickness of 5m height. Further details provided in the attached GR. The Panchapatmali bauxite deposit is situated at the NW side of the Karnapodikonda at a distance of 7 Km. The area is in prime terrain for Bauxite for further resource proving and auction.

PROPOSAL FOR G3 STAGE OF EXPLORATION (PROSPECTING) FOR BAUXITE INKARNAPODIKONDA BLOCK, DISTRICT-KORAPUT, ODISHA

1.0.0 BLOCK SUMMARY

1.1.0 Physiography & Drainage

Karnapodikonda bauxite capping strikes in a NE – SW direction and rises to an elevation of 4991' (1520 m) above M.S.L in the southern part, 4877' (1466m) in central part. The periphery of the hill is of highly dissected nature and is marked by discontinuous escarpments. Bauxite scarps of varying heights have been observed on south and south-eastern margins, whereas the western margin is marked by khondalite scarps. These escarpments were probably developed by the process of sedimentation and scarp retreat: also prominent joint sets have played a role in the process. The deposit exhibits a general southern easterly and southerly slope.

The area is drained by numerous ephemeral and perennial streams set in a dendritic pattern controlled mostly by prominent joints in the khondalite. These streams and streamlets discharge water into Peddi Gudda and Kenja Gudda nalas on either sides of the hill, those nalas coursing in NE direction join together, to the west of Narayanpatnam, where it is called the Jhanjhavati River

1.2.0 Background Geology

1.2.1 Regional Geology

The area is a segment of east central part of EasternGhat hill ranges. The country rocks of the region are Khondalite, its variants, Granites & Charnockites. The Khondalite is the hill forming rocks and the Charnockites found invariably in slopes & valleys of the hills. Both Khondalite & Charnockites are concordant in nature. Granite occurs as intrusives in the region, which is predominantly Khondalite.

The Khondalite suite consists of garnet- sillimanite- quartz feldspar- graphite gneiss and its varieties are garnetiferous-quartz, sillimanite-quartz and porphyritic granite with relict garnet. Similarly the charnockite group is represented by both basic and intermediate varieties. Diopside-Hypersthene-granite and granite gneiss are the major lithounits in this suite.

On the basis of past works the tentative stratigraphic succession of the area may be given as follows:

Recent	Soil and Alluvium
Tertiary / Quaternary	Bauxite /Laterite/Aluminous Laterite
Archean	Granite Khondalite Suite rocks
Base Not Seen	

1.2.2 Geology of the Block

The exposed rocks on the deposit are represented by khondalite suite of rocks traversed by quartz-feldspar and pegmatite veins, soil, clay and bauxite.

Khondalite is exposed on the eastern ridge, the northern extension, in the western scarp of the central northeastern extension, in the western scarp of the central portion of North Block and all along the western scarp of south block. Khondalite makes up the hilloks in the central part of the deposit. Khondalite, greyish to pinkish grey in colour medium to fine grained, consists of quartz, garnet, feldspar, muscovite/biotite with occasional sillimanite needls. Mica flakes along with sillimanite needles are arranged in a preferred orientation. Garnet grains are unevenly distributed giving the rock a spotted appearance. Occasionally, alternating felsic and mafic minerals arranged in b and varying from a few centimetres to half a metre in thickness have also been observed. These alternating leucocratic and melanocratic band in part a gneissic appearance to the rock.

The most prominent planar element is foliation plane which is more usually defined by alternating felsic and mafic minerals aligned parallel to the trend.
The foliation trend of khondalite varies from N20^{o}-40^{o}E to S20^{o}-40^{o}W with dips varying from 65^{o} to 80^{o} towards southeast. The rock exhibits strike, oblique and cross joints, prominent set being in NE-SW and NW – SE directions with steep dips around 80^{o}. Ferruginous bands of about 2 cm in thickness have been observed along the strike joint.

Constant south-easterly dip of foliation planes in khondalite rocks coupled with plunge towards south-east of some linear elements such as millions, slickensides, puckering etc. are suggestive of isoclinal folding.
Soil and clay patches on the deposit occur in the low lying areas towards the western limit of the central part if the deposit.

