Proposal for Dumburuneli, Rayagada District, Odisha State for Reconnaissance Survey (G4 stage) under NMET.

Commodity: Graphite

By

Maheshwari Mining Pvt. Ltd.

Place: Kolkata

Date: 06-12-24

Summary of the Block for Reconnaissance Survey (G4 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
	Block ID	Dumburuneli Block
	Exploration Agency	Maheswari Mining Pvt. Ltd.
	Commodity	Graphite
	Mineral Belt	Eastern Ghats Mobile Belt (EGMB)
	Completion Period with entire Time schedule to complete the project	12 months
	Objectives	
	Whether the work will be carried out by the proposed agency or through outsourcing anddetails thereof. Components to be outsourced and name ofthe outsource agency	By proposed agency
	Name/Number of Geoscientists	
	Expected Field days (Geology) Geological Party Days	180 field days
1.	**Location**	
	Latitude	19°20'00"N to 19°25'00"N
	Longitude	83°32'30"E to 83°37'30"E
	Villages	Bhaleri, Pichuligurha, Panugurha, Sindupanga
	Tehsil/Taluk	Bissamcuttack
	District	Rayagada
	State	Odisha
2.	**Area(hectares/square kilometres)**	
	Block Area	72.14 sq km
	Forest Area	NA
	Government Land Area	NA
	Private Land Area	NA

3.	**Accessibility**	
	Nearest Rail Head	Rayagada, Muniguda, Bissamcuttack
	Road	SH-46, NH-326
	Airport	N/A
4.	**Hydrography**	
	Local Surface Drainage Pattern(Channels)	Surface pattern is subdendritic
	Rivers/Streams	The drainage system of the area is controlled by few perennial nala originated from the hills.
5.	**Climate**	
	Mean Annual Rainfall	1030 mm
	Temperatures (December)(Minimum)	December:13^0C to 20^0C
	Temperatures (June)(Maximum)	May: 40^0C
6.	**Topography**	
	Toposheet Number	65M/11
	Morphology of the Area	The area represents an undulatory topography with high hillocks and nala sections throughout the block together with agricultural lands.
7	**Availability of baseline geosciences data**	
	Geological Map(1:50K/25K)	1:50K map of GSI
	Regional structural set up map	NA
	DRM of Rayagada District	Published by GSI
	Geochemical Map	Not available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Available

8.	**Justification for taking up Reconnaissance Survey/ Regional Exploration**	Graphite bodies of economic importance occur in the Eastern Ghats Mobile Belt (EGMB), India, which consists of khondalite, charnockite and granite gneiss. The graphite bodies are found to be associated with khondalite. Depositions of graphite are lithologically as well as structurally controlled. They occur along the contact zones of khondalite and granite gneiss and along the foliation planes which exhibit at least two generations of folding. Most of the bodies of graphite are lenticular and show pinch and swell characters. During reconnoitary traverses, exposures of graphite bearing litho-units have been noticed around Bhaleri village of variable dimensions in which graphite occurs as schist type deposits. Analyses of few grab samples collected during reconnoitary traverses by the geologists of Maheshwari Mining Private Ltd. indicate FC content varying from 4.48 to 14.35%. In order to assess the geospatial disposition and to study the grade and resource potential of the graphite incidences a G4 stage of exploration is proposed.

Detailed description

Block Summary

In view of the auction policy of the Government and demand of graphite in the domestic industries, emphasis for assessment of graphite is warranted. In order to carve out an auctionable block, A detailed proposal to undertake "Reconnaissance Survey to identify potential graphite bearing areas in T.S.No E44F11 (65M/11) is being submitted, where the agency M/s Maheshwari Mining Private Ltd. recorded some observations with the help of limited field traverses with the background geology available and identified potential graphite prospects which can be taken up for detailed assessment from reconnaissance to exploration at different levels so as to support the State Govt. for putting potential blocks for auction with our effort to contribute for mineral development of the State.

