

**RECONNAISSANCE SURVEY (G-4 STAGE) FOR GRAPHITE IN
RANIBANDH BLOCK, BANKURA DISTRICT, WEST BENGAL**

(F.No. 23/447/2024-NMET/602)



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Reconnaissance survey (G-4 Stage) for Graphite in Ranibandh Block, Bankura (West Bengal) by Bhola Prasad Yadav, Dy. Manager (Geology)				
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रानीबांध ब्लॉक, बाँकुड़ा (पश्चिम बंगाल) में ग्रेफाइट के लिए टोही सर्वेक्षण (जी-4 चरण)

द्वारा

भोला प्रसाद यादव, उप प्रबंधक (भूविज्ञान)

महेश्वरी माइनिंग प्राइवेट लिमिटेड

अध्याय-1

सारांश

पश्चिम बंगाल के बाँकुरा जिले में रानीबांध ग्रेफाइट ब्लॉक में एफ.सं. 23/447/2024-एनएमईटी/602 के तहत एक पूर्वानुमान (जी-4 चरण) सर्वेक्षण किया गया। यह क्षेत्र उत्तरी सिंहभूम मोबाइल बेल्ट के सिंहभूम चट्टानों के समूह का एक हिस्सा है और एसओआई टोपोग्राफी संख्या 73जे/13 पर स्थित है। वर्तमान जांच में विभिन्न कार्य घटक शामिल हैं जिनमें 14 वर्ग किलोमीटर के क्षेत्र को कवर करते हुए 1:12,500 पैमाने पर बड़े पैमाने पर भूवैज्ञानिक मानचित्रण, 3.0 वर्ग किलोमीटर क्षेत्र में 1:4000 पैमाने पर विस्तृत मानचित्रण, 3.5-लाइन कि.मी. के लिए भूभौतिकीय स्व-संभावित (एस पी) सर्वेक्षण, ट्रेचिंग और 6 बोरहोल में 450 मीटर की खोजपूर्ण कोर ड्रिलिंग शामिल हैं। इस क्षेत्र में कार्बन अशुद्ध शिस्ट के भीतर ग्रेफाइट खनिजकरण हो रहा है और यह निरंतर और साथ ही असतत (पिच और स्वेल्) बैंड के रूप में मौजूद है।

कुल 30 बेडरॉक (बीआरएस)/ग्रेब नमूने एकत्र किए गए थे, जिनमें से 21 नमूने ग्रेफाइट शिस्ट थे, जो 14 वर्ग किमी क्षेत्र में 2.69% से 9.45% तक आशाजनक फिक्स्ड कार्बन (एफसी) मान दिखाते हैं। विस्तृत मानचित्रण क्षेत्र के विभिन्न स्थानों से बीआरएस/ग्रेब और ट्रेच से 109 ग्रेफाइट युक्त शिस्ट नमूने एकत्र किए गए थे। ग्रेफाइट युक्त बैंड की वितरण और निरंतरता के आधार पर, विस्तृत मानचित्रण क्षेत्र को दो अलग-अलग क्षेत्रों में विभाजित किया गया है: **जोन-ए** (खेल के मैदान के पास भुरकुरा, राजकाटा) और **जोन-बी** (आश्रम के पास रानीबांध, तालाब क्षेत्र और कुमारपारा क्षेत्र)।

जोन-ए में, ग्रेफाइट युक्त लिथो-बैंड की उजागर सतह की मोटाई 1.0 मीटर और 13.0 मीटर के बीच भिन्न होती है जोन-ए से एकत्र बीआरएस/ग्रेब और ट्रेच नमूनों के भू-रासायनिक विश्लेषण से 5.01-9.56% तक औसत एफसी (फिक्स्ड कार्बन) की सीमा मिलती है। बोरहोल में व्यक्तिगत बैंड की वास्तविक मोटाई अधिकतम 38.60 मीटर से लेकर न्यूनतम 0.26 मीटर तक भिन्न होती है, जबकि इन प्रतिच्छेदों की औसत फिक्स्ड कार्बन (एफसी) 2.15% से 8.55% तक भिन्न होती है। ग्रेफाइट के लिए क्रॉस-सेक्शनल क्षेत्र विधि द्वारा अनुमानित संचयी संसाधन जोन-ए के लिए 0.898 मिलियन टन है, जिसमें बैंडवार भारित औसत 2.15-9.56% एफसी (फिक्स्ड कार्बन) है।

जोन-बी में, ग्रेफाइट युक्त लिथो-बैंड की सतह की मोटाई 7.0 मीटर से 18.0 मीटर है, जिसकी स्ट्राइक लंबाई लगभग **600 मीटर** है तथा बीआरएस/ग्रूव और ट्रेंच नमूनों में **फिक्स्ड कार्बन** का प्रतिशत **1.42-11.34%** तक है। बोरहोल में ग्रेफाइट युक्त बैंड की वास्तविक मोटाई अधिकतम 5.67 मीटर से लेकर न्यूनतम 0.45 मीटर तक है और इन बैंडों में औसत फिक्स्ड कार्बन (एफसी) मात्रा 3.08% से 8.52% तक है। जोन-बी के लिए अनुमानित संचयी संसाधन **0.483 मिलियन टन** है, जिसमें बैंडवार भारित औसत एफसी (फिक्स्ड कार्बन) **3.08-8.69%** के बीच है।

चित्रित ग्रेफाइट युक्त क्षेत्रों (जोन-ए और जोन-बी सहित) की संचयी स्ट्राइक लंबाई लगभग **1.25 किलोमीटर** है। रानीबांध ब्लॉक (जोन-ए और जोन-बी सहित) में ग्रेफाइट का कुल संसाधन फिक्स्ड कार्बन ($FC\% \geq 2\%$) के साथ **1.38 मिलियन टन** होने का अनुमान है। यह संसाधन संयुक्त राष्ट्र फ्रेमवर्क वर्गीकरण (UNFC) अथवा MEMC नियम, 2015 के अनुसार **Reconnaissance Mineral Resources (334 वर्ग)** में वर्गीकृत किए गए हैं।

CHAPTER-1

Summary

A Reconnaissance (G-4 stage) survey was carried out in Ranibandh Graphite block in Bankura district of West Bengal under **F.No. 23/447/2024-NMET/602**. This area is a part of Singhbhum group of rocks of North Singhbhum Mobile Belt and located on SOI toposheet No. **73J13**. The current investigation involves various work components including Large Scale Geological Mapping on 1:12,500 covering an area of 14 sq km, detailed mapping in 1:4000 in 3.0 sq km area, geophysical Self-Potential survey for 3.5-line km, trenching and exploratory core drilling of 450 m in 6 boreholes. Graphite mineralisation is occurring within quartz-mica schist in this area and is present as continuous as well as discrete (pinch & swell) bands.

A total of **30 bedrock samples** (BRS) were collected, of which 21 samples were graphite schist, showing promising Fixed Carbon (FC) values ranging from **2.69% to 9.45%** within 14 sq km area. **109 graphite bearing schist samples** from the grooves and trenches were collected from different locations of detailed mapping area. Based on occurrences, distribution and continuity of graphite bearing bands, the detailed mapping area is sub-divided into two distinct zones: **Zone-A** (Bhurkura near Playground, Rajakata) and **Zone-B** (Ranibandh near Ashram, water tank and Kumarpara area).

In **Zone-A**, the exposed surface thicknesses of graphite-bearing litho-bands vary between 1.0 metre and 13.0 metres, indicating ore body with pinching and swelling structure with a strike length of approximately 650 m. The geochemical analyses of BRS (groove) and trench samples collected from **Zone-A** give range of average FC from **5.01-9.56 %**. In Boreholes, the true thicknesses of individual band vary from a maximum of **38.60 metres** to a minimum of **0.26 metre**, while the average fixed carbon (FC) content of these intersections varies from **2.15%** to **8.55%**. The Cumulative resource estimated by the cross-sectional area method for graphite is **0.898 million tonnes** for Zone-A with band wise weighted average of **2.15-9.56% FC**.

In **Zone-B**, the graphite bearing litho-bands have surface thicknesses **7.0 m to 18.0 m** with a strike length of approximately 600 m and percentage of fixed carbon of the BRS/groove and trench samples range from **1.42-11.34%**. While in boreholes the true thicknesses of graphite bearing bands range from a maximum of **5.67 metres** to a minimum of **0.45 metre**, and the average fixed carbon (FC) content of these bands varies from **3.08% to 8.52%**. The cumulative

resource estimated for Zone-B is **0.483 million tonnes** with band wise weighted average of FC range from **3.08-8.69%**.

The cumulative strike length of the delineated graphite-bearing zones (including **Zone-A & Zone-B**) is approximately **1.25 kilometres**. **Total resource** for graphite in Ranibandh block (including Zone-A and Zone-B) estimated as **1.38 million tonnes** with FC more than 2% ($\text{FC}\% \geq 2\%$). These resources are categorised under **Reconnaissance Mineral Resources (334)** as per the United Nations Framework Classification (UNFC) or MEMC Rule, 2015.

CHAPTER-2

Introduction

Graphite is a naturally occurring, stable crystalline form of pure carbon (C), known for its opaque, grey to black appearance, metallic & greasy lustre, that soils the hands upon contact. Despite being a non-metal, it exhibits excellent electrical and thermal conductivity due to the presence of free carbon atoms. Historically, graphite was discovered in 1564 in Borrowdale, England. The name "graphite" was introduced in 1789 by German chemist Abraham Gottlob Werner, derived from the Greek word “graphein,” meaning “to write,” due to its historical use in pencils. Previously, it was known as black lead or plumbago because of its resemblance to lead ore. Graphite typically occurs in metamorphic rocks such as marble, schist, and gneiss, and can also be found in igneous rocks and meteorites. Recognizing its strategic importance and broad industrial utility, the Government of India officially designated graphite as a **critical mineral** in 2023. This decision was based on its growing significance in key sectors such as refractories, lubricants, foundries, and particularly in **lithium-ion batteries** essential for electric vehicles and clean energy systems. Graphite also plays a vital role in the aerospace and defence industries, making it indispensable to India's future-oriented technological landscape. With global demand on the rise and India still relying on imports, the domestic exploration and responsible extraction of graphite are critical to reducing foreign dependence, fostering economic opportunities, and advancing the country's goals of self-reliance (**Atma Nirbhar Bharat**), industrial growth, and green energy-driven sustainable development.

As per NMI database, based on UNFC system total resources of graphite as on 01.04.2020 (Indian Mineral Yearbook 2023, Volume-III, Ministry of Mines, Govt. of India) has been placed at about 211.62 million tonnes, out of that 8.56 million tonnes are reserve categories, and 203.6 million tonnes are placed in resource category. Arunachal Pradesh accounts for 36% resources followed by Jammu and Kashmir (29%), Jharkhand (9%), Odisha (9%), Madhya Pradesh (5%), Tamil Nadu (4%). Production of graphite at about 89645 tonnes (in 2022-23) increased by 42% as compared to that in the preceding year. Tamil Nadu was leading producing state followed by Odisha. Graphite listed as critical mineral in the list of 30 critical minerals for India issued by Ministry of Mines, Govt. of India in June, 2023.

In Pursuance of NMET-mineral exploration Project **F.No. 23/447/2024-NMET/602, Reconnaissance survey (G4- Stage) for Graphite in Ranibandh, Bankura, West Bengal**

was carried out by M/s Maheshwari Mining Private Limited, Kolkata, West Bengal. The author along with other workers conducted mapping in parts of SOI Toposheet No. 73J13 in and around Ranibandh block, Bankura district, West Bengal, geologically the block represents a part of North Singhbhum Mobile Belt. Large-scale geological mapping in **1:12,500** was conducted in the block with an area of 14.00 sq. kms. Lithologies such as mica schist, graphite Schist, calc-silicate rocks, meta-basics, and quartzites were encountered during the mapping. A total of **30 BRS** samples were collected, of which 21 samples were graphite schist, showing promising Fixed Carbon (FC) values ranging from **2.69% to 9.45%**.

Detailed mapping in **1:4000** scale was carried out in **3** square kilometres area within the designated block. A **DGPS survey** was conducted for contouring and detailed geological mapping for the area. Groove lines and trenching (No. of Grooves-14 & Trenches-09) were done to expose in-situ graphite bearing zones and **109 samples** were generated from this activity. **109 graphite samples** from the grooves and trenches were analysed, show FC values ranging from **1.42% to 11.34%**. A Self-Potential (SP) survey of **3.5**-line kilometres was conducted within the block, revealing encouraging anomalous zones. A total of 6 boreholes were planned to intersect graphite bearing zones & drilled with a cumulative drilling metreage of 450 metres with 30 m vertical depth of intersection and 104 core samples were generated and analysed for fixed carbon (FC %).

2.1 Acknowledgement

During the execution of the project, constant support received from Mr. Sanjeev Ganeriwala, Joint Managing Director of Maheshwari Mining Private Limited, is gratefully acknowledged.

I also extend my thanks to Maheshwari Mining Private Limited for providing necessary resources and environment to carry out the work.

The author expresses his sincere gratitude to National Mineral Exploration Trust, Ministry of mines, Government of India for approving the project and funding it. The office of the Deputy Director General, State Unit: West Bengal, Geological Survey of India (GSI), Kolkata is thankfully acknowledged for monitoring & verifying the quantum of programme. Support from the office of the Collector (Bankura district), Divisional Forest Office (Bankura, West Bengal), Range office (Ranibandh, Bankura), SP office (Bankura, West Bengal), concerned RI offices and local police station (Ranibandh, Bankura) are being thankfully acknowledged.

Thanks are due to the local Gram Panchayats and Mr. Mrinal Garai for their cooperation in accomplishment of the project.

2.2 Details of the Project

The project has been approved by National Mineral Exploration Trust under F.No. 23/447/2024-NMET/602 for reconnaissance survey (G4 stage) for Graphite in Ranibandh Graphite Block, Bankura, West Bengal.

2.3 Investigating Agency

Maheshwari Mining Private Limited has been conducted this exploration programme in pursuance of F.No. 23/447/2024-NMET/602 approved by NMET on 12th March, 2024.

2.4 Objective

The objective of the current exploration programme includes.

- i. Large scale Mapping of the designated block on 1:12500 scale covering 14 sq km area for Graphite bearing litho-units along with other associated litho-units and subsequently detailed mapping on 1:4000 scale in 3.0 sq km area within the block focusing on graphite bearing zones, supported by DGPS survey for elevation contouring & precise locations of outcrops & features.
- ii. Undertaking geophysical surveys, particularly Self Potential (SP) surveys, to evaluate the lateral and vertical continuity of graphite zones inferred from surface observations.
- iii. In reconnaissance stage (G4) of exploration, the objective was to confirm the continuity of band and to assess the tentative resource of graphite in the designated block. Furthermore, determination of the grade of graphite analysing the Fixed Carbon (FC) content, was also a component of this work.
- iv. Attempt to delineate one or more blocks & upgrade the investigation into G3 Stage of exploration for Graphite.

2.5 Basis for taking up the investigation

The study area is located in Bankura district of West Bengal, and it is part of **North Singhbhum Mobile Belt (NSMB)** sandwiched between **Chotanagpur Gneissic complex & Singhbhum Craton**. The boundaries are again delineated by **Tamar–Porapahar Shear Zone** to the North and **Singhbhum Shear Zone** to the south.

More precisely the block is located between **Dalma Volcanics** and the **Tamar–Porapahar Shear Zone**. Previous geological mapping conducted by **Lahiri and Singh (1991-92 to 1992-93)** identified predominant lithological units comprising quartz-sericite schist, with occasional

occurrences of carbonaceous schist and garnetiferous mica schist. The area also hosts several elongated, mappable calc-silicate litho-units occurring as small enclaves within low-grade schistose rocks. Smaller bands of quartzite and pockets of ultrabasics and amphibolites have also been reported. The general structural trend of all the litho-units is **ENE–WSW**.

During the current reconnaissance traverse by geologists from **Maheshwari Mining Private Limited (MMPL)**, a graphite-bearing band was identified based on restricted outcrops, indicating a total strike length of approximately 500 metres. Analysis results from seven surface samples collected from this band revealed promising Fixed Carbon (F.C) values ranging from 6.32% to 8.26%.

Given the results of the present investigation, the area shows a favourable geological setting for graphite mineralisation.

2.6 Nature and quantum of work during present Investigation

Table-2.6.1 Nature and Quantum of work done during the present Investigation			
Sl. No.	Nature of work	Target assigned	Target achieved
1	Geological Survey-		
2	DGPS/Total Station Survey	3.0 km ²	3.0 km ²
3	Geological Mapping (LSM,1:12,500)	14.0 km ²	14.0 km ²
4	Geophysical Surveys (SP Survey)	3.0 L.km	3.5 L.km
5	Technological-		
6	(a) Surface exploration- Pitting/trenching	100 m ³	139.1 m ³
7	(b) Sub Surface exploration- Drilling	500 m	450 m
8	Geochemical survey-		
9	(a) Bed Rock Sample	50 nos.	92 nos.
10	(c) Core Sample	100 nos.	104 nos.
11	(d) PT sample	50 nos.	47 nos.
12	Petrographic/Mineral graphic studies-		
13	(a) Petrographic	5 nos.	5 nos.
14	(c) Petrographic Core	5 nos.	5 nos.
15	Chemical analysis (Nos.) (As per approved NQT)-		
16	1. Proximate Analysis	200 nos.	234 nos.
17	2. Check Samples	20 nos.	23 nos.
18	3. Associated 34 elements by ICPMS (Core Samples)	50 nos.	50 nos.
19	4. Whole Rock Analysis	10 nos.	10 nos.

2.7 Personnel Associated

Table 2.2 List of Personnel involved	
Responsibility Assigned	Personnel of MMPL Involved
PC (Project Coordinator)	Mr. Ambika Prasad Samantaray, President & CEO,
TAE (Technical Area Expert)	Mr. Pradipta Tarafdar, Advisor Geology
Overall Co-ordination	Mr. Sourabh Sarkar, GM
Geological Report Preparation & Documentation/Author	Mr. Bhola Prasad Yadav, Deputy Manager (Geology)
Field Geologist	Mr. Bhola Prasad Yadav, Deputy Manager (Geology)
	Mr. Abhijit Kundu, Geologist
Field Co-ordinator	Mr. Bhola Prasad Yadav, Deputy Manager (Geology)
Office Co-ordination	Mr. Balkrishan Vishwakarma, Manager Geology
	Ms. Anusrita Thakur, Manager Geology
ArcGIS and AutoCAD	Mr. Bhola Prasad Yadav, Deputy Manager (Geology)
Petrographic study	Ms. Medha Sarkar, Geologist
Surpac Modelling	Ms. Moulipriya Bhakta, Deputy Manager (Geology)
	Mr. Bhola Prasad Yadav, Deputy Manager (Geology)
Geophysics TAE (Technical Area Expert)	Dr. Suwendu Mondal, DGM
Field Geophysicist	M. Kiran, Geophysicist
Drilling co-ordinator	Mr. Dayaram Bhandari
DGPS Survey	Mr. Harihar Maity, Senior Surveyor
	Mr. Swarajpal Vinaylal Mohanta, Surveyor
Draftsman	Ms. Gargi Roy chowdhury

Peer Review	Mr. C R Dash, Director (Retd.), GSI
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2.8. Modes of operation of different work components and associated agencies

Large Scale Mapping on 1:12,500 scale in 14 Sq km area, Detailed Mapping in 1:4000 scale covering 3 sq km area, surface & sub-surface sampling (BRS and core sampling), petrographic studies, Geophysical Survey, Pitting and Trenching, DGPS survey, sub-surface exploration (drilling) work were conducted by the in-house strength of **Maheshwari Mining Private Limited**. Geochemical analyses (Proximate analysis) of BRS, Groove-Trench & core samples of graphite were carried out by **NMCI Shree Coal Laboratory**. Analysis of 34 trace elements was carried out using Inductively Coupled Plasma Mass Spectrometry (**ICP-MS**), and proximate analysis of check samples along with bulk density determination was conducted by **Shiva Analyticals (India) Private Limited**.

CHAPTER-3

Property Description

3.1 Details of area

The current area under investigation is the Ranibandh Graphite Block is located in Bankura district of West Bengal, which spans an area of 14 square kilometres.

3.2 Village, district and state details

The area of investigation is part of the Bankura district, West Bengal (Fig.3.2 a). The main localities of the mapped area are Ranibandh, Bhurkura, Kumarpura, Budhkhila, Rajakata, Taalgora & Tantipara.

3.3 Concerned SOI toposheet number

The Investigated area belongs to the western part of the Survey of India toposheet no. 73J13.

3.4 Geo-coordinates of the corner points of the investigated area

Table-3.4.1 Cardinal points of Large Scale (LSM) Mapping area (14 Sq Km)		
Cardinal points	Latitude	Longitude
M	22° 53' 17.710" N	86° 45' 49.140" E
N	22° 53' 16.590" N	86° 48' 34.020" E
O	22° 51' 40.250" N	86° 48' 34.020" E
P	22° 51' 40.250" N	86° 45' 49.140" E

Table-3.4.2 Cardinal points of Detailed Mapping (DM) area (3 Sq Km)		
Cardinal points	Latitude	Longitude
A	22° 52' 14.363" N	86° 46' 26.597" E
B	22° 53' 0.540" N	86° 48' 6.577" E
C	22° 52' 21.284" N	86° 48' 33.468" E
D	22° 52' 9.807" N	86° 48' 22.519" E
E	22° 52' 27.457" N	86° 47' 55.943" E
F	22° 51' 51.210" N	86° 46' 36.935" E

3.5 Land use/Land cover

The land cover of the designated area includes a hillock, notably Bamni Pahar in the northern portion, a few east–west trending ridges in the southwestern part and scattered small mounds. Protected forest regions are prominent in the southwestern and central portions, particularly near Ranibandh and Bhurkura. The area also includes cultivated lands and human settlements. Overall, the area is predominantly used for farming, accompanied by scattered residential settlements.

3.6 Forest type

The Southwestern, central & northern parts of the area is densely covered with vegetation, which can be classified under tropical dry, deciduous, and mixed forests.

3.7 Free hold details

The total area of the proposed block is freehold.

3.8 Location & Accessibility

Geographically the area belongs to the Bankura district of West Bengal. The area is bounded between latitude 22° 53' 17.710" N and 22° 51' 40.250" N, and longitude 86° 45' 49.140" E and 86° 48' 34.020" E, located to the western part of SOI toposheet No. 73J13 (Fig.3.1).

Geologically the area belongs to the eastern part of North Singhbhum Mobile Belt falling between Dalma Volcanics to the south and Tamar Porapahar shear zone to the north (Fig.3.3).

The area is well connected by a network of roads to Bankura, Jhargram, Tatanagar, Kharagpur, Purulia. Khatra, the subdivisional Headquarters is located about 15 km northeast of study area and can be accessed through Ranibandh-Khatra metalled road. The nearest railway station is Bankura on Howrah-Purulia Railway track of Southeastern Railway situated at 60 km NE of the block. Kazi Nazrul Islam Airport, Andal is at a distance of 121 km from Ranibandh.

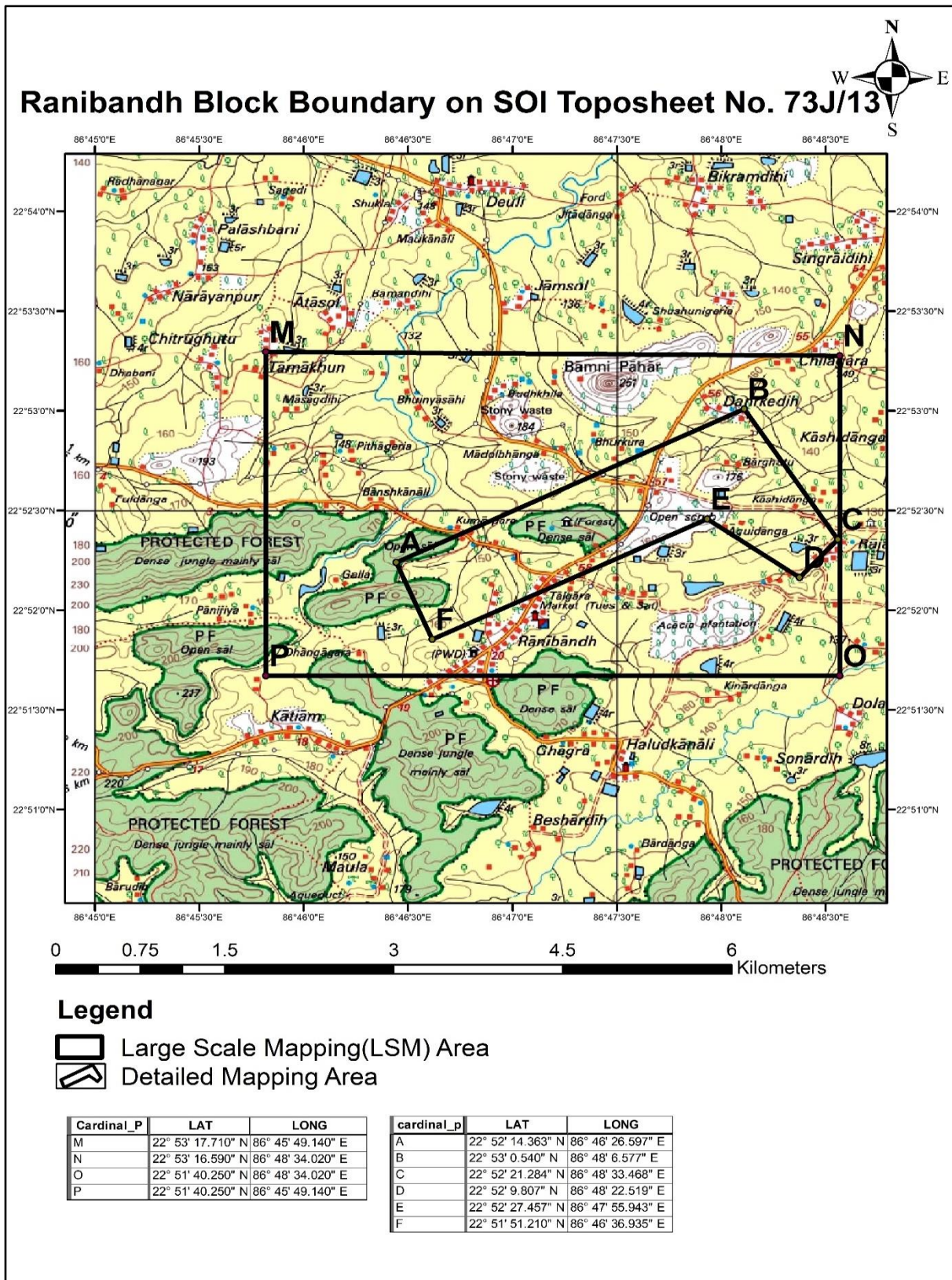


Fig.3.1 Location of Ranibandh Graphite Block on SOI toposheet number 73J13.

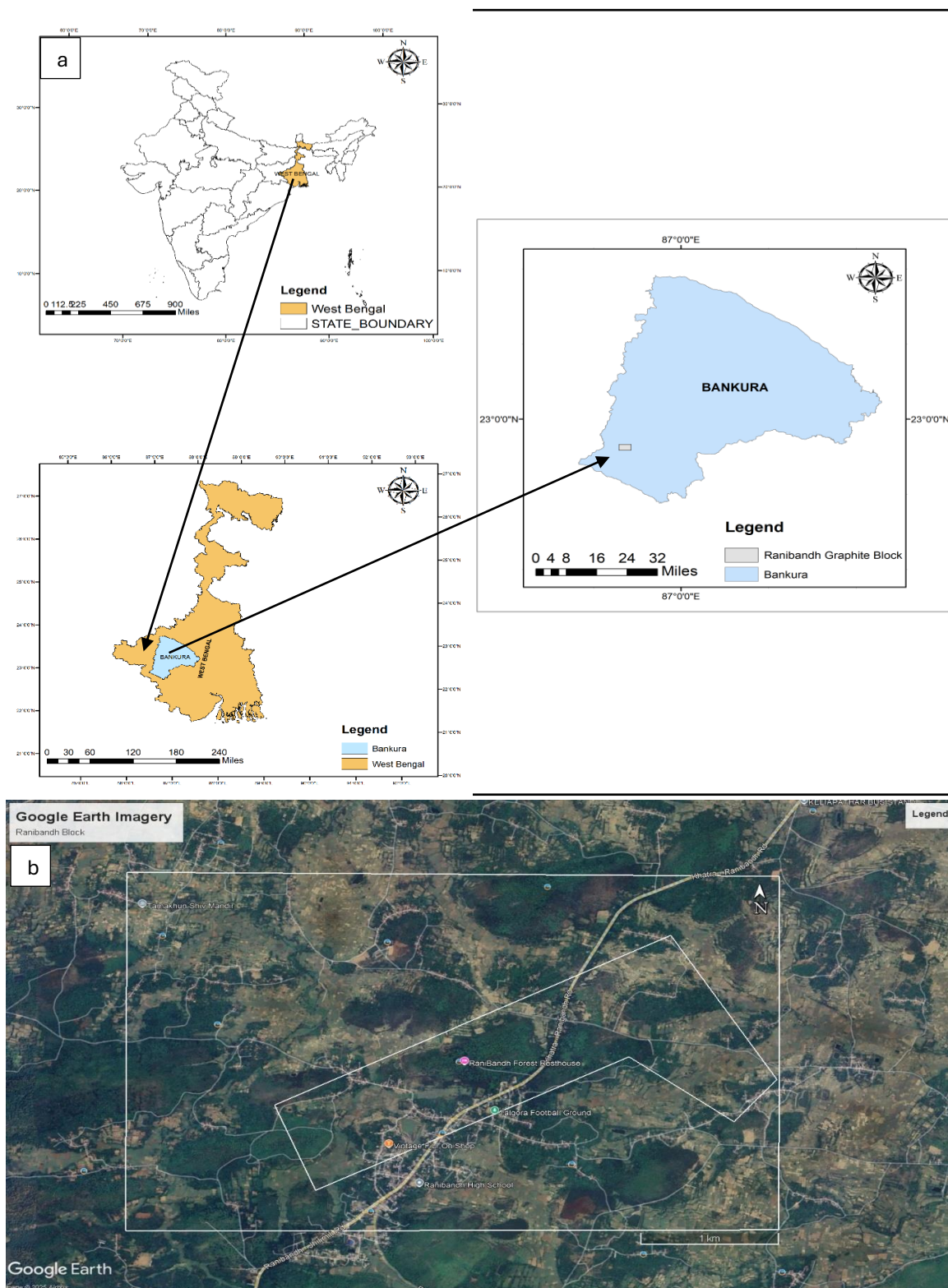


Fig.3.2 (a.) Location of study area. & (b.) Large Scale Mapping (LSM) & Detailed Mapping (DM) area of Ranibandh Graphite Block, Bankura (W.B) shown on Google Earth imagery.

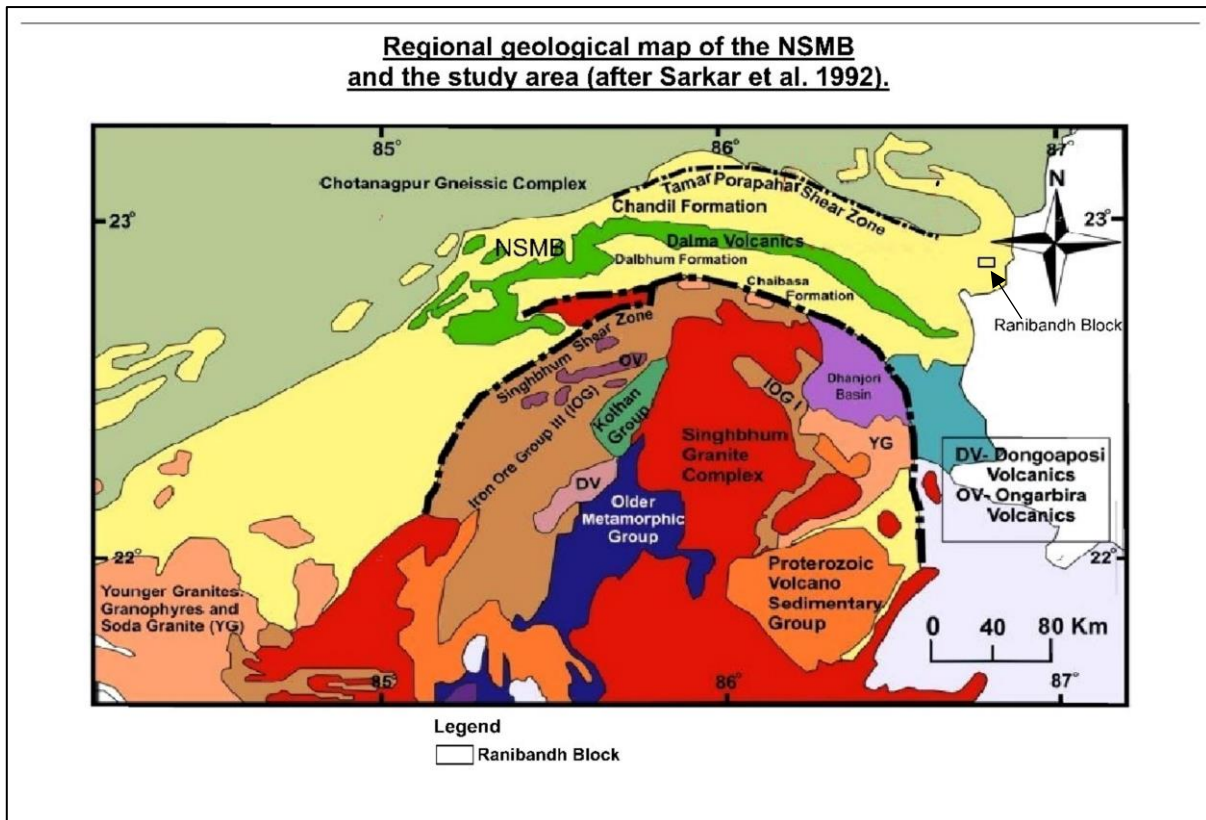


Fig. 3.3 Location of study area of Ranibandh Graphite block over geological map of NSMB (after Saha 1994).

3.9 Topography, climate & drainage

The topography of the area is generally undulating and dotted with small hills. Elevations range between 108 m and 197 m above mean sea level (MSL), with the highest point 251 m at Bamni Pahar at the northern margin. Three east–west trending ridges are present in the southwestern quadrant, contributing to local relief variation. The area experiences an extreme tropical climate. Summer (March to mid-June) is hot, with temperatures rising upto 45°C in May. Winter (November to February) is mild, with temperatures occasionally falling below 10°C, and an average minimum of 13°C. The region receives moderate rainfall, averaging 1300 mm annually, primarily between July and October. The drainage pattern is controlled by the Kasai River and its Right Bank Main Canal. Drainage is predominantly northeasterly, with local nalas flowing towards and joining the canal system.

3.10 Flora and Fauna

The area is characterized by a mixed dense jungle in its northern, central, and south-western parts with protected forest at central & south-western part. Main species of plantation include Sal (*Shorea robusta*), Palash (*Butea monosperma*), Mahua (*Madhuca longifolia*), Kusum (*Schleichera oleosa*), Simul (*Bombax ceiba*), Amla (*Phyllanthus emblica*), Mango (*Mangifera*

indica), where Sal (*Shorea robusta*) dominates the forest vegetation. In the fairly dense mixed jungle, the presence of Jackal, rabbit, snake (both venomous & non-venomous) etc. is common. Occasionally herds of elephants come down from Dalma Hills of Singhbhum district, Jharkhand to feed on and trample standing paddy crop during early winter months.

3.11 Local infrastructure

Being the part of North Singhbhum Mobile Belt, area is characterised by gently undulated topography consisting of low to high hill ranges together with nala sections and agricultural land, occupied by several villages including Ranibandh, Bhurkura, Kumarpara, Budhkhila, Rajakata, Taalgora, Neemdanga, Baskanali & Tantipara etc. It is well connected by metalled roads and electric power supplies for domestic use are given to villages.

CHAPTER-4

Previous Work

The basic framework of Singhbhum Geology is laid on the foundation work of **Ball (1881)**, **Jones (1934)**, **Dunn (1929, 1940)** and **Dunn and Dey (1942)**. Their pioneering and voluminous work documents a detail account of geology, stratigraphy, structure and economic minerals of the Singhbhum Fold Belt (SFB). Ever since these works a lot of studies on various aspects of geology were carried out by a good number of earth scientists in this belt. Revisions of stratigraphy of North Singhbhum Mobile Belt (NSMB) were proposed by **Sarkar and Saha (1962)**, **Gupta et al., (1980)** and many others. Structure and metamorphism of the Singhbhum Group of rocks were done by **Naha (1961,1965)**; **Mukhopadhyay and Sengupta (1972)**, **Gupta & Basu (1977)**; **Sarkar et al., (1992)**; **Pyne (1992)**, **Mukhopadhyay et al., (1998)**, **Chattopadhyay and Gangopadhyay (2001)**; **Huin and Jana (2004)**.

Occurrences and incidences of base metal mineralization were well known from different parts of the belt (**Dunn, 1929; Dunn and Dey, 1942**).

The **Directorate of Mines and Minerals, Government of West Bengal (1972)** undertook preliminary exploration for copper mineralisation near Tamakhun village, Purulia district. Drilling in the southern and eastern sides of the Tamakhun tank revealed greenish-grey chlorite schist/phyllite and white sericite schist/phyllite, with the former acting as the principal host rock for sulphide mineralisation in the form of streaks, veins, specks, and clots. Carbonaceous schist, quartzite, and phyllitic quartzite were also encountered, along with garnetiferous mica schist up to depths of 10–30 m below ground level.

Mehra and Biswas (1973) followed up with geochemical soil sampling and exploratory drilling (11 inclined boreholes) around old workings in Tamakhun. They identified sericite–quartz–chlorite schist as the dominant lithology, alongside chlorite–quartz schist, argillaceous limestone (not exposed on the surface), and brecciated quartzite. Surface expressions of copper mineralisation were rare, limited to old workings, mine dumps, and malachite stains. A single copper-bearing lode (chalcopyrite with subordinate pyrite and pyrrhotite) was intersected to a vertical depth of 60 m and 350 m along strike. Mineralisation continues as dissemination, foliation fillings, fracture and breccia fillings, with an average grade of 1.95% Cu.

The Geological Survey of India (Eastern Region) GSI, E.R. drilled boreholes in Tamakhun, Thakurdungri, and Purdaha areas. In Tamakhun (**F.S. 1991–93**), garnet-bearing chlorite-biotite schist was intersected up to 78 m depth. The dominant lithounits encountered in boreholes were chlorite-biotite schist/phyllite, locally graphitic or carbonaceous, with signs of fracturing/brecciation (in part), silicification, ferruginisation, and mylonitisation (in part), along with evidence of shearing. Garnetiferous chlorite-biotite schist was also intersected in boreholes TK(R)-2 and 3 at Thakurdungri.

Ghosh, Mitra, and Ghosh (1977) carried out an integrated survey of the Tamar–Porapahar shear zone (Khatra Block), concluding that the granitic and metasedimentary suites around the shear zone displayed low mineralisation potential.

Geophysical survey employing gravity, magnetic (V.F.) and resistivity methods has been carried out along available road. in Purulia and Bankura districts under a programme of Geophysical mapping (**Chakrabarty et.al. 1989**) and includes Jhillmili Bundwan - sector (15.9 km) and Kuilapal-Jamtaria -Manbazar sector (26.3 km). Gravity and magnetic measurements were made at station interval of 1000 metres along the roads. The magnetic (V.F.) contour map does not reveal any significant closure. The Bouger Gravity map shows a gravity “Low” for a strike length of 30 km (from SW of Manbazar to SE of Khatra) with an anomaly of the order of - 12.0 milligals and this gravity low corresponds to the Tamar-porapahar shear zone.

In the Final Report on Specialized Thematic Mapping of the area between the Dalma Volcanics and the Tamar–Porapahar Shear Zone by **Lahiri and Singh (1990–91 to 1992–93)**, graphite-bearing sericite schist (or carbonaceous sericite schist) was reported as a thin, impersistent unit associated with the argillaceous rock group in several locations. The litho-unit is described as a fine-grained, puckered, sericite-rich schist containing carbon/graphite, giving a black colour to the rock without mentioning location. Chemical analyses revealed concentrations of titanium (~1000 ppm), vanadium (200–500 ppm), and barium (~275 ppm). Analyses related to percentage of fixed carbon is not mentioned.

CHAPTER-5

Geology of the Area

5.1 Brief Regional Geology

The **Singhbhum Craton**, located in eastern India, is one of the oldest continental fragments of the Indian shield and preserves a geological history spanning from the Archaean to the Neoproterozoic (Sengupta & Mukhopadhyay, 2000; Acharyya, 2003). It consists of three distinct tectonic and lithological domains: the Archaean granite-greenstone core (**Singhbhum Granite Complex**), the North Singhbhum Mobile Belt (**NSMB**) to the north, and the Chhotanagpur Granite Gneissic Complex (**CGGC**) further north (Sarkar et al., 1992; Acharyya et al., 2006).

The present study area is a part of **NSMB (North Singhbhum Mobile Belt)**, a 200 km × 50 km curvilinear mobile belt, is sandwiched between two major tectonic features: the **Singhbhum Shear Zone (SSZ)** in the south and the **South Purulia Shear Zone (SPSZ)** (also referred to as the Tamar–Porapahar lineament) in the north (Gupta & Basu, 2000). The NSMB comprises low to medium-grade meta-volcano-sedimentary rocks that have undergone multiple phases of deformation and metamorphism (Mahato et al., 2008; De et al., 2016).

The stratigraphy of the **NSMB** includes the Dhanjori formation, Singhbhum Group (comprising Chaibasa and Dhalbhum formations), and the overlying Dalma Group. These sequences are mainly Palaeoproterozoic to Mesoproterozoic in age and lie unconformably on the **Archaean Singhbhum Granite Complex** (Sarkar & Saha, 1962; Gupta et al., 1980).

The **Dhanjori formation** lies directly over the Singhbhum Granite and consists of quartzite, conglomerate, pelites, and mafic volcanic flows (Dhanjori lava). These units represent an early volcano-sedimentary sequence deposited during basin development on the Singhbhum Craton (Sarkar & Saha, 1962). The rocks are weakly metamorphosed and typically occur in the southern margin of the **NSMB**.

Singhbhum Group

The Singhbhum Group, reclassified by **Sarkar & Saha (1962)** from the older "**Iron Ore Series**" of **Dunn & Dey (1942)**, is composed of two main formations: **Chaibasa** (lower) and **Dhalbhum** (upper).

Chaibasa formation: This unit is a meta-flysch facies sequence (**Naha, 1961**) and dominated by mica schists, kyanite-staurolite-garnet mica schist, hornblende schist, quartzite, quartz-mica schists, chlorite schist, quartz granulite, amphibolites and minor acid tuffs. It is characterised by relatively higher-grade (kyanite) metamorphism and complex internal folds (**Gupta et al., 1980; Mazumder, 2005**).

Dhalbhum formation: The Dhalbhum formation is dominantly psammo-pelitic and contains phyllite, carbonaceous phyllite, quartzite, ferruginous quartzite, basic-ultrabasic sills, calc-silicate rocks, and acid tuff (**Gupta & Basu, 2000; Chakraborti & Huin, 2008**). It has been interpreted as a shallow marine to continental facies sedimentation and includes significant tuffaceous material. It overlies the Chaibasa Formation with a possible unconformity (**Mazumder, 2005**).

Dalma Group

Dalma Lavas form a prominent belt of folded ultramafic-mafic volcanics and volcanoclastics associated with carbon phyllites overlying the Dhalbhum Formation. The lavas occur in an arcuate belt 200km long and 3-7 km wide along the spine of the North Singhbhum orogeny. The volcanics are folded into a large syncline with an axial (F2) surface trending E-W, designated separately by **Gupta, Basu & Ghosh (1980)** based on its volcanic nature. It includes two sub-units:

Lower Dalma formation: Comprising tuffaceous schists, vitric tuffs, carbonaceous phyllite-tuff, quartzite, ironstones, and gabbroic to ultramafic intrusive. This unit records komatiitic volcanism and pyroclastic deposition.

Upper Dalma formation: Dominated by metabasaltic flows, agglomerates, and massive to pillowed lavas. This unit indicates submarine mafic volcanism under an extensional regime.

Some studies also refer to **Chandil formation (Ray et al., 1996)** to represent felsic tuffaceous units north of Dalma, although this remains debated/controversial due to similarities with the Dhalbhum tuffs (**Sarkar & Saha, 1962**).

Geologically the present study area belongs to North Singhbhum Mobile Belt (**NSMB**) and stratigraphically the rocks of the study area are part of Chaibasa formation of Singhbhum Group.

5.2 Stratigraphic Column

Based on various geological investigations and supporting evidences, a tentative compiled stratigraphic column of the North Singhbhum Mobile belt is presented in (Table 5.2.1).

Table 5.2.1 Stratigraphic Column of North Singhbhum Mobile Belt (after Sarkar & Saha, 1962; Gupta et al., 1980)					
NSMB (North Singhbhum Mobile Belt)	Age	Group	Formation	Lithology	Reference
	Mesoproterozoic	Dalma Group	Dalma formation (Upper)	Pillow basalts, agglomerates	Gupta et al., 1980
			Dalma formation (Lower)	Tuffaceous schists, vitric tuff, carbonaceous phyllite, ultramafics	
	Palaeoproterozoic	Singhbhum Group	Dhalbhum formation	Phyllite, Carbonaceous phyllite, quartzite, calc-silicate, acid tuff, basic sills	Sarkar & Saha, 1962
			Chaibasa formation	kyanite- staurolite- garnetiferous mica schist, quartz-mica schist, hornblende schist, quartzite, tuff	Naha, 1961; Mazumder, 2005
		Dhanjori Lava	Dhanjori formation	Quartzite, conglomerate, pelite, mafic flows	Sarkar & Saha, 1962

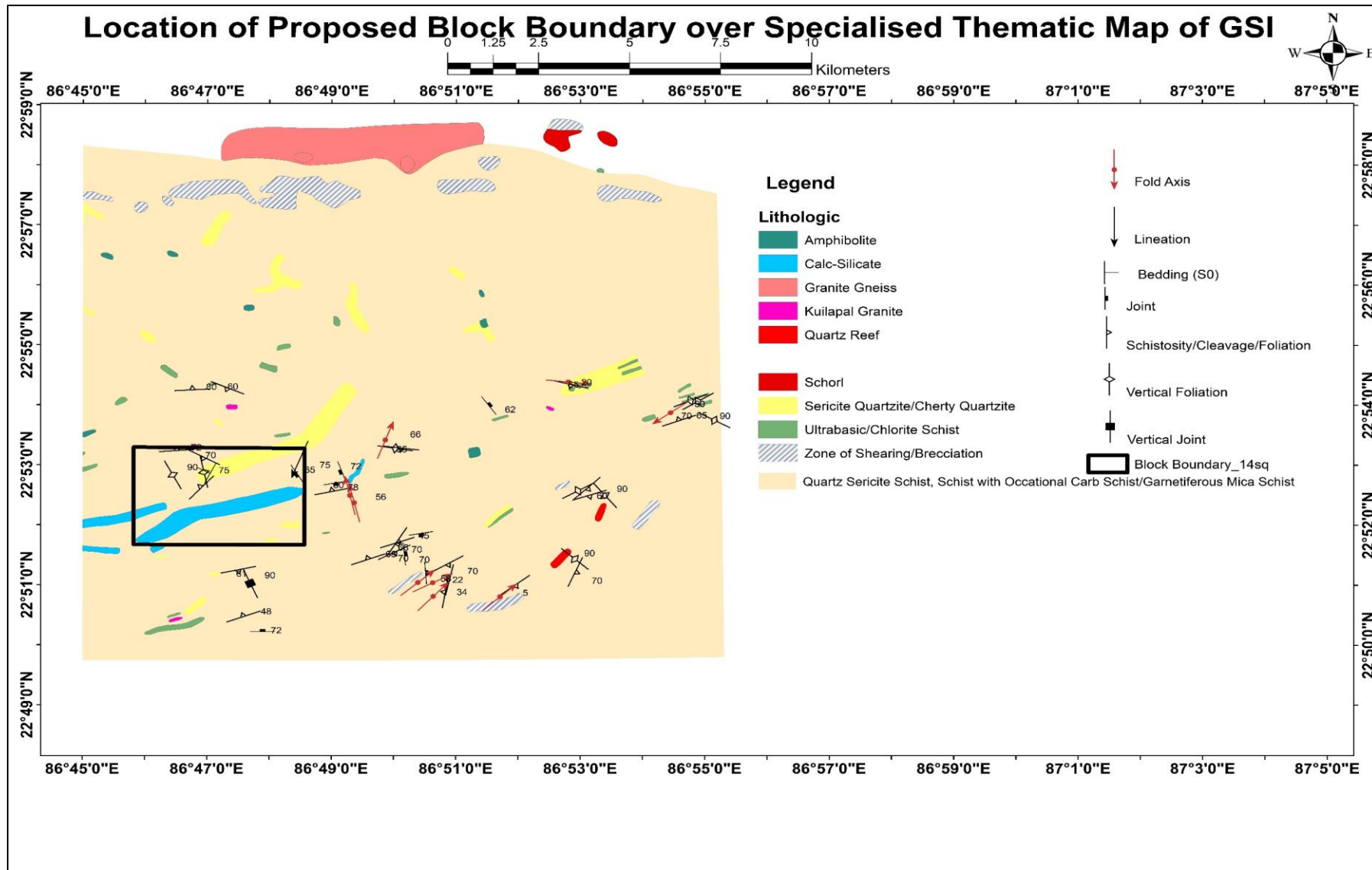


Fig.5.1 Ranibandh Graphite Block over Specialised Thematic Map of GSI on SOI toposheet no. 73J13 on 1:25000 scale.

5.3 Regional structure

North Singhbhum Mobile Belt (**NSMB**) is a curvilinear orogenic belt approximately 200 km long and 50 km wide. It marks the contact between the Paleoproterozoic Chotanagpur Granite Gneiss Complex (**CGGC**) to the north and the Archean Singhbhum Craton to the south. This belt has experienced a polyphase deformational history, as evidenced by folded structures and shear zones.

The NSMB records at least three major phases of folding: F_1 , F_2 , and F_3 . The early F_1 folds are isoclinal to tight in geometry and often rootless and intrafolial, particularly developed within the Chaibasa Formation. These folds were formed during the first phase of deformation (D_1), and their planar structures are marked by S_1 schistosity, presently parallel to the original bedding plane (S_0).

The second-generation folds (F_2), often coaxial with F_1 , are upright and asymmetric in nature, producing prominent E–W trending regional folds. These are accompanied by a strong axial planar foliation (S_2). In NSMB or Singhbhum fold belt, these folds progressively change character—upright in the north to overturned in the south, with plunges varying from sub-horizontal to steep, reflecting progressive non-coaxial deformation in a ductile shear zone (**Sengupta and Chattopadhyay, 2004**).

The F_3 Folds, predominantly observed within the Singhbhum Shear Zone to the south of NSMB, are superposed over earlier F_1 and F_2 structures and exhibit variable plunges towards the NNE. These Folds gradually die out northward and southward (**Bhattacharya and Sanyal, 1988**).

The F_4 Folds appear as macroscopic folds in the SE part of the Singhbhum fold belt, e.g. near Hathimara. These folds are open and upright, developed on S_3 and earlier S -planes. Axial planes are often marked by a fracture cleavage (S_4) that has NNE strike and subvertical dips towards E or W. The fold axes plunge at low angles towards NNE (**Bhattacharya and Sanyal, 1988**).

5.4 Regional metamorphism

Metamorphism of the NSMB

Metamorphic investigation of the rocks of the Singhbhum belt is limited. The metamorphosed volcanosedimentary rocks of the NSMB (schist, phyllite, and amphibolite) and the felsic intrusives experienced at least three phases of deformation (D_{1SMB} – D_{3SMB}) and metamorphism (M_{1SMB} – M_{3SMB} ; **Mahato et al., 2008**). The M_{2SMB} P–T condition increases from greenschist or low–P amphibolite facies (<5–6 kbar; 500–600 °C; **Lal and Singh, 1978; Lal et al., 1987; Sengupta et al., 2005**) in the southern parts of the NSMB, to higher–P (~ 10 kbar; ~ 620 °C) close to the Dalma Group (**Mahato et al., 2008**). Throughout the southern NSMB, the M_{3SMB} metamorphism shows greenschist facies mineral assemblages. U–Th–Pb chemical ages of monazite indicate 1.72 Ga (D_{1SMB}) (**Chatterjee et al., 2010**) and 1.55 Ga (D_{2SMB}) (**Mahato et al., 2008**). These workers correlated the greenschist facies M_3 exhumation with 1.3 Ga monazite ages, with similar ages (1.3–1.2 Ga) from monazite rims in schists from the southern NSMB. Monazite spot ages from metapelites in the northern domain of the NSMB yielded an age of 957 ± 17 Ma (D_{3SMB}) (**Rekha et al., 2011**). The overall metamorphic grade of the Singhbhum Group is reported to greenschist facies, which increases to garnet– staurolite– kyanite–bearing amphibolite facies close to the Tamar– Porapahar Shear Zone at the contact with the CGGC. The highest-grade rocks are the Chaibasa formation that show amphibolite facies assemblages and are exposed all along the middle part of the anticlinorium (**Gupta and Basu, 2000**). From this high-grade central part of the anticlinorium the metamorphic grade decreases northward to greenschist facies. In all these areas, the higher-grade rocks occur against the direction of axial plunge, and the regional metamorphism is found to be syn- to post-kinematic with respect to F1 and pre-kinematic with respect to F3 (**Bhattacharya and Sanyal, 1988**).

The progressive regional metamorphic sequence from chlorite, biotite, garnet, staurolite, and kyanite zones are clearly seen in eastern Singhbhum (Ghatsila) (**Naha, 1965**). A similar sequence is also found in central Singhbhum (Gamaria) (**Roy, 1966**). High-grade rocks of amphibolite facies are also found in the Kuilapal migmatite complex. In Sini area, the metamorphism is Barrovian type (**Lal et al., 1987**), with zonation from chlorite → biotite → garnet → staurolite → kyanite (**Naha, 1965; Roy, 1966**).

CHAPTER-6

Geo-Science Investigation

6.1 Geological Mapping

6.1.1 Large scale Mapping

6.1.1.1 Large scale Mapping on 1:12500 scale

As a part of **Reconnaissance Survey (G-4 Stage) for Graphite in Ranibandh block**, an area of 14.0 sq km was selected & geologically mapped in and around Ranibandh, Bhurkura, Kumarpara, Budhkhila, Rajakata, Taalgora, Neemdanga, Banskanali & Tantipara, Bhuinyasahi and Tamakhun areas. The boundaries of area form a polygon with specific geographical co-ordinates or corners defined by **M** (Lat. 22° 53' 17.710" N & Long. 86° 45' 49.140" E), **N** (Lat. 22° 53' 16.590" N & Long. 86° 48' 34.020" E), **O** (Lat. 22° 51' 40.250" & Long. N 86° 48' 34.020" E) and **P** (Lat. 22° 51' 40.250" N & Long. 86° 45' 49.140"). The area under investigation lies at the western end of *SOI* toposheet no. 73J/13, within the Bankura district of West Bengal (**Fig.3.1**).

During the Present investigation, rocks of Singhbhum Group were mapped, which essentially belong to Chaibasa formation of Palaeoproterozoic age comprising quartz-muscovite-biotite schist, graphite/carbon bearing mica schist, calc silicate/calc gneiss, quartzites, metabasic/amphibolite and quartz veins. Graphite/Carbonaceous material occurs along the foliation(S_1) and disseminated at places within quartz mica schist. Quartz mica schist/quartz sericite schist being the dominant lithologies with the discontinuous occurrences of calc silicates as low-lying mounds within former along with quartzites and meta-basics. The Calc-silicate rocks occur as discontinuous linear patches within dominant lithology i.e. Quartz-mica-schist.

6.1.1.2 Geological Map on 1:12500 Scale

The geological map (**Plate-I**) consists of mappable lithological units of quartz mica (muscovite-biotite) schist, graphite/carbon bearing quartz mica schist, calc- silicate, quartzite, metabasics. Quartz mica schist/ quartz sericite schist dominates the landscape, while calc silicates occur as discontinuous patches within quartz mica schist.

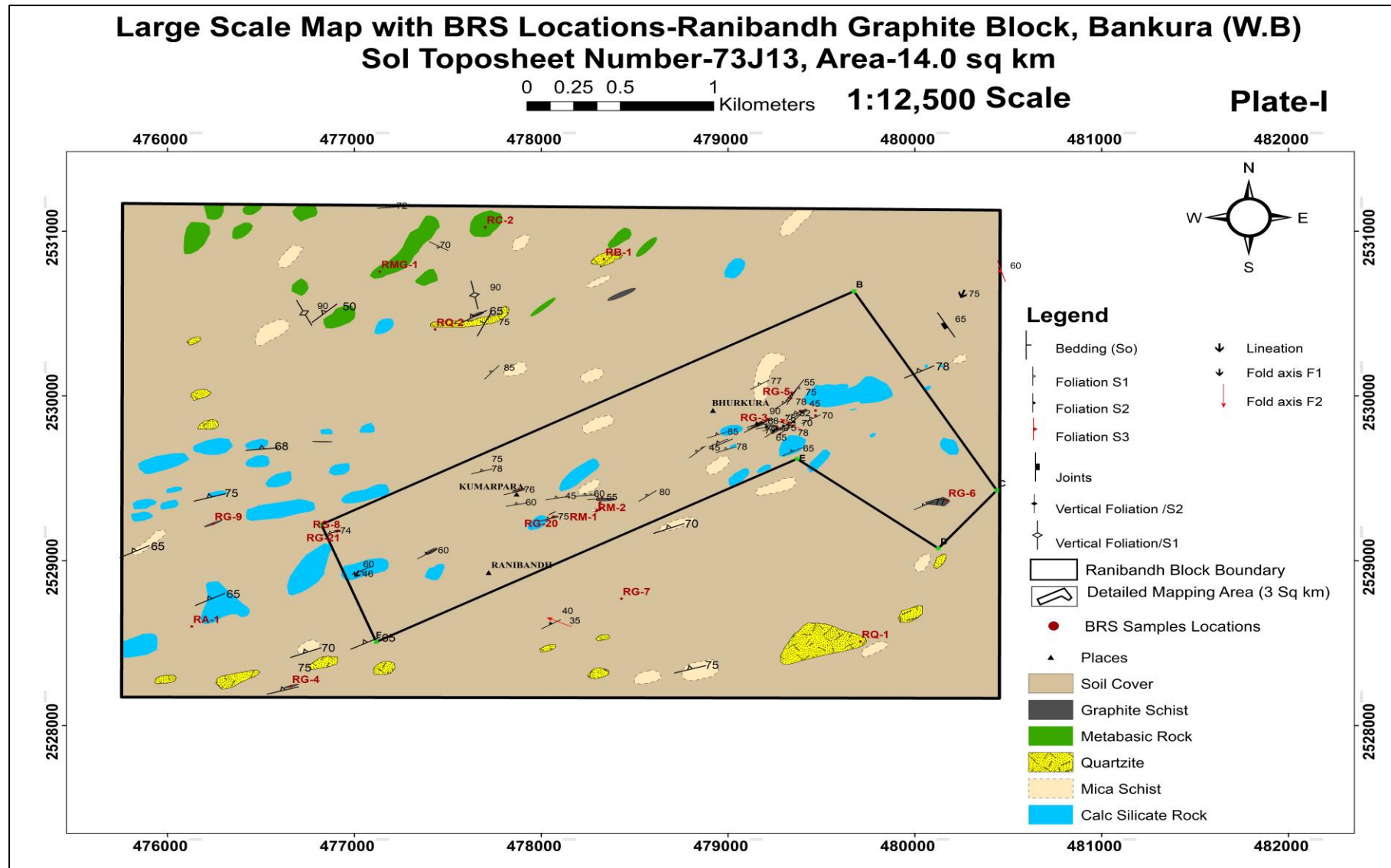


Plate-I Large Scale Map of Ranibandh Block on 1:12500 scale.