Bauxite Profile

Except for outcrops of Khondalite and clay the entire capping is bauxite. Irregular to oval shaped clay patches have been noticed and Khondalite outcrops cover within the bauxite capping of Karnapodikonda. Bauxite deposit follows the topographic profile. Better grade ore is exposed near the line of inflexion (between convex and concave elements of the hill slopes). Towards the conclave element of the hill and deposited over the in-situ bauxite found on the concave side. Better development of bauxite scarps is generally seen across the general trend of the capping i.e., towards south and south-east. On the topographic high, massive bauxite is found whereas lows generally contain vermicular bauxite mottled with clay. The bauxite in topographic depressions appears to be high in silica and low in alumina, In comparison to the massive bauxite found on the topographic highs. Nodular laterite is generally confined to the spurs.

Altitude has played an important role in process of bauxitazation, as could be evidenced from Karnapodikonda, and good grade ore is developed between 4000' (1219') to 4800' (1463m). Above 4800' (1463m) complete bauxitization has not been noticed and in these altitudes occur either altered Khondalite or Khondalite.

Bauxite of Karnapodikonda is mostly pinkish to brown in colour, massive and hard. It is vermicular to cavernous with cavities varring from a few millimetres to 1.0 cm in size and filled with white clay and occasionally yellow limonitic material. High grade bauxites are generally cavernous and highly gibbsitic and show honey-combed structure. These hexagonal cellular structures are composed of siliceous material and are filled with yellow limonitic and goethite material. Oolites and pisolites are rarely present in these bauxites.

Bauxite occurs as a blanket with thickness ranging from 0.6 to 19.0 m as observed in escarpments on the peripheries of the capping . The bauxite in a few places is covered by a ferruginous cap of about one metre thickness. Further ferruginous bands of 0.5 m to 2.0 m thickness have also observed in the scarp within the bauxite profile. Concretionary bodies varying in diameter from a few mm to 90 mm embedded in a dark brown fine grained ferruginous matrix are also found in the bauxite capping. These concretionary bodies are considered to have formed from percolating iron solutions through cubical joints.

Laterite /Bauxite capping of Karnapodikonda deposit shows an indistinct vertical zoning, with an iron-rich cap if about one metre thickness followed by massive bauxite of pinkish to pinkish white colour. The thickness of bauxite profile varies from 3.6 m to 19.0 m as observed in the scarp sections. This grades into weathered khondalite normally without a persistent lithomarge zone. This usually forms the lowest zone of the laterite / bauxite profile and is usually concealed by talus on the hill slopes. Lithomarge wherever it occurs is finely laminated by banded comprising yellow ochre and white to cream colour clays.

Karnapodikonda bauxite is composed of gibbsite, as the main aluminous mineral with minor amounts of hematite, goethite and limonite as iron minerals and anatase in traces. Gibbsite occurs as microcrystalline tabular aggregates and psedomorphs after feldspar, sillimanite and garnet. Hematite occurs as blood red, amorphous material. Unaltered to partly altered minerals of Plagioclase sillimanite and garnets are also seen within the groundmass.

1.3.0 Mineral Potentiality

Bauxite mineralisation is directly linked with Laterite formation. Laterite is the product of intense weathering in humid, warm, intertropical regions and is typically rich in kaolinitic clay as well as Fe- and Al-oxides/oxy-hydroxides. Laterite may be subdivided in two types, one is ferrugineous, which is called Ferricrete and another is aluminous, which is called alcrete or, bauxite. The accumulation of an alumina rich residuum, as opposed to one enriched in iron, in the upper zone of lateritic profile is a function of high rainfall, but also lower average temperature (around 22°C rather than 28°C for ferricretes) and higher humidity. Alumina enrichment is also due to relatively high Si

mobility compared to Al, and probably reflects near neutral pH conditions like between 4.5 and 9. This results in differential dissolution of minerals such as feldspar and kaolinite, where Si is leached in preference to Al giving a gibbsite like residue. This process can be shown schematically as - Feldspar- (loss of Si) → Kaolinite- (loss of Si) → Gibbsite (Al (OH) 3).

Seasonal climatic variation is also important for the formation of bauxite because alternate dry and wet spells makes fluctuation of groundwater levels and, hence dissolution of mass and transfer of the same. This fluctuation gives the variation in bauxite profiles as well as transformation from hydrated gibbsite to dehydrated form like boehmite and diaspore (AlO (OH)). It is also found that in humid, equatorial laterite zones, hydrated mineral that is gibbsite and goethite are abundant, whereas in seasonally contrasted climates the ores are relatively hydrated and boehmite-hematite assemblage form.

