PROPOSAL FOR PRELIMINARY EXPLORATION (G3) FOR BASE METALS IN JARIDIH-PIPRADIH BLOCK, DIST.- GIRIDIH, JHARKHAND (AREA 4.45 Sq. Km)

COMMODITY: BASE METALS (Copper, Lead Zinc)

BY

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PLACE: NAGPUR
DATE: 11.10.2024

SUMMARY OF THE BLOCK FOR PRELIMINARY EXPLORATION (G3) FOR BASE METALS IN JARIDIH-PIPRADIH BLOCK, DIST.- GIRIDIH, JHARKHAND

<table>
<tr><th>S. No</th><th>Features</th><th>Details</th></tr>
<tr><td></td><td>Block ID</td><td>JARIDIH-PIPRADIH</td></tr>
<tr><td>1</td><td>Exploration Agency</td><td>Mineral Exploration and Consultancy Limited (MECL)</td></tr>
<tr><td>2</td><td>Commodity</td><td>Copper, Lead and Zinc (Base metals)</td></tr>
<tr><td>3</td><td>Mineral Belt</td><td>Copper mineralization is essentially confined to the folded schists, folding movement indicated by the echelon disposition of mica-schist bands occurring to the north of Kulhawa. Parsabera fold (which is 1.5km East of the proposed block) plunges 60^0 towards WSW, as shown by the corrugations and lineation.</td></tr>
<tr><td>4</td><td>Completion period with entire Time schedule to complete the project</td><td>15 months</td></tr>
<tr><td>5</td><td>Objectives</td><td>i. Geological mapping and Topographical Survey on 1:2000 scale.
ii. To carry out 150 cu.m trenching to establish strike continuity of concealed mineralization.
iii. Integrated Geophysical Surveys comprising of gravity, Magnetic, S.P, I.P, Resistivity. with about 45 LKM and Gravity survey with 872 station to delineate potential zone areas.
iv. To take up exploratory drilling of about 1500m as per G-3 level of exploration to to confirm the strike and depth continuity of ore zones up to 60m vertical depth at 200 spacing and few boreholes to intersect ore zones at 2nd level
v. To estimate copper resources at G3 Level as per UNFC norms and Minerals (Evidence of Mineral Contents) Rules 2015</td></tr>
<tr><td>6</td><td>Whether the work will be carried out by the proposed agency or through outsourcing and details thereof.
Components to be outsourced and name of the outsource agency</td><td>Work will be carried out by proposed agency</td></tr>
<tr><td>7</td><td>Name/Number of Geoscientists</td><td>No of Geo Scientists – 02 no</td></tr>
<tr><td>8</td><td>Expected Field days (Geology, Geophysics, surveyor)</td><td>Geological Party days: 150 (At field) & 60 at HQ
Survey Party days: 45 days</td></tr>
<tr><td>9</td><td>Location
With Coordinates in UTM</td><td>
<table>
<tr><th rowspan="2">Corner Points</th><th colspan="2">WGS 84</th></tr>
<tr><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>24° 4' 11.425" N</td><td>86° 6' 5.552" E</td></tr>
<tr><td>B</td><td>24° 4' 49.003" N</td><td>86° 6' 9.277" E</td></tr>
<tr><td>C</td><td>24° 5' 11.986" N</td><td>86° 3' 57.628" E</td></tr>
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		D	24° 4' 34.521" N	86° 3' 51.705" E
9.1	Villages	Jaridih, Pipradih, Persabera, Baraganda, Mangartilia and Kanadih		
9.2	Taluka / Tehsil	Dumri		
9.3	District	Giridih		
9.4	State	Jharkhand		
10	Block area (hectares / Sq.km)	4.45 sq.km		
10.1	Forest area	The block co-ordinates were subjected in the Decision Support System (DSS) of Forest department, Ministry of Environment, Forest and Climate Change (MOEFCC). **It has been found that the block area is under "not inviolate". Implies Go area for exploration.**		
10.2	Government Land (Bilanam), Charagaha,	Data not available		
10.3	Private land	Part of the area is private, cultivated land		
10.4	Accessibility			
10.5	Nearest Rail Head	Parasnath (10 Km), Gomo Junction (35 Km)		
10.6	Road	NH-2 crosses 10km in SSW from the block.		
10.7	Nearest Airport	Ranchi (165 km)		
11	Hydrography			
	Local Surface drainage pattern (Channels) Rivers and Streams	Dendritic Drainage		
12	Climate			
	Mean Annual Rainfall	Average annual rainfall is 100mm		
	Temperatures	Minimum temp 10^{O}C (Dec-Feb), Maximum temp up to 45^{O}C (May)		
13	Topography			
	Toposheet No	72 L/04		
	Morphology of the area	Most of the area in the block is flat with small hills which are present in east and west parts of the present proposed area whose height is about 550msl and, ground level topography is about 330-350msl.		
14	Availability of baseline geo science data			
	Geological Map (1:50k / 25k)	Chalima G-4 map on 1:12500 scale mapped by MECL is available		
	Geo Chemical Map	Not Available		
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Not Available		
15	Justification for taking up Reconnaissance Survey/ Regional Exploration	1. Baraganda block which is in western part from the present proposed block which is explored by MECL at G-2 level at 50X50 spacing, where resources established are 2.6 million tonnes with avg grade 1.41% at 0.5% Cu Cutoff. 1.1 million tonnes with avg grade2.2% at 1.0% Cu Cutoff. 2. Based on the evaluation of Chalima G-4 block explored by MECL, where a total 101.84 sq.km area was mapped with collection of bedrock/soil/stream samples and based on mapping analytical results 3 potential zones were identified. Jaridih area is one of		

		the potential area where the present block is proposed. 3. In this Jaridih area a total 4 no trenches and 3 no of Scout boreholes have been drilled and demarcated 2 ore **Copper ore lodes zones** (The lodes/zones have been delineated on the basis of assay of chemical analysis i.e., Cu% at 0.2% cut-off) 4. Out of 3borehole drilled in Jaridih one borehole MCH-03 has intercepted 11.0 m copper ore lode with average 0.72% Cu, 0.42% Pb and 1.12% Zn, based on one borehole intersection a resource of 0.26 million tonnes are estimated. 5. G-4 Geological report of Chalima was peer reviewed and technically evaluated by TCC. Peer reviewer as well as MECL has recommended of detailed study in this are for potential copper deposit. 6. Considering the potentiality and previous work present exploration proposal at G-3 level in Jaridih-Pipradih is planned by MECL.