6.1.1.3 Description of the lithological units

Quartz mica schist/quartz sericite schist

A major part of the mapped area is occupied by the quartz mica schist of Chaibasa formation, found in various areas of the block, including Bhurkura, Ranibandh, and Kumarpara, Budhkhila being the dominant lithological unit in the block. In hand specimen, the rock is brownish to white, foliated and composed primarily of fine to medium grained biotite, muscovite and quartz \pm garnet. Schistosity is defined by flakes of muscovite biotite and prismatic quartz. The general trend of schistosity is E-W and NE-SW, with dip varying from 50° to 78° towards N or NW. Crenulations are also recorded in some locations. At some places, this lithounit is intruded by quartz veins of various dimensions

In thin section study, it is noted that the rock consists of biotite, muscovite and prismatic quartz grains aligned along penetrative foliation plane (schistosity).

Calc silicate rocks

Calc-silicate rocks are observed in the Bhurkura, Ranibandh, Kumarpara, Galla and Panijia areas, as discontinuous linear ridges or mounds within quartz mica schist of Chaibasa formation. These lithounits exhibit a NE–SW trend with dips ranging from 56° to 80° towards northwest. They are characterized by alternating compositional bands of carbonate and silicate minerals, producing ridge and furrow structure (ribbed weathering) due to differential weathering patterns. Small-scale folding is also evident within these bands. In hand specimens, the rocks are fine- to medium-grained, melanocratic, and exhibit moderate specific gravity. Sometimes it appears greenish grey to bluish in colour and displays prominent compositional layerings. The primary mineral constituents include quartz and plagioclase, interbanded with pyroxene (likely clinopyroxene) and carbonates. The presence of carbonates is confirmed by effervescence upon treatment with dilute hydrochloric acid. Microscopically, the rocks show distinct quartz-rich and augite-rich zones, confirming the banded nature observed in the field. Augite crystals appear as subhedral to anhedral grains.

Graphite bearing quartz mica schist/carbon phyllite

Graphite bearing schist has been observed in Bhurkura (Zone-A), Ranibandh near Ashram (Zone-B), Dhangagara, Kumarpara, Rajakata, near Budhkhila and other locations. In hand specimen, the graphite is opaque, dark grey to greyish black, fine-grained, with a sub-metallic lustre. It has a greasy feel and soils the hands. Graphite is present along the foliation of the rock and is disseminated throughout the mica schist/phyllite. The rock is composed of fine to medium grained, prismatic quartz, muscovite, biotite (in minor amounts) and graphite, with preferred orientation of flakes defining schistosity. The general foliation trend is E-W to NE-SW, with dip ranging from 45° to 78° towards N to NW. The strike of graphite band is E-W with 45°-60° dip almost towards north near Ashram area (Zone-B). The graphite is flaky to amorphous in nature, with thin quartz veins and ferruginous stains.

Quartzites

Quartzites are white, grey to buff, mainly composed of quartz and are observed near Kinaradanga and Budhkhila areas, with a general trend of bedding plane E-W to NE-SW. The dip varies from 45° to 50° towards the NW. Generally, the quartzite is massive, cherty or bedded in nature with a dimension from few to several metres.

Metabasic Rocks

These rocks are greenish and are found near Bhuinyasahi and Tamakhun areas. These are composed of medium-grained quartz, plagioclase, hornblende, with ferruginous inclusions. Few fibrous or bladed minerals, suspected to be actinolite-tremolite, are also present. These rocks are bouldery in nature and sometimes show crude foliation, and it has intrusive and concordant relation with the country rock quartz mica schist.

Quartz Veins

Quartz veins of varying dimensions, shapes, and orientations are observed within the quartz mica schist/quartz sericite schist. These veins are emplaced parallel to the schistosity (S_1) of the mica quartz schist.

Table 6.1.1.3.1 showing Litho-stratigraphic sequence based on field observation				
NSMB (North Singhbhum Mobile Belt	Age	Group	Formation	Lithology
			Intrusive	Quartz veins
	Palaeoproterozoic?	Singhbhum Group	Chaibasa formation?	Quartzite, metabasics, Calc silicate, Quartz mica schist, Graphite/Carbon bearing quartz mica schist



Fig.6.1 Field photographs showing (A). Quartz mica schist, (B). Quartz mica schist with quartz veins intruded along foliation plane, (C). Calc silicate (ridge & furrow structure) and (D). Calc silicate rocks (massive).



Fig.6.2 Field photographs showing (A). Graphite bearing mica schist at Bhurkura, (B) & (D). Graphite bearing mica schist within Quartz mica schist, (C) & (D). Exposed graphite mica schist at pond near Ranibandh Ashram, (E). Exposed graphite mica schist at Bhurkura Playground.



Fig.6.3 Field Photographs showing (A). Quartz mica schist at Kumarpara, (B). & (D). Quartzites, and (C) Metabasic rock.

6.1.1.4 Detailed Mapping on 1:4000 scale

Following large-scale mapping on 1:12,500 scale, a 3.0 square kilometre area was selected based on the occurrences of graphite-bearing litho-units within the block, and detailed mapping on 1:4,000 scale was conducted with DGPS Survey. DGPS was employed for contouring, fixing block boundary and data acquisition during geological mapping. The area of investigation is bounded by six cardinal points with the following coordinates:

A (22°52'14.363" N, 86°46'26.597" E), **B** (22°53'0.540" N, 86°48'6.577" E), **C** (22°52'21.284" N, 86°48'33.468" E), **D** (22°52'9.807" N, 86°48'22.519" E), **E** (22°52'27.457" N, 86°47'55.943" E), and **F** (22°51'51.210" N, 86°46'36.935" E). The designated area exposes rocks of Chaibasa formation of Singhbhum group. During the detailed mapping, lithologies like quartz mica Schist, calc silicate and graphite bearing quartz mica schist were mapped. The primary objective of the mapping was to identify and delineate the graphite-bearing zones along with the associated lithologies, and to establish the strike continuity and surface thickness (width) of the graphite bands.

6.1.1.5 Detailed Geological Map on 1:4000 scale

The Geological map consists of mappable lithological units of quartz mica (Muscovite-Biotite) schist, graphite/carbon bearing quartz mica schist, and calc- silicate rock.

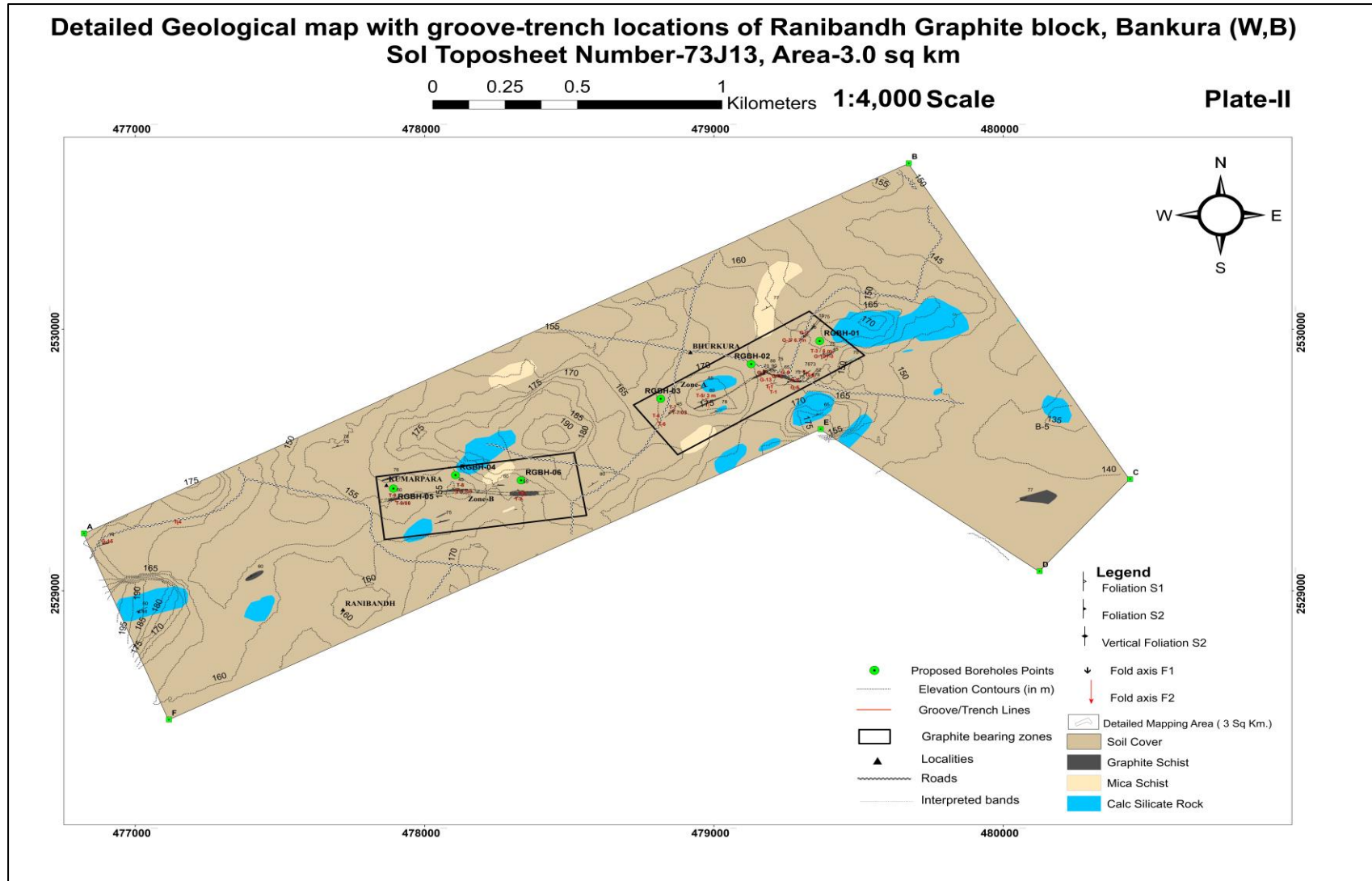
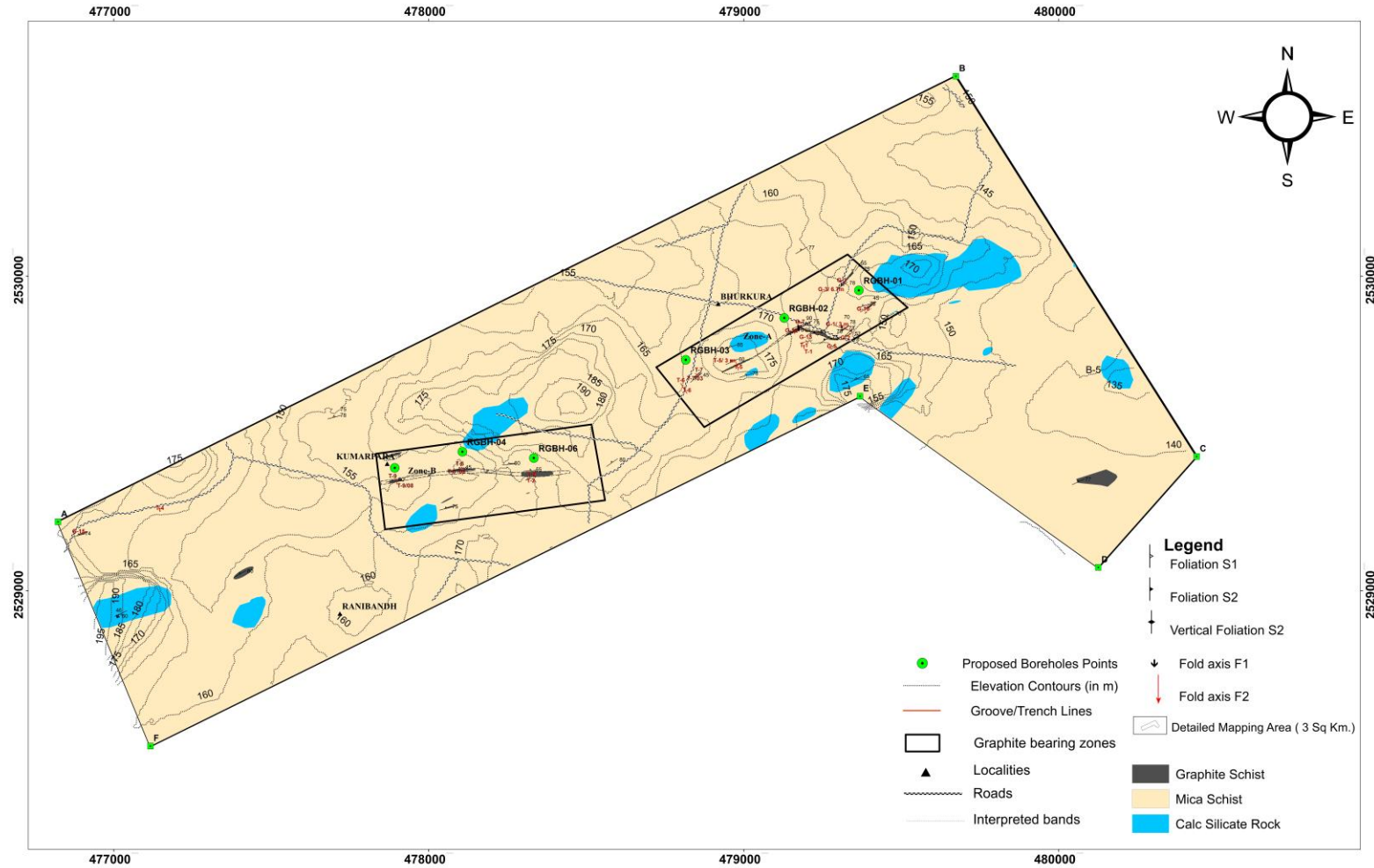


Plate-II Detailed Geological map with groove-trench locations of Ranibandh block, Bankura district, W.B.

**Interpreted Detailed Geological map with groove-trench locations of Ranibandh Graphite block, Bankura (W,B)
Sol Toposheet Number-73J13, Area-3.0 sq km**

0 0.25 0.5 1 Kilometers **1:4,000 Scale**

Plate-II A



6.1.1.6 Description of the lithological units (1:4000 Scale)

Graphite bearing quartz mica schist:

In Detailed Mapping area, Graphite bearing quartz mica schist is exposed near Bhurkura in playground and Rajakata. The general strike of the graphite bearing mica schist is NE-SW with dip ranging from 45°-78° towards northwest. After a gap of 500 m (along strike to the SW) an additional graphite bearing zone was observed near Ranibandh Ashram and in water tank, the strike of the graphite band changes to be E-W direction with dip ranging from 45°-60° towards north. Based on the occurrences of these graphite bearing bands, two zones were identified: **Zone A** (Bhurkura, Rajakata) and **Zone B** (near Ranibandh Ashram, Kumarpara). The strike length of the graphite band in **Zone A** is around 650 m (established with the help of surface exposures and grooves-trenches) with surface thickness ranging from 1.00-13.0 m whereas in **Zone B** the strike length of the graphite band is 600 m with 7 to 18 m surface thickness (established with the help of surface exposures and trenches). The cumulative strike length of the graphite band is **1.25 km** with thickness of individual band ranging from **1-18 m**.

Parameter	Zone-A (Bhurkura, Rajakata)	Zone-B (Ranibandh Ashram, Kumarpara)
Location	Bhurkura More, Rajakata	Ranibandh Ashram, water tank, Kumarpara
General trend	NE-SW	E-W
Dip direction & angle	45°-78° towards NW	45°-60° towards North
Strike length	~650 m	~600 m
Surface thickness	1.0-13.0 m	7.0-18.0 m

Quartz mica schist:

These rocks are greyish brown to silvery white and exposed in Bhurkura, Rajakata, Ranibandh near Ashram, Kumarpara, Neemdanga, along Ranibandh-Rudra Road and Tantipara. The litho unit is primarily composed of fine to medium grained, biotite, muscovite and quartz and show general strike of the foliation is varying from NE-SW to E-W, with a northerly dip ranging from 45° to 78°.

Calc silicate Rock:

Calc-silicate rocks within the area occur as linear, discontinuous patches that locally form small mound-like features. Exposures of these calc-silicate lithounits are observed near Ranibandh Ashram, Bhurkura (Chiladanga), Rajakata, and Kumarpara. Overall, these linear bodies trend NE–SW, consistent with the trend of country rock of the area. These rocks are typically bluish green to whitish grey and predominantly fine-grained. Due to differential weathering, they frequently display a characteristic ridge-and-furrow structure. Internally, these rocks show distinct compositional layering, comprising alternating quartz, plagioclase, and pyroxene-rich domains; however, in certain locations, these are massive.

6.1.1.7 Petrographic studies

General

Petrographic examination of thin sections from five surface bedrock samples and five core samples from the Ranibandh Graphite Block, Bankura District, West Bengal, reveals that these are predominantly composed of biotite, muscovite, quartz, graphite, and locally, calc-silicate components such as augite, quartz, and mica. The graphite-bearing samples display strong schistosity, defined by the planar alignment of platy minerals, characteristic of regional metamorphism in metasedimentary rocks. The objective of this study is to characterise the mineralogical and textural features of these thin sections and to understand the mode of graphite occurrence and associated metamorphic transformations.

Petrographic Observations

Thin section analysis indicates a lithological diversity, including biotite-muscovite-quartz schists with variable graphite and sulphide mineral content, as well as one distinctly calc-silicate rock. The schistose rocks are defined by schistosity formed through the alignment of muscovite and quartz, with quartz often showing mild stretching and deformation features. Graphite is commonly present in both fine flaky and cryptocrystalline forms, frequently concentrated along mica-rich bands and schistosity planes. In a few samples, the schistosity is overprinted by crenulation cleavage, suggesting a poly-phase deformational history.

Quartz in most sections appears as strained, stretched grains with undulose extinction, indicating dynamic recrystallisation. Lepidoblastic muscovite is the dominant phyllosilicate, with biotite subordinate and occasionally observed defining the schistosity fabric. In some core samples, coarse muscovite is aligned along crenulation planes stands in contrast to the finer muscovite-graphite-quartz assemblage that marks the earlier metamorphic fabric—pointing to overprinting by a later metamorphic phase.

Graphite, observed under transmitted and reflected light, occurs as opaque lepidoblastic grains when developed in flaky form, and xenoblastic when present in amorphous habit. The mineral shows golden-brown body colour under reflected light and marked anisotropy. It constitutes up to 35% modal abundance in certain schist samples and consistently aligns with the schistosity, supporting a syn- to pre-kinematic origin relative to later deformation phases. However, it should be mentioned that most of such thin sections were prepared from rock

portions containing graphite-rich bands and therefore may not fully represent the overall distribution of graphite within the entire sample.

Sulphide mineralisation, predominantly chalcopyrite and pyrrhotite, is noted in several sections. These opaque grains occur sparsely but are aligned along the schistosity, suggesting structurally controlled emplacement possibly associated with metamorphic or hydrothermal processes.

The calc-silicate rock, present among the core samples, is characterised by crudely alternating augite- and quartz-rich domains. The mineral identified as augite group of minerals appears as subidioblastic to xenoblastic grains, exhibiting inclined extinction, weak pleochroism from green-blue to yellow-brown, and second-order interference colours. The associated quartz shows undulose extinction, and the overall compositional banding corresponds with field-scale observations, including rib and furrow weathering and effervescence with dilute acid, confirming its identity as a metamorphosed calc-silicate lithology.

Collectively, the petrographic observations from these ten samples indicate a meta-sedimentary sequence subjected to polyphase deformation and metamorphism, with the development of graphite-rich schists and calc-silicate bands under lower greenschist to amphibolite facies metamorphic conditions.

The following observations are noted in the thin sections under Transmitted and Reflected Light:

Bedrock Samples

Thin Section: G-12

Rock Type: Graphite-bearing quartz-muscovite schist

The thin section G-12 (Fig. 1.a–d) is composed predominantly of fine-grained quartz and muscovite. The muscovite defines a well-developed schistosity, with the quartz grains appearing subidioblastic and elongate along the schistosity plane. Graphite occurs as fine to very fine flakes aligned along the schistosity, often concentrated in mica-rich bands. Under transmitted light, graphite appears opaque, while under reflected light it displays characteristic golden-brown pleochroism and anisotropy. Minute graphite aggregates in some regions

suggest zones of lower crystallinity. The overall mineral assemblage and textural features indicate a metamorphic origin under low- to medium-grade conditions and based on the modal abundance of the minerals; the rock can be named as graphite bearing muscovite quartz schist.

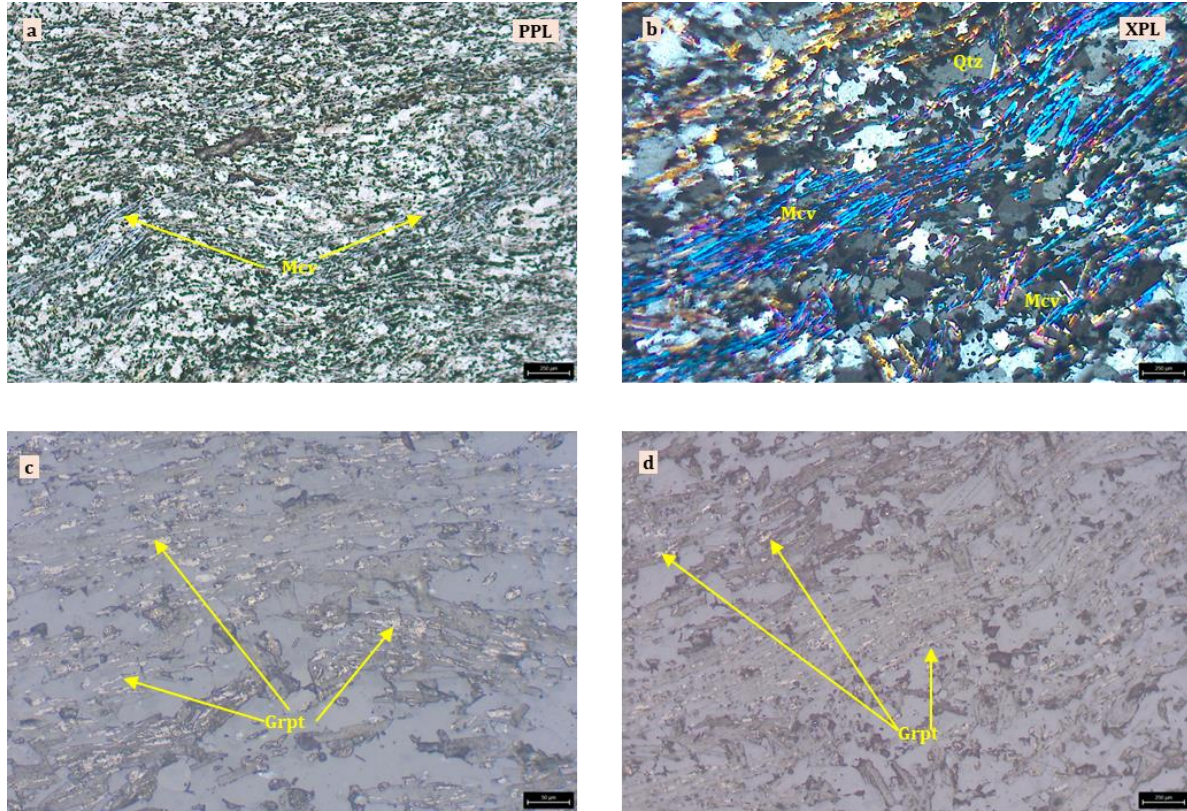


Fig. 6.4. Photo micrographs of thin section G-12 show (a) alignment of quartz and muscovite along schistosity under PPL; (b) same field under XPL highlighting elongate quartz grains; (c, d) fine flaky graphite observed under reflected light.

Thin Section: RC-2

Rock Type: Calc-silicate Rock

Thin section of sample RC-2 shows alternating quartz-rich and augite-rich domains, interpreted as compositional banding, consistent with mesoscopic field observations. Augite occurs in subidioblastic to xenoblastic grains, exhibiting about 45° inclined extinction, weak green-blue to yellow-brown pleochroism, and second-order interference colours, consistent with calcium-rich and iron bearing clinopyroxene composition observed during chemical analysis of the sample.

The examined mineral phases exhibit optical properties broadly comparable to diopside; however, chemical analysis reveals the presence of both Fe and Ca, suggesting a closer affinity to the augite group. Nevertheless, definitive confirmation of the mineral species was not possible, as the available sample quantity and reliance solely on optical microscopy impose limitations on precise mineral identification. Quartz is present as elongate, stretched grains showing undulose extinction.

On field observations shows rib-and-furrow weathering, a characteristic feature typically developed in lithologies containing alternating resistant and weathering-prone minerals. In this case, the calcium-bearing minerals are more susceptible to weathering, whereas the quartz-rich zones exhibit greater resistance. This observation is further substantiated by thin-section studies, which confirm the presence of quartz rich zones and clinopyroxene rich bands showing mineralogical banding, indicating that the sample represents a calc-silicate rock formed under high-temperature–pressure conditions.

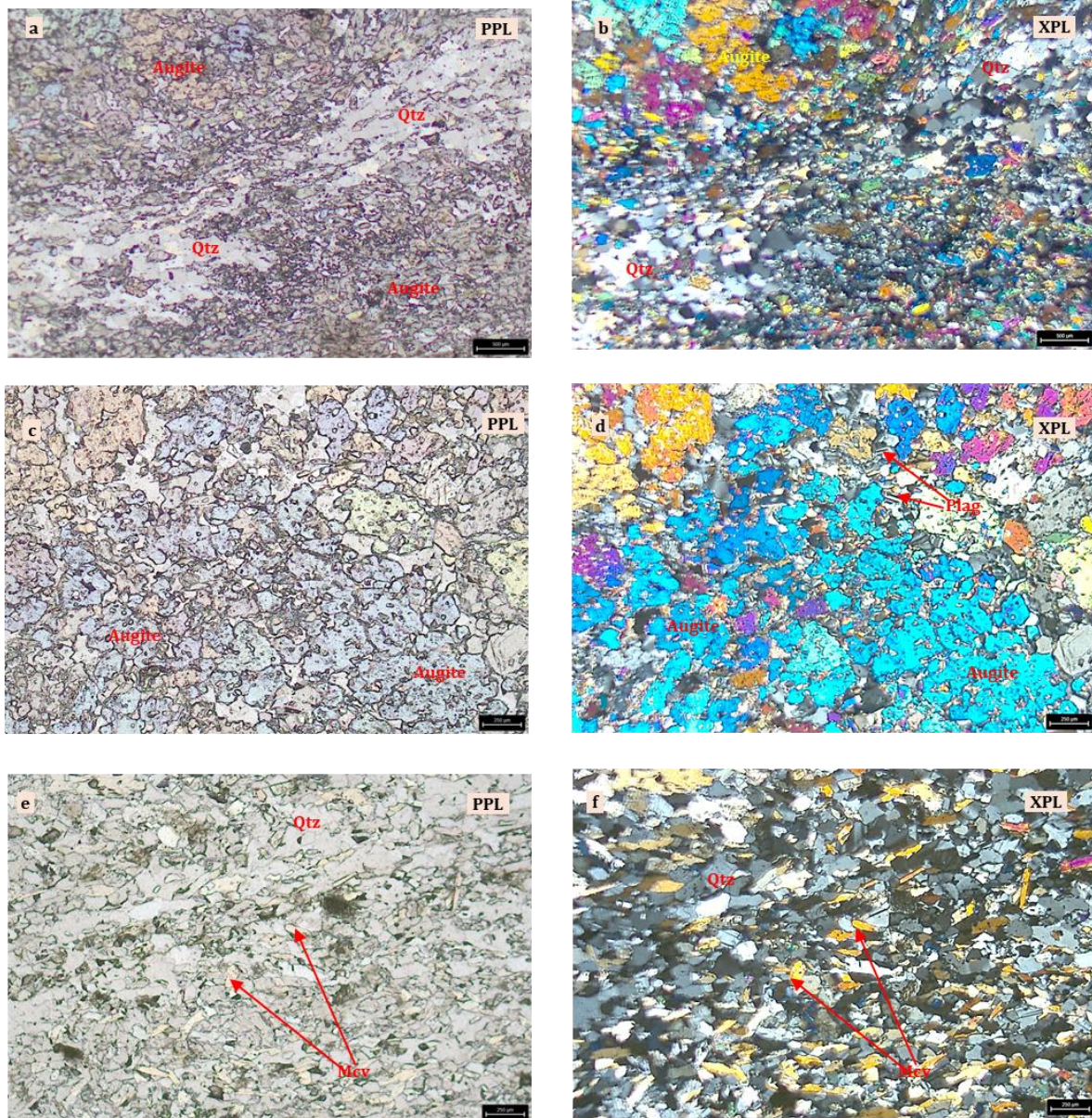


Fig. 6.5. Photo micrographs of thin section RC-2 show (a, c, e) quartz and augite assemblage with compositional banding under PPL; (b, d, f) corresponding XPL images showing inclined extinction and interference colours in augite.

Thin Section: RM-1

Rock Type: Quartz-biotite-muscovite schist

The thin section RM-1 (Fig. 6.6.a–d) consists predominantly of elongate quartz grains aligned along a penetrative schistosity. This schistosity is defined by the preferred orientation of muscovite and biotite, although no distinct compositional banding is observed. The quartz grains exhibit undulose extinction, indicating dynamic recrystallization and deformation. Muscovite and biotite are evenly distributed throughout the section, forming a well-foliated

fabric. Based on the mineral assemblage and texture, the sample is classified as a biotite-muscovite-quartz schist.

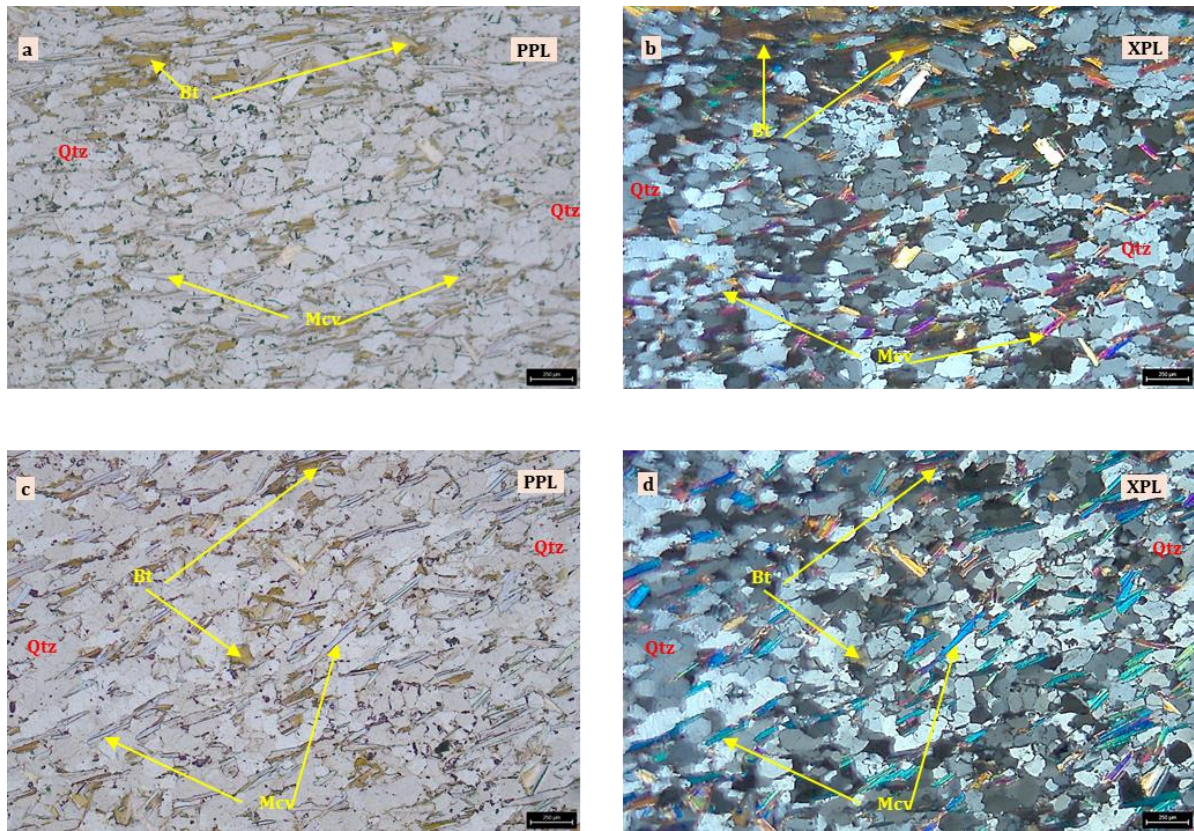


Fig. 6.6. Photo micrographs of thin section RM-1 show (a, c) well-aligned muscovite, biotite, and quartz defining schistosity under PPL; (b, d) corresponding XPL images highlighting undulose extinction in quartz and deformation textures.

Thin Section: T-2

Rock Type: Graphite-bearing biotite-muscovite schist

The thin section of sample T-2 (Fig. 6.7.a–f) exhibits two distinct domains. The first domain hosts fine-grained flaky graphite intergrown with muscovite and quartz, forming a well-developed schistosity. This schistosity has been overprinted by post-schistosity deformation, producing crenulation cleavage. The second domain comprises coarse muscovite grains oriented perpendicular to the earlier schistosity and aligned along the axial planar fabric of the crenulations. The graphite flakes, aligned with the crenulated fabric, suggest pre-kinematic crystallization relative to the crenulation-forming event. Sparse biotite is present as accessory. The mineralogy and structural features classify the rock as a graphite-bearing biotite-muscovite schist.

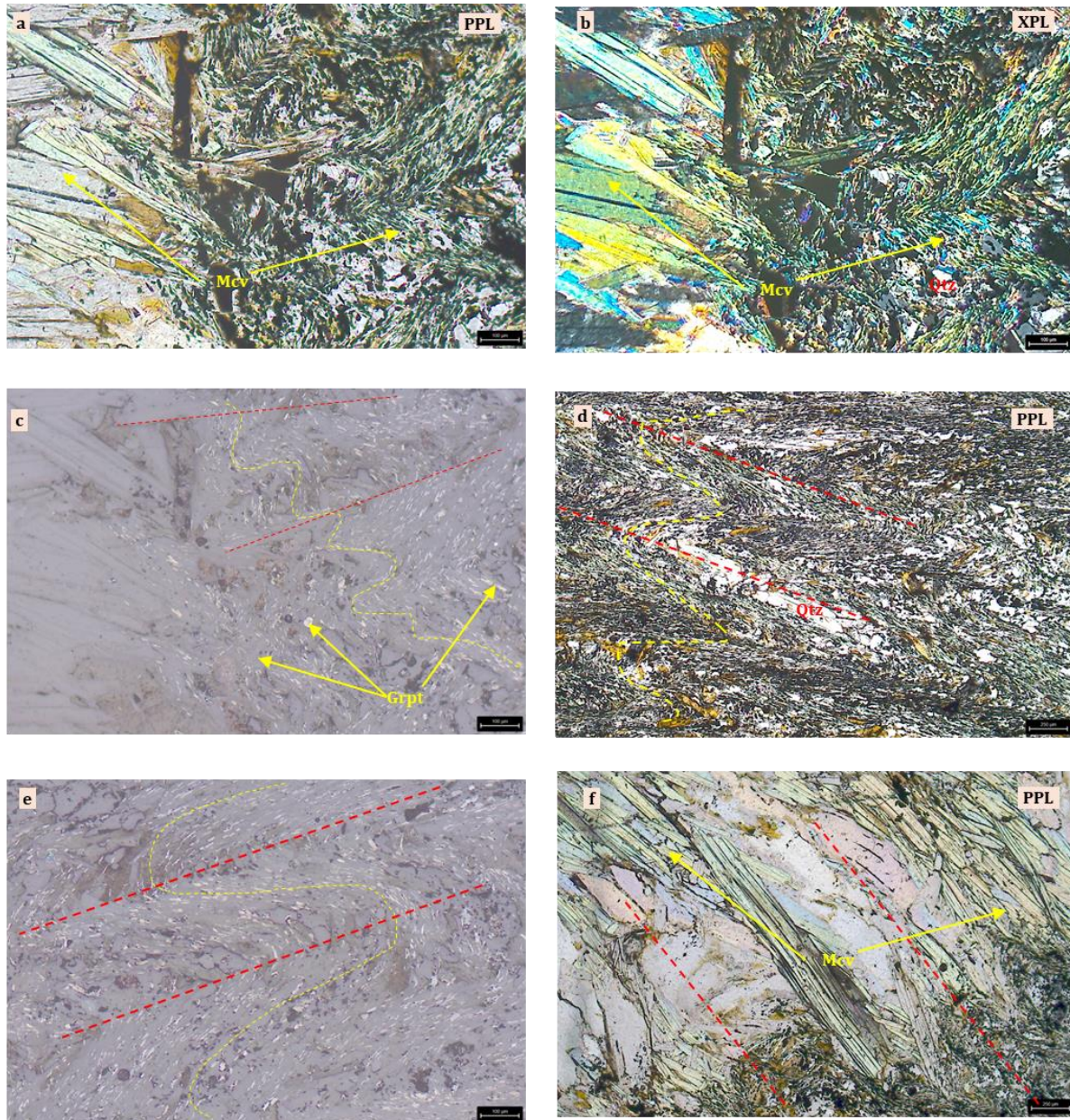


Fig. 6.7. Photo micrographs of thin section T-2 show (a, b, d & f) oriented quartz and muscovite with crenulation cleavage under PPL and XPL; (c & e) flaky graphite aligned along crenulated fabric under reflected light.

Thin Section: T-3

Rock **Type:** **Graphite-mica schist**

Thin section T-3/05 (Fig. 6.8. a–d) is composed primarily of muscovite and quartz, with graphite flakes prominently developed along the schistosity. The modal proportion of graphite is approximately 35%. Quartz grains are elongated along the schistosity plane and exhibit low relief and undulose extinction, indicative of deformation. Muscovite grains are fine to medium

in size. Lepidoblastic graphite flakes are well-formed, with flakes sizes upto 150 microns appear opaque in transmitted light and display golden-brown anisotropic nature under reflected light. These graphite flakes are oriented along the schistosity planes defined by the quartz and mica minerals. The mineral assemblage and textural relationships suggest a graphite-mica schist of low- to medium-grade metamorphic origin.

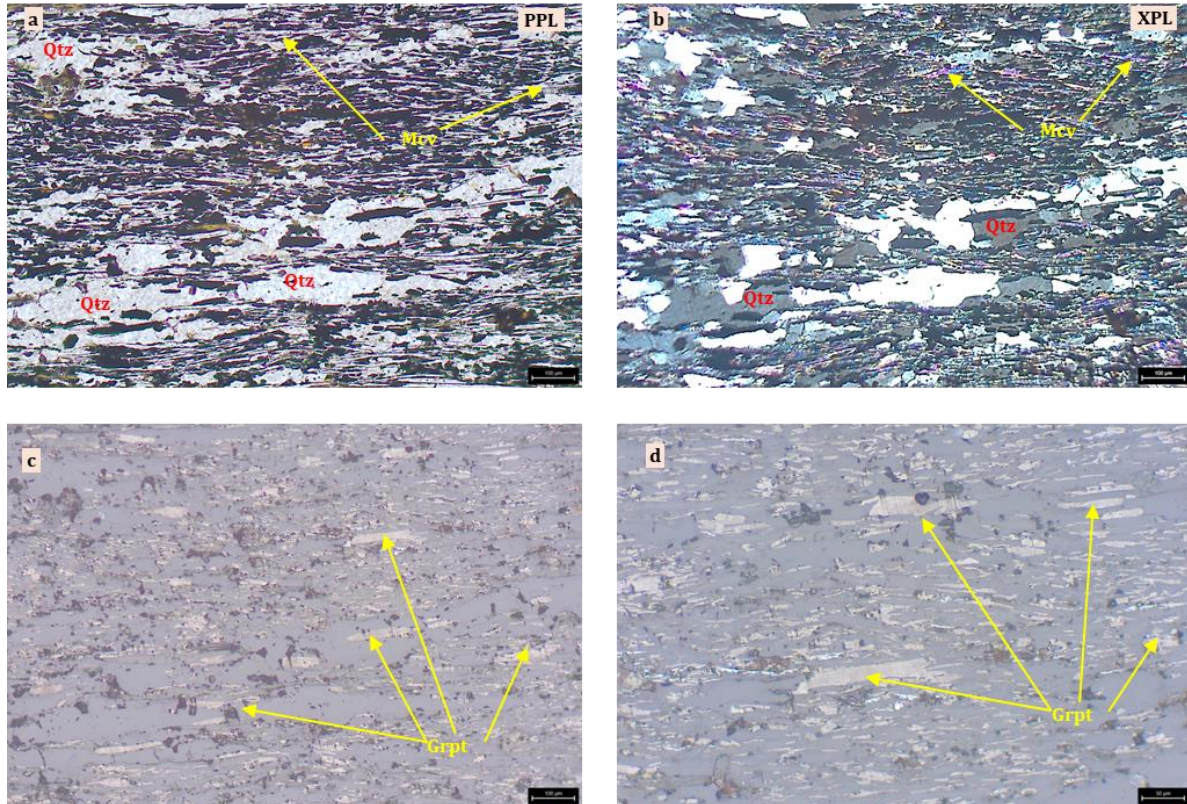


Fig. 6.8. Photo micrographs of thin section T-3 show (a, b) quartz and muscovite aligned along schistosity under PPL and XPL, with graphite flakes observed under reflected light (c, d).

Core Samples

Thin Section: RGBH/1B

Rock Type: Quartz-biotite-muscovite schist with graphite & sulphide mineralisation

The thin section RGBH/1B (Fig. 6.9 a–f) is composed primarily of biotite, muscovite, and quartz, displaying a well-developed schistosity. This fabric is defined by the preferred alignment of muscovite and biotite, while the quartz grains appear slightly elongated along the schistosity, indicating deformation under regional metamorphic conditions.

A notable feature of this sample is the visible presence of sulphide mineralisation concentrated along the schistosity planes. The opaque ore minerals under PPL are identified as chalcopyrite and pyrrhotite, based on their optical properties under reflected light. These minerals exhibit a

strong alignment with the schistose fabric, suggesting syn-kinematic introduction during metamorphism or early deformation phases.

In addition, graphite is observed in minor but significant quantities. It occurs as both fine flaky grains and cryptocrystalline patches, aligned along the schistosity, indicating a metamorphic origin. The association of graphite with mica further supports a structurally controlled concentration of these phases.

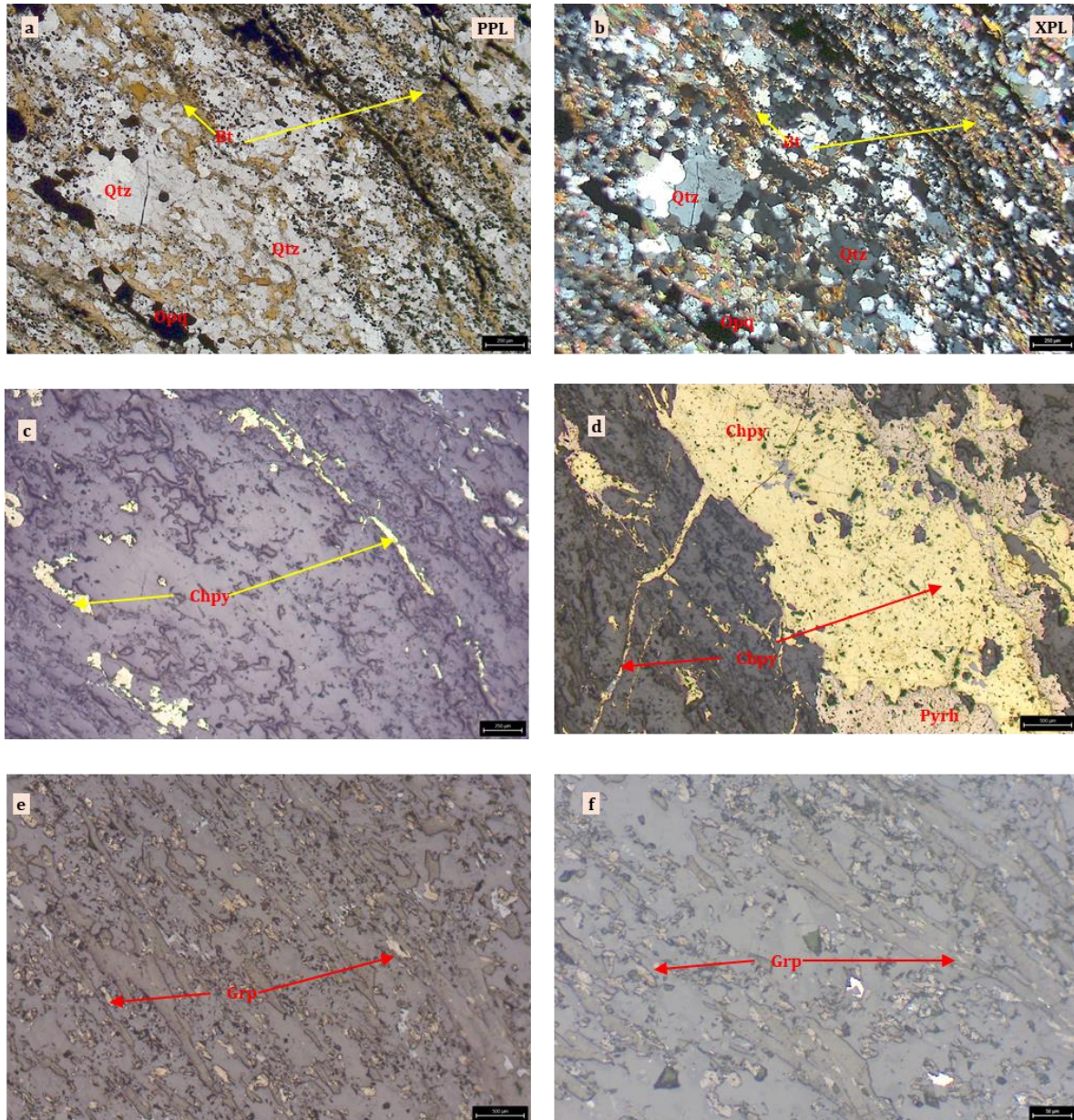


Fig. 6.9. Photo micrographs of thin section RGBH/1B show (a, b) schistosity defined by muscovite and biotite under PPL and XPL (c, d) sulphide minerals (chalcopyrite and pyrrhotite) aligned along schistosity under reflected light; (e, f) cryptocrystalline graphite and flaky graphite occurring along mineral alignment.

Thin Section: RGBH/2A**Rock Type: Graphite bearing biotite-muscovite-quartz schist**

The thin section RGBH/2A (Fig. 6.10.a–f) consists mainly of biotite, muscovite, and quartz, displaying a well-defined schistosity. The schistosity is prominently developed by the parallel alignment of muscovite and biotite, while quartz grains appear slightly elongated along the schistosity, indicating deformation under metamorphic conditions.

Minor sulphide mineralisation is observed within the section, primarily identified as chalcopyrite based on its optical characteristics under reflected light. The sulphides are sparsely distributed and occur in alignment with the schistosity, suggesting structural control during emplacement.

Graphite appears in two distinct forms: fine flaky grains and cryptocrystalline patches, both oriented along the schistosity. This alignment supports a metamorphic origin and possible syn-kinematic crystallisation of graphite during schistosity development.

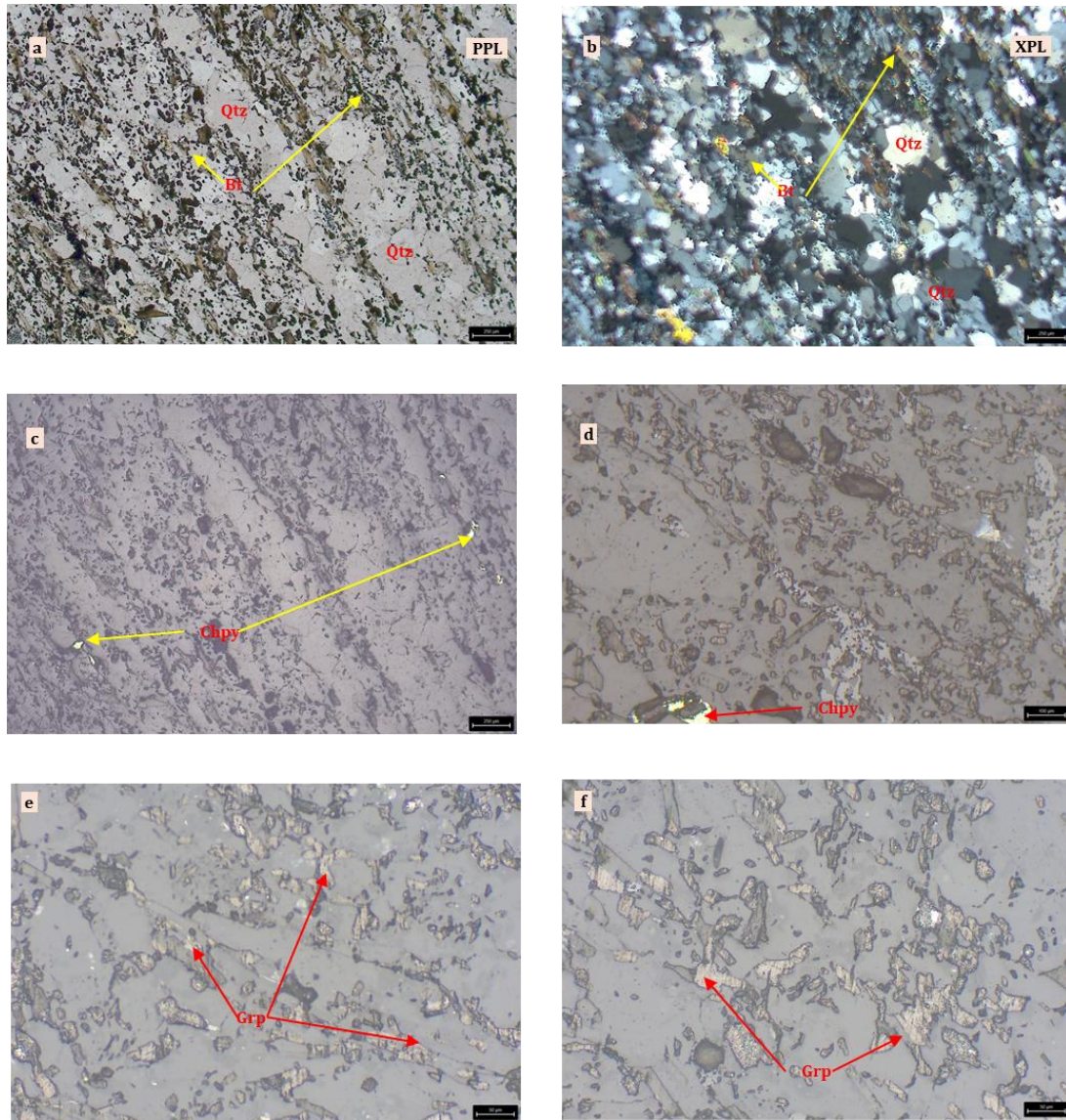


Fig. 6.10. Photo micrographs of thin section RGBH/2A show (a, b) schistosity defined by aligned biotite and muscovite (c, d) chalcopyrite grains under reflected light; (e, f) fine flaky and cryptocrystalline graphite along schistosity.

Thin Section: RGBH/2B

Rock Type: Quartz-biotite-muscovite schist

Thin section RGBH/2B (Fig. 6.11.a–d) represents a strongly foliated quartz-biotite-muscovite schist, where the schistosity is more distinct than in the previous samples. The alignment of platy minerals, muscovite and biotite, imparts a well-developed planar fabric across the thin section. The quartz grains, though subordinate in volume, appear elongated and show evidence

of strain parallel to the schistosity direction, indicating deformation under directed pressure during metamorphism.

Minor sulphide mineralisation is also evident, with chalcopyrite occurring in isolated clusters aligned along the schistosity. These opaque grains are distinguishable under reflected light and are likely of metamorphic or syn-deformational origin. Sparse occurrences of graphite are observed, manifested both as fine flaky grains and cryptocrystalline aggregates. These are consistently oriented along the schistosity planes, indicating a metamorphic recrystallisation of carbon material, possibly enhanced by deformation.

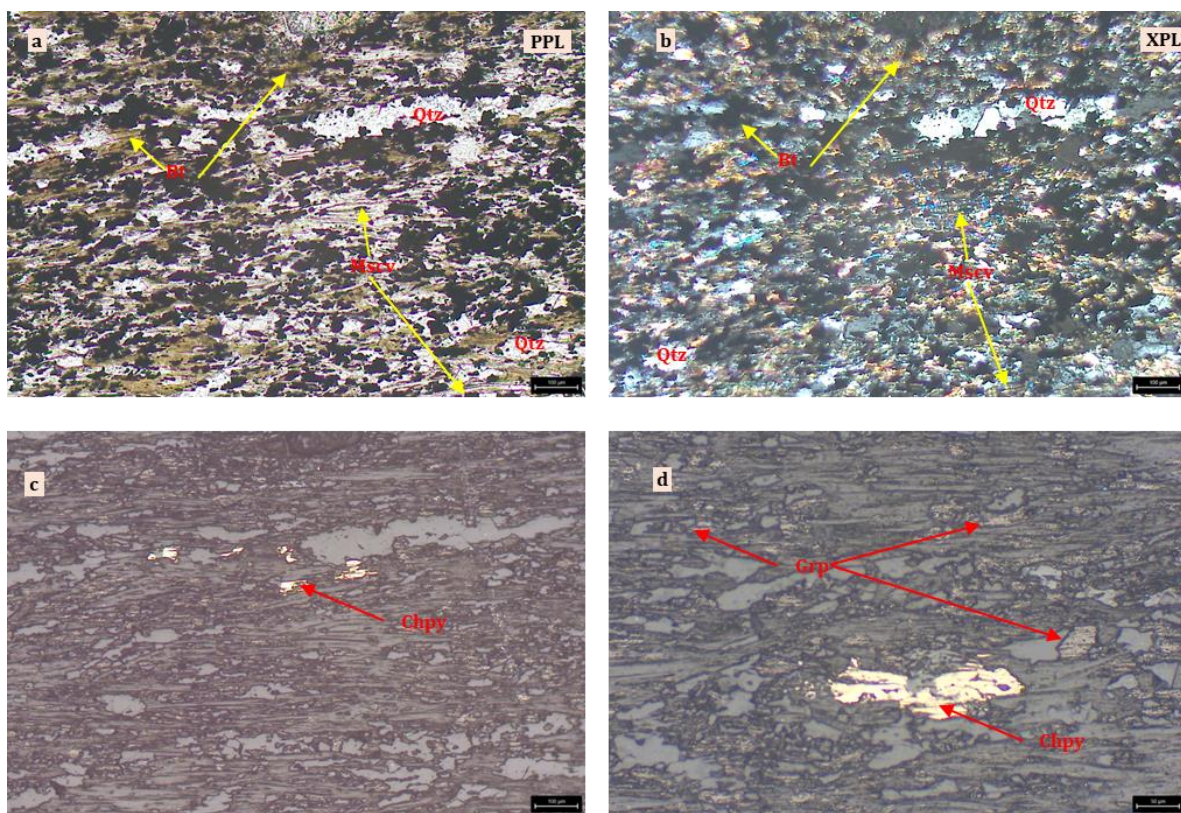


Fig. 6.11. Photo micrographs of thin section RGBH/2B show (a) well-developed schistosity defined by biotite and muscovite under PPL (b) under XPL; (c, d) Chalcopyrite grains and graphite flakes and cryptocrystalline patches along the schistosity.

Thin Section: RGBH/3A

Rock Type: Fine-grained Quartz-biotite-muscovite schist

The thin section RGBH/3A (Fig. 6.12.a–d) is composed predominantly of fine-grained muscovite, quartz, and lesser amounts of biotite, with occasional presence of plagioclase and

traces of pyroxene. The rock is distinctly fine-textured, which makes mineral boundaries less distinct in places. Quartz grains appear subidioblastic and interspersed with microcrystalline muscovite that doesn't show any mineral orientation or schistosity. Plagioclase appears in subordinate amounts and is sometimes altered. Pyroxene grains are present in trace amounts, as subidioblastic. Opaque minerals are extremely scarce in this section. The fine-grained nature of the rock, combined with its mineral assemblage and foliated structure, suggests it represents a metamorphosed rock, possibly at the greenschist facies boundary, where deformation and recrystallisation are evident but coarser minerals have not developed.

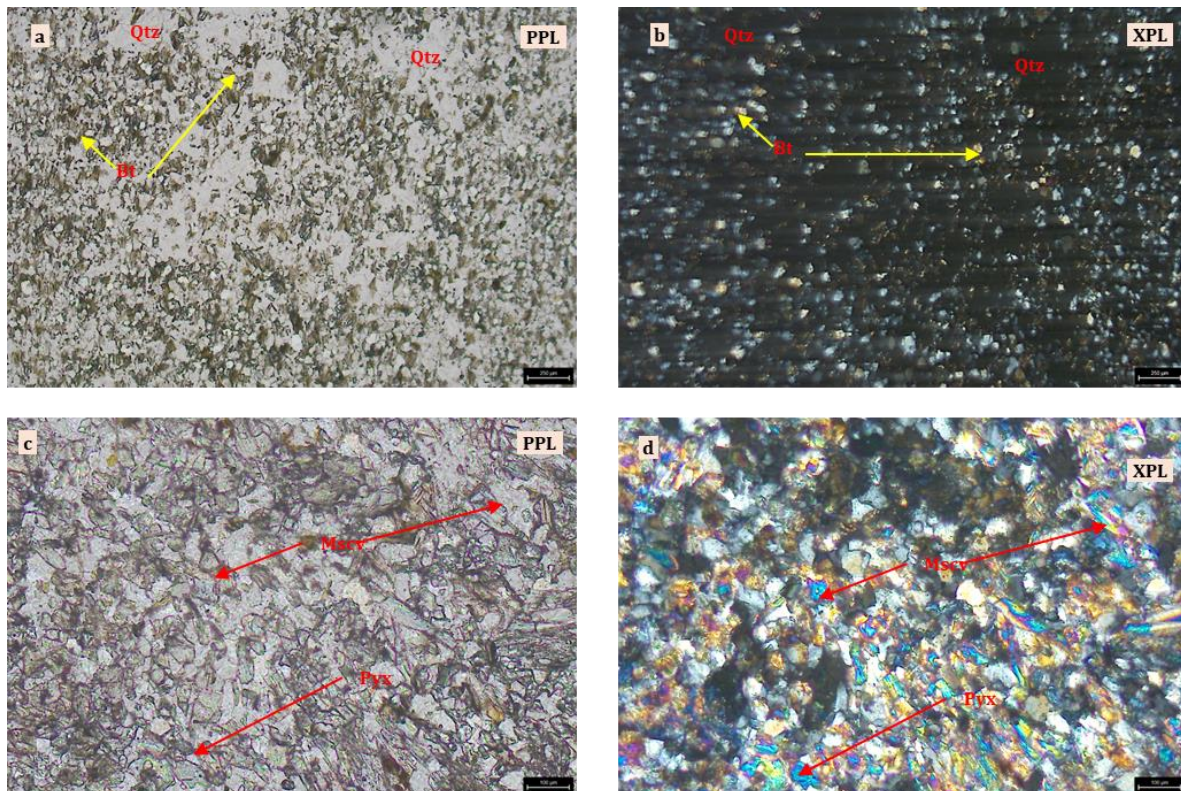


Fig. 6.12. Photo micrographs of thin section RGBH/3A show (a) compact alignment of fine muscovite and quartz under PPL; (b) elongate quartz and rare feldspar under XPL; (c) isolated pyroxene grain; (d) fine fabric lacking significant opaques.