Regional Geology of the area:

During the F. S. 1987-88, the strip of area along the Gumuda-Mukundpur road section between Vamsadhara and Nagaballi river valleys was studied. This area is bounded in the east and west by two major N-S trending lineaments aligned along the river valleys. The regional trend of the foliation, gneissosity, lithological boundaries and axial traces of early isoclinal folds is N_S with local swerves and steep dips. The thick pile of Khondalite (meta- sedimentary Group) of the Koraput area forms the core portion of the Eastern Ghat belt. The area under investigation forms the eastern part of this zone. It comprises a thick sequence of Khondalite Group of metamorphites interbanded with thin bands of pyroxene granulite and charnockite. Parallel bands, patches and lenses of granitic gneisses containing enclaves of khondalite, pyroxene granulite and charnockite occur amidst the khondalites. Locally, these granite bodies form large expanses. A lensoidal body of orthopyroxenite (Bronzite) and associated norite was recorded from near and west of Tumba and the Ghat section, 2 km east of Hathikhamba. Calc silicate units of Khondalite Group occur as lenses or bands of limited dimensions, e.g. 1 km north-east of Kiamunda. The broad stratigraphic framework of postulated by Ramakrishnan et al. (1994) is as follows-

Table no.1 Stratigraphic Sequence of Eastern Ghats [Ramakrishnan et al., (1994)]	
Age	**Lithological Units**
800-900 Ma	Alkaline rocks, granitoids
1000-1100 Ma	-------Eastern Ghats orogeny--------
	Development of eastern Ghats front of upgraded cratonic rocks.
	Incipient and massive charnockite and garnetiferous gneiss with biotite and sillimanite
1300-1400 Ma	Emplacement of alkaline rocks (Feldspathoid gneiss and anorthosite)
Khondalite Group (WKZ, CMZ, EKZ)	Garnet-sillimanite-graphite gneiss
	Cordierite-sappherine-spinel rocks
	Calc silicate rocks and rare marbles
	Quartzite rich in garnet
1600-1800 Ma (WCZ)	Evolution of purana basin
2600-2800 Ma	Charnockite with enclaves of basic granulite, high grade schists including BIF and layered basic complexes, representing original cratonic basement (?) in migmatitic amphibolite facis
3000 Ma	Vestigial events (?)

The detailed descriptions of mappable lithological units are as follow-

a) Pyroxene granulite:

Pyroxene granulites form thin lensoidal bodies, bands and en-echelon slivers conformably interbanded with khondalites and their migmatitic variants. These units occur all over the area but cumulatively constitute about 5-10% of the total volume of rock types- exposed. These have locally charnockitic appearance due to the development of quartzo-feldspathic phases near the contact of granites e.g. 2 km north of Ramanaguda and l km northwest of Deula. For similar reasons there is profuse development of hornblende and biotite and consequent development of a weak foliation e.g. l km south of Deula.

Though most of these rock types are medium grained, some bodies e.g. 0.5 km south of Parhalpadar are coarse or very coarse grained massive and can be described as a metagabbro. A major zone of these

basic granulites (locally metagabbroic or metanoritlc) at various stages of migmatisation is observed between Kanubai and Tumba in south and Bhagurhi in north. This zone is interbanded with khondalitic units and a lensoidal body of orthopyroxenite (bronzitite). In migmatitic zones e.g. l km east of Karubai, lenses, bands or wisps of basic granulite occur amidst a grey garnetiferous granitoid gneiss (migmatite). Highly deformed, dismembered and migmatised basic granulite bands also occur in Ledin, Dhepagurha, Minajhula, Champia, Palupai and Kararha. These rocks also occur as enclaves of various shapes and sizes at various stages of migmatisation in a coarse grained garnetiferous grey granitoid (migmatite) gneiss covering a considerable area between Lundrukana, Atararha and Kolnara. In most of these bodies garnet is usually absent or occurs only as accessory.

In hand specimens these are usually dark grey, equigranular, medium grained and massive, though locally they are coarse grained and some are weakly foliated. Pyroxenes and feldspars can easily be discerned as the main constituents in roughly equal proportions.