PROPOSAL FOR PRELIMINARY EXPLORATION (G3) FOR BASE METALS IN JARIDIH-PIPRADIH BLOCK, DIST.- GIRIDIH, JHARKHAND (AREA 4.45 Sq. Km)

1. INTRODUCTION

1.1. Copper with its unique physical, mechanical and electrical properties, has played a vital role in the industrial growth of a nation. In India, around 75% of demand is met through imports. The increasing demand of copper metal in the country could be eased with the exploration of new copper deposits of economic importance.

1.2. During, preceding decades. No large-scale metal deposit has been discovered in India. However, the possibility of working of small mineral bodies in proximity to each other, though technological advances and increased operational efficiency, cannot be ruled out. Therefore, it is necessary and imperative to locate and explore such small copper deposits in cluster.

2. BACKGROUND

2.1. MECL has carried out Reconnaissance Survey (G-4) in Chalima block in the FY 2022-2023 and in this block a total 101.84 sq.km area was mapped on 1:12500 scale with collection of 141 no of surface geo chemical samples and based on geological mapping and chemical analysis of surface geo-chemical samples three potential zones viz., (a) Jaridih (b) Chalima (c) Gejyjadih were identified and 180 cu.m of trenching was carried out in these three potential zones. trenching has exposed two mineralized zone based on which 5 no of scout borehole were drilled in the three potential zones. Three in Jaridih area and one each in other potential zones

2.2. Three boreholes drilled in Jaridih area have copper mineralization indication and in one borehole MCH-03 has intercepted 11.0 m copper ore lode with average 0.72% Cu, 0.42% Pb and 1.12% Zn, based on one borehole intersection a resource of 0.26 million tonnes are estimated.

2.3. Copper ore lodes zones: The lodes/zones have been delineated on the basis of assay of chemical analysis i.e., Cu% at 0.2% cut-off

2.4. No Geophysical survey was carried out during the G-4 exploration.

2.5. Geological report was peer reviewed by Shri Rajagopal Mohanty, ADG(Rtd), AMD. Peer reviewer as well as MECL has recommended of detailed study in this are for potential copper deposit

2.6. Considering the potentiality and previous work present exploration proposal at G-3 level in

Jaridih-Pipradih is planned by MECL

3. LOCATION AND ACCESSABILITY

3.1. The Jaridih-Pipradih area of about 4.45 sq.km falls in Survey of India Topo-sheet No. 72L/04. The block location on toposheet is given as PLATE-I. The Co-ordinates of the corner points of the block area are given in Table below.

3.2. Villages falling under the block are Jaridih, Pipradih, Persabera, Baraganda, Mangartilia and Kanadih boundary corner points of are given below:

Table:1

Block boundary co-ordinates of Jaridih-Pipradih block

Corner Points	WGS 84	
	Latitude	Longitude
A	24° 4' 11.425" N	86° 6' 5.552" E
B	24° 4' 49.003" N	86° 6' 9.277" E
C	24° 5' 11.986" N	86° 3' 57.628" E
D	24° 4' 34.521" N	86° 3' 51.705" E

4. PHYSIOGRAPHY AND DRAINAGE

4.1. The block falls in the northeastern vicinity of Chhotanagpur plateau. Geomorphologically area is characterized by gently undulating to hilly topography where predominant trend of the ridges is WNW-ESE to NW-SE which are mostly. The ridges are intervened with wide flat area with occasional knolls and mounds, famous Parasnath hill, which has distinction of having the highest peak in the state with an altitude of 1365m above the mean sea level lies in the vicinity of the proposed block.

4.2. The drainage pattern in the area is of dendritic type. Giridih district is drained by the Damodar, the Barakar and the Sakri rivers, explored block falls in Damodar and Barakar river shed area, jamuia and several other seasonal nalas are present and connected to Damodara and Barakar rivers

5. CLIMATE

5.1. The district experiences a dry climate with summers hot and humid. a dry semi-arid climate with annual rainfall varying from 40cm to 80cm. The monsoon begins in June's first week and continues up to September and winter from October to January is with pleasant weather. Summers are hot with temperature rising to 44° C in the month of May.

5.2. The annual rainfall is 1191.9 mm and is erratic due to cyclic low rainfall of 778 mm. The rainfall is mostly (60%) confined to the period from June to September.

6. REGIONAL GEOLOGY

6.1. Regionally proposed block is part of the area lying in the north eastern portion of the peninsular region. Rock types exposed are hornblende schist, biotite schist, tremolite-actinolite schist, quartzite, granite gneisses and banded gneiss of Archaean to Proterozoic / Chhotanagpur Gneissic Complex, pebbly sandstone and shale of Talchir Formation of Gondwana Super group along with gabbro and dolerite dykes, pegmatites and quartz veins, Hornblende schist/amphibolite, tremolite-actinolite schist and quartzite occurring as lenses and bands within quartz mica schist and granite-gneiss and this entire sequence has later been traversed by basic and acid intrusive like dolerite, gabbro, quartz and pegmatite veins.

6.2. The major part of the Giridih district area in general is occupied by the pre-cambrian meta sedimentary sequences, that belong to the Chotanagpur gneissic Complex. Chhotanagpur Granite gneisses which are mostly homogenous with gneissic structures are covers major part of the area. The Granite gneiss is the product of granitisation of schistose rocks. Basic and with ultrabasic rocks in the area in and around saria, dumri and pirtanar villages.

6.3. Regional Stratigraphy of the Giridih area is given as Table 2

Table 2 Regional Stratigraphic Sequence of lithology (After GSI, 2012)

AGE	SUPERGROUP/ GROUP / COMPLEX	FORMATION	LITHOLOGY
Holocene			Loose sand, silt, clay and their admixture
Middle Pleistocene to Holocene	Gondwana Super Group	Jamul formation	Oxidised brownish yellow clay with caliche altered with gritty sand
Jurassic To Cretaceous		Intrusive	Dolerite
Permain	Gondwana Super Group	Barakar	Sandstone Shale with coal Fire clay Feldspathic sandstone
Carboniferous to Permain		Talchir	Conglomerate, sandstone, boulder bed
Upper Proterozoic			Pegmatite / Vein quartz / fault breccia Brecciated quartz
			Intrusive Granite
Lower to Middle Proterozoic	Metamorphics of Chhotanagpur mica belt		Quartzite, Quartz schist Calc silicate rocks Quartz Mica Schist Mica Schist and Phyllite Amphibolite, Hornblende schist, Epidorite
Archaean to Proterozoic	Chhotanagpur Gneissic complex		Granite Gneiss Augen Gneiss Biotite gneiss Hornblende gneiss
Archaean to Lower Proterozoic	Unclassified Metamorphics		Quartzite, quartz schist, brecciated quartzite Sillimanite schist

