

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN GOVINDPUR BLOCK, CHANDRAPUR DISTRICT, MAHARASHTRA

(Under NMET Programme)



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KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED

101,102, BHASKAR TOWER, TEMPLE ROAD, CIVIL LINES, NAGPUR-440001

MAHARASHTRA

**GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION
(G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN
GOVINDPUR BLOCK, CHANDRAPUR DISTRICT, MAHARASHTRA**

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**EXECUTIVE
SUMMARY**



KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED

101,102, BHASKAR TOWER, TEMPLE ROAD, CIVIL LINES, NAGPUR-440001

MAHARASHTRA

1.0 कार्यकारी सारांश

1.1 प्रस्तावना

1.1.1 ताँबा अपनी विशिष्ट भौतिक, यांत्रिक और विद्युत गुणों के कारण किसी भी राष्ट्र के औद्योगिक विकास में महत्वपूर्ण भूमिका निभाता है। भारत में वर्तमान में लगभग 75% ताँबे की माँग आयात के माध्यम से पूरी की जाती है। ताँबे की बढ़ती हुई माँग को अन्वेषण गतिविधियों को तेज़ करके कम किया जा सकता है। प्रमुख ताँबा अयस्क भंडार सिंहभूम (झारखंड), बालाघाट (मध्य प्रदेश), तथा झुंझुनू और अलवर (राजस्थान) जिलों में पाए जाते हैं। ताँबे के भंडार और उत्पादन के मामले में भारत अपेक्षाकृत रूप से गरीब देश है।

1.1.2 पिछले कुछ दशकों में भारत में कोई बड़े पैमाने पर धातु भंडार खोजे नहीं गए हैं। हालाँकि, तकनीक में प्रगति और खनन दक्षता में सुधार के कारण निकटवर्ती छोटे भंडारों का उपयोग करना संभव हो गया है। इसलिए, ऐसे छोटे ताँबे के भंडारों के समूहों की पहचान और अन्वेषण करना न केवल आवश्यक है बल्कि समयोचित भी है।

1.1.3 ताँबा उन कुछ धातुओं में से एक है जो प्रकृति में सीधे उपयोग योग्य धात्विक रूप (नेटिव धातु) में पाए जाते हैं और प्राचीनतम सभ्यताओं में से कुछ के लिए यह जाना-पहचाना था। ताँबे के उपयोग का इतिहास ईसा पूर्व 9000 साल में मध्य पूर्व तक जाता है। ताँबा एक नरम, लचीला और प्रत्यास्थ धातु है, जिसकी ऊष्मीय और विद्युत चालकता बहुत अधिक होती है। यह एक महत्वपूर्ण लौहाधार धातु है, जिसका औद्योगिक उपयोग बहुत व्यापक है — रक्षा, अंतरिक्ष कार्यक्रम, रेलवे, पावर केबल, टकसाल, दूरसंचार केबल आदि में। भारत ताँबे के अयस्क (ओर) और संघननों (कनसंट्रेट्स) के उत्पादन में आत्मनिर्भर नहीं है। भारत अपने स्मेल्टर के लिए ताँबे के संघननों का आयात करता है, जो इसकी कुल ताँबे की आवश्यकताओं का लगभग 75% है। इस प्रकार, देश में ताँबे और इसके मिश्र धातुओं की घरेलू माँग घरेलू उत्पादन, स्क्रेप के पुनःचक्रण और आयात के माध्यम से पूरी की जाती है।

1.1.4 भारत में 1 अप्रैल 2020 तक ताँबे के अयस्क (Copper Ore) के कुल भंडार/संसाधन (Reserves/Resources) लगभग **1.66 बिलियन टन (166 करोड़ टन)** अनुमानित किए गए हैं, जैसा कि भारतीय खनिज ब्यूरो (IBM) के राष्ट्रीय खनिज डेटाबेस (NMI) के अनुसार है। कुल मात्रा में से लगभग **163.89 मिलियन टन** (लगभग 9.87%) को **भंडार (Reserves)** श्रेणी में रखा गया है, जबकि शेष लगभग **1.50 बिलियन टन** (लगभग 90.13%) को **शेष संसाधन (Remaining Resources)** श्रेणी में वर्गीकृत किया गया है। इसका अर्थ है कि भारत में अधिकांश ताँबे का अयस्क अभी तक प्रमाणित भंडार के बाहर है और इसके लिए और अधिक खोज एवं उन्नयन कार्य आवश्यक है।

1.1.5 प्रमुख राज्य और उनके अयस्क भंडार

भारत में ताँबे के अयस्क के भंडार प्रमुख रूप से निम्नलिखित राज्यों में पाए जाते हैं:

- **राजस्थान:** 813 मिलियन टन (लगभग 53.81%)
- **झारखंड:** 295 मिलियन टन
- **मध्य प्रदेश:** लगभग 100 मिलियन टन
- **उड़ीसा:** लगभग 70 मिलियन टन
- **छत्तीसगढ़:** लगभग 50 मिलियन टन

इन आंकड़ों से स्पष्ट है कि राजस्थान में ताँबे के अयस्क के सबसे बड़े भंडार मौजूद हैं।

1.1.6 ग्रेड-वार वर्गीकरण से पता चलता है कि भारत में 1.85% तांबा (Cu) या उससे अधिक ग्रेड वाले कोई भंडार (Reserves) नहीं हैं। अब तक पहचाने गए सभी भंडार 1.00% से लेकर 1.85% Cu के नीचे वाले ग्रेड वर्ग में आते हैं, जो कि कुल **163.89 मिलियन टन** भंडार आधार का पूरा हिस्सा बनाते हैं। यह दर्शाता है कि अंतरराष्ट्रीय उत्पादकों की तुलना में भारतीय तांबे के भंडारों का ग्रेड अपेक्षाकृत निम्न से मध्यम स्तर का है।

1.1.7 कुल अयस्क संसाधनों (Ore Resources) में लगभग **8.28 मिलियन टन** (लगभग 0.49%) उच्च ग्रेड वाले हैं, जिनमें 1.85% Cu या उससे अधिक तांबा होता है। इसके अलावा, लगभग **587 मिलियन टन** (लगभग 35.33%) संसाधन 1.00% से लेकर 1.85% Cu के ग्रेड श्रेणी में आते हैं। शेष संसाधन ऐसे हैं जिनमें 1.00% Cu से कम ग्रेड होता है, जो भविष्य में बेनिफिसिएशन (Beneficiation) और निष्कर्षण (Extraction) तकनीकों में प्रगति के जरिए आर्थिक रूप से व्यवहार्य बन सकते हैं।

अधारित धातु (Contained Metal) के संदर्भ में, सभी भंडारों (Reserves) और संसाधनों (Resources) से अनुमानित कुल तांबे की धातु मात्रा लगभग **12.20 मिलियन टन** है। इसमें से, **भंडारों में लगभग 2.16 मिलियन टन तांबा धातु** शामिल है, जबकि शेष धातु मात्रा **अवशिष्ट संसाधनों (Remaining Resources)** की श्रेणी में आती है।

1.1.8 तांबे के संसाधनों का वितरण देश में असमान है। राजस्थान के पास सबसे बड़ा हिस्सा है, जो लगभग **868 मिलियन टन** ($\approx 52.25\%$) है, इसके बाद मध्य प्रदेश में लगभग **387 मिलियन टन** ($\approx 23.28\%$) और झारखंड में लगभग **251 मिलियन टन** ($\approx 15.14\%$) तांबे के संसाधन हैं। ये तीनों राज्य मिलकर देश के तांबे के अयस्क संसाधनों का 90% से अधिक हिस्सा रखते हैं, जो भारत के खनिज क्षेत्र में उनकी **रणनीतिक महत्वता** को उजागर करता है।

1.1.9 प्रस्तावित ब्लॉक क्षेत्र, अर्जियन युग के बंगपाल ग्नीसेस में स्थित ठानेवासना शीयर ज़ोन का उत्तरी विस्तार है। गोविंदपुर ब्लॉक का सर्वेक्षण भू-वैज्ञानिक सर्वेक्षण भारत (GSI) और राज्य DGM द्वारा मैपिंग, सैंपलिंग, विस्तृत मैपिंग आदि के माध्यम से किया गया है, सिवाय ड्रिलिंग कार्य के।

1.1.10 सिंधेवही कॉपर बेल्ट, जो महाराष्ट्र के चंद्रपुर जिले में स्थित है, मध्य भारत के महत्वपूर्ण तांबे-धारक क्षेत्रों में से एक है। यह बेल्ट भूवैज्ञानिक दृष्टि से महत्वपूर्ण है क्योंकि यह सॉसर मोबाइल बेल्ट का हिस्सा है, जिसमें कई बेस मेटल क्षैतिजताएँ पाई जाती हैं। इस क्षेत्र में तांबे का खनिजीकरण मुख्य रूप से क्वार्ट्ज वेन्स, स्किस्टोस चट्टानों और शीयर जोन के साथ जुड़ा हुआ है, जो संरचनात्मक रूप से नियंत्रित हाइड्रोथर्मल गतिविधि को दर्शाता है।

1.1.11 सिंधेवही क्षेत्र में अन्वेषण गतिविधियों ने तांबे के प्रसार को बिखरे हुए क्षेत्रों में चिन्हित किया है, जिसमें खनिजीकरण मुख्य रूप से चैल्कोपाइराइट और बॉर्नाइट के रूप में होता है, साथ ही पाइराइट और अन्य सल्फाइड्स भी पाए जाते हैं। यद्यपि बड़े पैमाने पर भंडार अभी तक स्थापित नहीं हुए हैं, इस बेल्ट के भीतर छोटे और मध्यम आकार के तांबे-धारक क्षेत्रों का समूह भविष्य में विकास की महत्वपूर्ण क्षमता रखता है, विशेष रूप से आधुनिक अन्वेषण तकनीकों और उन्नत खनन विधियों के उपयोग से।

1.1.12 भारत में तांबे की बढ़ती मांग और देश की आयात पर निर्भरता को देखते हुए, सिंधेवही तांबा बेल्ट का विस्तार गहन अन्वेषण और संसाधन वृद्धि के लिए एक आशाजनक लक्ष्य प्रस्तुत करता है।

1.1.13 गोविंदपुर ब्लॉक में तांबे और उससे संबंधित खनिजीकरण के लिए G3 चरण का प्रस्ताव राष्ट्रीय खनिज अन्वेषण कोष (NMET) की 65वीं तकनीकी-सह-लागत समिति (TCC) की बैठक में 28, 29 और 31 मई 2024 को वीडियो कॉन्फ्रेंसिंग के माध्यम से भूवैज्ञानिक सर्वेक्षण ऑफ इंडिया, DGCO, A-II पुष्प भवन, नई दिल्ली में चर्चा के लिए प्रस्तुत किया गया।

TCC ने गोविंदपुर ब्लॉक के G3 चरण के अन्वेषण प्रस्ताव का तकनीकी मूल्यांकन उसके विभिन्न भूवैज्ञानिक घटकों और G-3 चरण में उनकी उपयुक्तता के आधार पर किया। समिति ने प्रस्ताव को कार्यकारी समिति (EC) को अनुशंसा की कि प्रारंभिक अन्वेषण (G-3) को मंजूरी दी जाए, जिसमें 1:2000 पैमाने पर भूवैज्ञानिक मानचित्रण, 180 प्राथमिक नमूनों का संग्रह, 160 घन मीटर की खदान खुदाई (Trenching), और पायलट बोअरहोल के माध्यम से 500 मीटर ड्रिलिंग शामिल हो।

NMET की TCC समिति ने इस प्रस्ताव को प्रारंभिक अन्वेषण (G-3) के अनुमोदन हेतु सिफारिश की, जिसका अनुमानित लागत ₹1,26,07,812.73 (लगभग ₹126 लाख, GST सहित) है और इसे 8 महीने की समय-सारणी में पूरा किया जाना प्रस्तावित है।

1.1.14 कार्यकारी समिति (EC) ने गोविंदपुर G3 ब्लॉक के लिए G-3 चरण अन्वेषण प्रस्ताव को मंजूरी दे दी है, जिसकी अनुमानित अन्वेषण लागत ₹1,26,07,812.73 यानी लगभग ₹126 लाख है, जैसा कि कार्यालय ज्ञापन संख्या F. No. 23/490/2024-NMET/284, नई दिल्ली, दिनांक 21 अगस्त 2024 में उल्लिखित है।

1.2.0 ब्लॉक का स्थान और पहुँच:

1.2.1 गोविंदपुर G3 तांबा एवं सम्बंधित खनिजीकरण खंड भारत सर्वेक्षण के टोपोशीट संख्या 55P/11 के अंतर्गत आता है और यह 20°28'22.98"N से 20°28'44.98"N अक्षांश और 79°36'54.97"E से 79°37'37.99"E देशांतर के बीच स्थित है।

1.2.2 यह खंड चंद्रपुर जिले के गोविंदपुर, यनोली, वैजापुर, सोनुली, मंगरूल गांवों और तालोदी तहसील के आसपास लगभग 0.83 वर्ग किलोमीटर क्षेत्र में फैला हुआ है, जो नागपुर से लगभग 120 किलोमीटर दूर स्थित है।

1.2.3 यह क्षेत्र राज्य राजमार्ग संख्या 9B के माध्यम से तालोदी से पहुँचा जा सकता है, जहाँ से गोविंदपुर प्रॉस्पेक्ट ब्लॉक क्षेत्र तक 9 किलोमीटर लंबी पक्की सड़क जुड़ती है। यह सड़क नेरी होते हुए चिमूर तक जाती है। बोथली तक जीप द्वारा पहुँचना संभव है, जो गोविंदपुर क्षेत्र से लगभग 10 किलोमीटर की दूरी पर स्थित है।

1.2.4 निकटतम रेलवे स्टेशन नागभीर है। साउथ ईस्टर्न रेलवे की नागपुर-नागभीर-चंद्रपुर एक्सप्रेस लाइन (0.76 मीटर नैरो गेज) तालोदी रोड और सिंदेवहीं रोड रेलवे स्टेशनों से होकर गुजरती है। ब्लॉक क्षेत्र के कोने वाले बिंदुओं के भौगोलिक (Geodetic) और यूटीएम (UTM) समन्वय तालिका संख्या 1 में दिए गए हैं।

तालिका संख्या-1

चंद्रपुर जिले, महाराष्ट्र राज्य में गोविंदपुर G3 ब्लॉक (तांबा एवं संबंधित खनिजों के लिए) के ब्लॉक सीमा के मुख्य बिंदुओं के समन्वय

ब्लॉक कॉर्नर पॉइंट	WGS 84 (DD MM SS)		UTM Zone-44 (m)	
	अक्षांश	देशांतर	पूर्वांक (m)	उत्तरांक (m)
A	20°28'45.36"N	79°36'55.19"E	355589.00 m E	2265129.00 m N
B	20°28'44.98"N	79°37'37.99"E	356829.00 m E	2265107.00 m N
C	20°28'23.55"N	79°37'38.07"E	356826.00 m E	2264448.00 m N
D	20°28'22.98"N	79°36'54.97"E	355577.00 m E	2264441.00 m N

1.3.0 अन्वेषण का उद्देश्य

1.3.1 वर्तमान अन्वेषण कार्यक्रम निम्नलिखित उद्देश्यों को पूरा करने हेतु तैयार किया गया है:

भूवैज्ञानिक मानचित्रण और GSI के बड़े पैमाने के मानचित्र के आधार पर 1:4000 पैमाने पर विस्तृत भूवैज्ञानिक मानचित्र का उन्नयन।

भू-भौतिक सर्वेक्षण (IP cum resistivity, SP और चुम्बकीय सर्वेक्षण) ताकि खनिज क्षेत्र का आकलन किया जा सके।

खोदाई (Pitting), खाई (Trenching), ड्रिलिंग, नमूना संग्रहण और विश्लेषण ताकि तांबे और सम्बंधित खनिजों के खनिजीकरण की जाँच की जा सके।

1.4.0 क्षेत्रीय भूविज्ञान

1.4.1 गोविंदपुर तांबा ब्लॉक, जो पश्चिमी बस्तर क्रेटन में स्थित है, आर्कीयन बेन्गपाल समूह के बेसमेंट जूनीसेस को प्रकट करता है, जिनमें मेटापेलाइट्स और सिलिसीकृत क्षेत्रों के अंश शामिल हैं। ये जूनीसेस न्यूप्रोटेरोज़ोइक पेनगंगा समूह के बलुआ पत्थर और क्वार्ट्जाइट्स द्वारा ढके होते हैं, जो बोथली के पास स्पष्ट रूप से प्रकट होते हैं और NNW-SSE रुझान वाले आउटलायर बनाते हैं जिनकी हल्की NE झुकाव (10° – 35°) है। ये बलुआ पत्थर कठोर, सघन, मध्यम-से-सूक्ष्म दाने वाले और लौह युक्त होते हैं, जिसमें ग्रेट और अर्कोज़ शामिल हैं।

1.4.2 संरचनात्मक रूपरेखा NW-SE और NNE-SSW रेखीय संरचनाओं द्वारा परिभाषित होती है। तांबे का खनिजीकरण मुख्य रूप से NS से लेकर NNE-SSW रुझान वाली सिलिसीकृत शीअर्ड क्वार्ट्ज वेन्स/रीफ्स द्वारा नियंत्रित होता है, जो सोनोली, मोटेगांव और लवारि के पास रीढ़ जैसी संरचनाएँ बनाते हैं, जिनमें मालाकाइट परत, चैल्कोपायराइट, पाइराइट और मामूली कोवेलाइट शामिल हैं। इसी तरह की क्वार्ट्ज वेन्स, जिसमें फैलाव वाले सल्फाइड और मालाकाइट के दाग होते हैं, गोविंदपुर और बोथली ब्लॉकों में भी पाई जाती हैं। हालांकि, तालोधी और नंदर गाँव के पास कई बंजर शीअर्ड क्वार्ट्ज वेन्स भी पाई जाती हैं, जिनका रुझान NW-SE से लेकर NE-SW तक विविध रूप से होता है और जिनकी ढाल तीव्र (35° – 80°) होती है।

लेटराइट		सेनोजोइक
बलुआ पत्थर/क्वार्ट्जाइट शेल और कंकालमेट के साथ (Sandstone/Quartzite with shale and conglomerate)	पेंगंगा समूह (Penganga group)	Neo proterozoic
क्वार्ट्ज वेन – सिलिसीकृत क्षेत्र (Quartz vein- silicified zone)	बेंगपाल समूह (Bengpal Group)	Archean
ग्रेनाइट ग्नाइस – माइग्माटाइट (Granite gneiss- migmatite)		
बैंडेड आयरन फॉर्मेशन (Banded Iron Formation)		
क्वार्ट्जाइट (Quartzite)		

अध्ययन क्षेत्र का भूवैज्ञानिक अनुक्रम आर्कियन से नियोप्रोटैरोज़ोइक युग तक की विविध शैल इकाइयों द्वारा दर्शाया गया है। बेसमेंट बेंगपाल ग्नाइसिक समूह से निर्मित है, जिसमें ग्रेनाइट ग्नाइस और पेग्माटाइट शामिल हैं तथा इनमें पुराने कायांतरित शैलों के अंश पाए जाते हैं, जो मुख्यतः मेटापेलाइट्स हैं। ये चट्टानें सामान्यतः NNW-SSE से लेकर NW-SE दिशा में पाई जाती हैं तथा इनका झुकाव हल्का NNE या NE की ओर होता है। बेसमेंट के भीतर पाए जाने वाले मेटापेलाइट्स के अंश N35°W-S35°E दिशा में फैले हुए हैं और इनका झुकाव 25°-50° के बीच दक्षिण-पश्चिम (SW) की ओर है।

आर्कियन ग्नाइस और शिस्ट में प्रमुख रूप से NW-SE दिशा की फोलिएशन देखी जाती है, हालांकि स्थानीय स्तर पर NE-SW प्रवृत्ति भी परिलक्षित होती है। इन बेसमेंट शैलों के ऊपर पेंगंगा समूह (नियोप्रोटैरोज़ोइक समकक्ष) पाया जाता है, जो मुख्यतः क्षेत्र के उत्तरी, उत्तर-पूर्वी और दक्षिण-पश्चिमी भागों में विद्यमान है। ये अवसादी शैलें पुराने कायांतरित शैलों पर असंगत रूप से स्थित हैं और बलुआ पत्थर व क्वार्ट्जाइट से बनी हैं, जो छोटे-छोटे टीले और रिज का निर्माण करती हैं, जबकि ग्नाइसिक बेसमेंट समतल भू-आकृति प्रदान करता है।

ये बलुआ पत्थर मध्यम से सूक्ष्म दानेदार, कठोर, सघन तथा श्वेत से हल्के भूरे रंग के होते हैं, और स्थानीय स्तर पर द्वितीयक क्वार्ट्ज वेन्स से कटे पाए जाते हैं। इनकी परतें NW-SE दिशा में फैली हुई हैं तथा हल्के झुकाव (4°-10°) के साथ उत्तर-पूर्व (NE) की ओर झुकी हुई हैं।

साथ ही, पैलियोप्रोटैरोज़ोइक आयु (2500-2200 मिलियन वर्ष पूर्व) का बैलाडिला समूह क्षेत्र के दक्षिणी भाग में क्वार्ट्जाइट और बैंडेड हेमेटाइट क्वार्ट्जाइट के साथ लौह अयस्क की लेंसयुक्त शिलाओं के असंगठित प्रस्फुटनों के रूप में पाया जाता है। सामान्य भूवैज्ञानिक संरचना में ग्रेनाइट गनीस, मिग्माटाइट, हॉर्नब्लेंड शिस्ट, ऐंफिबोलाइट, अल्ट्रामैफिक अंतःक्षेप तथा क्वार्ट्ज/पेग्माटाइट शिराएं भी सम्मिलित हैं।

समग्र रूप से, क्षेत्र की विशेषता मोटे मृदा आवरण से है, जहाँ शिलाओं का अनावृत हिस्सा सीमित है। संरचनात्मक ढाँचे में NW-SE से NNW-SSE दिशा के क्षेत्रीय रुझान परिलक्षित होते हैं, जबकि नवीन अवसादी अनुक्रम हल्की ढाल के साथ प्रकट होते हुए असंगति रूप से प्राचीन रूपांतरित आधारशिला के ऊपर पाए जाते हैं।

1.5.0 पूर्व कार्य

1.5.1 55P/11 टोपोशीट में आने वाले क्षेत्र का 1:63,360 पैमाने पर मानचित्रण पारिभू. एम.सी. और नाग, पी. (1959-60, GSI) द्वारा किया गया। इसमें मिग्माटाइट्स वाले गनीस, मेटा-सेडिमेंटरी एन्क्लेव और युवा अवसादी आवरण शामिल थे, जिन्हें विन्ध्यान्स से तुल्यंकित किया गया।

1.5.2 1971-1974 के क्षेत्रीय सर्वेक्षण के दौरान भू-विज्ञान और खनन निदेशालय ने बोथली गाँव से लगभग 1.8 किमी पूर्व में तांबे के खनिज अन्वेषण का कार्य किया।

1.5.3 भू-विज्ञान एवं खनन निदेशालय ने अपने पश्चिमी दीवार के निकट 30 मीटर लंबाई, 25 मीटर चौड़ाई और अधिकतम 6 मीटर गहराई वाला एक बड़ा गड्ढा खोला, जो क्वार्ट्ज और सिलिसीकृत शीयर क्वार्ट्ज माइका शिस्ट से भरा हुआ था, जिसमें मालाकाइट की समृद्धि पाई गई।

1.5.4 इस सिलिसीकृत क्षेत्र के पश्चिमी दीवार के तल में दो भूमिगत उद्घाटन स्थित हैं, जो लम्बवत हैं और 2 मीटर व्यास के हैं। इस सिलिसीकृत क्षेत्र में ताँबा, क्यूप्राइट और मालाकाइट शामिल हैं।

1.5.5 गोविंदपुर पुराने कार्य क्षेत्र में बड़े गड्ढों के उत्तर-पूर्वी कोने के पूर्व में लगभग 4 मीटर व्यास और 6 मीटर गहराई वाले दो छोटे गोलाकार शाफ्ट पाए गए। टोपोग्राफिक संख्या 55P/11 के गोविंदपुर और बोथली क्षेत्रों में ताँबे के अयस्क जमा की खोज के दौरान मालाकाइट युक्त क्वार्ट्ज शिराओं की पहचान हुई (पितले इत्यादि, 1974, DGM-MH)। चव्हाण इत्यादि (2010, GSI) ने बीआरएस में 3.15% ताँबा (Cu) रिपोर्ट किया।

1.5.6 महापात्र और डोरा (2009), नितनवरे (2011), कुमारवेल (2012) ने ठानेवासना ताँबा अयस्क को स्थापित किया। बरिक् (2015) ने ठानेवासना के पड़ोसी क्षेत्रों में और अन्वेषण किया और घनपुर-मुधोली एवं नई दिल्ली लाल हेती ब्लॉकों को प्रस्तुत किया। खुन्तिया और कुमारवेल (2015) ने बहमनी और मिंझारी क्षेत्रों के आसपास G4 चरण की जांच की और क्रमशः 0.37% और 0.6% तक ताँबे युक्त क्वार्ट्ज रीफ की सूचना दी। मिंझारी में बेस मेटल अन्वेषण से 1.13 मिलियन टन ताँबे का संसाधन प्राप्त हुआ जिसमें 0.2% Cu था (खुन्तिया, 2017)। कौशिक सी.एस. एवं अपराजित एन. (2021) ने शिरपुर-मोटेगांव-मेंधा क्षेत्रों में G4 चरण की जांच की ताकि ताँबे और संबंधित खनिजीकरण को स्थापित किया जा सके। उन्होंने मोटेगांव क्वार्ट्ज शिरा में ताँबे के मान 10 ppm से 2100 ppm Cu (औसत: 1055 ppm) और अरेगांव क्वार्ट्ज शिरा में ताँबे के मान 240 ppm से 1.10% Cu (औसत: 5620 ppm) रिपोर्ट किए। हाल ही में, GSI और DGM ने संयुक्त रूप से बोथली पुराने कार्य क्षेत्र का ड्रिलिंग के माध्यम से अन्वेषण किया।