Therefore, in summary, three processes can be put forward for the formation of bauxite,

(a) Weathering and leaching in-situ of bedrock to produce alumina and iron rich residues;

(b) Enrichment of sediments of weathered rocks in aluminium by groundwater leaching; and

(c) Erosion and redeposition of bauxitic material.

This block lies in the East Coast Bauxite Belt, the prime terrain for bauxite, and has been identified as potential mineral deposition by GSI in the previous work done by them.

1.4.0 Scope for Proposed Exploration

The scope of the proposed exploration is to explore the block to G3 stage of UNFC. The broad scopes are as below:

i. To carry out detailed geological mapping on 1:2000 scale and demarcate the rock types of Bauxite bearing formations with the structural features.
ii. To drill boreholes in the 400m or 200m section interval as per MEMC Rule 2015.
iii. To drill boreholes to prove depth continuity up to lithomarge zone vertical depth from the surface.
iv. To estimate Bauxite ore resources (333) in the block as per UNFC norms & Mineral (Evidence of Mineral Contents) Rules- 2015.

1.5.0 Recommendations of G4 Stage Mineral Exploration Report

Based on the studies done by Geological survey of India, a total resource of 17 million tonnes bauxite in this plateau has been estimated at cut of grade of + 40% Total Al2O3and -5% Total SiO2 with an average thickness of 5m height.

On basis of findings of stage of exploration, authors recommended that,

i) Detailed exploration in the form of closed spaced dry core drilling/ RC drilling will indicate a more reliable resource figure.

In addition to above the below mentioned activities are also proposed by OMECL.

- The topographic survey in 1:2000 scale followed by detailed mapping in adjacent areas.
- Extensive sampling work should be taken up to know the average grade as well as for the purpose of beneficiation.
- Petrographical and ore microscopic studies are to be carried out in more detail to know the origin and genesis of the deposit.

1.6.0 Objective

The present exploration programme has been formulated in accordance with the previous work carried out by GSI and also as per Mineral (Evidence of Mineral Contents) (MEMC) Rule-2015 & Mineral (Auction) Rule-2015 to fulfil the following objectives:-

Objective of the proposed Exploration is to carry out G-3 level exploration work in the block and to make it auction ready:

i. To carry out detailed geological mapping on 1:2000 scale and demarcate the rock types of Bauxite bearing formations with the structural features i.e. strike, dip, lineations / foliations etc.
ii. To drill boreholes in the 400m or 200m section interval as per MEMC Rule 2015.
iii. To drill boreholes to prove depth continuity up to lithomarge zone vertical depth from the surface
iv. To estimate Bauxite ore resources (333) in the block as per UNFC norms & Mineral (Evidence of Mineral Contents) Rules- 2015.

2.0.0 PREVIOUS WORK

2.1.0 Previous Exploration in adjoining area

The GSI has attempted limited exploration of the bigger bauxite deposits like Kodingamali and Panchapatmalinear Karnapodikonda. The GSI carried out reconnaissance survey for bauxite in and around the area FS 1977-78 and indicated occurrence of Bauxite in Karnapodikonda plateau.

2.2.0 Previous Exploration in the proposed block area of Karnapodikonda area

As a part of its reconnaissance operations, Geological survey of India has identified a number of small bauxite deposits out if which Karnapodikonda plateau was taken up for preliminary prospecting during the year 1977-78. The prospecting of this deposit has been taken up through geological mapping, channel sampling, scarp section study followed by chemical and mineralogical analysis of the sample. The collected samples has been analysed with 5 radicals i:e Al_2O_3 SiO_2, Fe_2O_3,TiO_2, LOI. The summary of quantum of work done are as below:

Sl. No.	Details	Unit	Remarks
1.	Mapping	Scale	1:10000
2.	Mapping Area	Sq Km	1.93
3.	Area taken for resource calculation	Sq Km	1.72
4.	Potential Resource	MT	17
5.	Drilling Data	No	No Drilling
6.	Pitting	No	2
7.	Trenching	No	Nil
8.	Grab Sampling	Nos	117
9.	Scarp sections	Nos	6
10.	Scarp Sample Analysed	Nos	51
11.	Average Thickness	Mtr	5
12.	Maximum RL	Mtr	1521
13.	Minimum RL	Mtr	1100
14.	Relief	Mtr	421

With the limited work the resource was estimated to the tune of 17 Million Tonnes.