AGE	SUPERGROUP/ GROUP / COMPLEX	FORMATION	LITHOLOGY
			Amphibolite, hornblende schist, metadolerite Calc granulite Mica schist, phyllite Talc tremolite schist

7. BLOCK GEOLOGY

7.1. Major litho units viz. Granite Gneiss, Quartz Mica schist, Mica Schist, Amphibolite Schist/Amphibolite mica schist / amphibolite, Talc tremolite schist, Quartzite and intrusive like pegmatite, quartz vein and dolerite. Lithounits exposed in Chalima/Jaridih-Piradih block belong to the Precambrian group of rocks represented by Meta-sedimentaries, quartzite intruded with dolerite, pegmatite and quartz veins.

7.2. The local stratigraphic sequence of litho units exposed in the proposed block area is

Table 3

Stratigraphic Sequence of Proposed Jaridih-Prpradih Block, Dist: Giridih, Jharkhand

AGE	SUPERGROUP/ GROUP / COMPLEX	FORMATION	LITHOLOGY
Holocene			Loose sand, silt, clay and their admixture
Jurassic To Cretaceous		Intrusive	Dolerite
Upper Proterozoic			Pegmatite / Vein quartz / fault breccia Brecciated quartz
			Intrusive Granite
Lower to Middle Proterozoic	Metamorphics of Chhotanagpur mica belt		Quartzite, Quartz schist Calc silicate rocks Quartz Mica Schist Mica Schist and Phyllite Amphibolite, Hornblende schist, Epidorite
Archaean to Proterozoic	Chhotanagpur Gneissic complex		Granite Gneiss Augen Gneiss Biotite gneiss Hornblende gneiss
Archaean to Lower Proterozoic	Unclassified Metamorphics		Quartzite, quartz schist, brecciated quartzite Sillimanite schist Amphibolite, hornblende schist, metadolerite Calc granulite Mica schist, phyllite Talc tremolite schist

7.3. HORNBLENDE SCHIST/HORNBLENDE MICA SCHIST/AMPHIBOLITE:

7.3.1. Hornblende schist/amphibolite occurs as persistent and conformable band of various dimensions within the gneisses. It is dark grey to black in colour and massive or schistose, well foliated, hard and compact or soft comprising hornblende, feldspars, biotite and quartz. Two sets of foliations are observed within hornblende schist

7.4. QUARTZ MICA SCHIST/MICA SCHIST:

7.4.1. Quartz mica schist is brown coloured, friable and schistose rock comprising muscovite and quartz. Crenulation cleavage and pucker lineation are developed in this rock.

7.4.2. **MICA SCHIST:** Mica Schist is exposed near Parsabera, Jangidiri, Bishanpur, Jaridih, Belatanr,. Bedding runs parallel to the schistosity. In most of the places, intercalation of the schist with amphibolite is clearly observed. Near Parsabera, the mica schist is interbanded with marble and tremolite-actinolite schist. The mica schist is medium grained, well foliated and composed of muscovite, biotite, quartz and feldspar. Garnet is, in general, rarely seen. However, the schist near nawadih is very rich in garnet. Here the schistosity swerves around coarse porphyroblasts of garnet and asymmetric puckers are well developed on the schistosity plane. The relative proportion of muscovite and biotite varies from place to place and in areas, where the mica content is less and the proportion of feldspars is considerably high, the schist resembles to foliated granite

7.5. **GRANITE GNEISS:**

7.5.1. Granite gneiss is light to dark colored, hard, compact and showing gneissosity. This is composed of dark minerals represented by biotite and hornblende, whereas the light-colored minerals are quartz and feldspars. Epidote and opaques are accessories. The granite gneiss contains lenses and bands of hornblende schist

7.6. **TALC TREMOLITE SCHIST/TALC TREMOLITE SCHIST/ ACTINOLITE SCHIST**

7.6.1. Small exposures of tremolite-actinolite schist are exposed near Baraganda village. It is interbedded with the mica schist and the sequence partly serves as the host rock for the copper mineralization at and around Baraganda. The rock is greenish white to grey in colour, coarse grained, composed predominantly of tremolite and actinolite with subordinate plagioclase, quartz, epidote, biotite and opaques. A foliation is crudely developed by dimensional alignment of tremolite and actinolite. The mineralisation in the tremolite-actinolite schist and mica schist is manifested by impersistent gossanisation, malachite stains and old workings

7.7. **PEGMATITE& QUARTZ VEIN:**

7.7.1. All the metasedimentaries are intruded by pegmatites and quartz veins of various dimension (a few cm to several metres thick). The pegmatites are associated with the quartz

veins in time and space. The pegmatites and quartz veins are, in general, emplaced along the main foliation is the country rocks. However, discordant relationship is also common at places. The pegmatites are composed dominantly of quartz, pink and white feldspars (both K. feldspars and plagioclase) with subordinate muscovite, biotite, tourmaline, epidote and magnetite.

7.7.2. **QUARTZITE**

These generally occur within mica schist as lenses and bands. Quartzite is white to greyish, medium to fine grains compact rock consisting of quartz with minor muscovite and ocassionally biotite indication of mineralization is in the form of dissemination of pyrite specks and limonitic stains are noted at places.

7.8. **DOLERITE DYKES**

7.8.1. The dolerites occur as sill and dykes. All the Metasedimentary rocks alos intruded by syntectonic basic rocks (meta dolerite, meta norite and younger amphibolite) which have been subsequently metamorphosed to the same grade as the country rocks.

8.0.0 **STRUCTURAL DETAILS OF THE AREA SUCH AS DIP, STRIKE, FOLDS, FAULTS, ETC.**

8.1.0 The strike of foliation generally varies between N 55°-80°W- S 55°- 80°E at places E-W. The amount of dip varies between 55°-80°, and it is vertical at many places. The dip is due south, in the northern part of the area, but is extremely variable. The strike of foliation is very consistent all over the area except where folding is indicated.

8.2.0 Folding of comparatively smaller dimension is noted in the copper bearing areas where these folds are of localized in nature It is noteworthy that copper mineralisation is essentially confined to the folded schists of en echelon disposition of the mica-schist bands. Fold plunges 60° towards WSW, as shown by the corrugations and lineation

8.3.0 Lineation of different types have been noted e.g., corrugation, preferred linear orientation of minerals and grooving. Among these, the corrugation lineation in mica schist is widespread.