1.5.7 ठानेवासना ताँबा पट्टी, जो महाराष्ट्र के चंद्रपुर जिले में पश्चिमी बस्तर क्रेटोन के अंतर्गत स्थित है, NNW-SSE दिशा वाले शीयर जोनों के साथ जुड़ी ताँबे की खनिजता द्वारा विशेषीकृत है। यह खनिजता मुख्यतः ग्रेनाइटॉइड और संबंधित शिलाओं में पाए जाने वाले क्वार्ट्ज-क्लोराइट शिराओं में होती है, जिसमें चैल्कोपायराइट प्रमुख सल्फाइड खनिज है। ये शिराएं अक्सर अविरल नहीं होतीं और 25-30 किमी तक स्ट्राइक के साथ फैली होती हैं, जिनमें व्यक्तिगत प्रस्फुटन 1.2 किमी तक की लंबाई प्राप्त करते हैं। इनमें संरचनात्मक विशेषताएँ जैसे पिंचिंग, स्वेलिंग, द्वि-प्रभागन और एन-इशेलोन पैटर्न देखे जाते हैं। खनिजता के साथ-साथ दीवार की चट्टानों में व्यापक हाइड्रोथर्मल रूपांतरण पाया जाता है, जिसमें क्लोरिटाइजेशन, सिलिसीफिकेशन, सेरिसिटाइजेशन, आर्गिलिक अल्टरेशन और के-मेटासोमेटिज्म शामिल हैं। ये भूवैज्ञानिक विशेषताएँ प्रीकैम्ब्रियन युग की संरचनात्मक रूप से नियंत्रित हाइड्रोथर्मल प्रणाली का संकेत देती हैं, जो एक महत्वपूर्ण क्षेत्रीय ताँबा-युक्त क्षेत्र का प्रतिनिधित्व करती हैं।

1.5.8 गोविंदपुर ब्लॉक में कुल स्टेशन की सहायता से विस्तृत मानचित्रण किया गया। N-S दिशा में 600 मीटर लंबाई की एक बेसलाइन स्थापित की गई।

1.5.9 इस बेसलाइन के साथ लम्बवत E-W दिशा में 100 मीटर अंतराल पर ट्रावर्स लाइनें बनाई गईं। प्रत्येक ट्रावर्स लाइन, जिसकी लंबाई 400 मीटर थी, पर 25 मीटर अंतराल पर पेग लगाए गए, ताकि मानचित्रण में सटीकता बनी रहे और व्यवस्थित बेडरॉक तथा मिट्टी के नमूने लेने में मदद मिल सके।

1.5.10 क्षेत्र में बेसमेंट चट्टानें बेंगपाल गनीस द्वारा प्रतिनिधित्व की जाती हैं, जिनमें मेटापेलाइट्स शामिल हैं, और जिनमें पेगमटाइट, क्वार्ट्ज और एपिडोट शिराएं प्रवेश कर चुकी हैं।

1.5.11 तांबे की खनिजता सिलिसीकृत क्षेत्र में मालाकाइट की परत के रूप में प्रकट होती है, जो बेंगपाल गनीस के भीतर क्वार्ट्ज-क्लोराइट शिस्ट के एन्क्लेव तक सीमित है। ये एन्क्लेव N-S और NNE-SSW दिशा वाले लीनमेंट्स के साथ स्थित हैं।

1.5.12 गोविंदपुर और बोथली के आसपास क्षेत्र में चट्टानों का अनावरण सीमित है क्योंकि अधिकांश क्षेत्र मोटे मिट्टी के आवरण से ढका हुआ है। गोविंदपुर क्षेत्र में 1:2000 पैमाने पर विस्तृत मानचित्रण किया गया। गोविंदपुर पुराने कार्य क्षेत्र में मालाकाइट युक्त क्वार्ट्ज शिरा, जो मेटापेलाइट्स (क्वार्ट्ज माइका शिस्ट) में प्रवेश कर रही थी, का मानचित्रण किया गया।

1.5.13 गोविंदपुर के दक्षिण-पूर्व में स्थित प्रमुख पुराने तांबे के खदान में आर्कीयन आयु के बेंगपाल गनीस के भीतर प्रवेश की गई सिलिसीकृत शीयर जोन में मालाकाइट, क्यूप्राइट और चैल्कोसाइट की परत पाई जाती है। मुख्य पुराने खदान गड्ढे के अलावा, मुख्य गड्ढे के उत्तर-पूर्व में दो छोटे गोलाकार शाफ्ट पाए गए हैं, जिनका व्यास 4 मीटर और गहराई 6 मीटर तक है, जिनमें मामूली मात्रा में मालाकाइट शामिल है।

1.5.14 खनिजित क्षेत्र की मोटाई और विस्तार का पता लगाने के लिए 2007-08 के क्षेत्रीय सत्र के दौरान मुख्य पुराने कार्य गड्ढे के अंदर और आसपास चार परीक्षण गड्ढे खोले गए, जिनमें यह सिद्ध हुआ कि वे खनिज रहित हैं।

1.5.15 N-S दिशा में फैली खनिज युक्त क्वार्ट्ज रीफ, जिसकी लंबाई 155 मीटर और चौड़ाई 4 से 7 मीटर है, व्यापक रूप से मोड़ी हुई है और इसका ढाल हल्का उत्तर-पूर्व की ओर है। गोविंदपुर पुराने कार्य क्षेत्र के आसपास कुछ छोटे पृथक क्वार्ट्ज-टूर्मलिन बैंड के प्रस्फुटन भी मानचित्रित किए गए हैं।

1.5.16 गोविंदपुर पुराने कार्य क्षेत्र में शीयर और सिलिसीकृत क्वार्ट्ज माइका शिस्ट में प्रवेश करने वाली सल्फाइड युक्त क्वार्ट्ज रीफ मानचित्रित की गई है। इसकी N-S प्रवृत्ति है और यह 155 मीटर की स्ट्राइक लंबाई तक प्रकट होती है, जिसकी चौड़ाई 4 से 5 मीटर है। यह गोविंदपुर के मुख्य गड्ढे से लगभग 25 मीटर पश्चिम में स्थित है।

1.5.17 N-S दिशा में फैली खनिज युक्त क्वार्ट्ज रीफ व्यापक रूप से मुड़ी हुई है, जिसका ढाल 120 से 150 डिग्री तक उत्तर-पूर्व की ओर है। गोविंदपुर और बोथली क्षेत्रों में छोटे और पृथक पुराने कार्य गड्ढों की एक श्रृंखला स्थित है, जिनमें बड़ी मात्रा में डंप सामग्री पाई गई है।

1.5.18 GSI द्वारा 2007-08 के क्षेत्रीय सत्र में महाराष्ट्र के चंद्रपुर जिले के गोविंदपुर ब्लॉक में 0.85 वर्ग किलोमीटर क्षेत्र में SP, मैग्नेटिक, रेजिस्टिविटी-कम-IP तकनीक (ग्रेडिएंट एरे), वर्टिकल इलेक्ट्रिकल साउंडिंग और डिपोल-डिपोल जैसी भू-भौतिक सर्वेक्षण की गई।

1.6.0 वर्तमान भूवैज्ञानिक कार्य

1.6.1 अनुमोदित कार्य दायरे के अनुसार, महाराष्ट्र के चंद्रपुर जिले में प्रस्तावित गोविंदपुर ब्लॉक में तांबा और संबंधित खनिजों के प्रारंभिक अन्वेषण को किया गया, जिसका मुख्य उद्देश्य तांबा-युक्त शिलाओं की पहचान करना था।

1.6.2 गोविंदपुर ब्लॉक के मौजूदा भूवैज्ञानिक मानचित्र को उन्नत और परिष्कृत करने के लिए 1:2000 पैमाने पर विस्तृत भूवैज्ञानिक मानचित्रण किया गया।

1.6.3 इस ब्लॉक में सतही अनावरण सीमित है। गोविंदपुर पुराने कार्य क्षेत्र में मालाकाइट खनिज युक्त क्वार्ट्ज शिराएं, जो मेटापेलाइट्स (क्वार्ट्ज-माइका शिस्ट) में प्रवेश कर रही थीं, का मानचित्रण किया गया। इसके अतिरिक्त, कुछ क्वार्ट्जाइट के प्रस्फुटन भी पहचाने गए।

1.6.4 चूंकि ब्लॉक का बड़ा हिस्सा मिट्टी और क्षयीकरण सामग्री से ढका हुआ है, विस्तृत भूवैज्ञानिक मानचित्रण के दौरान केवल सीमित अनावरण दर्ज किया जा सका।

1.6.5 पूर्व के अध्ययन और उपलब्ध साहित्य के आधार पर अयस्क युक्त क्षेत्रों में कुल 10 खाई खोदने का प्रस्ताव था, लेकिन वन अनुमति न मिलने के कारण केवल 5 खाइयाँ खोदी जा सकीं।

1.7.0 वर्तमान भू-भौतिक कार्य

1.7.1 भू-भौतिक अन्वेषण कार्य में मैग्नेटिक सर्वेक्षण, इलेक्ट्रिकल रेजिस्टिविटी टोमोग्राफी (ERT), इंड्यूस्ड पोलराइजेशन (IP) और सेल्फ-पोटेंशियल (SP) सर्वेक्षण शामिल थे। ये सर्वेक्षण 50 मीटर के ट्रावर्स अंतराल और 10 मीटर स्टेशन दूरी पर किए गए, तांबे की खनिजता के अपेक्षित आयामों को ध्यान में रखते हुए।

1.8.0 ब्लॉक का भूविज्ञान और संरचना:

तांबे की खनिजता सिलिसीकृत क्षेत्र में मालाकाइट की परत के रूप में प्रकट होती है, जो बेंगपाल गनीस के भीतर क्वार्ट्ज-क्लोराइट शिस्ट के एन्क्लेव तक सीमित है। ये एन्क्लेव N-S और NNE-SSW दिशा वाले लीनमेंट्स के साथ स्थित हैं।

मानचित्रित क्षेत्र की संक्षिप्त स्तरीय संरचना इस प्रकार है:

- क्वार्ट्ज शिरा – सिलिसीकृत क्षेत्र
 - ऐंफिबोलाइट
 - क्वार्ट्ज मोनोजोनाइट
 - क्वार्ट्ज क्लोराइट शिस्ट
- } बेंगल समूह – आर्कीयन

क्वार्ट्ज शिरा – सिलिसीकृत क्षेत्र

क्वार्ट्ज शिरा एक तालिका जैसे रूप वाली संरचना होती है, जो सिलिका-समृद्ध हाइड्रोथर्मल तरल पदार्थों के चट्टानों में दरारों, दोषों या शीयर जोनों से गुजरने पर क्रिस्टलीकृत होकर बनती है। ये प्रायः सफेद, दूधिया या कांच जैसी दिखाई देती हैं। क्वार्ट्ज शिराओं में द्रव्य रसायन के आधार पर (जैसे सोना, तांबा, सीसा, जस्ता, चांदी आदि) अयस्क खनिज पाए जा सकते हैं।

सिलिसीकृत क्षेत्र आमतौर पर आसपास की चट्टानों की तुलना में अधिक कठोर, सघन और क्षरण-प्रतिरोधी होता है। यह क्वार्ट्ज शिराओं के चारों ओर या शीयर जोनों, दोषों या छिद्रपूर्ण क्षेत्रों में उत्पन्न हो सकता है।

क्वार्ट्ज शिराएं अक्सर सिलिसीकृत क्षेत्रों के भीतर या उनके आसपास पाई जाती हैं। सिलिसीकृत हेलो (halo) होस्ट चट्टानों में व्यापक सिलिका भराव के कारण बनते हैं, जबकि क्वार्ट्ज शिराएं दरारों में संकेंद्रित सिलिका निक्षेप को दर्शाती हैं। ये दोनों हाइड्रोथर्मल गतिविधि के मजबूत संकेतक हैं और खनिज अन्वेषण (विशेष रूप से सोना, तांबा और अन्य एपिथर्मल/मेसोथर्मल अयस्कों के लिए) में महत्वपूर्ण माने जाते हैं।

क्वार्ट्ज माइका शिस्ट:

यह गहरा हरे-ग्रे रंग का, पर्णित (foliated) चट्टान है, जिसकी स्ट्राइक N40°W से S40°E तक है, और मोटाई 1 मीटर से 6 मीटर तक भिन्न होती है, साथ ही स्ट्राइक की निरंतरता 30 मीटर तक है। यह चट्टान महीन कणों वाली है और मुख्य रूप से क्लोराइट के गहरे हरे फ्लेक्स, रंगहीन क्वार्ट्ज के कण और विभिन्न मात्रा में सेरिसाइट से बनी है।

गोविंदपुर ब्लॉक में चट्टानों का अनावरण सीमित है क्योंकि अधिकांश क्षेत्र मोटी मिट्टी से ढका हुआ है। KEMSPL द्वारा 1:2000 पैमाने पर विस्तृत मानचित्रण का उन्नयन किया गया। गोविंदपुर पुराने कार्य क्षेत्र में मालाकाइट युक्त क्वार्ट्ज शिरा, जो मेटापेलाइट्स (क्वार्ट्ज माइका शिस्ट) में प्रवेश कर रही थी, का मानचित्रण किया गया।

1.9.0 ब्लॉक में खनिजता

1.9.1 पूर्व के कार्यों (GSI) से यह स्थापित हुआ कि ब्लॉक में खनिजता NNW-SSE दिशा वाले शीयर जोन के साथ जुड़ी हुई है, जिसमें धात्विक और अधात्विक दोनों प्रकार के खनिज पाए जाते हैं। सल्फाइड खनिजता सिलिसीकृत क्वार्ट्ज रीफ/शिराओं के साथ जुड़ी हुई है और इसमें मुख्य रूप से चैल्कोपायराइट, पायराइट, चैल्कोसाइट, कोवेल्लाइट और मालाकाइट शामिल हैं।

1.9.2 सल्फाइड खनिजता मुख्य रूप से डिफ्यूजन, दरारों में भराव और अत्यधिक दरारयुक्त और सिलिसीकृत क्वार्ट्ज शिराओं में बिंदु के रूप में होती है, और कुछ स्थानों पर यह होस्ट चट्टान के भीतर पृथक दानों के रूप में भी पाई जाती है।

1.9.3 खनिजता संरचनात्मक रूप से नियंत्रित है, जो शीयर उद्घाटनों और दरारों तक सीमित है। दीवार चट्टानों में परिवर्तन की प्रकृति और होस्ट चट्टान के भीतर खनिज के होने के तरीके से इसका हाइड्रोथर्मल मूल संकेतित होता है।

1.9.4 इस क्षेत्र में खनिजता को बेसमेंट चट्टानों में प्रवेश करने वाले युवा ग्रेनाइट अंतःक्षेपों से संबंधित हाइड्रोथर्मल गतिविधि के कारण माना जा सकता है।

1.9.5 इसका प्रमाण मेटापेलाइट्स में पाए जाने वाले कई गुलाबी फेल्डस्पार और क्वार्ट्ज शिराओं की उपस्थिति से मिलता है। तांबे की खनिजता स्पष्ट संरचनात्मक नियंत्रण (दरार के तल) और भौतिक नियंत्रण (परिवर्तित मेटापेलाइट्स) दर्शाती है, जो एपिजेनेटिक उत्पत्ति का संकेत देती है।

1.9.6 सिलिसीकृत क्वार्ट्ज शिराओं और मेटापेलाइट चट्टानों की दरारों के साथ सल्फाइड क्रस्टिफिकेशन और कॉम्ब संरचनाओं का होना एपिथर्मल प्रकार की खनिजता का और समर्थन करता है।

1.10.0 वर्तमान अन्वेषण के दौरान किए गए कार्य

1.10.1 ब्लॉक में अन्वेषण कार्य 20.11.2024 से प्रारंभ हुआ, जिसमें 1:2000 पैमाने पर भूवैज्ञानिक मानचित्रण का उन्नयन किया गया। साथ ही, सतही नमूना संग्रहण और भू-भौतिक सर्वेक्षण किया गया। भू-भौतिक डेटा की व्याख्या के बाद दिसंबर 2024 से जनवरी 2025 के दौरान खाई खोदने का कार्य किया गया। इस अध्ययन के परिणामों के आधार पर अगस्त 2025 में ड्रिलिंग योजना बनाई गई। अन्वेषण ड्रिलिंग 22.07.2025 को बोरेहोल संख्या KNGC-01 में शुरू हुई और 14.08.2025 को बोरेहोल बंद होने के साथ पूरी हुई। संबद्ध क्षेत्रीय कार्यों में खाइयों का मानचित्रण और नमूना संग्रहण, नमूना तैयारी, बोरेहोल स्थानों और ब्लॉक के सभी मुख्य बिंदुओं पर सर्वेक्षण शामिल थे। बोरेहोल कोर लॉगिंग और नमूना संग्रहण साथ-साथ किए गए। विश्लेषणात्मक/प्रयोगशाला अध्ययन शिवा प्रयोगशाला (NABL मान्यता प्राप्त) और JNARDDC, नागपुर में किए गए।

1.10.2 पूरे ब्लॉक क्षेत्र (0.83 वर्ग किमी) के लिए 1:2000 पैमाने पर भूवैज्ञानिक मानचित्रण का उन्नयन किया गया, जिसमें भू-रचना, संरचना और खनिजता के संकेत जैसे मालाकाइट दागों का निरीक्षण किया गया। क्षेत्र में क्वार्ट्ज माइका शिस्ट, क्वार्ट्ज क्लोराइट शिस्ट और क्वार्ट्जाइट का अनावरण देखा गया। चट्टानों की स्थिति और संरचनात्मक विशेषताओं जैसे बिस्तर, पर्णन, तह और जोड़ों को ब्रुन्टन कम्पास द्वारा दर्ज किया गया। भू-इकाइयों की सामान्य स्ट्राइक NNW-SSE है, जिसमें 20°-30° की ढाल उत्तर-पश्चिम की ओर है। क्षेत्र में दर्ज पढ़ाई को भूवैज्ञानिक मानचित्र (प्लेट-V) के रूप में प्रस्तुत किया गया।

1.10.3 गोविंदपुर ब्लॉक का क्षेत्र मुख्य रूप से सपाट स्थलाकृति वाला है। भूवैज्ञानिक मानचित्रण के दौरान प्रमुख भू-इकाइयां क्वार्ट्ज क्लोराइट शिस्ट, क्वार्ट्जाइट, क्वार्ट्ज माइका शिस्ट और क्वार्ट्ज शिराएं पाई गईं।

1.10.4 भूवैज्ञानिक मानचित्रण के दौरान KEMSPL ने खाइयों का निर्माण किया और विश्लेषण के लिए 42 सतही नमूने तथा 7 कोर नमूने एकत्र किए, जिनमें Pb, Cu, Zn, Co, Ni, Ag, As और Au जैसे तत्वों का परीक्षण किया गया। तांबे के मान न्यूनतम 22ppm और अधिकतम 205ppm पाए गए, लेकिन ये मान उत्साहवर्धक नहीं थे।

1.10.5 भू-भौतिक उच्च चार्जिबिलिटी क्षेत्र के आधार पर एक बोरहोल योजना बनाई गई थी। ड्रिलिंग कार्य किया गया और बोरहोल से सात नमूनों का विश्लेषण किया गया; हालांकि परिणाम उत्साहजनक नहीं थे।

1.10.6 विभिन्न स्थानों पर कुल पाँच खाइयां खोदी गईं। सभी खाइयां भू-इकाइयों की स्ट्राइक के लंबवत दिशा में खोदी गईं। खाइयों का आकार 5*(8m×1m×2m) था। खाइयों की खुदाई के बाद यह पाया गया कि कम गहराई पर कोई खनिजित क्षेत्र प्रकट नहीं हुआ। सभी खाइयों का उचित भूवैज्ञानिक मानचित्रण (Plate-VI) किया गया।

1.10.7 खाई के नमूनों में पाए गए तांबे (Cu) के मान नीचे तालिका संख्या 2 में प्रस्तुत किए गए हैं।

तालिका संख्या 2

क्रमांक	ग्राहक कोड	नमूने का विवरण	प्रयोगशाला पहचान संख्या	SOP/OM/058 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)
			LOQ	0.01	1	5	5	5	5	5	5
			Lab ID	सोना	चांदी	आर्सेनिक	कोबाल्ट	तांबा	निकल	सीसा	जस्ता
1	T1-S1	मिट्टी और	G390-1	<0.01	<1	<5	19	194	43	10	24

		क्वार्ट्ज बोल्डर									
2	T1-S2	मिट्टी और क्वार्ट्ज बोल्डर	G390-2	<0.01	<1	<5	20	167	47	6	22
3	T1-S3	मिट्टी और क्वार्ट्ज बोल्डर	G390-3	<0.01	<1	<5	20	178	44	7	24
4	T1-S4	मिट्टी और क्वार्ट्ज बोल्डर	G390-4	<0.01	<1	<5	18	103	36	<5	20
5	T1-S5	मिट्टी और क्वार्ट्ज बोल्डर	G390-5	<0.01	<1	<5	25	126	47	<5	22
6	T1-S6	मिट्टी और क्वार्ट्ज बोल्डर	G390-6	<0.01	<1	<5	20	135	41	<5	24
7	T1-S7	मिट्टी और क्वार्ट्ज बोल्डर	G390-7	<0.01	<1	<5	23	205	49	7	22
8	T1-S8	मिट्टी और क्वार्ट्ज बोल्डर	G390-8	<0.01	<1	<5	24	179	46	9	23
9	T2-S1	मिट्टी	G390-9	<0.01	<1	<5	18	34	50	5	80
10	T2-S2	मिट्टी	G390-10	<0.01	<1	<5	16	36	46	<5	70
11	T2-S2	मिट्टी	G390-10	<0.01	<1	<5	17	36	49	<5	71
12	T2-S3	मिट्टी	G390-11	0.02	<1	<5	16	38	53	6	71
13	T2-S4	मिट्टी	G390-12	<0.01	<1	<5	15	27	38	5	47
14	T2-	मिट्टी	G390-	<0.01	<1	<5	20	22	44	5	65

	S5		13								
15	T2-S6	मिट्टी	G390-14	<0.01	<1	<5	16	47	51	10	73
16	T2-S7	मिट्टी	G390-15	<0.01	<1	<5	17	63	52	<5	66
17	T2-S8	मिट्टी	G390-16	<0.01	<1	<5	19	40	58	<5	68
18	T3-S1	मिट्टी	G390-17	<0.01	<1	<5	23	38	47	8	32
19	T3-S2	मिट्टी	G390-18	<0.01	<1	<5	24	55	41	13	33
20	T3-S3	मिट्टी	G390-19	<0.01	<1	<5	25	53	43	18	32
21	T3-S4	मिट्टी	G390-20	<0.01	<1	<5	18	37	38	11	32
22	T3-S5	मिट्टी	G390-21	<0.01	<1	<5	18	49	36	14	35
23	T3-S6	मिट्टी	G390-22	<0.01	<1	<5	23	57	47	19	36
24	T3-S7	मिट्टी	G390-23	<0.01	<1	<5	22	45	42	13	33
25	T3-S8	मिट्टी	G390-24	<0.01	<1	<5	26	61	43	16	30
26	T4-S1	मिट्टी	G415-1	<0.01	<1	6	23	57	42	13	80
27	T4-S2	मिट्टी	G415-2	<0.01	<1	5	30	42	46	<5	13
28	T4-S3	मिट्टी	G415-3	<0.01	<1	<5	25	36	42	<5	34
29	T4-S4	मिट्टी	G415-4	<0.01	<1	5	30	43	52	<5	16
30	T4-S5	मिट्टी	G415-5	<0.01	<1	5	34	37	50	<5	13
31	T4-S6	मिट्टी	G415-6	<0.01	<1	6	26	43	53	<5	15
32	T4-S7	मिट्टी	G415-7	<0.01	<1	<5	13	38	35	<5	12
33	T4-S8	मिट्टी	G415-8	<0.01	<1	<5	25	43	47	<5	17
34	T5-S1	मिट्टी	G415-9	<0.01	<1	<5	35	46	23	<5	69
35	T5-S2	मिट्टी	G415-10	<0.01	<1	<5	74	48	24	<5	74
36	T5-S2	मिट्टी	G415-10	<0.01	<1	<5	73	48	26	<5	77
37	T5-S3	मिट्टी	G415-11	<0.01	<1	6	51	118	30	20	143
38	T5-S4	मिट्टी	G415-12	<0.01	<1	<5	64	168	33	26	107
39	T5-S5	मिट्टी	G415-13	<0.01	<1	<5	39	129	21	16	80
40	T5-S6	मिट्टी	G415-14	0.1	<1	<5	45	62	23	5	63

41	T5-S7	मिट्टी	G415-15	<0.01	<1	<5	43	77	28	15	79
42	T5-S8	मिट्टी	G415-16	<0.01	<1	7	36	101	31	20	74

1.10.8 के.ई.एम.एस.पी.एल. ने अनुमोदित 500 मीटर के मुकाबले 1 बोरहोल में कुल 61.00 मीटर की अन्वेषण ड्रिलिंग की है। बोरहोल का विवरण नीचे तालिका संख्या 3 में प्रस्तुत किया गया है।