3.0.0 BLOCK DESCRIPTION

The description of the Karnapodikonda block is given below in the Table No-1

TABLE – 1

Block Cardinal Points	WGS 84 – Coordinates		UTM – Coordinates	
	Latitude	Longitude	Easting	Northing
A	83° 04'51.00"	18°48'39.00"	719292.1848	2081181.152
B	83° 06'36.00"	18°48'37.00"	722367.8270	2081155.987
C	83° 05'52.00"	18°47'20.00"	721107.2766	2078772.862
D	83° 04'36.00"	18°47'16.00"	718882.8117	2078623.742
E	83° 03'21.00"	18°46'41.00"	716698.5700	2077521.966

4.0.0 PLANNED METHODOLOGY

In accordance to the objectives set for Exploration (G3) in Karnapodikonda Block, District Koraput, Odisha, geological mapping, and detailed drilling programme associated with other geological, sampling and analytical work is proposed in the block. The exploration shall be carried out as per Mineral (Evidence of Mineral Contents) Rule-2015 and Mineral (Auction) Rule-2015. Accordingly, the details of different activities to be carried out are presented in subsequent paragraphs.

4.1.0 Topographic Surveying

Topographical survey will be carried out in the block area in which G-3 stage of exploration will be carried out. All the surface features will be picked up and marked on a map on 1:2000 scale. The prospect area would be tied up with the triangulation network. The reduced levels and co-ordinates of boreholes would be determined. The locations of the channels and pits will be surveyed. The block boundary will be surveyed by DGPS & total station in WGS-84 Datum for demarcation of Block Boundary points and ancillary area to facilitate the state governments for auctioning of blocks.

4.2.0 Geological Mapping

The detailed geological mappings on 1:2000 scale will be carried out in the entire block are by taking geological traverses in the block. The contacts of different formations, identification of different rock formation, structural features, etc., will be carried out in detail. The geological map on 1:2000 scale will be generated based on the detail geological mapping of the block and interpretation of G-3 level exploration data.

4.3.0 Trenching

A total 10nos. of trenches (3mx1mx2m) will be carried out to know the strike continuity and accordingly the samples from the trenches will be taken to NABL accredited External Laboratory for analysis.

4.4.0 EXPLORATORY DRILLING

Based on the outcome of geological mapping, analytical results of surface, channel samples and delineation of Bauxite ore body, the detail drilling at close spaced grid is proposed for the mineralised area to bring the deposit to G-3 level. Thus, a total of 34 of exploratory boreholes involving 1020m of exploratory drilling have been earmarked for G-3 level of exploration. The borehole details are given in the table below and shown on the geological map (BH Proposal Map attached).

TABLE – 2

Sl No	BH ID	UTM_N	UTM_E	Longitude_ Degree Decimal	Latitude_ Degree Decimal	Proposed Depth
1.	PBH18KNPDK001	2080953.521	721895.855	83.105501	18.8085	30
2.	PBH18KNPDK002	2080752.1	721697.9019	83.103601	18.806702	30
3.	PBH18KNPDK003	2080548.202	721299.6318	83.099801	18.804903	30
4.	PBH18KNPDK004	2080327.826	719499.1484	83.082701	18.803104	30
5.	PBH18KNPDK005	2080329.473	719782.1685	83.08538528	18.8030889	30
6.	PBH18KNPDK006	2080346.678	721101.6695	83.097901	18.803104	30
7.	PBH18KNPDK007	2080124.73	719408.6924	83.08182057	18.80127924	30
8.	PBH18KNPDK008	2080131.129	719701.798	83.084601	18.801306	30
9.	PBH18KNPDK009	2080135.833	720102.4317	83.088401	18.801306	30
10.	PBH18KNPDK010	2080146.374	720941.4554	83.09635917	18.80131197	30
11.	PBH18KNPDK011	2080149.997	721304.3377	83.099801	18.801306	30
12.	PBH18KNPDK012	2079929.681	719382.7001	83.0815524	18.79952032	30
13.	PBH18KNPDK013	2079934.324	719904.4531	83.086501	18.799507	30
14.	PBH18KNPDK014	2079939.032	720305.0915	83.090301	18.799507	30
15.	PBH18KNPDK015	2079945.974	720828.4605	83.09526516	18.79951404	30
16.	PBH18KNPDK016	2079949.112	721048.4532	83.09735181	18.79951894	30
17.	PBH18KNPDK017	2079749.198	719298.8651	83.0807373	18.7978991	30
18.	PBH18KNPDK018	2079764.646	719766.4151	83.08517303	18.79798913	30