8.4.0 **Joints:** The three sets of joints observed in the area are (i) Strike Joints parallel to S0 or S1 (ii) Dip joints normal to S0 or S1 (iii) Conjugate joints occurring in pairs. Prominent joint sets are (i) NE-SW (ii) E-W and (iii) NW-SE. Strike and dip joints are noticed in the gneisses all over the area. The prominent joints sets are N30°W/72°SW and N40°E/70°SE.

8.5.0 The area is traversed by a number of small to medium scale faults marked by occurrence of highly brecciated and silicified horizons which trend in NS to NW-SE to NE-SW.

9. **PREVIOUS WORK:**

9.1 Systematic geological mapping was carried out by the A.K.Sen (1960) in the areas lying in the toposheets no. 72L/04 and 72H/16, district Hazaribagh, Biharon 1: 63,360 scale. A total area of about 714 sq km was mapped with identified rock types mainly schistose formations (e.g., quartz mica schist, mica-schist etc), dolerite dyke and massive granite. The rocks are isoclinally folded, conspicuously foliated and rarely faulted. The strike of the foliation is between N55-85W to S55-85E with dips either to the south or north. Identified chief economic mineral being chalcopyrite and recommended for 6 no of exploratory boreholes.

9.2 A preliminary appraisal of the Baraganda copper deposit in the Giridih sub division, Hazaribagh District, Bihar, with a view to ascertain whether the deposit warrants detailed exploration and if so, what would be the nature and quantum of work necessary, was conducted by Sarvashree N. K. Mukherjee and B. K. Dhruva Rao, Senior and Junior Mining Geologists, Indian Bureau of Mines. The scope of the work included rapid assessment of the potentiality of the area from a study of ancient and old workings, waste dumps tailing dumps, general geological set up and the earlier reports, and drawing up a scheme of exploration. After the study It was proposed to carry out the exploratory programme in two phases and the first phase would consist of drilling a few pilot boreholes at intervals of 200 m, for obtaining factual information regarding the grade, width and nature of mineralisation. If the first phase of work confirms the assumptions made regarding the grade, width and strike persistence, a programme for further detailed proving can be drawn up.

9.3 Ghosh S. K. (1968) carried out detailed investigations in the area for basemetal mineralisation around Bengabad, which includes Geological Mapping on 1:63,360scale and detail mapping on 1:1000scale. During the course of mapping, Ghosh located mineralised zones at Jhalakdiha, Ganganpur, Karkukudar, Tarajori and Bishunpur. Subsequently geochemical and detailed mapping were also carried out in Jhalakdiha, Ganganpur and Chandio area and reported copper, lead, and zinc mineralization. Further in Jhalakdiha and Ganganpur area, test drilling was carried out by Ghosh during F. S. 1968-69. Subsequently during the field season 1969-70, Ghosh and Kar carried out detailed mapping in Chandio block on 1:2000scale followed by geochemical sampling and drilling which indicates presence of Cu, Pb, and Zn mineralization.

9.4 Prasad (1976) has summarized the geology of the eastern Chhotanagpur region. According to him the area represents a highly metamorphosed and deformed Achaean terrain consisting of a group of para metamorphic rocks intruded by syntectonic basic rocks which have been subsequently metamorphosed to some grade as the country rooks.

9.5 During F.S. 1986-87, Prasad S. and Shrivastava S. K. carried out compilation of quadrangle

of degree sheets 72L and 72P. Field Season 1987-88 Singh S.N. carried out detail mineral investigation in the area around Bishanpur in Khurchuta Reserve Forest in Bengabad area in Giridih district, Bihar to test the causative source of the third Grade airborne E.M. anomaly intercept BE2-116-6990 (IP/OP-41/35). This airborne intercept has association of magnetic axis of high and is also supported by a significant geochemical anomalous zone for Copper, Lead and Zinc which was delineated by the geochemical survey conducted in course of ground follow up work of airborne anomaly.

9.6 Shrivastava S. K. and Mohan Raj D. (1989) carried out systematic geological Mapping in the unmapped areas for compilation of degree sheet 72 L covering parts of Munger, Deoghar and Giridih districts of Bihar during F. S. 1988-89. The area constitutes highly deformed pre-cambrian meta sedimentaries, represented by granite gneiss with thin bands of schistose rocks found in the synformal portions, conformable in attitude with the CGC. The fluvio-glacial sediments, the Talchirs of Lower Gondwana are found in small basins. The area is intruded by a number of basic and acid intrusive viz., the dolerite/gabbro, pegmatites and quartz reefs/veins.

9.7 Kumar Binod & Paul R. (1990) carried out Geological Mapping, Geochemical urvey and Exploration in and around Chandio Block, Giridih Districts of HesatuBelbathan Belt, Bihar during FS: 1989-90. During field season 1992-93, Prasad R.K. and Roy D. carried out preliminary investigation for gold and other associated base metal mineralization and old working in Chandio, Jhalakdiha, Kakakudar and Ganganpur, Giridih district, Bihar. These pockets of mineralization were also seen in calc-silicate, amphibolite and quartz schist lenses within the granite gneissic country.

9.8 Somprakhash Sahu and Harish Mishra (2010-2012) carried out "Specialised Thematic Mapping for Boundary Matching in parts of toposheet nos. 72 L/1, 2, 3, 4, 5, 6, 7, 8 & 10 in parts of Jamui, Munger, Nawada and Banka districts, Bihar and Kodarma, Giridih and Deoghar districts, Jharkhand" work includes Specialized Thematic Mapping on 1:25,000scale and Traverse mapping on 1:50,000 scale. The Specialized Thematic Mapping was carried out in parts of T. S. no. 72L/7 covering an area of about 120 sq. km. Traverse mapping has been carried out in parts of T. S. nos. 72 L/1, 2, 3, 4, 5, 6, 7, 8 & 10, covering an area of about 1000 L Kms. The indication of mineralization is in the form of dissemination of pyrite specks and limonitic stains are noted within pink quartzite near Luppi and within quartzite near Gansasar in T. S. no. 72L/7. Malachite and azurite stains are also observed in tremolite actinolite schist near Chandio, Gaganpur, Birgora and Gansasar village.