तालिका संख्या 2

अनुक्रम				चट्टानी संरचना	टिप्पणी
आरंभ (मी)	अंत (मी)	मोटाई (मी)	प्राप्ति (मी)		
0.00	1.00	1.00	0.50	काली/भूरी मिट्टी	
			0.50	विविध रंगों वाली मिट्टी, क्वार्ट्ज और ग्रेनाइटिक चट्टान के टुकड़े	
1.00	2.00	1.00	1.00	काली/भूरी मिट्टी; विभिन्न रंगों वाली मिट्टी जिसमें क्वार्ट्ज और ग्रेनाइटिक चट्टान के टुकड़े शामिल हैं	
2.00	3.00	1.00	1.00	काली/भूरी मिट्टी; विविध रंगों वाली मिट्टी जिसमें क्वार्ट्ज और ग्रेनाइटिक चट्टान के टुकड़े शामिल हैं	
3.00	4.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
4.00	5.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
5.00	6.00	1.00	0.40	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
			0.60	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
6.00	7.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
7.00	8.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
8.00	9.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
9.00	10.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका	काओलिनाइट

				शिस्ट	
10.00	11.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	काओलिनाइट
11.00	12.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
12.00	13.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
13.00	14.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
14.00	15.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
15.00	15.45	0.45	0.45	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
15.45	16.00	0.55	0.55	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	क्वार्ट्ज के टुकड़े
16.00	17.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	क्वार्ट्ज के टुकड़े
17.00	18.00	1.00	0.95	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	क्वार्ट्ज के टुकड़े
18.00	19.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
19.00	20.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
20.00	21.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
21.00	22.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
22.00	23.00	1.00	1.00	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
23.00	24.00	1.00	0.84	अत्यधिक अपरदित क्लोराइट माइका शिस्ट	कीचड़ जैसा अवशेष
			0.15	क्लोराइट माइका शिस्ट	
24.00	25.00	1.00	0.42	अत्यधिक अपरदित क्लोराइट माइका	ऑक्सीकरण

				शिस्ट	क्षेत्र
			0.58	कटा हुआ क्वार्टेज शिरा, पाइराइट के प्रसार के साथ चैल्कोपायराइट के कण	माइका द्वितीयक परिपूरक
25.00	26.00	1.00	0.48	क्वार्टेज क्लोराइट शिस्ट	
26.00	27.00	1.00	0.47	क्वार्टेज क्लोराइट शिस्ट	लिमोनाइटिय पट्टियाँ
27.00	28.00	1.00	0.35	क्वार्टेज क्लोराइट शिस्ट	
28.00	29.00	1.00	0.20	कटा हुआ क्वार्टेज शिरा, भंगुर, बायोटाइट से द्वितीयक परिपूरण और लिमोनाइटिय पट्टियाँ	
			0.48	क्वार्टेज क्लोराइट शिस्ट	
29.00	30.00	1.00	0.65	क्वार्टेज क्लोराइट शिस्ट जिसमें क्वार्टेज की शिराएँ हैं	
30.00	31.00	1.00	0.38	क्वार्टेज क्लोराइट शिस्ट	
31.00	32.00	1.00	0.28	क्वार्टेज क्लोराइट शिस्ट	
32.00	33.00	1.00	0.32	क्वार्टेज क्लोराइट शिस्ट	
33.00	34.00	1.00	0.52	क्वार्टेज क्लोराइट शिस्ट	
34.00	35.00	1.00	0.82	क्वार्टेज क्लोराइट शिस्ट	
35.00	36.00	1.00	0.62	क्वार्टेज क्लोराइट शिस्ट	
36.00	37.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट	
37.00	38.00	1.00	0.90	क्वार्टेज क्लोराइट शिस्ट	
38.00	39.00	1.00	0.96	क्वार्टेज क्लोराइट शिस्ट	
39.00	40.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट में झुकी हुई दरार	
40.00	41.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट — कठोर और सघन	
41.00	42.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट — टूटी हुई, लंबवत दरारों वाली	
42.00	43.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट — टूटी हुई, लंबवत दरारों वाली	
43.00	44.00	1.00	1.00	क्वार्टेज क्लोराइट शिस्ट — टूटी हुई, लंबवत दरारों वाली	
44.00	45.00	1.00	0.80	क्वार्टेज क्लोराइट शिस्ट — टूटी और दरार वाली	
			0.20	क्वार्टेज शिरा	

45.00	46.00	1.00	0.25	क्वार्ट्ज शिरा	
			0.75	क्वार्ट्ज-क्लोराइट शिस्ट	
46.00	47.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
47.00	48.00	1.00	0.85	क्वार्ट्ज-क्लोराइट शिस्ट	
			0.15	क्वार्ट्ज शिरा	
48.00	49.00	1.00	1.00	क्वार्ट्ज शिरा	
49.00	50.00	1.00	0.85	क्वार्ट्ज शिरा	
			0.15	क्वार्ट्ज-क्लोराइट शिस्ट	
50.00	51.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
51.00	52.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
52.00	53.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
53.00	54.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
54.00	55.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
55.00	56.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
56.00	57.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
57.00	58.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
58.00	59.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
59.00	60.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	
60.00	61.00	1.00	1.00	क्वार्ट्ज-क्लोराइट शिस्ट	

1.10.9 बोरेहोल कोर का भूवैज्ञानिक लॉगिंग सभी संरचनात्मक डेटा, भूविज्ञानात्मक और खनिज संबंधी टिप्पणियों के साथ सही तरीके से किया गया। ड्रिल किए गए बोरेहोल में तांबे का खनिजीकरण नहीं पाया गया। संबंधित प्रयोगशाला अध्ययन जैसे रासायनिक और भौतिक विश्लेषण, पेट्रोग्राफिक और मिनेरोग्राफिक अध्ययन समानांतर रूप से पूर्ण किए गए और भूवैज्ञानिक रिपोर्ट प्रस्तुत कर दी गई हैं।

1.10.10 प्रस्तावित कार्य की प्रकृति और मात्रा बनाम वास्तविक उपलब्धि का विवरण तालिका संख्या 4 में दिया गया है।

संख्या	कार्य का विवरण	प्रस्तावित कार्य	मात्रा	के. ई. एम. एस. पी. एल. द्वारा सम्पन्न किया गया
1	सर्वेक्षण कार्य			
	बोरेहोल निर्धारण तथा बोरेहोल के निर्देशांक एवं न्यूनतम स्तर	9	संख्या	5 बोरेहोल, 4

	(Reduced Level) का निर्धारण डीजीपीएस द्वारा"			कोने के बिंदु
2	भूवैज्ञानिक कार्य			
	विस्तृत भूवैज्ञानिक मानचित्र का उन्नयन	0.83	वर्ग किलोमीटर	0.83
	खाई खोदाई (10 संख्या)	160	घन मीटर	80
3	भू-भौतिक सर्वेक्षण			
	आई.पी. एवं रेसिस्टिविटी सर्वेक्षण, सेल्फ-पोटेंशियल सर्वेक्षण, मैग्नेटिक सर्वेक्षण (10 रेखा कि.मी.)	8-10	लाइन किलोमीटर	10
4	ड्रिलिंग कार्य			
	ड्रिलिंग कार्य	500	मी.	61.00
5	प्रयोगशाला अध्ययन			
	प्राथमिक नमूने- 8 संभवतः	180	संख्या	49
	बाहरी नमूने	18	संख्या	5
6	भौतिक अध्ययन, शिलाविज्ञान अध्ययन		संख्या	
	पतली परत का निर्माण	5	संख्या	3
	सतही पॉलिश की गई परत का निर्माण	5	संख्या	3
	संपूर्ण शिला विश्लेषण	5	संख्या	2

7	भूवैज्ञानिक प्रतिवेदन	1	संख्या	1
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1.10.11 निष्कर्ष और सिफारिश

1:2000 पैमाने पर भूवैज्ञानिक मानचित्रण, खाई खोदाई, भौ-भौतिक सर्वेक्षण और गोविंदपुर ब्लॉक, महाराष्ट्र में ट्रिलिंग सहित G3 चरण की जांच में, इस ब्लॉक क्षेत्र में सतही गहराई पर किसी भी तांबे और संबंधित खनिजकरण की पहचान नहीं हुई है। इस ब्लॉक क्षेत्र का तांबे और संबंधित खनिजकरण के लिए कोई आर्थिक महत्व नहीं है। कुल मिलाकर, इस ब्लॉक में खनिजकरण का कोई आर्थिक लाभ नहीं है।



**GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION
(G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN
GOVINDPUR BLOCK, CHANDRAPUR DISTRICT, MAHARASHTRA**

CHAPTER-1

EXECUTIVE SUMMARY

1.1.0 INTRODUCTION

1.1.1. Copper, with its distinctive physical, mechanical, and electrical properties, plays a crucial role in the industrial development of any nation. In India, nearly 75% of the copper demand is currently met through imports. The rising demand for copper can be reduced by intensifying exploration activities. Major copper ore deposits can be found in the district of Singhbhum (Jharkhand), Balaghat (Madhya Pradesh), and Jhunjhunu and Alwar (Rajasthan). India is a poor country in terms of copper reserves and production.

1.1.2. Over the past few decades, no large-scale metal deposits have been discovered in India. However, advances in technology and improvements in mining efficiency make it feasible to exploit smaller deposits located in close proximity. Hence, it is both necessary and timely to identify and explore such clusters of small copper deposits.

1.1.3 Copper is one of the few metals that occur in nature in directly usable metallic form (native metals) and was known to some of the oldest civilizations on record. The history of copper use dates to 9000 BC in the Middle East. Copper is a soft, malleable, and ductile metal with very high thermal and electrical conductivity and is an important ferrous base metal having wide industrial applications, ranging from defence, space programme, railways, power cables, mint,

telecommunication cables, etc. India is not self-sufficient in the production of copper ore. India imports copper concentrates for its smelter which is to the tune of 75% of its total copper requirement. Thus, the domestic demand for copper and its alloys is met through domestic production, and concentrates. Thus, the domestic demand for copper met by its recycling of scrap and by imports.

1.1.4 Copper Ore Reserves and Resource in India (as on 1 April 2020)

As per the National Mineral Inventory (NMI) database maintained by the Indian Bureau of Mines (IBM), the total reserve and remaining resource of copper ore in the country, as on 1 April 2020, are estimated at 1.66 billion tonnes. This estimate is based on the United Nations Framework Classification (UNFC) system.

1.1.5 Out of the total, about 163.89 million tonnes ($\approx 9.87\%$) fall under the reserve category, while the remaining ~ 1.50 billion tonnes ($\approx 90.13\%$) are placed under the remaining resources category. This indicates that the bulk of copper ore in India still lies outside the proven reserves and requires further exploration and upgradation.

1.1.6 Grade-wise classification shows that there are no reserve containing 1.85% Cu or more. All the reserves identified so far belong to the grade class of 1.00% to below 1.85% Cu, which accounts for the entire 163.89 million tonnes of the reserve base. This reflects the relatively low-to-moderate copper grades of Indian deposits when compared with some international producers.

1.1.7 Within the total ore resource, about 8.28 million tonnes ($\approx 0.49\%$) are of high grade, containing 1.85% Cu or more. A further 587 million tonnes ($\approx 35.33\%$) of resources fall in the grade range of 1.00% to below 1.85% Cu. The remainder consists of resources with grades below

1.00% Cu, which may still become viable in the future through advances in beneficiation and extraction technologies.

In terms of contained metal, the total copper metal content estimated from all reserve and resource is around 12.20 million tonnes. Of this, the reserve account for about 2.16 million tonnes of copper metal, while the remaining metal content lies in the category of Remaining Resource.

1.1.8 The distribution of copper resource is also uneven across the country. Rajasthan holds the largest share with approximately 868 million tonnes ($\approx 52.25\%$), followed by Madhya Pradesh with about 387 million tonnes ($\approx 23.28\%$) and Jharkhand with about 251 million tonnes ($\approx 15.14\%$). These three states together account for more than 90% of the country's copper ore resource, highlighting their strategic significance in India's mineral sector.

1.1.9 The proposed block area is northern extension of Thanewasna shear zones within Bengpal gneisses of Archaean age. The Govindpur block is explored by GSI and State Directorate of Geology Mining (DGM) by mapping, sampling, detailed mapping etc. except drilling component.

1.1.10. The Sindhewahi Copper Belt, located in Chandrapur district of Maharashtra, is one of the important copper-bearing zones in Central India. The belt is geologically significant as it forms part of the Sausar Mobile Belt, which hosts several base metal occurrences. Copper mineralisation in the area is primarily associated with quartz veins, schistose rocks, and shear zones, indicating structurally controlled hydrothermal activity.

1.1.11. Exploration activities in the Sindhewahi region have delineated copper occurrences in scattered pockets, with mineralisation mainly in

the form of chalcopyrite and bornite, along with pyrite and other sulphides. Although large-scale deposits have not yet been established, the cluster of small and medium-sized copper-bearing zones within this belt holds considerable potential for future development, particularly with the application of modern exploration techniques and advanced mining methods.

1.1.12 Given the rising demand for copper in India and the country's dependence on imports, the extension of Sindhewahi Copper Belt represents a promising target for detailed exploration and resource augmentation.

1.1.13 The proposal for Govindpur block G3 stage for copper and associated mineralisation was discussed in the 65th meeting of Technical-cum-Cost Committee (TCC), National Mineral Exploration Trust (NMET) held on 28th, 29th and 31st May- 2024 , through video conferencing at Geological Survey of India, DGCO, A-II Pushpa Bhawan, New Delhi. The Govindpur block G3 stage of exploration proposal was technically evaluated by the TCC for its various geological components and their suitability in the G-3 stage of exploration. The committee recommended the proposal to Executive Committee (EC) for approval of Preliminary Exploration (G-3) with Geological Mapping at 1: 2000 scale, primary samples of 180 nos, Trenching of 160 cu m. and 500m of drilling by means of pilot boreholes. The TCC committee of NMET recommended the proposal for approval of Preliminary Exploration (G-3) with estimated cost of Rs. 1,26,07,812.73 i. e. approximately 126 Lakh including GST in a time schedule of 8 months.

1.1.14 The Executive Committee (EC) has approved the G-3 stage exploration proposal for Govindpur G3 block at an estimated exploration cost of Rs. 1, 26, 07,812.73 i. e. approximately 126 Lakhs,

vide Office Memorandum F. No. 23/490/2024-NMET/284, New Delhi, dated, 21st Aug 2024.

1.2.0 LOCATION AND ACCESSIBILITY OF THE BLOCK

1.2.1 The Govindpur G3 Copper and associated mineralization block falls in part of the Survey of India Toposheet no. 55P/11 and lies between 20°28'22.98"N, 20°28'44.98"N latitudes and 79°36'54.97"E, 79°37'37.99"E longitudes.

1.2.2 The block covers an area of 0.83 sq km in and around villages of Govindpur, Yanoli, Vaijapur, Sonuli, Mangrul Talodi tehsil of Chandrapur district is about 120 km from Nagpur.

1.2.3 It is approachable by State Highway No. 9B to Talodi from where 9 km metalled road join to Govindpur Prospect block area. The road leads onward to Chimur via Neri. Bothli is accessible by jeepable road and is at a distance of 10 km from Govindpur area.

1.2.4 The nearest railway station is Nagbhir. Nagpur –Nagbhir Chandrapur extension line of South eastern railway (0.76m narrow gauge) passes through Talodi road and Sindewahi road railway stations. The Coordinates of the corner points of the block area both on geodetic and in UTM are given in Table No.1

Table no.-1

Co-ordinates of the cardinal points of the block boundary of the Govindpur G3 block for Copper and Associated mineralization in Chandrapur district, Maharashtra state.

Block Corner points	WGS 84 (DD MM SS)		UTM Zone-44 (m)	
	Latitude	Longitude	Easting (m)	Northing (m)
A	20°28'45.36"N	79°36'55.19"E	355589.94 m E	2265129.30 m N
B	20°28'44.98"N	79°37'37.99"E	356829.37 m E	2265107.49 m N
C	20°28'23.55"N	79°37'38.07"E	356826.45 m E	2264448.86 m N
D	20°28'22.98"N	79°36'54.97"E	355577.75 m E	2264441.54 m N

1.3.0 OBJECTIVE OF EXPLORATION

1.3.1 The present exploration programme has been formulated to fulfil the following objectives:

1. Geological mapping and upgradation of detailed geological map at 1:2000 scale based on GSI Large Scale Map.
2. Geophysical survey of IP cum resistivity, SP and Magnetic to assess the mineralized zone.
3. Pitting, trenching, drilling, sampling and sample analysis to check the mineralization of Copper and associated minerals.

1.4.0 REGIONAL GEOLOGY

1.4.1 The Govindpur Copper Block, located in the western Bastar Craton, exposes basement gneisses of the Archaean Bengpal Group with enclaves of metapelites and silicified zones. These gneisses are overlain by sandstones and quartzites of the Neoproterozoic Penganga Group, well exposed near Bothli, forming NNW–SSE trending outliers with gentle NE dips (10°–35°). The sandstones are hard, compact, medium- to fine-grained, and ferruginous, comprising grit and arkose.

1.4.2 The structural framework is defined by NW–SE and NNE–SSW lineaments. Copper mineralisation is primarily controlled by NS to NNE–SSW trending silicified sheared quartz veins/reefs, forming ridges near Sonoli, Motegaon, and Lawari, with malachite encrustation, chalcopyrite, pyrite, and minor covellite. Similar quartz veins with disseminated sulphides and malachite stains also occur in Govindpur and Bothli blocks. However, several barren sheared quartz veins occur near Talodhi and Nander villages, trending variably from NW–SE to NE–SW with steep dips (35°–80°).

Laterite		Cenozoic
Sanstone/ Quartzite with shale and conglomerate	Penganga group	Neoproterozoic
Quartz vein- silicified zone	} Bengpal Group	Archean
Granite gneiss- migmatite		
Banded Iron Formation		
Quartzite		

The geological succession of the study area is represented by diverse lithological units ranging from Archaean to Neoproterozoic age. The basement is constituted by Bengpal Gneissic Group, comprising granite gneiss and pegmatite with enclaves of older metamorphics, dominantly metapelites. These rocks generally strike NNW–SSE to NW–SE with gentle dips towards the NNE or NE. The enclaves of metapelites within the basement trend N35°W–S35°E with dips varying between 25°–50° towards the SW.

The Archaean gneisses and schists show dominant NW–SE foliations, though a NE–SW trend is also locally observed. Overlying these basement rocks, the Penganga Group (Neoproterozoic equivalent) occurs mainly in the northern, northeastern, and southwestern parts of the area. These

sedimentary rocks, resting unconformably on the older metamorphics, comprise sandstone and quartzite, forming small hillocks and ridges, while the gneissic basement forms plain topography. The sandstones are medium to fine-grained, hard, compact, white to buff in colour, and locally traversed by secondary quartz veins. These beds strike NW–SE with low dips (4° – 10°) towards the NE.

In addition, the Bailadila Group of Palaeoproterozoic age (2500–2200 Ma) is represented in the southern part of the area by isolated outcrops of quartzite and banded haematite quartzite with lenses of iron ore. The general geological framework also includes granite gneisses, migmatites, hornblende schist, amphibolite, ultramafic intrusives, and quartz/pegmatite veins.

Overall, the area is characterised by thick soil cover with limited rock exposures. The structural framework is marked by NW–SE to NNW–SSE regional trends, with younger sedimentary sequences showing gentle dipping attitudes unconformably overlying the older metamorphic basement.

1.5.0 PREVIOUS WORK:

1.5.1 The area covering 55P/11 was mapped on 1:63,360 scale by Parimoo, M.C. and Nag, P (1959- 60) of GSI. Gneisses with migmatites, meta sedimentary enclaves and younger sedimentary cover, equated to Vindhyan were mapped in the area.

1.5.2 During the FS 1971-1974 Directorate of Geology and Mining carried out prospecting for copper mineralisation about 1.8 km east of village Bothli.

1.5.3 Directorate of Geology and mining open a large pit of 30mts length, width 25m and maximum depth of 6m near its western wall, filled with quartz and silicified sheared quartz mica schist enriched with malachite.

1.5.4 Two underground openings are located in this silicified zone at the bottom of the western wall, are vertical and 2m in diameter. This silicified zone comprises of copper, cuprite and malachite.

1.5.5 Two small circular shafts each about 4 mts in diameter and 6m depth was located to the east of the northeastern corner of the large pits in Govindpur old working. Prospecting for copper ore deposits in Govindpur and Bothli areas of toposheet no. 55P/11 resulted in identification of malachite bearing quartz veins (Pitale et al., 1974. DGM-MH). Chavhan et al., (2010, GSI), reported 3.15% Cu in Bed Rock Samples.

1.5.6 Mahapatra and Dora, (2009), Nitnaware, (2011), Kumaravel (2012) established Thanewasna copper deposit. Barik (2015) carried out further exploration in neighboring area of Thanewasna has given the Ghanpur-Mudholi and NaiDilli Lal Heti blocks. **Khuntia and Kumaravel, (2015),**

carried out G4 stage investigation around Bahmni and Minjhari areas and reported quartz reef with copper mineralisation up to 0.37% and 0.6% respectively. Base metal exploration at Minjhari resulted in copper resource of 1.13 million tons with 0.2% (Khuntia, 2017). **Kaushik C.S. & Aparajit N., (2021)**, carried out a G-4 stage investigation in and around Shirpur- Motegaon Mendha areas, to establish copper and associated mineralization. They reported copper values ranging from 10 ppm to 2100 ppm Cu (Av: 1055 ppm) in the Motegaon quartz vein, and copper values ranging from 240 ppm to 1.10 % Cu (Av: 5620 ppm) in the Aregaon quartz vein. Recently GSI and DGM jointly explored the Bothli old working by means of drilling.

1.5.7 The Thanewasna Copper Belt, located in Chandrapur district of Maharashtra within the western Bastar Craton, is characterised by copper mineralisation associated with NNW–SSE trending shear zones. The mineralisation occurs predominantly in quartz–chlorite veins hosted within granitoids and related rocks, with chalcopyrite being the principal sulphide mineral. The veins, often discontinuous, extend along strike for 25–30 km, with individual outcrops attaining lengths of up to 1.2 km, and display structural features such as pinching, swelling, bifurcation and en-echelon patterns. The mineralisation is accompanied by widespread hydrothermal alteration including chloritisation, silicification, sericitisation, argillic alteration and K-metasomatism in the wall rocks. These geological features suggest a structurally controlled hydrothermal system of Precambrian age, representing an important copper-bearing zone of regional significance.

1.5.8 Detailed mapping was carried out in Govindpur Block with the aid of Total Station. A base line of 600m length was laid along N-S direction.

1.5.9 The traverse lines were laid at right angle to this base line in E-W direction at 100m interval. Pegs were put at 25m intervals along all the

each traverse line of 400m length each in order to maintain the accuracy in mapping and aid in systematic bed rock and soil sampling.

1.5.10 The basement rocks represented by Bengpal gneiss with metapelites, which have been intruded by pegmatite, quartz, and epidote veins, are exposed in the area.

1.5.11 Copper mineralisation is manifested by malachite encrustation in silicified zone confined to enclave of quartz chlorite schist within Bengpal gneisses which have been emplaced along N-S and NNE-SSW trending lineaments.

1.5.12 The area has scanty exposures around Govindpur and Bothli as most of the area is covered by thick soil. Detailed mapping on 1:2000 was carried out in Govindpur area. Quartz vein with malachite intruding metapelites (Quartz mica schist) was mapped in Govindpur old working area.

1.5.13 The main old copper mine exposed in southeast of Govindpur comprising encrustation of malachite, cuprite and chalcocite are observed in silicified shear zone intruded within Bengpal gneisses of archaean age. Apart from main old mine pit, two small circular shafts observed northeast of the main pit, having 4m diameter and depth upto 6m, comprising of minor amount of malachite.

1.5.14 In order to find out thickness and extension of mineralized zone four trial pits were opened in and around main old working pit during the field season 2007-08 and it is proved to be non mineralized .

1.5.15 The mineralized quartz reef trending N-S having a 155m length and 4 to 7m width, is broadly folded with shallow plunge towards northeast. A few small isolated outcrop of quartz tourmaline bands are also mapped in and around Govindpur old working.

1.5.16 Quartz reefs with sulphides intruding sheared silicified quartz mica schist was mapped in Govindpur old working area, having N-S trend and exposed for a strike length for 155m with 4 to 5m width and is located about 25m west of main pit at Govindpur.

1.5.17 The mineralized quartz reef trending N-S is broadly folded with low plunge of 120 to 150 towards NE. A chain of small and isolated old working pits with a huge dump material were located at Govindpur and Bothli area.

1.5.18 Geophysical surveys employing SP, Magnetic, resistivity cum IP techniques (Gradient Array), Vertical electrical sounding and Dipole-dipole were conducted over an area of 0.85 Sq km in Govindpur block of Chandrapur District of Maharashtra in FS 2007-08 by GSI.

1.6.0 PRESENT GEOLOGICAL WORK

1.6.1 As per the approved scope of work, preliminary exploration for Copper and associated minerals was undertaken in the proposed Govindpur Block, Chandrapur District, Maharashtra, with the primary objective of delineating copper-bearing bodies.

1.6.2 Detailed geological mapping on 1:2000 scale was carried out to upgrade and refine the existing geological map of the Govindpur Block.

1.6.3 The block has scanty surface exposures. In the Govindpur old working area, quartz veins with malachite mineralization intruding metapelites (quartz-mica schist) were mapped. In addition, a few quartzite exposures were identified.

1.6.4 As major part of the block is covered by soil and weathered material, only limited exposures could be recorded during the detailed geological mapping.

1.6.5 A total of 10 trenches were proposed in the ore-bearing zones based on previous studies and available literature. However, due to non-clearance of forest permission, only 5 trenches could be excavated.

1.7.0 PRESENT GEOPHYSICAL WORK

1.7.1 Geophysical investigations were carried out, comprising Magnetic Survey, Electrical Resistivity Tomography (ERT), Induced Polarization (IP), and Self-Potential (SP) Surveys. These were conducted at a traverse interval of 50 m with a station spacing of 10 m, keeping in view the expected dimensions of copper mineralization.