In thin sections, they exhibit a xenoblastic granular texture composed of non- interlocking mosaic of plagioclase and pyroxene. Both these constituents are equant and occur in nearly equal proportions. Plagioclase is of intermediate (andesine) composition. Its twin Lamellae are in most grains partially effaced or deformed and exhibit wavy extinction. Diopsidic-augite is the chief pyroxene. It is nearly colourless and some have peripheral growth of secondary hornblende. Hypersthene or bronzite occur in minor proportions. Hornblende and biotite are secondary after pyroxenes. In some samples e.g. near Kandalkapai they form large prismatic grains. Opaque ores occur as accessory minerals.

b) Charnockite:

Greyish quartzo-feldspathic gneisses/granulites with the characteristic vitreous appearance and bluish quartz are included in this lithotypes. These have minor areal coverage in the area, and most of their exposures are in Robarhi, Bankili, Barhisola and Kararha areas. In the above mentioned area they occur in a complex structural set-up close to a synformal closure. Here, they are interbanded with khondalites and have parallel layers and bands of quartz-feldspar neosomes e.g. near the road junction 1 km east of Barhisola. Similar rocks also occur in patches between Tumba, Karubai and Hathikhamba, 1 km north of Bandhagurha, near Lalibi and as small enclaves in migmatites occurring in Lundrukana, Atararha and Kolnara areas.

In hand specimens, these are bluish grey, greasy looking, weakly foliated or banded rocks. Presence of streaks of bluish quartz is characteristic. Minor proportions of mafic constituents are usually present. Garnet is seen locally.

In thin sections, these are gneissic or weakly foliated xenoblastic, inequigrenular rocks. Quartz forms

about 20-25% of the rock and is usually occurs in lenticular patches. This shows wavy extinction and pressure lamellae and a crude preferred orientation. Orthoclase occurs as anhedral grains of variable sizes. Many of these are finely perthitic. This forms 40-50% of the mode. Plagioclase of acid to intermediate composition (oligoclase- andesine) occurs in subordinate proportions. This forms tabular grains and constitute about 10-15% of the rock. In some samples however, it constitutes the bulk of feldspars and hence the rock tends to be an enderbite (Sample Nos. RG-1, RG-41, RG-44) e.g. samples from near the 150.5 km stone near road junction, near 157 km. stone (near Karnigurha), 1 km south of Rugurbai. Hypersthene is the usual mafic constituent. It forms small prismatic grains in clusters. It is altered to greenish hornblende along margin and cleavages. Breakdown of hypersthene to garnet is seen in some samples e.g. from the forest track 2 km south of Rorhangi. In this sample, garnet forms reaction rim around hypersthene (Sample No. M-30). Minor proportions of diopside-augite is seen in some samples. Garnet if present, forms small anhedral granules usually occurring in clusters or concentrated in bands associated with other mafics e.g. hypersthene, hornblende and/or biotite. Biotite and opaque ores occur as accessories.

c) Quartzites:

This unit forms minor bands and lenses and belongs to the Khondalite group. These occur in greater spatial frequence between Kailashkotta and Lundrukana within a thick sequence of Khondalitic litho-units. They grade into quartz-K.feldspar-garnet-sillimanite gneisses along strike. Small bands also occur in Sikabarhi and Beja areas. These are coarse grained, brownish or greyish white or pure white, hard, compact and weakly foliated rocks composed mainly of quartz. Garnet and sillimanite occur in minor proportions. A band of pure white orthoquartzite about 20 m. thick and traceable for more than 500 m. along strike is located 500 m. east of Lundrukana.

In thin section, these rocks exhibit a xenoblastic mosaic of anhedral quartz which forms nearly 80-80% of the rock. Orthoquartzite of Lundrukana area is almost entirely composed of quartz. Sillimanite occurs as accessory in most of the samples and forms stumpy prisms and needles usually included in quartz and garnet. These needles exhibit a strong preferred orientation. Garnet forms pinkish anhedral porphyroblasts with inclusions of quartz and sillimanite. Perthitic orthoclase and opaque minerals occur as accessories in some samples. In some quartz-rich bands in khondalite garnet also forms ribbon like lenticles (RG- 37) e.g. in sample from near Tabangi.

d) Quartz-orthoclase-garnet-sillimanite gneisses:

These are the most predominant lithounit of khondalite group. These constitute nearly 75-80% of the areas and are coarsely banded, gneissic, of variable grain size and appearance. They have the

characteristic brownish look on the surface due to alteration of garnet and kaolinisation of feldspars. However, fresh outcrops can be seen in quarries and road cuttings.

e) g. in Kailashkotta-Kolnara ghat section, in Hathikhamba-Bhagurhi road section and in Kailashkotta-Lalibi forest track. In hand specimens, the fresh ones are hard, compact, well foliated, rich in quartz in which occur variable proportions of orthoclase, garnet and sillimanite. Some of the rare varieties rich in dark coloured spinel occur as thin lenses near Bhagurhi 1 km northeast of Lalibi. In general there is wide range of variation in the modal distribution of constituent mineral phases. A thin band of qtz + gt + sill + graphite schist with films rich in graphite was observed 1 km northeast of Parikuthi on the northern slope of the small hillock.