9.9 A.B. Ekka, & Kaushik Pramanik, (2016) carried out studies on APPLICATION OF MULTISPECTRAL AND HYPERSPECTRAL REMOTE SENSING TOWARDS MAPPING OF ALTERATION / MINERALIZED ZONE IN KESARPUR COPPER BELT, ORISSA AND BARAGANDA COPPER-LEAD-ZINC MINERALISED BELT, BIHAR in Baraganda area Since tremolite, chlorite and sericite are the main alteration minerals whose absorption are in the 2.2 and 2.35µm and reflectance in 1.6-1.7 µm – an FCC with bands 27-146-206 in RGB was generated to highlight these minerals. Spectra from different mineralized areas in the eastern part (Parsabera-Baraganda area) and western part (Dondlo-Pipradih area) were taken as end-member spectra for classification using SAM classifier. Inferred, tremolite being the main alteration mineral along with chlorite and sericite are found along NW-SE linear zone (shear zone ??) from Dondlo in the west and Parsabera in the east.

9.10 A.K. MUKHOPADHYAY & T.K. PYNE (1986) carried out RECONNAISSANCE SURVEY OF AIRBORNE ELECTROMAGNETIC ANOMALIES AND ASSOCIATED MAGNETIC FEATURES IN PARTS OF GIRIDIHDISTRICT, BIHAR. A.B. Ekka, & Kaushik Pramanik, (2016) carried out studies on APPLICATION OF MULTISPECTRAL AND HYPERSPECTRAL REMOTE SENSING TOWARDS MAPPING OF ALTERATION / MINERALIZED ZONE IN KESARPUR COPPER BELT, ORISSA AND BARAGANDA COPPER-LEAD-ZINC MINERALISED BELT, BIHAR The analytical values for Cu, Pb, Zn, Ni & Co in the geochemical soil samples collected is not encouraging and the samples do not show any significant positive response by Jone's THM kit. Thus the 515 aeromagnetic intercepts evaluated during the present course of investigation do not appear to be significant in relation to any base metal mineralisation.

9.11 Mineral Exploration and Consultancy Limited (MECL) carried out GENERAL EXPLORATION (G2) FOR ESTIMATION OF COPPER ORE IN BARAGANDA BLOCK, GIRIDIH DISTRICT, JHARKHAND through NMET funding (2020), 0.59 sq.km block area was explored by drilling 30 number of exploratory boreholes with total meterage of 5490.90, host rock is Chlorite-Biotite schist, Garnettiferrous chlorite schist, Silicified quartz biotite schist, muscovite biotite schist and trend of the formations is N70°W-S70°E with vertical dips mostly, MECL estimated about 2.38 million tonnes of copper resources at 5% Cu cutoff with average grade of 1.41% over a strike length of 103km and 250m vertical depth.

9.12 MECL has carried out Reconnaissance Survey (G-4) in Chalima block in the FY 2022-2023 and in this block a total 101.84 sq.km area was mapped on 1:12500 scale with collection of

141 no of surface geo chemical samples and based on geological mapping and chemical analysis of surface geo-chemical samples three potential zones viz., (a) Jaridih (b) Chalima (c) Gejyjadih

9.12.1 Present proposed location falls in Jaridih area where, Area is situated between UTM co-ordinates 405914E-405977E to 2663733N-2663724N and 405922E-405942E to 2663707N-2663747N) lying south-eastern corner of chandadih village. Here there is open quarry of 50X20m over strike length 25m, this quarry was mined for soap stone as per locals., presently the quarry is filled with water. Lithology exposed in this area are talc-mica-schist, talc-tremolite-schist, tremolite-schist / tremolite actinolite schist, quartzite and micaceous quartzo feldspathic schist. All the rock types schistose at different intensity and concordant to each other. However, exposure of Talc schist and Talc tremolite/Tremolite schist is limited to the Quarry indicating pocket nature of talc schist. General trend of schistosity is N65°W to S65°E, dipping due 60°-77° south.

Photograph: H&I ; Jaridih Shaft (East and West Facing view)

9.12.2 All the rocktypes show copper mineralization i.e., malachite and azurite staining, Staining is more prominent along probable vein and stringers along Tremolite schist, and at the contact with the Micaceous Qtz-feldspathic schist with some native Chalcopyrite. Malachite Staining continues to the east of the Quarry where it is prominent is the micaceous Quartzo-feldspathic schist and Quartzite and become obsolete in further east. Total length of the Copper mineralization staining is about 150 m.

Photograph: L Malachite stains in tremolite schist

9.12.3 14 bedrock and 1 soil sample have given good anomalous values in this region details are below.

S No	Sample No	Cu	Zn	Pb	Co	Mo
		Values in PPM				
1	MCH/BR/006	39	584	207	7.13	6.26
2	MCH/BR/016	202	842	7.64	4.56	5.96
3	MCH/BR/021	782.38	312	107	3.13	7.22
4	MCH/BR/026	476	660	610	1.96	4.88
5	MCH/BR/029	22534	4288	12178	2.53	67
6	MCH/BR/033	1704	175	2491	1.53	15.2
7	MCH/BR/074	15127	982.07	6897.45	2.5	BDL
8	MCH/BR/075	1067	404.24	858.85	0.86	8.28
9	MCH/BR/076	28248.2	7163.11	7789.18	3.87	241.29
10	MCH/BR/077	29958	3497.99	11615.997	1.31	1.64
11	MCH/BR/078	9115	302.84	1254.33	0.31	35.39
12	MCH/BR/082	22.44	297.37	1211.45	0.21	3.04
13	MCH/BR/092	1769	59.33	298.04	0.23	4.01
14	MCH/BR/093	566	21.39	96.18	0.29	2.15
15	MCH/SL/006	1492	576.896	906.51	8.404	1.884
	Minimum	22.44	21.39	7.64	0.21	1.64
	Maximum	29958	7163.11	12178	8.404	241.29

14.0.1.1 Total 4 number of trenches namely TE, TF, TG& TH were excavated. The trench are excavated up to the C horizon to expose the bedrock by digging the ground 1m deep and 1m wide of desired variable lengths Based on the trenching two potential zones of mineralization are identified, over a strike length of 500m., details are given below.