1.8.0 GEOLOGY AND STRUCTURE OF THE BLOCK:

Copper mineralisation is manifested by malachite encrustation in silicified zone confined to enclave of quartz chlorite schist within Bengpal gneisses which have been emplaced along N-S and NNE-SSW trending lineaments.

The brief stratigraphy of the mapped area is as follows

Quartz vein-Silicified zone	}	Bengpal Group	Archaean
Amphibolite			
Quartz monzonite			
Quartz chlorite schist			

Quartz Vein- Silicified Zone

A quartz vein is a tabular body of quartz that has crystallized from silica-rich hydrothermal fluids moving through fractures, faults, or shear zones in rocks. They are often white, milky, or glassy in appearance. Quartz veins can host ore minerals (e.g., gold, copper, lead, zinc, silver, etc.) depending on the fluid chemistry.

A silicified zone usually appears harder, denser, and more resistant to weathering than the surrounding rock. It may occur around quartz veins or along shear zones, faults, or porous horizons.

Quartz veins often occur within or are surrounded by silicified zones. Silicified halos form due to pervasive silica flooding in the host rock, while quartz veins represent concentrated silica deposition in fractures. Both are strong indicators of hydrothermal activity and are considered important in mineral exploration (especially for gold, copper, and other epithermal/mesothermal deposits).

Quartz Mica Schist :

It is dark greenish grey color and foliated having strike of N40°W to S40°E varying in thickness of 1m to 6m, with strike continuity of 30m. The rock shows fine grained rock is mainly composed of dark green flakes of chlorite, colourless grains of quartz with varying amounts of sericite.

The area has scanty exposures in Govindpur block as most of the area is covered by thick soil. Upgradation of detailed mapping on 1:2000 was carried out KEMSPL. Quartz vein with malachite intruding metapelites (Quartz mica schist) was mapped in Govindpur old working area.

1.9.0 MINERALISATION IN THE BLOCK

1.9.1 Previous work of GSI established mineralisation in the block is along the NNW–SSE trending shear zone, which hosts both metallic and non-metallic minerals. The sulphide mineralisation is associated with silicified quartz reefs/veins and essentially comprises chalcopyrite, pyrite, chalcocite, covellite, and malachite.

1.9.2 The sulphide mineralisation occurs predominantly as disseminations, fracture fillings, and specks within highly fractured

and silicified quartz veins, and in places also as discrete grains within the host rock.

1.9.3 The mineralisation is structurally controlled, being confined to shear openings and fractures. Its hydrothermal origin is indicated by the nature of wall rock alteration and the mode of occurrences within the host rock.

1.9.4 The mineralisation in the area may be attributed to hydrothermal activity related to younger granite intrusives emplaced into the basement rocks.

1.9.5 This is evidenced by the presence of numerous pink feldspar and quartz veins within the metapelites. The copper mineralisation shows a distinct structural control (fracture planes) and lithological control (altered metapelites), suggesting an epigenetic origin.

1.9.6 The occurrence of sulphide crustification and comb structures along fracture planes of silicified quartz veins and metapelite rocks further supports an epithermal type of mineralisation.

1.10.0 EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION

1.10.1 The exploratory work in the block was commenced on 20.11.2024 with upgradation of geological mapping on 1:2000 scale. Simultaneously, surface sampling and geophysical survey has been taken up. After, interpretation of the geophysical data trenching was done in December'2024 to January 2025. Data generated by integration of studies drilling planned in August 2025. The exploratory drilling commenced in borehole no KNGC-01 on 22.07.2025 and completed with the closure of borehole on 14.08.2025. The allied field works including mapping of trenches and trench sampling, sample preparation, surveying at borehole location and all cardinal points of the block were

taken up. Borehole core logging and sampling has been carried out simultaneously. The analytical/ laboratory studies were carried out in Shiva laboratory (NABL Accredited) laboratory and JNARDDC, Nagpur.

1.10.2 Upgradation of geological mapping was carried out at 1:2000 scale for the entire block area of 0. 83 Sq Km depicting the lithology, structure and mineralization signatures such as malachite stains were observed in the pits of the area and quartz mica schist, quartz chlorite schist and quartzite out crops were observed. Attitude and structural features of the rocks like bedding, foliation, folds and joints have been recorded by brunton compass. General strike of the litho units is NNW-SSE dipping 20°-30° due NW. The readings recorded in the field were plotted and produced in the form of geological map given as Plate-V.

1.10.3 The Govindpur block area mainly has the flat topography. Major lithologies which were encountered during geological mapping are quartz chlorite schist, quartzite, quartz mica schist and quartz veins.

1.10.4 During the geological mapping, KEMSPL has executed trenches and collected 40 no of samples and 7 no of core samples for analysis of elements including Pb, Cu, Zn, Co, Ni, Ag, As and Au. Copper values have been reported as lowest 22ppm and highest 205ppm but the values are not encouraging.

1.10.5 On the basis of the geophysical high chargeability zone, a borehole was planned at the identified location. Drilling operations were carried out, and seven samples were analyzed from the borehole; however, the results were not encouraging.

1.10.6 Five number of trenches have been excavated at different locations. All the trenches were excavated perpendicular direction to the strike of the litho units. Dimension of the trenches are 5*(8mX1mX2m).

After excavation of trenches it was observed that no mineralization zone exposed at the shallow depth and all trenches after proper geological mapping of the trenches (Plate-VI).

1.10.7 The trench sample Cu values are tabulated below in Table no. 2

Table no. 2

S No.	Customer Code	Sample Description	Lab ID	SOP/OM/058 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)
			LOQ	0.01	1	5	5	5	5	5	5
			Lab ID	Au	Ag	As	Co	Cu	Ni	Pb	Zn
1	T1-S1	Soil and Quartz boulders	G390-1	<0.01	<1	<5	19	194	43	10	24
2	T1-S2	Soil and Quartz boulders	G390-2	<0.01	<1	<5	20	167	47	6	22
3	T1-S3	Soil and Quartz boulders	G390-3	<0.01	<1	<5	20	178	44	7	24
4	T1-S4	Soil and Quartz boulders	G390-4	<0.01	<1	<5	18	103	36	<5	20
5	T1-S5	Soil and Quartz boulders	G390-5	<0.01	<1	<5	25	126	47	<5	22
6	T1-S6	Soil and Quartz boulders	G390-6	<0.01	<1	<5	20	135	41	<5	24
7	T1-S7	Soil and Quartz boulders	G390-7	<0.01	<1	<5	23	205	49	7	22
8	T1-S8	Soil and Quartz boulders	G390-8	<0.01	<1	<5	24	179	46	9	23
9	T2-S1	Soil	G390-9	<0.01	<1	<5	18	34	50	5	80
10	T2-S2	Soil	G390-10	<0.01	<1	<5	16	36	46	<5	70
11	T2-S2	Soil	G390-10	<0.01	<1	<5	17	36	49	<5	71
12	T2-S3	Soil	G390-11	0.02	<1	<5	16	38	53	6	71

13	T2-S4	Soil	G390-12	<0.01	<1	<5	15	27	38	5	47
14	T2-S5	Soil	G390-13	<0.01	<1	<5	20	22	44	5	65
15	T2-S6	Soil	G390-14	<0.01	<1	<5	16	47	51	10	73
16	T2-S7	Soil	G390-15	<0.01	<1	<5	17	63	52	<5	66
17	T2-S8	Soil	G390-16	<0.01	<1	<5	19	40	58	<5	68
18	T3-S1	Soil	G390-17	<0.01	<1	<5	23	38	47	8	32
19	T3-S2	Soil	G390-18	<0.01	<1	<5	24	55	41	13	33
20	T3-S3	Soil	G390-19	<0.01	<1	<5	25	53	43	18	32
21	T3-S4	Soil	G390-20	<0.01	<1	<5	18	37	38	11	32
22	T3-S5	Soil	G390-21	<0.01	<1	<5	18	49	36	14	35
23	T3-S6	Soil	G390-22	<0.01	<1	<5	23	57	47	19	36
24	T3-S7	Soil	G390-23	<0.01	<1	<5	22	45	42	13	33
25	T3-S8	Soil	G390-24	<0.01	<1	<5	26	61	43	16	30
26	T4-S1	Soil	G415-1	<0.01	<1	6	23	57	42	13	80
27	T4-S2	Soil	G415-2	<0.01	<1	5	30	42	46	<5	13
28	T4-S3	Soil	G415-3	<0.01	<1	<5	25	36	42	<5	34
29	T4-S4	Soil	G415-4	<0.01	<1	5	30	43	52	<5	16
30	T4-S5	Soil	G415-5	<0.01	<1	5	34	37	50	<5	13
31	T4-S6	Soil	G415-6	<0.01	<1	6	26	43	53	<5	15
32	T4-S7	Soil	G415-7	<0.01	<1	<5	13	38	35	<5	12
33	T4-S8	Soil	G415-8	<0.01	<1	<5	25	43	47	<5	17
34	T5-S1	Soil	G415-9	<0.01	<1	<5	35	46	23	<5	69
35	T5-S2	Soil	G415-10	<0.01	<1	<5	74	48	24	<5	74
36	T5-S2	Soil	G415-10	<0.01	<1	<5	73	48	26	<5	77
37	T5-S3	Soil	G415-11	<0.01	<1	6	51	118	30	20	143
38	T5-S4	Soil	G415-12	<0.01	<1	<5	64	168	33	26	107
39	T5-S5	Soil	G415-13	<0.01	<1	<5	39	129	21	16	80
40	T5-S6	Soil	G415-14	0.1	<1	<5	45	62	23	5	63
41	T5-S7	Soil	G415-15	<0.01	<1	<5	43	77	28	15	79
42	T5-S8	Soil	G415-16	<0.01	<1	7	36	101	31	20	74

1.10.8 KEMSPL, has carried out a total of 61.00m of exploratory drilling in 1 borehole against an approved meterage of 500m. The details of the borehole has been tabulated below in table no. 3

Table no. 3

Run				Lithology	Remark
From(m)	To (m)	Thick (m)	Rec (m)		
0.00	1.00	1.00	0.50	Soil, Black/Brown	
			0.50	Soil, Variegated, fragments of quartz and granitic rock	
1.00	2.00	1.00	1.00	Soil variegated, fragments of quartz and granitic rock	
2.00	3.00	1.00	1.00	Soil variegated, fragments of quartz and granitic rock	
3.00	4.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
4.00	5.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
5.00	6.00	1.00	0.40	Chlorite mica schist, highly weathered, grey	Kaolinite
			0.60	Chlorite mica schist, highly weathered, grey	Kaolinite
6.00	7.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
7.00	8.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
8.00	9.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
9.00	10.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
10.00	11.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Kaolinite
11.00	12.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
12.00	13.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
13.00	14.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge

14.00	15.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
15.00	16.00	1.00	0.45	Chlorite mica schist, highly weathered, grey	Sludge
			0.55	Chlorite mica schist, highly weathered, grey	Fragments of Qtz
16.00	17.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Fragments of Qtz
17.00	18.00	1.00	0.95	Chlorite mica schist, highly weathered, grey	Fragments of Qtz
18.00	19.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
19.00	20.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
20.00	21.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
21.00	22.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
22.00	23.00	1.00	1.00	Chlorite mica schist, highly weathered, grey	Sludge
23.00	24.00	1.00	0.84	Chlorite mica schist, highly weathered, grey	Sludge
			0.15	Chlorite mica schist, highly weathered, grey	
24.00	25.00	1.00	0.42	chlorite mica schist, highly weathered, grey	Oxydised zone
			0.58	Sheared quartz vein, dissemination of pyrite with specks of chalcopyrite	Mica Secondary filling
25.00	26.00	1.00	0.48	Quartz chlorite schist, grey	
26.00	27.00	1.00	0.47	Quartz chlorite schist, grey	Limonitic Strains
27.00	28.00	1.00	0.35	Quartz chlorite schist, grey	
28.00	29.00	1.00	0.20	Sheared quartz vein, fractured, secondary filling of biotite, limonitic strain	
			0.48	Quartz chlorite schist, grey	
				Quartz chlorite schist with the veins of qtz, grey in colour	
29.00	30.00	1.00	0.65		
30.00	31.00	1.00	0.38	Quartz chlorite schist, grey	
31.00	32.00	1.00	0.28	Quartz chlorite schist with qtz boulder	
32.00	33.00	1.00	0.32	Quartz chlorite schist, grey	

33.00	34.00	1.00	0.52	Quartz chlorite schist, grey	
34.00	35.00	1.00	0.82	Quartz chlorite schist, grey	
35.00	36.00	1.00	0.62	Quartz chlorite schist, grey	
36.00	37.00	1.00	1.00	Quartz chlorite schist, grey	
37.00	38.00	1.00	0.90	Quartz chlorite schist, grey	
38.00	39.00	1.00	0.96	Quartz chlorite schist, grey	
39.00	40.00	1.00	1.00	Quartz chlorite schist inclined fracture , grey	
40.00	41.00	1.00	1.00	Quartz chlorite schist hard and compact, grey	
41.00	42.00	1.00	1.00	Quartz chlorite schist broken, vertical fractured , grey	
42.00	43.00	1.00	1.00	Quartz chlorite schist hard, vertical fractured, grey	
43.00	44.00	1.00	1.00	Quartz chlorite schist broken, vertical fractured, grey	
44.00	45.00	1.00	0.80	Quartz chlorite schist broken, fractured, grey	
45.00	46.00	1.00	0.20	Sheared quartz vein	
46.00	47.00	1.00	0.25	Sheared quartz vein	
47.00	48.00	1.00	0.75	Quartz chlorite schist, grey	
48.00	49.00	1.00	1.00	Quartz chlorite schist, grey	
49.00	50.00	1.00	0.85	Quartz chlorite schist, grey	
50.00	51.00	1.00	0.15	Sheared quartz vein	
51.00	52.00	1.00	1.00	Sheared quartz vein	
52.00	53.00	1.00	0.85	Sheared quartz vein	
53.00	54.00	1.00	0.15	Quartz chlorite schist, grey	
54.00	55.00	1.00	1.00	Quartz chlorite schist, grey	
55.00	56.00	1.00	1.00	Quartz chlorite schist, grey	
56.00	57.00	1.00	1.00	Quartz chlorite schist, grey	
57.00	58.00	1.00	1.00	Quartz chlorite schist, grey	
58.00	59.00	1.00	1.00	Quartz chlorite schist, grey	
59.00	60.00	1.00	1.00	Quartz chlorite schist, grey	
60.00	61.00	1.00	1.00	Quartz chlorite schist, grey	

1.10.9 Geological logging of the borehole cores were properly done alongwith all the structural data lithological and mineralogical observations. Copper mineralization has not been observed in the drilled borehole. The associated laboratory studies i.e., chemical and physical analysis, petrographic and minerographic studies have been completed simultaneously and geological report has been submitted.

1.10.10 The details of the nature and quantum of work proposed Vs actual achievement is given in Table no. 4

Table-no. 4

Proposed quantum of work Vs Actual achievement by KEMSPL, Govindpur block for Preliminary exploration (G3) for Copper and associated mineralization, Chandrapur dist, Maharashtra

Sl	Proposed work	Quantity	Unit	Achieved by KEMSPL
1	Survey work			
	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes and By DGPS	9	Nos	5,(Borehole), 4 (Corner points)
2	Geological work			
	upgradation of detailed geological map	0.83	Sq km	0.83
	Trenching (10 nos)	160	Cu.m	80
3	Geophysical survey			
	IP cum resistivity, SP, Magnetic-10 Lkm	8-10	Line km	10
4	Drilling			
	Drilling	500	m	61.00

5	Laboratory studies			
	Primary samples 8 radicals	180	Nos	49
	External samples	18	Nos	5
6	Physical & Petrological studies			
	Preparation of thin section	5	Nos	3
	Preparation of polished section	5	Nos	3
	Whole rock analysis	5	Nos	2
7	Geological report	1	Nos	1

1.10.11 CONCLUSION AND RECOMMENDATION

Preliminary exploration involving geological mapping on 1:2000 scale, trenching, geophysical investigations and drilling in Govindpur block, Maharashtra has not identified any copper and associated mineralization within the block area at shallower depth. The block area does not have any economic significance for copper and associated mineralization.

Overall the mineralization in this block does not any economical interest.

CHAPTER-2

2.0.0 DETAILS OF THE QUALIFIED PERSON(S) / EXPLORATION AGENCY

2.1.0 KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED

NABET ACCREDITED AGENCY FOR COAL AND MINERALS
101, 102, BHASKAR TOWER, TEMPLE ROAD, CIVIL LINES, NAGPUR-440001
MAHARASHTRA

2.2.0 QUALIFIED PERSONS

Exploration agency: Kartikay Exploration And Mining Services Private Limited

Experience : 20 years Since 2008
Email: kartikayngp@kartikay.co.in

Sl no	Name	Designation
1	Shri. Pradeep Kulkarni	GM (Exploration)
2	Shri. Nitin Kohad	DGM (Geology)
3	Shri. Dileep Kumar Jadhav	Manager (Geology)
4	Shri. Pradhuman kr Mishra	Head Geophysicist
5	Shri. D Sairam	Geophysicist

CHAPTER-3

3.0.0 TITLE AND OWNERSHIP

3.1.0 TITLE OF THE REPORT

Ownership: Government of Maharashtra

Name of prospector: Kartikay Exploration And Mining Services Private Limited

Address of the Prospector: 101, 102, Bhaskar tower, Temple road, Civil lines, Nagpur-440001, Maharashtra, India

E-mail of prospector: kartikayngp@kartikay.co.in

Telephone no of Prospector: 0712-2956388

3.2.0 DETAILS ABOUT PERIOD OF PROSPECTING

The exploratory work in the block commenced on 20th November 2024 the allied field works including surveying, geological mapping, trenching, drilling and surface chip/ trench/ borehole sampling etc. were completed simultaneously. The analytical / laboratory studies were also carried out simultaneously in laboratory of Shiva Analytics and other Government /NABL accredited laboratories.

3.3.0 DETAILS OF EXPLORATION AGENCY, QUALIFICATION, AND EXPERIENCE OF ASSOCIATED TECHNICAL PERSONS ENGAGED IN EXPLORATION

3.3.1 Exploration Agency: Kartikay Exploration And Mining Services Private Limited

3.3.2 Qualification: M.Sc /M. Sc Tech (Geology)

3.3.3 Experience: 20 Years, since 2008

CHAPTER-4

DETAILS OF THE AREA

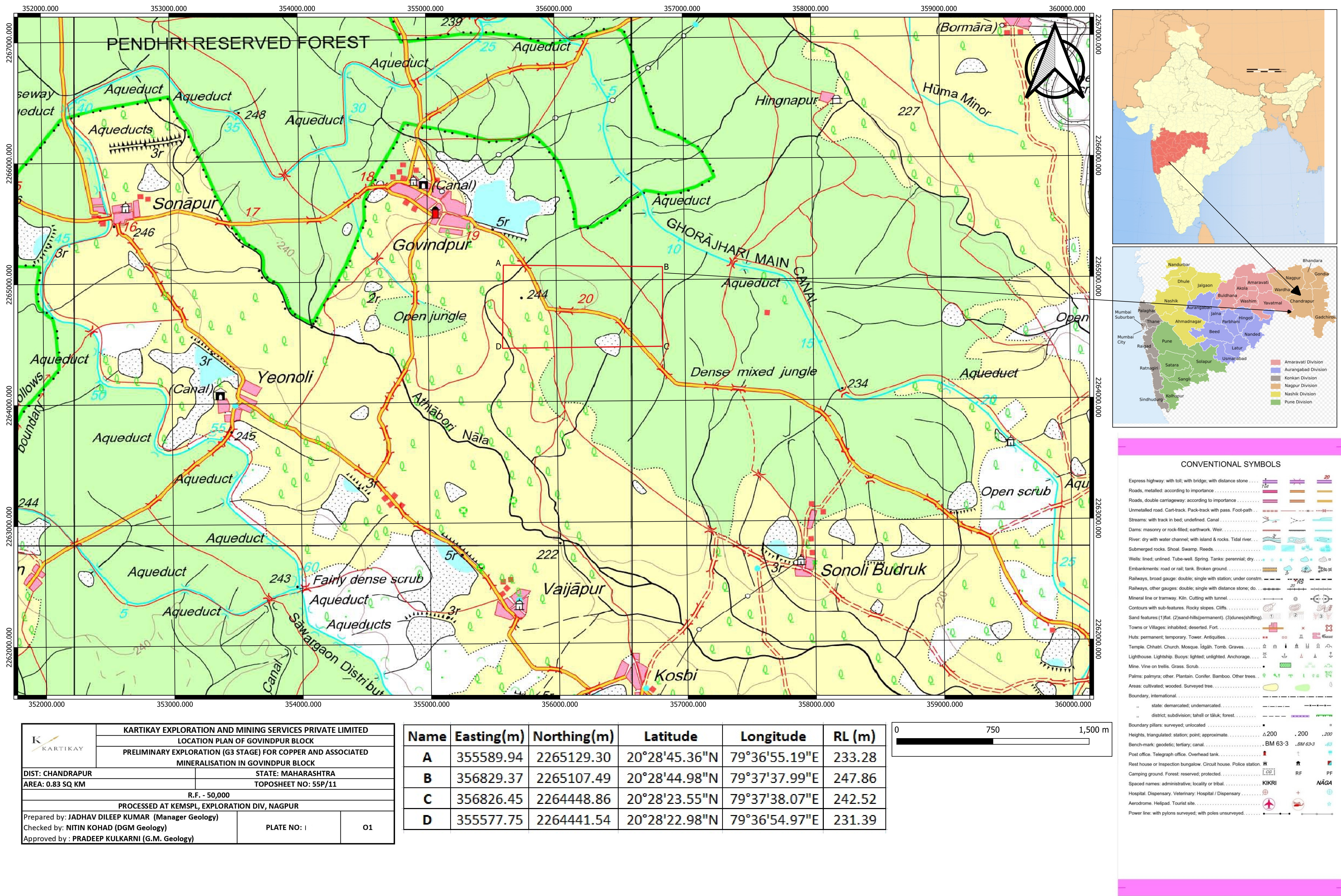
4.1.0 LOCATION AND ACCESSIBILITY OF THE AREA

4.1.1 The Govindpur (G3) Copper and associated mineralization block falls in part of the Survey of India Toposheet no. 55P/11 and lies between 20°28'22.98"N, 20°28'44.98"N latitudes and 79°36'54.97"E, 79°37'37.99"E longitudes.

4.1.2 The block covers an area of 0.83 sq km in and around villages of Govindpur, Yanoli, Vaijapur, Sonuli, Mangrul Talodi tehsil of Chandrapur district is about 120 km from Nagpur.

4.1.3 It is approachable by State Highway No. 9B to Talodi from where 9 km metalled road join to Govindpur Prospect block area. The road leads onward to Chimur via Neri. Bothli is accessible by jeepable road and is at a distance of 10 km from Govindpur area.

4.1.4 The nearest railway station is Nagbhir. Nagpur –Nagbhir Chandrapur extension line of Southeastern railway (0.76m narrow gauge) passes through Talodi road and Sindewahi road railway stations. The Coordinates of the corner points of the block area both on geodetic and in UTM are given in Table No.1



Text Figure-1: Location Map of Govindpur (G-3 stage) Block for Copper and Associated Mineralization, Chandrapur dist, Maharashtra.

4.2.0 DETAILS OF THE AREA WITH LAND USE

4.2.1 Major part of the area falls under forest and some part of the block is falling under private land.

4.2.2 The cadastral details of the area have not acquired.

4.3.0 MINERALS UNDER INVESTIGATION

4.3.1 The block has been explored for copper and associated minerals.



CHAPTER-5

PHYSIGRAPGY AND ENVIRONMENT

5.1.0 RELIEF OF THE AREA WITH MINIMUM AND MAXIMUM ELEVATION DRAINAGE PATTERN, NATURAL WATER COURSES, RESERVOIRS, ETC.

5.1.1 Physiographically, the area exhibits a pediment zone/peneplain in major part while minor high and lows are seen. Ghodazhari canal is flowing eastern side of the block and it irrigates the paddy field in this area. The area around Govindpur in general is a flat terrain. The area is drained by number of small nalas. Water level in the wells range from 3 to 9m in depth from surface. The altitude of the area varies between 229 and 240m.

5.1.2 Block area is primarily characterized by its rural landscape. Water resources play a crucial role in the lives of its residents for various purposes, including agriculture, drinking water supply, and industrial use. Groundwater is an essential source of water for both agricultural and domestic purposes in the area.

5.1.3 The area has numerous wells, hand pumps, and tube wells that tap into the groundwater reserves. The area has number of small ponds, some of which are natural, while others have been created for water storage and irrigation purposes. These water bodies contribute to local water availability and are used for irrigation and livestock. Irrigation canals, often derived from the streamlets, are used to distribute water to agricultural fields across the district.

5.2.0 ROADS, RAILWAY TRACK, ELECTRIC TRANSMISSION LINE, TELEPHONE LINE, ETC.

5.2.1 The Govindpur block is approachable by State Highway No. 9B to Talodi from where 9 km metalled road join to Govindpur Prospect block

area. The road leads onward to Chimur via Neri. Bothli is accessible by jeepable road and is at a distance of 10 km from Govindpur area.

5.2.2 The nearest railway station is Nagbhir. Nagpur –Nagbhir Chandrapur extension line of Southeastern railway (0.76m narrow gauge) passes through Talodi road and Sindewahi road railway stations.

5.2.3 There is one pylon surveyed power transmission line passes through the block connecting Talhodi to Govindpur and few un surveyed power transmission lines passes through the present exploration block in NE-SW direction. Telephone and internet line network is well developed in the area.