Thin Section: RGBH/3B

Rock Type: Calc-silicate Rock

Thin section RGBH/3B (Fig. 6.13.a–f) displays a crudely developed compositional banding of quartz-rich and clinopyroxene-rich domains. This textural feature aligns with field-scale observations of banding and suggests metamorphic differentiation. Augite is present as

subidioblastic to xenoblastic grains, displaying $\sim 45^\circ$ inclined extinction, weak green-blue to yellow-brown pleochroism, and second-order interference colours. These optical features, together with the chemical analysis indicating a calcium-rich and iron-bearing clinopyroxene composition, confirm the mineral identification as augite.

Quartz is abundant and typically occurs as strained, elongate grains with undulose extinction, indicating post-crystallisation deformation. The augite and quartz layers alternate irregularly, contributing to a medium to coarse but recognizable metamorphic banding.

In hand specimen and field tests, the sample also showed effervescence with dilute hydrochloric acid, indicating the potential presence of minor carbonate phases. However, Calcites were not observed under microscope. This might be due to presence of carbonate minerals as micro veins which were not captured during preparation of thin section. These features, coupled with the mineralogical assemblage and high-temperature indicators, confirm the sample as a metamorphosed calc-silicate rock.

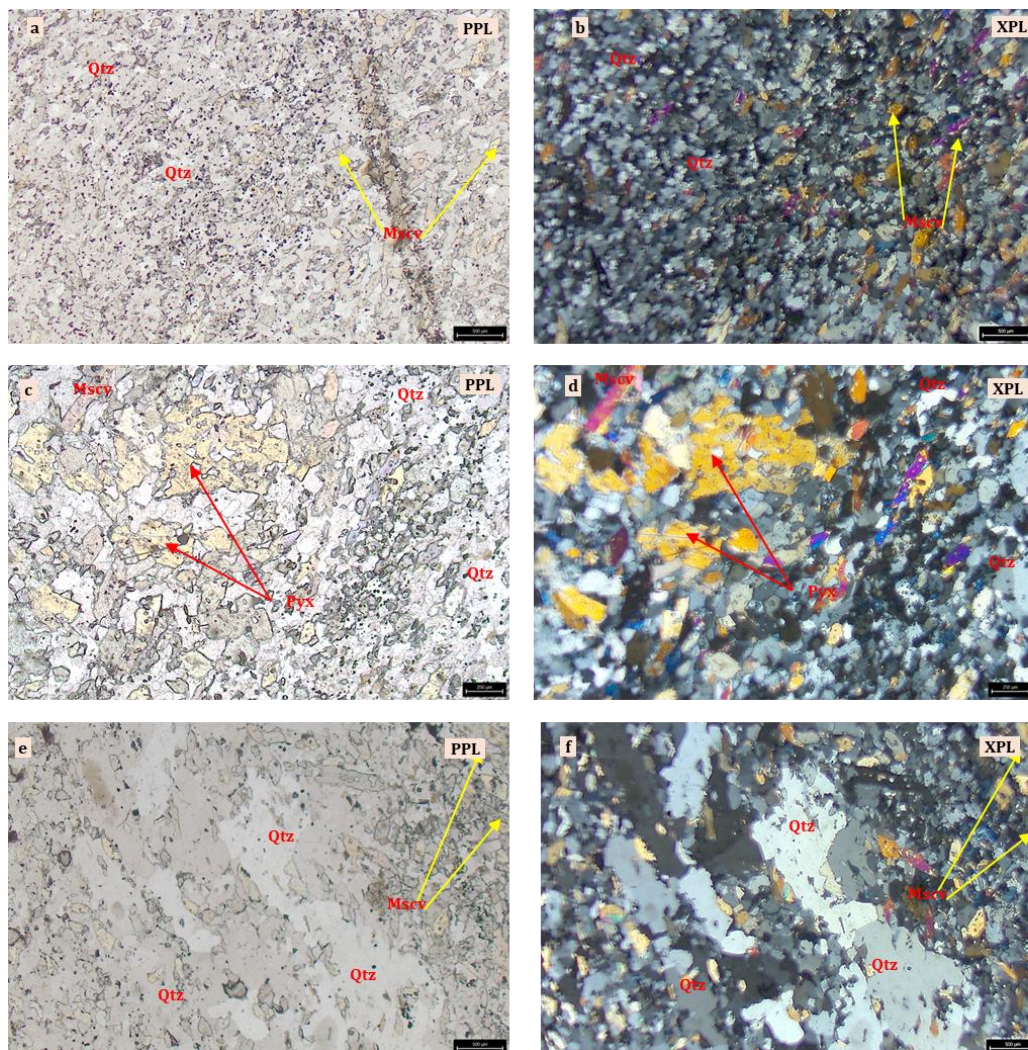


Fig. 6.13. Photo micrographs of thin section RGBH/3B show (a, b, c, d, e, f) alternating quartz- and augite-rich layers under PPL; (b, c) shows augite grains with $\sim 45^\circ$ inclined extinction and 2nd order interference colours under XPL, (e, f) shows elongated quartz grain in the silica dominated zones.

Mineralogy

1. Quartz (SiO_2):

Under transmitted light, Quartz is colourless in PPL, showing very low relief and no pleochroism. It has no cleavage but often exhibits undulose extinction under XPL due to strain effects. Interference colours are in the first order (grey to white).

2. Muscovite ($\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$):

Under transmitted light, Muscovite is colourless in PPL with low relief and shows no pleochroism. It displays perfect basal cleavage, visible as lepidoblastic flakes. Under XPL, muscovite shows high-order interference colours (2nd to 3rd order, often pastel). Extinction is parallel.

3. Biotite ($\text{K}(\text{Mg,Fe})_3(\text{AlSi}_3\text{O}_{10})(\text{F,OH})_2$):

Under transmitted light, Biotite shows strong pleochroism in PPL, ranging from brown to greenish brown and yellow. It shows perfect basal cleavage. Under XPL, biotite exhibits oblique extinction and higher-order interference colours (2nd to 3rd order) but mostly masked by its bodycolour.

4. Graphite (C):

Under transmitted light graphite appears opaque while under golden-brown body colour under reflected light. It is highly anisotropic in nature. It occurs as lepidoblastic grains when occurring as flakes and xenoblastic for cryptocrystalline graphite.

5. Chalcopyrite (CuFeS_2):

Under reflected light, Chalcopyrite is brassy yellow in colour with a metallic lustre. It shows moderate anisotropy with yellow to brownish tints under rotation. It has slightly lower reflectance than pyrite and may show faint internal reflections.

6. Pyrrhotite (Fe_{1-x}S):

Under reflected light, Pyrrhotite appears bronze to brown with a metallic lustre. It exhibits strong anisotropy, with pinkish–brown to grey colour changes. It has weak bireflectance and is softer than pyrite.

7. Clinopyroxene – Augite ($(\text{Ca},\text{Na})(\text{Mg},\text{Fe},\text{Al},\text{Ti})(\text{Si},\text{Al})_2\text{O}_6$):

Under transmitted light, Augite shows pale green-blue to yellow-brown weak to moderate pleochroism in PPL, showing moderate to high relief. It displays distinct cleavages intersecting at $\sim 87^\circ$ and 93° in some sections and under XPL, it shows inclined extinction (up to 45°) with 2nd order interference colours.

Conclusion

The petrographic study of surface and core samples from the Ranibandh Graphite Block has revealed a complex metamorphic terrain characterised by a diverse suite of graphite-bearing schists and calc-silicate rocks. The thin section analyses highlight a dominant lithology of quartz-biotite-muscovite schist with varying degrees of graphite and sulphide mineralisation, accompanied by occasional calc-silicate bands composed of augite and quartz. The presence of strong schistosity, crenulation cleavage, and strained quartz grains indicates a poly-deformational and poly-metamorphic history, with evidence for overprinting metamorphic events.

Graphite occurs both as fine flakes and cryptocrystalline aggregates, consistently aligned along schistosity planes, suggesting syn- to pre-kinematic crystallisation during regional metamorphism. Sulphide phases, chiefly chalcopyrite and pyrrhotite, appear structurally controlled, supporting a metamorphic or hydrothermal emplacement. The calc-silicate rocks, with alternating pyroxene- and quartz-rich bands and deformation features, further corroborate high-temperature metamorphic conditions.

Collectively, these observations shows that the rocks in the block have undergone medium- to high-grade metamorphism and structural reworking. The structurally aligned graphite and sulphide minerals, coupled with the consistent mineral assemblages, affirm a favourable geological environment for graphite concentration—guided both by lithological composition and deformational architecture.

6.1.1.8 Petrochemical studies

Table No. 6.1.1.8.1 Petrochemical analytical results of petrographic thin section samples																			
S.N o.	Sample Id	Meth od	SOP/OM/105																SOP/OM /103
		LOQ	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.1
		Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
		Lab ID	Al2 O3	Ba O	Ca O	Cr2 O3	Fe (T)	Fe2 O3	K2 O	Mg O	Mn O	Na2 O	P2 O5	SO 3	Ti O2	SiO 2	Sr O	V2 O5	LOI
1	RGBH-01 B	G173 1-1	11.09	<0.05	1.44	0.06	5.47	7.83	3.85	1.95	<0.05	0.64	0.09	4.20	0.49	60.06	<0.05	<0.05	7.72
2	RGBH-02 A	G173 1-2	9.76	0.11	4.86	<0.05	4.45	6.36	4.14	5.07	0.36	<0.08	0.19	<0.05	0.46	65.59	<0.05	<0.05	2.91
3	RGBH-02 B	G173 1-3	13.31	<0.05	0.21	0.05	5.50	7.87	4.58	2.52	<0.05	<0.08	0.07	<0.05	0.64	55.79	<0.05	0.06	14.50
4	RGBH-03 A	G173 1-4	13.57	0.29	0.58	0.06	2.92	4.18	9.64	1.76	<0.05	0.15	0.07	<0.05	0.62	58.89	<0.05	0.05	10.00
5	RGBH-03 B	G173 1-5	6.98	0.10	9.18	<0.05	3.45	4.93	2.83	6.25	0.16	<0.08	0.13	<0.05	0.33	65.65	<0.05	<0.05	3.28
6	T-2/7	G174 2-1	13.96	<0.05	<0.05	<0.05	1.62	2.31	4.71	1.32	<0.05	<0.08	<0.05	<0.05	0.62	64.57	<0.05	0.08	12.14
7	T-3/5	G174 2-2	13.35	<0.05	<0.05	0.05	1.42	2.04	4.60	0.95	<0.05	<0.08	0.05	<0.05	0.59	68.13	<0.05	<0.05	9.98
8	G-12/4	G174 2-3	12.41	<0.05	<0.05	<0.05	2.32	3.32	4.31	1.24	<0.05	<0.08	<0.05	<0.05	0.62	68.24	<0.05	<0.05	9.53
9	RC-2	G933 4-8	4.36	0.06	6.96	0.07		3.52	1.71	4.73	0.20	0.08	0.18	<0.05	0.21	76.72	<0.05	<0.05	1.15
10	RM-1	G933 4-3	14.99	0.14	0.86	<0.05		4.03	3.50	2.67	0.23	1.26	0.05	<0.05	0.37	68.33	<0.05	<0.05	3.44

6.1.2 Structure

The area exhibits both primary as well as secondary structures as follows.

6.1.2.1 Primary structures

Bedding plane (S_0)

Bedding or stratification (S_0) is the important primary planar structure preserved in quartzite/sericite quartzite of the study area otherwise later deformation and metamorphism has greatly modified and obliterated the primary fabric.

6.1.2.2 Secondary (Planar) structures

The present area of the study shows evidence of deformation on microscopic to megascopic scales.

Schistosity(S_1)

Schistosity(S_1) is the most prominent planar structure observed in the study area, especially well-developed in lithologies such as quartz-mica schist and graphite-bearing schist/carbonaceous phyllite. It is defined by the parallel alignment of micaceous minerals and strained quartz. This foliation, developed during the first phase of deformation (D_1), presently it is broadly parallel to the primary bedding (S_0) and developed with F_1 folds, which are presently recorded as isoclinal of rootless nature.

In Zone-A, the S_1 foliation trends NE–SW with dips ranging from 45° to 78° towards the northwest. In Zone-B, the trend shifts to E–W with dips between 45° and 60° towards the north.

Gneissosity (S_1) / Compositional banding

Crude Compositional banding is prominent within the calc-silicate lithounits occurring as discontinuous, thin elongated ridges within the quartz mica schist of the Chaibasa Formation. The trend of banding is NE–SW, with dip ranging from 56° to 80° towards north to northwest. Compositional banding is marked by alternating layers of carbonate and silicate minerals, primarily quartz, plagioclase, pyroxene (augite) and carbonates (**Fig.6.5/Fig.6.15**).

Crenulation cleavage (S_2)

They are restricted to graphite schist and are best developed around Bhurkura area. The development of cleavage is attributed to micro folding of mica layers (**Fig.6.7 c & e/ Fig.6.14**). They are mostly sub horizontal or moderately to steeply dipping from 45° to 75° north-westerly. These features are associated with deformation phase D_2 .

Fold

The mapped area exhibits signatures of two phases of deformation, as interpreted from folds developed within detached rock unit of calc-silicates, quartz mica/sericite schist and graphite bearing schist. The first phase (D_1) is characterized by the development of open, tight isoclinal, rootless, and intrafolial folds, indicating high strain conditions during early regional metamorphism. The second phase of deformation (D_2) is marked by the overprinting of earlier structures, resulting in tight isoclinal folds (disharmonic in nature) in quartz sericite schist and parasitic folds in calc-silicates and prominent crenulations formed over schistosity (Fig.6.7 c & e). These fold patterns collectively point towards at least two deformational histories, with F_2 folds superimposed over earlier F_1 folds in this area.

Other structures:

This includes boudinage of quartz veins and pinch and swell structure observed in NE part of the block and recorded in quartz sericite schist.

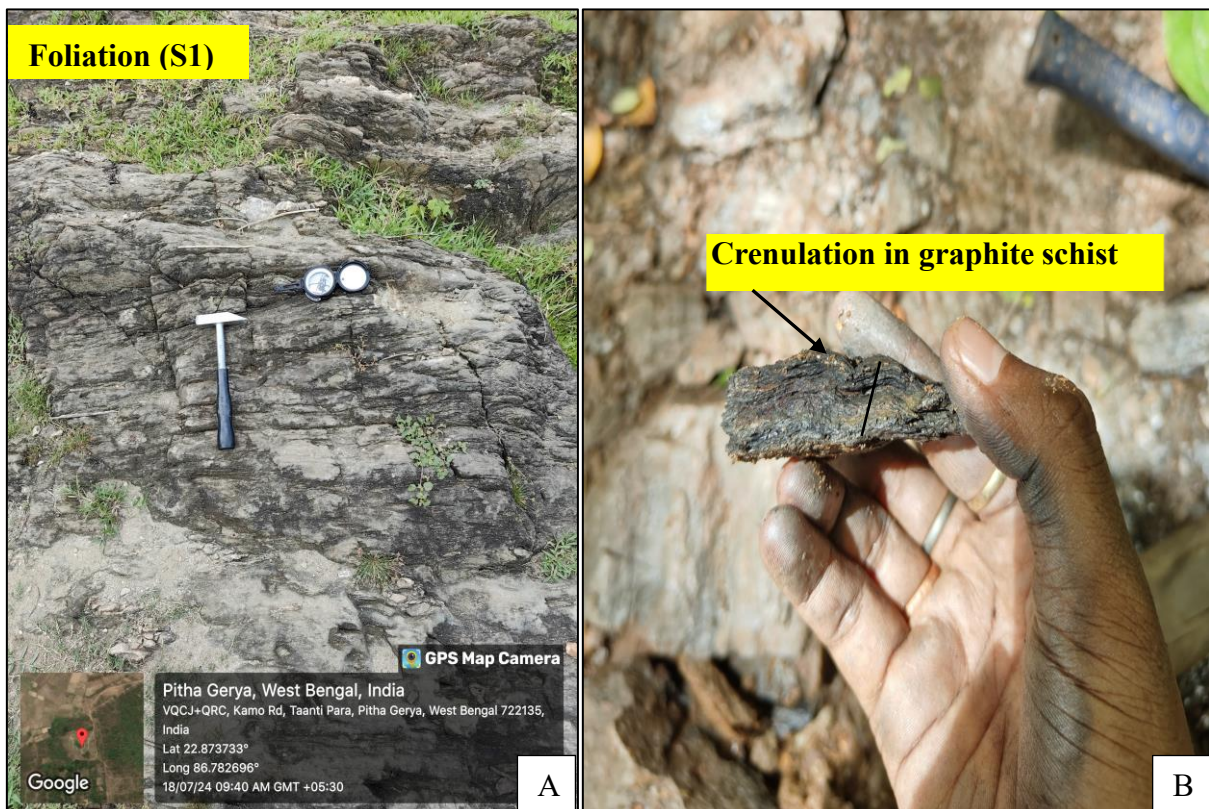


Fig.6.14 Field photographs showing A. Schistosity in quartz mica schist, B. Crenulation cleavage in graphite bearing quartz mica schist.



Fig.6.15 Field photographs showing A. Isoclinal fold in calc silicate boulder, B. Open fold in graphite bearing quartz mica schist, C. Parasitic fold on boulder of calc silicate.

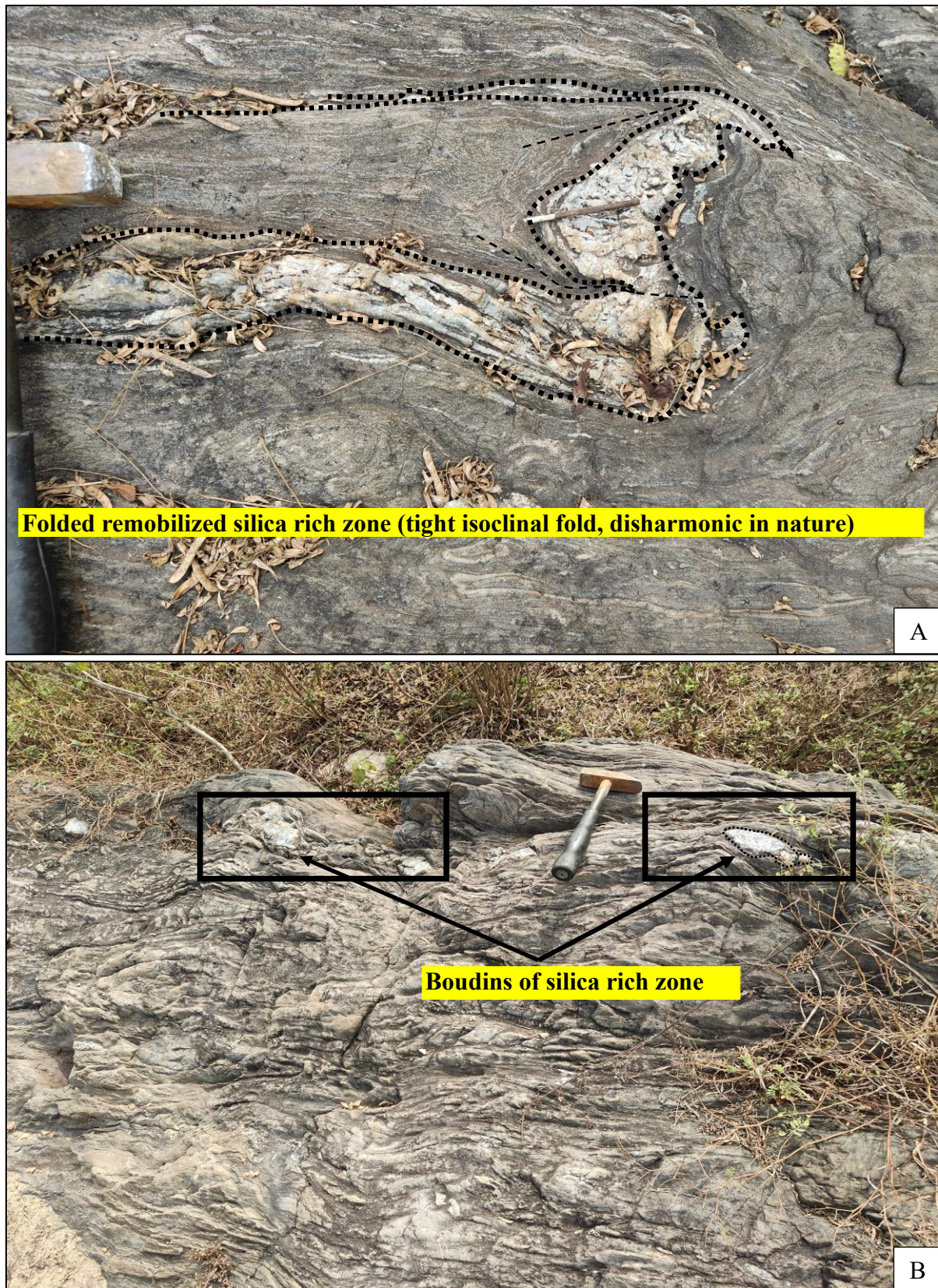


Fig.6.16 Field photographs showing A. Folded remobilized silica rich zone (isoclinal fold disharmonic in nature) in quartz sericite schist, B. Boudins of silica rich zone in quartz sericite schist.

6.1.3 Metamorphism

Based on the study of thin sections and rock samples for the lithounits exposed in the area, following mineralogical assemblages can be ascertained-

1. Quartz mica schist /Quartz sericite schist are composed of

Biotite + Muscovite + Quartz \pm Plagioclase \pm Garnet \pm Sericite (Field +thin section)

2. Graphite/Carbon bearing mica schist/Carbonaceous Phyllite are composed of

Quartz \pm Biotite + Muscovite + Graphite/Carbonaceous matter (opaque) \pm Chalcopyrite \pm pyrrhotite (Thin section)

3. Calc silicates/Calc-gneiss

Quartz \pm Plagioclase + Augite \pm Carbonates (Field +thin section)

4. Quartzites

Quartz \pm Mica (Field observations)

5. Metabasic Rocks

Quartz \pm Plagioclase + Hornblende \pm Actinolite \pm Tremolite (Field observation)

The quartz mica schist/quartz sericite schist with biotite, muscovite, plagioclase, and \pm garnet indicate medium to upper greenschist to lower amphibolite facies metamorphism. Graphite-bearing schist and carbonaceous phyllite, with carbonaceous matter and sulphides, also reflect greenschist to lower amphibolite facies, typical of regional metamorphism. Quartzites with quartz, \pm biotite, and \pm muscovite suggests greenschist facies metamorphism marked by recrystallization of quartz and minor mica growth. The calc-silicates/calc-gneiss, containing quartz, plagioclase, and augite, represent amphibolite facies metamorphism, typically derived from calcareous sedimentary rocks subjected to medium to high-grade metamorphism. Lastly, the Metabasic rocks, marked by the presence of hornblende, actinolite, tremolite, quartz, and plagioclase, suggest greenschist to amphibolite facies conditions.

Different mineral assemblages enumerated above indicate the rock of this area suffered a greenschist to lower amphibolite facies of metamorphism.

6.1.4 Mineralogy of ore zones and ore texture

In Ranibandh, graphite occurs as fine to medium flakes within graphite-bearing quartz mica schist. The ore zone comprises biotite, muscovite, quartz with minor sulphides such as pyrite & chalcopyrite. The surrounding country rock is schist composed of biotite, muscovite and quartz \pm garnet. Graphite flakes are aligned along foliation planes and scattered within the quartz-mica-biotite matrix.

6.1.5 Trenching

6.1.5.1 Trenching

Trench is a three-dimensional excavation which is placed based on geological and geophysical data collected from the detailed mapped area, in order to check the existence of the ore body, its extension and the actual orientation near surface just below soil cover.

6.1.5.2 Methodology employed at Ranibandh block,

The following steps were followed for placing trenches in the ore-bearing zone:

- Trenches were planned at intervals of 200–230 metres, or directly over identified geophysical anomalies, especially in areas lacking surface exposures, as per the stage-wise investigation requirements.
- Each trench was oriented with its longest axis across the strike of the ore body to effectively intersect and expose in-situ graphite band.
- When an ore body was encountered within a trench, systematic sampling was done along the floor or walls by collecting continuous chips using a chisel and hammer. The standard sample length was approximately 1 metre, though sometimes more and sometimes less based on local lithological variations.
- If samples with good concentration of graphite were obtained, additional trenches were planned & excavated at specific distances from the previous ones to further delineate strike continuity of the ore body.
- After sampling, all trenches were backfilled with soil to restore the site condition.

6.1.5.3 Discussion on analytical results of trench samples

A total of nine trenches were planned and excavated with a cumulative volume of 139.1 cubic metres. Out of nine, six trenches expose graphite schist (T-2, T-3, T-5, T-7, T-8 and T-9) band

in both the target area **Zone-A** (Bhurkura & Rajakata) and **Zone-B** (Ranibandh near Ashram & Kumarpara). 47 Trench samples of graphite schist were collected from these six trenches. In analytical results, fixed carbon ranges from 1.42 % to 11.24%, where 45 samples shown FC values more than 2%. Details of geochemical analyses are given in annexure-III.

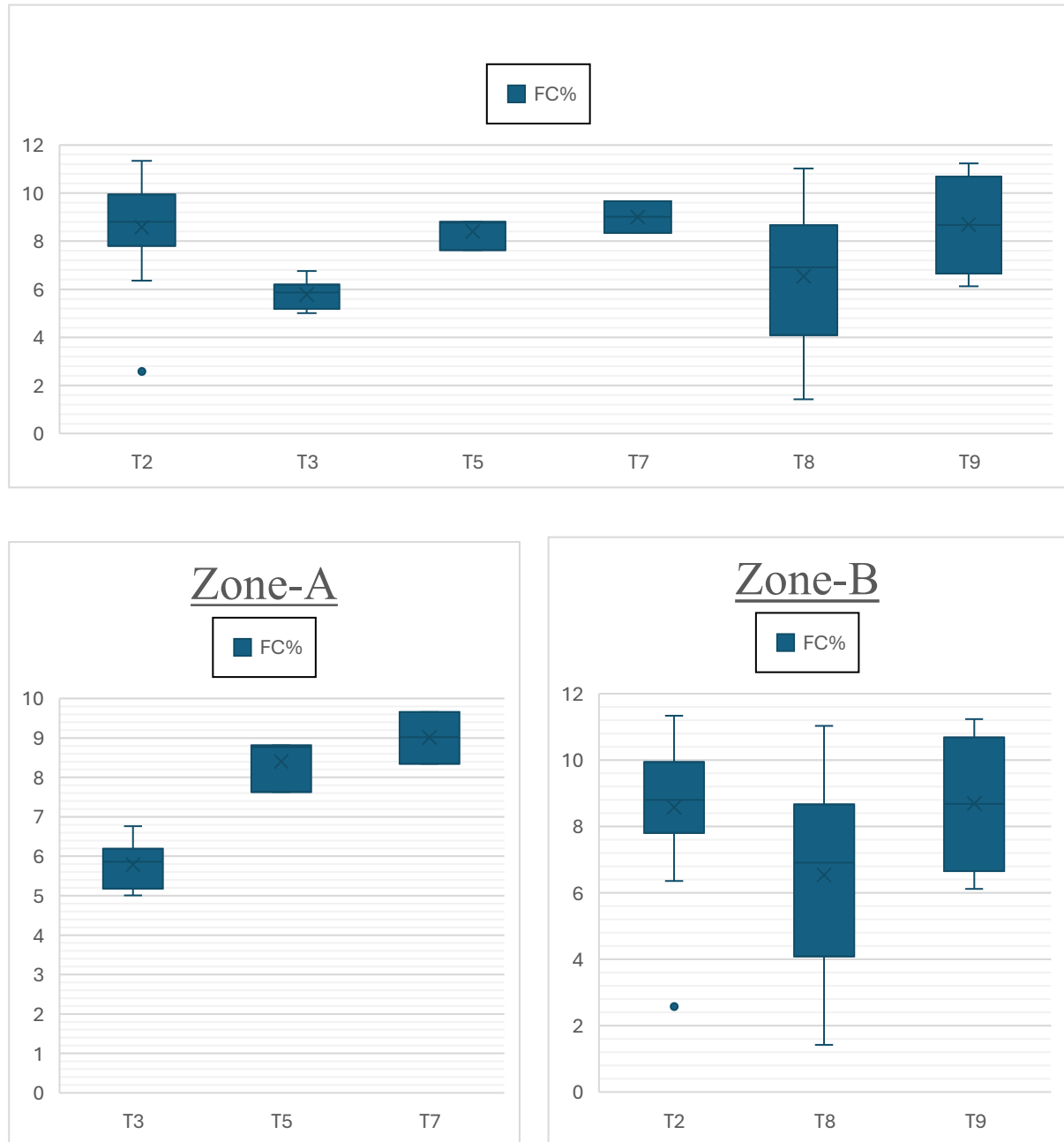


Fig. 6.17 Box and whisker plots showing variations of fixed carbon concentration in graphite schist for the trench samples.

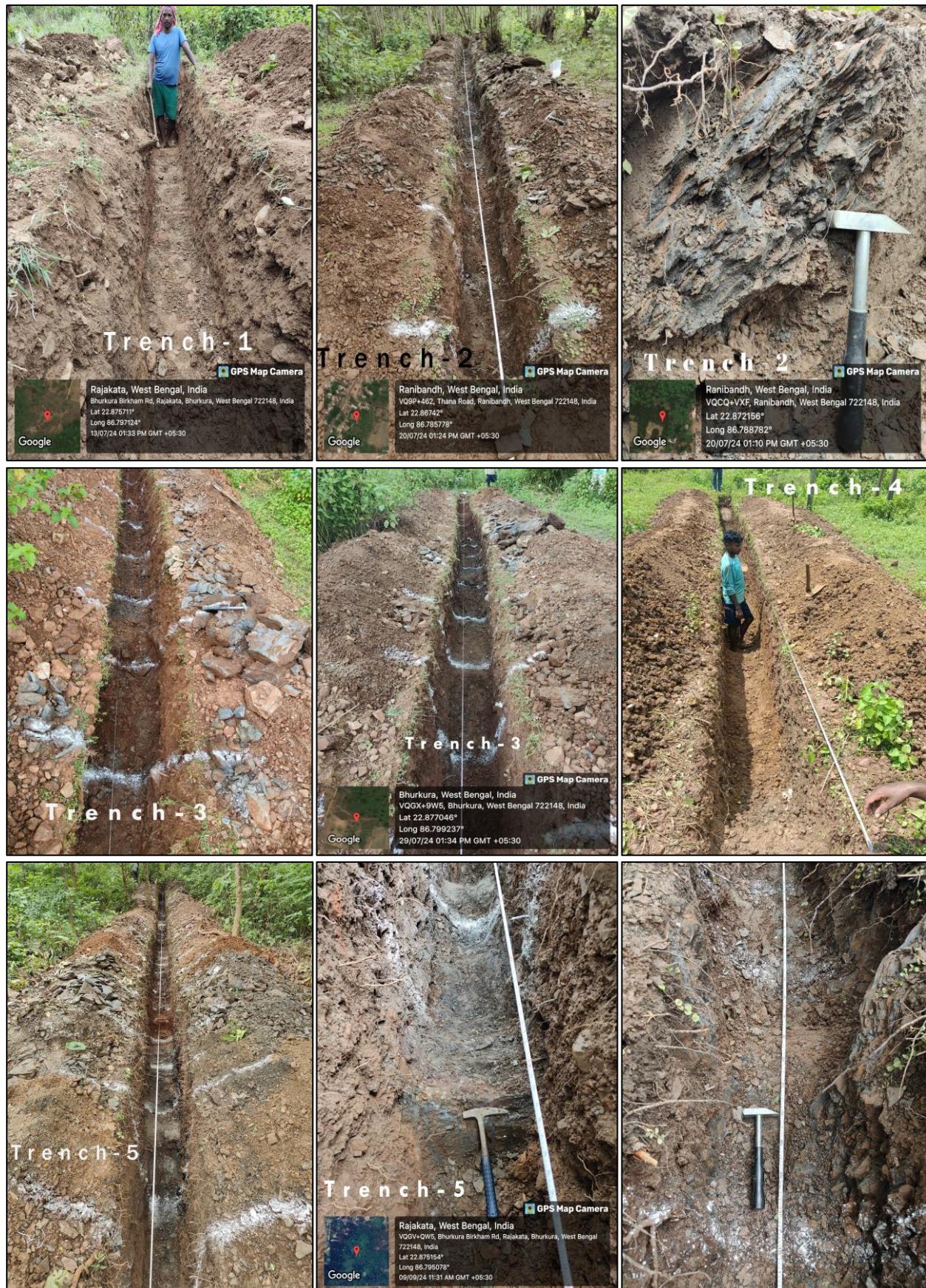


Fig.6.18 Field photographs showing trench sampling activities at different locations of the block.



Fig.6.19 Field Photographs showing trenching activities and in-situ graphite bands exposed during trenching.

6.1.6 Interpreted ore zones on the basis of geological investigation

Major graphite ore zones:

The zones having fixed carbon value of each sample more than 2% has been categorised under major graphite bearing zone, in Ranibandh block more than 95% of collected samples (BRS+Trench) have shown FC values more than 2%. So, based on detailed geological mapping, trenching, and surface exposure and geochemical analyses of the graphite schist samples, two distinct graphite-bearing ore zones are delineated within the detailed mapping area: **Zone-A** (Bhurkura near playground and Rajakata) and **Zone-B** (near Ranibandh Ashram, in water tank, and Kumarpara).

In **Zone-A**, the graphite mica schist shows a well-defined NE–SW strike with a moderate to steep dip ranging from 45° to 78° towards northwest. This zone demonstrates a continuous graphite band with a strike length of approximately **650 metres**, traced and confirmed by surface outcrops and groove-trench sampling. The exposed thickness of this graphite-bearing band varies between 1.0 metre and **13.0 metres**, indicating pinching and swelling structure of the ore body. The geochemical analyses of BRS (Groove) and Trench samples collected across this zone ranges from **5.01-9.56 % FC**.

The graphite schist reappears after a gap of approximately 500 metres to the SW of **Zone-A**, near the Ranibandh Ashram, water tank, and Kumarpara localities is named as **Zone-B**. Here, the graphite band exhibits an E–W strike with dips ranging from 45° to 60° towards the north. This zone hosts a comparatively thicker graphite band, with a confirmed strike length of about **600 metres**, supported by surface mapping and trench data. The surface thickness within this block ranges from **7.0 metres to 18.0 metres**, signifying well-developed graphite enrichment with potential for lateral continuity. The percentage of fixed carbon for this zone ranges from **1.42-11.34%**. The cumulative strike length of the delineated graphite-bearing zones is thus approximately **1.25 kilometres**, with individual bands exhibiting significant thickness variation from **1 metre to 18 metres**.

It is noteworthy that the intervening gap between **Zone-A** (Bhurkura–Rajakata) and **Zone-B** (Ranibandh Ashram–Kumarpara) may also potentially host graphite mineralisation. This inference is supported by the presence of geophysical anomalies within this zone. However, due to forest plantations and constraints, trenching could not be carried out in this sector. Hence, this unexposed gap area remains a promising target for future exploration to establish the continuity of graphite-bearing bands between the two identified zones.

The details of the mapped graphite bearing zones are tabulated as follows:

Table No.: 6.1.6.1 Details of interpreted ore zones on the basis of geological investigation.

Parameter	Zone-A (Bhurkura, Rajakata)	Zone-B (near Ranibandh Ashram, Pond, Kumarpara)
General strike	NE–SW	E–W
Dip direction & angle	45°–78° towards NW	45°–60° towards North
Gap between zones	—	~500 m SW of Zone-A
Established strike length	~650 m	~600 m
Surface thickness	1.0–13.0 m	7.0–18.0 m
Supporting data	Surface exposures, groove trench	Surface mapping, trenches
Fixed Carbon (%) range	5.01–9.56 %	1.42–11.34 %

In Addition to these zones, graphite bearing schist occurrences were also noticed at Budhkhila near electric sub-station, Neemdanga and Rajakata near water tank.



Fig.6.20 Photographs from the visit to the Ranibandh Graphite Block by two geologists and a geophysicist from Geological Survey of India (GSI).

6.2. Geophysical exploration

The primary objective of carrying out an integrated Self-Potential (SP) survey within the two identified graphite zones was to effectively delineate concealed graphite-bearing bodies and pinpoint potential drilling sites with a higher probability of intersecting significant mineralisation.

SP data acquisition

A Self-Potential (SP) survey was conducted, covering a total of 3.58-line kilometres across 14 profiles in August 2024. Due to accessibility challenges during data acquisition, the profile lengths varied, with an average length of 255 metres. Data points were spaced at 10-metre intervals to effectively delineate smaller graphite patches. The spacing between profiles was irregular, tailored to meet the specific objectives of the study. The Fixed Base method was employed for SP data acquisition, with field parameters selected based on geological insights into graphite occurrences. All profiles were oriented perpendicular to the strike of the geological formations. Some profiles were surveyed over known graphite zones, while others extended across unexposed areas.

SP data processing

The preprocessing of SP data encompassed drift correction, reference electrode calibration, and the determination of absolute SP values relative to a universal reference point at each location. The total SP anomaly map was prepared using the minimum curvature gridding method. The grid cell size was decided on by automated cell size based on the data statistics. A Residual SP anomaly map was prepared using a spatially Gaussian high pass filter. An interactive spectrum filter was applied to decide the cutoff wavelength. The depths of the target zones responsible for graphite occurrences were estimated using 3D Euler deconvolution solution where the structural index was fixed at 1. The SP data processing was done in Geosoft Oasis Montaj version 8.4 software.

Results and discussions

The analysis of quality-assessed SP data statistics reveals that SP values range from a minimum of -161 mV to 29 mV. The mean SP value of -38 mV across this area is a positive indicator of graphite mineralization potential. The total SP anomaly map highlights overall graphite mineralization potential, with negative SP anomalies appearing as blue zones. Two key zones, TSP-Z1 and TSP-Z2, show SP anomaly values ranged between -120 mV and -80.0 mV and -160 mV to -40 mV respectively. Red to pink, yellow, and green zones correspond to values of

-6.3 to 29 mV, -28 to -14 mV, and -63 to -35 mV, respectively. Blue zones, followed by green and yellow zones, indicate the highest probability of graphite occurrence, whereas red and pink zones lack graphite mineralization potential.

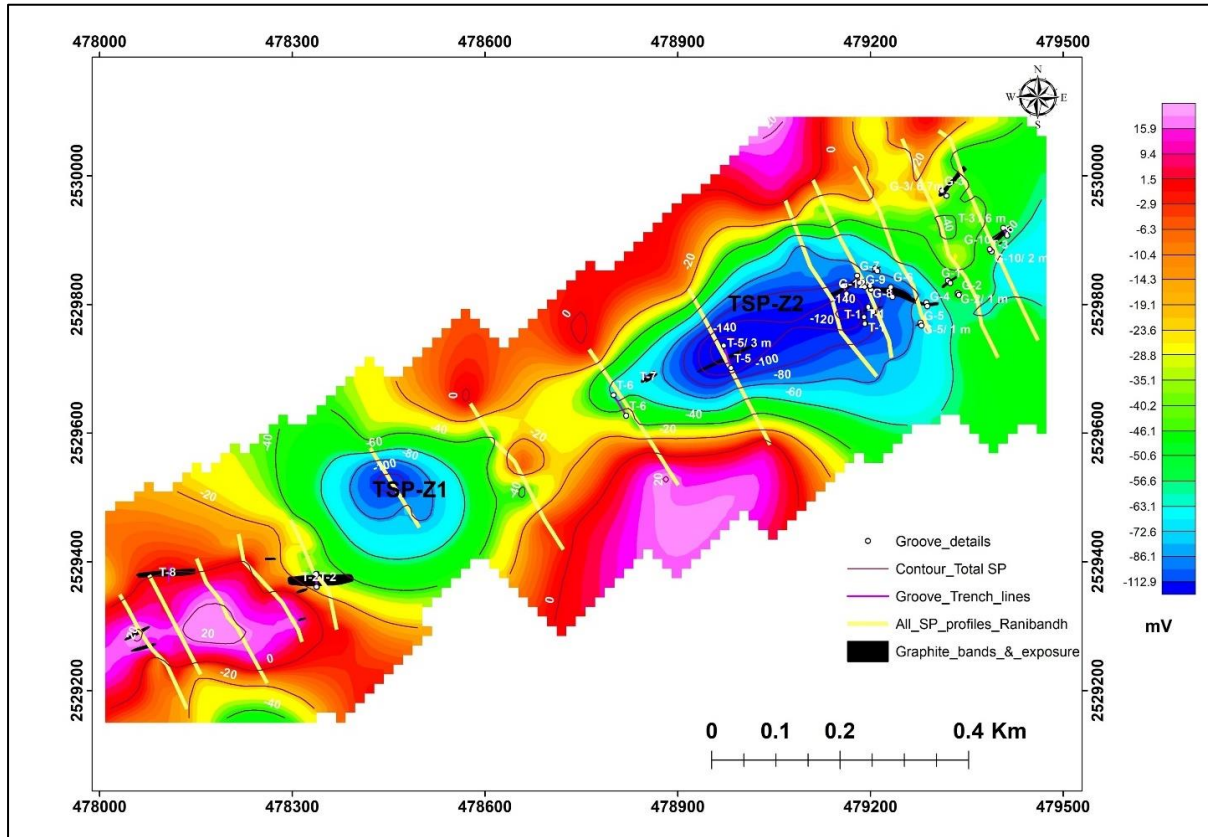


Fig. 6.21 Total SP anomaly map of the area. Graphite exposure profile lines, grooves, and trench locations are overlaid for better understanding.

The mapped graphite exposure areas have been overlaid to validate the anomaly map and assess the continuity of surface exposures into subsurface zones. Notably, the TSP-Z1 area does not correlate with any surface exposures, suggesting it as a concealed potential zone for graphite. In contrast, TSP-Z2 is aligned with several geologically documented exposures, validating the anomaly map's accuracy in this area. However, some surface exposures on either side of the map fall outside the blue-coloured zones, reflecting intermediate negative SP values. The total SP anomaly map does not effectively highlight small graphite bands present at shallow depths, which may explain the mismatch between some mapped exposures and the negative (blue) SP anomaly zones. These areas could warrant further investigation using a residual anomaly map for improved delineation.

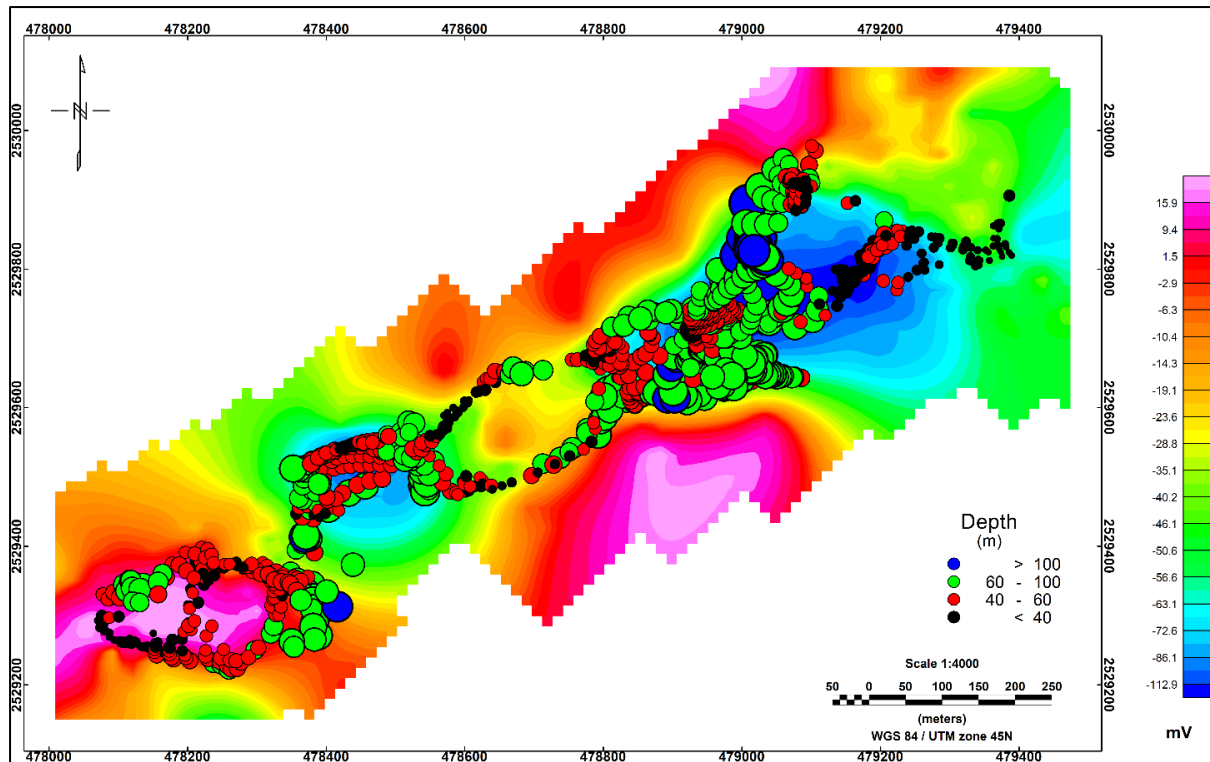


Fig.-6.22 3D Euler depth solutions overlay the total SP anomaly map.

The Euler depth solutions of the total SP anomaly data indicate occurrence depths ranging from 19 m to 140 m, with an average depth of 53 m. The detailed distribution of depth solutions is shown as clusters in Fig. 6.22.

The residual SP anomaly map (Fig. 6.23) displayed using an RGB colour scale consistent with the total SP anomaly map (Fig. 6.21), effectively delineates shallow-seated mineralization that was not visible in the total anomaly map. Notably, several small, shallow graphite exposure patches are distinctly highlighted in this residual map. A total of 12 potential zones have been identified and labelled RSP-Z1 through RSP-Z12. However, zones such as RSP-Z1, RSP-Z3, and RSP-Z12 are located at the edges of profile lines or beyond the common profile boundaries and are likely artifacts introduced by interpolation; hence, they may be disregarded.

The residual SP anomaly values in the area range from -22 mV to +12 mV. Compared to the total SP anomaly map, the residual map shows a better correlation with geologically verified graphite exposures, likely due to the shallow depth of mineralization. A prominent mineralized trend has been identified along the AB direction. Interestingly, zones RSP-Z5 to RSP-Z8 show no apparent surface expressions of graphite; these may represent soil-covered or very shallow subsurface graphite bodies.

Additionally, some mapped graphite exposures do not align with blue (negative) anomaly zones. This discrepancy could be attributed to data gaps or local masking of SP responses by

shallow water channels during data acquisition. The spatial extent and central coordinates of each delineated zone are summarized in Table 6.2.1. The alignment and orientation of known graphite exposures further validate the reliability of the residual SP anomaly interpretation shown in Fig. 6.23.

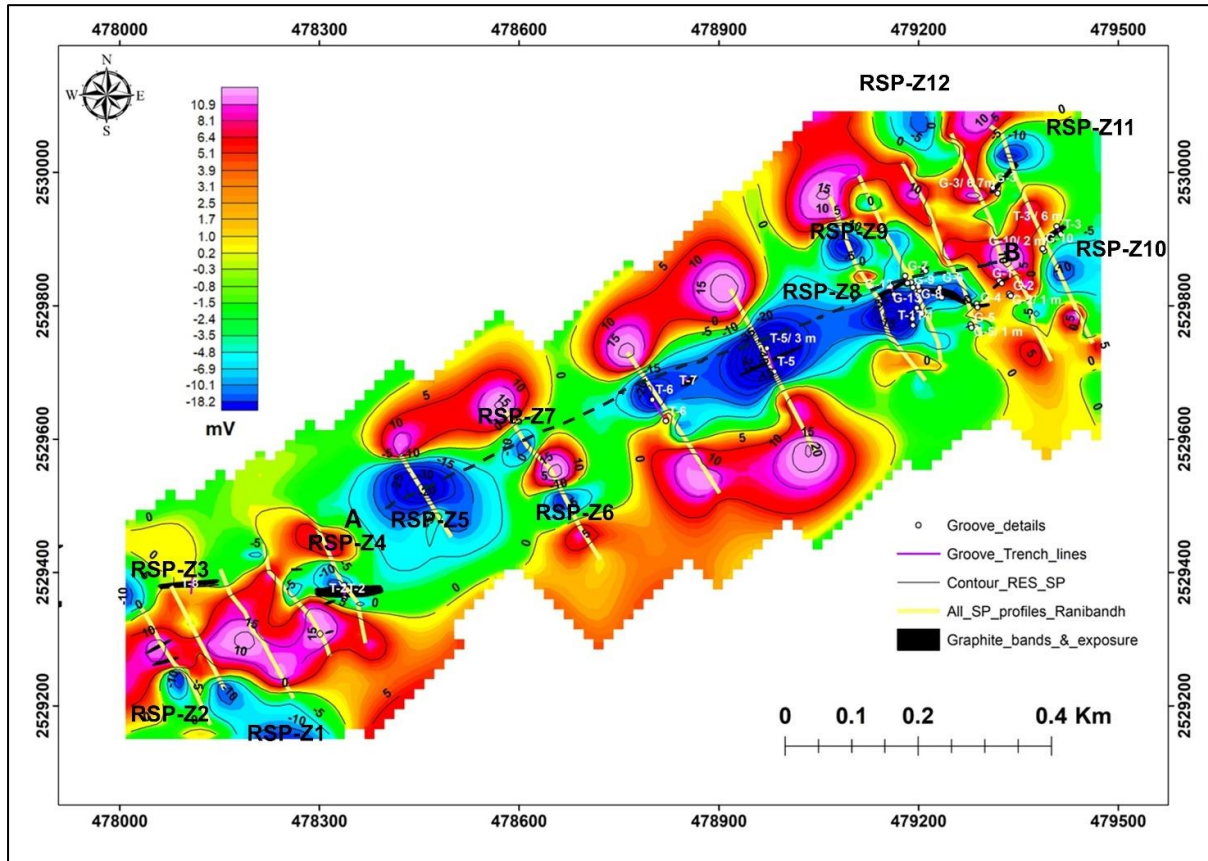


Fig.6.23 Contour of residual SP anomaly map of the area. This map identifies twelve potential graphite zones, labelled RSP-Z1 through RSP-Z12. Major mineralization trends are indicated by dotted lines labelled AB.

The Euler 3D solutions derived from the residual SP anomaly map suggest a potential depth range for shallow graphite occurrences, varying from 11 m to 80 m, with an average depth of 27 m. The distribution of depth solutions is shown in Fig. 6.24, where red-coloured clusters dominate, indicating a modal occurrence depth between 20 m and 50 m. Within the surveyed SP area of 0.6922 square km, the total potential area for graphite mineralization is approximately 0.067 square km, representing 9.68% of the survey region. The UTM zone used in this study is UTM 45N.

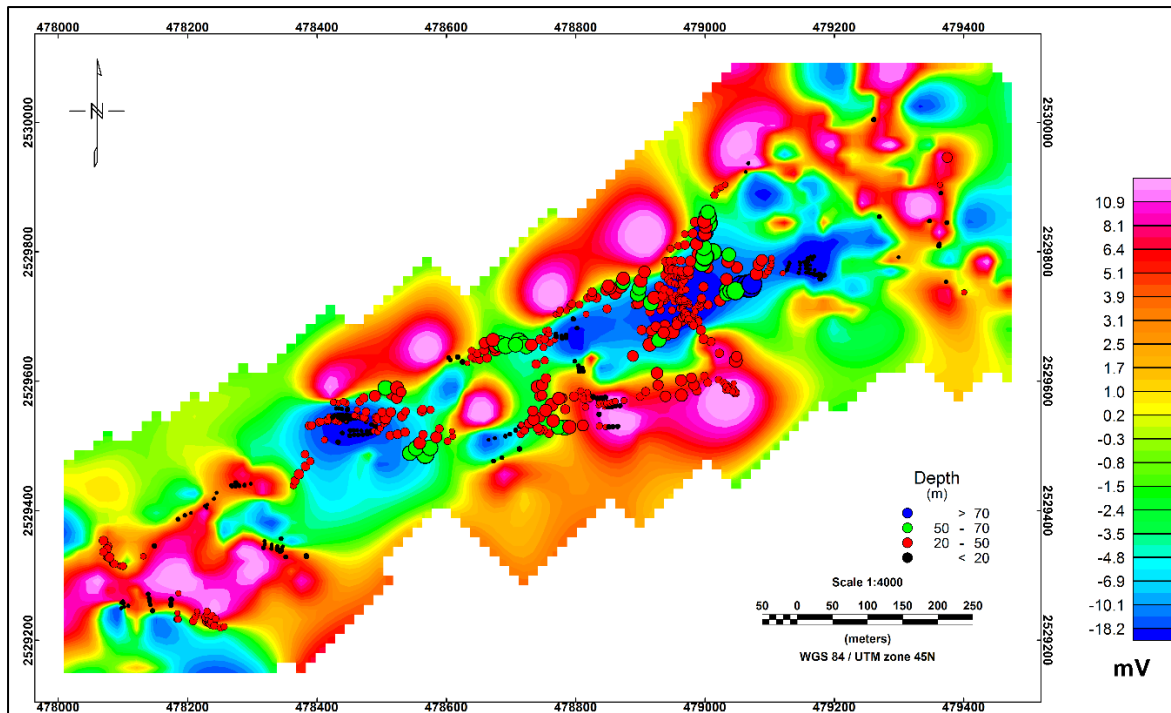


Fig.-6.24 3D Euler depth solutions overlay the residual SP anomaly map.

Table 6.2.1 shows the central locations of the potential zones (RSP-Z1 -RSP Z12) and their area coverage

Location name	UTM_X	UTM_Y	Area in Square km	Area in Hector
RSP-Z1	478247.2	2529157	0.002262409	0.226240932
RSP-Z2	478161.2	2529217	0.001572269	0.157226877
RSP-Z3	478088.5	2529240	0.000638705	0.063870465
RSP-Z4	478328.3	2529381	0.000760535	0.076053457
RSP-Z5	478453.3	2529525	0.014409996	1.440999606
RSP-Z6	478664.5	2529506	0.001170337	0.117033724
RSP-Z7	478606.5	2529589	0.000977264	0.09772645
RSP-Z8	478978	2529726	0.037926298	3.792629813
RSP-Z9	479088.3	2529886	0.002471338	0.247133811
RSP-Z10	479415.4	2529855	0.002021383	0.202138341
RSP-Z11	479339.2	2530030	0.001823839	0.182383912
RSP-Z12	479204.2	2530073	0.001050726	0.10507256

Conclusion

The study yields the following key conclusions:

1. The SP (Spontaneous Polarization) method effectively delineates graphite mineralization.
2. The residual SP anomaly map more precisely outlines mineralized zones compared to the total SP anomaly map, showing stronger correlation with geological data.
3. Graphite occurrences display a primary trend along the NE-SW direction and a secondary trend along the NW-SE direction.
4. Shallow occurrences are generally found at an average depth of 30 metres, while deeper occurrences average around 70 metres, with depths ranging from a minimum of 11 metres to a maximum of 140 metres.
5. The total potential area constitutes 9.6% of the surveyed area.

6.3 Geochemical exploration

Bed rock sampling

As a part of bed rock sampling (BRS), both grab and groove samples were collected from graphite bearing zones for geochemical analysis. Grab samples were collected from outcrops with the help of chisel and hammer. A total of 21 grab samples and **62 groove samples** of graphite bearing quartz mica schist were collected from different graphite-bearing zones.

Methodology of sample collection from grooves

In order to collect samples from the exposed outcrops of graphite bearing lithological-units, the following method was adopted -

- Groove lines (Fig.) are placed in order to remove the weathered surface of the outcrops. The longest axis of the groove is perpendicular to the strike of the ore body.
- After removing the weathered surface, samples are collected continuously from the groove with the help of chisel and hammer.
- Samples length for each sample is normally 1m.
- Groove lines planned at a distance of 50 m or less from each other along the strike of the ore body to collect samples. At every desired location it was not possible to collect samples by putting groove lines.

Groove sampling

Groove lines were placed across various graphite-bearing zones within the study area to collect fresh samples. These groove lines are oriented perpendicular to the strike of the graphite-bearing lithological units. The graphite-bearing outcrops were first thoroughly cleaned to remove any unwanted material; lines for groove were marked across the strike using lime; the groove was excavated with a consistent width and shallow depth using a shovel and chisel; fresh graphite-bearing samples were then collected from the groove line continuously at 1 m interval, with the sample length for each sample being 1 m or sometimes a little more or less depending upon lithology. Collected samples were carefully placed in plastic bags, properly labelled with tags, and sent to the laboratory for analysis. A total of **62 groove samples** were collected from different graphite-bearing zones. The band swerving along G-6-G4-G-2 is fold.

Discussion on analytical results of bedrock samples

A total of 21 grab samples of graphite schist were collected and analysed, yielding encouraging Fixed Carbon (FC) values ranging from 2.69% to 9.45%. In addition, geochemical analyses of 62 groove samples from the graphite schist litho-unit revealed fixed carbon percentages varying from 1.90% to 10.03%; notably, 61 out of these 62 samples recorded FC values exceeding 2%.



Fig. 6.25 Field photographs showing in-situ graphite schist encountered in groove lines.



Fig. 6.26 Field photographs showing in-situ graphite schist encountered in groove lines.

CHAPTER-7

Integration of geology, geophysics & geochemical exploration data and interpretation

Anomalous graphite or carbon bearing litho unit /zone was superimposed by SP anomaly zones. Basically, two zones: **Zone-A** and **Zone-B** were observed satisfying and complementing the geological and geophysical data. The geological data, geochemical data and geophysical anomaly were found to have supported each other or complementing each other (Plate-III).

Zone wise correlation of geology, geophysics, and geochemical exploration is given as follows:

Zone-A: In this zone, 13 grooves and 5 trenches were excavated. Graphite schist encountered in all 13 grooves (Total collected samples-58) and 3 trenches (Total number of samples-12), and subsequently samples of graphite schist were collected and analysed for fixed carbon percentage. Analytical results have shown encouraging values for FC ranging from **2.83-10.03%** for grooves (Groove-1 to Groove-13) and **5.01-9.66%** for trenches (T-3, T-5 & T-7). Zone-A also exhibits encouraging Total SP values (TSPZ-2) for these zones and are bounded by Total SP contour ranging from 160 mV to -40 mV in Total SP map. T-3 and G-3 does not show alignment with geophysical anomaly on total SP map, as these exposures were either located at the edge of the SP profile or distant from SP profile line. In residual map, both the data are correlatable.