Trench No	**Zone Width**	**Element**	**Min**	**Max**
TE	Zone-1 (2.00 m)	Cu (%)	0.1	0.1
		Zn (%)	0.08	0.11
		Pb (%)	0.03	0.05
	Zone-2 (1.00 m)	Cu (%)	0.33	0.33
		Zn (%)	0.06	0.06
		Pb (%)	0.12	0.12
TF	Zone-1 (2.00 m)	Cu (%)	-	-
		Zn (%)	0.07	0.08
		Pb (%)	-	-
	Zone-2 (3.00 m)	Cu (%)	-	-
		Zn (%)	0.03	0.08

		Pb (%)	0.03	0.06
TG	Zone-1 (3.00 m)	Cu (%)	-	-
		Zn (%)	-	-
		Pb (%)	0.06	0.07
	Zone-2 (1.00 m)	Cu (%)	-	-
		Zn (%)	0.06	0.06
		Pb (%)	-	-

9.12.4 A total three boreholes drilled in Jaridih area have copper mineralization indication and in one borehole MCH-03 has intercepted 11.0 m copper ore lode with average 0.72% Cu, 0.42% Pb and 1.12% Zn, based on one borehole intersection a resource of 0.26 million tonnes are estimated.

9.12.5 Copper ore lodes zones: The lodes/zones have been delineated on the basis of assay of chemical analysis i.e., Cu% at 0.2% cut-off

Table showing zones intersected in the exploratory boreholes drilled by MECL in Jaridih area Zone demarcated at 0.20% Cu, Pb, Zn cut-off

Borehole No	Depth (m)		Thickness (m)	Intersection Angle (in Degree)	True Width (m)	Cu %	Pb %	Zn %	Remarks
	From	To							
MCH-03	70.00	83.00	13.00	45	11.26	0.72	0.42	1.12	75.00 to 79.00 1% Cu
MCH-04	27.00	34.00	7.00	45	6.06	0.04	0.16	0.52	
MCH-04	43.00	44.00	1.00	45	0.87	0.06	0.06	0.19	
MCH-05	70.50	73.50	3.5	45	3.03	0.07	0.08	0.32	

10 Mineralization:

10.1 Mineralization in the study area is indicated by malachite and azurite staining, limonitisation and ferruginisation mainly in tremolite-actinolite schist, hornblende schist, quartzite, dolerite and quartz veins. strike of foliation generally varies between N 55°- 80°W- S 55°- 80°E at places E-W. The amount of dip varies between 55°- 80°, and it is vertical at many places

10.2 mineralization is concentrated along foliation planes, i.e. litho structurally controlled coupled with hydrothermal activity, hence structural geometry of the are is essential to upgrading this block to G-3 level.

11.0.0 OBJECTIVE

11.1.0 Phase-I

(a) To carry out geological mapping with collection of surface geochemical samples and Topographical survey on 1:2000.

(b) To carry out Trenching work (150 cu.m) to expose the strike continuity of the ore body

(c) To carry out Geophysical survey comprising of Gravity, Magnetic, S.P, I.P, Resistivity with about 45 LKM and Gravity survey with 872 stations.

11.2.0 Phase II

(a) Upon positive interpretation of Geophysical survey coupled with mapping data, Drilling of about 1500m will be done to confirm the strike and depth continuity of ore zones up to 60m vertical depth at 200 spacing and few boreholes to intersect ore zones at 2nd level

(b) To estimate copper ore resources at G3 level as per UNFC norms and Minerals (Evidence of Mineral Contents) Rules 2015

12.0.0 PROPOSED SCHEME OF EXPLORATION

12.1.0 **Geological mapping**: Detailed Geological Mapping supported with collection of surface samples (Bedrock/channel) will be carried out in the block area on 1:2000 scale to demarcate the litho-units along with structural features for planning of G-3 level work. All the geological features will be recorded and litho-contacts will be plotted for finalization of Geological map. This map will be used as base map for future work. During the course of geological mapping total 50samples shall be collected for analysis of Cu, Pb, Zn, Ni, Co, Mo, & W by AAS method. Total 5 nos. External check samples (10% of primary samples) shall be analysed for Cu, Pb, Zn, Ni, Co, Mo, & W at external NABL accredited laboratory to check for analytical bias if any.

12.2.0 **Survey:** The Block boundary will be surveyed by DGPS in WGS-84 datum for demarcation of block boundary/corner points. Triangulation network will be laid down in the proposed block for the entire area of 4.45 sq.km. (445 Ha). Topographical Surveying will be carried out in in the entire block area at 2 m contour interval and existing physical and manmade features in the area shall be surveyed. During exploratory drilling all Boreholes will be fixed on the ground whose RL's and co-ordinates will be determined by DGPS.

12.3.0 **Trenching:** Trenches shall be excavated across the Stirke line to decipher the ore zone. Total 150 cu.m. trenching shall be carried out in the area. The location of trenches shall be decided by the site geologist based on the outcome of geological mapping in the block area. During the course of trenching work total 100 nos. trench samples shall be collected for analysis of Cu, Pb, Zn, Ni, Co, Mo, & W by AAS method. Total 10 nos. External check samples (10% of primary samples) shall be analysed for Cu, Pb, Zn, Ni, Co, Mo, & W at external NABL accredited laboratory to check for analytical bias if any

12.4.0 Geophysical Survey:

12.4.1 Since Copper is highly dense and moderately magnetic so it can be easily identified by Gravity and Magnetic survey along with I.P Resistivity and S.P. As per the Geology of the area the strike of the ore body is in NW-SE the layout was planned in N9°E which is perpendicular to the strike direction. Magnetic, S.P, I.P and Resistivity is planned in 45 Lkm with Line interval of 100 mts and station interval of 10mts, whereas gravity survey was planned with 50m station interval & 100mts Line interval. Hence, MECL proposes to conduct Magnetic, S.P, I.P, Resistivity with about 45 LKM and Gravity survey with 872 station.

12.5.0 **Drilling:** Based on the outcome of Phase-I work (Geological mapping, trenching, geophysical survey) and review with TCC, Phase II work i.e Drilling comprising of total 1500m will be carried out and boreholes shall be taken up in the area to cover entire strike length as established in phase-I work, at 200m spacing interval. These boreholes will be planned to target the 1st level intersection at 60m vertical depth and a few boreholes shall be drilled for 2nd level intersections i.e. 120 vertical depth. The present exploration at G3 stage would be helpful to upgrade the resource in to 333 category of UNFC.

12.6.0 **Drill core logging:** Detailed drill core logging will be done with consideration of lithological details, structural features, e.g. joints, veins foliations, mineralization pattern, visual estimation of copper content and other associated minerals in percentage etc. for entire length of all the holes and determination of Rock Quality Designations (RQD) for entire length of core in each borehole.