5.3.0 HOST POPULATION (LOCAL TRIBES), HUMAN SETTLEMENTS WITHIN AND NEARBY THE AREA

5.3.1 Chandrapur is a district in the Maharashtra State of India. For administrative convenience, Chandrapur district is divided into Tehsils, Blocks, PS, and Community Development Blocks (C.D. Blocks). In many states, Blocks or C.D. Blocks are treated the same as tehsils, though they may have slightly different roles depending on the region.

5.3.2 A Community Development Block is a rural area set aside for administration and development. Each block is managed by a Block Development Officer (BDO) and includes several gram panchayats, which are the local governing bodies at the village level. Chadrapur district in Maharashtra state comprises with 15 tehsils.

Sl No	TEHSIL (CD BLOCK)	AREA (km ²)	POPULATION
1	Ballarpur	261	1,34,540
2	Bhadravati	1,165	1,58,751
3	Brahmapuri	815	1,66,165
4	Chandrapur	1,180	4,81,758
5	Chimur	1,142	1,69,547
6	Gondpipri	750	79,672

7	Jiwati	559	61,820
8	Korpana	560	1,25,317
9	Mul	500	1,14,611
10	Nagbhir	735	1,33,020
11	Pombhurna	398	50,781
12	Rajura	895	1,38,408
13	Sawali	663	1,07,937
14	Sindewahi	792	1,10,440
15	Warora	1,029	1,71,540

5.3.3 Demographic figures of Chandrapur, including the number of males and females, children aged 0–6 years, total households, and literacy status in rural and urban areas.

PARTICULARS	TOTAL	RURAL	URBAN
Total Population	22,04,307	14,28,929	7,75,378
Total Male Population	11,23,834	7,26,106	3,97,728
Total Female Population	10,80,473	7,02,823	3,77,650
Child Population (Age 0–6) years	2,31,316	1,54,465	76,851
Male Child Population (Age 0–6) years	1,18,471	78,642	39,829
Female Child Population (Age 0–6) years	1,12,845	75,823	37,022
Literate Population	15,78,615	9,62,394	6,16,221
Literate Male Population	8,72,565	5,41,613	3,30,952
Literate Female Population	7,06,050	4,20,781	2,85,269
Illiterate Population	6,25,692	4,66,535	1,59,157
Illiterate Male Population	2,51,269	1,84,493	66,776
Illiterate Female Population	3,74,423	2,82,042	92,381
Households	5,36,686	3,56,228	1,80,458

5.3.4 Here's a detailed summary of Basic Population Details of Chandrapur district based on Census 2011:

Total population of Chandrapur district is 22,04,307, including 11,23,834 males and 10,80,473 females. In rural areas, it is 14,28,929, including 7,26,106 males and 7,02,823 females. In urban areas, it is 7,75,378, including 3,97,728 males and 3,77,650 females.

Child population (0–6 years) in Chandrapur district is 2,31,316, including 1,18,471 boys and 1,12,845 girls. In rural areas, it is 1,54,465, including 78,642 boys and 75,823 girls. In urban areas, it is 76,851, including 39,829 boys and 37,022 girls.

5.3.5 Literate population in Chandrapur district is around 15,78,615, including 8,72,565 males and 7,06,050 females. In rural areas, it is 9,62,394, including 5,41,613 males and 4,20,781 females. In urban areas, it is 6,16,221, including 3,30,952 males and 2,85,269 females.

5.3.6 Illiterate population in Chandrapur district is about 6,25,692, including 2,51,269 males and 3,74,423 females. In rural areas, it is 4,66,535, including 1,84,493 males and 2,82,042 females. In urban areas, it is 1,59,157, including 66,776 males and 92,381 females.

5.3.7 There are about 5,36,686 households in Chandrapur district, including 3,56,228 in rural areas and 1,80,458 in urban areas.

5.3.8 The distribution of scheduled caste (SC) and scheduled tribe (ST) populations within Chandrapur. It also includes data on how densely people live in rural versus urban areas. Together, these figures offer insights into community spread and the pressure on local infrastructure and services.

PARTICULARS	TOTAL	RURAL	URBAN
Total SC Population	3,48,365	1,87,643	1,60,722
SC Male Population	1,76,898	95,203	81,695
SC Female Population	1,71,467	92,440	79,027
Total ST Population	3,89,441	3,23,796	65,645
ST Male Population	1,96,753	1,63,363	33,390
ST Female Population	1,92,688	1,60,433	32,255

5.3.9 Scheduled caste (SC) population in Chandrapur district is approximately 3,48,365, including 1,76,898 males and 1,71,467 females. In rural areas, it is 1,87,643, including 95,203 males and

92,440 females. In urban areas, it is 1,60,722, including 81,695 males and 79,027 females.

5.3.10 Scheduled tribe (ST) population in Chandrapur district is about 3,89,441, including 1,96,753 males and 1,92,688 females. In rural areas, it is 3,23,796, including 1,63,363 males and 1,60,433 females. In urban areas, it is 65,645, including 33,390 males and 32,255 females.

5.3.11 Overall population density of Chandrapur district is around 193 people per km². Rural areas have about 128 people per km². Urban areas have about 2,668 people per km².

5.4.0 SOCIO DEMOGRAPHIC PROFILE OF THE AREA AND NEARBY

Nagbhir is a town and tehsil in Chandrapur District of Maharashtra. According to Census 2011, the sub-district code of Nagbhir Block (CD) is 04066. The total area of Nagbhir Tehsil is 735 km². Nagbhir has a sex ratio of approximately 988 females per 1,000 males.

Nagbhir Tehsil has a total of 134 villages, each with its own identity, gram panchayat, and local lifestyle. These villages form the real backbone of the region, where everyday life is rooted in agriculture, tradition, and community ties. The list below shows all villages in Nagbhir Tehsil, along with their respective gram panchayat and nearest town.

Govindpur is a village located in Nagbhir tehsil of Chandrapur district in Maharashtra, India. It is situated 20km away from sub-district headquarter Nagbhir (tehsildar office) and 105km away from district headquarter Chandrapur. As per 2009 stats, Govindpur village is also a gram panchayat.

Govindpur has its own place in the vibrant Chandrapur region. In the following sections, you'll find details about population, literacy,

households, children, caste data, area, pincode, local governance, nearby villages, connectivity, and more.

According to Census 2011, the location code or village code of Govindpur is 540677. The village spans a total geographical area of 816.59 hectares. Brahmapuri is nearest town to Govindpur village for all major economic activities, which is approximately 38km away.

Particulars	Total	Male	Female
Total Population	2,532	1,266	1,266
Child Population (0–6 yrs)	247	115	132
Scheduled Castes (SC)	123	65	58
Scheduled Tribes (ST)	198	98	100
Literate Population	1,600	931	669
Illiterate Population	932	335	597

Source:<https://www.census2011.co.in/data/subdistrict/4071-chandrapur-chandrapur-maharashtra.html>

5.5.0 HISTORICAL SITES AND ARCHAEOLOGICAL MONUMENTS, PLACES OF WORSHIP, PUBLIC UTILITIES ETC.

Chandrapur district contains historical sites such as the Mahakali temple and the ancient Bhadravati Jain temple, along with megalithic burial sites near Nagbhir.

Historical Sites & Archaeological Monuments

- **Mahakali Temple**: An ancient temple with sculptures blending Hindu and Tibetan traditions, built around the 16th century.
- **Bhadravati Jain Temple**: A Jain temple known for its peaceful atmosphere and intricate statues.

Places of Worship

- **Mahakali Temple**: A prominent religious site in Chandrapur, especially busy on Tuesdays.

- Bhadravati Jain Temple: A noted place for quiet contemplation and admiration of its architecture.

5.6.0 FORESTS, SANCTUARIES, NATIONAL PARK AND WILD LIFE SANCTUARIES ETC.

The main forest area in Maharashtra's Chandrapur district is the Tadoba Andhari Tiger Reserve, Maharashtra's oldest and largest national park, renowned for its tiger population, deciduous forests, grasslands, and lakes. Other notable wildlife areas near the district include the Bhamragarh Wildlife Sanctuary, known for its deep forests.

Ghodazari Wildlife Sanctuary is a natural sanctuary, it also hosts historical sites like the megalithic burials.

Tadoba Andhari Tiger Reserve: This protected area combines Tadoba National Park and Andhari Wildlife Sanctuary

Bhamragarh Wildlife Sanctuary: Located near the Chandrapur district, this sanctuary offers deep forest environments, making it a popular destination for jungle lovers and groups.

5.7.0 FLORA AND FAUNA WITHIN AND NEARBY

Govindpur block area largely falls in the dry-deciduous forests. The district forests and working plans list teak-dominated and mixed dry-deciduous types with bamboo, salai, sisam, semal etc. Other common flora found in the region would likely include agricultural crops like rice and wheat, as these are significant agricultural products in the area.

Govindpur block area includes tigers, deer, wild boar, wild dog, jackal, wolf, bison etc. Domestic cattle like dog, goat, cow and buffaloes are also present in the area including birds like crow, hen etc. Various snake species, including python and various species of vipers and cobras are

found in and around the area. The area also hosts a diverse range of insects and butterflies.

5.8.0 WATER BODIES SUCH AS RIVER, NALA, STREAM, RESERVOIR, ETC.

Wainganga river one of the major perennial rivers in the district, drains large area. Possibly somewhat distant depending on local topography.

Ghodazari Dam / Reservoir Located in Nagbhir tehsil. It irrigates areas including Talodhi and Nawargaon. Other than there is no such noticeable water bodies are present in the block area.

5.9.0 CLIMATIC CONDITIONS

The climate of Govindpur and its surrounding areas is classified as tropical wet and dry, typical of eastern Maharashtra. It is strongly influenced by the monsoon winds, resulting in three distinct seasons – a hot summer, a rainy monsoon, and a mild winter.

During the summer season, which lasts from March to mid-June, the weather becomes extremely hot and dry. Day time temperatures often rise above 40 °C, with May being the hottest month. Heat waves and strong, dry winds are common, making outdoor conditions harsh and uncomfortable.

The monsoon season extends from mid-June to September, when the southwest monsoon brings heavy rainfall. The average annual rainfall in the region is around 1100–1400 mm, most of which falls in these four months. Humidity levels remain very high, between 70–90%, and the landscape turns green with flowing nalas, tanks, and reservoirs filled to capacity.

After the rains, the post-monsoon period in October and November brings pleasant weather. The skies remain partly cloudy in early October, but

humidity begins to fall. Temperatures range between 20 °C and 32 °C, and this short transitional period is favourable for agriculture and outdoor work.

The winter season lasts from December to February and is characterized by mild and dry weather. Day temperatures are comfortable, usually between 20 °C and 28 °C, while nights can become cool, dropping to around 10 °C in December and January. Winters are considered the most comfortable season for living and working in the region.

Overall, Govindpur experiences a climate of extreme summer heat, heavy monsoon rains, and mild winters, with November to February being the most pleasant period of the year.

5.10.0 OTHER PHYSIOGRAPHIC, SOCIAL AND ENVIRONMENTAL FACTOR

Physiographic Factors

Govindpur lies in the eastern part of Maharashtra, within the Vidarbha region, which is part of the Deccan Plateau. The area is generally flat to gently undulating, with some low hills and forested tracts nearby. The soils are largely black cotton soil (regur) and mixed red soils, derived from basaltic rocks, which are fertile but often require good water management. The region has a network of seasonal nalas, small streams, and irrigation tanks, while larger reservoirs like Ghodazari support agriculture. Forests and scrubland patches are common in the surrounding landscape, which is part of the Wainganga river basin.

Social Factors

The village society is predominantly rural, with agriculture as the main occupation. Major crops grown include paddy, soybean, cotton, tur (pigeon pea), wheat, and vegetables, depending on the season and

availability of irrigation. A significant section of the population belongs to tribal and backward communities, who also depend on forest produce such as tendu leaves, mahua flowers, bamboo, and firewood. Literacy levels in Chandrapur district are moderately high, though rural areas like Govindpur may have gaps, especially among women and elderly populations. Social life is closely tied to agriculture cycles, local festivals, and traditional practices.

Environmental Factors

The environmental setting of Govindpur is shaped by its forests, wildlife corridors, and water resources. The wider district is home to rich biodiversity, with the Tadoba–Andhari Tiger Reserve and Ghodazari Wildlife Sanctuary located not far away. These protected areas influence the local environment, as the forests around Govindpur support species like deer, wild boar, peacocks, and a variety of birds and reptiles. Seasonal changes strongly affect the environment: the monsoon renews greenery and water bodies, while summers often lead to drought-like conditions, forest fires, and scarcity of drinking water. Human pressures, such as agriculture expansion, overgrazing, and fuelwood collection, also impact the local ecology.

CHAPTER-6

INFRASTRUCTURE AND ENVIRONMENT

6.1.0 LOCAL INFRASTRUCTURE, HOST POPULATION, HISTORICAL SITES, FORESTS, SANCTUARIES, NATIONAL PARK AND ENVIRONMENTAL SETTING OF THE AREA.

Local Infrastructure

- Govindpur village has schools up to secondary/senior secondary level (pre-primary, primary, middle, secondary).

- Health infrastructure:

1 Primary Health Sub-Centre, 1 Veterinary Hospital, and at least one RMP (Registered Medical Practitioner) in the village.

- Irrigation / water supply:

Village area is ~816.6 hectares; agricultural area about 434 ha. Of this, ~19 ha is irrigated (presumably with more reliable sources), canals irrigate ~265 ha, and tanks/lakes support ~150 ha.

- Drinking water & sanitation:

Sources include treated tap water (throughout year), wells (covered & uncovered), hand pumps. Village has open drainage; collected garbage on street; sanitation coverage is claimed (village under total sanitation) though drainage water is discharged into water bodies.

- Connectivity / roads / transport:

Public bus services are available; autos within village. Nearest district road 5-10 km away. No national or state highway within 10 km. Pucca roads and footpaths within village. No railway station within 10 km.

- Other amenities:

Post office(s), mobile coverage, power supply (~18 hours in both seasons for agriculture), public library, local polling station, etc.

Host Population & Socio-demographic:

- Population (2011) ~ 2,532 people in ~656 households.
- Sex ratio: ~1000 females per 1000 males; higher than state average. Child (0-6 years) population ~247, making up about 9.8% of total. Female literacy is lower (~59%) vs male (~81%). Overall literacy ~70%.
- Caste composition: Scheduled Castes ~4.9%.
- Economy: Agriculture is the main livelihood; small part of population also engaged in non-farm. Some forest produce or dependency on nearby forests implied via large forest cover in Chandrapur.

Forests, Sanctuaries, National Park & Environmental Setting:

- Forest cover in the region is significant: Out of total Govindpur area (~816.6 ha), ~255.07 ha is forest area.
- District wide, Chandrapur has a very high proportion of forested land (~70% of geographical area).
- Ghodazari Wildlife Sanctuary: This is relatively close (Nagbhir tehsil). It includes southern tropical dry forest and a large lake, is part of a tiger migration corridor between Tadoba-Andhari and Umred Karhandala. While the exact distance to Govindpur is not explicitly given, Nagbhir is nearby (~20 km) so parts of this sanctuary may lie within or close to a 10 km radius of some villages in Nagbhir block.
- Ghodazari Dam / Reservoir: Near enough to influence the area (irrigation, reservoir water). The dam is surrounded by forest and has wildlife.
- Ghoda Jhari Lake (6 km from main Nagpur-Chandrapur highway) in Nagbhir tehsil: a reservoir / lake that is a scenic water body in the region. It may be part of local water bodies available to villages in the area.

Historical / Cultural Sites

- I did not find specific historical monuments or heritage-sites documented within ~10 km of Govindpur village in the publicly available sources I checked.
- The area does have old rest houses around Ghodazari dam and small structures associated with irrigation and forest administration.

Environmental Setting and Natural Features

- Terrain is flat and small undulations are there in block and nearby areas.
- Soil types: loamy soils (brown / yellow loams) over much of the area; in steeper slopes, sandy / retari / bardi soils and “pandhri” soils. These steeper and/or poorer soils often coincide with forest cover
- Water bodies: tanks, lakes (like Ghoda Jhari), small tanks and seasonal depressions collecting water during monsoon. Many shallow tanks / depressions are part of the local hydrology.

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CHAPTER-7

GEOLOGY OF THE AREA

7.1.0 REGIONAL GEOLOGY

1.4.1 The study area Govindpur Copper block is located in the western part of Bastar craton and exposes basement gneisses belonging to the Bengpal Group with enclaves of older metapelites and zones of silicification.

1.4.2 The gneisses are overlain by sandstone and quartzite equated to Penganga Group. Penganga sandstone is best exposed at 2.5 km ENE of Bothli village. It occurs as outlier trending NNW-SSE with gentle dip of 10° to 35° towards NE.

1.4.3 At some places strike varies E-W with northerly dip of 15° to 25°. Penganga sandstone is hard, compact, medium to fine grained, brown whitish yellow or buff coloured rock due to presence of ferruginous cementing material. It mainly comprises of grit and arkose. The area shows lineaments trending NW-SE and NNE-SSW direction.

1.4.4 The mineralisation is essentially controlled by NS and NNE-SSW trending lineaments with silicified sheared quartz veins/reef. The silicified sheared quartz vein occurred in the form of ridges at various places in the area, viz: the ridge 1.5 km north of Sonoli, 2 km south of Motegaon and near Lawari village, are associated with copper mineralisation, malachite encrustation, pyrite, chalcopyrite and a few grains of covellite.

1.4.5 The other sheared quartz veins which are devoid of any mineralisation have been noticed about 5 km southwest of Talodhi and about 4 km east of Nander village trending NW and at some places trend varies from NS to NE-SW with dip varying from 35° to 80° towards west.

1.4.6 In Govindpur and Bothli blocks, malachite encrustation is seen in quartz veins with disseminated fine specks of pyrite and chalcopyrite. Laterite Cenozoic Sandstone / Quartzite with shale and conglomerate Penganga Group Neoproterozoic Quartz vein- silicified zone Archaean Granite gneiss- migmatite Banded Iron Formation Quartzite Bengpal Group Bengpal Group of Archaean age occupies part of the investigation area.

		Cenozoic
Sanstone/ Quartzite with shale and conglomerate	Penganga group	Neoproterozoic
Quartz vein- silicified zone	} Bengpal group	Archean
Granite gneiss- migmatite		
Banded Iron Formation		
Quartzite		

1.4.7 It comprises of granite gneisses and migmatite with enclaves of hornblende schist, amphibolites, ultramafic and quartz/pegmatite veins. Bailadila group of Palaeoproterozoic age (2500-2200 m.y) comprising quartzite, banded haematite quartzite with lenses of iron ores occurs as isolated outcrops in the southern part of the area.

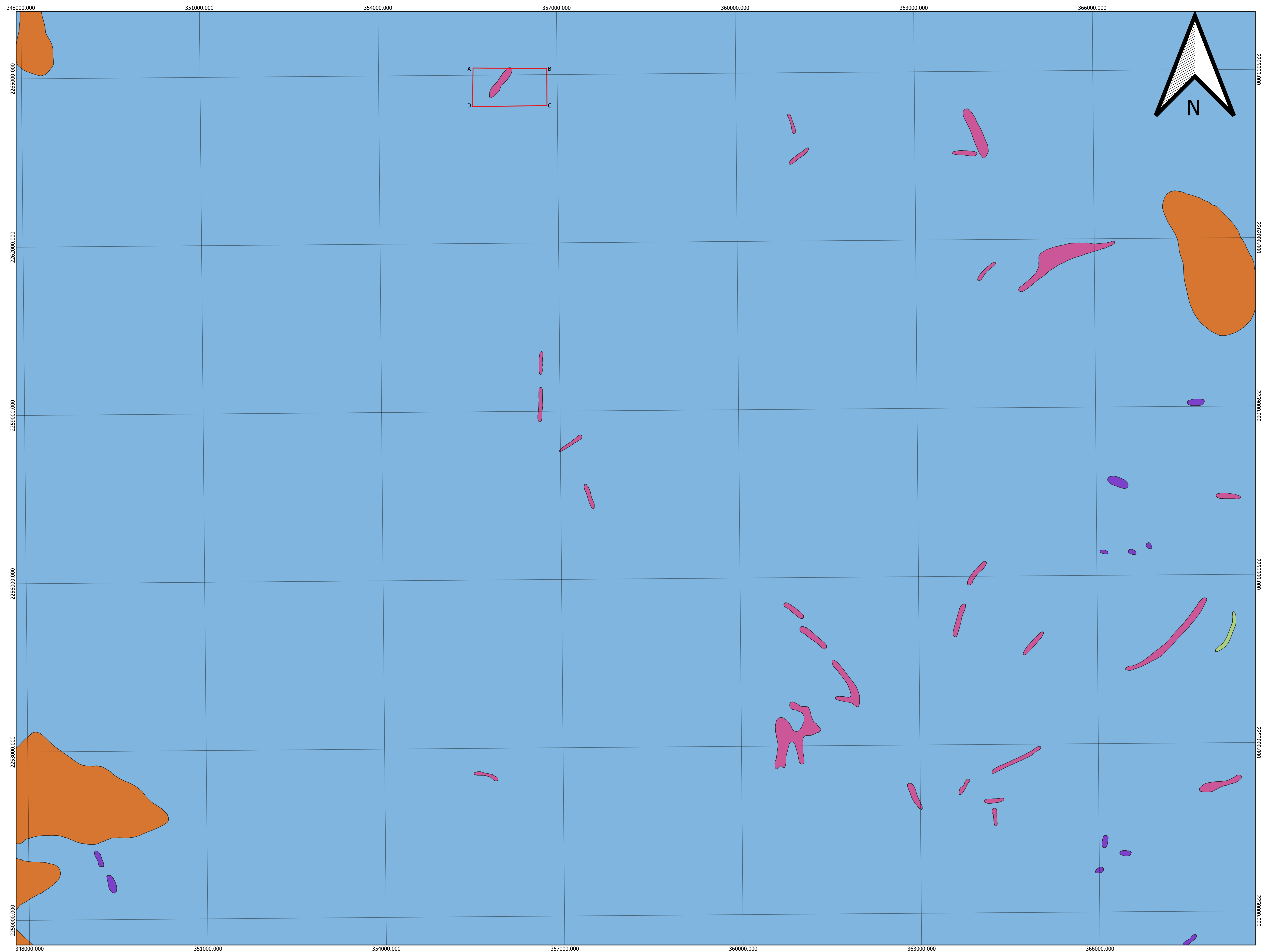
1.4.8 Penganga group (equivalent) of Neoproterozoic age occupies in the northern, northeastern and south western part of the area. Archaean gneiss forms the plain topography in the area while Penganga sandstone and quartzite forms small hillocks and ridges. Most of the area is covered by thick soil.

1.4.9 Bengpal Gneissic group forming the basement for all the overlying lithounits, consists of granite gneiss/pegmatite with enclaves of older metamorphics (metapelites). Bengpal group of rocks have general NNW-SSE to NW-SE strike with a gentle dip towards NNE or NE direction.

1.4.10 The foliations of Archaean gneisses and schists have NW-SE strike but NE-SW trend is also observed. The enclave of metapelites in basement gneisses trend in N35°W- S35°E with 25° to 50° dip towards SW.

1.4.11 The sedimentary rocks resting unconformably on the metamorphics, referable to Penganga group, show NW-SE strike with a low dips (4° to 10°) to NE. Sandstones are medium to fine grained, hard, compact, white to buff coloured having minor secondary quartz veins at places.

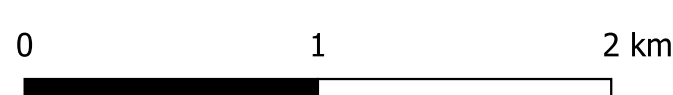




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	GOVINDPUR BLOCK BOUNDARY
	LITHOLOGY
	GRANITE GNEISS/MIGMATITE
	LATERITE
	QUARTZITE
	SANDSTONE

Name	Easting(m)	Northing(m)	Latitude	Longitude	RL (m)
A	355589.94	2265129.30	20°28'45.36"N	79°36'55.19"E	233.28
B	356829.37	2265107.49	20°28'44.98"N	79°37'37.99"E	247.86
C	356826.45	2264448.86	20°28'23.55"N	79°37'38.07"E	242.52
D	355577.75	2264441.54	20°28'22.98"N	79°36'54.97"E	231.39



	KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED		
	REGIONAL GEOLOGICAL MAP SHOWING GOVINDPUR BLOCK (After GSI)		
	PRELIMINARY EXPLORATION (G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN GOVINDPUR BLOCK		
DIST: CHANDRAPUR		STATE: MAHARASHTRA	
AREA: 0.83 SQ KM		TOPOSHEET NO: 55P/11	
SCALE: 1:25000			
PROCESSED AT KEMSPL, EXPLORATION DIV, NAGPUR			
Prepared by: DILEEP KUMAR J (Manager Geology)		PLATE- II	02
Checked by: NITIN KOHAD (DGM Geology)			
Approved by : PRADEEP KULKARNI (G.M. Geology)			

Text figure-2: Regional Geological map of the Govindpur block (after GSI)

7.2.0 REGIONAL STRUCTURE

7.2.1 The Govindpur Copper Block, situated in the western part of the Bastar craton, is underlain by basement gneisses of the Bengpal group with enclaves of older metapelites, hornblende schist, amphibolites, ultramafics and quartz/pegmatite veins.

7.2.2 The foliations in the Archaean gneisses and schists generally show NW–SE strike, although NE–SW trends are also recorded. The enclaves of metapelites exhibit a N35°W–S35°E strike with dips varying from 25° to 50° towards the southwest.

7.2.3 The Bengpal group rocks, which form the basement, strike in NNW–SSE to NW–SE direction with gentle dips towards NNE or NE. Overlying sedimentary units of the Penganga group (Neoproterozoic) unconformably rest on these metamorphics, showing NW–SE strike with low dips of 4° to 10° towards the northeast.