19.	PBH18KNPDK019	2079758.158	719999.1746	83.08737968	18.79790585	30
20.	PBH18KNPDK020	2079746.953	720908.3994	83.096001	18.797708	30
21.	PBH18KNPDK021	2079550.914	719206.5713	83.07984003	18.79611797	30
22.	PBH18KNPDK022	2079596.244	719803.7476	83.08550833	18.79646419	30
23.	PBH18KNPDK023	2079610.152	720385.2049	83.09102406	18.7965281	30
24.	PBH18KNPDK024	2079545.545	720710.4225	83.094101	18.79591	30
25.	PBH18KNPDK025	2079327.577	719110.1654	83.078901	18.794111	30
26.	PBH18KNPDK026	2079408.64	720187.2227	83.08912406	18.7947291	30
27.	PBH18KNPDK027	2079358.157	720667.2579	83.09367073	18.79422214	30
28.	PBH18KNPDK028	2079348.749	720913.095	83.096001	18.794111	30
29.	PBH18KNPDK029	2079135.918	718999.842	83.07783353	18.7923916	30
30.	PBH18KNPDK030	2079207.13	719989.2362	83.08722406	18.7929301	30
31.	PBH18KNPDK031	2079148.702	720812.8886	83.09502837	18.79231489	30
32.	PBH18KNPDK032	2078927.036	718914.493	83.077001	18.790514	30
33.	PBH18KNPDK033	2079005.933	719808.1757	83.08548465	18.7911321	30
34.	PBH18KNPDK034	2078823.566	718674.3557	83.0747123	18.78960479	30
					Total	**1020m**

4.5.0 Core Logging

The borehole cores would be logged systematically. Viz. details of the litho units, colour, structural feature, texture, mineralization, percentage of core recovery and Bauxite ore type would be recorded.

4.6.0 Core Sampling

The mineralized part of drill core will be splitted into two equal halves and one part will be preserved in the core box for future reference and will be stored in core library, after completion of the project. The whole samples shall be splitted through coning and quartering in field. One part will be sent to the NABL accredited/ State Laboratory, Bhubaneswar for analysis, second part will be preserved in the camp as duplicate sample, third part will be utilized for preparing composite sample for individual ore band and the fourth part will be kept as either check sample or sample to be used for any other specific purpose. The length of each sample will be kept 1m within the ore zone depending upon the width of particular type of Bauxite ore and its physical character. The primary core samples will be analysed for 7 radicals i.e (Al_2O_3, SiO_2, Fe_2O_3, TiO2, V_2O_5, Ga and LOI).

Quantum of samples generated are around 1070nos. of core & pit samples and 107nos. check samples in G-3 stage of exploration from the mineralized zone

intersected in the boreholes of Karnapodikonda block. All the primary and internal check samples would be analysed for 7 radicals i.e Al_2O_3, SiO_2, Fe_2O_3, TiO2, V_2O_5, Ga and LOI. The composite samples would be prepared from the mineralized zones of primary drill core samples of each borehole as well as from the mineralized zones demarcated in the channels. Around 75nos. of composite sample would be generated from drill cores in G-3 stage of exploration and be analyzed for 14 radicals.

39 nos. of composite samples shall be analysed for Trihydrate alumina, Monohydrate alumina and reactive silica.

A total of 10 nos. composite samples in G-3 level would be analyzed by X-ray diffraction to ascertain the presence of different mineral phases.

A total of 10 nos. composite samples in G-3 would be analyzed by ICP-MS method to ascertain the presence of trace elements associated with the Bauxite deposit

4.7.0 Petrological and Minerographic Studies

Thin and polished section studies on drill cores as well as out-crop samples would be done for ascertaining the petrographic and minerographic characteristics. These samples would be drawn from ore zones and host rocks. A provision of 10 samples for petrographic and 10 samples for minerographic studies has been kept in G-3 level.