In thin sections, these rocks exhibit a well-developed foliation especially due to the strong preferred orientation of sillimanite, lenticular or ribbon quartz and rarely stretched garnet, Anhedral, interlocking, equant or lenticular quartz is the chief constituent (50-60%). Perthitic orthoclase and very rarely plagioclase occur in minor proportions (10-15%) in some samples.

Garnet is the chief mafic constituent and is present in varying quantities in almost all varieties. It is usually anhedral, equant, forms porphyroblasts and encloses quartz, sillimanite and feldspars. The porphyroblasts have pushed apart the external schistosity of the rock. Sillimanite is the characteristic mineral phase and occurs as small broken fragments included in quartz or garnet in highly migmatised varieties. In migmatised samples this forms bands rich in acicular grains with strong preferred orientation parallel to the general trend of the rock. This may constitute upto 10-15% of the rock. In some spinel-sillimanite schists which occur as thin lenses within khondalite near Lalibi, sillimanite forms coarse blades and prisms constituting nearly 50% of the sample. Spinel forms dark green anhedral grains in clusters. Corundum occurs as accessory. In another Spinel-rich variety (M-12) of Bhagurhi area considerable proportion of garnet (10% to 20%) is associated with spinel and sillimanite. Other accessories include zircon, apatite, biotite and opaque minerals.

e) Diopside-calcite-garnet-scapolite granulite:

These are relatively rare rock types of the area. One such occurrence is recorded 1 km northeast of Kiamunda and another 0.75 km west southwest of Palupai in road section. These occur as thin conformable lenses or bands within garnet-sillimanite-quartz gneisses.

In hand specimens these are light grey, medium to fine grained, well-banded, locally controlled, fresh and compact rocks.

In thin section the sample from Kiamunda area (M-16) contains almost equal proportions of diopside,

calcite, scapolite, garnet, plagioclase in a xenoblastic mosaic. Grains are equant and fresh. Sphene occurs in accessory proportions.

f) Orthopyroxenite and norite:

A lensoidal orthopyroxenite body is recorded for the first time from the area between Tumba and Hathikhamba. This is well exposed in the road section between 169 and 170 km stones. This is closely associated with metagabbro and metanorite and this mafic-ultramafic sequence is conformably interbanded with charnockite-khondalite. This body can be traced for more than 1 km along strike and is about 50-100 m. wide.

In hand specimens pyroxenite is yellowish brown, medium to coarse grained, very compact and massive. Locally it is very coarse and almost monomineralic. Norite on the other hand is a coarse grained rock with euhedral brownish pyroxenes showing a preferred orientation (flow lineation). Metagabbro is coarse, even grained, dark grey and massive. Thin schlierens of sheared leucogabbro occur within pyroxenite.

In thin section, orthopyroxenite exhibits a non-interlocking cumulus texture. Bronzite- enstatite is the main constituent. It forms subhedral or euhedral prismatic or tabular grains. Some grains show pink bands and exsolution of clinopyroxene (?) as wisps along cleavage. Biotite-phlogopite is secondary after pyroxene. Minor proportions of plagioclase occurs as the intercumulus phase. In norite plagioclase (andosine-labradorite) and bronzite occur in nearly equal proportions. Metagabbro grades into pyroxene granulites and is composed of hypersthene, a clinopyroxene (diopside-augite) and plagioclase is variable proportions.

g) Granitoid gneisses and migmatite:

These rock units occur in patches intervening bands of khondalite, pyroxene granulite and charnockite. They occupy large expanses in Vamsadhara river valley between Gumuda and Kenduguda (Nanda and Pati, 1987) and also in the Nagavalli river valley between Kolnara and Rayagada. In Lekapai, Lundrakana, Pipaligurha, Atararha and Gaurahlelibadi areas, near and east of Kolnara, a greyish coarse grained migmatitic-granite-adamellite gneiss predominates. This has enclaves in the form of bands, lenses, schlierens of pyrexene granulite, charnockite and rarely of khondalite. These enclaves are at various stages of assimilation with the development of quartz-feldspar neosomes in them. Locally the granitic rocks are medium grained, white or greyish white and alaskitic e.g. near 181.9 km stone in ghat section. The palaeosomes are rich in biotite and/or hornblende. These migmatites are usually garnetiferous. They exhibit nebulitic, stromatic and banded structures. There is local development of megacrysts of feldspars. In Bathirhi area this migmatite is pinkish, banded and rich in garnet and biotite.