7.2.4 The Penganga sandstones and quartzites form outliers, ridges and hillocks, while the gneissic terrain mostly represents plain topography. The area is further dissected by lineaments trending NW–SE, NS and NNE–SSW, which have played a significant role in controlling deformation, silicification, and mineralisation.

7.3.0 REGIONAL MINERALIZATION

7.3.1 Mineralisation in the Govindpur copper Block is structurally controlled, primarily associated with NS and NNE–SSW trending shear zones and lineaments. Silicified sheared quartz veins and reefs occur as prominent ridges at various locations, notably north of Sonoli, south of Motegaon and near Lawari village.

7.3.2 These zones host copper mineralisation characterised by malachite encrustations along with pyrite, chalcopyrite and occasional covellite

grains. In Govindpur and Bothli blocks, quartz veins also show disseminated pyrite and chalcopyrite associated with malachite stains. However, several quartz veins devoid of mineralisation are also noted, such as those southwest of Talodhi and east of Nander village, trending NW to NE-SW with steep dips of 35° to 80° towards the west. Overall, mineralisation in the block is closely linked to quartz veining, silicification, and shear-controlled structural features within the gneissic basement and overlying Penganga sediments.

7.4.0 BLOCK GEOLOGY

Copper mineralisation is manifested by malachite encrustation in silicified zone confined to enclave of quartz chlorite schist within Bengpal gneisses which have been emplaced along N-S and NNE-SSW trending lineaments.

The brief stratigraphy of the mapped area is as follows

Quartz vein-Silicified zone	}	Bengpal group	Archaean
Amphibolite			
Quartz monzonite			
Quartz chlorite schist			

In Govindpur and Bothli blocks, malachite encrustation is seen in quartz veins with disseminated fine specks of pyrite and chalcopyrite.



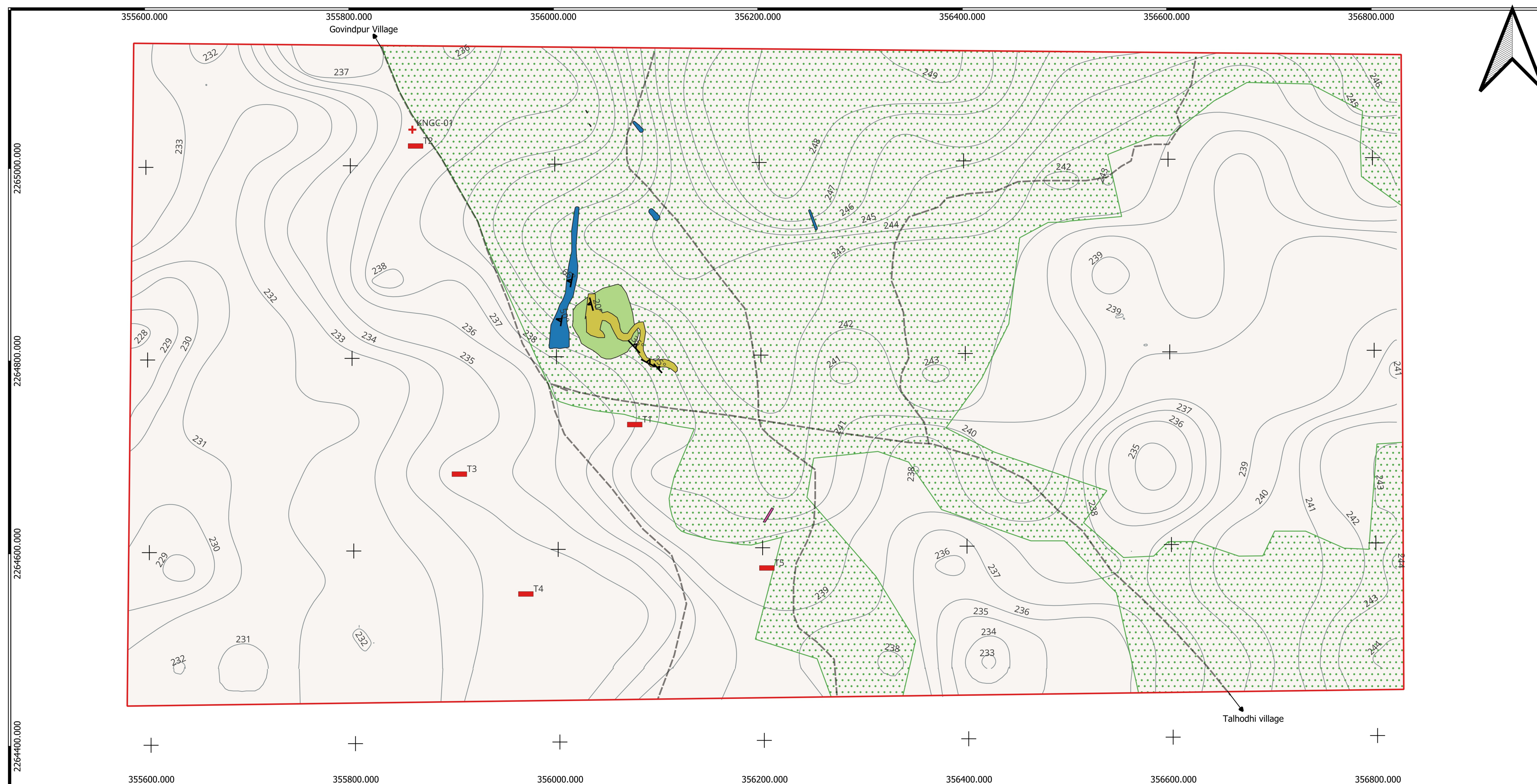
Text fig.-3: Photograph showing Govindpur block old working area



Text fig.-4: Photograph showing shaft in Govindpur block old working area

Laterite Cenozoic Sandstone / Quartzite with shale and conglomerate
Penganga group Neoproterozoic Quartz vein- silicified zone Archaean
Granite gneiss- migmatite Banded Iron Formation Quartzite Bengpal
Group Bengpal Archaean age occupies part of the investigation area.





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	Govindpur block boundary
	Old Pit
	Forest cover
	Soil cover
	Contour lines
+	Borehole location (KNGC-01)
↘	Dip & dip direction
	Trench locations
Lithology	
	Milky quartz vein
	Quartz Chlorite Schist/Silicified Zine
	Quartz vein
	Roads Connectivity

Name	Easting (m)	Northing (m)	Latitude	Longitude	RL (m)
A	355589.94	2265129.30	20°28'45.36"N	79°36'55.19"E	233.2754
B	356829.37	2265107.49	20°28'44.98"N	79°37'37.99"E	247.8622
C	356826.45	2264448.86	20°28'23.55"N	79°37'38.07"E	242.5238
D	355577.75	2264441.54	20°28'22.98"N	79°36'54.97"E	231.3931

	KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED			
	SURFACE GEOLOGICAL MAP OF GOVINDPUR BLOCK			
	PRELIMINARY EXPLORATION (G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN GOVINDPUR BLOCK			
DIST: CHANDRAPUR		STATE: MAHARASHTRA		
AREA: 0.83 SQ KM		TOPOSHEET NO: 55P/11		
SCALE: 1:2000				
PROCESSED AT KEMSPL, EXPLORATION DIV, NAGPUR				
Prepared by: DILEEP KUMAR J (Manager Geology)			PLATE NO. V	05
Checked by: NITIN KOHAD (DGM Geology)				
Approved by: PRADEEP KULKARNI (G.M. Geology)				

Text figure-5: Geological map of the Govindpur block Chandrapur district, Maharashtra

7.5.0 DESCRIPTION OF ROCK TYPES

Soil

Lateritic soils are common, reddish to yellowish brown in colour, moderately deep to deep. Sandy loam to clayey in texture, with moderate fertility. Shallow to moderately deep, reddish brown to dark brown, with high iron content. Generally stony/gravelly on slopes, loamy in valley portions. Low agricultural potential due to high Fe concentration and low moisture retention. Part of the Bailadila group (Palaeoproterozoic age). BHQ, ferruginous quartzite, and hematite ore bodies occur as ridges and isolated outcrops, associated with quartzite and schistose formations.

Quartz Vein- Silicified Zone

A quartz vein is a tabular body of quartz that has crystallized from silica-rich hydrothermal fluids moving through fractures, faults, or shear zones in rocks. They are often white, milky, or glassy in appearance. Quartz veins can host ore minerals (e.g., gold, copper, lead, zinc, silver, etc.) depending on the fluid chemistry.



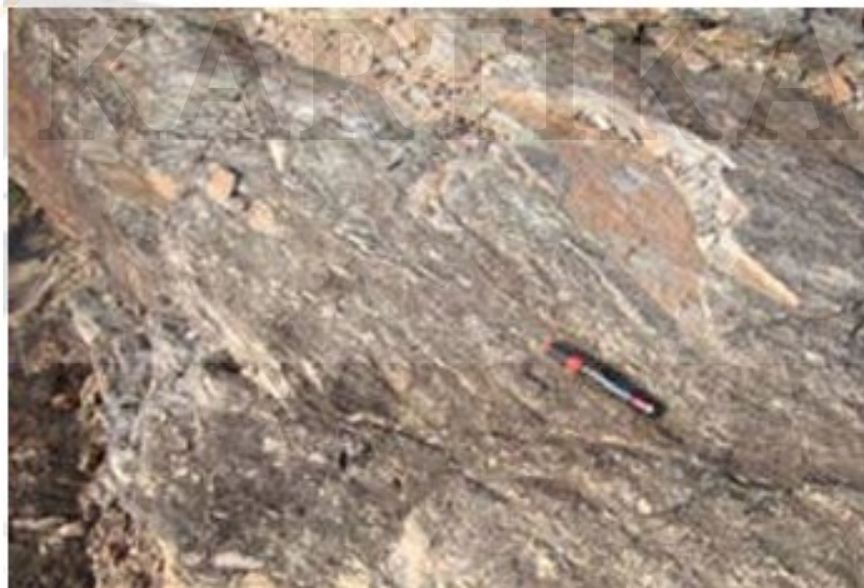
Text figure: 6. Showing Quartz vein from the Borehole KNGC-01

A silicified zone usually appears harder, denser, and more resistant to weathering than the surrounding rock. It may occur around quartz veins or along shear zones, faults, or porous horizons.

Quartz veins often occur within or are surrounded by silicified zones. Silicified halos form due to pervasive silica flooding in the host rock, while quartz veins represent concentrated silica deposition in fractures. Both are strong indicators of hydrothermal activity and are considered important in mineral exploration (especially for gold, copper, and other epithermal/mesothermal deposits).

Quartz Mica Schist:

It is dark greenish grey color and foliated having strike of N40°W to S40°E varying in thickness of 1m to 6m, with strike continuity of 30m. The rock shows fine grained rock is mainly composed of dark green flakes of chlorite, colourless grains of quartz with varying amounts of sericite.

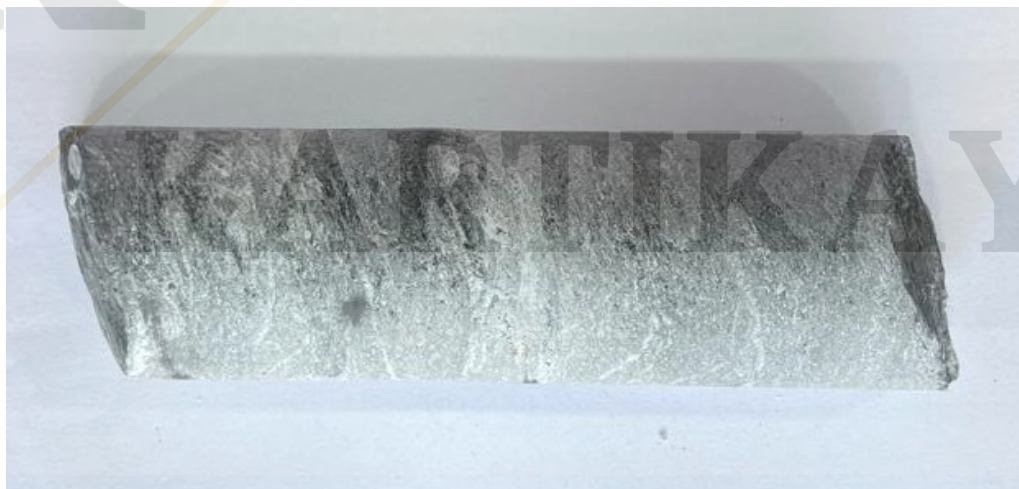


Text figure-7: Photograph showing Quartz mica schist

The area has scanty exposures in Govindpur block as most of the area is covered by thick soil. Upgradation of detailed mapping on 1:2000 was carried out by KEMSPL. Quartz vein with malachite intruding metapelites (Quartz mica schist) was mapped in Govindpur old working area.

Quartz chlorite mica schist:

In the Govindpur area, quartz–chlorite–mica schist occurs as medium- to fine-grained, foliated metamorphic rock exhibiting well-developed schistosity. It is composed essentially of quartz, chlorite, and mica (biotite/muscovite), with accessory iron oxides. The alignment of chlorite and mica flakes imparts a distinct sheen and foliation to the rock, while minor crenulation and folding features indicate polyphase deformation. On weathering, the schist gives rise to reddish brown, micaceous sandy soil of moderate depth, which is commonly observed in the area.



Text fig-8 Showing Quartz Chlorite mica schist from the borehole KNGC-01

7.6.0 PETROGRAPHIC STUDIES:

7.6.1 A total of 3 number of samples of various litho-units collected from the borehole drilled in Govindpur block, were subjected to petrographic studies at Petrology Laboratory, NIT Nagpur. The results are furnished as Annexure-IV.

Table No. 5

Summary of the petrographic study

SL No.	SAMPLE NO.	ROCK TYPE CONFIRMED BY LAB
1	KNGC/01/P-01	Quartz chlorite mica schist
2	KNGC/01/P-02	Quartz vein
3	KNGC/01/P-03	Quartz chlorite schist

7.7.0 MINERALISATION IN THE BLOCK

Mineralisation in the area is generally observed along the NNW–SSE trending shear zone and comprises both metallic and non-metallic minerals. The sulphide mineralisation is spatially associated with silicified quartz reefs/veins and is predominantly represented by chalcopyrite, pyrite, chalcocite, covellite, and malachite.

It occurs mainly as disseminations, fracture fillings, and specks within highly fractured and silicified quartz veins, and locally as discrete grains within the host rock.

The mineralisation is structurally controlled, being confined to shear openings and fractures, and is interpreted to be of hydrothermal origin, as evidenced by wall rock alteration and the style of occurrence within the host rocks.

The mineralisation is likely related to hydrothermal fluids associated with younger granite intrusives emplaced into the basement, as indicated by the presence of numerous pink feldspar and quartz veins within the metapelites. Copper mineralisation in the area thus exhibits both structural control (fracture planes) and lithological control (altered metapelites), suggesting an epigenetic origin.

Furthermore, features such as sulphide crustification and comb structures along fracture planes in silicified quartz veins and metapelitic rocks indicate an epithermal type of mineralisation.

7.8.0 MINERAGRAPHIC STUDIES

A total of 3 nos. of polished sections of samples were subjected to mineragraphic studies. The polished section studies suggest the presence of Quartz chlorite mica schist (at few places sulphide phases in the form of pyrite and chalcopyrite are present in the scattered manner), Quartz vein (No sulphide phase is present in the sample), Quartz chlorite schist (At few places sulphide phases in the form of pyrite and chalcopyrite are present in the scattered manner all along the foliation plane). The sample wise details of the mineragraphic studies are presented as Annexure-IVB and the photomicrographs of the thin section are given as Pmg-1 to Pmg-3.



Pmg-1: Photographs showing sulphide phases in the form of pyrite and chalcopyrite under cross nicols.

Sample no. KNGC/01/P-01



Pmg-2: Photographs showing weakly foliated quartz.

Sample no. KNGC/01/P-02



Pmg-3: Sulphide phases in the form of pyrite and chalcopyrite are present in the scattered manner all along the foliation plane

Sample no. KNGC/01/P-03

CHAPTER-8

PREVIOUS WORK

8.1.0 DETAILS OF PREVIOUS EXPLORATION CARRIED OUT BY OTHER AGENCIES/PARTIES

8.1.1 The area covering 55P/11 was mapped on 1:63,360 scale by Parimoo, M.C. and Nag, P (1959-60). Gneisses with migmatites, metasedimentary enclaves and younger sedimentary cover, equated to Vindhyaans were mapped in the area.

8.1.2 During the FS 1971-1974 Directorate of geology and mining carried out prospecting for copper mineralisation about 1.8 km east of village Bothli.

8.1.3 Directorate of geology and mining open a large pit of 30mts length, width 25m and maximum depth of 6m near its western wall, filled with quartz and silicified sheared quartz mica schist enriched with malachite.

8.1.4 Two underground openings are located in this silicified zone at the bottom of the western wall, are vertical and 2m in diameter. This silicified zone comprises of copper, cuprite and malachite.

8.1.5 Two small circular shafts each about 4 mts in diameter and 6m depth was located to the east of the northeastern corner of the large pits in Govindpur old working. Prospecting for copper ore deposits in Govindpur and Bothli areas of toposheet no. 55P/11 resulted in identification of malachite bearing quartz veins (Pitale et al., 1974. DGM-MH). Chavhan et al., (2010, GSI), reported 3.15% Cu in Bed rock sample. Mahapatra and Dora, (2009), Nitnaware, (2011), Kumaravel (2012) established Thanewasna copper deposit. Barik (2015) carried

out further exploration in neighboring area of Thanewasna has given the Ghanpur-Mudholi and NaiDilli Lal Heti blocks. Khuntia and Kumaravel, (2015), carried out G4 stage investigation around Bahmni and Minjhari areas and reported quartz reef with copper mineralisation up to 0.37% and 0.6% respectively. Base metal exploration at Minjhari resulted in copper resource of 1.13 million tons with 0.2% (Khuntia, 2017). Kaushik C.S. & Aparajit N., (2021), carried out a G-4 stage investigation in and around Shirpur- Motegaon Mendha areas, to establish copper and associated mineralization.

8.1.6 They reported copper values ranging from 10 ppm to 2100 ppm Cu (Av: 1055 ppm) in the Motegaon quartz vein, and copper values ranging from 240 ppm to 1.10 % Cu (Av: 5620 ppm) in the Aregaon quartz vein. Recently GSI and DGM jointly explored the Bothli old working by means of drilling.

8.1.7 Detailed mapping was carried out in Govindpur Block with the aid of Total Station. A base line of 600m length was laid along N-S direction.

8.1.8 The traverse lines were laid at right angle to this base line in E-W direction at 100m interval. Pegs were put at 25m intervals along all the traverse line of 400m length each in order to maintain the accuracy in mapping and aid in systematic bed rock and soil sampling.

8.1.9 The basement rocks represented by Bengpal Gneiss with metapelites, which have been intruded by pegmatite, quartz, and epidote veins, are exposed in the area.

8.1.10 Copper mineralisation is manifested by malachite encrustation in silicified zone confined to enclave of quartz chlorite schist within Bengpal gneisses which have been emplaced along N-S and NNE-SSW trending lineaments.

8.1.11 The area has scanty exposures around Govindpur and Bothli as most of the area is covered by thick soil. Detailed mapping on 1:2000 was carried out in Govindpur area. Quartz vein with malachite intruding metapelites (Quartz mica schist) was mapped in Govindpur old working area.

8.1.12 The main old copper mine exposed in southeast of Govindpur comprising encrustation of malachite, cuprite and chalcocite are observed in silicified shear zone intruded within Bengpal gneisses of archaean age. Apart from main old mine pit, two small circular shafts observed northeast of the main pit, having 4m diameter and depth upto 6m, comprising of minor amount of malachite.

8.1.13 In order to find out thickness and extension of mineralized zone four trial pits were opened in and around main old working pit during the field season 2007-08 and it is proved to be non mineralized .

8.1.14 The mineralized quartz reef trending N-S having a 155m length and 4 to 7m width, is broadly folded with shallow plunge towards northeast. A few small isolated outcrop of quartz tourmaline bands are also mapped in around Govindpur old working

8.1.15 The basement rocks of the area are represented by Bengpal Gneiss with enclaves of metapelites, intruded by pegmatite, quartz, and epidote veins. Copper mineralization is observed as malachite encrustations within silicified zones, confined to metapelite enclaves within the Bengpal gneisses. These mineralized zones are emplaced along prominent N-S and NNE-SSW trending lineaments, indicating structural control on the localization of mineralization.

8.1.16 Quartz reefs with sulphides intruding sheared silicified quartz mica schist was mapped in Govindpur old working area, having N-S

trend and exposed for a strike length for 155m with 4 to 5m width and is located about 25m west of main pit at Govindpur.

8.1.17 The mineralized quartz reef trending N-S is broadly folded with low plunge of 120 to 150 towards NE. A chain of small and isolated old working pits with a huge dump material were located at Govindpur and Bothli area.

8.1.18 Geophysical surveys at the Govindpur copper prospect (Topo Sheet No. 55P/11) were carried out during the 2007–08 field season over an area of 0.85 sq. km. A 0.85 km N08°E–S08°W baseline with 17 orthogonal traverses at 100 m spacing was established, and data were collected at 10 m station intervals.

8.1.19 The survey revealed a N–S trending intrusive body near W10 station, structurally controlled between traverses S20 and N27, with steep dips to the west and gentle dips to the east, possibly representing a quartz vein with limited mineralisation. The most promising zone occurs at the eastern end (stations E5–E10, traverses N2–N12), where a combination of low resistivity (~200–300 ohm-m), high chargeability (>10–12 mV/V), and low SP suggests potential copper mineralisation near old workings. In contrast, other zones showed high chargeability associated with high resistivity (>600 ohm-m), indicating disseminated mineralisation.

8.1.20 To provide depth control, Vertical Electrical Sounding (VES) and Dipole–Dipole (Dp–Dp) surveys were also conducted. VES at N15/E3 indicated an increase in chargeability with depth, with values reaching ~280 ohm-m resistivity and 14 mV/V chargeability beyond 100 m, correlating well with mineralisation indicators. The Dp–Dp method confirmed possible mineralisation at ~45 m depth (3rd level) along traverses N10 and N20. Profiling along traverses 'O', N10, and N20 further suggested that the eastern end, where low resistivity coincides

with high chargeability, is the most favourable zone for copper mineralisation compared to the western end.



CHAPTER-9

EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION

9.1.0 INTRODUCTION

9.1.1 The Govindpur (G-3 stage) block over an area of 0.83 sq. km. lies in the Talodhi tehsil of Chandrapur district in Maharashtra and it is covered in Survey of India Toposheet no. 55P/11. The current investigation was aimed to find out the potentiality for Copper and associated mineralization in the block.

9.1.2 The Exploration proposal for Govindpur (G3) block for Copper and associated mineralization was discussed in 65th meeting of Technical-cum-Cost Committee (TCC), National Mineral Exploration Trust (NMET) held on 28th, 29th and 31st May- 2024 , through video conferencing at Geological Survey of India, DGCO, A-II Pushpa Bhawan, New Delhi. The Govindpur block G3 stage of exploration proposal was technically evaluated by the TCC for its various geological components and their suitability in the G-3 stage of exploration. The committee recommended the proposal to Executive Committee (EC) for approval of preliminary Exploration (G-3) with geological mapping at 1: 2000 scale, primary samples of 180 nos, Trenching of 160 cu m. and 500m of drilling by means of pilot boreholes. The TCC committee of NMET recommended the proposal for approval of Preliminary Exploration (G-3) with estimated cost of Rs. 1,26,07,812.73 i. e. approximately 126 Lakh including GST in a time schedule of 8 months.

9.1.3 The Executive Committee (EC) has approved the G-3 stage exploration proposal for Govindpur G3 block at an estimated exploration cost of Rs. 1, 26, 07,812.73 i. e. approximately 126 Lakhs, vide Office

Memorandum F. No. 23/490/2024-NMET/284, New Delhi, dated, 21st Aug 2024.

9.1.4 As per the approved scope of work, preliminary exploration for Copper and associated minerals was undertaken in the proposed

9.2.0 OBJECTIVES OF INVESTIGATION

Govindpur Block, Chandrapur District, Maharashtra, with the primary objective of delineating copper-bearing bodies.

1 Upgradation of geological mapping on a 1:2000 scale will carry out to upgrade and refine the existing geological map of the Govindpur Block.

2 To check the Copper associated mineralization, trenching, surface sampling, geophysical studies and drilling will be carry out.

3 To estimate Reconnaissance resource of intersection as per UNFC norms and Minerals (Evidence of Mineral contents) Rules 2015 and Minerals (Evidence of Mineral content Ammendment Rules 2021.

9.3.0 EXPLORATION ACTIVITIES TAKEN UP:

9.3.1 The exploratory work in the block commenced on 20.11.2024 with geological mapping on a 1:2000 scale. Simultaneously, surface sampling and a geophysical survey were taken up.

9.3.2 After delineation of the primary area by interpreting of geophysical data, trenching was carried out during December 2024 and January 2025. Subsequently, the geophysical report and its review were prepared. Based on the recommendations, exploratory drilling was initiated in July 2025. The first borehole (KNGC-01) was started on 22.07.2025 and drilling was completed with the closure of the borehole on 14.08.2025.



Text figure-9 Photograph Showing Geophysical survey work carried in the Govindpur block, Chandrapur dist, Maharashtra

9.3.3 Alongside, allied field works such as mapping of trenches, trench sampling, sample preparation, and surveying at borehole location and cardinal points of the block were undertaken. Borehole core logging and sampling were carried out simultaneously. The analytical/laboratory studies were completed at Shiva Laboratory (NABL Accredited) and JNARDDC, Nagpur.