12.7.0 **Drill core sampling:** The borehole cores will be spitted into two equal halves by using core splitter. One half will be powdered to -200 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gram of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-200 mesh size) will be kept as duplicate for future reference. Total 250nos. borehole core samples shall be analysed for Cu, Pb, Zn, Ni, Co, Mo, & W elements by AAS method and about 25 no of samples will be analyzed for Au and Ag by Fire Assay Method.

12.8.0 Borehole sampling (Check Analysis): Total 28 Nos. External Check samples (10% of primary samples), which include 25 no check samples which shall be analysed for Cu, Pb, Zn, Ni, Co, Mo, & W and 3 Nos check samples which will be analysed for Au & Ag values at external NABL accredited laboratory to check for any analytical bias.

12.9.0 **Petrography and Mineragraphy Studies** Total 10 nos. of samples for Petrographic study by thin section 10 no of samples for Mineragraphic studies through polished section are proposed to be carried out at MECL Lab. Petrological and Mineragraphic study report includes 10 Nos. of digital photomicrographs of thin and polished sections.

12.10.0**Specific gravity** determination Total 05 nos. of selected core samples shall be subjected to specific gravity determination studies.

13.0.0 QUANTUM OF WORK

13.1.0 The following quantum of work have been proposed for preliminary level exploration for Basemetals in Jaridih-Pipradih block:

Sl. No.	Item of Work	Unit	Target
A	**GEOLOGICAL & SURVEY WORK**		
1	Detailed Geological Mapping (1:2000 scale)	Sq.km.	4.45
2	Topographical Survey (2m contour interval)	Sq.km	4.45
3	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes and block boundary by DGPS	Nos.	15
B	**Trenching**	Cu.m	150
C	**Drilling**		
1	Drilling up to 300m (Hard Rock)	m	1500
2	Borehole deviation Survey by Multishot Camera	m	1500
3	Determination of Specific Gravity	Nos.	5
D	**Laboratory Studies**		
1	Chemical Analysis		
(a)	Surface Samples (Bedrock/Channel) Primary samples- for Cu, Pb, Zn, Ni, Co, Mo, & W + Check 10% i.e 5	Nos	50+5= 55
(b)	Trench Samples (Primary samples) - for Cu, Pb, Zn, Ni, Co, Mo, & W+ Check 10% i.e 10	Nos	100+10 = 110
(c)	Borehole Samples (Primary samples) - for Cu, Pb, Zn, Ni, Co, Mo, & W (250 samples) 25 samples will be analyzed for AU and Ag Check Total 275 sample and check samples (10%) i.e 28	Nos	275+28 = 303
E	**Petrological samples**	Nos	10
	Mineralogical Samples	Nos	10
	Specific Gravity Samples	Nos	5
	Geological Report preparation (Digital and Hard Copy Format)	Nos	1

14.0.0 TIME SCHEDULE AND ESTIMATED COST

14.1.0 The proposed exploration program envisages geological mapping, Geophysical Survey, Trenching and core drilling, sample preparation and laboratory studies. The above said activities will be completed within 11 months, geological report preparation and peer review will take another 4months with two months overlapping with the laboratory works. Therefore, a total **15 months** are planned for completion of the entire exploration program.

14.2.0 mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded Projects. The total estimated is INR 469.53 Lakhs

Sl. No.	Item	Total (Rs)
1	Geological mapping & other Geological works	27,36,816.00
2	Ground Geophysical Survey	1,15,50,185.00
3	Survey work for Block demarcation, Geophysical work & Trenching work	7,36,980.00
4	Trenching/pitting work	4,99,500.00
5	Drilling	1,97,29,900.00
6	Laboratory Studies	19,30,025.00
	Sub total	**3,71,83,406.00**
7	Borehole Geophysical logging	**9,33,375.00**
8	Geological Report	11,43,503.43
9	Peer Review	30,000.00
10	Proposal Prepration	5,00,000.00
	Total	**3,97,90,284**
11	GST (18%)	71,62,251
Total cost including 18% GST		**4,69,52,536**
SAY, in Lakhs		**469.53**

Time line of the project

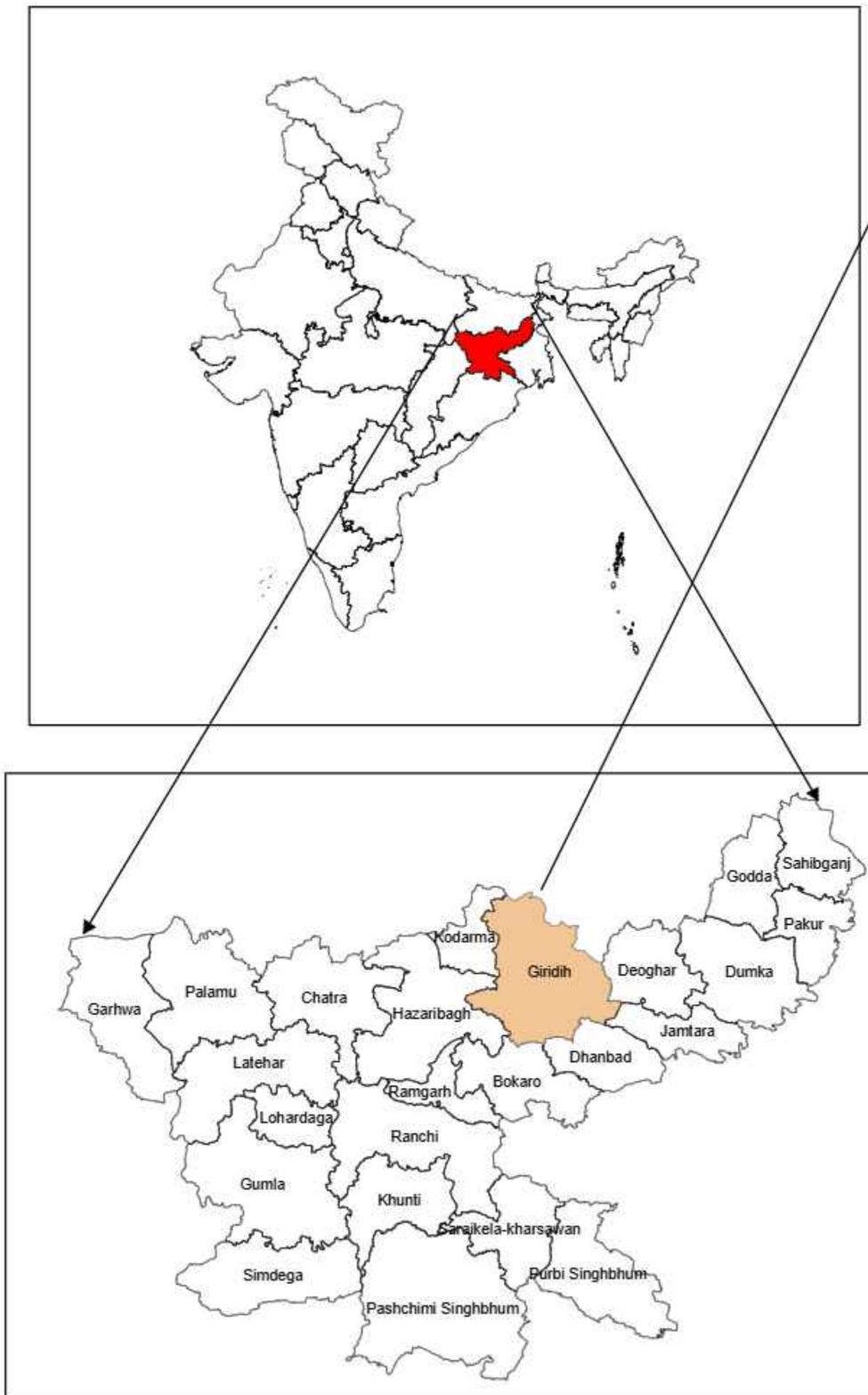
TIME SCHEDULE /ACTION PLAN FOR PRELIMINARY EXPLORATION (G3) FOR COPPER IN JARIDIH-PIRPADIH BLOCK, GIRIDIH DISTRICT, JHARKHAND.