Zone-B: In this zone, geologically 3 Trenches namely T-2, T-8 and T-9 were excavated, and 35 samples of graphite schist were collected, which show encouraging results varying from **1.42-11.34% FC**, notably out of 35 samples **33 samples** show FC values more than 2%. In Total SP map, area does not correlate with surface occurrences of graphite possibly due to sparse spacing of SP profile lines, but residual SP map does show some correlation with T-2 which is bounded by residual SP contour -5 mV to -10 mV and other exposures (BRS+T-8,T-9) does not compliment or match with residual SP map as these bands were at extremity of SP profile lines.

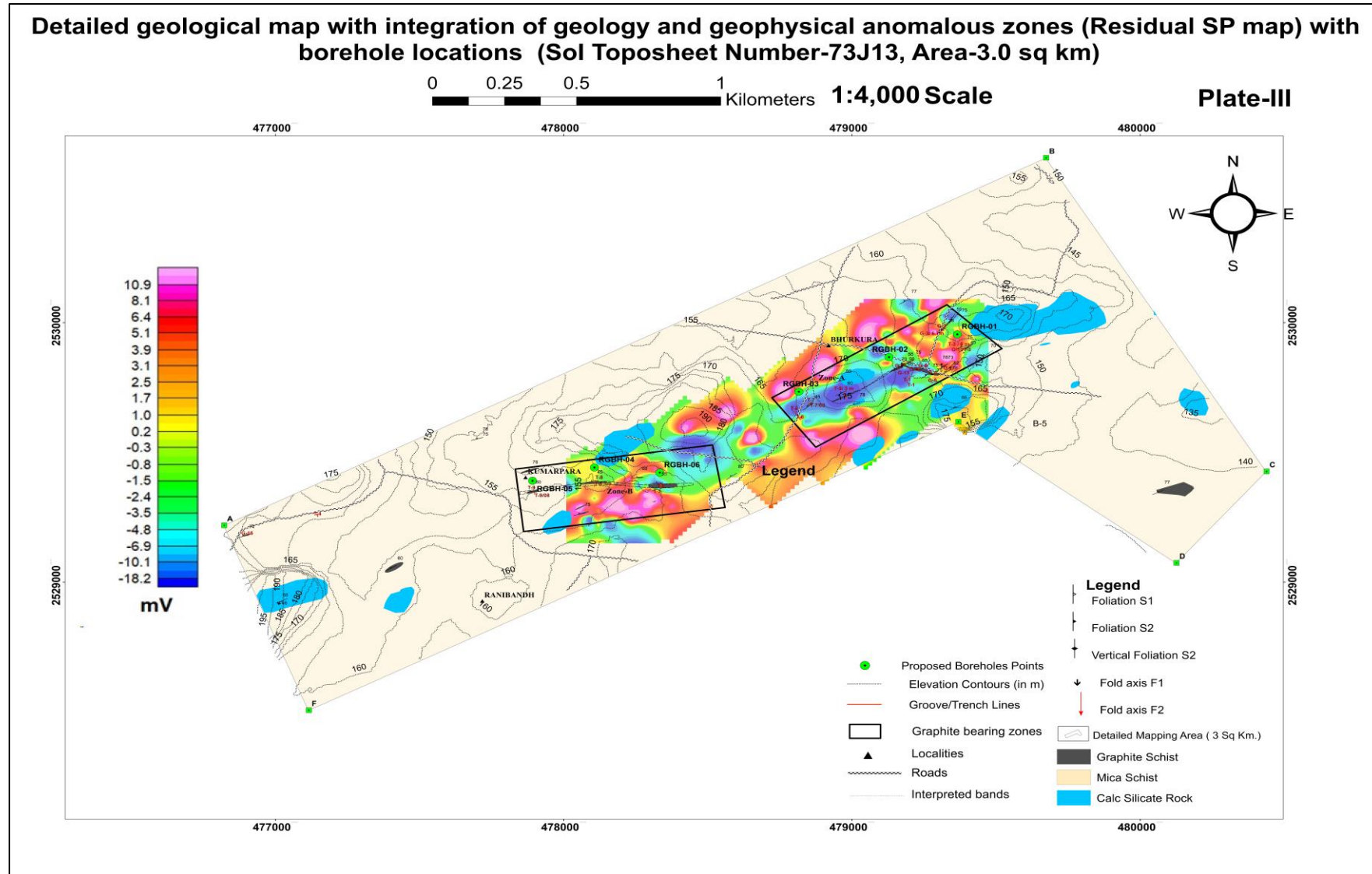


Plate-III Map showing integration of geology and geophysical anomalous zones (Residual SP map) with borehole locations.

CHAPTER-8

Mineral prospect

8.1 Surface indication of mineralisation

Graphite- or carbon-bearing schists are exposed on the surface around the playground of Bhurkura, near the Ashram at Ranibandh, and around the water tank, where those exhibit a dark grey to greyish-black colour with a metallic to sub-metallic lustre and give greasy feel in touch. These outcrops are prominent in Bhurkura, Rajakata, Ranibandh Ashram and water tank section, and Kumarpara area. The fine- to medium-grained graphite schist occurs interlayered with quartz-biotite-muscovite schist.

8.2 Mode of occurrence

In this area, graphite is found in the form of graphite bearing quartz-biotite-muscovite schist. Graphite/carbon is present along the foliation or schistosity plane of the host rock i.e. quartz-biotite-muscovite schist and marked on platy muscovite and strained quartz grains. It typically appears as fine to medium-grained flakes within the mica schist, and in some instances, these schistose layers are puckered or crenulated.

8.3 Details of mineralisation

Graphite- or carbon-bearing schist has been observed at several localities, including Bhurkura playground, Rajakata, Ranibandh Ashram and nearby water tank, and Kumarpara area. Based on the occurrence, distribution, and continuity of the graphite-bearing bands, the area has been subdivided into two distinct zones, designated as **Zone-A** and **Zone-B**, which are separated by an approximate gap of 500 metres. Detailed information on the strike length, surface thickness, and other characteristics of the mineralisation of each zone is discussed previously under **Section 6.1.6**.

8.4 Genesis of mineralisation

Graphite is considered to be a progressive and temperature dependant transition from amorphous kerogen to crystalline graphite (Landis, 1971; Grew, 1974; Buseck and Bo-Jun 1985). Graphitization involves the progressive solid-state transformation of carbonaceous materials with increasing crystallinity and increases with metamorphic grade (Sharma et al., 2022). Graphitization of naturally occurring organic carbon may occur at temperatures as low as 300° C to 500° C or as high as 800° C to 1200° C, when an igneous intrusion gets in contact

with a carbonaceous body (Rustu S. Kalyoncu, 2000). Since the graphitization process is irreversible, it is an important indicator of grade of metamorphism. At low grade of metamorphism up to green schist facies, the composition of the precursor material will control the process of graphitization (Diesel et. al. 1978, Busec and Huang 1985, Okuyama Kusunose and Itaya, 1986), whereas, in the high-grade metamorphism, all the carbonaceous matter is converted to graphite (Okuyama, Kusunose and Itaya, 1986). In low grade rocks many authors (Diesel et.al. 1975; Itaya 1981) have noted mixture of carbonaceous matter and graphite (detrital graphite). Graphitization process is accelerated in the presence of calcite in pelitic rocks in comparison to arenaceous rocks. Itaya (1981), Wang (1989) reported further, that to a great extent, graphitization in a regional terrain of metamorphism is attained in the temperature range of 410° C to 440°C with little pressure dependence. Thus, the degree and process of graphitization of carbonaceous matter is considered to be controlled mainly by the metamorphic temperature, the duration of metamorphism and metamorphic fluid with some influence from the lithology and original texture of the organic matter.

In the present study area, graphite/carbon mineralization is associated with quartz mica schist and calc-silicates which indicate syngenetic origin of graphite/carbon along with other metasediments. carbonization takes place during diagenesis and regional metamorphism of organic rich sediments and further graphitization take place due to emplacement of intrusive granites (Kuliapal granite) followed by quartz veins which might have supplied sufficient temperature and pressure. The organic origin can be confirmed after carbon isotope analysis which experiment was beyond the scope of work. Pyrite/sulphides veins along the foliation of graphite bearing quartz mica schist also indicate about organic rich sediment which might have undergone medium temperature regional metamorphism in deep marine reducing environment.

CHAPTER-9

Exploration by scout drilling

As part of the **Reconnaissance Survey (G-4 Stage) for graphite in Ranibandh, Bankura (F.No. 23/447/2024-NMET/602)**, 6 numbers of boreholes were strategically planned following promising geochemical analyses results and the correlation between surface geology and identified geophysical SP anomalies. These boreholes were drilled to intersect the graphite-bearing litho-units at a vertical depth of intersection 30 metres from surface (first level). Out 6 boreholes, 3 boreholes were located in **Zone-A** and 3 in **Zone-B**. A total of **450 metres** of exploratory drilling was done by across the six boreholes, against the approved drilling target of 500 metres. The spacing between two adjacent boreholes was generally maintained at 220–245 metres or adjusted as per the distribution of surface geological evidences, except for borehole RGBH-03, where ground constraints necessitated a deviation from this spacing. Detailed information on borehole spacing is provided under the borehole planning section (Para. 9.3). The drilling operations commenced on 10th February 2024 and completed on 30th March 2025.



Fig. 9.1 Field photographs showing the drill site and the deployed drill rig in operation during exploratory drilling at Ranibandh Block.

9.1 Stage of exploration

Guidelines followed as per MEMC Rule, 2015 are in compliance with G4 stage of exploration and resources categorised under UNFC Class 334.

9.2 Methodology of drilling

Drilling is a critical aspect of mineral exploration, allowing a geologist to uncover the subsurface information of mineral deposits. It provides essential data for evaluating the potential of a site for mining. Various drilling methods are employed based on the characteristics of the litho-units. In Ranibandh block, a wireline hydrostatic diamond drilling rig was deployed. In this method, a diamond-tipped drill bit is used to penetrate the litho-units, and the core samples are retrieved using a wireline system that allows for quick and efficient extraction of the drill core without removing the entire drill string from the borehole. As the dips of ore bodies are varying between 45° to 78° in different graphite bearing zones, inclined boreholes were drilled with of HQ3 size with triple tube core barrels to enhance core recovery. The diameter of the borehole was 96mm, and that of the core was 61.5mm. The inclination angle of each borehole is 45° except RGBH-05 with 50° with respect to the horizontal surface.



Fig. 9.2 Showing Core photographs of graphite schist with interlayered cenululated quartz veins with emplacements of sulphides (Pyrite, chalcopyrite etc.) as specks, streaks and stringers.



Fig. 9.3 Core photographs of various boreholes showing graphite bearing quartz mica schist.

9.3 Borehole planning

Boreholes were planned on the basis of surface geological and geophysical considerations.

Borehole planning based on geological & geophysical evidences

The outcrops with zones of graphite samples with more than or equal to 2 % FC were considered as the reference locations for placing boreholes in order to intersect at 30 m vertical depth. Four numbers of boreholes namely RGBH-01, RGBH-02, RGBH-03, RGBH-06 were planned on the basis of geological & geophysical considerations, since both the data were complementing each other.

Borehole planning based on only geological evidences

In Zone-B, two numbers of boreholes namely RGBH-04 and RGBH-05 were planned on the basis of geological evidences (trenches: T-8 and T-9). Geophysical anomaly was not correlatable for these locations.

Table-9.1: Details of zone wise borehole location and vertical depth

Sl. No.	Bore hole Id	Location	Zone of Graphite	Vertical Depth of intersection	Inclination	Azimuth	Remarks
1	RGBH-01	Bhurkura	A	58.36 m	45°	135°	The borehole was planned on the basis of geological (T-3) and geophysical signatures.
2	RGBH-02	Bhurkura	A	36.74 m	45°	145°	The borehole was planned on the basis of geological (G-12) and geophysical evidences.
3	RGBH-03	Bhurkura	A	34.48 m	45°	140°	The borehole was planned on the basis of geological (T-7) and geophysical evidences.
4	RGBH-04	Kumarpara	B	32.14 m	45°	175°	The borehole was planned on the basis of geological (T-8) evidence.
5	RGBH-05	Kumarpara	B	24.00 m	50°	175°	The borehole was planned on the basis of geological (T-9) evidence.
6	RGBH-06	Ranibandh near Ashram	B	29.48 m	45°	175°	The borehole was planned on the basis of geological (T-2) and geophysical evidences.

Table-9.2 Details of boreholes & spacing

Sl. No.	Boreholes	Zone of Graphite	Distance Between Boreholes Along the Strike
1	RGBH-01 & RGBH-02	Zone-A	245
2	RGBH-02 & RGBH-03	Zone-A	335
3	RGBH-04 & RGBH-05	zone-B	221
4	RGBH-04 & RGBH-06	zone-B	227

Table-9.3 Boreholes summary									
Sl. No.	Borehole Id	Easting	North ing	RL at Coll ar (m)	End of borehole (m)	Inclinati on of Bh.	Azi mut h	Date of Commence ment	Date of Completi on
1	RGBH -01	479365.576	2529955	163.33	106	45°	135°	10.02.2025	25.02.2025
2	RGBH -02	479128.866	2529867	169.23	110	45°	145°	22.03.2025	30.02.2025
3	RGBH -03	478816	2529734	170.58	67	45°	140°	05.03.2025	15.03.2025
4	RGBH -04	478106.692	2529442	172.50	62	45°	175°	01.03.2025	05.03.2025
5	RGBH -05	477892.111	2529391	162.98	43	50°	175°	23.02.2025	26.02.2025
6	RGBH -06	478333.62	2529422	175.75	62	45°	175°	10.03.2025	18.03.2025

9.4 Borehole pillars

On completion of all the 6 drilled boreholes, borehole pillars indicating the borehole numbers were embedded at the drill site for future reference and identification.



Fig 9.4 Embedded borehole pillars at Ranibandh block.

9.5 Details of intersected ore zone

Borehole Id: RGBH-01

The borehole **RGBH-01** (Plate-III) was planned within the major graphite-bearing **Zone-A**, targeting the area around trench **T-3** and a corresponding geophysical anomaly (RSP-Z10) to intersect the graphite band dipping at **45° towards NW**. The trench sampling results in this location yielded a promising weighted average of **5.79% Fixed Carbon (F.C.)** for 6 trench samples.

Accordingly, borehole RGBH-01 was drilled with an inclination of **45°** and an azimuth of **S135°E**, positioned at a horizontal distance of 60 metres from graphite band of Trench T-3, to investigate the depth persistence of the graphite band up to **58.36 metres vertical depth**. The borehole was drilled to a total depth of **106 metres** (a detailed lithological log is provided in the annexure-IV).

The borehole intersected a lithological unit such as quartz mica schist, calc-silicate rocks, quartz veins, graphite-bearing quartz mica schist and quartzite. Within the depth interval from 19.40 to 106.00 metres, five distinct graphite-bearing bands were encountered, separated by partings of variable thickness. The true thicknesses of graphite-bearing bands ranges from **0.38 metres to 38.60 metres**. The graphite mineralisation is foliation-controlled, occurring along the schistosity planes of the graphite bearing quartz mica schist, interlayered with sheared quartz veins with some specks of sulphide (Pyrite, chalcopyrite, pyrrhotite).

The details of the intersected graphite bands, their depth range, true thickness, and weighted average of fixed carbon content are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-01	19.4	19.9	ZONE-A/B-2	0.38	2.15
	22.35	23.7	ZONE-A/B-3	1.02	4.62
	28.3	29	ZONE-A/B-4	0.53	4.2
	51.35	51.85	ZONE-A/B-5	0.38	2.66
	54.85	106	ZONE-A/B-5	38.60	7.029

The cross-sectional view illustrating these bands is presented in **Figure 9.3**.

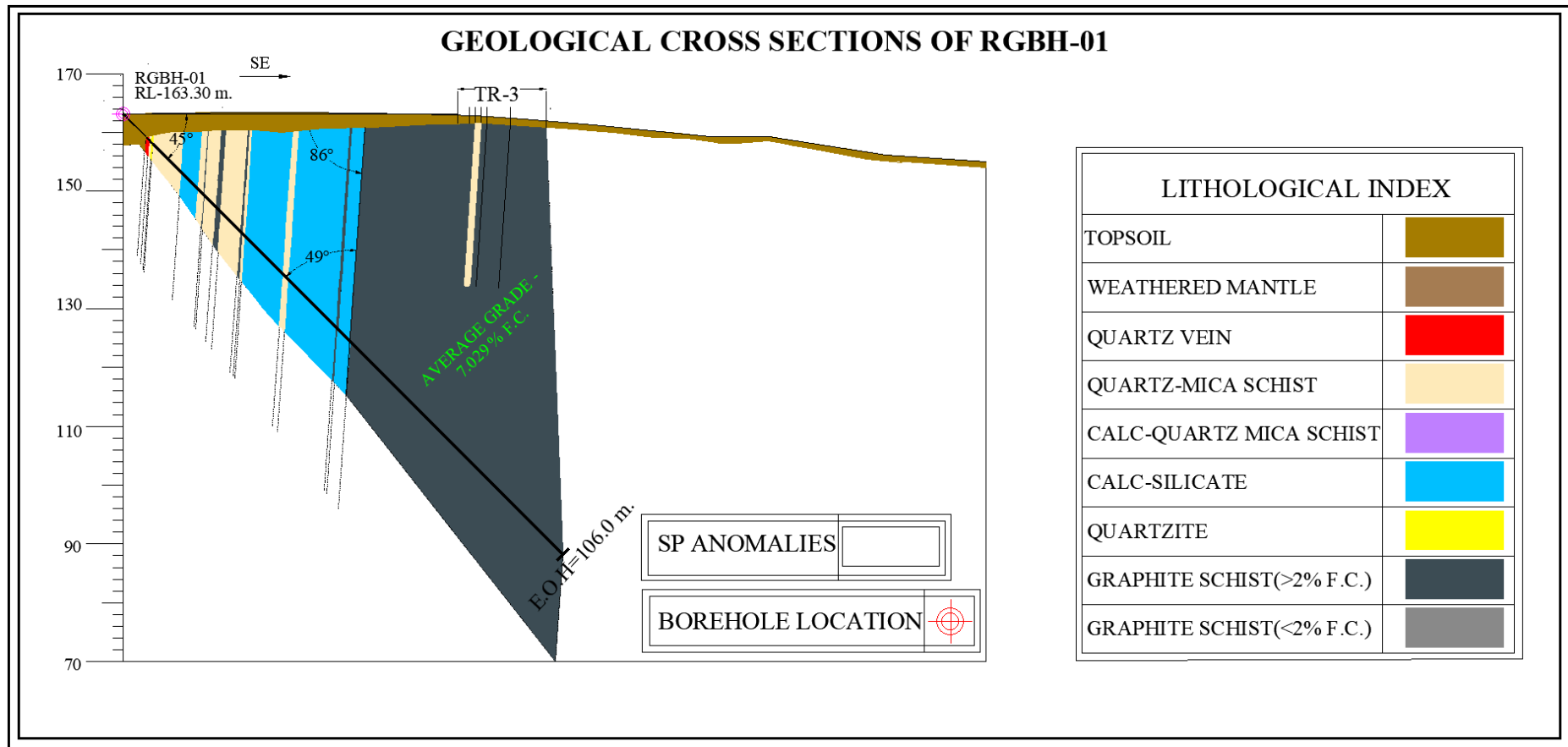


Fig. 9.5 Geological cross section of RGBH-01

Borehole Id: RGBH-02

The borehole **RGBH-02** (Plate-III) was planned within the major graphite-bearing **Zone-A**, targeting the area around groove G-12 and a corresponding geophysical anomaly (RSP-Z8) to intersect the graphite band dipping at **70° towards NW**, as exposed in G-12. The seven samples of groove G-12 show encouraging values for FC with weighted average of **6.94%**.

Accordingly, borehole RGBH-02 was drilled with an inclination of **45°** and an azimuth of **S145°E**, positioned at a horizontal distance of 41 (actual distance adjusted to **51 metres** due to plantation constraints) metres from groove G-12, to investigate the depth persistence of the graphite band up to **36.74 metres vertical depth**. The borehole was drilled up to a total depth of **110 metres** (a detailed lithological log is provided in the annexure-V).

The borehole intersected quartz mica schist, quartz veins, meta-psammite/quartzite, and graphite-bearing quartz mica schist interlayered with sheared quartz veins and minor sulphide mineralisation (pyrite, chalcopyrite, bornite, and pyrrhotite) emplaced along the foliation planes. Within the depth interval from 52.25 to 94.45 metres, 3 distinct graphite-bearing bands were encountered, separated by partings of various thicknesses. The true thicknesses of graphite bearing band is ranging from **1.48 metres to 9.3 metres**.

The details of the intersected graphite bands, their depth range, true thickness, and weighted average of fixed carbon content are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-02	52.25	53.88	ZONE-A/B-1	1.48	6.04
	77.95	79.77	ZONE-A/B-5	1.65	6.13
	84.16	94.45	ZONE-A/B-5	9.33	8.55

Borehole Id: RGBH-03

The borehole **RGBH-03** (Plate-III) was planned within the major graphite-bearing **Zone-A**, targeting the area around trench T-7 and a corresponding geophysical anomaly (RSP-Z8) to intersect the graphite band dipping with **45° towards NW**, as noticed in T-7. The three samples of T-7 show encouraging values for FC with weighted average of **9.01%**.

Accordingly, borehole RGBH-03 was drilled with an inclination of **45°** and an azimuth of **S140°E**, positioned at a horizontal distance of 60 metres from trench, to investigate the depth persistence of the graphite band up to 34.48 metres vertical depth. The borehole was drilled up to a total depth of 67 metres (a detailed lithological log is provided in the annexure-VI).

The borehole intersected quartz mica schist, calc silicate and graphite-bearing quartz mica schist. Within the depth interval from 45.23 to 49.23 metres, 2 distinct graphite-bearing bands were encountered, separated by partings, with true thicknesses ranging from **0.26 metres to 0.62 metres**.

The details of the intersected graphite bands, their depth range, true thickness, and weighted average of fixed carbon content are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-03	45.23	45.53	RGBH-03/B1	0.26	6.09
	48.51	49.23	RGBH-03/B2	0.62	5.72

Borehole Id: RGBH-04

Borehole **RGBH-04** (Plate-III) was drilled in Zone-B, targeting the graphite band identified in trench T-8, which dips 45° towards the north. Surface samples from T-8 show two graphite bands with surface thicknesses of 6 m and 1 m, with weighted average 8.20% FC and 6.40% FC, respectively.

The borehole was drilled with an inclination of 45°, and an azimuth of S175°E, and positioned 60 m from the graphite band of trench T-8 to investigate the depth continuity of graphite band up to 32.14 m of vertical intersection. Borehole was drilled up to a total depth of 62 m, and intersected quartz mica schist, calc-silicates, quartzite, quartz veins, graphite-bearing quartz mica schist, and graphite-bearing calc-silicate (a detailed lithological log is provided in annexure-VII).

Between 49.10 m and 57.45 m, two graphite bands were encountered, separated by quartz mica schist (calcareous) partings. The bands have true thicknesses 1.73 m and 5.67 m, respectively. The details of the intersected graphite bands, their depth range, true thickness, and weighted average of fixed carbon content are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH04	49.10	54.77	ZONE-B/B-8	5.67	6.80
	55.72	57.45	ZONE-B/B-9	1.73	3.30

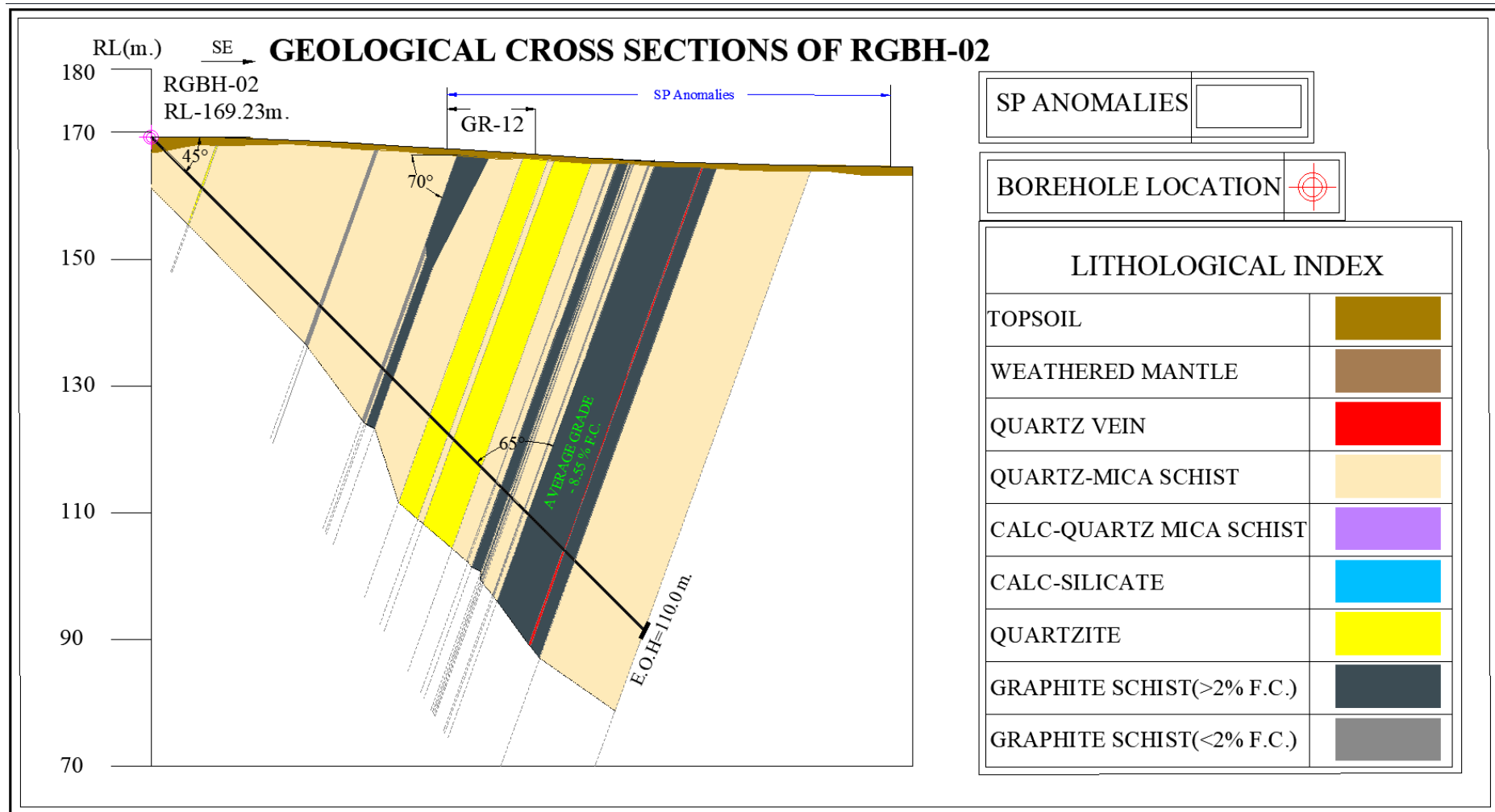


Fig. 9.6 Geological cross section of RGBH-02.

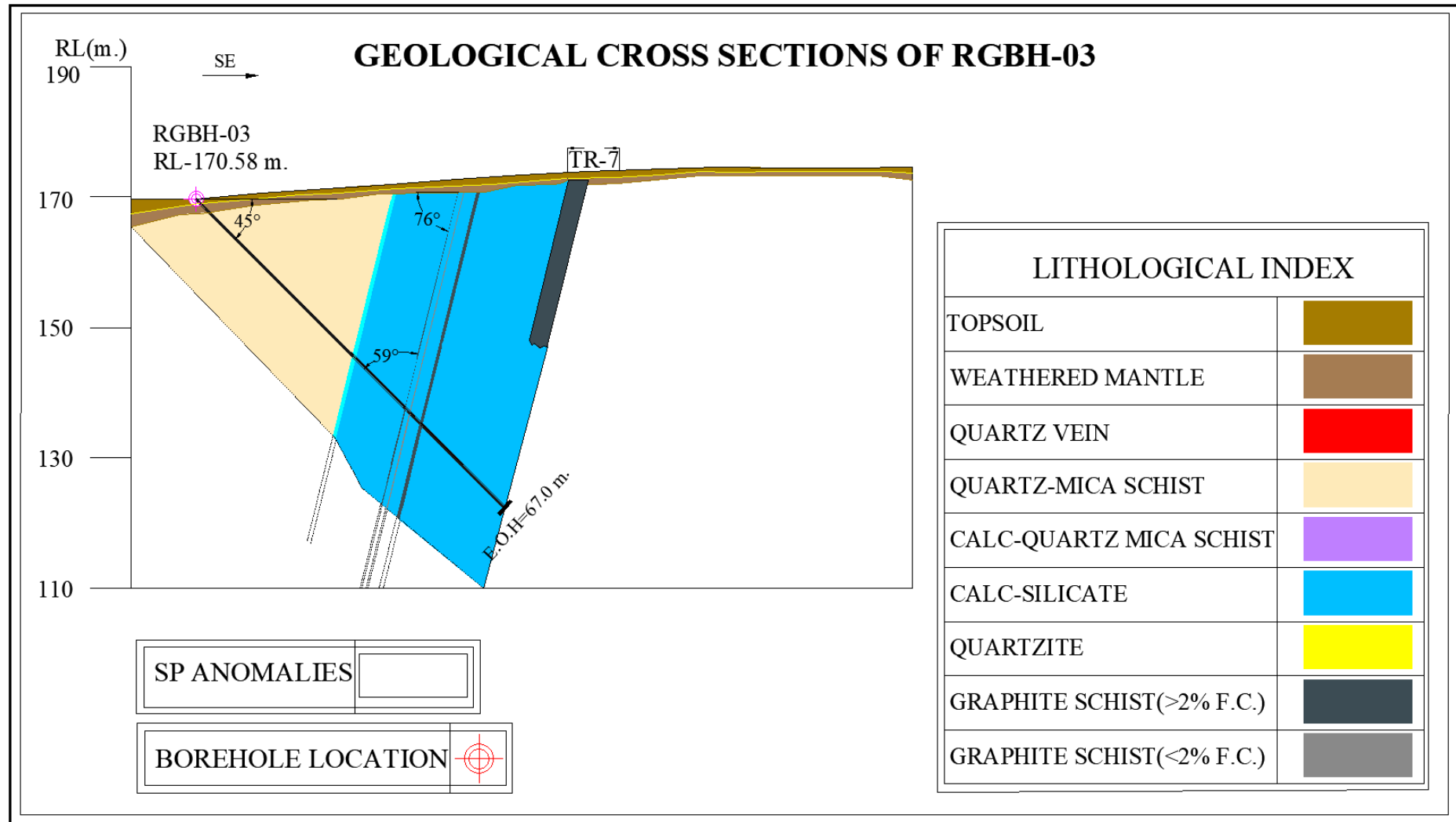


Fig. 9.7 Geological cross section of RGBH-03.

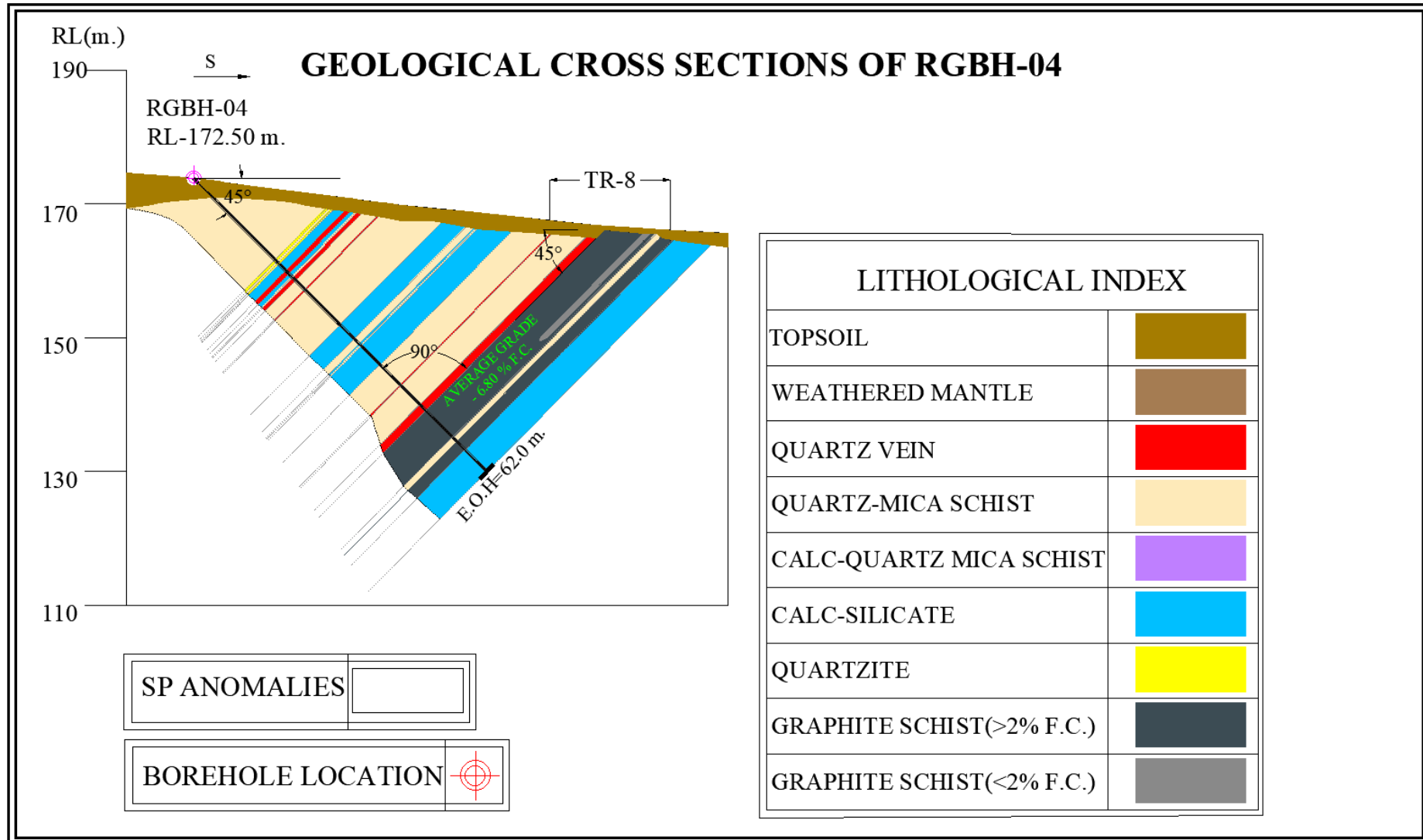


Fig. 9.8 Geological cross section of RGBH-04

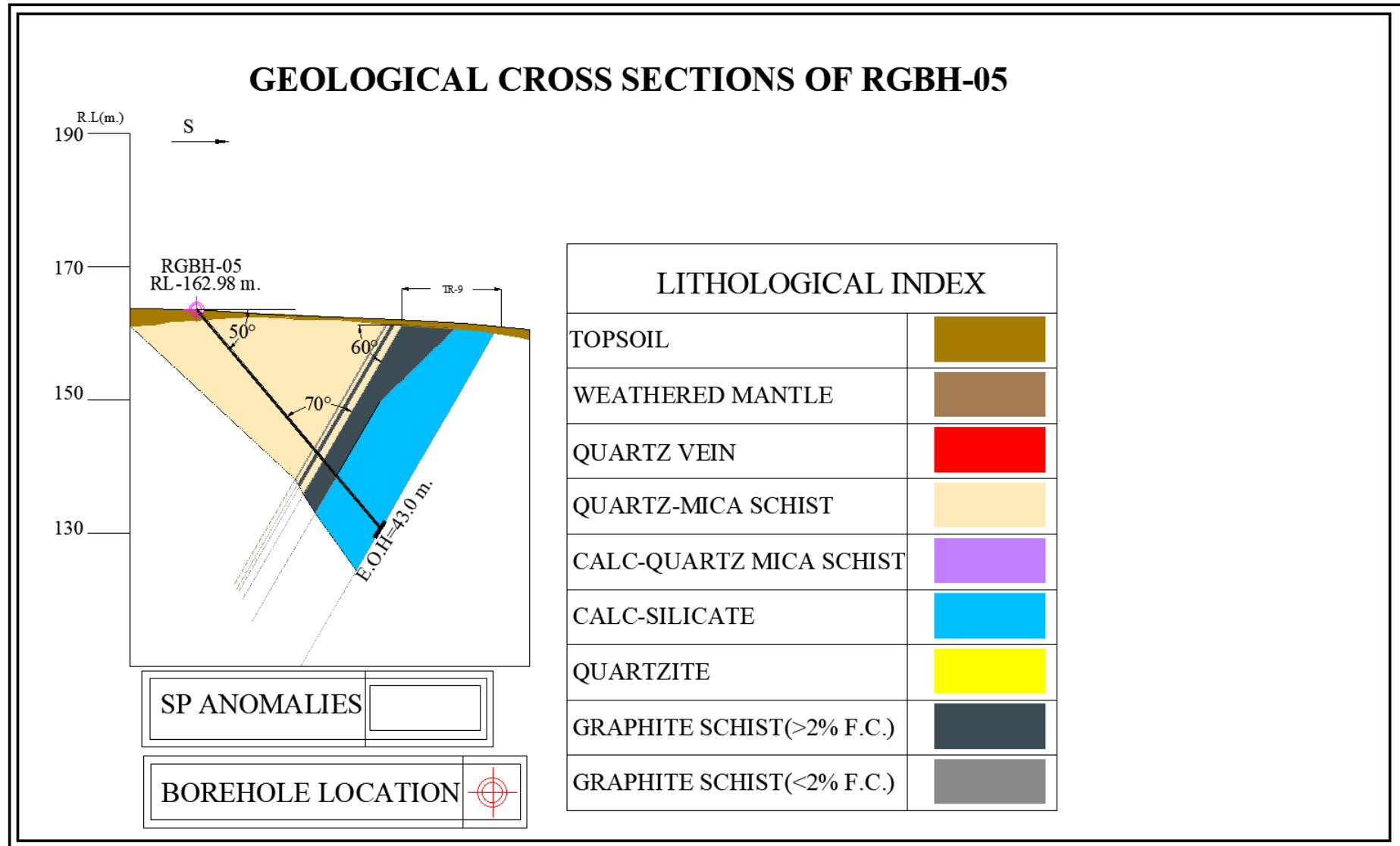


Fig. 9.9 Geological cross section of RGBH-05.

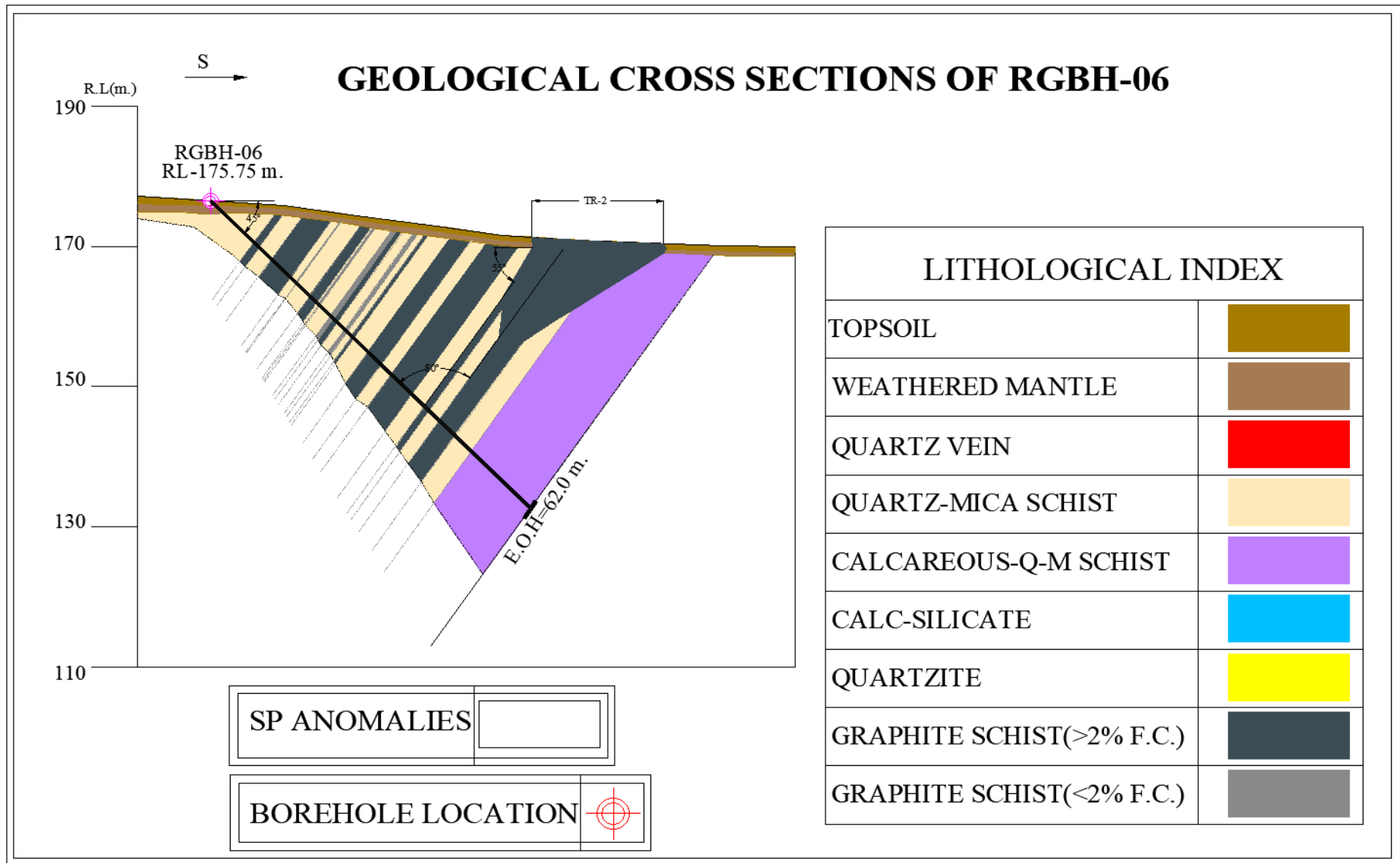


Fig. 9.10 Geological cross section of RGBH-06.

Borehole Id: RGBH-05

Borehole **RGBH-05** (Plate-III) was drilled in Zone-B, targeting the graphite band identified in trench T-8, which dips 60° towards the north. Eight Trench samples from T-9 show encouraging results, with weighted average of 8.69% FC.

The borehole was planned with an inclination 50°, with azimuth of S175°E, and positioned 47.3 m from the graphite band of trench T-9 to investigate the depth continuity of graphite band up to 24 m vertical depth of intersection. Borehole was drilled up to a total depth of 43.0 m, intersecting quartz mica schist, calc-silicates, graphite-bearing quartz mica schist (a detailed lithological log is provided in the annexure-VIII).

Between 28.0 m and 32.70 m, two graphite bands with true thickness of 0.48 m and 2.97 m were encountered, separated by quartz mica schist parting.

The details of the intersected graphite bands, their depth range, true thicknesses, and weighted average of fixed carbon content are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-05	28.00	28.50	ZONE-B/B-8	0.48	6.72
	29.63	32.70	ZONE-B/B-9	2.97	8.52

Borehole Id: RGBH-06

Borehole **RGBH-06** (Plate-III) was drilled in Zone-B, targeting the graphite band identified in Trench T-2 and geophysical residual SP zone RSP-Z4, which dips 55° towards the north. 18 trench samples from T-2 with surface thicknesses of 14.74 metres showed encouraging results, with weighted average of 8.58% FC.

The borehole was planned with an inclination of 45°, with an azimuth of S175°E, and positioned 51 m from the graphite band in trench T-2 to investigate the depth continuity of graphite band at vertical depth of 29.48 m. Borehole was drilled up to a total depth of 62.0 m, intersecting quartz mica schist, graphite-bearing quartz mica schist and calcareous quartz mica schist (a detailed lithological log is provided in the annexure-IX).

Between 8.38 m and 47.28 m, 9 graphite bands intersected with true thicknesses ranging from 0.45 m and 3.93 m, separated by the partings of quartz mica schist.

The details of the intersected graphite bands, their depth range, true thickness, and weighted average of fixed carbon are summarised below:

Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-06	8.38	9.38	ZONE-B/B-1	0.98	3.65
	11.77	15.45	ZONE-B/B-2	3.62	5.55
	19.19	20.58	ZONE-B/B-3	1.37	5.95
	23.75	24.58	ZONE-B/B-4	0.82	3.97
	27.29	27.75	ZONE-B/B-5	0.45	5.81
	30.53	33.03	ZONE-B/B-6	2.46	5.60
	35.00	39.00	ZONE-B/B-7	3.94	3.08
	41.4	42.35	ZONE-B/B-8	0.93	7.43
	44.25	47.28	ZONE-B/B-9	2.98	4.86

9.6 Logging

The cores obtained from drilling were stored in steel core boxes for logging and sampling. The cores were marked with arrows indicating the top and bottom, and steel pegs were placed between each run, with the depth of the borehole written on each peg. Detailed borehole data, including geological and mineralization information such as colour, lithology, physical characteristics, ore mineral constituents, and type of occurrence, along with recovery data & RQD for each run, were systematically recorded during core logging. All these informations were meticulously entered into log register for each borehole. The location of each borehole was determined using survey coordinates referenced to DGPS survey data. The run-wise lithologs of all boreholes drilled by MMPL are given in annexures-IV,V,VI,VII,VIII & IX.

9.7 Mineralogy of ore zone

The host rock for the graphite- or carbon-bearing litho-band is quartz mica schist. The graphite-bearing schist is mainly composed of biotite, muscovite, plagioclase, quartz, and graphite or carbonaceous matter. Among sulphide minerals, pyrite, pyrrhotite, and chalcopyrite are the principal types present in the carbonaceous phyllite. These sulphides occur as minor disseminations, specks, and fine stringers, typically emplaced along quartz veins and aligned parallel to the foliation of the schistose host rock. Few carbonate veins are also present as secondary fracture fillings.

9.8 Methodology of ore zone sampling and sample preparation

The sampling of the mineralised zones was carried out based on the following points-

- Initially the sample length was kept 1m for each sample generated from a particular graphite bearing bands and sampling was done continuously .
- If the sampled length exceeds a round figure by more than 0.50 m then one more sample was prepared with the exceeded quantum. For example for a graphite bearing band of thickness 7.62 m , a total eight numbers of samples were generated where the sample length of the 1st seven sample was 1m each while the sample length for the last sample was 0.62 m.
- If the sample length exceeds a round figure by less than 0.50 m then the exceeded length was added with the sample collected immediately before it. For example for a graphite bearing band of thickness 7.40 m , a total seven numbers of samples were generated where the sample length of the 1st six sample was 1m while the sample length for the last sample was kept 1.4m.

The sample preparation for the drilled cores was carried out in the following method-

At first the cores were split into two parts longitudinally with the help of core cutter machine. Then the half split cores were crushed to 75 micron (Equivalent to 200 mess) and reduced the sample weight to **1.5kg** through coning and quartering. The final reduced sample, weighing 1.5 kg, was divided into two equal portions of 750 grams each—one designated as the original sample and the other as the check (duplicate) sample. The original sample with **750 gms** was divided into three parts for proximate, ICPMS and check sample analysis. Sample weight was kept **250g** for each to send them into laboratory.



Fig.9.11 Photographs showing stages of core samples cutting.

9.9 Chemical analysis and laboratory procedures

The samples after submission to Chemical Laboratory are analysed for their fixed carbon content. Generally, of FC content of graphite is done through proximate analysis. The standard for chemical procedure followed for determination of FC is **IS 11321:1985** of Bureau of Indian standard. The process of proximate analysis starts with the freeing of moisture content and determination of volatile matter and ash content. After determination of these two parameters i.e. volatile matter and ash, the sum of these two is deducted from 100. The result thus obtained from this is the fixed carbon.

Determination of moisture

About 5 g of the sample is weighed in a tarred porcelain dish and covered with a watch glass. Then the dish is placed in an air oven with maintain of temperature $150 \pm 10^\circ\text{C}$ and the watch glass is removed from it. Then the sample is heated for 02 hours in the oven and the dish is covered with the watch glass before it is taken out of the oven. Then the dish is cooled in a desiccator and weighed. The following formula is used for calculation of moisture content.

$$\text{Moisture \%} = A/B \times 100$$

Where, A= loss in weight in g of the material after heating and B= weight in g of the material taken.

Determination of volatile matter

Nearly 1 g of the moisture free sample is introduced in a weighted volatile matter crucible with tightly fit lid. Then the crucible is heated in a muffle furnace maintained at temperature of $925^\circ \pm 25^\circ\text{C}$ for 7 minutes. The bottom of the crucible shall not rest on the floor of the muffle furnace. Then remove the crucible from the muffle furnace after 7 minutes and cool it in desiccators and weigh. The following formula is used for calculation of volatile matter content.

$$\text{Volatile matter \%} = A/B \times 100$$

Where A= loss in weight in g of the moisture free sample after heating up to $925^\circ \pm 250^\circ\text{C}$

B= weight in g of the moisture free sample taken.

Determination of ash

Nearly 1 g of the moisture free sample is taken in a silica crucible, keep the crucible in a muffle furnace and heat to $500^\circ \pm 100^\circ\text{C}$ within one hour and $775^\circ \pm 100^\circ\text{C}$ in two hours. A slow stream of air is maintained through the muffle furnace. The temperature is further increased to $925^\circ \pm 25^\circ\text{C}$ and kept for one hour. Cool it in a desiccator and weigh the sample. The procedure is repeated till the residue in the crucible is constant in weight. The following formula is used for calculation of ash content.

$$\text{Ash \%} = \text{A/B} \times 100$$

Where A= Weight of ash in g and B= weight in of the sample taken.

After determination of these parameters, FC is calculated with the formula

$$\text{FC \%} = 100 - (\text{VM \%} + \text{Ash \%})$$

Where, FC= Fixed carbon

VM= Volatile matter

Ash= Ash content

Proximate analysis

A total 104 numbers of core samples were generated for proximate analysis. Analytical result of 104 core samples show encouraging results ranging from 0.38-11.39% FC. Out of 104 core samples, **100 samples** having more than 2% FC values. The detailed analysis report is given in annexure-X.

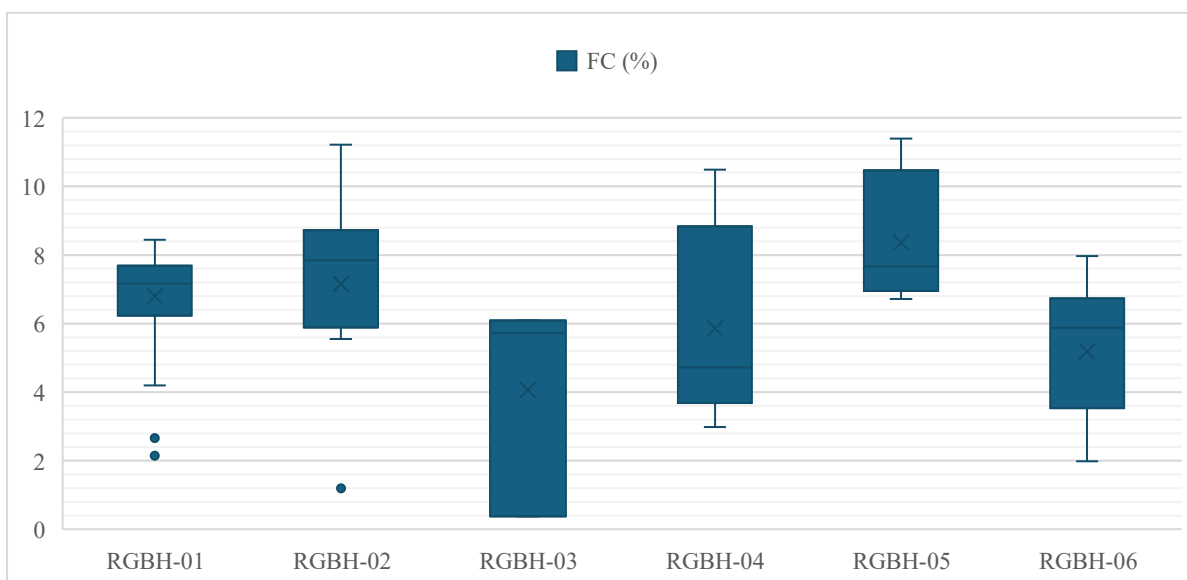


Fig.9.12 Box and whisker plots showing variations of fixed carbon concentration in graphite schist for the borehole core samples.

Analysis of minor and trace element

A total 50 numbers of core samples were analysed for minor and trace elements. The analysis report is given in annexure-XII. The ICMPS results of 50 core samples show Copper (Cu) values ranging from 111 to 571 ppm, Zinc (Zn) 109 to 2285 ppm, Titanium (Ti) 2503 to 6041 ppm, and Vanadium (V) 195 to 533 ppm.

9.10 Check samples

For the reliability of analytical data, approximately 10% of duplicate samples from various boreholes, BRS and trench samples were sent to NABL accredited laboratories for cross-checking and correlation of FC values. The samples analysed by NMCI Shree coal Laboratory (IS 11321:1985) and Shiva Analyticals (India) Private Limited (IS 1350, Part-I) were interchanged with each other. Shiva Analyticals (India) Private Limited followed IS 1350, Part-I for fixed carbon analysis. The analytical report indicates that the variation of values of both original and check samples for percentage of fixed carbon concentrations is not much. Analytical results of proximate analysis for external check (10% of the total generated core samples) are given in annexure-XI.

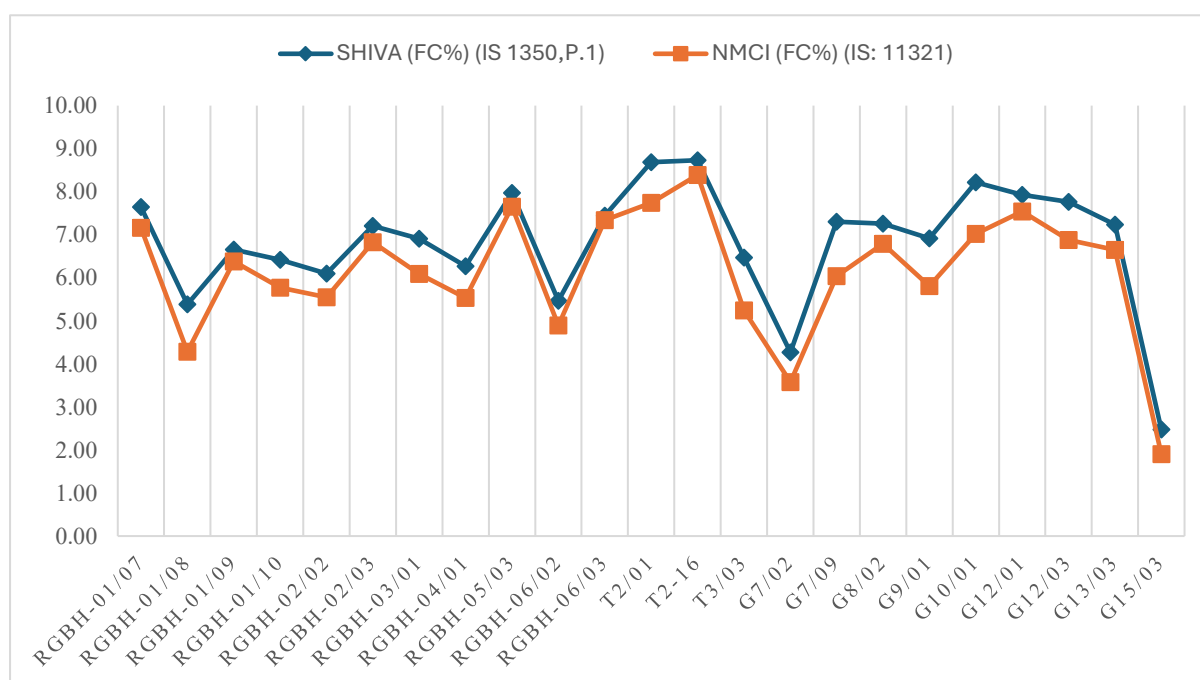


Fig.9.13 Deviation in FC% in the analyses of two laboratories for original and check samples of bedrock, trench and borehole core samples.

9.11 Details of the borehole drilled in the ore zones and their correlation

The details of the intersected mineralised zones are given in the annexure-XIII. Within the graphite bearing zone-A, Zone-A/B-1 and Zone-A/B-5 was correlatable for both the borehole RGBH-01 and RGBH-02. For Zone-B, Zone-B/B-8 & Zone-B/9 was correlatable for RGBH-04, RGBH-05 and RGBH-06. Rest of the bands interpreted to show pinch and swell structure.

CHAPTER-10

Resource estimation

Graphite mineralisation within the Ranibandh Graphite Block has been delineated through a systematic programme of geological mapping, grooving-trenching, geophysical surveys, exploratory core drilling and surface and sub-surface sampling carried out under the G-4 stage of exploration. As a follow up of surface mapping and identification of graphite-bearing zones, a total **450 metres** of core drilling was completed in six boreholes to assess the grade and study the continuity of graphite bands at depth. Drilling data, supported by surface observations, indicate that the graphite bearing zones occurs as multiple continuous as well as discrete bands within quartz mica schist, displaying a tabular geometry as well as pinch-and-swell structure when compared in two adjacent boreholes planned to intersect same graphite bearing zones. A total of **21 grab samples** of graphite schist yielded fixed carbon (FC) values ranging from **2.69% to 9.45%**, while **62 groove samples** collected from graphite schist litho-units reported FC values between **1.90% and 10.03%**, with **61 samples** exceeding 2% FC. **47 trench samples** of graphite schist were collected from six trenches (T-2, T-3, T-5, T-7, T-8 and T-9) showing percentage of fixed carbon from **1.42 % to 11.24%**, where 45 samples shown FC values more than 2%. In addition, **104 core samples** obtained from intersected boreholes show FC values ranging from **0.38% to 11.39%**, with **100 samples** showing values above **2% FC**. Resource estimation for each graphite-bearing zone was carried out by the **cross-sectional area method**, considering a fixed carbon cut-off grade of **2%**, in accordance with standard practice of present days exploration for graphite.

10.1 Detailed description of the ore zones

Resource estimation for graphite was attempted for all 6 positive boreholes, considering the mentioned cut-off values of 2% FC and considering dip length, strike influence and true thickness of the mineralized zones. Zone wise and borehole wise description of intersected Graphite bands delineated at $\geq 2\%$ FC is as follows:

Graphite Zone-A

Zone-A comprises Bhurkura and Rajakata area and located at a distance of 100 m SE of Bhurkura more. To investigate the subsurface geological continuity of the graphite mineralisation up to a vertical depth of 30 metres, three boreholes — **RGBH-01, RGBH-02, and RGBH-03** — were planned and drilled. Based on the interpretation of surface and subsurface data, a total of five graphite bands (**Plate-IV**) have been delineated within Zone A.