This has bluish grey patches, lenses and clots measuring a few contimetres across of charnockitic composition. The foliation and gneissosity of the surrounding granitic gneiss passes undisturbed through these clots and patches of gneissic charnockite. Similar features are also observed 500 m. southeast of Kudalims. This could be evidence in favour of decharnockitisation process which could have led to the formation of large bodies of quartz-feldspar neosomes of granitic or adamellitic composition. Similar granitic bodies are also observed in mafic granulite-charnockite dominant areas surrounding Robarhi-Bankili_Kararha. In the eastern part of the area studied, between Bangi and Kondajammu, granitic bodies occur in a khondalite-dominant terrain. These are mafic-poor, leucocratic garnetiferous and locally contain accessory garnets and sillimanite scavenged from Khondalites. These bodies grade into khondalites through a zone of migmatised khondalite across the contact. Enclaves of khondalite show higher degree of deformation and contortions compared with the enclosing granitic patches. Foliation of khondalites passed imperceptibly into migmatites at many localities. Their contacts with basic granulites are however, relatively sharp. A small lens of muscovite bearing granitic pegmatite is exposed in pits 0.5 km south of Sundhi Dhamini. In general, pegmatites are rare in the area. In thin sections, these exhibit a xenoblastic mosaic of quartz and feldspars with minor proportions of mafics. Quartz constitutes 20% to 3o% of the rock and forms anhedral equant or lenticular grains of variable sizes. Orthoclase, many grains of which are perthitic, is the main feldspar (50%-60%). Sodic plagioclase is subordinate in proportion. Both quartz and feldspar show signs of high strain, locally they exhibit peripheral granulation. Garnet is the most common mafic constituent. It forms small, fresh anhedral grains. Some of the older generation garnets form skeletal grains with inclusions of sillimanite if present, quartz and feldspars. Biotite is usually present as dispersed brownish flakes in migmatites of charnockite-dominant zones. Hornblende occurs close to the contacts of enclaves of basic granulites. Apatite, opaque ores and rarely zircon occur as accessory phases.

Mineralisation Details:

Graphite schist occurs as thin, impersistent unit with metapelitic group of rocks (Khondalite). This has been recorded from several areas. It is a medium to coarse grained, greyish white in color in which the graphite flakes defines the schistosity by the parallel arrangement to a particular direction.

The Reconnaitory traverses under taken in the area and the chemical analysis results suggest that the area is a potential graphite prospect. The Darukona Block in the North and Kanapulisi Block in the South of the proposed block has also yielded encouraging results. Khondalite are found abundantly in the area which act as the host rock for the graphite. The bands of graphite have been found to occur along the litho-contacts as well as the foliation planes. It is inferred that numerous bands of graphite form a zone of graphite trending NW-SE extending from Darukona to Kanapulisi Block.

GRAPHITE SAMPLES REPORTS OF MAHESHWARI MINING							
SL NO	**SAMPLE CODE**	**SAMPLE ID**	**MOISTURE (%) ARB**	**VM (%) DB**	**ASH (%) DB**	**S (%) DB**	**FC (%) DB**
1	NMCI/FST/24-25/2042	PGH/SL-4	2.62	0.96	84.50	0.19	14.35
2	NMCI/FST/24-25/2043	BH/SL-6	0.20	0.93	87.20	0.17	11.70
3	NMCI/FST/24-25/2044	PGH/SL-3	1.40	1.99	92.11	0.14	5.75
4	NMCI/FST/24-25/2045	PGH/SL-5	0.19	0.85	88.72	0.22	10.21
5	NMCI/FST/24-25/2046	BH/SL-2(A)	1.25	3.71	91.67	0.14	4.48
6	NMCI/FST/24-25/2047	BH/SL-2(B)	0.76	1.53	92.60	0.15	5.72
7	NMCI/FST/24-25/2048	BH/SL-1	0.29	1.13	90.71	0.16	8.00