4.8.0 Specific Gravity Determination

To derive the tonnage factors, 15 nos. samples in G-3 stage are proposed to be subjected for specific gravity determination. The samples are to be drawn from ore zones/ mineralised zones.

4.9.0 Bulk Density Determination

A provision of 5 nos pits in Bauxite ore zone is kept for assessment of bulk density of Bauxite ore. The dimension of the pit will be 1 m x 1 m x 1 m.

5.0.0 NATURE QUANTUM AND TARGET

The quantum of work proposed by OMECL in Karnapodikonda Block (G-3Level of Exploration) is given in Table-3.

TABLE – 3

Proposed Quantum of Work(G-3) in Karnapodikonda Block, District-Koraput, Odisha			
Sl. No.	**Item of Work**	**Unit**	**QTY**
1.	Topographic Survey (1:5000/2000)	Sq Km	9.062
2.	Geological Mapping (1:5000/2000)	Sq Km	9.062
3.	Core Drilling (34 BHs x 30m)	m	1020
4.	Trenching & Pitting	Nos.	10
5.	Sample Preparation & Laboratory studies Primary Samples (Channel Sample+Core)		
	a) Primary samples for 7 radicals (Total Al2O3,Available Al2O3(THA), Total SiO2, Reactive SiO2#, Fe2O3, Ga, TiO2, V2O5, and LOI,)	Nos.	1070
	b) Check samples for 7 radicals (Total Al2O3,Available Al2O3(THA), Total SiO2, Reactive SiO2#, Fe2O3,TiO2, V2O5 and LOI)	Nos.	107
	c) REE in Lithomarge clay	Nos.	34
	d) Composite samples for for 14 radicals (Al2O3, SiO2#,Fe2O3,TiO2, V2O5, P2O5, LOI, MnO,MgO,CaO,Na2O,K2O,Cr2O3 & Organic Carbon)	Nos.	75
	e) Composite Mettalurgical Samples (Trihydrate Alumina(THA), Monohydrate Alumina(MHA), Reactive Silica(R-SiO2)	Nos.	39
6.	X-RD Studies on composite	Nos.	10
7.	ICP -MS studies (14 trace elements including Gallium	Nos.	10
8.	Preparation of thin section	Nos.	10
9.	Petrographic studies	Nos	10
10.	Minerographic studies	Nos	10
11.	Specific gravity determination	Nos	15
12.	Bulk density Determination	Nos	5
13.	Exploration Report	Nos	1

6.0.0 MANPOWER DEPLOYEMENT

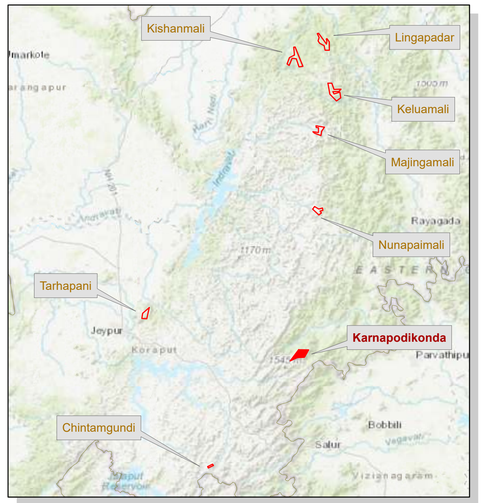
A total of 6 geologists proposed to be engaged for the exploration works at Karnapodikonda block. Four geologists will be engaged for the various field work during exploration. A survey team, drilling team & sampling team from outsourced partner shall be engaged with the field team for mapping, traversing, drilling & sampling.