The individual bands exhibit true thicknesses ranging from a maximum of **38.60 metres** to a minimum of **0.26 metre**, while the average fixed carbon (FC) content of these bands varies from **2.15% to 8.55%**. A sectional view illustrating the interpreted graphite bands with an average FC% exceeding 2% is given in **Plate-V**.

Borehole wise and depth wise intersection of anomalous graphite bands delineated at $\geq 2\%$ F.C. are given in summarised tabulated form with their average FC% of each band.

Table 10.1 showing borehole wise and depth wise intersection of anomalous graphite bands for Zone-A, delineated at $\geq 2\%$ F.C. cut off					
Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH-01	19.40	19.90	ZONE-A/B-2	0.38	2.15
	22.35	23.70	ZONE-A/B-3	1.02	7.31
	28.30	29.00	ZONE-A/B-4	0.53	8.10
	51.35	51.85	ZONE-A/B-5	0.38	8.44
	54.85	106.00	ZONE-A/B-5	38.60	7.029
RGBH-02	52.25	53.88	ZONE-A/B-1	1.48	6.04
	77.95	79.77	ZONE-A/B-5	1.65	6.13
	84.16	94.45	ZONE-A/B-5	9.33	8.55
RGBH-03	45.23	45.53	RGBH-03/B1	0.26	6.09
	48.51	49.23	RGBH-03/B2	0.62	5.72

Graphite Zone-B

Zone-B comprises Ranibandh near water tank, ashram and Kumarpara area and located at 100 m west of Ranibandh Ashram. A total three boreholes namely RGBH-04, RGBH-05 and RGBH-06 were planned and drilled corresponding to the trenches T-8, T-9 and T-2 respectively, to study the continuity of the graphite bearing litho bands up to 30 m vertical depth. Based on the integrated interpretation of surface and subsurface data, a total of nine graphite bands (**Plate-IV**) were delineated within Zone B. The individual band exhibit true thicknesses ranging from a maximum of **5.67 metres** to a minimum of **0.45 metre**, while the average fixed carbon (FC) content of these bands varies from **3.08% to 8.52%**. A sectional view illustrating the interpreted graphite bands with an average FC% exceeding 2% is presented in **Plate-V**.

The borehole wise and depth wise intersection of anomalous graphite bands delineated at $\geq 2\%$ F.C. are given in summarised table with average FC% of each band.

Table 10.2 showing borehole wise and depth wise intersection of anomalous graphite bands for Zone-B, delineated at $\geq 2\%$ F.C. cut off					
Bh Id	Depth From (m)	Depth To (m)	Graphite bands	True thickness (m)	Weighted av. FC (%)
RGBH04	49.10	54.77	ZONE-B/B-8	5.67	6.81
	55.72	57.45	ZONE-B/B-9	1.73	3.30
RGBH-05	28.00	28.50	ZONE-B/B-8	0.48	6.72
	29.63	32.70	ZONE-B/B-9	2.97	8.52
RGBH-06	8.38	9.38	ZONE-B/B-1	0.98	3.65
	11.77	15.45	ZONE-B/B-2	3.62	5.55
	19.19	20.58	ZONE-B/B-3	1.37	5.95
	23.75	24.58	ZONE-B/B-4	0.82	3.97
	27.29	27.75	ZONE-B/B-5	0.45	5.81
	30.53	33.03	ZONE-B/B-6	2.46	5.60
	35	39	ZONE-B/B-7	3.94	3.08
	41.4	42.35	ZONE-B/B-8	0.94	7.43
	44.25	47.28	ZONE-B/B-9	2.98	4.86

10.2 Cut-off grade

The graphite within the Ranibandh Graphite Block is predominantly composed of small to medium sized flakes, along with quantum amorphous in nature. As per present practice of graphite exploration the cut off is considered as 2% FC for resource estimation.

10.3 Bulk density calculation

A total of 5 core samples submitted to at Shiva Analyticals (India) Private Limited for bulk density determinations (**SOP/OM/094**). The average bulk density determined from these samples is **2.36**, which is considered for ore resource estimation.

Table 10.3 showing bulk density analysis of 5 core samples				
Sl. No.	Sample Id	Sample description	Method	SOP/OM/094
			Units	gm/cm³
			Lab ID	Bulk Density
1	RGBH-01/10	Powder	G1547-4	2.32
2	RGBH-02/09	Powder	G1547-26	2.48
3	RGBH-04/04	Powder	G1547-36	2.21
4	RGBH-05/03	Powder	G1547-40	2.48
5	RGBH-06/13	Powder	G1547-47	2.31

10.4 Assumption of resource estimation by cross sectional area method

In order to estimate the resources and grades of graphite/carbon bearing zones following parameters have been considered.

- The **cut-off grade** was considered as **2% FC** for graphite bearing rock/graphite schist
- The average bulk density of **2.36** for 5 graphite schist samples were taken into consideration during the resource estimation.
- **True thickness** of the ore body was calculated trigonometrically by multiplying the apparent thickness along the borehole axis with Sine of acute angle produced by core axis and true dip of ore body.
- For surface, true thickness of the ore body in grooves and trenches was calculated by multiplying the apparent surface thickness of the mineralized zone along groove lines/trenches with Sine of dip angle of ore body.
- **Strike influence** for each borehole was considered 50% of borehole interval between two successive positive (Intersected mineralisation) boreholes and 25% of the same for the side of less geological confidence i.e. in which side there is no borehole.
- **For graphite bands with surface manifestation (grooves or trenches) and borehole intersections:** The dip length of such bands for groove-trenches was considered up to **50% of the distance** from the surface exposure (groove or trench line) to the borehole intersection point along the dip surface of the ore body. For a borehole intersection point 50% of the distance along dip length is considered towards groove line or trench and an additional distance of 25% from borehole intersection downward along dip surface of the ore body.
- **For graphite bands without surface manifestation but intersected in boreholes:** For the bands which could not be exposed in grooves and trenches, but the band is intersected only in boreholes, the dip length was considered as 25% of the distance above and 25% below the borehole intersection point on the dip surface.
- The volume of the graphite-bearing band was calculated for each borehole intersection and for each groove line or trench intersection using the formula:

$$\text{Volume (V)} = \text{Strike influence} \times \text{Dip length} \times \text{True thickness}$$

Total volume (Vg) was determined by adding up together all pieces of small volume of lodes.

- **Average Grade:**

The average grade of each graphite-bearing band was determined using the formula:

$$\text{Average Grade} = [\Sigma (l_1 \times A_1 + l_2 \times A_2 + \dots)] \div [\Sigma (l_1 + l_2 + \dots)]$$

Where,

l_1, l_2, \dots = sample lengths and

A_1, A_2, \dots = fixed carbon percentages.

- **Resource Calculation**

The resource of graphite was calculated by using the formula:

$$\text{Resource (Rg)} = \text{Volume (Vg)} \times \text{Average bulk density (}\rho\text{g)}$$

Where,

Rg = Resource of graphite

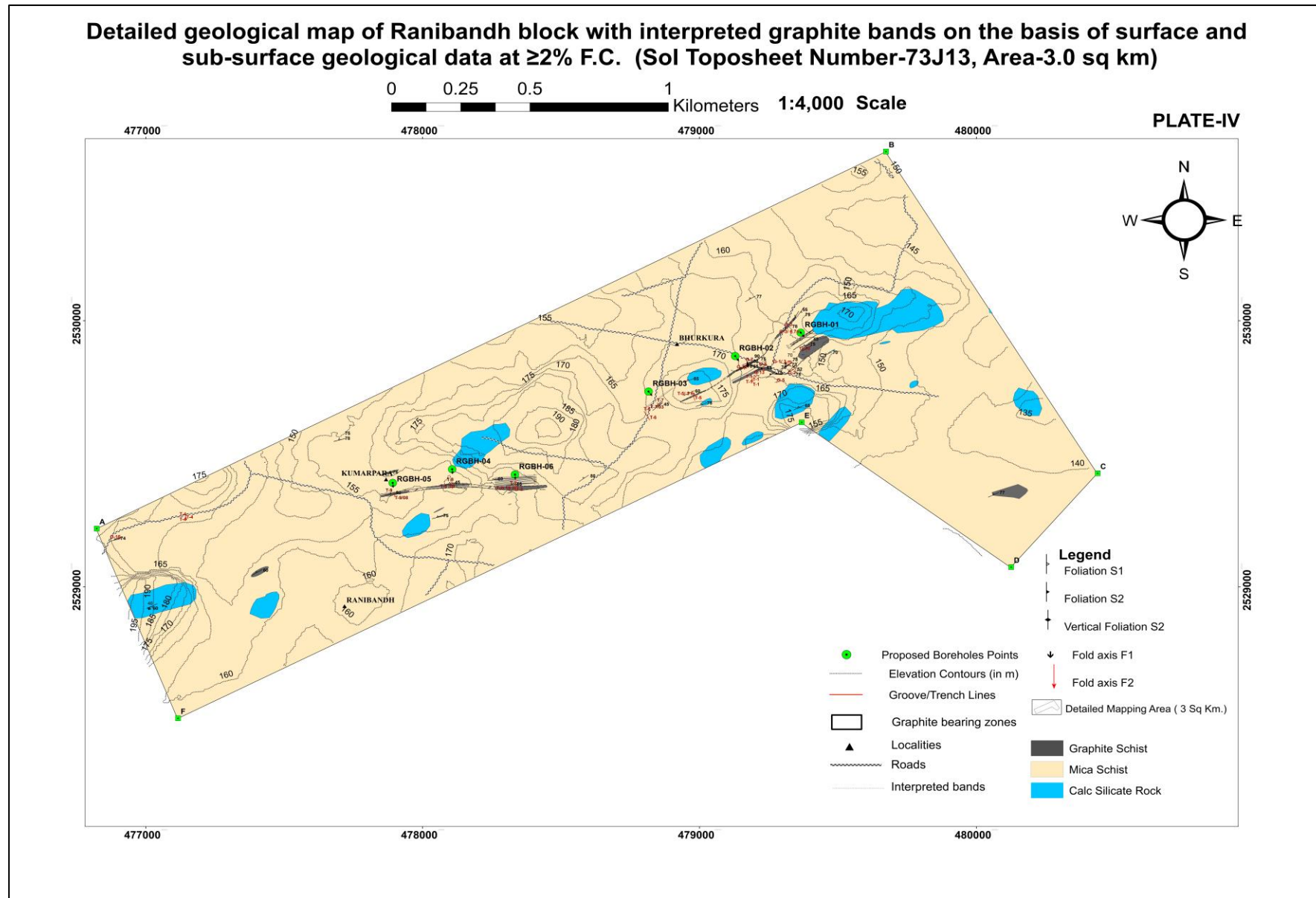
Vg = Volume of the graphite band

ρg = Average bulk density of the graphite band.

- **Methodology of Resource estimation**

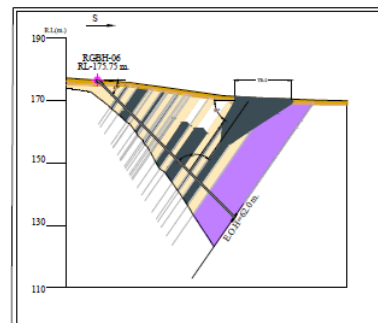
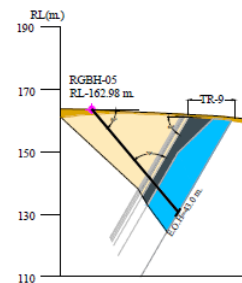
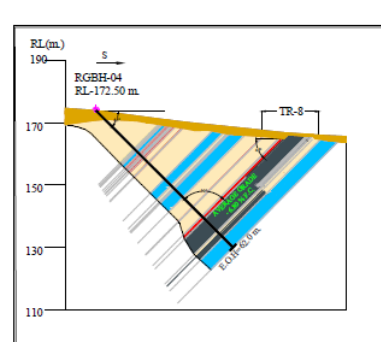
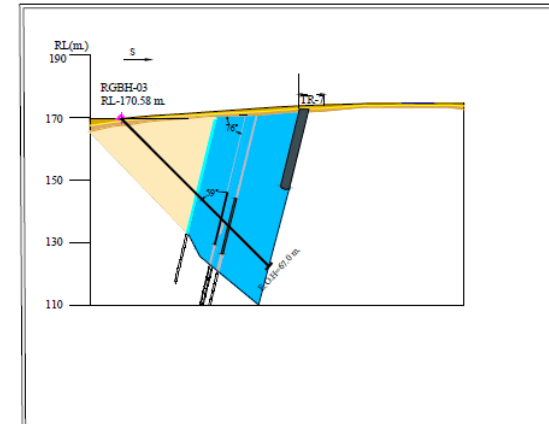
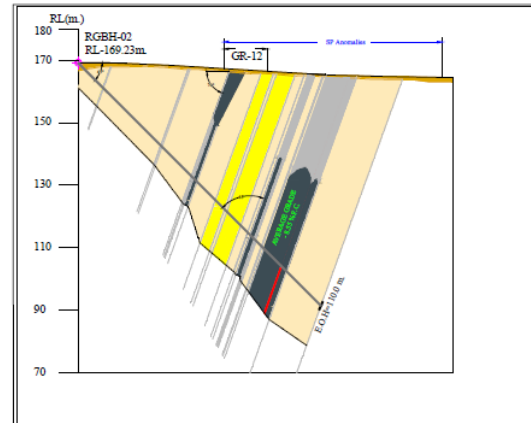
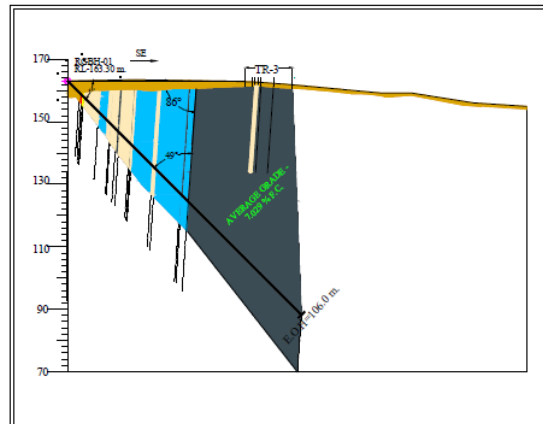
Estimation of resource and grade of graphite in Ranibandh block is done by the “**Cross Sectional Area method**”.










- Resources of graphite in Ranibandh block is categorized under **Reconnaissance Mineral Resources (334)** as per the United Nations Framework Classification (UNFC) or MEMC Rule, 2015.





GEOLOGICAL CROSS SECTIONS OF SIX BOREHOLES SHOWING ANOMALOUS GRAPHITE BANDS DELINEATED AT GREATER THAN 2% FC IN RANIBANDH GRAPHITE BLOCK, BANKURA (WEST BENGAL)


PLATE-V



LITHOLOGICAL INDEX	
TOPSOIL	
WEATHERED MANTLE	
QUARTZ VEIN	
QUARTZ-MICA SCHIST	
CALCAREOUS-QUARTZ-MICA SCHIST	
CALC-SILICATE ROCKS	
QUARTZITE	
GRAPHITE SCHIST(>2% F.C.)	
GRAPHITE SCHIST(<2% F.C.)	

SP ANOMALIES 

BOREHOLE LOCATION 

NAME OF THE BLOCK	RANIBANDH GRAPHITE BLOCK
PREPARED BY	BHOLA PRASAD YADAV
INVESTIGATING AGENCY	MMPL 

10.5 Resource estimation by cross sectional area method

10.5.1. Resource for Graphite at 2% cut off

The resource for graphite was estimated by the cross-sectional area method based on the assumptions outlined in section 10.4. The zone wise resource calculation details are given in table 10.5.1, 10.5.2 and 10.5.3. The Cumulative estimated resource for graphite is **0.898 million tonnes** for **Zone-A** with average grade of **2.15-9.56% FC** and **0.483million tonnes** for **Zone-B** with average grade of **3.08-8.69% FC**. Total resource for graphite in Ranibandh block is **1.38 million tonnes** delineated at $\geq 2\%$ cut off.

Table 10.5.1 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ F.C Cut off for Zone-A										
Bh Id	Depth From (m)	Depth To (m)	Graphite Bands	True Thickness (m)	Strike length	Dip Length	Bulk Density	Weighted Av. FC (%)	Resource of Graphite bands at FC% cut off $\geq 2\%$	Resource (in Million Tonnes)
TRENCH-03			ZONE-A/B-5	1.00	123	27.28	2.36	5.76	7899.041	0.008
			ZONE-A/B-5	4.99	123	28.48	2.36	5.79	41232.53	0.041
RGBH-01	19.40	19.90	ZONE-A/B-2	0.38	123	8.26	2.36	2.15	904.7769	0.001
	22.35	23.70	ZONE-A/B-3	1.02	123	10.12	2.36	6.46	2992.993	0.003
	28.30	29.00	ZONE-A/B-4	0.53	123	13.15	2.36	7.68	2016.579	0.002
	51.35	51.85	ZONE-A/B-5	0.38	123	25.59	2.36	8.05	2803.056	0.003
	54.85	106.00	ZONE-A/B-5	38.60	123	40.91	2.36	7.029	458423.2	0.458
G-12			ZONE-A/B-1	4.70	144.75	18.99	2.36	6.94	30476.74	0.030
RGBH-02	52.25	53.88	ZONE-A/B-1	1.48	144.75	27.28	2.36	6.04	13766.85	0.014
	77.95	79.77	ZONE-A/B-5	1.65	144.75	40.68	2.36	6.13	22922.13	0.023

Table 10.5.1 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ F.C Cut off for Zone-A

Bh Id	Depth From (m)	Depth To (m)	Graphite Bands	True Thickness (m)	Strike length	Dip Length	Bulk Density	Weighted Av. FC (%)	Resource of Graphite bands at FC% cut off $\geq 2\%$	Resource (in Million Tonnes)
	84.16	94.45	ZONE-A/B-5	9.33	144.75	46.12	2.36	8.55	146928.9	0.147
T-7			T-7/B1	2.91	167.5	25.42	2.36	9.01	29247.24	0.029
RGBH-03	45.23	45.53	RGBH-03/B1	0.26	167.5	17.5	2.36	6.09	1798.615	0.002
	48.51	49.23	RGBH-03/B2	0.62	167.5	18.32	2.36	5.72	4489.976	0.004
G-1			ZONE-A/B-5	2.93	80	24.47	2.36	9.56	13554.89	0.014
G-2			ZONE-A/B-5	0.98	70	24.47	2.36	4.02	3953.51	0.004
G-3			ZONE-A/B-1	6.47	108.5	20	2.36	4.97	33142	0.033
G-4			ZONE-A/B-5	2.82	50	24.47	2.36	6.71	8139.172	0.008
G-5			ZONE-A/B-5	0.94	50	24.47	2.36	2.36	2713.057	0.003
G-6			ZONE-A/B-5	12.21	40.7	18.19	2.36	7.63	21341.53	0.021
G-7			ZONE-A/B-1	8.46	27.5	18.19	2.36	5.58	9983.042	0.010
G-8			ZONE-A/B-5	1.81	19	18.19	2.36	6.69	1478.428	0.001
G-9			ZONE-A/B-5	4.70	6.8	18.19	2.36	6.39	1371.408	0.001
G-10			ZONE-A/B-5	1.29	80	24.47	2.36	7.65	5938.466	0.006
G-11			ZONE-A/B-1	2.90	54.25	18.19	2.36	5.03	6748.354	0.007
G-13			ZONE-A/B-5	3.29	50	18.19	2.36	7.83	7058.717	0.007
T-5			ZONE-A/B-1	2.30	157.5	20	2.36	8.4	17083.33	0.017
Cumulative Resource in million tonnes for Graphite of Zone-A delineated at $\geq 2\%$ FC Cut off										0.898

Table 10.5.2 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ FC Cut off for **Zone-B**

Bh Id	Depth From (m)	Depth To (m)	Graphite Bands	True Thickness (m)	Strike length	Dip Length	Bulk Density	Weighted Av. FC (%)	Resource of Graphite bands at FC% cut off $\geq 2\%$	Resource (in Million Tonnes)
Trench-8			ZONE-B/B-8	4.243	223.5	20.31	2.36	8.20	45449.75	0.045
			ZONE-B/B-9	0.707	223.5	20.31	2.36	6.40	7574.959	0.008
RGBH04	49.10	54.77	ZONE-B/B-8	5.670	223.5	30.47	2.36	6.81	91126.57	0.091
	55.72	57.45	ZONE-B/B-9	1.730	223.5	32.56	2.36	3.30	29711.19	0.030
Trench-9			ZONE-B/B-8	6.928	165	13.255	2.36	8.69	35758.85	0.036
RGBH-05	28.00	28.50	ZONE-B/B-8	0.483	165	16.72	2.36	6.72	3144.375	0.003
	29.63	32.70	ZONE-B/B-9	2.965	165	18.57	2.36	8.52	21442.65	0.021
Trench-02			ZONE-B/B-8 & 9	14.744	218.5	17.01	2.36	8.58	129323.4	0.129
RGBH-06	8.38	9.38	ZONE-B/B-1	0.985	113.50	6.49	2.36	3.65	1711.196	0.002
	11.77	15.45	ZONE-B/B-2	3.624	113.50	11.00	2.36	5.55	10678.16	0.011
	19.19	20.58	ZONE-B/B-3	1.369	113.50	15.70	2.36	5.95	5755.19	0.006
	23.75	24.58	ZONE-B/B-4	0.817	113.50	19.00	2.36	3.97	4159.945	0.004
	27.29	27.75	ZONE-B/B-5	0.453	113.50	13.33	2.36	5.81	1617.498	0.002
	30.53	33.03	ZONE-B/B-6	2.462	113.50	15.30	2.36	5.60	10089.91	0.010
	35	39	ZONE-B/B-7	3.939	113.50	18.07	2.36	3.08	19066.63	0.019
	41.4	42.35	ZONE-B/B-8	0.936	218.50	22.06	2.36	7.43	10642.42	0.011
	44.25	47.28	ZONE-B/B-9	2.984	218.50	24.38	2.36	4.86	37513.52	0.038
G-15			ZONE-B	3.912	100	20	2.36	6.35	18466.53	0.018
Cumulative Resource in million tonnes for Graphite of Zone-B delineated at $\geq 2\%$ FC Cut off										0.483

Table 10.5.3 showing Zone wise and Total Resource of Ranibandh block (Zone-A & Zone-B) for Graphite delineated at \geq 2% FC cut off				
Zone	Strike of zone	Weighted Av. FC (%) DB	Total Resource of Zone at FC% cut off \geq 2%	Total Resource (in Million Tonnes)
ZONE -A	650	2.15-9.56%	898408.5245	0.898408524
ZONE-B	600	3.08-8.69%	483232.7808	0.483232781
Total Resource of the block (ZONE-A & ZONE-B) in Million Tonnes				1.38

10.5.2 Resource estimation by 3D SURPAC Modelling

Assessment of resource for graphite has been estimated based on analytical results of surface samples and core samples with fixed carbon $\geq 2\%$ by cross-sectional area method using SURPAC 3D Modelling Software. The consideration of assumption and basic parameters for resource estimation has been outlined in section 10.4. Resources for Graphite of **Zone-A** and **Zone-B** are **0.8424 million tonnes** and **0.5035 million tonnes** respectively, with a total resource for the block **1.346 million tonnes** at greater than 2% F.C.

Table 10.5.2.1 Resource estimation of Zone-A by Surpac 3D solid modelling					
Zone	Band	Volume (in Cubic meter)	Bulk Density (average)	Tonnes	Resource in MT
A	B-1	59589	2.36	140630.04	0.1406
	B-2	2174	2.36	5130.64	0.0051
	B-3	1149	2.36	2711.64	0.0027
	B-4	760	2.36	1793.60	0.0018
	B-5	293291	2.36	692166.76	0.6922
Total Resource of Graphite ore body (FC $\geq 2\%$)		356963			0.8424

Table 10.5.2.2 Resource estimation of Zone-B by Surpac 3D solid modelling					
Zone	Band	Volume (in Cubic metre)	Bulk Density (average)	Tonnes	Resource in MT
B	B-1	649	2.36	1531.64	0.001532
	B-2	4504	2.36	10629.44	0.010629
	B-3	2419	2.36	5708.84	0.005709
	B-4	1874	2.36	4422.64	0.004423
	B-5	801	2.36	1890.36	0.00189
	B-6	4148	2.36	9789.28	0.009789
	B-7	7992	2.36	18861.12	0.018861
	B-8	141597	2.36	334168.9	0.334169
	B-9	49368	2.36	116508.5	0.116508
Total Resource of Graphite ore body (FC $\geq 2\%$)		213352			0.503511

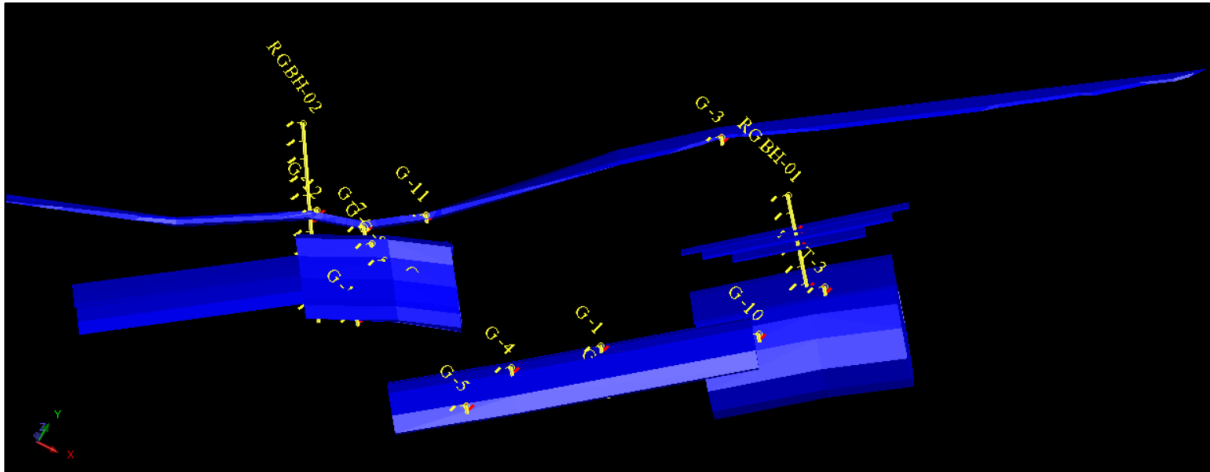


Fig 10.1 Solid Model for Graphite mineralization for Zone A (B-1 to B-5).

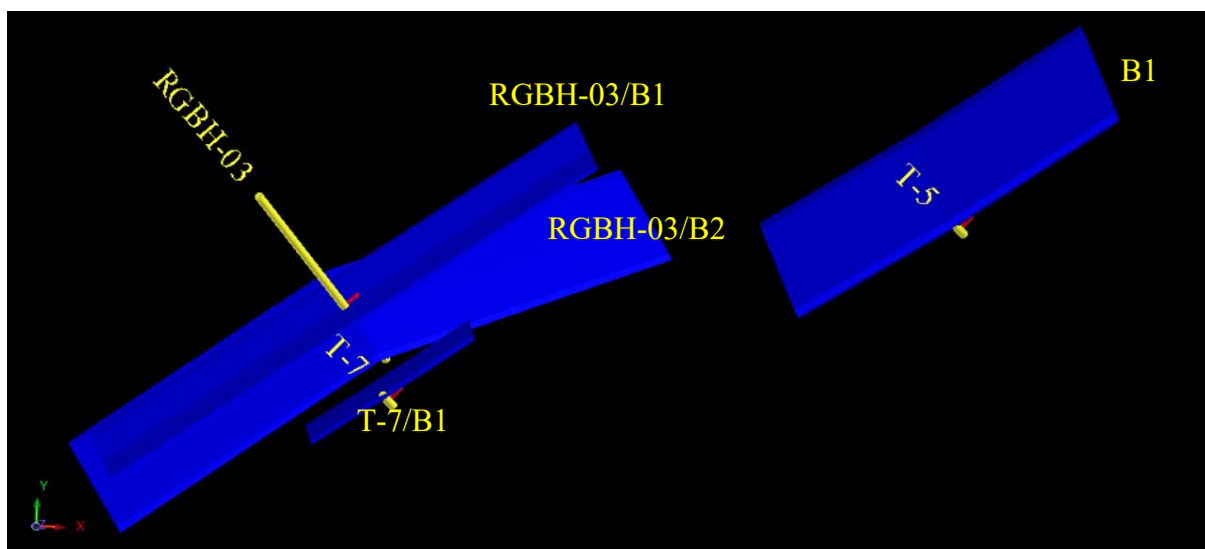


Fig 10.2 Solid Model for Graphite mineralization for Zone A (B-1 & B-2).

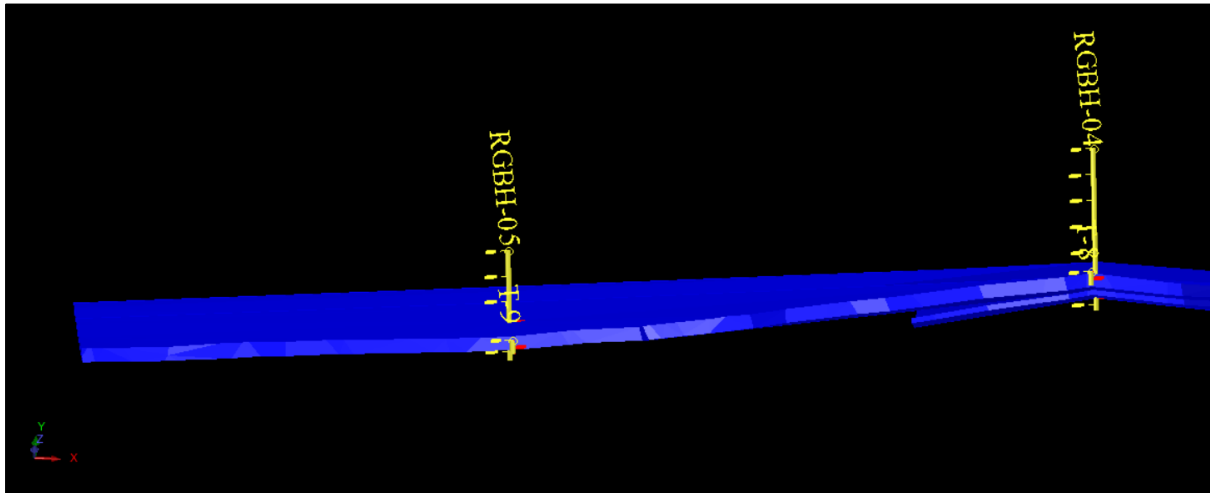


Fig 10.3 Solid Model for Graphite mineralization for Zone B (B-8 & 9).

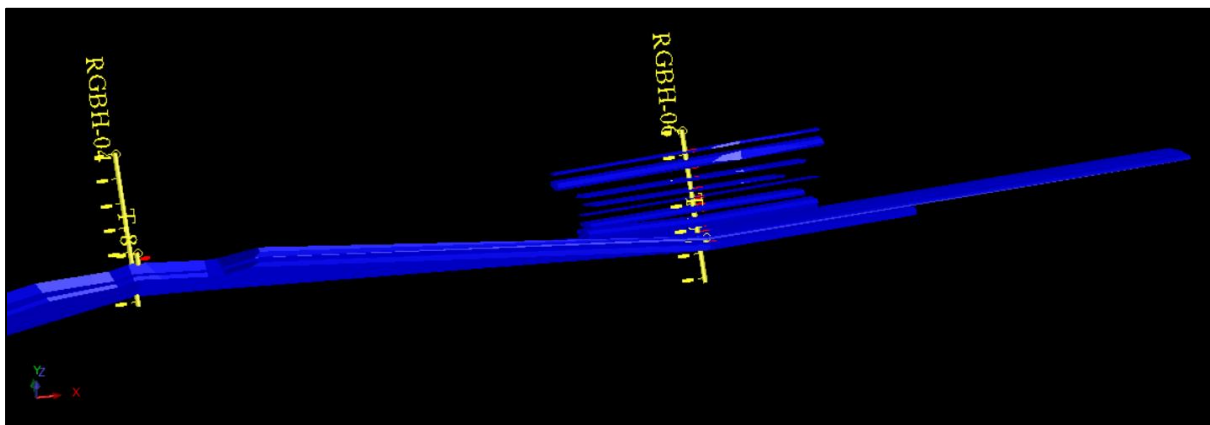


Fig 10.4: Solid Model for Graphite mineralization for Zone B (B-1 to B-9).

10.5.3 Resource estimation by LV Section panel method

The resource of graphite has also been estimated by LV Section Panel Method for Zone-A and Zone-B, in order to ascertain the reliability of resource estimated by Geological Cross Section Method.

10.5.3.1 Methodology adopted in LV Section Panel Method of Resource Estimation

- **Panel Preparation for Zone-A and Zone-B**

LV section panel was Prepared incorporating data from three boreholes: RGBH-01, RGBH-02, and RGBH-03 from Zone-A and RGBH-04, RGBH-05 and RGBH-06 from Zone-B.

- **Strike Influence (L):** Maintained equivalent to that adopted in the **Cross-Sectional Area Method**.

- **Influence of Dip Length (B):** Determined from the difference in Reduced Levels (RL) of the lode.

- **Volume**

The volume of the panel was computed using the formula:

$$\text{Volume} = L \times B \times T$$

where:

L = Strike influence

B = Influence of dip length

T = Thickness of the lode/band

- **Resource Estimation**

The calculated volume of the graphite ore lodes was multiplied by the **average bulk density (2.36)** to obtain the tonnage of the resource

Table 10.5.3.1 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ F.C Cut off for Zone-A (LV Section panel method)

Bh Id/Trench/ Groove Lines	Dep th Fro m (m)	Dep th To (m)	Graphit e Bands		Surfac e thickn ess/ thickn ess along Bh (m)	Ang le of lode with core axis in deg ree (α)	Ang le of lode in deg ree θ	Thick ness of the bands (T)	Stri ke leng th (m)/ Leng th (L)	Influe nce of Dip Leng th/ breat h (B)	Volum e of the Pannels (V)	Bulk Dens ity	Weigh ted Av. FC (%)	Resour ce of Graphi te bands at FC% cut off $\geq 2\%$	Resou rce (in Millio n Tonn es)
						α	θ	T	L	B	V	BD		$R=V \times B \times D$	
TRENCH-03			ZONE-A/B-5	Panel -1	1		86	6.540	123	27.82	22378.9644	2.36	5.79	52814.35598	0.053
			ZONE-A/B-5	Panel -1	5										
RGBH-01	19.40	19.90	ZONE-A/B-2	Panel -2	0.50	49	86	0.300	123	8.24	304.056	2.36	2.15	717.57216	0.001
	22.35	23.70	ZONE-A/B-3	Panel -3	1.35	49	86	0.950	123	10.1	1180.185	2.36	6.46	2785.2366	0.003
	28.30	29.00	ZONE-A/B-4	Panel -4	0.70	49	86	0.500	123	13.125	807.1875	2.36	7.68	1904.9625	0.002
	51.35	51.85	ZONE-A/B-5	Panel -5	0.50	49	86	0.427	123	25.532	1340.966172	2.36	8.05	3164.680166	0.003
	54.85	106.00	ZONE-A/B-5	Panel -6	51.15	49	86	36.390	123	40.94	183246.2118	2.36	7.029	432461.0598	0.432
G-12			ZONE-A/B-1	Panel -7	5		70	3.420	144.75	18.19	9004.86855	2.36	6.94	21251.48978	0.021
RGBH-02	52.25	53.88	ZONE-A/B-1	Panel -8	1.63	65	70	1.150	144.75	25.87	4306.384875	2.36	6.04	10163.06831	0.010

Table 10.5.3.1 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ F.C Cut off for Zone-A (LV Section panel method)

Bh Id/Trench/ Groove Lines	Dep th Fro m (m)	Dep th To (m)	Graphit e Bands		Surfac e thickn ess/ thickn ess along Bh (m)	Ang le of lode with core axis in deg ree (α)	Ang le of lode in deg ree θ	Thick ness of the bands (T)	Stri ke leng th (m)/ Leng th (L)	Influe nce of Dip Leng th/ breat h (B)	Volum e of the Pannel s (V)	Bulk Dens ity	Weigh ted Av. FC (%)	Resour ce of Graphi te bands at FC% cut off $\geq 2\%$	Resou rce (in Millio n Tonn es)
						α	θ	T	L	B	V	BD		R=VxB D	
	77.9 5	79.7 7	ZONE-A/B-5	Panel -9	1.82	65	70	1.290	144.7 5	38.44	7177.80 51	2.36	6.13	16939.6 2004	0.017
	84.1 6	94.4 5	ZONE-A/B-5	Panel -10	10.29	65	70	7.280	144.7 5	43.43	45765.6 654	2.36	8.55	108006. 9703	0.108
T-7			T-7/B1	Panel -11	3		76	2.420	167.5	24.62	9979.71 7	2.36	9.01	23552.1 3212	0.024
RGBH-03	45.2 3	45.5 3	RGBH-03/B1	Panel -12	0.3	59	76	0.210	167.5	16.56	582.498	2.36	6.09	1374.69 528	0.001
	48.5 1	49.2 3	RGBH-03/B2	Panel -13	0.72	59	76	0.510	167.5	17.81	1521.41 925	2.36	5.72	3590.54 943	0.004
G-1			ZONE-A/B-5		3		78	3	80	24.01	5762.4	2.36	9.56	13599.2 64	0.014
G-2			ZONE-A/B-5		1		78	1	70	24.01	1680.7	2.36	4.02	3966.45 2	0.004
G-3			ZONE-A/B-1		6.7		75	6.7	108.5	19.28	14015.5 96	2.36	4.97	33076.8 0656	0.033
G-4			ZONE-A/B-5		3		70	3	50	22.99	3448.5	2.36	6.71	8138.46	0.008

Table 10.5.3.1 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ F.C Cut off for Zone-A (LV Section panel method)

Bh Id/Trench/ Groove Lines	Dep th From (m)	Dep th To (m)	Graphit e Bands		Surfac e thickn ess/ thickn ess along Bh (m)	Ang le of lode with core axis in deg ree (α)	Ang le of lode in deg ree (θ)	Thick ness of the bands (T)	Stri ke leng th (m)/ Leng th (L)	Influe nce of Dip Leng th/ breat h (B)	Volum e of the Pannel s (V)	Bulk Dens ity	Weigh ted Av. FC (%)	Resour ce of Graphi te bands at FC% cut off $\geq 2\%$	Resou rce (in Millio n Tonnes)
						α	θ	T	L	B	V	BD		R=VxB D	
G-5			ZONE-A/B-5		1		70	1	50	22.99	1149.5	2.36	2.36	2712.82	0.003
G-6			ZONE-A/B-5		13		70	13	40.7	17.09	9042.31 9	2.36	7.63	21339.8 7284	0.021
G-7			ZONE-A/B-1		9		70	9	27.5	17.09	4229.77 5	2.36	5.58	9982.26 9	0.010
G-8			ZONE-A/B-5		2		65	2	19	16.5	627	2.36	6.69	1479.72	0.001
G-9			ZONE-A/B-5		5		70	5	6.8	17.09	581.06	2.36	6.39	1371.30 16	0.001
G-10			ZONE-A/B-5		2		40	2	80	15.84	2534.4	2.36	7.65	5981.18 4	0.006
G-11			ZONE-A/B-1		3		75	3	54.25	17.56	2857.89	2.36	5.03	6744.62 04	0.007
G-13			ZONE-A/B-5		3.5		70	3.5	50	17.09	2990.75	2.36	7.83	7058.17	0.007
T-5			ZONE-A/B-1		3		50	3	157.5	15.33	7243.42 5	2.36	8.4	17094.4 83	0.017
Cumulative Resource in million tonnes for Graphite of Zone-A delineated at $\geq 2\%$ FC Cut off															0.811

Table 10.5.3.2 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ FC Cut off for Zone-B (LV Section panel method)

Bh Id/Trench/ Groove Lines	Dep th Fro m (m)	Dep th To (m)	Graphite Bands		Surfa ce thickn ess/ thickn ess along Bh (m)	Ang le of lode with core axis in deg ree (α)	Ang le of lode in deg ree	Thick ness of the bands (T)	Stri ke leng th (m)/ Len gth (L)	Influe nce of Dip Lengt h/ breat h (B)	Volum e of the Pannel s (V)	Bulk Dens ity	Weig hted Av. FC (%)	Resour ce of Graphi te bands at FC% cut off $\geq 2\%$	Resou rce (in Millio n Tonn es)
						α	θ	T	L	B	V	BD		$R=V \times B \times D$	
Trench-8			ZONE-B/B-8	Panel -1	6		45	3.15	223.5	14.36	10109.799	2.36	8.20	23859.12564	0.024
			ZONE-B/B-9	Panel -1	1		45	0.51	223.5	14.36	1636.8246	2.36	6.40	3862.906056	0.004
RGBH04	49.10	54.77	ZONE-B/B-8	Panel -2	5.67	90	45	4.01	223.5	20.93	18758.19855	2.36	6.81	44269.34858	0.044
	55.72	57.45	ZONE-B/B-9	Panel -3	1.73	90	45	1.22	223.5	22.77	6208.6959	2.36	3.30	14652.52232	0.015
Trench-9			ZONE-B/B-8	Panel -4	8.00		60	6	165	11.73	11612.7	2.36	8.69	27405.972	0.027
RGBH-05	28.00	28.50	ZONE-B/B-8	Panel -5	0.50	70	60	0.38	165	14.48	907.896	2.36	6.72	2142.63456	0.002
	29.63	32.70	ZONE-B/B-9	Panel -6	3.07	70	60	2.35	165	16.49	6393.9975	2.36	8.52	15089.8341	0.015
Trench-02			ZONE-B/B-8 & 9	Panel -7	18.00		55	11.05	218.5	15.06	36361.2405	2.36	8.58	85812.52758	0.086
RGBH-06	8.38	9.38	ZONE-B/B-1	Panel -8	1.00	80	55	0.71	113.50	5.33	429.52	2.36	3.65	1013.662598	0.001

Table 10.5.3.2 showing Borehole & Groove/Trenches wise Resource for Graphite delineated at $\geq 2\%$ FC Cut off for Zone-B (LV Section panel method)															
Bh Id/Trench/Groove Lines	Dep th From (m)	Dep th To (m)	Graphite Bands		Surfa ce thickn ess/ thickn ess along Bh (m)	Ang le of lode with core axis in deg ree (α)	Ang le of lode in deg ree	Thick ness of the bands (T)	Stri ke leng th (m)/ Len gth (L)	Influe nce of Dip Leng th/ breat h (B)	Volum e of the Pannel s (V)	Bulk Dens ity	Weig hted Av. FC (%)	Resour ce of Graphi te bands at FC% cut off $\geq 2\%$	Resou rce (in Millio n Tonn es)
						α	θ	T	L	B	V	BD		$R=V \times B \times D$	
	11.77	15.45	ZONE-B/B-2	Panel -9	3.68	80	55	2.6	113.50	9.04	2667.70	2.36	5.55	6295.78144	0.006
	19.19	20.58	ZONE-B/B-3	Panel -10	1.39	80	55	0.98	113.50	12.90	1434.87	2.36	5.95	3386.28612	0.003
	23.75	24.58	ZONE-B/B-4	Panel -11	0.83	80	55	0.59	113.50	15.62	1045.99	2.36	3.97	2468.544188	0.002
	27.29	27.75	ZONE-B/B-5	Panel -12	0.46	80	55	0.33	113.50	10.98	411.26	2.36	5.81	970.563924	0.001
	30.53	33.03	ZONE-B/B-6	Panel -13	2.50	80	55	1.77	113.50	13.63	2738.20	2.36	5.60	6462.149286	0.006
	35	39	ZONE-B/B-7	Panel -14	4.00	80	55	2.83	113.50	15.72	5049.34	2.36	3.08	11916.44854	0.012
	41.4	42.35	ZONE-B/B-8	Panel -15	0.95	80	55	0.67	218.50	18.14	2655.61	2.36	7.43	6267.228508	0.006
	44.25	47.28	ZONE-B/B-9	Panel -16	3.03	80	55	2.14	218.50	18.75	8767.31	2.36	4.86	20690.8575	0.021
G-15			ZONE-B		4.00		78	4	100	19.563	7825.20	2.36	6.35	18467.472	0.018
Cumulative Resource in million tonnes for Graphite of Zone-B delineated at $\geq 2\%$ FC Cut off															0.295

Table 10.5.3.3 showing Zone wise and Total Resource of Ranibandh block for Graphite delineated at $\geq 2\%$ FC cut off (LV Section panel method)				
Zone	Strike of zone	Weighted Av. FC (%) DB	Total Resource of Zone at FC% cut off $\geq 2\%$	Total Resource (in Million Tonnes)
ZONE -A	650	2.15-9.56%	811271.816	0.811271816
ZONE-B	600	3.08-8.69%	295033.8649	0.295033865
Total Resource of the block (ZONE-A & ZONE-B) in Million Tonnes				1.11

The resource for graphite estimated by Longitudinal Vertical (LV) Section Panel method based on the assumptions outlined in section 10.5.3.1. The zone wise resource calculation details are given in table 10.5.3.1, 10.5.3.2 and 10.5.3.3. The Cumulative estimated resource for graphite is **0.811 million tonnes** for **Zone-A** with average grade of **2.15-9.56% FC** and **0.295 million tonnes** for **Zone-B** with average grade of **3.08-8.69% FC**. Total resource for graphite in Ranibandh block is **1.11 million tonnes** delineated at $\geq 2\%$ cut off.

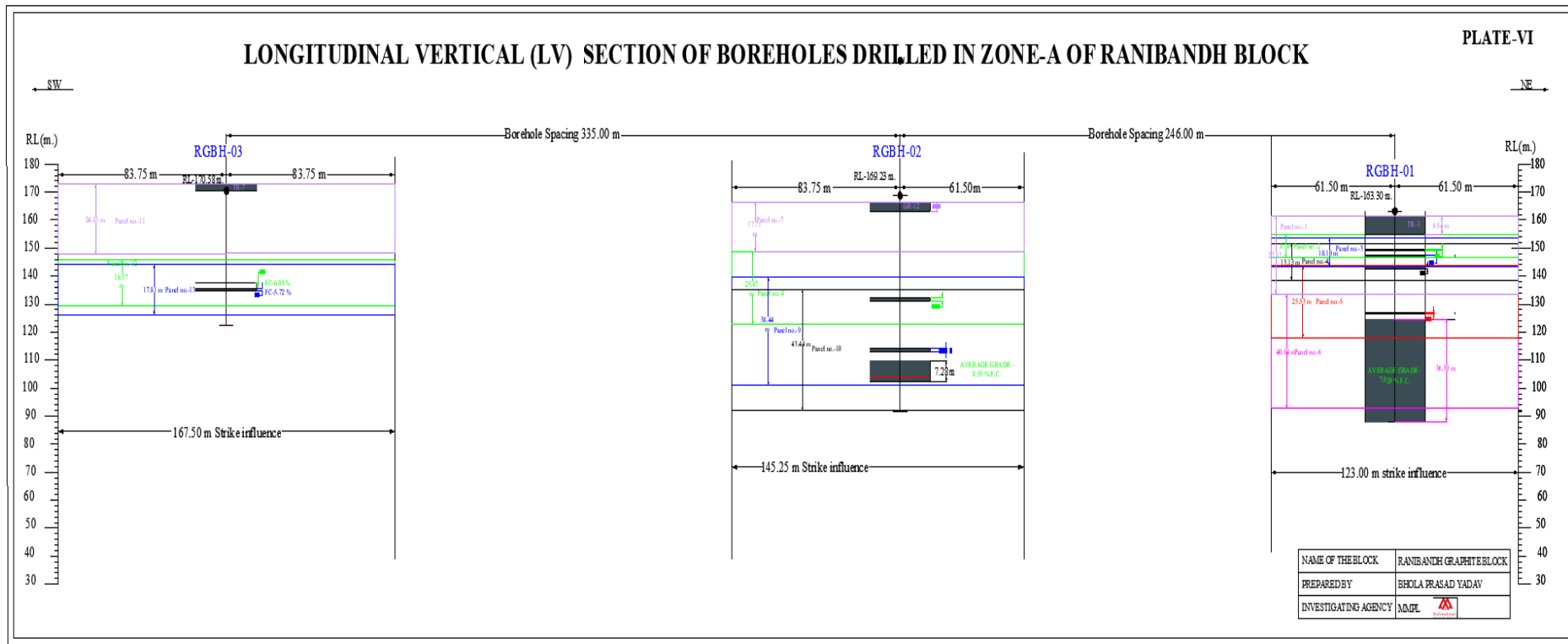


Plate-VI Longitudinal Vertical (LV) Section of boreholes drilled in Zone-A of Ranibandh block.

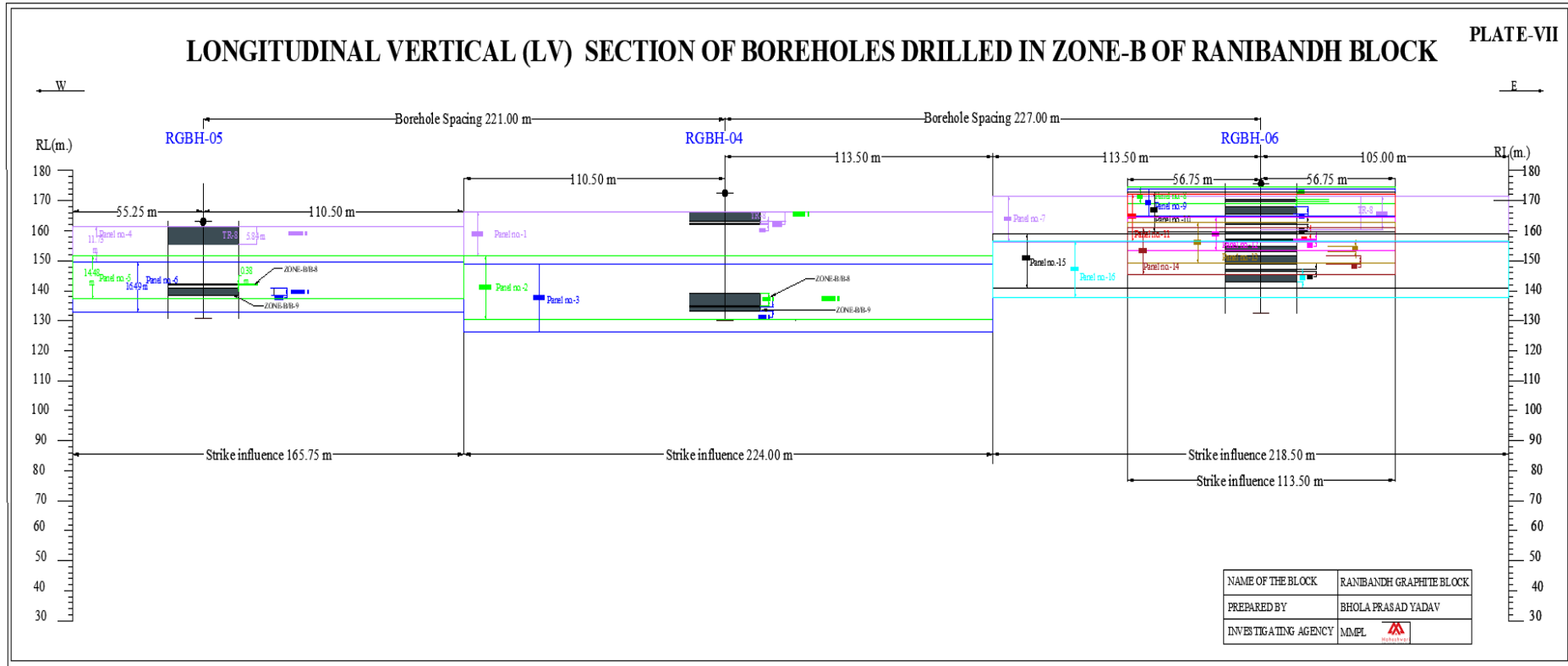


Plate-VII Longitudinal Vertical (LV) Section of boreholes drilled in Zone-B of Ranibandh block.

CHAPTER-11

Conclusion and recommendations

11.1 Conclusion

The graphite (crystalline and amorphous) bearing zones consist of small to medium sized flakes as well as amorphous? one of graphite in association with biotite, muscovite, and quartz along the schistosity. Sulphide mineralisation such as pyrite, pyrrhotite, chalcopyrite, bornite etc. also occur in the form of streaks, specks and stringers along fractures and foliation planes emplaced with sheared quartz veins but concentration of those sulphide veins do not warrant any investigation for basemetals. The geochemical analysis of **21 grab samples** of graphite schist shows fixed carbon (FC) values ranging from **2.69% to 9.45%**, while **62 groove samples** collected from graphite schist litho-units reported FC values between **1.90% and 10.03%**, with **61 samples** exceeding 2% FC. **47 trench samples** of graphite schist collected from six trenches (T-2, T-3, T-5, T-7, T-8 and T-9) show percentage of fixed carbon from **1.42 % to 11.24%**, where 45 samples shown FC values more than 2%. **104 core samples** obtained from intersected boreholes show FC values ranging from **0.38% to 11.39%**, with **100 samples** showing values above the **2% FC**.

In Zone-A, the exposed surface thicknesses of graphite-bearing litho-bands vary between 1.0 metres and **13.0 metres**, indicating ore body with pinching and swelling with a strike length of approximately **650 m**. The geochemical analyses of BRS (groove) and trench samples collected from Zone-A give range of average FC from **5.01-9.56 %**. In Boreholes the individual bands have true thicknesses ranging from a maximum of **38.60 metres** to a minimum of **0.26 metre**, while the average fixed carbon (FC) content of these bands varies from **2.15% to 8.55%**.

The Cumulative estimated resource by the cross-sectional area method for graphite is **0.898 million tonnes** for **Zone-A** with average FC% from **2.15-9.56%**.

In Zone-B, the graphite bearing litho-bands have surface thicknesses **7.0 m to 18.0 m** with a strike length of approximately **600 m** and percentage of fixed carbon of the BRS/groove and trench samples range from **1.42-11.34%**. While in boreholes the true thicknesses of graphite schist bearing bands range from a maximum of **5.67 metres** to a minimum of **0.45 metre**, and the average fixed carbon (FC) content of these bands varies from **3.08% to 8.52%**.

The cumulative estimated resource for **Zone-B** is **0.483 million tonnes** with average FC% ranging from **3.08-8.69%**.

The cumulative strike length of the delineated graphite-bearing zones is thus approximately **1.25 kilometres**, with surface thickness of individual bands ranging from **1 metre to 18 metres**.

A total resource for graphite in Ranibandh block (including Zone-A and Zone-B) is **1.38 million tonnes** with average grade of **6.967% F.C.** (delineated at **≥2% cut off**).

The ICMPS results of 50 core samples show Copper (Cu) values ranging from 111 to 571 ppm, Zinc (Zn) from 109 to 2285 ppm, Titanium (Ti) from 2503 to 6041 ppm, and Vanadium (V) from 195 to 533 ppm.

11.2 Recommendation

Based on geological field observations, the geophysical self-potential (SP) anomaly map, and borehole data, it can be inferred that graphite mineralisation within the area exhibits a characteristic tabular to pinch-and-swell geometry. To upgrade the shape of overall orebody and resource confidence level, systematic, closely spaced drilling, along with extensive pitting and trenching, is recommended. Therefore, the area is recommended for upgradation to **G-3 stage of exploration** to delineate the graphite ore more precisely. Also, **beneficiation studies** and **Total Graphitic Carbon (TGC) analysis** should be carried out to accurately characterise the graphite and confirm the crystalline graphite content and amorphous one.