Observation and Recommendations of previous work

➢ According to J.K Nanda and U.C Pati these area are dominated by lithounit of khondalite group. These constitute nearly 75-80% of the areas and are coarsely banded, gneissic, of variable grain size and appearance. They have the characteristic brownish look on the surface due to alteration of garnet and kaolinisation of feldspars. However, fresh outcrops can be seen in quarries and road cuttings eg. in Kailashkotta-Kolnara ghat section, in Hathikhamba-Bhagurhi road section and in Kailashkotta-Lalibi forest track. In hand specimens, the fresh ones are hard, compact, well foliated, rich in quartz in which occur variable proportions of orthoclase, garnet and sillimanite. Some of the rare varieties rich in dark coloured spinel occur as thin lenses near Bhagurhi 1 km northeast of Lalibi. In general there is wide range of variation in the modal distribution of constituent mineral phases. A thin band of qtz + gt + sill + graphite schist with films rich in graphite was observed 1 km northeast of Parikuthi on the northern slope of the small hillock.

➢ Dr. S. Pasayat and K. N. Adhikari 3.8 described the occurrence of graphite near Panugurha (19°22':83°35'30", 65 M/11). The occurrence has been reported about 150 m. west of village, fine flaky graphite occurs associated with pegmatite intruded into charnockite. The country rock is charnockite with numerous quartz-feldspathic veins. Strike and dip N55°W/subvertical. Thickness 50-70 cm. strike extension has not been seen. Visual estimate is 5-10% F.C.

Previous Exploration in adjoining area (Regional area)

- J. K. Nanda U. C. Pati, Geologists (Sr.) August, 1988 of GSI had reported occurrence of pelitic and psammopelitic meta sedimentaries with or without graphite in the area along with charnockite and granite suite of rocks.
- B.C. Mohanty & P.C. Vajani (1982-83) of Directorate of Geology, Odisha first reported the graphite occurrences around Sollagudi, Narigapanga, Khallupadar, Mudra, Bongna, Berli and Sabinala villages of Rayagada District. Preliminary investigation was carried out and found Graphite occurrences occur under a thick soil cover. Analysis shows F.C. content varying from 7 to 49%. It was observed thatGraphite occurs as within migmatised khondalite and are of stratiform type. The ore bodies exhibit concordant relationships with the host rocks indicating structural control of mineralization.
- S. N. Parida& D. N. Pani (1983-84) of DG (O) carried out mapping in nearby areas of Narigapanga block and found 7 occurrences of Graphite. Out of these the graphite deposit near Bandhamandi is of low grade with F.C. content varying from 4.56 to 21.38%. The deposit

occurs in two isolated patches.

- Later on, S.P. Nanda & B.S. Rauta (2015-16) of DG (O)carried out investigation at G-4 level aroundPanchubai village RayagadaDsitrictand estimated a total reconnaissance resource of 0.032 mt for 10 graphite bodies. Out of 10 graphite bodies, Narigapanga has the highest graphite resource of 0.029 mt.
- D. K. Sahoo, B.S. Rauta (2016-17) of DG (O) carried out Exploration around Naringpanga of Rayagada district during the Field Season 2016-17 by DG (O) to assess the resource and grade of graphite around Naringpanga to carve out an auctionable block. The Block has been successfully auctioned.
- DoMG Odisha has recently completed a G2 level exploration in Jagdalpurblock (Toposheet no.- E44F10) and established a mineralized zone of about 1km length and 300m width having optimum vertical depth of mineralization upto 132m and drilling was done by the agency through outsource by the state department DoMG Odisha has recently completed a G2 level exploration in Khalpadar block (Toposheet no.- E44F10) and established a mineralized zone of about 1km length and 300m width having optimum vertical depth of mineralization upto 132m and drilling was done by the agency out source by the state department.