The details of the OMC team is as follows

1. Mr Shailender Kumar Sinha (GM)
2. Mrs Nirupama Das, AGM (Geo)
3. Dr. P.K. Nayak, Manager (Geo)
4. Mr Radheshyam Sahoo, Manager (Geo)
5. Mr Umakanta Behera, Manager (Geo)
6. Mr Dileswar Kishan, Manager(Geo)

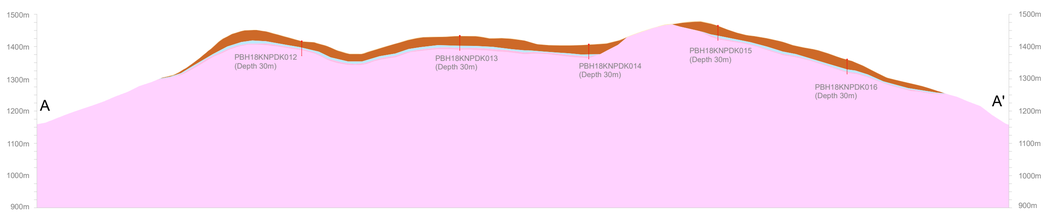
PLATE - VI

Map Showing Exploration Proposal (G3)
In Karnapodikonda Block of Narayanpatna Tehsil
of Koraput District, Odisha



(Geology Map Source: DG. Odisha)

Conceptual Section along AA'



Legend

Geology

- Soil
- Bauxite
- Lithomarge/Clay
- Khondalite

- Proposed Drillholes
- Proposed Block Boundary
- Plateau Boundary

Odisha Mineral Exploration Corporation Limited	
Karnapodikonda Block **Proposed Plan for Exploration**	
Scale 1:10,000	
Date: 11/01/2019	Sign. :
Map Datum & Projection: WGS84, Latitude/Longitude	

F. No. 6/2/2015-NMET/1066
Ministry of Mines
National Mineral Exploration Trust

New Delhi, the 12th February, 2019

OFFICE MEMORANDUM

Subject: Approval of 06 mineral exploration projects to be executed by Odisha Mineral Exploration Corporation Limited (OMECL).

On the recommendation of Technical-cum-Cost Committee (TCC) of NMET, the Executive Committee in its 11th meeting, held on 7th February, 2019 approved 06 mineral exploration projects to be executed by OMECL, a subsidiary of Odisha Mining Corporation, at the cost of Rs. **1517.01 Lakh**. The details of the Blocks are given at **Annexure-I.**

2. The mineral exploration projects will be funded by NMET as per the costing recommended by the TCC and approved by the Executive Committee. The Implementing Agency shall complete the same as per the approved cost estimates and time schedule, enclosed in **Annexure II & VII**.

3. The Implementing Agencies shall submit progress on monthly basis to NMET. The TCC, NMET shall review the progress of projects and provide update to the Executive Committee.

12/02/2019
(Pradeep Singh)
Director, NMET

To
The Managing Director,
Odisha Mining Corporation,
OMC House,
Bhubaneswar-751001, Odisha.

Copy for information & necessary action to:

1. Sh. D. Mohanraj, ADG, NM-II & Chairman, NMET TCC, Geological Survey of India, Seminary Hills, Nagpur- 440 006.
2. The General Manager (Exploration), Odisha Mineral Exploration Corporation Limited, 3rd Floor, Bayan Bhavan, Unit-3, Jawahar Lal Nehru Marg, Bhubaneswar-751001, Odisha.

Annexure-I

List of mineral blocks to be executed by OMECL, approved in 11th Executive Committee on 7th February, 2019

Sl. No.	*Block Name*	*Commodity*	*Stage*	*Duration*	*Approved Cost (Rs. in Lakhs; inclusive of all taxes)*
1	Keluamali, District- Kalahandi, Odisha	Bauxite	G-3	12-14 months	339.05
2	Majhingamali, District- Rayagada & Kalahandi, Odisha	Bauxite	G-3	10-12 months	187.93
3	Tarhapani (west) Block, District- Koraput, Odisha	Bauxite	G-3	10-12 months	211.61
4	Nunapaimali Block, District- Rayagada, Odisha	Bauxite	G-3	10-12 months	202.21
5	Karnapodikonda, Tehsil- Narayanpatna, District- Koraput, Odisha	Bauxite	G-3	08-10 months	170.98
6	Khandadhar Sub-block-A, District- Sundargarh, Odisha	Iron Ore	G-2	12-14 months	405.23
				Total	**1517.01**

Annexure -VI-A

Details cost etimate for Bauxite in Karnopodikonda Block District-Koraput, Odisha