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13. Locality index

Locality Index			
Sl no.	Name	Latitude	Longitude
1	Bhurkura More	22° 52' 37.516" N	86° 47' 39.225" E
2	Budh khila Primary School	22° 52' 58.616" N	86° 46' 54.953" E
3	Budh khila	22° 53' 5.180" N	86° 46' 54.660" E
4	Galla	22° 52' 9.113" N	86° 46' 9.059" E
5	Kumarpara	22° 52' 21.364" N	86° 46' 47.591" E
6	Neemdanga	22° 52' 2.474" N	86° 46' 53.994" E
7	Panijia	22° 51' 57.088" N	86° 45' 50.065" E
8	Pitha Gerya	22° 52' 46.993" N	86° 46' 5.275" E
9	Rajakata	22° 52' 14.195" N	86° 48' 27.600" E
10	Ranibandh	22° 51' 57.107" N	86° 46' 59.194" E
11	Ranibandh High School	22° 51' 53.806" N	86° 47' 3.576" E
12	Taal gora	22° 52' 3.554" N	86° 47' 39.566" E
13	Taalgora Primary school	22° 51' 58.255" N	86° 47' 41.578" E
14	Tantipara	22° 52' 31.700" N	86° 46' 21.835" E

Annexure-I showing details of BRS (grab) samples collected from graphite bearing litho unit and their analytical results of Ranibandh Graphite Block, Bankura (W.B)									
Sample Code	Sample Id	Easting	Northing	Elevation (m)	MOISTUR E (%) (ARB)	VM (%) (DB)	ASH (%) (DB)	S (%) (DB)	FC (%) (DB)
NMCI/FST/24-25/1251	RG-1	2529908.625	479385.404	152.00	0.29	2.79	89.85	0.18	7.18
NMCI/FST/24-25/1252	RG-2	2529859.663	479211.528	161.00	0.75	3.75	92.07	0.15	4.03
NMCI/FST/24-25/1253	RG-3	2529825.925	479148.797	161.00	0.34	3.02	89.82	0.16	7.00
NMCI/FST/24-25/1254	RG-4	2528236.732	476658.888	178.00	2.56	4.14	90.13	0.17	5.56
NMCI/FST/24-25/1255	RG-5	2530019.385	479339.966	163.00	0.43	3.13	94.07	0.11	2.69
NMCI/FST/24-25/1256	RG-6	2529366.38	480171.099	148.00	0.85	3.32	87.31	0.15	9.22
NMCI/FST/24-25/1257	RG-7	2528769.147	478429.262	155.00	0.95	3.49	92.29	0.19	4.03
NMCI/FST/24-25/1258	RG-8	2529177.293	476905.392	163.00	1.46	3.74	88.20	0.11	7.95
NMCI/FST/24-25/1259	RG-9	2529224.44	476244.395	162.00	0.45	3.71	88.16	0.09	8.04
NMCI/FST/24-25/1260	RG-10	2529431.052	477883.123	164.00	0.62	3.05	89.16	0.08	7.71
NMCI/FST/24-25/1261	RG-11	2529988.655	479325.677	163.00	0.36	3.08	91.40	0.13	5.39
NMCI/FST/24-25/1262	RG-12	2529911.28	479468.037	153.00	0.20	2.85	89.28	0.12	7.75
NMCI/FST/24-25/1263	RG-13	2529837.986	479322.623	151.00	0.36	2.91	90.81	0.18	6.10

Annexure-I showing details of BRS (grab) samples collected from graphite bearing litho unit and their analytical results of Ranibandh Graphite Block, Bankura (W.B)									
Sample Code	Sample Id	Easting	Northing	Elevation (m)	MOISTUR E (%) (ARB)	VM (%) (DB)	ASH (%) (DB)	S (%) (DB)	FC (%) (DB)
NMCI/FST/24-25/1264	RG-14	2529810.393	479262.748	153.00	0.25	2.97	87.41	0.17	9.45
NMCI/FST/24-25/1265	RG-15	2529767.324	479276.936	166.00	0.16	3.14	88.63	0.17	8.06
NMCI/FST/24-25/1266	RG-16	2529838.193	479171.608	160.00	0.96	3.76	90.71	0.16	5.37
NMCI/FST/24-25/1267	RG-17	2529381.214	478324.707	174.00	0.16	2.92	90.76	0.14	6.18
NMCI/FST/24-25/1268	RG-18	2529350.481	478313.265	174.00	0.36	3.30	88.48	0.15	8.07
NMCI/FST/24-25/1269	RG-19	2529313.577	478316.062	171.00	0.19	3.69	93.21	0.14	2.96
NMCI/FST/24-25/1270	RG-20	2529267.814	478065.247	155.00	0.41	2.65	91.47	0.18	5.70
NMCI/FST/24-25/1271	RG-21	2529180.351	476916.509	162.00	0.63	3.35	88.51	0.16	7.98

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	East ing	North ing	Eleva tion	Groove Dimensi on (m)	Litholog y	Fr om (m)	To (m)	Sam ple Len gth (m)	Gr aph ite Band Wi dth	Sample Code	Sampl e Id	Proximate Analysis				
													MO IST UR E (%) AR B	VM (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
G1	G-1	4793 20.8	252983 7.24	154.47 7	5x0.25x0 .25 m	Graphite schist	1.0 0	2.0 0	1.00	3.00	NMCI/FST/24 -25/1422	G1/01	0.43	3.1 1	87. 97	0.1 4	8.78
	G-1	4793 24.5	252983 3.41	154.38 9		Graphite schist	2.0 0	3.0 0	1.00		NMCI/FST/24 -25/1423	G1/02	0.28	2.6 7	87. 32	0.1 4	9.87
						Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24 -25/1424	G1/03	0.39	3.4 1	86. 46	0.1 0	10.03
G-2	G-2	4793 35.8	252981 7.83	154.12 4	4x0.30x0 .20 m	Graphite schist	2.0 0	3.0 0	1.00	1.00	NMCI/FST/24 -25/1425	G2/01	0.33	3.0 0	92. 87	0.1 1	4.02
	G-2	4793 38	252981 4.7	153.96 5													
G-3	G-3	4793 18.7	252996 8.65	160.22 9	5x0.25x0 .30 m	Graphite schist	0.0 0	1.0 0	1.00	6.70	NMCI/FST/24 -25/1426	G3/01	0.44	3.1 6	92. 13	0.1 6	4.55
	G-3	4793 11.3	252997 6.58	160.30 3		Graphite schist	1.0 0	1.7 0	0.70		NMCI/FST/24 -25/1427	G3/02	0.48	3.5 0	90. 16	0.1 8	6.16
						Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24 -25/1428	G3/03	0.29	2.4 4	91. 72	0.1 5	5.69
						Graphite schist	4.0 0	5.0 0	1.00		NMCI/FST/24 -25/1429	G3/04	0.63	2.9 8	90. 53	0.1 6	6.33
						Graphite schist	6.0 0	7.0 0	1.00		NMCI/FST/24 -25/1430	G3/05	0.42	2.9 6	94. 04	0.1 7	2.83
						Graphite schist	7.0 0	8.0 0	1.00		NMCI/FST/24 -25/1431	G3/06	0.44	2.6 3	92. 44	0.1 1	4.82
						Graphite schist	8.0 0	9.0 0	1.00		NMCI/FST/24 -25/1432	G3/07	0.33	2.6 9	92. 43	0.1 1	4.77

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	Easting	Northing	Elevation	Groove Dimension (m)	Lithology	From (m)	To (m)	Sample Length (m)	Graphite Band Width	Sample Code	Sample Id	Proximate Analysis				
													MOISTURE (%) A.R.B	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
G-4	G-4	4792 87.1	252980 2.94	157.77 7		Graphite schist	1.0 0	2.0 0	1.00	3.00	NMCI/FST/24-25/1433	G4/01	0.29	3.2 4	90. 77	0.1 2	5.87
	G-4	4792 88.4	252979 7.2	158.25 9		Graphite schist	2.0 0	3.0 0	1.00		NMCI/FST/24-25/1434	G4/02	0.22	2.9 7	89. 70	0.0 9	7.24
						Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24-25/1435	G4/03	0.46	3.5 0	89. 33	0.1 4	7.03
G-5	G-5	4792 77.8	252977 1.55	161.15	7x0.20x0.25 m	Graphite schist	3.0 0	4.0 0	1.00	1.00	NMCI/FST/24-25/1436	G5/01	0.08	3.6 5	93. 85	0.1 4	2.36
	G-5	4792 79.3	252976 7.03	161.39 7													
G-6	G-6	4792 34.4	252981 1.85	159.54 4	14x0.30x0.30 m	Graphite schist	1.0 0	2.0 0	1.00	13.0 0	NMCI/FST/24-25/1437	G6/01	0.35	2.8 7	90. 50	0.1 3	6.50
	G-6	4792 31.5	252982 6.96	159.55 8		Graphite schist	2.0 0	3.0 0	1.00		NMCI/FST/24-25/1438	G6/02	0.39	2.9 8	87. 83	0.1 2	9.07
						Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24-25/1439	G6/03	0.40	3.3 4	90. 38	0.0 8	6.20
						Graphite schist	4.0 0	5.0 0	1.00		NMCI/FST/24-25/1440	G6/04	0.26	2.8 9	89. 68	0.1 5	7.28
						Graphite schist	5.0 0	6.0 0	1.00		NMCI/FST/24-25/1441	G6/05	0.32	2.4 9	90. 67	0.1 9	6.65
						Graphite schist	6.0 0	7.0 0	1.00		NMCI/FST/24-25/1442	G6/06	0.58	3.2 4	88. 45	0.1 1	8.20
						Graphite schist	7.0 0	8.0 0	1.00		NMCI/FST/24-25/1443	G6/07	0.50	3.2 3	88. 46	0.0 9	8.22
						Graphite schist											

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	East ing	North ing	Eleva tion	Groove Dimensi on (m)	Litholog y	Fr om (m)	To (m)	Sam ple Len gth (m)	Gr aph ite Ba nd Wi dth	Sample Code	Sampl e Id	Proximate Analysis				
													MO IST UR E (%) AR B	VM (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
						Graphite schist	8.00	9.00	1.00		NMCI/FST/24-25/1444	G6/08	0.18	3.50	88.76	0.08	7.66
						Graphite schist	9.00	10.00	1.00		NMCI/FST/24-25/1445	G6/09	0.24	2.72	88.79	0.13	8.36
						Graphite schist	10.00	11.00	1.00		NMCI/FST/24-25/1446	G6/10	0.27	2.64	89.40	0.12	7.84
						Graphite schist	11.00	12.00	1.00		NMCI/FST/24-25/1447	G6/11	0.44	2.84	89.69	0.18	7.29
						Graphite schist	12.00	13.00	1.00		NMCI/FST/24-25/1448	G6/12	0.60	3.22	88.73	0.17	7.88
						Graphite schist	13.00	14.00	1.00		NMCI/FST/24-25/1449	G6/13	0.58	2.97	88.78	0.17	8.08
G-7	G-7	479183	2529833.57	162.83	12x0.30x0.30 m	Graphite schist	2.00	3.00	1.00	9.00	NMCI/FST/24-25/1450	G7/01	0.43	3.29	90.00	0.16	6.55
	G-7	479179.5	2529844.6	162.459		Graphite schist	3.00	4.00	1.00		NMCI/FST/24-25/1451	G7/02	0.23	4.36	91.92	0.14	3.58
						Graphite schist	4.00	5.00	1.00		NMCI/FST/24-25/1452	G7/03	0.45	3.35	90.98	0.15	5.52
						Graphite schist	5.00	6.00	1.00		NMCI/FST/24-25/1453	G7/04	0.43	3.06	91.15	0.14	5.65
						Graphite schist	6.00	7.00	1.00		NMCI/FST/24-25/1454	G7/05	0.41	3.12	90.80	0.18	5.90
						Graphite schist	7.00	8.00	1.00		NMCI/FST/24-25/1455	G7/06	0.60	3.02	92.01	0.16	4.81

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	East ing	North ing	Eleva tion	Groove Dimensi on (m)	Litholog y	Fr om (m)	To (m)	Sam ple Len gth (m)	Gr aph ite Ba nd Wi dth	Sample Code	Sampl e Id	Proximate Analysis				
													MO IST UR E (%) AR B	VM (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
						Graphite schist	8.00	9.00	1.00		NMCI/FST/24-25/1456	G7/07	0.37	3.34	90.88	0.14	5.64
						Graphite schist	9.00	10.00	1.00		NMCI/FST/24-25/1457	G7/08	0.38	3.39	89.87	0.17	6.57
						Graphite schist	10.00	11.00	1.00		NMCI/FST/24-25/1458	G7/09	0.50	4.07	59.74	0.15	36.04
G-8	G-8	479201.1	2529822.69	161.477	6x0.20x.030	Graphite schist	3.00	4.00	1.00	2.00	NMCI/FST/24-25/1459	G8/01	0.33	2.99	90.29	0.13	6.59
	G-8	479199.4	2529828.83	161.485		Graphite schist	4.00	5.00	1.00		NMCI/FST/24-25/1460	G8/02	0.36	3.10	89.99	0.12	6.79
G-9	G-9	479191.2	2529827.34	162.501	7x0.30x0.25 m	Graphite schist	1.50	2.50	1.00	5.00	NMCI/FST/24-25/1461	G9/01	0.27	3.17	90.88	0.14	5.81
	G-9	479188.6	2529834.69	162.257		Graphite schist	2.50	3.50	1.00		NMCI/FST/24-25/1462	G9/02	0.35	3.02	90.36	0.11	6.51
						Graphite schist	3.50	4.50	1.00		NMCI/FST/24-25/1463	G9/03	0.36	2.82	90.33	0.14	6.71
						Graphite schist	4.50	5.50	1.00		NMCI/FST/24-25/1464	G9/04	0.45	2.85	91.01	0.14	6.00
						Graphite schist	5.50	6.50	1.00		NMCI/FST/24-25/1465	G9/05	0.46	2.91	90.01	0.15	6.93
G-10	G-10	479388.6	2529882.16	155.929	4x0.30x0.20 m	Graphite schist	1.00	2.00	1.00	2.00	NMCI/FST/24-25/1466	G10/01	0.25	3.03	89.77	0.18	7.02
	G-10	479386	2529885.63	156.149		Graphite schist	2.00	3.00	1.00		NMCI/FST/24-25/1467	G10/02	0.17	2.73	88.86	0.14	8.27

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	Easting	Northing	Elevation	Groove Dimension (m)	Lithology	From (m)	To (m)	Sample Length (m)	Graphite Band Width	Sample Code	Sample Id	Proximate Analysis				
													MOISTURE (%) A.R.B	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
G-11	G-11	479207.3	2529855.87	161.149	5x0.25x0.30 m	Graphite schist	1.00	2.00	1.00	3.00	NMCI/FST/24-25/1468	G11/01	0.50	3.17	91.64	0.18	5.01
	G-11	479210.7	2529851.79	160.642		Graphite schist	2.00	3.00	1.00		NMCI/FST/24-25/1469	G11/02	0.61	3.91	90.63	0.17	5.29
						Graphite schist	3.00	4.00	1.00		NMCI/FST/24-25/1470	G11/03	0.60	3.61	91.44	0.17	4.78
G-12	G-12	479157.8	2529829.43	165.105	14x0.25x0.20 m	Graphite schist	2.00	3.00	1.00	5.00	NMCI/FST/24-25/1471	G12/01	0.31	2.89	89.41	0.16	7.54
	G-12	479162.8	2529816.72	164.971		Graphite schist	3.00	4.00	1.00		NMCI/FST/24-25/1472	G12/02	0.29	3.10	89.88	0.15	6.87
						Graphite schist	4.00	5.00	1.00		NMCI/FST/24-25/1473	G12/03	0.20	3.08	89.87	0.17	6.88
						Graphite schist	5.00	6.00	1.00		NMCI/FST/24-25/1474	G12/04	0.26	3.31	90.45	0.14	6.10
						Graphite schist	6.00	7.00	1.00		NMCI/FST/24-25/1475	G12/05	0.28	3.30	89.22	0.17	7.31
G-13	G-13	479204.5	2529787.72	161.016	11x0.25x0.20 m	Graphite schist	1.00	2.00	1.00	3.50	NMCI/FST/24-25/1476	G13/01	0.14	3.16	88.75	0.16	7.93
	G-13	479196.9	2529796.31	161.549		Graphite schist	2.00	3.00	1.00		NMCI/FST/24-25/1477	G13/02	0.28	3.29	87.76	0.14	8.81
						Graphite schist	3.00	4.00	1.00		NMCI/FST/24-25/1478	G13/03	0.31	3.44	89.77	0.14	6.65
						Graphite schist	9.80	10.30	0.50		NMCI/FST/24-25/1479	G13/04	0.27	3.57	88.21	0.16	8.06

Annexure-II showing details of BRS (groove) samples of graphite bearing schist with analytical results for F.C. of Ranibandh Graphite Block, Bankura (W.B)																	
Groove Id	Details	Easti ng	Northi ng	Eleva tion	Groove Dimensi on (m)	Litholog y	Fr om (m)	To (m)	Sam ple Len gth (m)	Gr aph ite Band Wi dth	Sample Code	Sampl e Id	Proximate Analysis				
													MO IST UR E (%) AR B	VM (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
G-15	G-15	4769 00.9	252918 8.92	164.00 2	10X0.25 X0.25 m	Graphite schist	1.0 0	2.0 0	1.00	4.00	NMCI/FST/24 -25/1480	G15/01	1.52	3.6 2	87. 12	0.1 5	9.11
	G-15	4769 02.7	252917 8.78	163.39 8		Graphite schist	2.0 0	3.0 0	1.00		NMCI/FST/24 -25/1481	G15/02	1.50	3.6 8	89. 22	0.1 8	6.92
						Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24 -25/1482	G15/03	0.84	2.7 7	95. 16	0.1 7	1.90
						Graphite schist	5.0 0	6.0 0	1.00		NMCI/FST/24 -25/1483	G15/04	1.88	3.8 9	88. 50	0.1 3	7.48

Annexure-III showing details of trench samples collected from graphite bearing schist and analytical results of Ranibandh Graphite Block, Bankura (W.B)																	
Trench Id	Details	Easting	Northing	Elevation	Trench Dimension (m)	Lithology	From (m)	To (m)	Sample Length (m)	Graphite Band Width (m)	Sample Code	Sample Id	Proximate Analysis				
													MOI STURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
T-2	T-2	4783 37.7	252938 0.871	156.35 4	20x0.70x 0.70 m	Graphite schist	1.0 0	2.0 0	1.00	18.00	NMCI/FST/24 -25/1484	T2/0 1	0.52	3.4 7	88. 67	0.1 2	7.74
	T-2	4783 36.7	252938 0.759	156.31 6		Graphite schist	2.0 0	3.0 0	1.00		NMCI/FST/24 -25/1485	T2/0 2	0.63	3.7 5	93. 58	0.0 9	2.58

Annexure-III showing details of trench samples collected from graphite bearing schist and analytical results of Ranibandh Graphite Block, Bankura (W.B)																	
Trench Id	Details	Easti ng	Northi ng	Eleva tion	Trench Dimensi on (m)	Lithology	Fr om (m)	To (m)	Sam ple Len gth (m)	Grap hite Band Widt h (m)	Sample Code	Sam ple Id	Proximate Analysis				
													MOI STU RE (%) ARB	V M (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
	T-2	4783 37.9	252936 1.018	159.61 5		Graphite schist	3.0 0	4.0 0	1.00		NMCI/FST/24 -25/1486	T2/0 3	0.46	2.8 5	89. 25	0.0 7	7.83
	T-2	4783 37.4	252936 0.888	159.49 3		Graphite schist	4.0 0	5.0 0	1.00		NMCI/FST/24 -25/1487	T2/0 4	0.27	2.7 8	87. 20	0.0 8	9.94
						Graphite schist	5.0 0	6.0 0	1.00		NMCI/FST/24 -25/1488	T2/0 5	0.20	2.6 3	87. 71	0.0 9	9.57
						Graphite schist	6.0 0	7.0 0	1.00		NMCI/FST/24 -25/1489	T2/0 6	0.22	2.9 1	85. 68	0.0 7	11.34
						Graphite schist	7.0 0	8.0 0	1.00		NMCI/FST/24 -25/1490	T2/0 7	0.28	3.0 5	87. 71	0.0 8	9.16
						Graphite schist	8.0 0	9.0 0	1.00		NMCI/FST/24 -25/1491	T2/0 8	0.31	2.7 6	87. 31	0.0 9	9.84
						Graphite schist	9.0 0	10. 00	1.00		NMCI/FST/24 -25/1492	T2/0 9	0.58	2.9 3	88. 52	0.1 0	8.45
						Graphite schist	10. 00	11. 00	1.00		NMCI/FST/24 -25/1493	T2/1 0	0.66	3.3 6	88. 64	0.1 4	7.86
						Graphite schist	11. 00	12. 00	1.00		NMCI/FST/24 -25/1494	T2/1 1	0.51	3.5 0	90. 06	0.0 8	6.36
						Graphite schist	12. 00	13. 00	1.00		NMCI/FST/24 -25/1495	T2/1 2	0.41	3.3 7	86. 52	0.1 5	9.96
						Graphite schist	13. 00	14. 00	1.00		NMCI/FST/24 -25/1496	T2/1 3	0.22	2.5 8	89. 68	0.1 8	7.56

Annexure-III showing details of trench samples collected from graphite bearing schist and analytical results of Ranibandh Graphite Block, Bankura (W.B)																	
Trench Id	Details	Easti ng	Northi ng	Eleva tion	Trench Dimensi on (m)	Litholo gy	Fr om (m)	To (m)	Sam ple Len gth (m)	Grap hite Band Widt h (m)	Sample Code	Sam ple Id	Proximate Analysis				
													MOI STU RE (%) ARB	V M (%) DB	AS H (%) DB	S (%) DB	FC (%) DB
						Graphite schist	14.00	15.00	1.00		NMCI/FST/24-25/1497	T2/14	0.66	3.41	86.10	0.17	10.32
						Graphite schist	15.00	16.00	1.00		NMCI/FST/24-25/1498	T2/15	0.39	3.14	88.82	0.15	7.89
						Graphite schist	16.00	17.00	1.00		NMCI/FST/24-25/1499	T2/16	0.19	2.93	88.54	0.14	8.39
						Graphite schist	17.00	18.00	1.00		NMCI/FST/24-25/1500	T2/17	0.33	3.52	86.90	0.14	9.44
						Graphite schist	18.00	19.00	1.00		NMCI/FST/24-25/1501	T2/18	0.16	3.33	86.26	0.18	10.23
T3	T3	479407	2529919	162.79	15X1X0.70 m	Graphite schist	3.00	4.00	1.00	6.00	NMCI/FST/24-25/1502	T3/01	0.64	3.23	90.82	0.19	5.76
	T3	479413	2529907	161.44		Graphite schist	5.00	6.00	1.00		NMCI/FST/24-25/1503	T3/02	0.12	2.57	92.25	0.17	5.01
						Graphite schist	6.00	7.00	1.00		NMCI/FST/24-25/1504	T3/03	0.15	2.91	91.69	0.16	5.24
						Graphite schist	7.00	8.00	1.00		NMCI/FST/24-25/1505	T3/04	0.07	2.98	90.87	0.15	6.00
						Graphite schist	8.00	9.00	1.00		NMCI/FST/24-25/1506	T3/05	0.35	3.32	89.78	0.14	6.76
						Graphite schist	9.00	10.00	1.00		NMCI/FST/24-25/1507	T3/06	0.25	3.24	90.65	0.15	5.96

Annexure-III showing details of trench samples collected from graphite bearing schist and analytical results of Ranibandh Graphite Block, Bankura (W.B)																	
Trench Id	Details	Easting	Northing	Elevation	Trench Dimension (m)	Lithology	From (m)	To (m)	Sample Length (m)	Graphite Band Width (m)	Sample Code	Sample Id	Proximate Analysis				
													MOI STURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
T5	T5/01	478972	2529736	178.8	35.5X1.0 X0.60 m	Graphite schist	20.50	21.50	1.00	3.00	2251	T5/01	0.55	2.28	89.91	0.18	7.63
	T5/02	478983	2529701	175.84		Graphite schist	21.50	22.50	1.00		2252	T5/02	0.41	2.65	88.43	0.11	8.81
	T5/03					Graphite schist	22.50	23.50	1.00		2253	T5/03	0.49	2.18	88.89	0.16	8.77
T7	T7/01	478846	2529691	173.62	8.0X1.5 X1.0 m	Graphite schist	3.00	4.00	1.00	3.00	NMCI/FST/24-25/2369	T7/01	0.90	2.53	87.66	0.15	9.66
	T7/02	478854	2529686	174.28		Graphite schist	4.00	5.00	1.00		NMCI/FST/24-25/2370	T7/02	0.55	2.28	89.18	0.19	8.35
	T7/03					Graphite schist	5.00	6.00	1.00		NMCI/FST/24-25/2371	T7/03	0.76	2.27	88.60	0.11	9.02
T8	T8/01	478109	2529393	166.74	18.0X1.0 X1.0 m	Graphite schist	7.00	8.00	1.00	9.00	NMCI/FST/24-25/2372	T8/01	0.58	1.61	87.28	0.09	11.03
	T8/02	478107	2529368	164.86		Graphite schist	8.00	9.00	1.00		NMCI/FST/24-25/2373	T8/02	0.86	2.51	90.50	0.08	6.91
	T8/03					Graphite schist	9.00	10.00	1.00		NMCI/FST/24-25/2374	T8/03	1.00	2.93	90.08	0.13	6.87
	T8/04					Graphite schist	10.00	11.00	1.00		NMCI/FST/24-25/2375	T8/04	1.44	2.31	87.61	0.12	9.96
	T8/05					Graphite schist	11.00	12.00	1.00		NMCI/FST/24-25/2376	T8/05	1.26	2.47	89.98	0.18	7.37
	T8/06					Graphite schist	12.00	13.00	1.00		NMCI/FST/24-25/2377	T8/06	1.67	2.82	89.93	0.17	7.08

Annexure-III showing details of trench samples collected from graphite bearing schist and analytical results of Ranibandh Graphite Block, Bankura (W.B)																	
Trench Id	Details	Easting	Northing	Elevation	Trench Dimension (m)	Lithology	From (m)	To (m)	Sample Length (m)	Graphite Band Width (m)	Sample Code	Sample Id	Proximate Analysis				
													MOI STURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
	T8/07					Graphite schist	13.00	14.00	1.00		NMCI/FST/24-25/2378	T8/07	0.75	2.69	95.72	0.17	1.42
	T8/08					Graphite schist	14.00	15.00	1.00		NMCI/FST/24-25/2379	T8/08	1.11	2.13	91.31	0.16	6.40
	T8/09					Graphite schist	15.00	16.00	1.00		NMCI/FST/24-25/2380	T8/09	0.71	2.68	95.41	0.14	1.77
T9	T9/01	477896	2529354	160.84	15.0X1.0 X1.0 m	Graphite schist	0.0	1.00	1.00	8.00	NMCI/FST/24-25/2381	T9/01	0.56	2.38	91.35	0.15	6.12
	T9/02	477899	2529339	159.16		Graphite schist	1.00	2.00	1.00		NMCI/FST/24-25/2382	T9/02	0.76	2.24	91.43	0.14	6.19
	T9/03					Graphite schist	2.00	3.00	1.00		NMCI/FST/24-25/2383	T9/03	1.16	2.11	88.48	0.18	9.22
	T9/04					Graphite schist	3.00	4.00	1.00		NMCI/FST/24-25/2384	T9/04	1.04	2.12	89.57	0.16	8.14
	T9/05					Graphite schist	4.00	5.00	1.00		NMCI/FST/24-25/2385	T9/05	0.84	2.24	88.09	0.14	9.53
	T9/06					Graphite schist	5.00	6.00	1.00		NMCI/FST/24-25/2386	T9/06	1.07	2.05	86.54	0.17	11.24
	T9/07					Graphite schist	6.00	7.00	1.00		NMCI/FST/24-25/2387	T9/07	1.38	2.36	86.42	0.15	11.07
	T9/08					Graphite schist	7.00	8.00	1.00		NMCI/FST/24-25/2388	T9/08	0.47	2.14	89.68	0.13	8.05

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
10.02.2025 (DAY)	0.00	0.50	0.50	0.45	90.00			Light brown			Unconsolidated Silty Soil with fragments of Quartz (1-3 cm)	Soil Cover	Dry drilling
	0.50	1.00	0.50	0.46	92.00			Light brown			Unconsolidated Silty Soil with fragments of Quartz (1-3 cm)	Soil Cover	Dry drilling
11.02.2025 (DAY)	1.00	1.80	0.80	0.75	93.75			Reddish			Lateritic Silty soil with pebbles of Silica (1-2 cm)	Soil Cover	Dry drilling

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	1.80	2.80	1.00	0.90	90.00			Reddish			Lateritic Silty soil with pebbles of Silica (1-2 cm)	Soil Cover	Dry drilling
	2.80	4.00	1.20	1.08	90.00			Reddish			Lateritic Silty soil with pebbles of Silica (1-2 cm)	Soil Cover	Dry drilling
11.02.2025(NIGHT)	4.00	5.50	1.50	0.80	53.33			Greyish	fine		fine grained sandy soil with micas	Soil Cover	
	5.50	6.40	0.90	0.70	77.78			White to colourless	medium		Hard, sub-angular fragments/nodules of Quartz	Quartz vein?	Nodular, fragments

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	6.40	7.00	0.60	0.28	46.67			Greyish	fine to medium	Weak	Quartz-muscovite schist with microfolds, crenulations	Quartz-mica schist	Slickensides, $\alpha=37^\circ$
	7.00	7.30	0.30	0.25	83.33			White to colourless	fine to medium		Quartz pebbles & nodules	Quartz vein?	
	7.30	8.50	1.20	0.95	79.17			Brown to whitish	medium		Loose Silica sand with few felspar & mica	Unconsolidated Silica Sand	crushed materials of Quartz-Mica Schist?

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	8.50	10.00	1.50	0.96	64.00			Brown to whitish	medium		Loose Silica sand with few feldspar & mica	Unconsolidated Silica Sand	crushed materials of Quartz-Mica Schist?
15.02.2025(DAY)	10.00	10.15	0.15	0.15	100.00			Brownish	fine	Partially	Quartz-muscovite schist	Quartz-mica schist	
	10.15	10.45	0.30	0.30	100.00			Greyish blue/ Colourless	medium		Quartz rich fragments, non-reactive to dil. HCL	Quartz vein?	Fractured, fragmented subangular nodules
	10.45	11.00	0.55	0.40	72.73			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	11.00	11.30	0.30	0.28	93.33			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured
	11.30	11.80	0.50	0.49	98.00			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured
	11.80	13.00	1.20	1.20	100.00			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured, FI-11, $\alpha=55^\circ$
	13.00	14.00	1.00	0.80	80.00			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured, FI-09, $\alpha=55^\circ$, foliated
15.02.2025 (NIGHT)	14.00	14.15	0.15	0.15	100.00			Brownish	fine	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	14.15	16.00	1.85	1.75	94.59			Greyish to whitish(colorless)	fine	Altered at places	Hard, fractured, alternate layerings of carbonates & silicates	Calc-silicate	FI-16, Effervescent with dil. HCL
	16.00	18.20	2.20	2.05	93.18	0.10		Greyish to whitish(colorless)	fine	Altered at places	Hard, fractured, alternate layerings of carbonates & silicates	Calc-silicate	FI-20, Effervescent with dil. HCL
	18.20	19.00	0.80	0.65	81.25			yellowish brown	fine	Partially	Quartz-mica/sericite schist	Quartz-mica schist	signatures of graphite along fractures,

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
													fractured, Silicified
	19.0 0	19.4 0	0.40	0.38	95.00			yellowish brown	fine	Partially	Quartz- mica/sericite schist	Quartz- mica schist	signatures of graphite along fractures, fractured, Silicified
	19.4 0	19.9 0	0.50	0.50	100.0 0			Greyish black	fine	Oxidation of Iron/pyrite	Hard, Crenulated, Quartz-mica- graphite Schist	Quartz- mica- graphite schist	Soils hand, sub-metallic lustre, greasy feel, Siliceous
	19.9 0	22.0 0	2.10	2.10	100.0 0			Greyish brown	fine	Partially	Quartz- muscovite-	Quartz- mica schist	Fractured, Graphite patch at 20.20 m

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											biotite(less) schist		
16.02.2025 (DAY)	22.00	22.35	0.35	0.35	100.00			Brownish	fine	Partially	Hard, fractured, Quartz-muscovite, biotite(less) schist	Quartz-mica schist	Crenulated at places
	22.35	23.50	1.15	1.05	91.30			Greyish Black	fine		Hard, fractured, Quartz-muscovite, biotite(less) Graphite schist	Quartz-mica - graphite schist	Soils hand, sub-metallic lustre, greasy feel

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	23.5 0	23.7 0	0. 20	0.15	75.00			Greyish Black	fine		Hard, fractured, Quartz- muscovite, biotite(less) graphite schist	Quartz- mica- graphite schist	Soils hand
	23.7 0	25.0 0	1. 30	1.15	88.46			Yellowish brown to reddish brown	fine	Partially weathered, oxidised	Hard, Silicified, quartz-mica schist, oxidised at place to give reddish stain	Quartz- mica schist?	Non- effervescent with dil. HCL
	25.0 0	27.0 0	2. 00	1.90	95.00			Yellowish brown	fine	Partially weathered,	Hard, Quartz- mica schist	Quartz- mica schist?	Fractured.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
										oxidised/Li monitic	with crude schistosity		
16.02.2025 (NIGHT)	27.0 0	28.0 0	1. 00	1.00	100.0 0			Greyish yellow	fine	Partially	Highly fractured, Quartz-mica schist	Quartz- mica schist?	Silicified & Limonitised at places.
	28.0 0	28.3 0	0. 30	0.26	86.67			Greyish yellow	fine	Partially	Quartz-mica schist, foliated	Quartz- mica schist	Fractured.
	28.3 0	29.0 0	0. 70	0.70	100.0 0			Greyish black	fine	Reddish stain at places	Foliated, Quartz-mica- graphite schist	Quartz- mica- graphite schist	Soils hand, oxidised at places.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	29.00	29.40	0.40	0.40	100.00			Greyish brown	fine	Partially	Quartz-muscovite-biotite(less) schist	Quartz-Mica Schist	$\alpha=47^\circ$, foliated
	29.40	29.50	0.10	0.10	100.00			Greyish to buff	fine	Partially	hard, alternate banding of silicates (Greyish/colour less) & buff colour carbonates (Calc-Silicates)	Calc-silicate? / Calc-gneiss	Weak to no effervescence
	29.50	31.00	1.50	1.42	94.67	0.10	6.66666667	Greyish to buff	fine	Partially	hard, alternate banding of silicates	Calc-silicate? /	Fractured, FI-15, less mica,

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											(Greyish/colourless) & buff colour carbonates (Calc-silicates)	Calc-gneiss	No effervescence
17.02.2025 (DAY)	31.00	31.95	0.95	0.85	89.47		0	Greyish to buff	fine	Partially	hard, alternate banding of silicates (Greyish/colourless) & buff colour carbonates (Calc-silicates)	Calc-silicate? / Calc-gneiss	Fractured, F-11

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	31.95	32.50	0.55	0.45	81.82		0	Brownish	fine	highly weathered	Highly weathered, loose/unconsolidated, fragile quartz-feldspar rich rock	Calc-silicate?	Quartzo-feldspathic
	32.50	33.25	0.75	0.72	96.00		0	Brownish	fine	highly weathered	Highly weathered, loose/unconsolidated, fragile quartz-feldspar rich rock	Calc-silicate?	Quartzo-feldspathic
	33.25	34.00	0.75	0.65	86.67		0	Greyish to brown	fine		Hard, Fractured/Fragmented,	Calc-silicate?	Highly Fractured

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											Quartz- feldspar, clino- pyroxene/diops ide rich rock/Calc- silicate?		
	34.0 0	34.5 0	0.50	0.35	70.00		0	Greyish to brown	fine	Partially	Hard, Fractured/Frag mented, Quartz- feldspar, clino- pyroxene/diops ide rich rock/Calc- silicate?	Calc- silicate?	Highly Fractured

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
17.02.2025 (NIGHT)	34.50	35.70	1.20	1.12	93.33	0.11	9.16666667	Bluish/colourless to Greyish white	fine	Partially	Hard, Fractured, Calc-silicate with alternate carbonate(white/light) & silicates (Colourless/Bluish)	Calc-silicate?	Fractured, Effervescent with dil. HCL
	35.70	36.70	1.00	0.95	95.00	0.72	72	Greyish white to Bluish black	fine		Hard, Calc-silicate with crude alternate banding, Quartz, feldspar &	Calc-silicate	Vitreous lustre, micro step faults

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											diopside rich rock, giving effervescence when treated with dil. HCL		
	36.70	37.00	0.30	0.10	33.33		0	Greyish white to Bluish black/colour less	fine		Fractured Calc-silicates	Calc-silicate	Core loss
18.02.2025 (DAY)	37.00	38.50	1.50	1.35	90.00	0.33	22	Greyish white to Bluish black/colour less	fine		Calc-silicate with more quartz/silica	Calc-silicate?	Fractured, no effervescence

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	38.50	38.68	0.18	0.18	100.00		0	Greyish white to Bluish black/colour less	fine		Calc-Silicate with more quartz/silica	Calc-silicate?	Fractured, no effervescence
	38.68	39.88	1.20	1.10	91.67		0	Dark grey	fine		Hard, Quartz-mica (muscovite & more biotite) schist with schistosity	Quartz-mica schist	with thin silica layers/quartz veins along foliation
	39.88	40.00	0.12	0.10	83.33		0	Grey to bluish	fine		Hard, Quartz, feldspar, diopside rich rock giving	Calc-silicate	Sharp contact between Mica schist & Calc-silicate

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											effervescence when treated with dil. HCL/ Calc-Silicate		
18.02.2025 (NIGHT)	40.00	41.50	1.50	1.48	98.67	0.34	22.6666667	Bluish grey	fine		Hard, compact, Cal-silicate, effervescent with dil. HCL	Calc-silicate	Fractured, FI-10
	41.50	42.50	1.00	0.85	85.00	0.13	13	Bluish grey	fine		Hard, compact, Cal-silicate, effervescent with dil. HCL	Calc-silicate	
19.02.2025 (DAY)	42.50	43.00	0.50	0.49	98.00	0.24	48	Bluish grey	fine		Hard, compact, Cal-silicate,	Calc-silicate	

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											effervescent with dil. HCL		
	43.00	44.00	1.00	1.00	100.00	0.3	30	Bluish grey	fine		Hard, compact, Cal-silicate, effervescent with dil. HCL	Calc-silicate	Alternate light & dark band
	44.00	44.80	0.80	0.76	95.00	0.15	18.75	Bluish grey	fine		Hard, compact, Cal-silicate, effervescent with dil. HCL	Calc-silicate	Alternate light & dark band, FI-3
	44.80	45.00	0.20	0.20	100.00	0.11	55	Bluish grey	fine		Hard, compact, Cal-silicate, effervescent with dil. HCL	Calc-silicate	Alternate light & dark band

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
19.02.2025 (NIGHT)	45.00	46.00	1.00	0.96	96.00	0.3	30	Light green to grey	fine	Clino-Pyroxene to give greenish colour?	Hard, Quartz, feldspar, diopside rich rock giving effervescence when treated with dil. HCL/ Calc-Silicate	Calc-silicate	Partially weathered along fractures, Fractured, FI-5, Grano-blastic
	46.00	49.00	3.00	2.98	99.33	1.89	63	Light green to grey	fine	Clino-Pyroxene to give greenish colour?	Hard, Quartz, feldspar, diopside rich rock giving effervescence when treated	Calc-silicate	Partially weathered along fractures, Fractured, FI-11, Grano-blastic

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											with dil HCL/ Calc-Silicate		
	49.00	51.35	2.35	2.35	100.00	1.61	68.5106383	Greyish	fine	Mica along fracture plane	Hard, Quartz, feldspar, diopside rich rock giving effervescence when treated with dil. HCL/ Calc-Silicate	Calc-silicate	Fractured, FI-11, Granoblastic, crude foliation
	51.35	51.85	0.50	0.50	100.00		0	Greyish black	fine	limonitic alteration along fractures	Hard, compact, Quartz-mica graphite Schist	Quartz-mica graphite schist	Fractured at places

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	51.8 5	52.1 2	0. 27	0.27	100.0 0		0	Greyish	fine	Sulphides along foliations	Alternate layers of silica & graphite (low concentration) within calc- silicates?	Calc- silicate	Fractured along foliation, hard. Pyrite at places along foliation
20.02.2025 (DAY)	52.1 2	54.8 5	2. 73	2.73	100.0 0	1.72	63.003 663	Light green to grey	fine		Hard, Quartz, feldspar, diopside rich rock giving effervescence when treated with dil HCL/ Calc-Silicate	Calc- silicate	Fractured

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	54.85	55.00	0.15	0.12	80.00		0	Greyish	fine	Yellowish stains/sulphides	Hard interlayered Quartz-mica/sericite graphite schist	Quartz-mica graphite schist	low concentration, sharp contact between Calc-silicates & Quartz-mica graphite schist. Pyrite along foliation. Soils hand.
	55.00	56.00	1.00	1.00	100.00	0.29	29	Greyish black	fine		Hard, interlayered Quartz-mica/sericite graphite schist	Quartz-mica graphite schist	$\alpha=47^{\circ}-50^{\circ}$, foliated, fractured.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											with pyrite along foliations		
	56.00	58.00	2.00	2.00	100.00	0.65	32.5	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Calcite veins/radiating crystals of calcite(aragonite?) along fractures. Soils hand. Fractured.
	58.00	59.50	1.50	1.50	100.00	0.91	60.6666667	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite	Quartz-mica graphite schist	Calcite veins/carbonate veins along fractures.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											along fractures/foliations.		Effervescent along fractures. $\alpha=48^\circ$, Soils hand.
	59.50	61.00	1.50	1.50	100.00	1.33	88.6666667	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Fractured, FI-3,
	61.00	62.50	1.50	1.50	100.00	0.68	45.3333333	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite	Quartz-mica graphite schist	FI-12, Soils hand.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											along fractures/foliations.		
	62.50	64.00	1.50	1.50	100.00	0.96	64	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Fractured, Calcite veins at places. Soils hand.
	64.00	65.50	1.50	1.50	100.00	1.13	75.33333333	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	FI-7

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	65.50	67.00	1.50	3.00	200.00	1.02	68	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Brecciated silica clasts. FI-9. $\alpha=53^\circ$
20.02.2025 (NIGHT)	67.00	70.00	3.00	3.00	100.00	2.32	77.3333333	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	FI-11

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	70.0 0	73.0 0	3.00	3.00	100.0 0	2.59	86.333 3333	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz- mica graphite schist	FI-4, $\alpha=50^\circ$
	73.0 0	76.0 0	3.00	3.00	100.0 0	2.05	68.333 3333	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along	Quartz- mica graphite schist	FI-13, $\alpha=46^\circ$, Soils hand

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	76.0 0	79.0 0	3.00	3.00	100.0 0	2.85	95	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz- mica graphite schist	Sulphides present giving metallic lusture
21.02.2025 (DAY)	79.0 0	82.0 0	3.00	3.00	100.0 0	3.00	100	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along	Quartz- mica graphite schist	microfolds/crenulations.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
21.02.2025 (NIGHT)	82.00	85.00	3.00	3.00	100.00	3.00	100	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	
	85.00	88.00	3.00	3.00	100.00	3.00	100	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	crenulated at places, Carbonate veins at places. $\alpha=50^\circ$

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
22.02.2025	88.0 0	89.5 0	1.50	1.50	100.0 0	1.38	92	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz- mica graphite schist	crenulated at places, Carbonate veins at places, Silicification.
23.02.2025 (DAY)	89.5 0	91.0 0	1.50	1.50	100.0 0	1.28	85.333 3333	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along	Quartz- mica graphite schist	crenulated at places, Silicification.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	91.00	94.00	3.00	3.00	100.00	2.94	98	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	microfolds/crenulations.
24.02.2025 (DAY)	94.00	95.50	1.50	1.47	98.00	1.47	98	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	Crenulated, hard siliceous at places.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH01						EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529955	Water Table: NA	
Date of Commencement				10.02.2025						ELEVATION : (M)	163.33		
Date of Completion				25.02.2025						AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	95.5 0	96.5 0	1.00	1.00	100.0 0	1.00	100	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz- mica graphite schist	hard, compact & siliceous.
24.02.2025 (NIGHT)	96.5 0	97.0 0	0.50	1.00	200.0 0	0.50	100	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along	Quartz- mica graphite schist	hard, compact & siliceous.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.57 6	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/A NGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recov ery (m)	Recov ery (%)	RQ D (> 10c m. Piec es)	RQD (%)	Colour	Grai n size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	97.0 0	98.0 0	1.00	1.00	100.0 0	1.00	100	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz- mica graphite schist	hard, compact & siliceous.
	98.0 0	99.0 0	1.00	1.00	100.0 0	0.96	96	Greyish black	fine		Hard, Quartz- mica/sericite graphite schist with pyrite along	Quartz- mica graphite schist	Hard, compact & siliceous. Yellowish stains, pyrite &

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		chalcopyrite present.
	99.00	100.00	1.00	1.00	100.00	0.96	96	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Hard, compact & siliceous. Yellowish stains, pyrite & chalcopyrite present. Gold may present
25.02.2025	100.00	101.00	1.00	1.00	100.00	0.88	88	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	Hard, compact & siliceous. Yellowish stains, pyrite &

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		chalcopyrite present.
	101.00	102.00	1.00	1.00	100.00	1.00	100	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Hard, compact & siliceous. Yellowish stains, pyrite & chalcopyrite present.
	102.00	103.00	1.00	1.00	100.00	0.96	96	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along	Quartz-mica graphite schist	calcite vein at 102.95 m.

Annexure-IV Summarised lithological-log sheet of RGBH-01 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH01					EASTING:	479365.576	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529955	Water Table: NA	
Date of Commencement					10.02.2025					ELEVATION : (M)	163.33		
Date of Completion					25.02.2025					AZIMUTH/ANGLE:	135°/45°	EOH: 106.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											fractures/foliations.		
	103.00	106.00	3.00	3.00	100.00	2.77	92.3333333	Greyish black	fine		Hard, Quartz-mica/sericite graphite schist with pyrite along fractures/foliations.	Quartz-mica graphite schist	Silicified at 104.30-104.38 m, carbonate veins at places. Quartz vein at 105.48-105.63 m.
BH CLOSED AT 106.00 M													

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
22.03.2025(DAY)	0.00	0.50	0.50	0.45	90			Reddish brown	fine	Laterisation	Fine grained lateritic soil with medium grained silica pebbles	Lateritic Soil	
	0.50	1.00	0.50	0.45	90			Reddish brown	fine	Laterisation	Fine grained lateritic soil with medium grained silica pebbles	Lateritic Soil	
22.03.2025(NIGHT)	1.00	1.35	0.35	0.35	100			Reddish brown	fine	Laterisation	Fine grained lateritic soil with medium grained silica pebbles	Lateritic Soil	
	1.35	1.50	0.15	0.15	100			Yellowish brown	fine	laterisation & Limonitisation	Lateritic & limonitic soil	Lateritic Soil	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	1.50	2	0.50	0.48	96			Yellowish brown	fine	laterisation & Limonitisation	Lateritic & limonitic soil	Lateritic Soil	
	2.00	2.5	0.50	0.49	98			Yellowish brown	fine	laterisation & Limonitisation	Lateritic & limonitic soil	Lateritic Soil	
	2.50	3	0.50	0.48	96			Yellowish brown	fine	laterisation & Limonitisation	Lateritic & limonitic soil	Lateritic Soil	
23.03.2025(DAY)	3.00	4	1.00	0.90	90			Greyish brown to Brownish	fine	Moderately oxidised	Hard, fractured, Quartz-Sericite schist/ Quartz-muscovite-biotite schist	Quartz-mica schist	FI-13, Fractured.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	4.00	6.35	2.35	2.35	100			Greyish brown to reddish Brownish	fine	Strongly oxidised/limonitised	Hard to fragile, quartz-muscovite-biotite schist	Quartz-mica schist	Highly fractured
	6.35	6.6	0.25	0.25	100			Greyish	fine	moderate	Quartz-mica schist with less concentration of graphite	Graphite bearing quartz-mica schist	Fractured.
	6.60	7	0.40	0.30	75			Greyish to reddish brown	fine	Strongly oxidised	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured.
	7.00	8	1.00	0.90	90			Greyish brown	fine	oxidation along fractures	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	8.00	9.00	1.00	0.88	88			light brown	fine	Weathered	Hard, fractured, fragmented Quartz mica schist/Quartz Sericite schist	Quartz-mica schist	Highly fractured
	9.00	10.00	1.00	0.92	92			Grey to greyish brown	fine	highly weathered	Quartz mica schist/Quartz Sericite schist	Quartz-mica schist	
23.03.2025(NIGHT)	10.00	11.00	1.00	0.95	95			Grey to greyish brown	fine	moderately weathered	Quartz mica schist/Quartz Sericite schist	Quartz-mica schist	Fractured, hard.FI-10
	11.00	11.15	0.15	0.15	100			Grey to greyish brown	fine	moderately weathered	Quartz mica schist/Quartz Sericite schist	Quartz-mica schist	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	11.15	11.45	0.30	0.20	66.666667			Brownish	fine	ferruginous alteration	Quartz rich rock/Quartzite	Quartzite?	Hard, fractured.
	11.45	12.00	0.55	0.55	100			Buff to ash grey	fine to medium	light green alteration	Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	faint schistosity.
	12.00	13.00	1.00	0.93	93			Buff to yellowish brown	fine to medium	Limonitised at places	Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	faint schistosity.
	13.00	14.00	1.00	0.95	95			Buff to yellowish brown	fine to medium	Limonitised at places	Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	14.00	15.00	1.00	0.97	97			Buff to yellowish brown	fine to medium	Blackish stains	Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	
	15.00	16.00	1.00	0.95	95			Buff to ash grey	fine to medium		Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich quartz mica rock	alternate light green & ash grey banding
24.03.20 25(DAY)	16.00	17.00	1.00	0.90	90			Buff to ash grey	fine to medium		Weathered, hard, light weight, kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.86 6	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	17.00	18.00	1.00	0.92	92			Buff to ash grey	fine to medium		Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	
	18.00	19.00	1.00	0.94	94			Buff to ash grey	fine to medium		Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	
	19.00	20.00	1.00	0.90	90	0.2	20	Buff to ash grey	fine to medium		Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.86 6	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	20.00	21.00	1.00	0.95	95	0.3	30	Buff to ash grey	fine to medium		Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	
	21.00	22.00	1.00	0.93	93	0.18	18	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	
	22.00	23.00	1.00	0.94	94	0.32	32	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	alternate light green & ash grey banding

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
24.03.20 25(NIGHT)	23.00	24.00	1.00	0.92	92	0.13	13	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	alternate light green & ash grey banding
	24.00	25.00	1.00	0.97	97		0	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	alternate light green & ash grey banding
	25.00	26.00	1.00	0.92	92	0.22	22	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.866	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	26.00	27.00	1.00	0.92	92	0.27	27	Buff to ash grey	fine to medium	limonitic at places	Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	Quartzite/quartz vein at 26.00-26.30 m. Fractured.
	27.00	28.00	1.00	0.93	93		0	Buff to ash grey	fine to medium		Weathered, hard, light weight, Kaoline rich mica quartz rock	Kaoline rich Quartz mica rock	Hard, fractured.
	28.00	29.00	1.00	0.93	93		0	Greenish grey	fine	weak alteration	Hard, fractured, Quartz-muscovite, biotite, chlorite? Schist	Quartz mica schist	FI-8

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	29.00	30.00	1.00	0.96	96	0.28	28	dark grey to ash grey	fine	weak alteration	Hard, fractured, quartz mica schist	Quartz mica schist	FI-7, Silicified or quartzitic at place(29.30-29.70m)
	30.00	31.00	1.00	0.98	98		0	Greenish to brown	fine	moderately ferruginous, Chloritization?	Hard, fractured, quartz-mica (muscovite, biotite) schist	Quartz mica schist	Silicified at places.
25.03.2025(DAY)	31.00	32.50	1.50	1.48	98.666667		0	Greenish to brown	fine	moderately ferruginous,	Hard, fractured, quartz-mica (muscovite, biotite) schist	Quartz mica schist	Silicified at place (31.7-32.5 m). FI-3

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
										Chloritization?			
	32.50	34.00	1.50	1.45	96.66 6666 67		0	Buff to Greyish	fine		Hard, fractured, Quartz-muscovite-biotite schist	Quartz mica schist	Interlayered, silicified at 32.5-33.14 m
	34.00	35.50	1.50	1.49	99.33 3333 33	0.5	33.33 33	Dark grey to greenish grey	fine	Oxidised along fractures	Hard, fractured, Quartz-biotite-muscovite schist	Quartz mica schist	Quartz veins along foliation

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	35.50	37.00	1.50	1.35	90		0	light grey to brown	fine	Oxidised along fractures	Hard, fractured, Quartz-biotite-muscovite shist	Quartz mica schist	
25.03.2025(NIGHT)	37.00	37.40	0.40	0.40	100	0.24	60	Reddish brown	fine	oxidised at places	Hard, fractured, Quartz-biotite-muscovite shist	Quartz mica schist	
	37.40	38.00	0.60	0.60	100	0.28	46.6667	Grey to brown	fine	oxidised at places	Hard, fractured, Quartz-biotite- muscovite-graphite shist	Quartz mica schist with graphite	Low concentration of graphite
	38.00	38.50	0.50	0.50	100		0	Reddish brown to grey	fine	oxidised at places	Hard, fractured, Quartz-biotite-muscovite shist	Quartz mica schist	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	38.50	40.00	1.50	1.50	100	0.53	35.3333	Reddish brown to grey	fine to medium	oxidised at places, chloritization?	Hard, fractured, Quartz-biotite-muscovite schist	Quartz mica schist	alternate layerings of quartz veins
	40.00	41.50	1.50	1.50	100	0.5	33.3333	Pinkish Grey to light green	fine to medium		Hard, fractured, Quartz-biotite-muscovite schist	Quartz mica schist	Thin to thick quartzitic band at places(41.00-41.50m). Thin mica/biotite layers in quartz rich band.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	41.50	43.00	1.50	1.38	92	0.34	22.666667	Greenish black to brownish black	fine to medium		Hard, fractured, Quartz-biotite-muscovite schist	Quartz mica schist	Thin to thick quartzitic band at places (41.93-42.65m). Thin mica/biotite layers in quartz rich band. Quartz vein at 42.65-42.77 m. Lenticular shaped quartz

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.866	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
26.03.2025(DAY)	43.00	44.50	1.50	1.42	94.666667		0	Greyish black	fine to medium		Hard, fractured, quartz-biotite-muscovite schist	Quartz mica schist	Quartz veins at places
	44.50	46.00	1.50	1.37	91.333333	0.26	17.333333	Greyish brown	fine to medium		Hard, fractured, quartz-biotite-muscovite schist	Quartz mica schist	Quartz vein at 44.6-44.72 m & 44.76-44.82 m. Quartzite band- 45.30-45. m
	46.00	47.50	1.50	1.43	95.333333	0.78	52	yellowish brown	fine to medium	strongly oxidised, kaolinized	Weathered, fractured, quartz-feldspar, mica rich rock	Quartz mica schist	Hard quartzitic layer with less or no mica at (46.15-47.05m)

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	47.50	49.00	1.50	1.43	95.33 3333 33	0.52	34.66 66 67	yellowish brown to greenish brown	fine to medium	Oxidised, kaolinized Chloritization?	Hard to fragile, quartz-muscovite-biotite schist	Quartz mica schist	quartz veins at places.
	49.00	50.5	1.50	1.50	100	1.35	90	Greyish to greenish black	fine	ferruginous alteration at fractures	Hard, fractured, quartz, feldspar, biotite, muscovite schist	Quartz mica schist	quartz veins at places.
	50.50	51.29	0.79	0.79	100	0.12	15.18 89 87 34	Greyish to greenish black	fine	ferruginous alteration at fractures	Hard, fractured, Quartz, feldspar, biotite, muscovite schist	Quartz mica schist	quartz veins at places.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	51.29	51.89	0.60	0.60	100	0.12	20	Greyish	fine	ferruginous alteration at fractures	Hard, fractured, interlayered(foliated) Quartz, mica (muscovite, biotite) Graphite schist	Quartz-mica Schist thin layers of graphite	Low concentration of graphite.
	51.89	52.00	0.11	0.11	100		0	Greyish brown	fine	Ferruginous, limonitised	Hard, fractured, Quartz-mica (muscovite, biotite) schist	Quartz mica schist	
26.03.2025(NIGHT)	52.00	52.25	0.25	0.25	100		0	Greyish brown	fine	reddish brown stains at fractures/oxidation	Hard, Fractured, Quartz-mica (muscovite, biotite) schist	Quartz mica schist	Silicified at places.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	52.25	53.88	1.63	1.63	100		0	Greyish black	fine		Hard, fractured, Crenulated (at places). Quartz-mica-graphite schist	Quartz-mica-graphite schist	Sulphides (pyrite & chalcopyrite) along foliation
	53.88	55.00	1.12	1.06	94.64		0	Grey to greyish brown	fine	Yellowish brown alteration	Hard, fractured, Quartz-feldspar-mica (muscovite, biotite) schist	Quartz mica schist	Interlayering of quartz veins. $\alpha=59-69^\circ$ (fracture)
	55.00	58.00	3.00	2.97	99		0	Ash grey to yellowish to light brown	fine	Ferruginous/limonitised at places	Hard, fractured, Quartz-feldspar-mica (muscovite, biotite) schist	Quartz mica schist/Quartz Sericite Schist	more silica less mica

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	58.00	61.00	3.00	2.88	96		0	Ash grey to yellowish to light brown	fine	Ferruginous/limonitised at places	Hard, fractured, Quartz-feldspar-mica (muscovite, biotite) schist (thin layers of mica)	Quartz mica schist/Quartz Sericite Schist	Quartzitic/silicified at 59.75-60.55m
27.03.2025(DAY)	61.00	61.20	0.20	0.20	100		0	Greenish Grey	fine	Greenish alteration	Hard, fractured, Quartz, feldspar, biotite, muscovite schist	Quartz mica schist/Quartz Sericite Schist	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	61.20	61.55	0.35	0.25	71.42 8571 43		0	Grey to brown	fine	Moderate ferruginous alteration	Hard, fractured, interlayered quartz mica schist?	Quartz mica schist/Quartz Sericite Schist	
	61.55	62.15	0.60	0.60	100		0	Grey to brown	fine	Moderate ferruginous alteration	Hard, fractured, thin layerings of mica with quartz & feldspar rich rock	Quartz-mica schist/Quartz Sericite schist?	quartzitic/high silica.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	62.15	64.00	1.85	1.15	62.16 2162 16		0	yellowish brown- pinkish grey	fine	Ferruginous/limonitised at places	Hard, fractured, quartz (colourless) and feldspar (pinkish brown) rich rock with no or less mica. Quartzofeldspathic rock.	Meta-Psammite/Quartzite?	$\alpha=64^\circ$, foliation
	64.00	66.00	2.00	1.72	86		0	Pinkish grey		Highly limonitised/ferruginous	Hard to fragile limonitic formation with quartz fragments	Meta-Psammite/Quartzite?	Kaolinized at places
27.03.2025(NIGHT)	66.00	66.35	0.35	0.35	100		0	yellowish brown	fine	Highly limonitised/ferruginous	Hard, Quartzofeldspathic fragments of Quartzite?	Meta-Psammite/Quartzite?	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	66.35	67.00	0.65	0.60	92.30 7692 31		0	Greyish to Greenish	fine	Moderately altered	Soft-fragile, Quartz mica schist?	Quartz- mica schist/Quartz Sericite schist?	Greenish coloration due to chlorite?
	67.00	67.40	0.40	0.38	95		0	Greyish to pinkish	fine	Moderately altered	Soft-fragile, Quartz mica schist?	Quartz- mica schist/Quartz Sericite schist?	Greenish coloration due to chlorite?

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	67.40	68.00	0.60	0.45	75		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	
	68.00	69.00	1.00	0.90	90		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	
	69.00	70.00	1.00	0.94	94		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
28.03.2025(DAY)	70.00	72.00	2.00	1.77	88.5		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	
	72.00	73.00	1.00	0.87	87		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	
	73.00	73.70	0.70	0.70	100		0	Greyish to pinkish	fine to medium	Ferruginous/limonitised at places	Hard, quartzofeldspathic fragments of quartzite?	Quartzite?	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	73.70	75.00	1.30	1.24	95.38 4615 38		0	Light grey to greyish white	fine to medium	Moderately altered	Hard, quartz-feldspar with less mica rich rock	Quartz- mica schist/Quartz sericite schist?	Quartz mica schist with less mica? Quartz vein at 74.80- 75.00 m
28.03.20 25(NIGHT)	75.00	76.00	1.00	0.93	93	0.36	36	Grey to buff	medium	Ferruginous at places	Hard, fractured, interlayered quartz- feldspar mica schist?	Quartz- mica schist/Quartz sericite schist?	Thick to thin biotite layers.
	76.00	76.80	0.80	0.80	100	1.08	36	light brown to grey	fine		Hard, fractured, interlayered quartz- feldspar mica schist?	Quartz- mica schist/Quartz	$\alpha=60-65^\circ$ (foliation/fracture)

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
												Sericite schist?	
	76.80	76.97	0.17	0.17	100			blackish	medium		Quartz-mica hornblende graphite schist?	Quartz-mica hornblende graphite schist?	Sulphides (pyrite & chalcopyrite). Quartz vein- 76.70-76.80 m
	76.97	77.95	0.98	0.98	100			Light grey to brownish grey	fine		Hard, fractured, interlayered, Quartz- feldspar- mica rich rock with biotite layers at places	Quartz-mica schist/Quartz sericite schist?	

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	77.95	79.00	1.05	1.05	100			Greyish black	fine		Quartz-mica-graphite schist	Quartz-mica-graphite schist	Sulphides along fractures & foliations
	79.00	79.77	0.77	0.77	100	1.15	38.3333	Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist, crenulated.	Quartz-mica-graphite schist	streaks of pyrite. Light green alteration at fracture (Chloritisation?)
	79.77	80.02	0.25	0.25	100			Black to greenish black	medium		Hard, hornblende rock with streaks of pyrite.	Hornblende schist?	with 5 cm quartz-mica? graphite-pyrite schist?