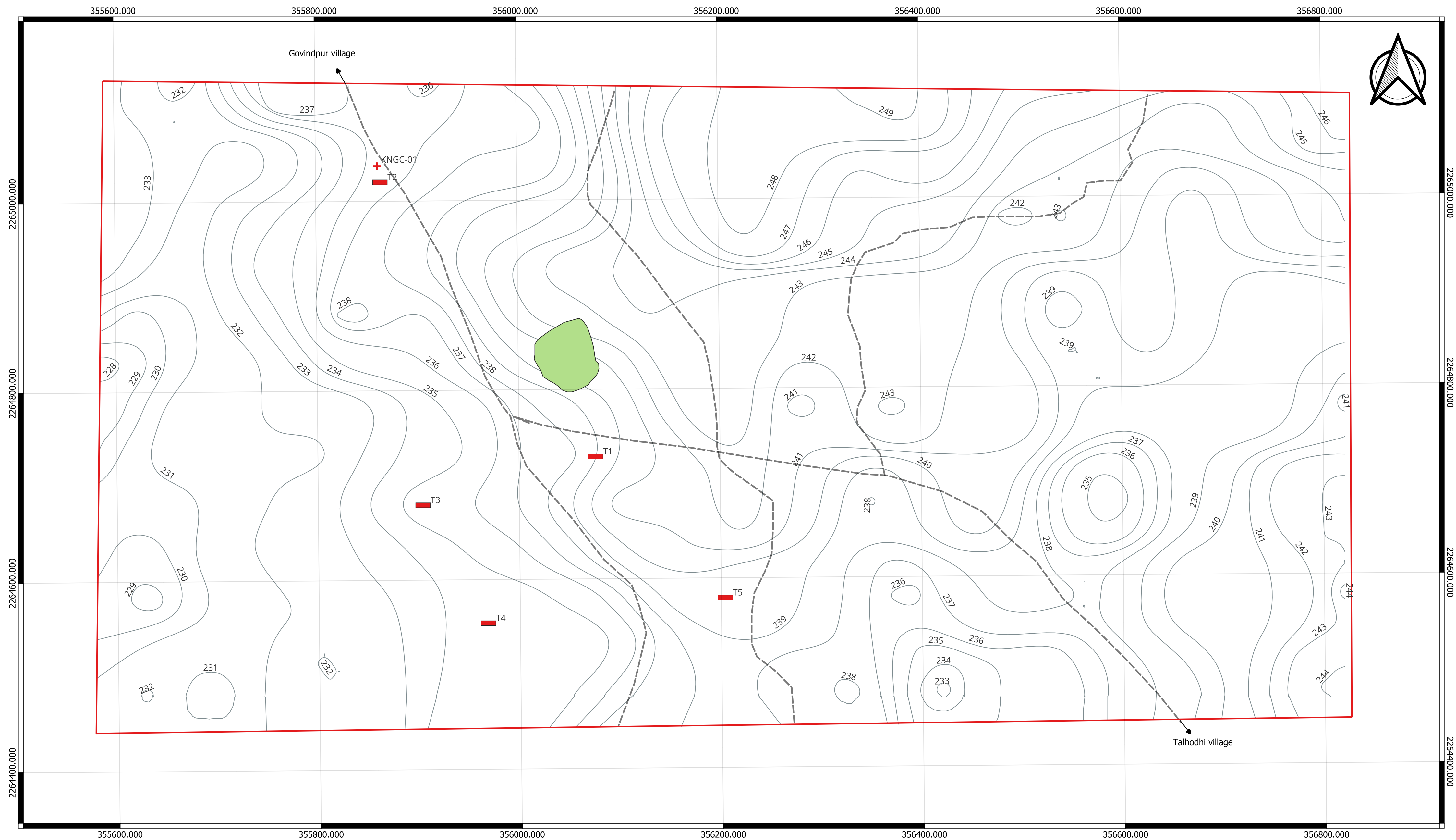
9.3.4 Upgradation of geological mapping was carried out at 1:2000 scale for the entire block area of 0.83 sq Km, depicting lithology, structure, and mineralization signatures. Malachite stains were observed in pits, and outcrops of quartz mica schist, quartz chlorite schist, and quartzite were identified. Borehole data, particularly from oxidized zones, helped in

delineating litho contacts which were mapped using a handheld GPS. Structural features such as bedding, foliation, folds, and joints were recorded with a Brunton compass. The general strike of the litho-units was noted as NNW–SSE with dips of 20° – 30° due NW. The readings were plotted and presented in the geological map (Plate-V).



Figure-10: Geological traverses by a Geologist team

9.3.5 The Govindpur block area exhibited flat topography. The topography map of the block is formulated in text figure no. 11.



Name	Easting (m)	Northing (m)	Latitude	Longitude	RL (m)
A	355589.94	2265129.30	20°28'45.36"N	79°36'55.19"E	233.2754
B	356829.37	2265107.49	20°28'44.98"N	79°37'37.99"E	247.8622
C	356826.45	2264448.86	20°28'23.55"N	79°37'38.07"E	242.5238
D	355577.75	2264441.54	20°28'22.98"N	79°36'54.97"E	231.3931

INDEX

- Govindpur block boundary
- Old working pit
- Contour Lines
- + Borehole location (KNGC-01)
- Trench locations
- Road connectivity

	KARTIKAY EXPLORATION AND MINING SERVICES PRIVATE LIMITED		
	SURFACE TOPOGRAPHY MAP OF GOVINDPUR BLOCK		
	PRELIMINARY EXPLORATION (G3 STAGE) FOR COPPER AND ASSOCIATED MINERALISATION IN GOVINDPUR BLOCK		
DIST: CHANDRAPUR		STATE: MAHARASHTRA	
AREA: 0.83 SQ KM		TOPOSHEET NO: 55P/11	
SCALE: 1:2000			
PROCESSED AT KEMSPL, EXPLORATION DIV, NAGPUR			
Prepared by: DILEEP KUMAR J (Manager Geology)		PLATE NO. IV	04
Checked by: NITIN KOHAD (DGM Geology)			
Approved by : PRADEEP KULKARNI (G.M. Geology)			

Text figure-11: Surface topographic map of Govindpur block , Chandrapur district, Maharashtra

The major lithologies encountered during mapping were quartz chlorite schist, quartzite, quartz mica schist, and quartz reef veins.

9.3.6 During the trenching and drilling operations, KEMSPL collected a total of 40 trench samples and 7 core samples for elemental analysis of Pb, Cu, Zn, Co, Ni, Ag, As, and Au. The copper values ranged from a minimum of 5 ppm to a maximum of 205 ppm, indicating that the results were not encouraging. Analytical value ranges for the seven core samples show the corresponding mineral assay values.

A total of 40 samples were drawn from trenches (5 trenches × 8 samples each). However, analytical results were reported for 42 samples. The difference in the number of samples is due to check analyses carried out by the chemical laboratory as part of quality assurance and verification of analytical results.

Table no.-6

Statement showing the Primary analysis of borehole core samples of Govindpur block (G3 stage) for Copper and associated mineralisation, District-Chandrapur, Maharashtra.

Method	SOP/OM/058	SOP/OM/059	SOP/OM/059	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051	SOP/OM/051
Units	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
LOQ	0.01	1	5	5	5	5	5	5
Lab ID	Au	Ag	As	Co	Cu	Ni	Pb	Zn

G2339-1	<0.01	<1	<5	10	11	13	25	20
G2339-2	0.09	<1	<5	25	24	57	32	176
G2339-3	<0.01	<1	<5	20	86	31	33	95
G2339-4	<0.01	<1	<5	5	37	8	12	31
G2339-5	<0.01	<1	<5	14	5	20	14	42
G2339-6	<0.01	<1	<5	7	8	14	<5	84
G2339-7	<0.01	<1	<5	48	15	126	12	77

9.3.7 Geophysical investigations were carried out, comprising Magnetic Survey, Electrical Resistivity Tomography (ERT), Induced Polarization (IP), and Self-Potential (SP) Surveys. These were conducted at a traverse interval of 50 m with a station spacing of 10 m, keeping in view the expected dimensions of copper mineralization. A detailed report on geophysical investigation is enclosed as annexure no. ANNEXURE-IIC

By integration of geological, geophysical investigation of trenching, it was put up to TCC-1 for technical review of data, The committee stated that the area is not encouraging from BRS and trench samples indicate maximum copper (Cu) values of around 200 ppm. However, the zone exhibiting the strongest chargeability anomaly may be tested with a one inclined borehole, drilled at a 50-55° to a vertical depth of 50–60 meters, with a south westerly bearing.

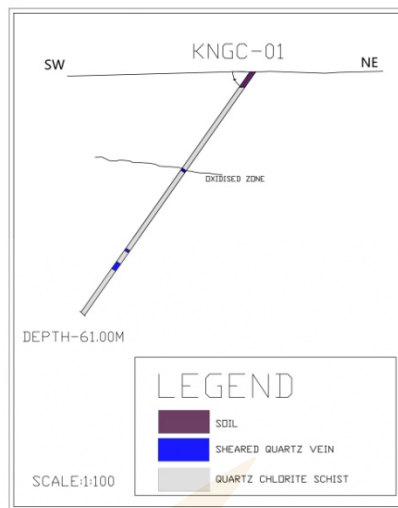


Text figure-12: Showing Geophysical survey by the KEMSPL team

9.3.8 Based on a high chargeability zone identified through geophysical studies, a borehole was planned at coordinates 355853E, 2265037N. Drilling was carried out, and 7 borehole samples were analysed, but the results were also not encouraging.



Text figure-13. Showing Quartz vein encountered in the borehole KNGC-01



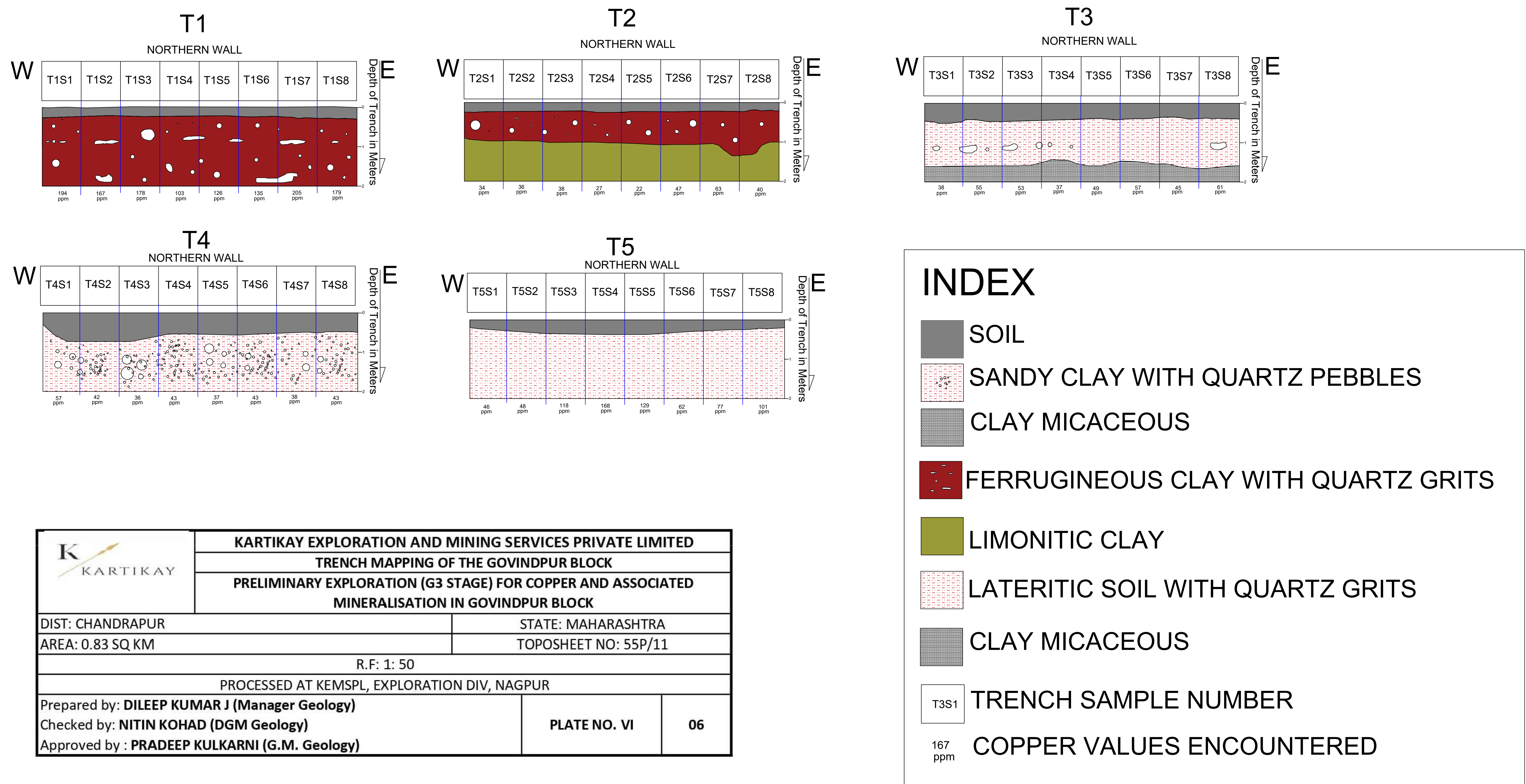
Text fig.-14. Showing Graphic log for the borehole drilled in KNGC-01



Figure-15: Inspection visit by GSI Officers

9.3.9 A total of five trenches were excavated in forest free areas at different locations, oriented perpendicular to the strike of litho-units. The dimensions of the trenches were approximately 8 m × 1 m × 2 m each. Geological mapping of the trenches confirmed that no mineralization zones were exposed at shallow depths. Litho units intersected graphically presented as trench wall face maps (Plate-VI) meter wise samples collected and analysed. Trench map is shown below in text figure. 16.





Text figure-16: Photograph showing the trench mapping in Govindpur block (G3 stage), Chandrapur district, Maharashtra.



Text figure-17: Photographs showing the trench sampling and mapping

The details of trenches and trench sample values for Cu tabulated below in Table no 7.

Table no.-7

S No.	Customer Code	Sample Description	Lab ID	SOP/OM/058 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/059 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)	SOP/OM/051 ppm (mg/kg)
			LOQ	0.01	1	5	5	5	5	5	5
			Lab ID	Au	Ag	As	Co	Cu	Ni	Pb	Zn
1	T1-S1	Soil and Quartz boulders	G390-1	<0.01	<1	<5	19	194	43	10	24
2	T1-S2	Soil and Quartz boulders	G390-2	<0.01	<1	<5	20	167	47	6	22
3	T1-S3	Soil and Quartz boulders	G390-3	<0.01	<1	<5	20	178	44	7	24
4	T1-S4	Soil and	G390-4	<0.01	<1	<5	18	103	36	<5	20

		Quartz boulders									
5	T1-S5	Soil and Quartz boulders	G390-5	<0.01	<1	<5	25	126	47	<5	22
6	T1-S6	Soil and Quartz boulders	G390-6	<0.01	<1	<5	20	135	41	<5	24
7	T1-S7	Soil and Quartz boulders	G390-7	<0.01	<1	<5	23	205	49	7	22
8	T1-S8	Soil and Quartz boulders	G390-8	<0.01	<1	<5	24	179	46	9	23
9	T2-S1	Soil	G390-9	<0.01	<1	<5	18	34	50	5	80
10	T2-S2	Soil	G390-10	<0.01	<1	<5	16	36	46	<5	70
11	T2-S2	Soil	G390-10	<0.01	<1	<5	17	36	49	<5	71
12	T2-S3	Soil	G390-11	0.02	<1	<5	16	38	53	6	71
13	T2-S4	Soil	G390-12	<0.01	<1	<5	15	27	38	5	47
14	T2-S5	Soil	G390-13	<0.01	<1	<5	20	22	44	5	65
15	T2-S6	Soil	G390-14	<0.01	<1	<5	16	47	51	10	73
16	T2-S7	Soil	G390-15	<0.01	<1	<5	17	63	52	<5	66
17	T2-S8	Soil	G390-16	<0.01	<1	<5	19	40	58	<5	68
18	T3-S1	Soil	G390-17	<0.01	<1	<5	23	38	47	8	32
19	T3-S2	Soil	G390-18	<0.01	<1	<5	24	55	41	13	33
20	T3-S3	Soil	G390-19	<0.01	<1	<5	25	53	43	18	32
21	T3-S4	Soil	G390-20	<0.01	<1	<5	18	37	38	11	32
22	T3-S5	Soil	G390-21	<0.01	<1	<5	18	49	36	14	35
23	T3-S6	Soil	G390-22	<0.01	<1	<5	23	57	47	19	36
24	T3-S7	Soil	G390-23	<0.01	<1	<5	22	45	42	13	33
25	T3-S8	Soil	G390-24	<0.01	<1	<5	26	61	43	16	30
26	T4-S1	Soil	G415-1	<0.01	<1	6	23	57	42	13	80
27	T4-S2	Soil	G415-2	<0.01	<1	5	30	42	46	<5	13
28	T4-S3	Soil	G415-3	<0.01	<1	<5	25	36	42	<5	34
29	T4-S4	Soil	G415-4	<0.01	<1	5	30	43	52	<5	16
30	T4-S5	Soil	G415-5	<0.01	<1	5	34	37	50	<5	13
31	T4-S6	Soil	G415-6	<0.01	<1	6	26	43	53	<5	15
32	T4-S7	Soil	G415-7	<0.01	<1	<5	13	38	35	<5	12
33	T4-S8	Soil	G415-8	<0.01	<1	<5	25	43	47	<5	17

34	T5-S1	Soil	G415-9	<0.01	<1	<5	35	46	23	<5	69
35	T5-S2	Soil	G415-10	<0.01	<1	<5	74	48	24	<5	74
36	T5-S2	Soil	G415-10	<0.01	<1	<5	73	48	26	<5	77
37	T5-S3	Soil	G415-11	<0.01	<1	6	51	118	30	20	143
38	T5-S4	Soil	G415-12	<0.01	<1	<5	64	168	33	26	107
39	T5-S5	Soil	G415-13	<0.01	<1	<5	39	129	21	16	80
40	T5-S6	Soil	G415-14	0.1	<1	<5	45	62	23	5	63
41	T5-S7	Soil	G415-15	<0.01	<1	<5	43	77	28	15	79
42	T5-S8	Soil	G415-16	<0.01	<1	7	36	101	31	20	74

9.3.11 KEMSPL, has carried out a total of 61.00m of exploratory drilling in one borehole against an approved meterage of 500m. The details of the borehole has been tabulated in table no-3 and Annexure-1B.

9.3.12 Geological logging of the borehole cores were properly done along with all the structural data lithological and mineralogical observations. Copper mineralization has not been observed in the drilled borehole. The associated laboratory studies i.e., chemical and physical analysis, petrographic and minerographic studies have been completed simultaneously and geological report has been submitted.

9.3.13 The details of the nature and quantum of work proposed vs actual achievement is given in Table no-4.

9.4.0 DETAILS OF SURFACE SAMPLING, TRENCHING, DRILLING, ETC.

9.4.1 The present scheme of preliminary exploration (G3) in Govindpur block formulated by KEMSPL includes geological mapping, surface sampling, trenching, trench mapping and sampling, drilling, core logging, core sampling and associated laboratory studies to establish the copper

and associated mineralisation over a promising strike length, depth continuity and to establish the resource.

9.4.2 Considering the previous GSI work and potentiality of the base metal in the area KEMSPL, carried out preliminary exploration (G3) covering geological mapping at 1:2000 scale (Plate-V) total 49 no of sample from the trenches and by means of drilling in one borehole with 61.00m drilling and other associated geological and analytical work. Geological mapping of trenches with sample details and corresponding Cu values is displayed in Table no.-7 and Plate-VI. Results of the trench samples were not encouraging hence, planned a borehole based on high chargeability of the geophysical survey which is KNGC-01.

The Table no.-7 shows that all five trenches has shown very less values for copper. Hence, KEMSPL carried out a total of 61.00m of exploratory drilling in one borehole against an approved meterage of 500.00m. During the present exploration, a total of 7 nos. of primary core samples, 4 nos. of external check samples were analysed for 8 radicals including Pb, Cu, Zn, Co, Ni, Ag, As and Au. The details of analysis of primary core samples, trench samples and external check samples for Pb, Cu, Zn, Co, Ni, Ag, As and Au are given in Annexure-IIB, IIC and IID respectively.

CHAPTER-10

LOCATION OF DATA POINTS

10.1.0 ACCURACY AND QUALITY OF SURVEY USED TO LOCATE DRILL HOLES/BOUNDARY POINTS

10.1.1 The survey of borehole drilled in the block and boundary cardinal points have been carried out by the DGPS (Make- CompNav -Sino-GNSS, Sokkia and Model- GLONASS, GRX2 -L1C/A,L2C,L2E(L2P) L1C/A,L1P,L2C/A,L2PL1C/A) Annexure-1A and 1B. The photograph of DGPS is given in the Text fig.-18 below.

Equipment Used:-

The specification of the survey equipment used for the above survey work by M/s KEMSPL is as given in the table below: -

SPECIFICATION OF SURVEY EQUIPMENT

S.N	Equipment	Make	Model/S.N	Least count/accuracy
1	Total Station	Nikon	Nikon -352D	±5mm
2	Total Station	Sanding	S-1152	±4mm
3	DGPS receiver	CompNav -Sino-GNSS	T30 & Jupiter -Channel: 1668 GPS: L1C/A, L1C, L2P, L2C, L5 BDS: B1I, B2I, B3I, B1C, B2a, B2b GLONASS: L1, L2, L3 Galileo: E1, E5a, E5b, E6c, E5 AltBOC QZSS: L1C/A, L2C, L5, L1C IRNSS: L5 SBAS: L1C/A PPP: B2b & HAS L-Band1 SN- 3573 , 4008 ,	Static and Fast Static Long Observations Static Signal Baseline RTK DGPS SBAS Standalone Laser Tilt Measurement Accuracy Horizontal 2.5 mm + 0.5 ppm RMS Vertical 5 mm +

			4035.	0.5 ppm RMS 3 mm + 0.1 ppm Horizontal 3.5 mm + 0.4 ppm Vertical Horizontal 8mm + 1ppm RMS Vertical 15mm + 1ppm RMS <0.4m RMS Horizontal 0.5 RMS Vertical 0.8 RMS 1.5m 3D RMS ≤3.5cm (5m range, ≤60°Tilt in laser mode)
4	DGPS receiver	Sokkia	GRX2 - L1C/A,L2C,L2E(L2P) L1C/A,L1P,L2C/A,L2P L1C/A	Static H:3mm+0.5ppm V:5mm+0.5ppm RTK H:10mm+1ppm V:15mm+1ppm
S.N	Equipment	Make	Model/S.N	Least count/accuracy
1	Total Station	Nikon	Nikon -352D	±5mm
2	Total Station	Sanding	S-1152	±4mm



Text figure.-18: DGPS Survey work (Make-CompNav-Sino-GNSS, Model-T30&Jupiter Channel: 1668)

10.1.2 The base station has been utilised for fixing of the boreholes position on the ground as well as for reduced levels of the boreholes. The coordinate of base station is given in Table-8.

Table no.-8

**Co-ordinates of the Base Point for DGPS survey of Govindpur Block
for Preliminary exploration(G-3 Stage) for Copper and associated
mineralization, Chandrapur District, Maharashtra**

S. N	STATION	UTM (WGS84)		DMS Co-ordinates		GTS RL (m)	Remarks
		Easting(m)	Northing(m)	Latitude	Longitude		
1	GD-01	356054.95	2264846.94	20° 28' 36.3150" N	79° 37' 11.3499" E	243.420	On Pillar

10.2.0 TECHNICAL SPECIFICATION OF DGPS

MAKE: Comp Nav -Sino-GNSS

MODEL T30 &Jupiter -Channel: 1668

a) MEASUREMENT ACCURACY :

Static Mode-Horizontal – 10 mm +0.1 ppm or better.

Vertical – 20 mm +0.4 ppm or better.

b) BASE LINE ACCURACY :

a. Accuracy Horizontal shall not be more than 4 mm for 10 km baseline with occupation line of 10 minutes or less.

b. Accuracy vertical shall not be more than 7.5 mm for 10 km baseline for with occupation of 10 minutes or less.

Table no-9

Co-ordinates of the Borehole KNGC-01 with DGPS Govindpur Block for Preliminary exploration (G-3 Stage) for Copper and associated mineralization, Chandrapur District, Maharashtra

Point No	Easting(m)	Northing(m)	WGS84 Latitude	WGS84 Longitude	RL (m)
	WGS84 UTM		DMS		
KNGC-01	355853.12	2265037.06	20° 28' 42.4405" N	79° 37' 04.3254" E	234.93

Table no.-10

Cardinal points of the Govindpur Block for Preliminary exploration (G-3 Stage) for Copper and associated mineralization, Chandrapur District, Maharashtra

Point No	Easting(m)	Northing(m)	WGS84 Latitude	WGS84 Longitude	RL (m)
	WGS84 UTM		DMS		
1	356829.37	2265107.49	20°28'45.36"N	79°36'55.19"E	247.8622
2	356826.45	2264448.86	20°28'44.98"N	79°37'37.99"E	242.5238
3	355577.75	2264441.54	20°28'23.55"N	79°37'38.07"E	231.3931
4	355589.94	2265129.30	20°28'22.98"N	79°36'54.97"E	233.2754

CHAPTER-11**SAMPLING TECHNIQUE****11.1.0 NATURE AND QUALITY OF SAMPLING AND MEASURES TAKEN TO ENSURE SAMPLE REPRESENTATIVITY**

11.1.1 The present work has been formulated to take up the Preliminary exploration (G-3 stage) for copper and mineralization in Govindpur block, Chandrapur district, Maharashtra on the basis of the presence of Copper and associated mineralization reported in earlier work done by GSI. Sampling has been done during the exploration programme which includes surface sampling, trench sampling, primary borehole and sampling for petrography and mineragraphy.