Previous Exploration in adjoining area

- To the North of this block M/s Maheshwari Mining Pvt Ltd, a Notified Private Exploration Agency (NPEA) has undertaken the Reconnaissance survey of graphite, in the Darukona Area. The graphite bodies have been identified as separate bands within the contact zones between khondalite and granite gneiss. Bedrock sampling (Grab & Groove both) has provided encouraging results leading to the identification of the graphite bearing zones. A total of around 800 m of strike length of graphite bearing zones (4 graphite bearing zones) and with an average width of around 30m. Drilling is yet to be carried out in the block.

A few trenches planned on the basis of interpretation of geophysical anomalies. The trenches also helped in tracing the continuity of the graphite mineralization in some locations. Area is yet to be studied by drilling.

- To the South of this block M/s Maheshwari Mining Pvt Ltd, a Notified Private Exploration Agency (NPEA) has undertaken the Reconnaissance survey of graphite, in the Kanapulisi Area. The graphite bodies have been identified as separate bands within the contact zones between khondalite and granite gneiss. Bedrock sampling (Grab & Groove both) has provided encouraging results leading to the identification of the graphite bearing zones. A total of around 600 m of strike length of graphite bearing zones (3 graphite bearing zones) and with an average width of around 30m. Drilling is yet to be carried

out in the block.

A few trenches planned on the basis of interpretation of geophysical anomalies. The trenches also helped in tracing the continuity of the graphite mineralization in some locations. Area is yet to be studied by drilling.

Block description

CO-ORDINATES OF CORNER POINTS		
POINT	**LONGITUDE**	**LATITUDE**
A	83.54166667	19.41666667
B	83.54166667	19.33333333
C	83.58333333	19.33333333
D	83.58333333	19.35000000
E	83.62500000	19.35100000
F	83.62500000	19.41700000

The quantum of work proposed by the agency in Dumburuneli West (G-4 Level of Exploration) is given in Table below.

Components	G4-stage
Aerial reconnaissance	Nil
Geological Survey	1:12,500 scale for 72.14 sq km area. Identification of lithology, structure, surface mineralization, borehole core studies and old history of mining, if any.
Geophysical Survey	Regional ground geophysical survey: 3 L km, 300stns.(200 m – 400 m traverse interval, 10-20 m station interval) (i) Magnetic survey (ii) SP Survey (iii) ERT
Geochemical Survey	Bedrock samples:100nos Pit samples: 30 nos Trench samples: 100 nos

Pitting/Trenching	30 nos. Pits (1m X 1m X 1m): 30 cu m 10 nos. Trench (10m X 1m X 1m): 100 cu m
Scout drilling /Systematic drilling	Ten boreholes with a total of 500m of drilling target.
Grab and Chip sampling for Petrographic and mineragraphic studies	(10PS+10PCS) representative samples from all bed rocks to carryout petrographic studies (PS) and petro-chemistry (PCS).
Core sample	200 borehole core samples from graphite bearing zones. Sample Length 1m.
Analysis for associated REE + Vanadium (ICPMS 14 Element)	150 Nos.
Analyses of samples	BRS + Pit samples + Trench samples + Core samples=100+30+100+100=330 nos
Synthesis of all available data	Integration of regional geophysical, geological, and geochemical data. Synthesis of all available data and Report writing

References

- Pasayat S., Adhikari K. N. (April, 1988) report on the assessment of graphite resources in parts of Koraput and Phulbani districts, ORISSA, (pp. 12)
- Nanda J. K., Pati U. C., Geotraverse across Eastern Ghats in Orissa sector: Gumuda- Mukundpur road section, Koraput district, ORISSA.
- Ramakrishnan, M., Nanda, J. K., & Augustine, P. F. (1998). Geological evolution of the Proterozoic Eastern Ghats Mobile Belt. Geological Survey of India Special Publication.