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	80.02	80.31	0.29	0.29	100			Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist with interlayered quartz veins	Quartz-mica-graphite schist	Pyrite along foliation
	80.31	80.56	0.25	0.25	100			Black to Greenish black	medium		Hard, hornblende rock with streaks of pyrite.	Hornblende schist?	
	80.56	80.76	0.20	0.20	100			Greyish black	fine		Hard, fractured, quartz-mica-graphite schist with interlayered quartz veins	Quartz-mica-graphite schist	Sulphides at places.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.86 6	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	80.76	82.00	1.24	1.24	100			Light grey to greenish grey	fine	Light green alteration/Chloritization?	Hard, fractured, quartz-mica schist? With thin layers of mica in quartzitic band	Quartz-mica schist/Quartz sericite schist?	Mica layers sparsely present.
29.03.2025(DAY)	82.00	82.80	0.80	0.80	100	1.54	51.3333	Greyish	fine	Light green alteration/Chloritization?	Hard, fractured, quartz-mica schist? With thin layers of mica in quartzitic band	Quartz-mica schist/Quartz sericite schist?	Quartz band at 82.39-82.63 m
	82.80	83.05	0.25	0.25	100			blackish	fine to medium		Biotite schist	Quartz-mica schist	Biotite more.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	83.05	83.35	0.30	0.30	100			Greyish black	fine		Quartz-mica-graphite schist	Quartz-mica-graphite schist	
	83.35	84.16	0.81	0.81	100			Shiny black	fine to medium	Greenish alteration	Quartz-biotite-hornblende rich rock	Quartz-mica schist?	Biotite more.
	84.16	85.00	0.84	0.84	100			Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist with quartz veins at places	Quartz-mica-graphite schist	
	85.00	88.00	3.00	2.95	98.33	1.84	61.33	Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist with crenulated quartz veins at places	Quartz-mica-graphite schist	Sulphides along foliations & fractures.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
							33 33						
	88.00	91.00	3.00	3.00	100	1.62	54	Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist with crenulated quartz veins at places	Quartz-mica-graphite schist	Sulphides along foliations & fractures. Lens shaped quartz vein
29.03.2025(NIGHT)	91.00	91.95	0.95	0.95	100	1.26	42	Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist with crenulated quartz veins at places	Quartz-mica-graphite schist	Sulphides along foliations & fractures.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.866	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	91.95	92.25	0.30	0.30	100			Whitish/Colourless	medium		Fractured Quartz vein with few traces of graphite	Quartz vein	
	92.25	94.00	1.75	1.65	94.28571429			Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Sulphides emplaced with quartz veins
	94.00	94.45	0.45	0.45	100	2.7	90	Greyish black	fine		Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Sulphides emplaced with quartz veins

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	94.45	97.00	2.55	2.55	100			Light grey to whitish	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz-mica schist?	Sulphides (Pyrite, chalcopyrite, pyrrhotite?) at places. Siliceous.
	97.00	100.00	3.00	2.97	99	2.48	82.666667	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz-mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Siliceous, sheared.

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:		479128.86 6	Casing Depth: 4.5 m
Rig No.				R-89(XY-4)						NORTHING:		2529867	Water Table: NA
Date of Commencement				22.03.2025						ELEVATION: (M)		169.23	
Date of Completion				30.03.2025						AZIMUTH/ANGLE:		145°/45°	EOH: 110.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
30.03.20 25(DAY)	10 0.0 0	10 3.0 0	3. 0 0	2.97	99	2.85	95	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Siliceous, sheared.
	10 3.0 0	10 5.0 0	2. 0 0	1.88	94	1.24	62	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Crenulated

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	10 5.0 0	10 6.0 0	1. 0 0	0.97	97	0.75	75	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Crenulated
	10 6.0 0	10 7.0 0	1. 0 0	0.92	92	0.62	62	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Crenulated

Annexure-V Summarised lithological-log sheet of RGBH-02 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH02						EASTING:	479128.86 6	Casing Depth: 4.5 m	
Rig No.				R-89(XY-4)						NORTHING:	2529867	Water Table: NA	
Date of Commencement				22.03.2025						ELEVATION: (M)	169.23		
Date of Completion				30.03.2025						AZIMUTH/ANGLE:	145°/45°	EOH: 110.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
30.03.20 25(NIGHT)	10 7.0 0	10 9.0 0	2. 0 0	1.94	97	1.56	78	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Crenulated.
	10 9.0 0	11 0.0 0	1. 0 0	1.00	100	0.91	91	Light grey	fine to medium		Hard, silicified, sheared, Quartz-mica schist with folded/sheared quartz veins.	Quartz- mica schist?	Sulphides (Pyrite, chalcopyrite, azurite?) at places. Crenulated & siliceous.
Borehole RGBH-02 Closed at 110.00 m													

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
05.03.2025	0.00	0.50	0.50	0.49	98.00			Light brown	fine, loose		Fine grained, loose, clay rich silty soil with silica pebbles.	Topsoil	
	0.50	1.00	0.50	0.45	90.00			Light brown	fine, loose		Fine grained, loose, clay rich silty soil with silica pebbles.	Topsoil	
06.03.2025	1.00	1.50	0.50	0.50	100.00			reddish brown	fine, loose	Weathered	Lateritised, quartz-mica schist	Weathered mantle	weathered part of quartz-mica schist?
	1.50	2.00	0.50	0.47	94.00			light to reddish brown	fine, loose	Weathered	Weathered Quartz-mica schist?	Weathered mantle	
	2.00	2.50	0.50	0.50	100.00			Light brown	fine	Highly weathered	Weathered, fractured, Quartz-mica schist?	Weathered mantle	

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH03					EASTING:	478816	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529734	Water Table: NA	
Date of Commencement					05.03.2025					ELEVATION: (M)	170.58		
Date of Completion					15.03.2025					AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	2.50	3.00	0.50	0.45	90.00			Light brown	fine	Highly weathered	Weathered, fractured, Quartz-mica schist?	Weathered mantle	
07.03.2025	3.00	4.50	1.50	1.34	89.33			Greyish brown	fine to medium	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist?	Foliated. Quartz vein at places
	4.50	5.50	1.00	0.90	90.00			Greyish brown	fine to medium	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist?	Foliated. Quartz vein at places
	5.50	7.00	1.50	1.40	93.33			Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist?	Foliated. Quartz vein at places. FI-9
	7.00	8.50	1.50	1.38	92.00			Greyish brown	fine	Partially	Hard, fractured Quartz-mica	Quartz-mica schist?	Foliated. quartz vein at places. FI-11

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH03					EASTING:	478816	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529734	Water Table: NA	
Date of Commencement					05.03.2025					ELEVATION: (M)	170.58		
Date of Completion					15.03.2025					AZIMUTH/AN GLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											(muscovite, biotite) schist		
	8.50	10.00	1.50	1.35	90.00			Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz- mica schist?	Quartz vein at places. $\alpha=55^\circ$ foliation
	10.00	11.50	1.50	1.43	95.33	0.35	23.333333	Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz- mica schist	Quartz vein at places. $\alpha=50-54^\circ$ (foliation/fracture)
	11.50	13.00	1.50	1.50	100.00	0.73	48.666667	Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz- mica schist	Foliations, Quartz veins. $\alpha=58-59^\circ$ (foliation/fracture)
	13.00	16.00	3.00	2.90	96.67	0.97	32.333333	Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist.	Quartz- mica schist	Foliations, Quartz veins.

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											Alternate silica & mica rich layer		
	16.00	19.00	3.00	2.90	96.67	1.21	40.33	Greyish brown	fine	Partially	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	Foliations, Quartz veins at places. Crenulated at places. Alternate silica & mica layerings.
	19.00	22.00	3.00	2.60	86.67	0.51	17	light grey to greyish brown	fine	Ferruginous along fractures/foliations.	Hard, Fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	Crenulated, quartz vein at places.
08.03.2025	22.00	25.00	3.00	2.80	93.33	1.02	34	light grey to greyish brown	fine	Ferruginous along fractures/foliations.	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	Crenulated at places.
	25.00	28.00	3.00	2.92	97.33	1.03	34.33	light grey to greyish brown	fine	Ferruginous along fractures/foliations.	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	$\alpha=57^\circ$ (fracture/foliation)

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH03					EASTING:	478816	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529734	Water Table: NA	
Date of Commencement					05.03.2025					ELEVATION: (M)	170.58		
Date of Completion					15.03.2025					AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	28.00	31.00	3.00	2.96	98.67	1.19	39.666667	light grey	fine	Ferruginous along fractures/foliations.	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	
	31.00	32.00	1.00	0.98	98.00		0	light grey	fine	Ferruginous along fractures/foliations.	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	
09.03.2025	32.00	34.00	2.00	1.94	97.00	1.15	57.5	light grey	fine	Ferruginous along fractures/foliations.	Hard, fractured Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	
	34.00	34.70	0.70	0.70	100.00	0.42	60	light grey	fine		Hard, Quartz-biotite-muscovite-carbonate(few) schist	Quartz-mica-carbonate-schist?	Transitional zone between Quartz-mica schist & calc-silicate. Few carbonate patches give effervescence.

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	34.70	37.00	2.30	2.23	96.96	1.63	70.869565	Grey to light green	medium		Hard, fractured, Quartz, plagioclase, diopside epidote? Carbonate rich rock.	Calc-silicate/C alc-gneiss	Sulphides along fractures (pyrite& chalcopyrite). Alternate crude banding of of grey& light green band. Strong effervescent with dil. HCL
	37.00	40.00	3.00	3.00	100.00	2.5	83.333333	Grey to light green	medium		Hard, Plagioclase, diopside, epidote? Carbonate rich rock. (Biotite with calcite vein at 37.90-38.05 m)	Calc-silicate/C alc gneiss	Calcite vein & quartz patches at places.
	40.00	43.00	3.00	2.85	95.00	1.74	58	Grey to light green	medium	moderate along fractures	Hard, Plagioclase, diopside, epidote?	Calc-silicate/C alc gneiss	Strong effervescent with dil HCL. Alternate grey & light green layering.

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											Carbonate rich rock.		
13.03. 2025	43.00	45.23	2.23	2.23	100.00	1.42	63.67713	Grey to light green	medium	moderate to strong along fractures.	Hard, Plagioclase, diopside, epidote? Carbonate rich rock.	Calc-silicate	Strong effervescent with dil HCL. Alternate grey & light green layering.
	45.23	45.53	0.30	0.30	100.00			Greyish black	fine		Hard, Quartz-mica-graphite schist (Sharp contact)	Quartz-mica graphite schist	Sulphides along fractures. Soils hand.
	45.53	46.00	0.47	0.47	100.00			Greyish to whitish	medium		Hard, Plagioclase, diopside, epidote? Carbonate rich rock.	Calc-silicate/Calc gneiss	Sulphides along fractures. Alternate grey & light green layering.

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	46.00	46.25	0.25	0.25	100.00			Greyish to whitish	medium	Pervasive at fractures	Hard, Plagioclase, diopside, epidote? Carbonate rich rock.	Calc-silicate	Alternate grey & light green layering.
	46.25	46.60	0.35	0.35	100.00			Greyish black	fine		Hard, crenulated, Quartz-mica/sericite schist low concentration of graphite.	Quartz-mica/sericite-graphite schist?	very Low concentration of graphite
	46.60	48.51	1.91	1.91	100	2.02	67.33333	Greyish to Greyish white	fine to medium	Moderate light green to black stains along fractures	Hard, interlayered/banded, Plagioclase, diopside, epidote? Carbonate rich	Calc-silicate	

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH03					EASTING:	478816	Casing Depth: 9.60 m	
Rig No.					R-89(XY-4)					NORTHING:	2529734	Water Table: NA	
Date of Commencement					05.03.2025					ELEVATION: (M)	170.58		
Date of Completion					15.03.2025					AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											rock with thin layers of graphite		
	48.51	49.00	0.49	0.49	100			Greyish black	fine		Hard, fractured, Quartz mica graphite schist	Quartz-mica - graphite schist	Pyrite, chalcopyrite emplaced along quartz veins
	49.00	49.23	0.23	0.23	100			Greyish black	fine		Hard, fractured, Quartz mica graphite schist	Quartz-mica - graphite schist	Pyrite, chalcopyrite emplaced along quartz veins
	49.23	52.00	2.77	2.77	100			Greyish to light green	medium		Hard, Interlayered/banded, Plagioclase, diopside, epidote? Carbonate rich rock with thin layers of graphite	Calc-silicate	Sulphides along fracture/foliation.

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
14.03.2025	52.00	54.00	2.00	2	100			Greyish to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	
	54.00	55.00	1.00	1	100			Greyish to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	55.00	57.00	2.00	2	100			Greyish to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	
	57.00	58.00	1.00	1	100			Greyish to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	
15.03.2025	58.00	60.00	2.00	2	100			Dark to light	medium		Hard, Plagioclase,	Calc-silicate	

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
								grey to light green			quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band		
	60.00	62.00	2.00	2	100			Dark to light grey to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	
	62.00	65.00	3.00	2.99	99.66666667			Dark to light grey to	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich	Calc-silicate	

Annexure-VI Summarised lithological-log sheet of RGBH-03 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH03						EASTING:	478816	Casing Depth: 9.60 m	
Rig No.				R-89(XY-4)						NORTHING:	2529734	Water Table: NA	
Date of Commencement				05.03.2025						ELEVATION: (M)	170.58		
Date of Completion				15.03.2025						AZIMUTH/ANGLE:	140°/45°	EOH: 67.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
								light green			rock with alternate dark grey & greenish band		
	65.00	67.00	2.00	1.96	98			Dark to light grey to light green	medium		Hard, Plagioclase, quartz, carbonate, diopside? rich rock with alternate dark grey & greenish band	Calc-silicate	
	Borehole RGBH-03 Closed at 67.00 m												

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
01.03.2025	0	0.5	0.5	0.5	100			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	Composed of mica schist?
	0.5	1	0.5	0.45	90			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	
	1	1.5	0.5	0.49	98			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	
	1.5	2	0.5	0.46	92			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	
	2	2.5	0.5	0.5	100			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	
	2.5	3	0.5	0.47	94			Light brown	Fine	Weathered clay	Loose, silty clay rich soil with few quartz nodules.	Topsoil	
	3.0	4.00	1.00	0.86	86.00			Reddish brown	Medium	Partially lateritised	Lateritic soil with few quartz pebbles& nodules	Lateritic soil	
	4.0	5.50	1.50	1.40	93.33			Brownish	Fine	Highly weathered	Quartz-mica schist	Quartz-mica schist	Highly weathered, Fragile.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	5.50	7.00	1.50	1.45	96.67			Brownish Grey	Fine to medium	Highly weathered	Quartz-mica schist	Quartz-mica schist	Ferruginous at places. Fragile.
	7.00	8.50	1.50	1.48	98.67			Brownish Grey	Fine to medium	Highly weathered	Quartz-mica schist	Quartz-mica schist	Fragile.
	8.50	10.00	1.50	1.48	98.67			Brownish Grey	Fine to medium	Highly weathered	Quartz-mica schist	Quartz-mica schist	Weathered fragile, fractured.
	10.00	11.50	1.50	1.50	100.00			Brownish Grey	Fine to medium	Weathered	Fractured, Quartz-mica schist with silica pebbles? grains	Quartz-mica schist	medium grained silica grains in mica matrix
	11.50	13.00	1.50	1.50	100.00			Brownish Grey	Fine to medium	Weathered	Fractured, Quartz-mica schist with silica pebbles? grains	Quartz-mica schist	medium grained silica grains in mica matrix. Greenish tinct.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
02.03.2025	13.00	14.50	1.50	1.42	94.67			Brownish Grey	Fine to medium	Weathered	Fractured, Quartz-mica schist with silica pebbles? grains	Quartz-mica schist	medium grained silica grains in mica matrix.
	14.50	16.00	1.50	1.47	98.00			Brownish Grey	Fine	Ferruginous stains along fractures	Hard, fractured, Quartz-mica schist	Quartz-mica schist	
	16.00	17.20	1.20	1.20	100.00			Brownish Grey	Fine	Partially Weathered	Hard, fractured, Quartz-mica schist	Quartz-mica schist	
	17.20	17.50	0.30	0.25	83.33			Whitish grey	Medium		Angular fragments of quartzite	Quartzite	Angular fragments
	17.50	17.60	0.10	0.10	100.00			Whitish grey	Medium		Angular fragments of quartzite	Quartzite	Angular fragments

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	17.60	17.85	0.25	0.20	80.00			Brownish grey	Fine	Highly Weathered	Weathered, fractured, Quartz-mica schist	Quartz-mica schist	
	17.85	18.10	0.25	0.20	80.00			Whitish grey	Medium			Quartzite	Angular fragments
	18.10	18.20	0.10	0.10	100.00			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	
	18.20	19.00	0.80	0.65	81.25			Light brown to brown	Fine to medium	Chemical weathering	Highly weathered, fragmented, pieces of Calc-silicate?	Calc-silicates?	
	19.00	19.50	0.50	0.32	64.00			Light brown to brown	Fine to medium	Chemical weathering	Highly weathered, fragmented, pieces of Calc-silicate?	Calc-silicates?	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		R u n (m)	Core Reco very (m)	Recov ery (%)	RQ D (> 10c m. Pie ces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	Fr o m (m)	To (m)											
	19.50	20.00	0.50	0.35	70			Dark grey	Fine to medium		Sub-angular fragments of quartz	Quartz vein?	Sugary texture
	20.00	20.15	0.15	0.15	100			Dark grey	Fine to medium	Partially altered	Quartz vein?	Quartz vein?	Greenish-yellowish stains along fractures & contact
	20.15	20.50	0.35	0.28	80			Yellowish brown to light green	Fine	Highly weathered	Highly weathered Calc-Silicate	Calc-silicates?	
	20.50	20.75	0.25	0.23	92			brown	Fine to medium	Highly weathered	Highly weathered Calc-Silicate	Calc-silicates?	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	20.75	21.00	0.25	0.2	80			Greyish brown	Fine	Weathered.	Quartz-mica schist with quartz veins along foliation	Quartz-mica schist	
	21.00	21.50	0.50	0.34	68			Brownish grey	Fine to medium		Quartz vein? with interlayered thin mica schist	Quartz vein?	
	21.50	21.60	0.10	0.1	100			Brownish grey	Fine to medium		Quartz vein	Quartz vein?	
	21.60	22.00	0.40	0.4	100			Brownish grey	Fine	Partially	Hard, fractured, Quartz-mica schist interlayered with quartz vein	Quartz-mica schist	
	22.00	22.50	0.50	0.48	96			Brownish grey	Fine	Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	Black to reddish stains along fracture.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	22.50	23.00	0.50	0.4	80			Brownish grey	Fine	Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	
	23.00	23.50	0.50	0.45	90			Brownish grey	Fine to medium	Weak	Hard, fractured, Quartz-muscovite-biotite schist with quartz vein at 23.4-23.5 m	Quartz-mica schist	
	23.50	23.70	0.20	0.2	100			Whitish grey	Medium	Weak	Fractured, Quartz vein	Quartz vein	
	23.70	24.00	0.30	0.2	66.66666667			Brownish grey	Fine to medium	Partially	Hard, fractured, Quartz-mica schist interlayered with quartz vein	Quartz-mica schist	
	24.00	24.50	0.50	0.5	100	0.18	36	Brownish grey	Fine to medium	Reddish brown stains at fractures	Quartz-muscovite-biotite schist	Quartz-mica schist	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	24.50	25.00	0.50	0.5	100	0.38	76	Brownish grey	Fine to medium		Quartz-muscovite-biotite schist	Quartz-mica schist	
03.03.2025	25.00	26.00	1.00	0.87	87		0	Brownish grey	Fine to medium	Reddish brown stains	Quartz-muscovite-biotite schist	Quartz-mica schist	
	26.00	26.50	0.50	0.5	100	0.18	36	Brownish grey	Fine to medium	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist	
	26.50	28.00	1.50	1.4	93.33333333		0	Brownish grey	Fine to medium	Reddish brown stains at fractures	Quartz-muscovite-biotite schist	Quartz-mica schist	
	28.00	29.50	1.50	1.35	90	0.24	16	Brownish grey	Fine to medium	Reddish brown stains at fractures	Quartz-muscovite-biotite schist	Quartz-mica schist	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
29.50	31.00	1.50	1.35	90		0	Brownish grey	Fine to medium	Partially	Quartz-muscovite-biotite schist	Quartz-mica schist		
31.00	32.50	1.50	1.40	93.33333333	0.14	9.33333333	Light brown to yellowish	Fine to medium	yellowish brown stains/Oxidation & light green alteration (Chloritisation?)	Hard, fractured, weathered, Calc-silicate with alternate white & grey banding	Calc-silicates?	Non-effervescent	
32.50	33.00	0.50	0.47	94			Light brown to brown	Fine	Highly weathered	Highly weathered, fragile, calc-silicate? silica fragments	Calc-silicates?	Non-effervescent	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		R u n (m)	Core Reco very (m)	Recov ery (%)	RQ D (> 10c m. Pie ces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	Fr o m (m)	To (m)											
	33.00	34.00	1.00	0.94	94			Light brown to brown	Fine	Moderately to highly weathered	Hard to loose, weathered, Calc-silicates?	Calc-silicates?	Yellowish band. Fragile at places.
	34.00	35.00	1.00	1.00	100			Greyish	Fine to medium	Partially	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	Highly fractured.
	35.00	35.25	0.25	0.25	100			Light brown to grey	Fine to medium	Partially	Hard, fractured, Calc-silicates, gives effervescence when treated with dil. HCL	Calc-silicates	Fragmented.
	35.25	35.50	0.25	0.25	100			Greyish	Fine to medium	Partially	Hard, Fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	
	35.50	36.08	1.18	1.18	100	0.29	19.333333	Light brown	Fine to medium	Highly weathered	Highly weathered, fragmented Calc-silicates?	Calc-silicates	Siliceous fragments

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		R u n (m)	Core Reco very (m)	Recov ery (%)	RQ D (> 10c m. Pie ces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	Fr o m (m)	To (m)											
	36.68	37.00	0.32	0.32	100			light grey	Fine to medium		Hard, fresh, interlayered grey & white silicates & carbonates. Calc- silicates	Calc-silicates	Effervescent with dil. HCL
	37.00	38.50	1.50	1.50	100	0.35	23.333333	Light grey to brown	Fine to medium	Weak	Hard, Calc-silicate (Interlayered - massive)	Calc-silicates	Fractured at places.
	38.50	39.40	0.90	0.90	100			Light grey	Fine to medium	Weak	Hard, Calc-silicate (Interlayered - massive)	Calc-silicates	
	39.40	40.00	0.60	0.60	100	0.35	23.333333	Greyish	Fine to medium	Reddish brown stains/Oxidation	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured, crenulated, interlayered silica.
04.03.2025	40.00	41.50	1.50	1.43	95.33333333	0.23	15.333333	Greyish	Fine to medium	Reddish brown stains/Oxidation	Quartz-muscovite-biotite schist	Quartz-mica schist	Fractured.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH04					EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.					R-167 SM 35					NORTHING:		2529442	Water Table: NA
Date of Commencement					01.03.2025					ELEVATION: (M)		172.5	
Date of Completion					05.03.2025					AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	41.50	43.00	1.50	1.45	96.66666667	0.48	32	Greyish	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	$\alpha=88-90^\circ$
	43.00	43.70	0.70	0.7	100			Greyish	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	Silica layers
	43.70	43.90	0.20	0.2	100	0.56	37.333333	Greyish - white	Medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz vein	Quartz vein	
	43.90	44.50	0.60	0.6	100			Greyish	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	44.50	46.00	1.50	1.5	100	1.00	66.66	Greenish Grey	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	
	46.00	47.00	1.00	1	100	0.55	55.00	Greenish Grey	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	Crenulated at places. Quartz vein at 44.94-45.01 m
	47.00	47.85	0.85	0.85	100	0.24	24.00	Greenish Grey	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-muscovite-biotite schist	Quartz-mica schist	Crenulated at places. microfolds.
	47.85	47.90	0.05	0.05	100			Blackish	Fine		Graphite rich rock with quartz grains	Graphite	Crenulated at places.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	47.90	48.00	0.10	0.1	100			light	Medium	Weak alteration at fractures	Quartz vein	Quartz vein	
	48.00	49.00	1.00	0.82	82			Whitish grey	Medium	Reddish brown stains along fractures	Quartz vein	Quartz vein	Highly fractured.
	49.00	49.10	0.10	0.1	100			Whitish grey	Medium	Reddish brown stains along fractures	Quartz vein	Quartz vein	
	49.10	50.50	1.40	1.4	100			Greyish black	Fine to medium		Hard, fractured, Quartz-mica-Graphite schist	Quartz-mica-graphite schist	Sulphides along fractures. Highly fractured at places.

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	50.50	51.00	0.50	0.5	100	0.72	48	Grey-greyish black	Fine to medium		Hard, interlayered, Quartz mica-graphite schist	Quartz-mica-graphite schist	Graphite with mica layers
	51.00	51.20	0.15	0.15	100			Greyish	Fine to medium		Hard, Quartz-muscovite-biotite schist	Quartz-Mica Schist	
	51.15	51.42	0.27	0.27	100			Grey-greyish black	Fine to medium		Graphite bearing interlayered quartz mica schist	Quartz-mica-Graphite Schist	Hard, more micas
	51.42	52	0.58	0.58	100			Greyish black	Fine to medium		Good quality Hard, fractured, Quartz-mica- graphite schist	Quartz-mica-Graphite Schist	Thin quartz veins at places.
	52.00	53.50	1.50	1.50	100	0.43	28.666667	Greyish black	Fine to medium	Reddish brown	Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-	Sulphides (pyrite,

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
										stains/Oxidation		graphite schist	chalcopryrite) along foliation & fractures at places.
	53.50	54.1	0.60	0.60	100	1.09	72.66 6667	Greyish black	Fine to medium	Reddish brown stains/Oxidation	Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Sulphides (Pyrite & chalcopryrite) along foliation & fractures at places. Fractured.
	54.10	54.3	0.17	0.17	100			Greyish white	Fine to medium		Quartz vein	Quartz vein	
	54.27	54.8	0.50	0.50	100			Greyish black	Fine to medium		Graphite schist with carbonates, effervescent with dil. HCL	Graphite bearing calc-silicate?	Hard, crude schistosity. Soils hand

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	54.77	55	0.23	0.33	143.47 82609			Grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated with dil. HCL.	Quartz-mica schist	Calcareous. Crude schistosity.
05.03.2025	55.00	55.7	0.72	0.72	100			Grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated with dil. HCL.	Quartz-mica schist	Calcareous. Crude schistosity.
	55.72	56.5	0.78	0.78	100	0.97	64.66 6667	Greyish black	Fine to medium		Hard, Graphite bearing calc-silicate?	Graphite bearing Calc-silicate?	Effervescent with dil. HCL. Crude foliation. Quartz, mica, carbonate graphite, Present. Pyrite,

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH04					EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.					R-167 SM 35					NORTHING:		2529442	Water Table: NA
Date of Commencement					01.03.2025					ELEVATION: (M)		172.5	
Date of Completion					05.03.2025					AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
													chalcopyrite along foliations.
	56.50	57.5	0.95	0.95	100	1.25	62.5	Greyish black	Fine to medium		Hard, Graphite bearing Calc-silicate?	Graphite bearing calc-silicate?	Effervescent with dil. HCL. Crude foliation. Quartz, mica, carbonate graphite, Present. Pyrite, chalcopyrite along foliations/fractures.
	57.45	58	0.55	0.55	100			Dark grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated	Calc-silicate?	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.69 2	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											with dil. HCL. with calcite veins		
	58.00	59	1.00	1.00	100	0.82	82.00	Dark grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated with dil. HCL. with calcite veins	Calc-silicate?	
	59.00	60	1.00	1.00	100	0.95	95.00	Dark grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated with dil. HCL. with calcite veins	Calc-silicate?	
	60.00	61	1.00	1.00	100	0.80	80.00	Dark grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives	Calc-silicate?	

Annexure-VII Summarised lithological-log sheet of RGBH-04 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH04						EASTING:		478106.692	Casing Depth: 6.0 m
Rig No.				R-167 SM 35						NORTHING:		2529442	Water Table: NA
Date of Commencement				01.03.2025						ELEVATION: (M)		172.5	
Date of Completion				05.03.2025						AZIMUTH/ANGLE:		175°/45°	EOH: 62.00 M
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
											effervescence when treated with dil. HCL. with calcite veins		
	61.00	62	1.00	1.00	100	0.83	83.00	Grey	Fine to medium		Hard, Quartz, muscovite, biotite rich rock with calcareous/carbonate. Gives effervescence when treated with dil. HCL. with calcite veins	Calc-silicate?	Light greenish alteration/Coloration.
Borehole No. RGBH-04 Closed at 62.00 m.													

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
23.02.2025	0.00	0.50	0.50	0.5	100.00			Brownish to light brown	Fine		Loose sediments, composed of silty, clay rich mica schist?	Topsoil	
	0.50	1.00	0.50	0.45	90.00			Brownish to light brown	Fine		Loose sediments, composed of silty, clay rich mica schist?	Topsoil	
	1.00	1.50	0.50	0.5	100.00			Brownish to light brown	Fine		Loose sediments, composed of silty, clay rich mica schist?	Topsoil	
	1.50	2.00	0.50	0.45	90.00			Brownish to light brown	Fine		Loose sediments, composed of silty, clay rich mica schist?	Topsoil	

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	2.00	3.00	1.00	0.91	91.00			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fragile
	3.00	4.00	1.00	0.9	90.00			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fragile
	4.00	5.50	1.50	1.4	93.33			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	5.50	7.00	1.50	1.4	93.33			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	7.00	8.50	1.50	1.5	100.00			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	8.50	10.00	1.50	1.35	90.00			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	10.00	11.50	1.50	1.45	96.67			Brownish grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	11.50	13.00	1.50	1.5	100.00			Brownish grey	Fine to medium	Limonitic at places	Hard, Quartz-mica (muscovite, biotite) schist with few quartz veins at places	Quartz-mica schist	Fractured.
24.02.2025	13.00	14.50	1.50	1.42	94.67			Brownish grey	Fine	Highly weathered	Quartz-mica schist	Quartz-mica schist	Fractured.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	14.50	16.00	1.50	1.49	99.33			Brownish grey	Fine to medium		Quartz-mica schist	Quartz-mica schist	Fractured.
	16.00	17.50	1.50	1.38	92.00			Brownish grey to dark grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	17.50	19.00	1.50	1.32	88.00			Brownish grey to dark grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	19.00	20.50	1.50	1.38	92.00	0.19	12.67	Dark grey	Fine		Quartz-mica schist	Quartz-mica schist	Fractured.
	20.50	22.00	1.50	1.3	86.67	0.61	40.67	Dark grey	Fine	Weak Alteration	Quartz-mica (Muscovite, biotite) schist	Quartz-mica schist	

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
25.02.2025	22.00	23.50	1.50	1.3	86.67			Dark grey	Fine	Ferruginous alteration	Quartz-Mica (Muscovite, biotite) schist	Quartz-mica schist	Sulphides. Highly Fractured.
	23.50	25.00	1.50	1.26	84.00			Brownish grey to greyish black	Fine	Ferruginous alteration	Quartz-Mica (muscovite, biotite) schist with graphite patch	Quartz-mica schist	Graphite band at 24.5-24.55 m
	25.00	26.50	1.50	1.24	82.67			Brownish Grey to greyish black	Fine	Ferruginous alteration at fractures	Quartz-mica (muscovite, biotite) schist with graphite patch	Quartz-mica schist	Graphite band at 25.0-25.10 m
	26.50	27.25	0.75	0.75	100.00			Brownish grey to grey	Fine	Yellowish brown stains	Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH05						EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529391	Water Table: NA	
Date of Commencement				23.02.2025						ELEVATION: (M)	162.98		
Date of Completion				26.02.2025						AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	27.25	27.50	0.25	0.25	100.00			Dark grey	Fine	Yellowish brown stains	Quartz-mica-schist with graphite	Quartz-mica-schist with graphite	
	27.50	28.00	0.50	0.5	100.00			Brownish grey	Fine	Ferruginous alteration	Hard, fractured, Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	
	28.00	28.50	0.50	0.5	100.00			Greyish black	Fine	Oxidation/reddish brown	Quartz-mica-graphite schist with patches of silica along foliation	Quartz-mica-graphite schist	Crenulated, siliceous at places.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	28.50	29.50	1.00	1	100.00			Yellowish brown to brownish grey	Fine	Reddish brown coloration	Hard, fractured, Quartz-mica (muscovite, biotite) schist with graphite patch at 29.70-29.78 m	Quartz-mica schist	
	29.50	29.63	0.13	0.13	100.00	0.27	18.00	Brownish grey	Fine	Oxidation/reddish brown	Hard, fractured, Quartz-Mica (muscovite, biotite) schist	Quartz-mica schist	
	29.63	31.00	1.37	1.27	92.70			Greyish black	Fine	Oxidation/reddish brown	Hard, fractured, Quartz-mica-graphite schist with quartz vein	Quartz-mica-graphite schist	Siliceous at places. Sulphides.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	31.00	32.50	1.50	1.5	100.00	0.15	10.00	Greyish black	Fine	Oxidation/reddish brown	Hard, fractured, Quartz-mica-graphite schist with quartz vein	Quartz-mica-graphite schist	
	32.50	32.70	0.20	0.18	90.00	0.26	17.33	Greyish black	Fine		Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	
	32.70	34.00	1.30	1.22	93.85			Greyish	Fine	Oxidation/reddish brown	Hard, Fractured, alternate banding of light & dark grey colour minerals, Effervescent with dil. HCL. Calc-Silicate	Calc-silicate	Graphite at 33.60-33.65 m

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH05						EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529391	Water Table: NA	
Date of Commencement				23.02.2025						ELEVATION: (M)	162.98		
Date of Completion				26.02.2025						AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
26.02.2025	34.00	35.50	1.50	1.40	93.33	0.65	43.33	Greyish	Fine	Weak alteration	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase, diopside & mica). Effervescent with dil. HCL.	Calc-silicate	Fractured.
	35.50	37.00	1.50	1.42	94.67	0.64	42.67	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase,	Calc-silicate	Fractured. Crenulated/folded at places.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH05						EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529391	Water Table: NA	
Date of Commencement				23.02.2025						ELEVATION: (M)	162.98		
Date of Completion				26.02.2025						AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											diopside & mica). Effervescent with dil. HCL.		
	37.00	38.50	1.50	1.46	97.33	1.05	70.00	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase, diopside & mica). Effervescent with dil. HCL.	Calc-silicate	Fractured.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
	38.50	39.00	0.50	0.50	100.00		0.00	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase, diopside & mica). Effervescent with dil. HCL.	Calc-silicate	Fractured.
	39.00	40.00	1.00	0.92	92.00	0.52	52.00	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase,	Calc-silicate	Fractured.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH05						EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529391	Water Table: NA	
Date of Commencement				23.02.2025						ELEVATION: (M)	162.98		
Date of Completion				26.02.2025						AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											diopside & mica). Effervescent with dil. HCL.		
	40.00	41.00	1.00	0.80	80.00	0.38	38.00	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase, diopside & mica). Effervescent with dil. HCL.	Calc- silicate	Fractured.

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH05					EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.					R-167 SM 35					NORTHING:	2529391	Water Table: NA	
Date of Commencement					23.02.2025					ELEVATION: (M)	162.98		
Date of Completion					26.02.2025					AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	41.00	42.50	1.50	1.45	96.67	1.1	73.33	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase, diopside & mica). Effervescent with dil. HCL.	Calc-silicate	Fractured. Fizzes along fractures.
	42.50	43.00	0.50	0.50	100.00	0.28	56.00	Greyish to greenish	Fine	Light green alteration/Ferruginous alteration at fractures	Hard, alternate light brown(carbonate) & dark grey (Quartz, plagioclase,	Calc-silicate	Fractured, Fracture filling calcite veins. More mica. Fizzes

Annexure-VIII Summarised lithological-log sheet of RGBH-05 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH05						EASTING:	477892.111	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529391	Water Table: NA	
Date of Commencement				23.02.2025						ELEVATION: (M)	162.98		
Date of Completion				26.02.2025						AZIMUTH/ANGLE:	175°/50°	EOH: 43.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho- code	Remarks
	From (m)	To (m)											
											diopside & mica). Effervescent with dil. HCL.		along fractures.
Borehole No. RGBH-05 Closed at 43.00 m.													

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH06					EASTING:		478333.62	
Rig No.					R-167 SM 35					NORTHING:		2529422	
Date of Commencement					10.03.2025					ELEVATION: (M)		175.75	
Date of Completion					18.03.2025					AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
10. 03. 2025	0	0.5	0.5	0.48	96			Brownish			Topsoil, fine grained clayey rich	Topsoil	
	0.5	1	0.5	0.49	98			Brownish			Topsoil, fine grained clayey rich	Topsoil	
	1	1.5	0.5	0.5	100			Brown to light brown	fine		Weathered, loose materials composed of quartz-mica schist?	Weathered mantle	
	1.5	2	0.5	0.48	96			Brown to light brown	fine		Weathered, loose materials composed of quartz-mica schist?	Weathered mantle	
	2	2.5	0.5	0.5	100			Brown to light brown	fine		Weathered, loose materials composed	Weathered mantle	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH06					EASTING:		478333.62	
Rig No.					R-167 SM 35					NORTHING:		2529422	
Date of Commencement					10.03.2025					ELEVATION: (M)		175.75	
Date of Completion					18.03.2025					AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
											of quartz-mica schist?		
11.03 .2025	2. 5	3	0. 5	0.43	86			Brownish	Fine to mediu m	Weathered .	Hard, Quartz- muscovite, biotite, schist with quartz grains at places in mica schist ground mass	Quartz-mica schist	Fractured.
	3	4	1	0.92	92			Brownish	Fine to mediu m		Hard, Quartz, muscovite, biotite, schist with quartz grains at places in mica schist ground mass	Quartz-mica schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	4	5.5	1.5	1.38	92			Brownish to greyish brown	Fine to medium		Hard, Quartz-muscovite, biotite, schist with quartz grains at places in mica schist ground mass	Quartz-mica schist	
	5.5	7	1.5	1.5	100			Greyish	Fine to medium		Loose, weathered, Quartz-mica schist	Quartz-mica schist	Clay rich, mud
	7	8.38	1.38	1.21	87.68 115942			Greyish brown	Fine	Ferruginous alteration at places.	Loose to hard, weathered, fractured, Quartz-mica schist	Quartz-mica schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	8.38	8.5	0.12	0.12	100			Greyish	Fine	Partially	Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Average concentration.
	8.5	9.38	0.88	0.88	100			Greyish	Fine	Limonitised at places.	Graphite bearing mica schist	Quartz-mica-graphite schist	
	9.38	9.51	0.13	0.13	100			Brown	Fine	Ferruginous alteration at places.	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	
	9.51	10	0.49	0.49	100			Greyish black to brown	Fine	Limonitised at places/fractures.	Limonitised Quartz-mica schist	Quartz-mica schist	Graphite band at 9.51-9.65 m

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	R Q D (> 10cm. Pieces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	10	11.5	1.5	1.5	100	0.15	10	Greyish black to brown	Fine	Limonitised at places.	Hard, fractured, Quartz-mica schist with layers of graphite at 10.20-10.35 m	Quartz-mica schist	Graphite band at 10.20-10.35 m
	11.5	11.8	0.27	0.25	92.59	0.1	37.0	Brownish	Fine	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	
	11.8	13	1.23	1.23	100			Greyish black to brown	Fine	Ferruginous alteration at fractures	Hard, fractured, Quartz-mica-graphite with quartz vein & interlayered mica schist at places.	Quartz-mica-graphite Schist	Quartz-mica band at 12.6-12.73 m

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:	478333.62	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529422	Water Table: NA	
Date of Commencement				10.03.2025						ELEVATION: (M)	175.75		
Date of Completion				18.03.2025						AZIMUTH/ANGLE:	175°/45°	EOH: 62.00 M	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	RQD (> 10cm. Pieces)	RQD (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	13	14.5	1.5	1.5	100			Greyish black to light grey	Fine	Ferruginous alteration at fractures	Hard, fractured, Quartz-mica-graphite with quartz vein & interlayered mica schist at places.	Quartz-mica-graphite schist	Fractured. Sub-metallic lustre.
	14.5	14.9	0.4	0.4	100			Greyish black to brown	Fine		Hard, fractured, Interlayered quartz mica schist with graphite layers at places	Quartz-mica schist with graphite	Thin layers of graphite.
	14.9	15.5	0.55	0.55	100	0.16		Greyish black	Fine	Ferruginous	Hard, fractured, quartz- mica-graphite schist	Quartz-mica-graphite schist	Soils hand

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Core Recovery (m)	Recovery (%)	R Q D (> 10c m. Pieces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	15.5	16.00	0.55	0.55	100			Grey - brown	Fine	Ferruginous	Hard, fractured Quartz-mica schist with quartz veins	Quartz-mica schist	Quartz vein (15.80-15.90m)
	16.55	16.55	0.55	0.55	100			Grey - brown	Fine	Ferruginous	Hard, fractured Quartz-mica schist with quartz veins	Quartz-mica schist	
	16.67	16.61	0.12	0.12	100			Greyish black	Fine		Hard, crenulated, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Soils hand.
	16.70	17.03	0.83	0.83	100			Grey - brown	Fine	Ferruginous	Hard, fractured, muscovite, biotite schist	Quartz-mica schist	
	17.50	19.00	1.47	0.47	31.333333			Grey - brown	Fine	Ferruginous	Hard, fractured, muscovite, biotite schist	Quartz-mica schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:	478333.62	Casing Depth: 5.0 m	
Rig No.				R-167 SM 35						NORTHING:	2529422	Water Table: NA	
Date of Commencement				10.03.2025						ELEVATION: (M)	175.75		
Date of Completion				18.03.2025						AZIMUTH/ANGLE:	175°/45°	EOH: 62.00 M	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
12.03 .2025	19	19 .1 9	0. 1 9	0.19	100			Grey - brown	Fine		Hard, Mica-Quartz schist	Quartz-mica schist	
	19 .2	20 .5 0	1. 3 1	1.27	96.94 65648 9	0.2 4		Greyish black to light grey	Fine	Ferruginous	Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	
	20 .5	20 .5 8	0. 0 8	0.08	100			Greyish black to light grey	Fine	Ferruginous	Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	Siliceous.
	20 .5 8	20 .8 7	0. 2 9	0.29	100			Greyish green	Fine		Weathered, Quartz-mica schist	Quartz-mica schist	with Quartz vein.

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	20 .8 7	21 .0 8	0. 2 1	0.21	100			Greyish black - white	Fine		Hard, Quartz-mica- graphite schist with quartz veins	Quartz-mica- graphite schist	Siliceous.
	21 .0 8	22 .2 2	0. 9 2	0.92	100			Grey-green- brown	Fine	Kaolinized at places	Quartz-mica schist with quartz veins	Quartz-mica schist	Hard-soft, fragile at places
	22 .0 0	23 .2 8	1. 1 8	1.18	100			Grey - yellowish green	Fine	Ferrugino us	Hard, fractured, Quartz-muscovite, biotite, schist	Quartz-mica schist	Quartz vein & thin layers (2cm) of graphite
	23 .2	23 .5	0. 3 2	0.32	100			Greyish black- off-white	Fine	Ferrugino us	Hard, Crenulated, Quartz mica schist graphite with low concentration	Quartz-mica- schist with graphite	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	23 .5	23 .8	0. 2 5	0.25	100			Brown greyish	Fine to mediu m	Ferrugino us	Hard, Quartz-mica- schist with thin layers of graphite	Quartz-mica- schist with graphite	Low concentration.
	23 .8	24 .6	0. 8 3	0.83	100			Greyish black, brown	Fine	Ferrugino us/Oxidise d at places	Hard, crenulated, Quartz-mica- graphite schist with quartz vein	Quartz-mica- graphite schist	Siliceous.
	24 .6	25	0. 4 2	0.42	100			Grey-light green	Fine	Ferrugino us/Oxidise d at places	Hard, fractured, quartz, muscovite- biotite schist	Quartz-mica schist	
	25	25 .9	0. 9 2	0.88	95.65 21739 1	0.1 2		Grey, brown	Fine	Ferrugino us/Oxidise d at places	Hard, fractured, Quartz, Muscovite- biotite schist	Quartz-mica schist	with graphite at 25.25-25.35 m

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	25.9	26.5	0.58	0.52	89.65 51724 1			Buff-greyish black- brown	Fine		Hard, fractured, Quartz-mica- graphite schist with mica schist layer at 26.23-26.30	Quartz-mica graphite schist	FC%-1.98. Interlayered with mica schist
	26.5	27.3	0.79	0.79	100			Light grey	Fine	Ferruginous at fractures	Hard, Quartz-mica schist with traces of graphite	Quartz-mica schist	Fractured, crenulated at places.
	27.3	27.8	0.46	0.46	100			Greyish black	Fine	Ferruginous	Hard, Quartz-mica- graphite schist	Quartz-mica- graphite schist	Quartz veins at places.
	27.75	28.05	0.16	0.16	64.00			Light grey	Fine	Ferruginous	Hard, Quartz- muscovite, biotite schist	Quartz-mica schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	28.00	29.00	1.00	0.94	94.00	0.39	39.00	Light grey-brown	Fine to medium	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	Traces of graphite at 28.37 m.
	29.00	30.00	1.00	0.94	94.00	0.24	24.00	Light grey-brown	Fine to medium	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	
	30.00	30.53	0.53	0.53	100.00	0.36	36.00	Light grey-brown	Fine to medium	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	Patch of graphite at 30.24-30.34 m
	30.53	31.04	0.51	0.45	95.74			Greyish black	Fine to medium	Ferruginous	Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	
	31.00	32.35	1.35	1.35	100.00	0.81	54.00	Greyish black	Fine to medium	Ferruginous	Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Quartz veins at places.

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH06					EASTING:		478333.62	
Rig No.					R-167 SM 35					NORTHING:		2529422	
Date of Commencement					10.03.2025					ELEVATION: (M)		175.75	
Date of Completion					18.03.2025					AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	32.35	32.50	0.15	0.13	86.67	0.14	9.33	Greyish-brown	Fine to medium	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	with traces of graphite
	32.50	32.66	0.16	0.16	100.00			Greyish-brown	Fine to medium	Ferruginous	Hard, Quartz-muscovite, biotite schist	Quartz-mica schist	with traces of graphite
	32.66	33.03	0.37	0.37	100.00			Greyish black	Fine to medium		Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Crenulated, Quartz veins.
	33.03	34.07	0.97	0.97	100.00			Light grey-green- brown	Fine to medium		Hard-fragile, weathered, Quartz-mica schist	Quartz-mica schist	
	34.00	35.00	1.00	1.00	100.00	0.34	22.67	Light grey-Buff-greenish	Fine to medium		Hard-fragile, weathered, Quartz-mica schist	Quartz-mica schist	with minor concentration of graphite.

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal														
Drilled by Maheshwari Mining Pvt. Ltd.														
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ		
Borehole No.					RGBH06					EASTING:	478333.62	Casing Depth: 5.0 m		
Rig No.					R-167 SM 35					NORTHING:	2529422	Water Table: NA		
Date of Commencement					10.03.2025					ELEVATION: (M)	175.75			
Date of Completion					18.03.2025					AZIMUTH/ANGL E:	175°/45°	EOH: 62.00 M		
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks	
	Fr o m (m)	T o (m)												
	35.00	35.50	0.50	0.45	90.00			Greyish black	Fine to medium	Ferruginous	Hard, Quartz-mica-graphite schist	Quartz-mica-graphite schist		
	35.50	37.00	1.50	1.45	96.67	0.95	63.33	Greyish black-light grey	Fine to medium		Hard, fractured, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Interlayering of graphite & mica schist. Crenulate/folded.	
	37.00	38.00	1.00	0.94	94.00	0.46	46.00	Grey-light grey-greenish	Fine to medium	Ferruginous	Hard, fractured, Quartz-mica schist with thin layers of graphite	Quartz-mica schist	with thin layers of graphite	
13.03.2025	38.00	38.47	0.47	0.47	100.00	0.14	14.00	Greyish-brown	Fine to medium	Ferruginous	Hard, weathered, Quartz-mica schist	Quartz-mica schist		

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH06					EASTING:		478333.62	
Rig No.					R-167 SM 35					NORTHING:		2529422	
Date of Commencement					10.03.2025					ELEVATION: (M)		175.75	
Date of Completion					18.03.2025					AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	38 .4 7	39 .0 0	0. 5 3	0.45	84.91			Greyish black- light grey	Fine to mediu m	Ferrugino us	Hard, fractured, Interlayering of Quartz-mica schist & graphite schist	Quartz-mica- graphite schist	
	39 .0 0	40 .0 0	1. 0 0	0.96	96.00	0.5 1	51.0 0	Grey-light brown	Fine to mediu m	Ferrugino us	Hard, Quartz- muscovite, biotite schist	Quartz-mica schist	with traces of graphite
	40 .0 0	41 .4 0	1. 4 0	1.40	100.0 0			Dark grey- brown	Fine to mediu m	Ferrugino us	Hard, Quartz- muscovite, biotite schist with low concentration of graphite.	Quartz-mica schist	with traces of graphite. Quartz veins.
	41 .4 0	41 .5 0	0. 1 0	0.10	100.0 0			Greyish black	Fine	Ferrugino us	Quartz-mica- graphite schist	Quartz-mica- graphite schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.					RGBH06					EASTING:		478333.62	
Rig No.					R-167 SM 35					NORTHING:		2529422	
Date of Commencement					10.03.2025					ELEVATION: (M)		175.75	
Date of Completion					18.03.2025					AZIMUTH/ANGLE:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	41.50	42.35	0.85	0.85	100.00	0.80	53.33	Greyish black-light grey	Fine	Ferruginous	Hard, Quartz-mica-graphite schist	Quartz-mica-graphite schist	Interlayering of graphite & mica schist.
	42.35	43.00	0.65	0.65	100.00			Greyish brown-greenish brown	Fine	Ferruginous	Hard, Quartz-mica schist with thin layers of graphite & Quartz at places.	Quartz-mica schist	Low concentration.
	43.00	44.25	1.20	1.20	96.00	0.54	36.00	Greyish brown-greenish brown	Fine		Hard, Quartz-mica schist with thin layers of graphite & Quartz at places.	Quartz-mica schist	
	44.25	44.50	0.23	0.23	92.00			Greyish black	Fine		Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	Sulphides (pyrite, chalcopyrite) along foliations.

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGLE:		175°/45°	
Date	Run		Run (m)	Core Recovery (m)	Recovery (%)	R Q D (> 10cm. Pieces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	From (m)	To (m)											
	44.50	45.00	0.50	0.50	100.00	0.25	50.00	Greyish black	Fine		Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	Sulphides (pyrite, chalcopyrite) along foliations.
	45.00	46.00	1.00	1.00	100.00			Greyish black	Fine		Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	Sulphides (pyrite, chalcopyrite) along foliations.
18.03.2025	46.00	47.28	1.28	1.28	100.00	0.35	23.33	Greyish black	Fine		Hard, Quartz-mica-graphite schist with crenulated quartz veins	Quartz-mica-graphite schist	Sulphides (pyrite, chalcopyrite) along foliations.
	47.28	47.50	0.22	0.22	100.00			Greyish brown	Fine	Ferruginous	Hard, Quartz-mica (muscovite, biotite) schist	Quartz-mica schist	

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	47.50	50.50	3.00	2.96	98.67	0.89	29.67	Grey, brown	Fine	Ferruginous	Hard, Quartz-mica (muscovite, biotite) schist (more biotite)	Quartz-mica schist	Fractured. With carbonate veins at places.
	50.50	52.00	1.50	1.43	95.33			Dark grey-light green	Fine		Hard, Quartz-mica-carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	52.00	53.50	1.50	1.50	100.00	1.02	68.00	Dark grey-light green	Fine		Hard, Quartz-mica-carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	53.50	55.00	1.50	1.50	100.00	0.79	52.67	Dark grey-light green	Fine		Hard, Quartz-mica-carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	55.00	56.50	1.50	1.46	97.33	0.67	44.67	Dark grey-light green	Fine		Hard, Quartz-mica-carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.

Annexure-IX Summarised lithological-log sheet of RGBH-06 of Ranibandh Block, Bankura district, West Bengal													
Drilled by Maheshwari Mining Pvt. Ltd.													
NMET-RANIBANDH GRAPHITE BLOCK, BANKURA (W.B)										COORDINATES-		Drilling Size: HQ	
Borehole No.				RGBH06						EASTING:		478333.62	
Rig No.				R-167 SM 35						NORTHING:		2529422	
Date of Commencement				10.03.2025						ELEVATION: (M)		175.75	
Date of Completion				18.03.2025						AZIMUTH/ANGL E:		175°/45°	
Date	Run		R u n (m)	Cor e Rec over y (m)	Recov ery (%)	R Q D (> 10c m. Pie ces)	RQ D (%)	Colour	Grain size	Alteration	Lithology	Litho-code	Remarks
	Fr o m (m)	To (m)											
	56 .5 0	58 .0 0	1. 5 0	1.34	89.33		0.00	Dark grey-light green	Fine		Hard, Quartz-mica- carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	58 .0 0	59 .5 0	1. 5 0	1.50	100.0 0	0.3 2	21.3 3	Dark grey-light green	Fine		Hard, Quartz-mica- carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	59 .5 0	61 .0 0	1. 5 0	1.50	100.0 0	1.2 3	82.0 0	Dark grey-light green	Fine		Hard, Quartz-mica- carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
	61 .0 0	62 .0 0	1. 0 0	1.00	100.0 0	0.5 5	55.0 0	Dark grey-light green	Fine		Hard, Quartz-mica- carbonate schist (more biotite)	Calcareous quartz-mica schist	Crude schistosity. Effervescent with dil. HCL at places.
Borehole No. RGBH-06 Closed at 62.00 m.													