SL. No.	Item of Work	Unit	Base Rate 1.4.90 as per MECL SoR	Financial Year (2018-19)		
				MECL's Esc. Rate for F.Y 2018-19 (Rs)	Qty.	Amount (Rs)
A	**DRILLING**					
1	Surface Drilling (3 Rigs)	m.	1714	7028	1020	7168560
2	Tender preparation,Publishimg & finalisation	No.	0.0		1	400000
3	Road Making (Hill Terrain)	Km	7800	28976	0	0
	Sub Total A					**7568560**
B	**GEOLOGICAL WORK**					
1	Survey Party Days	day	1180	6056	90	545040
2	Geologist Party days	day	1541	8083	90	727470
3	Core Sampling Party days	day	525	2905	90	261450
4	Bulk Sampling Party days	day	2566	13908	10	139080
	Sub-Total B					**1673040**
C	**Trenching (3mx1mx2m) 10 Nos.**	Cu.m	395	1739	60	104340
	Sub-Total C					**104340**
D	**LABORATORY STUDIES**					
a	**Chemical Analysis**					
1	Primary Samples Check & Comp, Samples					
	a) Primary samples for 7 radicals (Total Al2O3,Available Al2O3(THA), Total SiO2, Reactive SiO2#, Fe2O3, Ga, TiO2, V2O5, and LOI,)	Nos	566	3086	1070	3302020
	b) Check samples for 7 radicals (Total Al2O3,Available Al2O3(THA), Total SiO2, Reactive SiO2#, Fe2O3,TiO2, V2O5 and LOI)	Nos	566	3086	107	330202
	c)REE in Lithomarge clay*	Nos		4620	34	157080
	d) Composite samples for for 14 radicals (Al2O3, SiO2#,Fe2O3,TiO2, V2O5, P2O5, LOI, MnO,MgO,CaO,Na2O,K2O,Cr2O3 & Organic Carbon)	Nos	1098 (110+76x13)	5998	75	449850
	d) Composite Mettalurgical Samples (Trihydrate Alumina(THA), Monohydrate Alumina(MHA), Reactive Silica(R-SiO2)	Nos	338 (110+76x3)	1838	39	71682
b	**Physical Analysis**					
	i) ICPMS Studies	Nos		**4620**	10	46200
	ii) XRD Studies on Composite	Nos	1137	5813	10	58130
	iii) Preparation of thin section	Nos	100	556	10	5560
	iv) Petrographic Studies	Nos	228	1478	10	14780
	v) Preparation of polished section	Nos	100	556	10	5560
	vi) Minerographic studies	Nos	364	2090	10	20900
	vii) Specific Gravity determination	Nos	32	194.5	15	2918
	Viil) Spectrographic Studies	Nos.	1173	5603	0	0
	ix) bulk Density	Nos	24	144	5	720
	Sub-Total D					**4465602**
E	**Preservation of Core**					
i)	GI Core boxes	Nos.		2000	204	408000
ii)	Transportation of Core Boxes	Km	8.8	33.0	1200	39600
	Sub-Total E					**447600**
	Total A+B+C+D+E					**14259142**
F	**EXPLORATION REPORT** - 1% of (A+B+C+D)				1	**142591**
	Total Cost (A+B+C+D+E+F)					**14401733**
	GST 18%					**2592312**
	Grand Total: with GST 18%					**16994045**
						Say Rs 170.98 Lakh

#if total SiO2 is more than 5%, Reactive Silica may be analysed.

* Initially 25 samples from 5 bore holes (1 m sample length) are required to be analysed, if results are not encouraging then the drilling may be stopped restricted to the top of lithomarge. If the results are encouraging all the bore holes may be drilled to the top of bedrock and the entire thickness of lithomarge clay to be analysed for REE elements.

** REE analysis can also be done in ferruginous laterite capping for five samples, if the results are encouraging, all the samples may be analysed.

Annexure - VI B

Time Schedule /Action Plan for Exploration proposal for Bauxite in Karnapodikonda block, District Koraput, Odisha)										
S. No.	Time/Items	Months	1	2	3	4	5	6	7	8
1	Work Order To the Out Sourced Partner									
2	Mobilisation	lumpsum								
3	Approach Road	km								
4	Drilling	1020 m								
5	Pitting (5 Pit)	5 Cu.m								
6	Survey	9.062 sq km								
7	Mappping	9.062 sq km								
8	Sampling	1410								
9	Laboratory Studies	1410								
10	Report writing with Peer Review	Months								