List of Plates

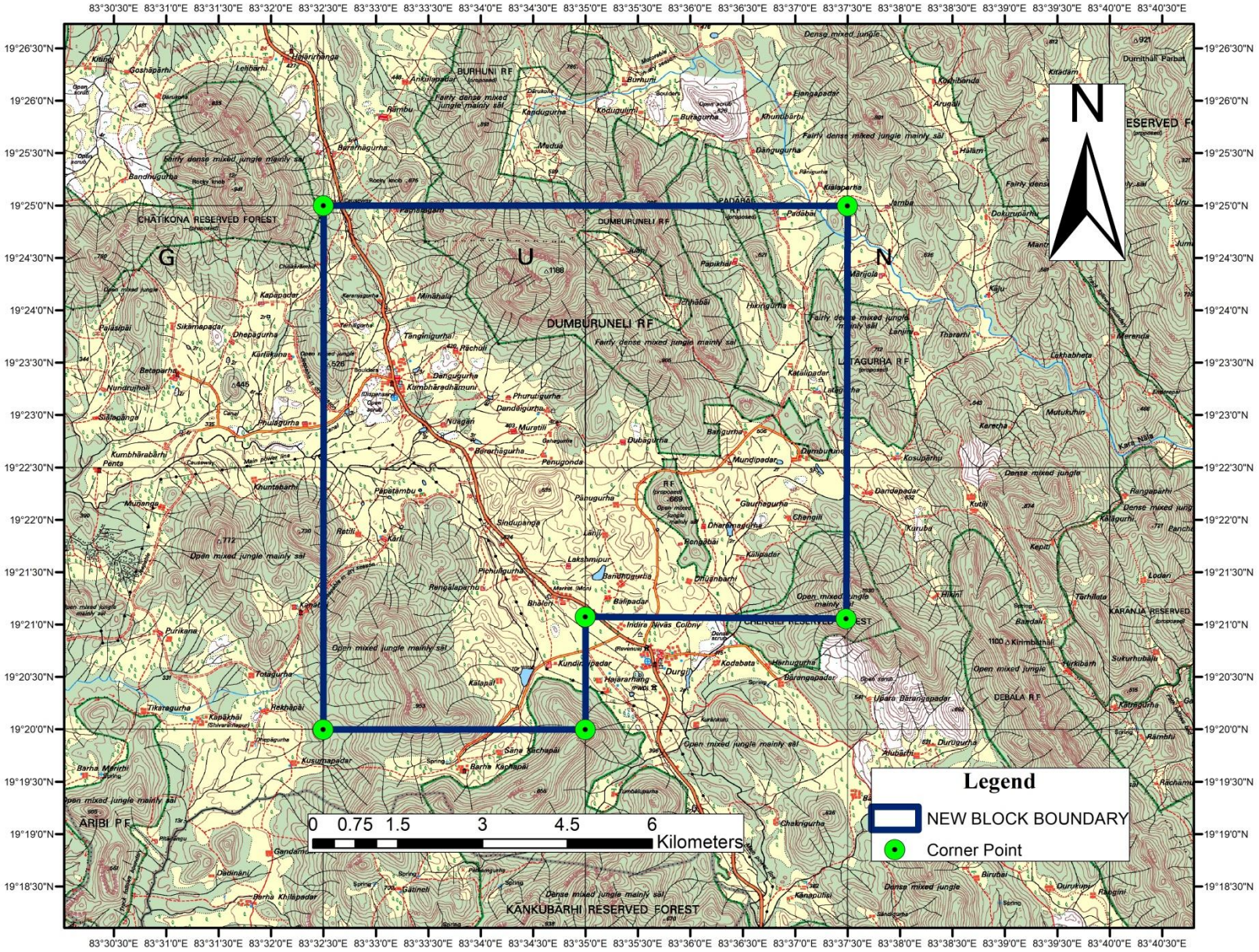
Plate 1: Block Boundary Superimposed on Survey of India Toposheet no. 65M/11 (1:50,000)

Plate2: Block Boundary on geological map 1:50,000 (Source: BHUKOSH Portal)

Proposed Timeline for different work components of Graphite investigation in Dumburuneli, Rayagada District, Odisha													
	Months												
Item of work	**1**	**2**	**3**	**4**	**5**	**6**		**7**	**8**	**9**	**10**	**11**	**12**
Large Scale Mapping (1:12,500)													
Bed rock sampling													
Geophysical survey by Geophysicist													
Laying of Geophysical survey lines & location of Boreholes by surveyors													
Trenching & Sampling													
Chemical analysis of surface samples													
Drilling													
Core Sampling & its preparation													
Chemical analysis of core samples													
Processing of Analytical data													
Preparation of Geological report													

REVIEW

BLOCK BOUNDARY SUPERIMPOSED ON TOPOSHEET NO 65M/11



GEOLOGICAL MAP OF DUMBURUNELI BLOCK