11.1.2 During the course of geological mapping, areas were identified for surface samples. One bedrock sample was taken by chipping across the strike of the body with the help of hammer and chisel for about 1m x 1m area. During the sampling, surface was properly cleaned and sample was collected in separate plastic bag. After collecting the sample, all the instruments were properly cleaned before proceeding for next sample collection to maintain quality and to avoid contamination. Trenching was carried out and sampling from trenches was done. From trenches, lithological and mineralogical variations were taken into consideration while collection of samples. Samples were collected from the wall of the trenches using hammer and chisel. All the samples were collected with utmost care to avoid contamination and packed in separate plastic bags.

11.1.3 During the present exploration, a total 42 nos. of primary trench samples were collected, Accordingly, 5 nos. external check samples were prepared and analysed. The primary samples and two no. of whole rock analysis have been analysed at Chemical Laboratory of Shiva Analytics (A

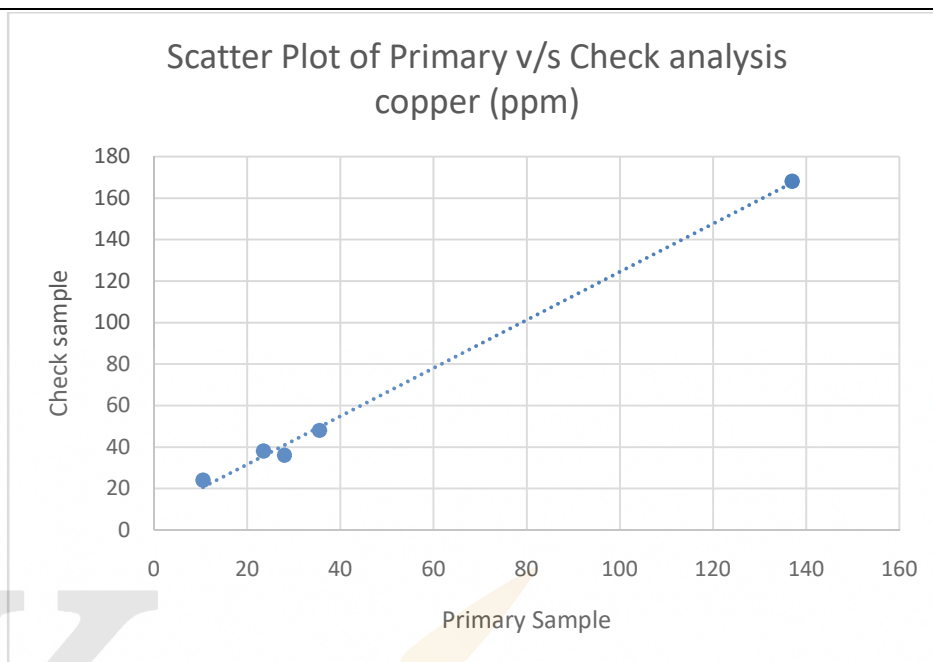
NABL accredited). The, external check samples have been analysed at Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC) Nagpur (A NABL accredited Laboratory). The details of analysis of primary trench samples, borehole core samples, whole rock samples and external check samples are given in Annexure-IIA, Annexure-IIB, Annexure-IIC and Annexure-IID respectively. Comparison of primary and external check sample result for Cu is given in Annexure-II E respectively.

The detail of all the statistical parameters pertaining to radical for Cu is provided in table no.-11

Sr. No.	Primary sample no	External check sample no	Primary copper (ppm)	External check copper (ppm)
1	G415-7(T4-S7)	JNA/25-26/ SEPT/1962	38	23.50
2	G415-3(T4-S3)	JNA/25-26/ SEPT/1963	36	28.00
3	G415-12(T5-S4)	JNA/25-26/ SEPT/1964	168	137.0
4	G415-10 (T5-S2)	JNA/25-26/ SEPT/1965	48	35.50
5	2-QV	JNA/25-26/ SEPT/1966	24	10.50

Table no.-11: Statistical comparison of Primary and External Check sample analysis for Cu (trench and borehole samples)

11.1.4 Scatter plot of Primary Vs External check samples of trench and borehole samples for Cu is provided in the Text figure-18. The analytical values from the primary and check samples are in the acceptable range



Text figure-19: Scatter plot of Primary Vs External check samples of trench and borehole samples for Cu value.

CHAPTER-12

DRILLING TECHNIQUES AND DRILL SAMPLING EMPLOYED

12.1.0 DRILLING TYPES AND DETAILS

12.1.1 KEMSPL has drilled 1 no. of borehole involving 61.00m of drilling and other associated geological and analytical work. The details of borehole are given in Annexure-IB.

12.1.2 The borehole in the block was drilled by skid mounted wire line conventional core drill (RD-100). Drill rig is equipped with ALU-370, 4-cylinder IC Engine as prime mover. Drilling was continued in HQ size then NQ string by using NQ IMP DIAMOND BIT (Hyden, Rock drill, Sandvik) till closure of the borehole. Drilling was done with 1 no. of conventional drill rig (RD 100) with capacity to drill down up to a depth of 500m (Text fig-11).

12.1.3 The quality of drilling was ensured during the operation. After closure, the borehole has been properly plugged and sealed with cement pillar. The details of borehole with number, DGPS coordinate details, RL, depth, etc are provided in Annexure-IB.

12.2.0 DEVIATION SURVEY IN DRILLING

Deviation survey has not been carried out in the borehole.

12.3.0 WHETHER CORE AND CHIP SAMPLE RECOVERIES HAVE BEEN PROPERLY RECORDED AND RESULTS ASSAYED

12.3.1 On completion of each run drill cores were laid out on corrugated GI sheets and washed at the drill site for initial field logging, which includes marking of downhole indications, meterage intervals, fitting of core and inspection for lost intervals, and recording of basic geotechnical

parameters by the site geologists. Recovery is recorded by core runs, and any areas of core loss that can be more specifically identified are recorded. Cores are kept in GI boxes with 5m core placing capacity, in book pattern. Proper run wise depth marking and directional indications are shown throughout.

12.3.2 The core samples have been recorded properly and the detailed run wise litholog and summarized litholog for boreholes are given in Annexure- IIIA and Annexure IIIB respectively. The logging of run wise borehole cores have helped in deciphering the physical characters like colour, shape, size and nature of the mineralisation as well as texture, structural features such as joints, fractures and foliations etc. and their attitude with respect to core axis and identification of different litho units.

12.3.3 The targeted mineralised zones / length recorded during the geological core logging have been sampled and analysed for 8 radicals i.e., Pb, Cu, Zn, Co, Ni, Ag, As and Au. The primary samples have marked in the mineralized zones intersected in the borehole based on ore type and lithology and in general the sample length has been kept as 0.50 m which varied in some instances upto 1.0m because of variation in lithology and type and mineralisation. The details of analysis of primary core samples are given in Annexure-IIIB.

12.4.0 MEASURES TAKEN TO MAXIMIZE SAMPLE RECOVERY AND ENSURE REPRESENTATIVE NATURE OF THE SAMPLES

12.4.1 The entire core drilling has been done by wire line method in HQ and NQ size using diamond bits and NX casing has been used up to the loose portion. The polymer was used as drilling fluid to flush out the cuttings and stabilize the borehole wall. The drilling fluid also works as a coolant to avoid burning of drill bits. Proper core recovery of more than

>90% was maintained in sheared quartz vein zone, however in case of weathered, loose and fractured zone, the core recovery was low. Whenever core recovery is less, the grade of the recovered portion has been extrapolated over the non-recovered section. However, all the precautions like modulated water pressure, proper liner and outer tubes, optimum head pressure and the hands of an expert drilling technician had been taken to maintain the quality of drilling.

12.5.0 WHETHER THE RELATIONSHIP EXISTS BETWEEN SAMPLE RECOVERY AND GRADE

12.5.1 No such definite relation exists between sample recovery and grade.

12.6.0 CORE LOGGING

12.6.1 The borehole cores were geologically logged recording textural, lithological, mineralogical and structural details. Each lithology was identified based on accepted nomenclature. Their colour, grain size, mineral variations and lithological changes etc meticulously recorded. Depth parameters of zones of weathering, oxidation and fracturing etc are recorded. Similarly, mineralisation zones, various physically identifiable ore minerals and their megascopic characteristics are identified. The core recovery figures, changes in recovery percentage with changes in lithology, weathering characteristics of respective rocks etc are also noted. Core chip samples also have been logged, the mineralisation zones relogged after splitting of the core for additional information, that can support resource estimation.

12.6.2 In short, all relevant data that complements the resource estimation was collected while logging. These data will also guide the future investigations that may follow up. All the cores were kept and preserved properly in the GI core boxes of specifications given by NMET following “book pattern”. The detailed run wise litholog and summarized

litholog for boreholes are given in Annexure- IIIA and Annexure- IIIB respectively.



Text figure.-20: Photograph showing preservation of borehole cores in GI core boxes with proper marking

12.7.0 ROCK QUALITY DESIGNATION (RQD %)

12.7.1 During the detailed geological logging of the core samples, RQD have been measured over entire column of the core, mineralized zone and footwall. RQD data is incorporated in the run-wise litholog, given as Annexure-IIIA. Rock Quality Designation (RQD) is a modified measure of the degree of jointing and the fracture in a rock mass, measured as a

percentage of drill cores in lengths of 10cm or more. High quality rock has RQD more than 75%, low quality rock has RQD of less than 50%. D.U. Deere in 1963 defines the RQD is the ratio of the sum of the total length of the cores of the length 10cm and longer recovered from drilling of one run (1.0 m) drilling.

$$\text{RQD (\%)} = (\text{Total length of the core in pieces of 10cm or more}) / \text{Length of the run}) \times 100.$$



CHAPTER-13

SUB SAMPLING TECHNIQUES AND SAMPLE PREPARATION**13.1.0 WHETHER CUT OR DRAWN AND WHETHER QUARTER, HALF OR ALL CORE TAKEN**

13.1.1 The core sampling and analyses have been carried out for entire mineralized zones/length intersected in the boreholes. Samples were marked and collected for copper and gold. Chalcopyrite and pyrite in specks were observed during logging of cores. The mineralized core has been split into two equal halves by core splitter in such a way that the concentrations of ore minerals are uniform in both the halves. The one half portion of the sample was crushed to (-) 200 mesh and about 500g representative sample of (-) 200 mesh was drawn by coning and quartering method of gradual size reduction with the help of crusher and pulverizer. Two samples weighing 100gm each were drawn, one of which were sent to Shiva analytics, Chemical Laboratory, Bangalore for primary chemical analysis for 8 radicals, 2 samples for whole rock analysis and the other was used for the purpose of check analysis. The remaining 300g fraction is kept for any further study in future. Same standard procedure is adopted for trench sample also.



Text figure.-21: Photograph showing Core Splitting activity



Text figure.-22: Photograph showing sample Crusher used in sample processing



Text figure-23: Photograph showing Pulveriser

13.1.2 During the present exploration, a total 42 no of trench sample, 7 nos. of core samples, and 5 no. of external check samples were prepared for analysis of 8 radicals including Cu, Pb, Zn, Co, Au, Ag, As and Ni. The primary and external check samples have been analysed for 8 radicals i.e., Cu, Pb, Zn, Co and Mo, at chemical laboratory of Shiva analyticals, Bangalore. External check samples have been analysed for same elements at Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC) Nagpur (A NABL accredited Laboratory). The details of analysis of primary analysis of trench, bore hole core, whole rock analysis and external check samples are given in Annexure-IIA, Annexure-IIB, Annexure-IIC and IID respectively.

13.2.0 NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE PREPARATION TECHNIQUE

13.2.1 The details of sampling procedure for primary samples (Trench and drilled core) are described in Para 13.1.0. Quality of the sample preparation is maintained by proper cleaning, maintenance of the

equipment and proper crushing, sieving and coning and quatering of samples. For sample preparation proper technique and expertise has been used.

13.3.0 QUALITY CONTROL PROCEDURES ADOPTED

13.3.1 Meter wise samples were collected from the trenches and the primary core samples have been collected from sheared quartz vein and foot wall & hanging wall intersected in the borehole drilled and the samples have been prepared at centralized mechanized sampling unit. The standard sampling procedure in supervision of qualified sampling technician has been adopted to control the quality of samples. Similarly, external check samples have also been prepared under the supervision of qualified sampling technician following the standard sampling procedure.

13.4.0 MEASURES TAKEN TO ENSURE THE SAMPLING IS REPRESENTATIVE OF THE IN SITU MATERIAL COLLECTED

13.4.1 All the primary samples (Trench & drill core) have been marked and prepared from sheared quartz vein. During the preparation of primary samples, the lithologies have been studied meticulously and samples have been marked properly. These cores are subjected for preparation of primary samples as per the sampling procedure for primary samples described in Para 13.1.0.

The proper marking of primary samples from drilled cores and following standard procedure for sample preparation shows the representative samples have been collected from the in situ materials.

13.5.0 WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAINSIZE OF THE MATERIAL BEING SAMPLED

13.5.1 For all the analysis of samples have been prepared at (-) 200 mesh size.

CHAPTER-14

QUALITY OF ASSAY DATA AND LABORATORY TESTS

14.1.0 THE NATURE, QUALITY AND APPROPRIATENESS OF THE ASSAYING AND LABORATORY PROCEDURES

14.1.1 Preliminary exploration (G-3 stage) for copper and associated mineralization in Govindpur block encompasses several lab analysis including analysis for trench samples for 8 elements by ICPOES method including Cu, Pb, Zn, Co, As, Ni, Au, Ag. Description of each analysis method is given in subsequent para.

14.2.1 ANALYSIS OF COPPER (Cu), NICKEL (Ni), COBALT (Co), ZINC (Zn), GOLD (Au), SILVER (Ag), ARSENIC (As), BY ICPOES METHOD

Reagents and Standards

- Aqua Regia – 30–40 ml (prepared using AR grade HNO_3 and HCl in 1:3 ratio)
- Hydrofluoric Acid (HF) – 5–10 ml (AR grade)
- Perchloric Acid (HClO_4) – 2–3 ml (if required for complete digestion)
- Stock Standard Solutions – 1000 ppm solutions of Cu, Ni, Co, Zn, Au, Ag, As, Pb (for calibration)
- Distilled / Deionized Water – for dilution and washing

METHOD OF ANALYSIS BY ICPOES

1. Accurately weigh 0.25–0.50 g of the representative powdered sample and transfer it into a Teflon or quartz beaker.
2. Add 30–40 ml of aqua regia and 5–10 ml HF, along with 2–3 ml HCl if needed. Cover the beaker and digest the sample on a hot plate or in a microwave digester until a clear syrup-like solution is obtained.

3. After digestion, add 10–20 ml distilled water and heat gently for 5–10 minutes.
4. Filter the solution through Whatman No. 40 filter paper into a 100 ml volumetric flask. Wash the residue 3–4 times with hot distilled water and combine the washings with the filtrate. Make up to the mark with distilled water.
5. Prepare calibration standards by diluting stock standard solutions to cover the expected concentration range of analytes in the samples.
6. Aspirate blank, standards, and sample solutions into the ICPOES instrument.
7. The sample solution is nebulized into an aerosol and introduced into the Argon plasma, where it is atomized and excited. Each element emits light at characteristic wavelengths.
8. The optical emission intensity for each element (Cu, Ni, Co, Zn, Au, Ag, As, Pb) is measured at its respective analytical wavelength.
9. Construct calibration curves from standards and calculate the concentration of the analytes in the samples by comparison with the calibration curves.
10. For quality control, run blanks, CRMs (Certified Reference Materials), and replicate samples at regular intervals.

14.3.1 INSTRUMENT: INDUCTIVELY COUPLED PLASMA–OPTICAL EMISSION SPECTROMETER (ICPOES)

ICPOES is a multi-element analytical technique that relies on optical emission from excited atoms and ions in a high-temperature Argon plasma. The sample solution, converted into aerosol, is carried into the plasma by an Argon flow. At temperatures of 6000–8000 K, the elements present are excited, and as they return to lower energy states, they emit radiation at specific characteristic wavelengths.

- The emitted light is dispersed by a spectrometer and detected by a photomultiplier or CCD detector.
- The emission intensity is directly proportional to the concentration of the analyte.
- Quantification is based on calibration curves prepared using standards, in accordance with the Beer–Lambert Law principle.



Text figure-24: Photographs showing ICPOES instrument

14.4.0 ANALYSIS OF LEAD (Pb), BY AAS METHOD

Reagents and Standards

- Aqua Regia – 30–40 ml (prepared using AR grade acids)
- Hydrofluoric acid (HF) – 10 ml (AR grade acid)
- Stock standards for Copper – 1 ml solution of 1000 ppm strength

METHOD OF ANALYSIS OF LEAD (Pb) BY AAS METHOD

1. Weigh 0.3–1.0 g of the representative sample into a Teflon beaker and add 30–40 ml of aqua regia along with 10 ml of hydrofluoric acid.

2. Cover the beaker with a lid and digest the contents on a hot plate for 5–6 hours until a syrup-like solution is formed.
3. After digestion, add 10–20 ml of distilled water and heat for 5–10 minutes. Filter the solution through Whatman Grade 40 filter paper into a 250 ml volumetric flask.
4. Wash the residue on the filter 4–5 times with hot distilled water.
5. Add the washings to the filtrate and make up the final volume to 250 ml in the volumetric flask.
6. Aspirate the prepared solution into the AAS using the Air–Acetylene flame mode.
7. Record the absorbance and concentration using the Atomic Absorption Spectrophotometer (Analytik Jena ZEE nit model).

14.5.0 INSTRUMENT: ATOMIC ABSORPTION SPECTROMETER (AAS)

Atomic Absorption Spectrometry is a technique that measures the concentration of an analyte in a sample by monitoring the absorption of light. It requires calibration with standards of known analyte concentrations to establish the relationship between absorbance and concentration, following the Beer–Lambert Law.

In principle, atoms in the atomizer absorb radiation of a defined wavelength, promoting their electrons to higher orbitals (excited state) for a very short time (nanoseconds). The energy required, i.e., the wavelength, is specific to a given electron transition in a particular element. Each wavelength is therefore element-specific, and the absorption lines are extremely narrow (on the order of a few picometers), giving the method high elemental selectivity.

The radiation flux is measured both with and without the sample in the atomizer. The ratio of these measurements (absorbance) is then converted to analyte concentration or mass using the Beer–Lambert Law.



Text figure-25: Photographs showing Atomic Absorption Spectrometer (AAS) instrument

CHAPTER-15

MOISTURE

15.1.0 All the analysis has been carried out with natural moisture.



CHAPTER-16

BULK DENSITY/SPECIFIC GRAVITY

16.1.0 The G3-stage exploration carried out in for Copper and associated mineralization in Govindpur block, Chandrapur district, Maharashtra had no provisions made for bulk density/specific gravity measurements.



CHAPTER-17

BENEFICIATION STUDIES

17.1.0 The present exploration carried out is of Preliminary exploration (G3) in Govindpur block, Chandrapur district, Maharashtra for which there was no provision of benification studies.



CHAPTER-18

RESOURCE ESTIMATION TECHNIQUE

18.1.1 M/s Kartikay Exploration and Mining Services Private Limited has undertaken G3 stage exploration over an area of 0.83 sq. km in the Govindpur block, Chandrapur district, Maharashtra, with the objective of assessing the presence of mineralization, if any. The exploration programme was systematically designed and executed, comprising detailed geological mapping, trenching, geophysical investigations, and primary sample analyses from trenches.

18.1.2 The analytical results obtained from the trench samples were found to be not encouraging. Nevertheless, based on zones of high chargeability identified in the geophysical survey data, the committee recommended the drilling of a test borehole to further verify the subsurface mineralization potential. The borehole, however, did not intersect any mineralized zone. Consequently, no resource estimation techniques were applied, as the exploration results did not warrant further evaluation.

CHAPTER-19

REPORTING OF RESOURCES

19.1.0 No copper mineralization intersected in the block during G3 level of exploration. Hence resource could not be estimated.



CHAPTER-20

SUMMARY AND RECOMMENDATIONS

20.1.1 SUMMARY

Exploration in the Govindpur block, Chandrapur district, Maharashtra, forms part of the Thanewasna Copper Belt, where copper mineralisation has historically been reported in quartz veins and silicified zones. Previous studies by GSI and DGM documented malachite, cuprite, and chalcocite in old workings at Govindpur and Bothli, with copper values up to 3.15% Cu in isolated samples.

In the present investigation, detailed geological mapping (1:2000 scale), geophysical surveys (SP, IP, resistivity, magnetic), trenching, and exploratory drilling were carried out over 0.83 sq. km. Lithologies mapped include quartz-mica schist, quartz-chlorite schist, quartzite, and quartz veins, with minor malachite staining observed. Geophysical anomalies guided trenching and one borehole (KNGC-01), supported by systematic sampling and analysis.

The results, however, were not encouraging. Copper values from trench and borehole samples ranged only between 22 ppm and 205 ppm, and no significant mineralised zones were exposed at shallow depths or in drilling.

20.2.0 CONCLUSION AND RECOMMENDATION

Preliminary exploration (G3 stage), including geological mapping on 1:2000 scale, trenching, geophysical surveys, and drilling carried out in the Govindpur block, Maharashtra, have not revealed copper or associated mineralization at shallow depths. The block does not indicate any economic potential for copper or related mineralization. Overall, the mineralization within this block is not considered to be of economic interest."

CHAPTER-21

PLATES AND MAPS

21.1.0 Location Map of the block showing various topographic and physiographic features on SoI toposheet is given as Plate-I. Scale:1:50,000

21.2.0 Regional Geology Map is given as Plate-II. Scale: 1:12,500

21.3.0 Geological map carried out by GSI as plate-III. Scale 1:2000

21.4.0 Surface topography map as plate-IV. Scale 1:2000

21.5.0 Geological Map on 1:2000 scale showing BH, Trench Locations etc is given as Plate-V.

21.6.0 Map showing Trench Mapping with analysis results for Copper on 1: 50 scale is given as Plate-VI.

21.7.0 Geological Cross Section along Section Lines AA' on 1: 50 scale is given as Plate-VII.

KARTIKAY

CHAPTER-22

ANNEXURE / ENCLOSURES TO THE REPORT

22.1.0 The report includes all the relevant annexure and maps, plans, sections, photographs & photomicrograph etc. List of annexures, tables, maps/plans/sections, photographs, Text figures & photomicrograph etc are provided before the start of the text part of the Geological Report.



CHAPTER-23

ANY OTHER INFORMATION

23.1.0 ANY OTHER INFORMATION

No Such information is required to be mentioned additionally.



CHAPTER-24

**CERTIFICATE FROM THE QUALIFIED PERSON WITH NAME, DATE
AND SIGNATURE**

1 NAME: DILEEP KUMAR JADHAV

DESIGNATION: MANAGER (GEOLOGY)



2 NAME: NITIN KOHAD

DESIGNATION: DY. GENERAL MANAGER (GEOLOGY)



3 NAME: PRADEEP KULKARNI

DESIGNATION: GENERAL MANAGER (EXPLORATION)



**LIST OF PERSONNEL ASSOCIATED WITH PRELIMINARY
EXPLORATION (G-3) FOR COPPER AND ASSOCIATED
MINERALISATION IN GOVINDPUR BLOCK, DISTRICT: CHANDRAPUR,
MAHARASHTRA**

1	Overall guidance	Shri. P. Kulkarni, GM (Exploration)
2	Overall Planning, Co ordination & Supervision	Shri. Nitin Kohad DGM (Geology)
3	Project Management	Shri. P. Kulkarni, GM (Exploration)
4	Physical Execution of work	Shri. Nitin Kohad DGM (Geology)
5	a) Geology	Shri. Dileep Kumar Manager (Geo)
	b) Survey	Shri. Gourav Meshram
	c) Drilling	In-House KEMSPL
6	Sample Processing	In-House KEMSPL
7	Chemical Laboratory	Shiva Analytics, Bangalore JNARDDC, Nagpur
8	Petrographic Studies	NIT, Raipur
9	Documentation	Shri. Dileep Kumar Jadhav, Manager (Geology)
10	Non-Coal Geological Report Cell	Shri. Dileep Kumar Jadhav, Manager (Geology) Shri. Nitin Kohad DGM (Geology) Shri. P. Kulkarni, GM (Exploration)
11	Reprography and Printing	Shri. Dileep Kumar Jadhav, Manager (Geology)
12	Hindi Translation	Shri. Dileep Kumar Jadhav, Manager (Geology)

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ABBREVIATIONS USED

	Abbreviation	Full form
1	UNFC	United Nation Framework Classification
2	IBM	Indian Bureau of Mines
3	GSI	Geological Survey of India
4	NMET	National Mineral Exploration Trust
5	TCC	Technical cum Cost Committee
6	EC	Executive Committee
7	DGM-MH	Directorate of Geology & Mining, Maharashtra
8	NABL	National Accreditation Board for Testing and Calibration Laboratories
9	JNARDDC	Jawaharlal Nehru Aluminium Research Development and Design Centre
10	F.S.P.	Field Season Programme
11	MEMC	Minerals (Evidence of Mineral Contents)
12	MMDR	Mines & Minerals (Development and Regulation)
13	NH	National Highway
14	WGS-84	World Geodetic System-84
15	UTM	Universal Transverse Mercator
16	RL	Reduced Level
17	cu m	Cubic Meter
18	ICPOES	Inductively Coupled Plasma–Optical Emission Spectrometer
19	DGPS	Differential Global Positioning System
20	DMS	Degree Minute Second
21	M/m	Meter
22	Sq. km	Square Kilometer
23	M. Sc.	Master of Science
24	M. Sc. Tech	Master of Science Technology
25	mRL	Reduced Level in meter
26	QA/QC	Quality Assessment/ Quality Checks
27	WD-XRF	Wavelength Dispersive X-ray Fluorescence
28	CRM	Certified Reference Material
29	SoI	Survey of India