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
1	NMCI/FST/25-26/3963	RGBH-01/01	19.40	19.90	0.50	Quartz-mica-graphite schist	0.44	4.23	93.44	0.18	2.15
2	NMCI/FST/25-26/3964	RGBH-01/02	22.35	23.70	1.35	Quartz-mica-graphite schist	1.66	5.28	89.93	0.17	4.62
3	NMCI/FST/25-26/3965	RGBH-01/03	28.30	29.00	0.70	Quartz-mica-graphite schist	2.09	5.55	90.08	0.17	4.20
4	NMCI/FST/25-26/3966	RGBH-01/04	51.35	51.85	0.50	Quartz-mica-graphite schist	0.21	1.79	95.40	0.15	2.66
5	NMCI/FST/25-26/3967	RGBH-01/05	55.00	56.00	1.00	Quartz-mica-graphite schist	0.37	2.27	91.81	0.17	5.75
6	NMCI/FST/25-26/3968	RGBH-01/06	56.00	57.00	1.00	Quartz-mica-graphite schist	0.29	1.90	91.49	0.18	6.43

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
7	NMCI/FST/25-26/3969	RGBH-01/07	57.00	58.00	1.00	Quartz-mica-graphite schist	0.27	1.51	91.19	0.14	7.16
8	NMCI/FST/25-26/3970	RGBH-01/08	58.00	59.00	1.00	Quartz-mica-graphite schist	0.45	2.24	93.32	0.16	4.28
9	NMCI/FST/25-26/3971	RGBH-01/09	59.00	60.00	1.00	Quartz-mica-graphite schist	0.56	2.82	90.66	0.14	6.38
10	NMCI/FST/25-26/3972	RGBH-01/10	60.00	61.00	1.00	Quartz-mica-graphite schist	0.42	1.68	92.43	0.12	5.77
11	NMCI/FST/25-26/3973	RGBH-01/11	61.00	62.00	1.00	Quartz-mica-graphite schist	0.48	1.84	90.55	0.11	7.50
12	NMCI/FST/25-26/3974	RGBH-01/12	62.00	63.00	1.00	Quartz-mica-graphite schist	0.41	2.06	90.50	0.13	7.31

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
13	NMCI/FST/25-26/3975	RGBH-01/13	63.00	64.00	1.00	Quartz-mica-graphite schist	0.44	1.60	90.60	0.11	7.69
14	NMCI/FST/25-26/3976	RGBH-01/14	64.00	65.00	1.00	Quartz-mica-graphite schist	0.49	2.06	90.41	0.15	7.38
15	NMCI/FST/25-26/3977	RGBH-01/15	65.00	66.00	1.00	Quartz-mica-graphite schist	0.45	2.38	90.14	0.14	7.34
16	NMCI/FST/25-26/3978	RGBH-01/16	66.00	67.00	1.00	Quartz-mica-graphite schist	0.55	2.29	89.86	0.15	7.70
17	NMCI/FST/25-26/3979	RGBH-01/17	67.00	68.00	1.00	Quartz-mica-graphite schist	0.44	1.71	90.56	0.14	7.59
18	NMCI/FST/25-26/3980	RGBH-01/18	68.00	69.00	1.00	Quartz-mica-graphite schist	0.33	1.61	91.27	0.17	6.95

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
19	NMCI/FST/25-26/3981	RGBH-01/19	69.00	70.00	1.00	Quartz-mica-graphite schist	0.31	1.58	91.00	0.14	7.28
20	NMCI/FST/25-26/3982	RGBH-01/20	70.00	71.00	1.00	Quartz-mica-graphite schist	0.31	1.54	91.84	0.16	6.46
21	NMCI/FST/25-26/3983	RGBH-01/21	71.00	72.00	1.00	Quartz-mica-graphite schist	0.37	1.42	90.55	0.35	7.68
22	NMCI/FST/25-26/3984	RGBH-01/22	72.00	73.00	1.00	Quartz-mica-graphite schist	0.30	1.33	90.31	0.31	8.05
23	NMCI/FST/25-26/3985	RGBH-01/23	73.00	74.00	1.00	Quartz-mica-graphite schist	0.32	1.55	90.17	0.38	7.90
24	NMCI/FST/25-26/3986	RGBH-01/24	74.00	75.00	1.00	Quartz-mica-graphite schist	0.35	1.22	91.68	0.32	6.78

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
25	NMCI/FST/25-26/3987	RGBH-01/25	75.00	76.00	1.00	Quartz-mica-graphite schist	0.34	1.41	91.14	0.35	7.10
26	NMCI/FST/25-26/3988	RGBH-01/26	76.00	77.00	1.00	Quartz-mica-graphite schist	0.34	1.40	89.79	0.37	8.44
27	NMCI/FST/25-26/3989	RGBH-01/27	77.00	78.00	1.00	Quartz-mica-graphite schist	0.32	1.54	89.96	0.42	8.08
28	NMCI/FST/25-26/3990	RGBH-01/28	78.00	79.00	1.00	Quartz-mica-graphite schist	0.32	1.64	90.27	0.29	7.80
29	NMCI/FST/25-26/3991	RGBH-01/29	79.00	80.00	1.00	Quartz-mica-graphite schist	0.32	1.51	90.36	0.37	7.76
30	NMCI/FST/25-26/3992	RGBH-01/30	80.00	81.00	1.00	Quartz-mica-graphite schist	0.32	1.54	90.11	0.41	7.94

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
31	NMCI/FST/25-26/3993	RGBH-01/31	81.00	82.00	1.00	Quartz-mica-graphite schist	0.37	1.55	90.19	0.35	7.91
32	NMCI/FST/25-26/3994	RGBH-01/32	82.00	83.00	1.00	Quartz-mica-graphite schist	0.37	1.56	90.94	0.31	7.19
33	NMCI/FST/25-26/3995	RGBH-01/33	83.00	84.00	1.00	Quartz-mica-graphite schist	0.30	1.18	92.46	0.28	6.08
34	NMCI/FST/25-26/3996	RGBH-01/34	84.00	85.00	1.00	Quartz-mica-graphite schist	0.37	1.57	90.48	0.24	7.71
35	NMCI/FST/25-26/3997	RGBH-01/35	85.00	86.00	1.00	Quartz-mica-graphite schist	0.26	1.42	90.65	0.26	7.67
36	NMCI/FST/25-26/3998	RGBH-01/36	86.00	87.00	1.00	Quartz-mica-graphite schist	0.25	1.46	91.34	0.27	6.93

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
37	NMCI/FST/25-26/3999	RGBH-01/37	87.00	88.00	1.00	Quartz-mica-graphite schist	0.21	1.30	91.06	0.29	7.35
38	NMCI/FST/25-26/4000	RGBH-01/38	88.00	89.00	1.00	Quartz-mica-graphite schist	0.22	1.43	91.42	0.24	6.91
39	NMCI/FST/25-26/4001	RGBH-01/39	89.00	90.00	1.00	Quartz-mica-graphite schist	0.19	1.32	92.51	0.31	5.86
40	NMCI/FST/25-26/4002	RGBH-01/40	90.00	91.00	1.00	Quartz-mica-graphite schist	0.23	1.34	91.39	0.38	6.89
41	NMCI/FST/25-26/4003	RGBH-01/41	91.00	92.00	1.00	Quartz-mica-graphite schist	0.24	1.24	92.91	0.35	5.50
42	NMCI/FST/25-26/4004	RGBH-01/42	92.00	93.00	1.00	Quartz-mica-graphite schist	0.28	1.16	92.62	0.27	5.95

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
43	NMCI/FST/25-26/4005	RGBH-01/43	93.00	94.00	1.00	Quartz-mica-graphite schist	0.27	1.29	91.26	0.29	7.16
44	NMCI/FST/25-26/4006	RGBH-01/44	94.00	95.00	1.00	Quartz-mica-graphite schist	0.24	1.45	90.72	0.28	7.55
45	NMCI/FST/25-26/4007	RGBH-01/45	95.00	96.00	1.00	Quartz-mica-graphite schist	0.23	1.25	91.82	0.29	6.64
46	NMCI/FST/25-26/4008	RGBH-01/46	96.00	97.00	1.00	Quartz-mica-graphite schist	0.22	0.99	92.09	0.29	6.63
47	NMCI/FST/25-26/4009	RGBH-01/47	97.00	98.00	1.00	Quartz-mica-graphite schist	0.20	1.30	92.53	0.34	5.83
48	NMCI/FST/25-26/4010	RGBH-01/48	98.00	99.00	1.00	Quartz-mica-graphite schist	0.21	1.07	92.38	0.32	6.23

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
49	NMCI/FST/25-26/4011	RGBH-01/49	99.00	100.00	1.00	Quartz-mica-graphite schist	0.23	1.17	92.33	0.36	6.14
50	NMCI/FST/25-26/4012	RGBH-01/50	100.00	101.00	1.00	Quartz-mica-graphite schist	0.23	1.42	91.88	0.35	6.35
51	NMCI/FST/25-26/4013	RGBH-01/51	101.00	102.00	1.00	Quartz-mica-graphite schist	0.28	1.63	90.17	0.31	7.89
52	NMCI/FST/25-26/4014	RGBH-01/52	102.00	103.00	1.00	Quartz-mica-graphite schist	0.29	1.50	91.03	0.32	7.15
53	NMCI/FST/25-26/4015	RGBH-01/53	103.00	104.00	1.00	Quartz-mica-graphite schist	0.30	1.00	91.30	0.39	7.31
54	NMCI/FST/25-26/4016	RGBH-01/54	104.00	105.00	1.00	Quartz-mica-graphite schist	0.26	1.29	90.42	0.19	8.10

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
55	NMCI/FST/25-26/4017	RGBH-01/55	105.00	106.00	1.00	Quartz-mica-graphite schist	0.18	1.63	89.72	0.21	8.44
68	NMCI/FST/25-26/4018	RGBH-02/01 (A)	37.40	38.00	0.60	Quartz-mica-graphite schist	1.20	5.19	93.48	0.14	1.19
69	NMCI/FST/25-26/4019	RGBH-02/01	51.29	51.89	0.60	Quartz-mica-graphite schist	0.45	1.77	96.81	0.15	1.27
70	NMCI/FST/25-26/4020	RGBH-02/02	52.25	53.25	1.00	Quartz-mica-graphite schist	0.54	2.52	91.75	0.18	5.55
71	NMCI/FST/25-26/4021	RGBH-02/03	53.25	53.88	0.63	Quartz-mica-graphite schist	0.68	2.68	90.35	0.14	6.83
72	NMCI/FST/25-26/4022	RGBH-02/04	77.95	79.00	1.05	Quartz-mica-graphite schist	1.22	3.29	90.08	0.18	6.45

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
73	NMCI/FST/25-26/4023	RGBH-02/05	79.00	79.77	0.77	Quartz-mica-graphite schist	0.67	2.88	91.25	0.17	5.70
74	NMCI/FST/25-26/4024	RGBH-02/06	84.16	85.00	0.84	Quartz-mica-graphite schist	2.03	3.28	88.25	0.17	8.30
75	NMCI/FST/25-26/4025	RGBH-02/07	85.00	86.00	1.00	Quartz-mica-graphite schist	0.94	2.86	85.76	0.16	11.22
76	NMCI/FST/25-26/4026	RGBH-02/08	86.00	87.00	1.00	Quartz-mica-graphite schist	1.52	3.25	88.93	0.15	7.67
77	NMCI/FST/25-26/4027	RGBH-02/09	87.00	88.00	1.00	Quartz-mica-graphite schist	1.24	2.88	88.93	0.17	8.02
78	NMCI/FST/25-26/4028	RGBH-02/10	88.00	89.00	1.00	Quartz-mica-graphite schist	1.08	2.91	90.51	0.14	6.44

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
79	NMCI/FST/25-26/4029	RGBH-02/11	89.00	90.00	1.00	Quartz-mica-graphite schist	0.88	2.76	89.02	0.17	8.05
80	NMCI/FST/25-26/4030	RGBH-02/12	90.00	91.00	1.00	Quartz-mica-graphite schist	0.64	2.31	89.07	0.16	8.46
81	NMCI/FST/25-26/4031	RGBH-02/13	91.00	91.95	0.95	Quartz-mica-graphite schist	1.03	2.76	87.54	0.14	9.56
82	NMCI/FST/25-26/4032	RGBH-02/14	92.25	93.25	1.00	Quartz-mica-graphite schist	1.19	5.45	85.60	0.14	8.81
83	NMCI/FST/25-26/4033	RGBH-02/15	93.25	94.45	1.20	Quartz-mica-graphite schist	1.28	3.77	85.06	0.16	11.01
84	NMCI/FST/25-26/4034	RGBH-03/01	45.23	45.53	0.30	Quartz-mica-graphite schist	0.44	1.77	91.99	0.15	6.09

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
85	NMCI/FST/25-26/4035	RGBH-03/02	46.25	46.60	0.35	Quartz-mica-graphite schist	0.20	1.32	98.12	0.18	0.38
86	NMCI/FST/25-26/4036	RGBH-03/03	48.51	49.23	0.72	Quartz-mica-graphite schist	0.23	1.58	92.53	0.17	5.72
60	NMCI/FST/25-26/4037	RGBH-04/01	49.10	50.50	1.40	Quartz-mica-graphite schist	0.34	2.02	92.30	0.15	5.53
61	NMCI/FST/25-26/4038	RGBH-04/02	50.50	51.00	0.50	Quartz-mica-graphite schist	0.24	1.66	94.29	0.14	3.91
62	NMCI/FST/25-26/4039	RGBH-04/03	51.15	52.00	0.85	Quartz-mica-graphite schist	0.28	2.34	90.30	0.14	7.22
63	NMCI/FST/25-26/4040	RGBH-04/04	52.00	53.00	1.00	Quartz-mica-graphite schist	0.34	2.42	88.02	0.18	9.38

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
64	NMCI/FST/25-26/4041	RGBH-04/05	53.00	54.10	1.10	Quartz-mica-graphite schist	0.27	2.73	86.59	0.19	10.49
65	NMCI/FST/25-26/4042	RGBH-04/06	54.27	54.77	0.50	Quartz-mica-graphite schist	0.30	3.39	92.76	0.17	3.68
66	NMCI/FST/25-26/4043	RGBH-04/07	55.72	56.50	0.78	Quartz-mica-graphite schist	0.43	3.26	92.89	0.16	3.69
67	NMCI/FST/25-26/4044	RGBH-04/08	56.50	57.45	0.95	Quartz-mica-graphite schist	0.48	2.42	94.45	0.15	2.98
56	NMCI/FST/25-26/4045	RGBH-05/01	28.00	28.50	0.50	Quartz-mica-graphite schist	0.44	2.27	90.87	0.14	6.72
57	NMCI/FST/25-26/4046	RGBH-05/02	29.63	31.00	1.37	Quartz-mica-graphite schist	0.71	1.85	90.31	0.15	7.69

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
58	NMCI/FST/25-26/4047	RGBH-05/03	31.00	32.00	1.00	Quartz-mica-graphite schist	0.75	1.96	90.25	0.14	7.65
59	NMCI/FST/25-26/4048	RGBH-05/04	32.00	32.70	0.70	Quartz-mica-graphite schist	1.35	4.31	84.16	0.14	11.39
87	NMCI/FST/25-26/4049	RGBH-06/01	8.38	9.38	1.00	Quartz-mica-graphite schist/ Graphite bearing mica schist	1.87	3.19	93.00	0.16	3.65
88	NMCI/FST/25-26/4050	RGBH-06/02	11.77	13.00	1.23	Quartz-mica-graphite schist	0.83	2.92	92.01	0.18	4.89
89	NMCI/FST/25-26/4051	RGBH-06/03	13.00	14.50	1.50	Quartz-mica-graphite schist	0.73	2.44	90.05	0.17	7.34
90	NMCI/FST/25-26/4052	RGBH-06/04	14.90	15.45	0.55	Quartz-mica-graphite schist	0.79	2.81	90.92	0.12	6.15

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
91	NMCI/FST/25-26/4053	RGBH-06/05	19.19	20.58	1.39	Quartz-mica-graphite schist	0.86	2.47	91.41	0.17	5.95
92	NMCI/FST/25-26/4054	RGBH-06/06	23.75	24.58	0.83	Quartz-mica-graphite schist	0.74	2.68	93.22	0.13	3.97
93	NMCI/FST/25-26/4055	RGBH-06/07	25.92	26.50	0.58	Quartz-mica-graphite schist	1.11	2.40	95.48	0.14	1.98
94	NMCI/FST/25-26/4056	RGBH-06/08	27.29	27.75	0.46	Quartz-mica-graphite schist	0.77	2.64	91.44	0.11	5.81
95	NMCI/FST/25-26/4057	RGBH-06/09	30.53	31.00	0.47	Quartz-mica-graphite schist	0.57	2.26	92.79	0.14	4.81
96	NMCI/FST/25-26/4058	RGBH-06/10	31.00	32.35	1.35	Quartz-mica-graphite schist	0.33	2.58	90.26	0.18	6.98

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
97	NMCI/FST/25-26/4059	RGBH-06/11	32.66	33.03	0.37	Quartz-mica-graphite schist	0.41	2.52	91.04	0.17	6.27
98	NMCI/FST/25-26/4060	RGBH-06/12	35.00	36.00	1.00	Quartz-mica-graphite schist	0.32	2.85	89.03	0.15	7.97
99	NMCI/FST/25-26/4061	RGBH-06/13	36.00	37.00	1.00	Quartz-mica-graphite schist	0.25	2.51	94.16	0.14	3.19
100	NMCI/FST/25-26/4062	RGBH-06/14	38.47	39.00	0.53	Quartz-mica-graphite schist	0.39	1.52	96.14	0.14	2.20
101	NMCI/FST/25-26/4063	RGBH-06/15	41.40	42.35	0.95	Quartz-mica-graphite schist	0.54	2.40	89.99	0.18	7.43
102	NMCI/FST/25-26/4064	RGBH-06/16	44.25	45.00	0.75	Quartz-mica-graphite schist	0.69	2.86	90.30	0.19	6.65

Annexure-X Core samples analytical results for proximate analysis											
NMET-Ranibandh Graphite Block, Bankura (W.B)											
SL NO.	SAMPLE CODE	SAMPLE ID	DEPTH FROM (m)	DEPTH TO (m)	THICKNESS (m)	LITHOLOGY	MOISTURE (%) ARB	VM (%) DB	ASH (%) DB	S (%) DB	FC (%) DB
103	NMCI/FST/25-26/4065	RGBH-06/17	45.00	46.00	1.00	Quartz-mica-graphite schist	1.32	2.57	95.16	0.17	2.10
104	NMCI/FST/25-26/4066	RGBH-06/18	46.00	47.28	1.28	Quartz-mica-graphite schist	1.63	2.75	91.13	0.16	5.96

Annexure-XI Analytical results of proximate analysis for external check samples (10% of the total generated core samples)						
Sample Details			Characteristics			
SL.No.	Sample ID	Method	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984
		Units	%	%	%	%
		Lab ID	Analysis Sample Moisture (IM, adb)	Ash (adb)	Volatile Matter (VM, adb)	Fixed Carbon (FC, adb)
1	RGBH-01/07	G1547-1	0.07	90.60	1.68	7.65
2	RGBH-01/08	G1547-2	0.14	92.79	1.69	5.38
3	RGBH-01/09	G1547-3	0.18	89.78	3.39	6.66
4	RGBH-01/10	G1547-4	0.19	91.63	1.77	6.42

Annexure-XI Analytical results of proximate analysis for external check samples (10% of the total generated core samples)

Sample Details			Characteristics			
Sl.No.	Sample ID	Method	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984
		Units	%	%	%	%
		Lab ID	Analysis Sample Moisture (IM, adb)	Ash (adb)	Volatile Matter (VM, adb)	Fixed Carbon (FC, adb)
5	RGBH-02/02	G1547-23	0.20	91.01	2.69	6.10
6	RGBH-02/03	G1547-24	0.21	89.74	2.84	7.21
7	RGBH-03/01	G1547-33	0.16	91.47	1.47	6.91
8	RGBH-04/04	G1547-36	0.21	87.61	2.84	9.34
9	RGBH-05/03	G1547-40	0.38	89.50	2.16	7.97
10	RGBH-06/02	G1547-42	0.45	91.27	2.82	5.46
11	RGBH-06/03	G1547-43	0.32	89.27	2.97	7.44
12	T2/01	G1562-1	0.12	88.61	2.58	8.69
13	T2-16	G1562-2	<0.05	88.64	2.58	8.73
14	T3/03	G1562-3	0.06	91.74	1.73	6.47
15	G7/02	G1562-4	0.09	92.02	3.62	4.27
16	G7/09	G1562-5	0.15	89.83	2.72	7.30

Annexure-XI Analytical results of proximate analysis for external check samples (10% of the total generated core samples)

Sample Details			Characteristics			
Sl.No.	Sample ID	Method	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984	IS 1350 (P.1): 1984
		Units	%	%	%	%
		Lab ID	Analysis Sample Moisture (IM, adb)	Ash (adb)	Volatile Matter (VM, adb)	Fixed Carbon (FC, adb)
17	G8/02	G1562-6	0.08	90.13	2.54	7.26
18	G9/01	G1562-7	0.06	90.98	2.04	6.91
19	G10/01	G1562-8	0.06	89.83	1.89	8.22
20	G12/01	G1562-9	<0.05	89.78	2.24	7.93
21	G12/03	G1562-10	<0.05	89.97	2.22	7.76
22	G13/03	G1562-11	<0.05	89.85	2.87	7.24
23	G15/03	G1562-12	0.17	95.39	1.97	2.47
<p><u>Abbreviations:</u></p> <p>adb: Air Dry Basis</p>						

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Annexure XIII showing mineralised ore zone of borehole & groove/trenches for graphite delineated at $\geq 2\%$ FC cut off					
Bh Id	Depth From (m)	Depth To (m)	Graphite Bands	True Thickness (m)	Weighted Av. FC (%)
RGBH-01	19.40	19.90	ZONE-A/B-2	0.38	2.15
	22.35	23.70	ZONE-A/B-3	1.02	4.62
	28.30	29.00	ZONE-A/B-4	0.53	4.20
	51.35	51.85	ZONE-A/B-5	0.38	2.66
	54.85	106.00	ZONE-A/B-5	38.60	7.029
TRENCH-03			ZONE-A/B-5	1.00	5.76
			ZONE-A/B-5	4.99	5.79
RGBH-02	52.25	53.88	ZONE-A/B-1	1.48	6.04
	77.95	79.77	ZONE-A/B-5	1.65	6.13
	84.16	94.45	ZONE-A/B-5	9.33	8.55
G-12			ZONE-A/B-1	4.70	6.94
RGBH-03	45.23	45.53	RGBH-03/B1	0.26	6.09
	48.51	49.23	RGBH-03/B2	0.62	5.72
T-7			T-7/B1	2.91	9.01
G-1			ZONE-A/B-5	2.93	9.56
G-2			ZONE-A/B-5	0.98	4.02
G-3			ZONE-A/B-1	6.47	4.97
G-4			ZONE-A/B-5	2.82	6.71
G-5			ZONE-A/B-5	0.94	2.36
G-6			ZONE-A/B-5	12.21	7.63
G-7			ZONE-A/B-1	8.46	5.58
G-8			ZONE-A/B-5	1.81	6.69
G-9			ZONE-A/B-5	4.70	6.39
G-10			ZONE-A/B-5	1.29	7.65
G-11			ZONE-A/B-1	2.90	5.03
G-13			ZONE-A/B-5	3.29	7.83

Annexure XIII showing mineralised ore zone of borehole & groove/trenches for graphite delineated at $\geq 2\%$ FC cut off					
Bh Id	Depth From (m)	Depth To (m)	Graphite Bands	True Thickness (m)	Weighted Av. FC (%)
T-5			ZONE-A/B-1	2.30	8.4
RGBH04	49.10	54.77	ZONE-B/B-8	5.67	6.81
	55.72	57.45	ZONE-B/B-9	1.73	3.30
Trench-8			ZONE-B/B-8	4.24	8.20
			ZONE-B/B-9	0.71	6.40
RGBH-05	28.00	28.50	ZONE-B/B-8	0.48	6.72
	29.63	32.70	ZONE-B/B-9	2.97	8.52
Trench-9			ZONE-B/B-8	6.93	8.69
RGBH-06	8.38	9.38	ZONE-B/B-1	0.98	3.65
	11.77	15.45	ZONE-B/B-2	3.62	5.55
	19.19	20.58	ZONE-B/B-3	1.37	5.95
	23.75	24.58	ZONE-B/B-4	0.82	3.97
	27.29	27.75	ZONE-B/B-5	0.45	5.81
	30.53	33.03	ZONE-B/B-6	2.46	5.60
	35	39	ZONE-B/B-7	3.94	3.08
	41.4	42.35	ZONE-B/B-8	0.94	7.43
	44.25	47.28	ZONE-B/B-9	2.98	4.86
Trench-02			ZONE-B/B-8 & 9	14.74	8.58
G-15			ZONE-B	3.91	6.35

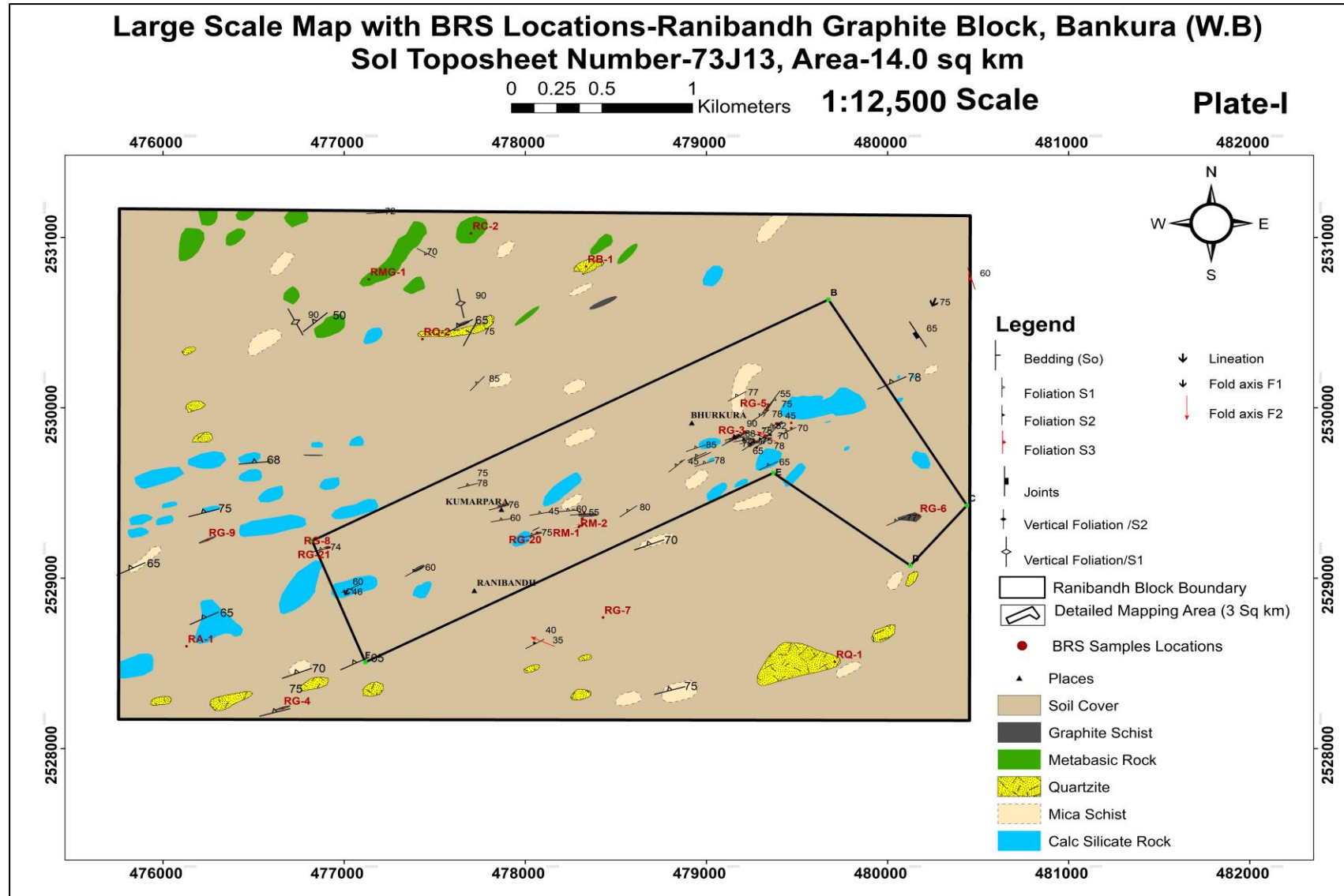


Plate-I Large Scale Map of Ranibandh Block on 1:12500 scale.

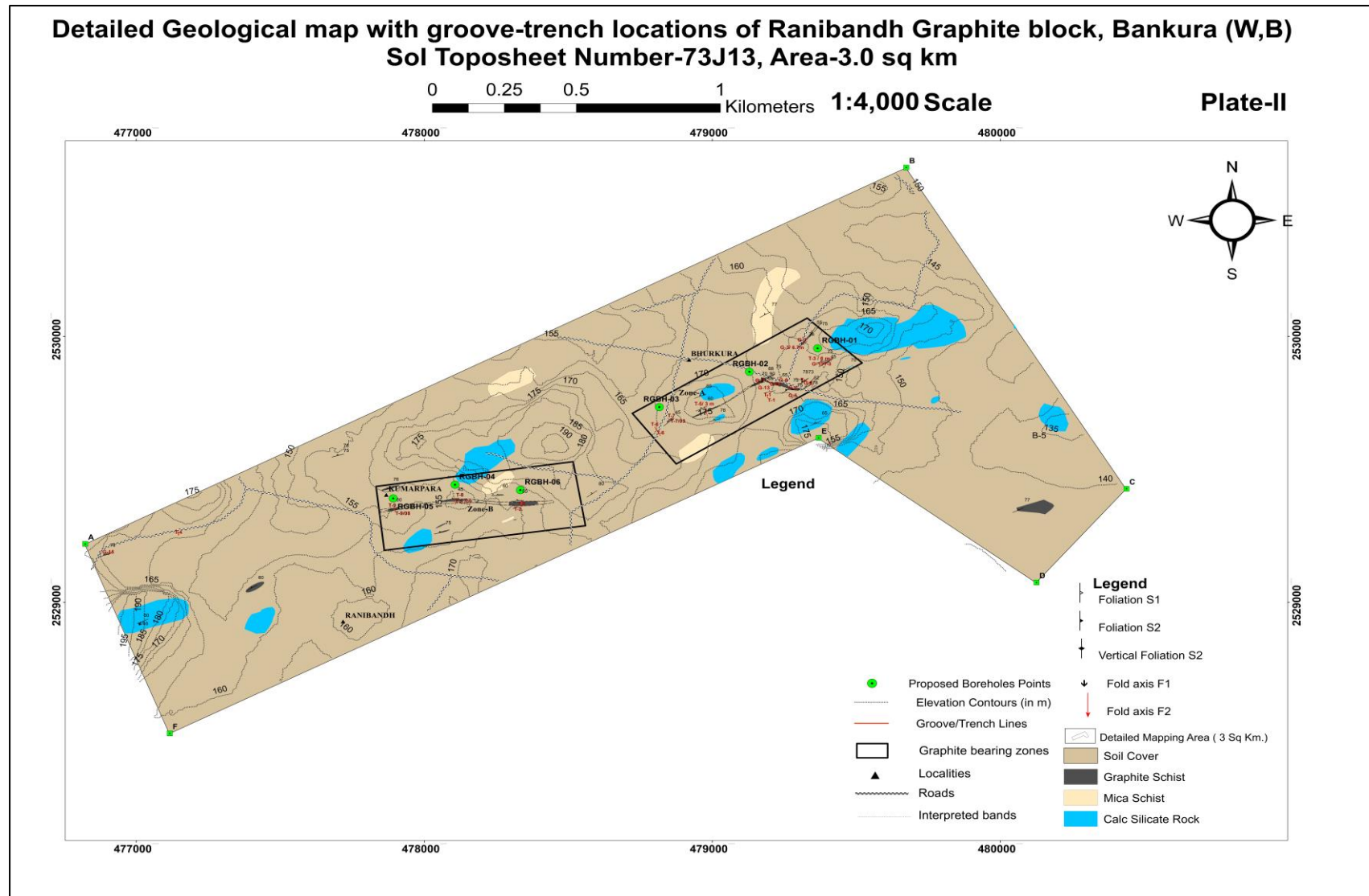
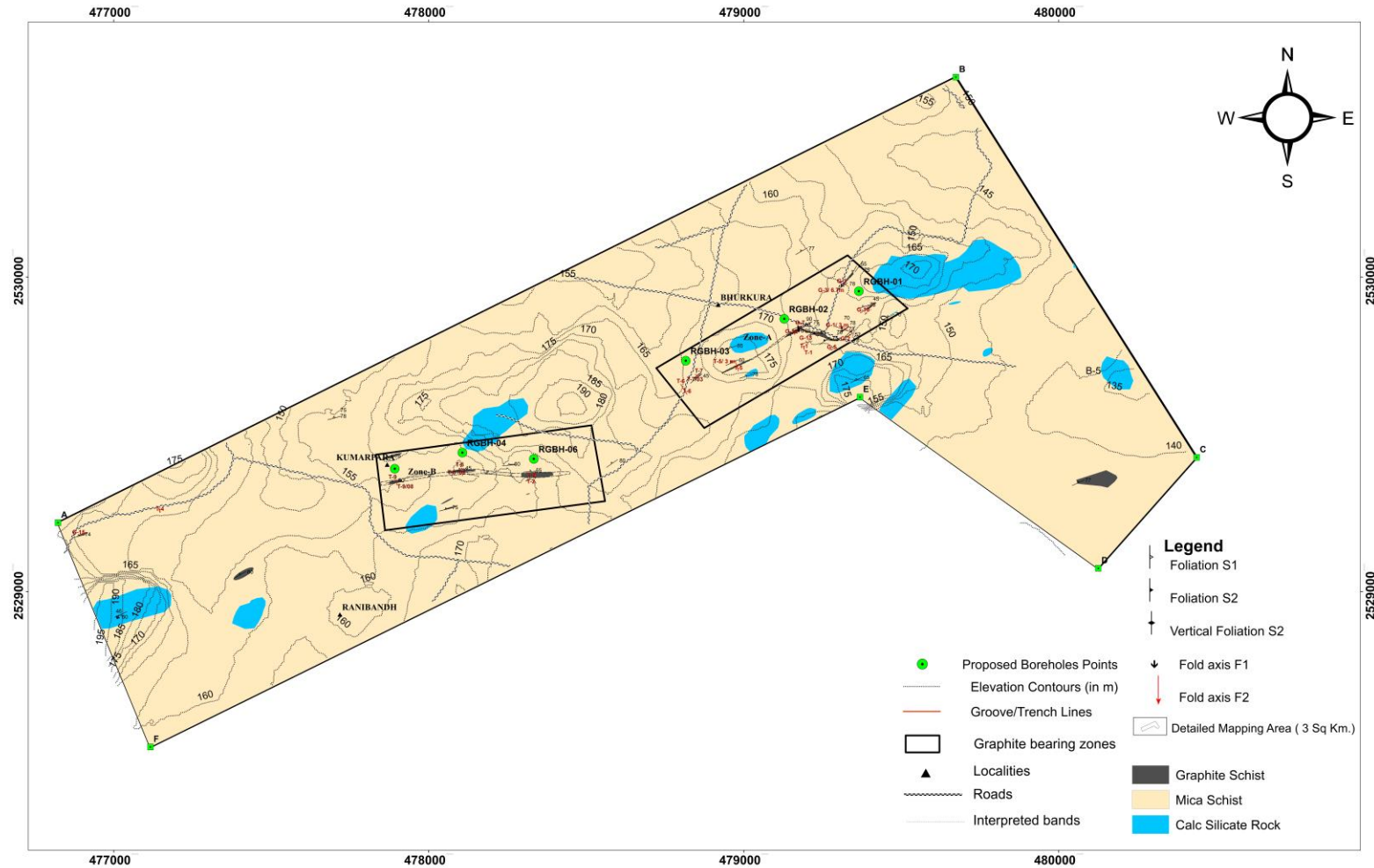


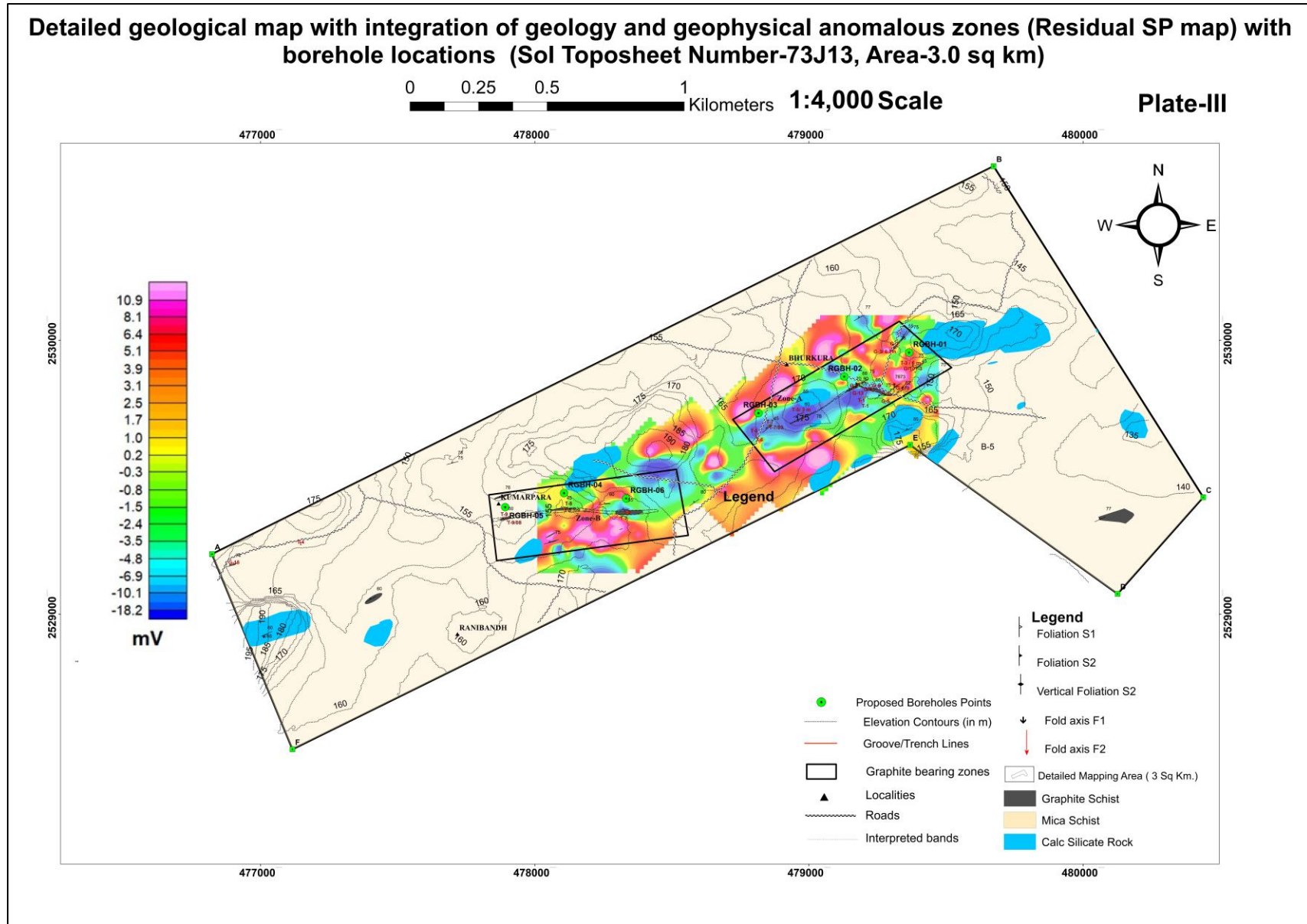
Plate-II Detailed Geological map with groove-trench locations of Ranibandh block, Bankura district, W.B.

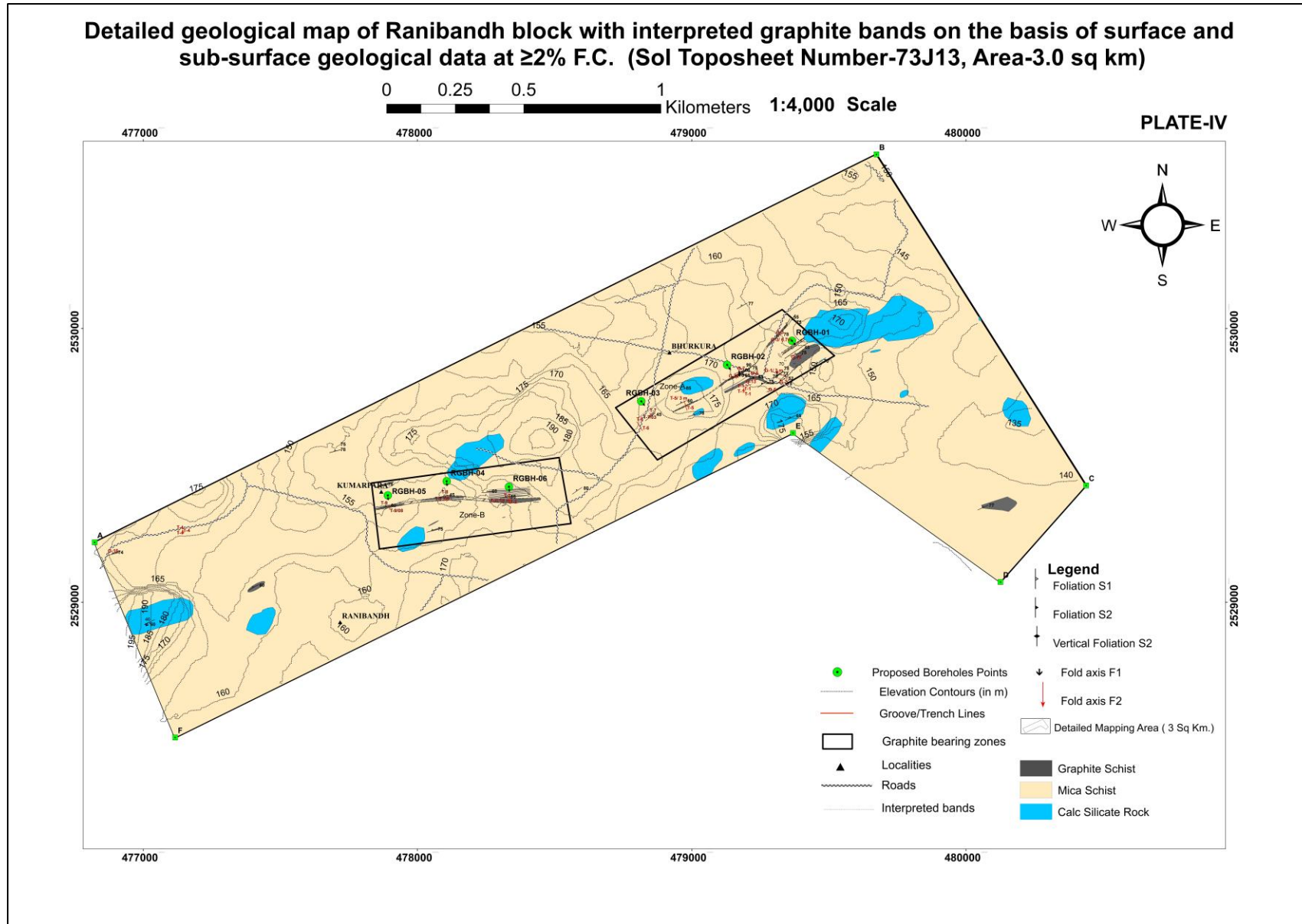
**Interpreted Detailed Geological map with groove-trench locations of Ranibandh Graphite block, Bankura (W,B)
Sol Toposheet Number-73J13, Area-3.0 sq km**

0 0.25 0.5 1 Kilometers **1:4,000 Scale**

Plate-II A

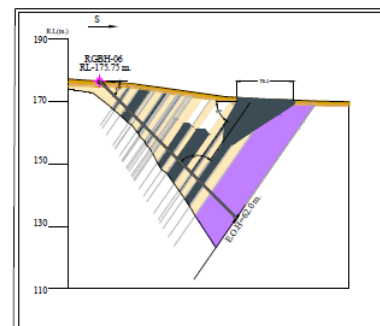
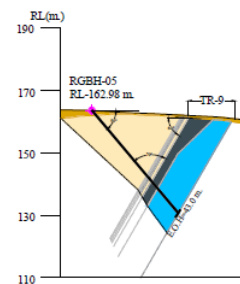
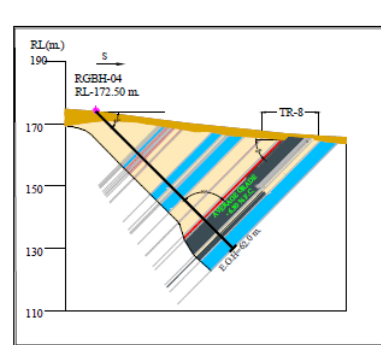
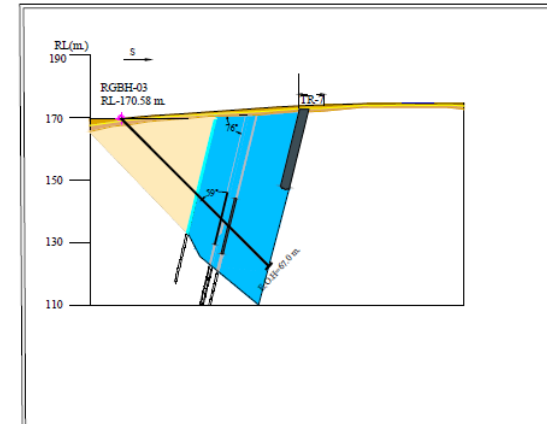
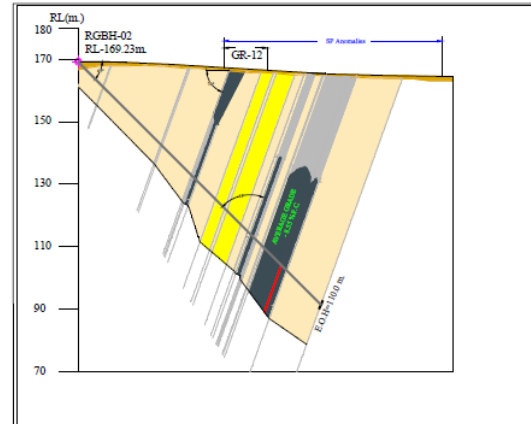
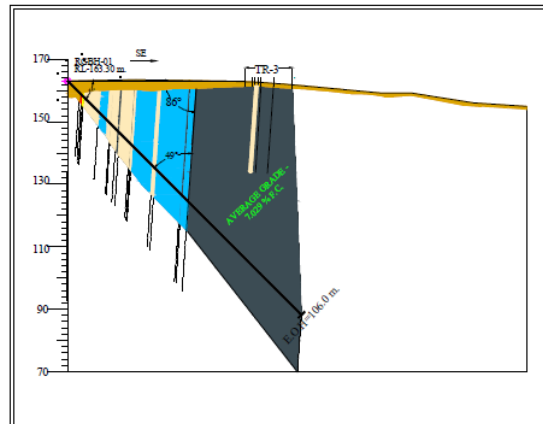






GEOLOGICAL CROSS SECTIONS OF SIX BOREHOLES SHOWING ANOMALOUS GRAPHITE BANDS DELINEATED AT GREATER THAN 2% FC IN RANIBANDH GRAPHITE BLOCK, BANKURA (WEST BENGAL)

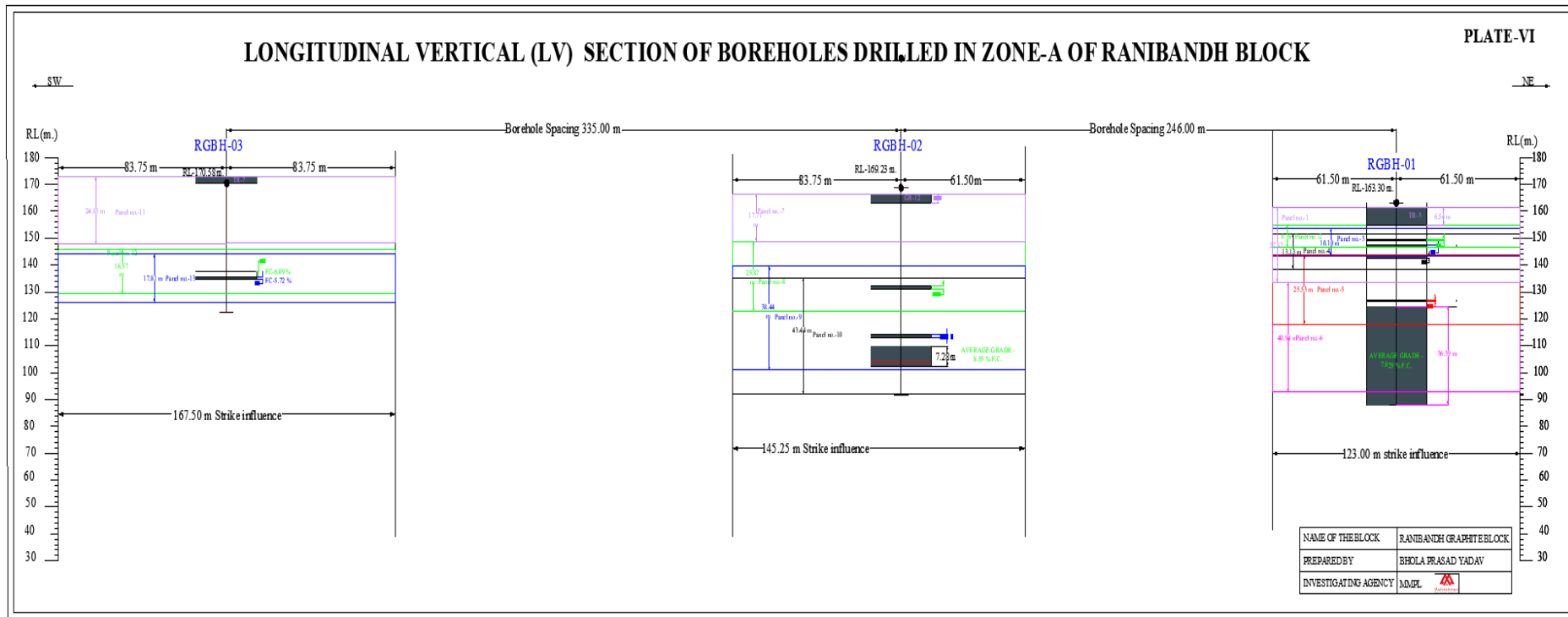
PLATE-V

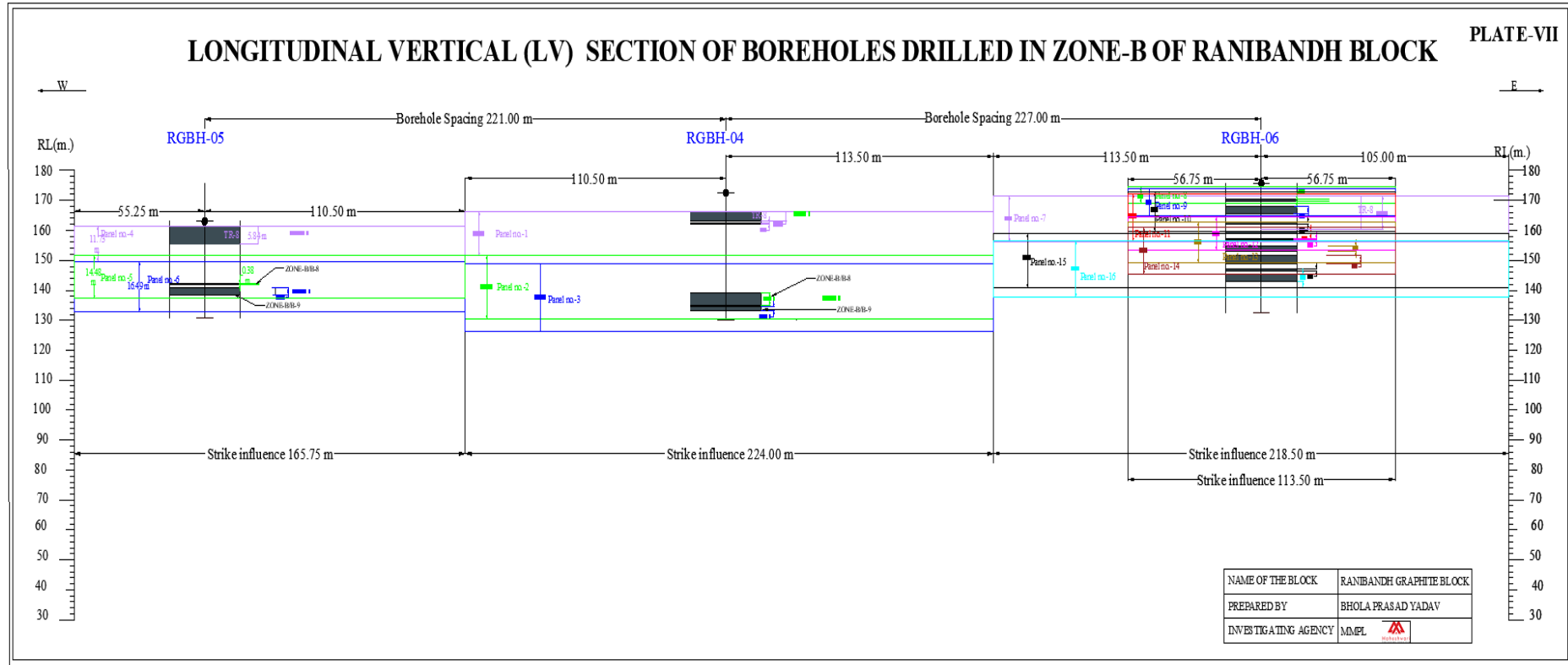


LITHOLOGICAL INDEX	
TOPSOIL	
WEATHERED MANTLE	
QUARTZ VEIN	
QUARTZ-MICA SCHIST	
CALCAREOUS-QUARTZ-MICA SCHIST	
CALC-SILICATE ROCKS	
QUARTZITE	
GRAPHITE SCHIST(>2% F.C.)	
GRAPHITE SCHIST(<2% F.C.)	

SP ANOMALIES	
BOREHOLE LOCATION	

NAME OF THE BLOCK	RANIBANDH GRAPHITE BLOCK
PREPARED BY	BHOLA PRASAD YADAV
INVESTIGATING AGENCY	MMPL





L.No:1707/ CRD/Report/7/2025

Dated the 21st July,2025

From:
Chittaranjan Dash,
Director(Retired, GSI),
Flat No:S-103,Sushila Apartment,
Behera Sahi Lane, Nayapalli,
Bhubaneswar ,Odisha
PIN-751012
Contact No:9437230523
Email:chittasundar@gmail.com

M/s Maheshwari Mining Private Limited,
Shilpangan, C.F. Building,
4th Floor, FR-01,
Plot-LB-I, Sector-III, Bidhan nagar,
Kolkata, West Bengal.
PIN code:700106

(Kind Attention: Bhola Prasad Yadav, Mobile no:8709723943)

Sub: Submission of peer reviewed geological report entitled "Reconnaissance Survey (G4 Stage) for Graphite in Ranibandh Block, Bankura District, West Bengal Reg-

Ref.1. Your Office L. No. MMPL / NMET / RANIBANDH / PR / 2025 / 001 Date: 08/07/2025

2. F. No. 44/1/2017-NMET/104 Dated June 6th, 2025

Sir,

With reference to the letter cited above, I am enclosing herewith" the Geological Report on Reconnaissance Survey (G-4 Stage) for Graphite in Ranibandh Block, Bankura District, West Bengal MMPL" with necessary comments, corrections and suggestions in pencil markings on the body of the Report along with a Note on peer review of the said Report for your kind perusal and further improvement of the Report at your end. It is requested to upload the Final Report in proper format of NMET.

Thanking you,
Yours' faithfully,

Encl: As stated above

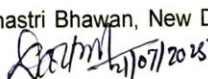
(CHITTARANJAN DASH)
Director(Retired), GSI

✓ L.No:1707A / CRD/Report/7/2025

Dated the 21st July,2025

Copy for information to:

The DS & HoD, NMET, Ministry of Mines,F-114, Shastri Bhawan, New Delhi, PIN-110001, E-mail:nmet-mines@ gov.in


(CHITTARANJAN DASH)
Director(Retired), GSI

A NOTE ON THE PEER REVIEW OF “THE GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GRAPHITE IN RANIBANDH AREA, BANKURA, WEST BENGAL”

The draft report entitled “ Geological report on Reconnaissance Survey(G-4 Stage) for Graphite in Ranibandh Area, Bankura, West Bengal is a meticulous compilation of the efforts on the geological data, geochemical data and geophysical data generated in the field followed by laboratory inputs from petrology, chemical and geodata laboratories. The author i.e. geoscientists and supervisory officer(s) are gracefully thanked for this commendable job. However, a few modifications are suggested to enhance the quality of the report vis-à-vis a sought after “Block” for further stages of exploration.

I thank the DS and HoD, NMET and M/s Maheshwari Mines Pvt Ltd for assigning me the job for peer review of the Report. The following points are to be considered to make the report of a hard and sincere work more lucid and user-friendly.

1. It is observed that graphite schist/ graphitic schist / carbonaceous rock/phyllite bands occur parallel to the regional foliation (S_1) within host quartz-mica schist, quartzite or calc-silicate gneiss. So bore-hole intersections of graphite bands in adjoining bore-holes may be correlated along with the host rock or including the foot wall and hanging wall rocks. As second level bore holes are not drilled, L-V section involving three boreholes in Zone-A and three in Zone-B may be prepared and if possible for the entire Block if the geology of the gap area between the Zone-A and Zone-B is properly understood. The Solid Model is also giving the data in two dimension but the foot wall and hanging wall rocks are not reflected.
2. In bore-hole sections the vertical depth of total run is more than 30m. The vertical depth may be recalculated for the data in corresponding Table (Table-9.1).
3. The angle between core axis and lithological banding in core (considered for fixing the bore-hole angle) should be considered while extending the intersections. For example α observed in photograph of core does not match with corresponding sections in the figures (Fig.9.1 and Fig.9.5). The increasing depth in the core may be marked with arrow on the body of core in the photograph as per Run.
4. α and β data may be incorporated in core-log format to ensure that there is no deviation in the bore hole.
5. The graphite schist is a potential mineralised band logged in the core, grooves and trenches. Hence a visual estimation may be made to know the volume percentage of graphite and associated gangue minerals in the samples. A few thin-sections made exclusively from graphite schist may be prepared and studied for


21/7/2025

percentage of graphite, gangue, mode of occurrence of graphene (shape, size and generations etc) and sequence of formation of the minerals (paragenesis).

6. S₀, S₂, S₃ and S₄ data may be plotted on the map besides S₁ and recorded folds plunge may be plotted on the map.

7. The slope of the hill across the strike of the mineral-band mirrors the dip of the band. In this Area, the bands dip northerly. The down dip (may be apparent dip) extension of outcrop in dip slope should be northerly.

The band swerving southerly along G₆-G₄-G₂ in Zone A may describe an open fold. The data on this is required. Similarly the band with strike data at G₁₂ - G₇ has taken a strike change from WSW to SW but it was extended upto a strike ridge at G₃ in NE. It is not understood how a strike band in ENE-WSW dipping moderate to steep northerly will be exposed as NE-SW strike band in down dip direction at the same contour value unless a structural disturbance. The Area of the map involving G₇, G₆, G₄ and G₃ may kindly be further elucidated. Structural data on Calc-silicate rocks mapped on both foot wall and hanging wall side near T₅ may be plotted in PLATE-IV.

8. All the calc-silicate minerals present in the calc-silicate rocks of the area may be described either in field samples, both core and trial excavations, and in thin section studies to justify that these rocks are calc-silicate rocks.

9. The relation between mafic rocks and other litho units may be described.

10. Minor corrections are suggested in the body of the report including placing the scale (linear), part of SOI sheet no at the top of map and Index or Legend of the Map should not override the Map itself.

It is also requested to upload the Final Report in proper format as per guide lines of NMET.



CHITTARANJAN DASH

Director (Retired), GSI

SL	Suggestions/Comments by Peer Reviewer	Action Taken
1.	It is observed that graphite schist/ graphitic schist / carbonaceous rock/phyllite bands occur parallel to the regional foliation (S_1) within host quartz-mica schist, quartzite or calc-silicate gneiss. So bore-hole intersections of graphite bands in adjoining boreholes may be correlated along with the host rock or including the foot wall and hanging wall rocks. As second level bore holes are not drilled, L-V section involving three boreholes in Zone-A and three in Zone-B may be prepared and if possible for the entire Block if the geology of the gap area between the Zone-A and Zone-B is properly understood. The Solid Model is also giving data in two dimensions but the foot wall and hanging wall rocks are not reflected.	<p>Complied With.</p> <p>Graphite bearing litho-units were correlated along with host rock and country rock i.e. foot wall and hanging wall rocks.</p> <p>Longitudinal Vertical (LV) Sections for Zone-A and Zone-B are prepared and accordingly resource was estimated as per LV section methodology.</p>
2.	In bore-hole sections the vertical depth of total run is more than 30m. The vertical depth may be recalculated for the data in corresponding Table (Table-9.1).	Complied With.
3.	The angle between core axis and lithological banding in core (considered for fixing the bore-hole angle) should be considered while extending the intersections. For example, the photograph observed in the core does not match with corresponding sections in the figures (Fig.9.1 and Fig.9.5). The increasing depth in the core may be marked with arrow on the body of core in the photograph as per Run.	<p>Complied With.</p> <p>Accordingly, Resource has been updated (as per Cross Sectional Area Method).</p>
4.	α and β data may be incorporated in core-log format to ensure that there is no deviation in the bore hole.	To know the deviation in drilled boreholes, a deviation survey tool called EZ-TRAC was used. The downhole and up hole deviation

SL	Suggestions/Comments by Peer Reviewer	Action Taken
		survey was carried out to monitor deviation at 15 m depth intervals. As per data, the deviation in boreholes is not much. However, α angle were also recorded while lithological logging in field.
5.	The graphite schist is a potential mineralised band logged in the core, grooves and trenches. Hence a visual estimation may be made to know the volume percentage of graphite and associated gangue minerals in the samples. A few thin section made exclusively from graphite schist may be prepared and studied for percentage of graphite, gangue, mode of occurrence of graphene (shape, size and generations etc.) and sequence of formation of the minerals (paragenesis).	The suggestion is noted. Detailed study for percentage of graphite, gangue, mode of occurrence of graphene (shape, size and generations etc.) and paragenesis will be carried out in the next exploration stage (G-3/G-2) as per UNFC guidelines, since such studies are beyond the scope of the current G-4 reconnaissance stage. However, Thin sections of Graphite schists have been prepared.
6.	S ₀ , S ₂ , S ₃ and S ₄ data may be plotted on the map besides S ₁ , and recorded folds plunge may be plotted on the map.	Complied With.
7.	<p>The slope of the hill across the strike of the mineral-band mirrors the dip of the band. In this Area, the bands dip northerly. The down dip (maybe apparent dip) extension of outcrop in dip slope should be northerly.</p> <p>The band swerving southerly along G₆-G₄-G₂ in Zone A may describe an open fold. The data on this is required. Similarly, the band with strike data at G₁₂ -</p>	<p>The band exposed along G₆-G₄-G₂ has been interpreted as a fold and described accordingly.</p> <p>The extension of the band up to G₃ was inferred based on the occurrence of Graphite bearing litho-unit at G₁₁ (located northeast of G₁₂).</p>

SL	Suggestions/Comments by Peer Reviewer	Action Taken
	G ₇ has taken a strike change from WSW to SW but it was extended up to a strike ridge at G ₃ in NE. It is not understood how a strike band in ENE-WSW dipping moderate to steep northerly will be exposed as NE-SW strike band in down dip direction at the same contour value unless a structural disturbance. The Area of the map involving G ₇ , G ₆ , G ₄ and G ₃ may kindly be further elucidated. Structural data on Calc-silicate rocks mapped on both foot wall and hanging wall side near T ₅ may be plotted in PLATE-IV.	Structural data for calc-silicate rocks near T ₅ has been recorded and plotted on the map (Plate-IV).
8.	All the calc-silicate minerals present in the calc-silicate rocks of the area may be described either in field samples, both core and trial excavations, and in thin section studies to justify that these rocks are calc-silicate rocks.	Calc-silicate rock in the area comprises Quartz ± Plagioclase + Augite ± Carbonates. The designation as calc-silicate is based on its typical ridge and furrow structure (differential weathering) and confirmed presence of carbonates through strong effervescence with dilute HCl. Thin-section study reveals crude banding with quartz-rich and augite (clinopyroxene)-rich domains.
9.	The relation between Mafic Rocks and other litho- units may be described.	It has intrusive and concordant relation with the country rock quartz mica schist.

SL	Suggestions/Comments by Peer Reviewer	Action Taken
10.	Minor corrections are suggested in the body of the report including placing the scale (linear), part of SOI sheet no at the top of map and Index or Legend of the Map should not override the Map itself.	Complied With.