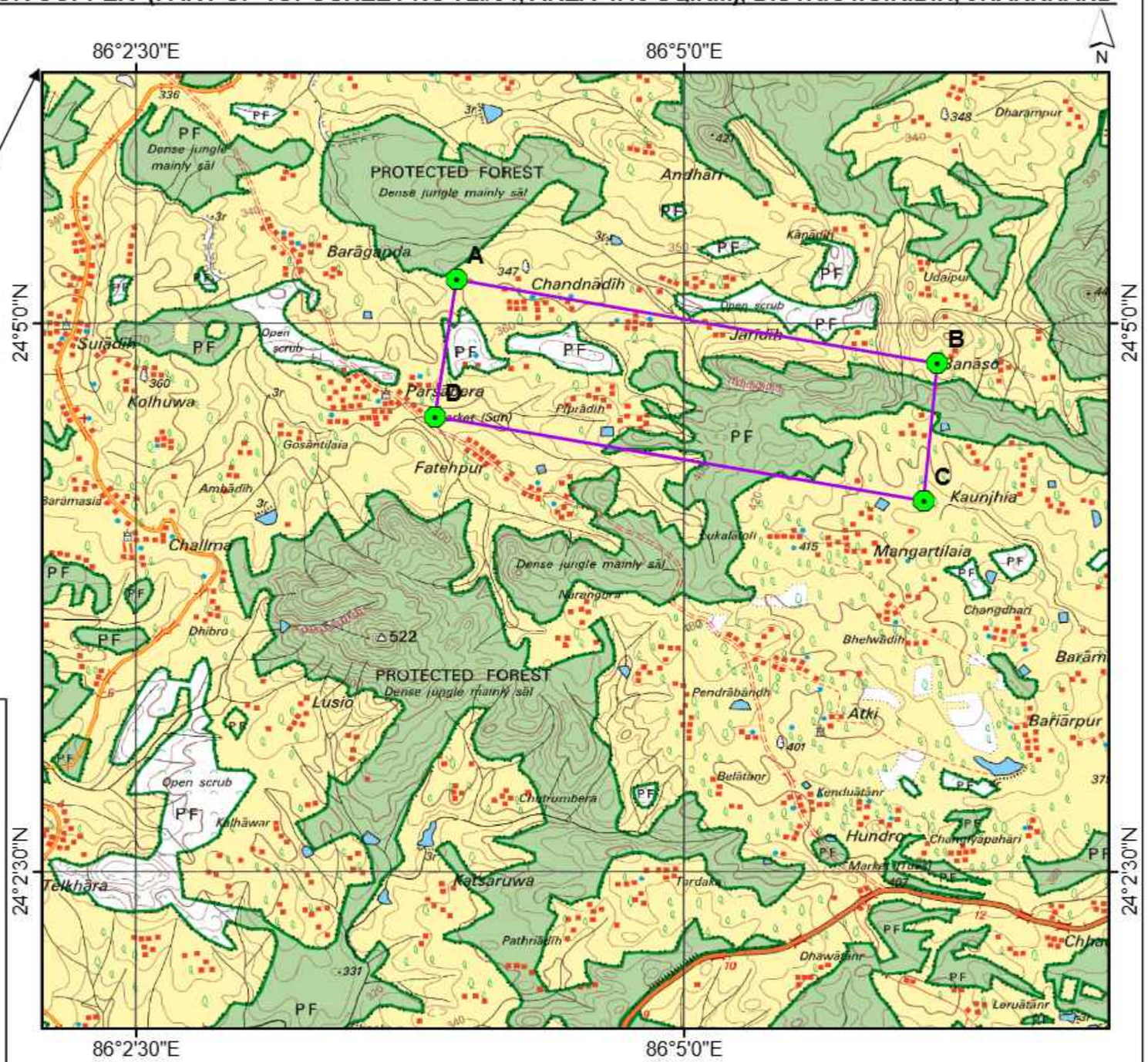
Sl. No.	Activities	Unit	MONTHS														
			1	2	3	4	5		6	7	8	9	10	11	12	13	14	15
1	Camp Setting	Month																
2	Geological mapping (1:2,000 scale)																	
3	Ground Geophysical Survey	Lkm																
4	Geophyscist party days (HQ) for data interpretation & Report																	
5	Trenching work	Month																
6	Drilling																	
7	Sampling Party days, Surface and Trench Sampling (1 Party)	day																
8	Camp Winding	Month																
9	Laboratory Studies	Nos.																
10	Geologist Party days at HQ (1 Party)	day																
11	Report Writing	Month																
12	Peer Review	Month																

Review

GR Review and submission

LOCATION MAP OF PROPOSED JHARIDIH PIPARDIH BLOCK FOR COPPER (PART OF TOPOSHEET NO 72I/04, AREA-4.45 SQ.KM), DISTRICT:GIRIDIH, JHARKHAND





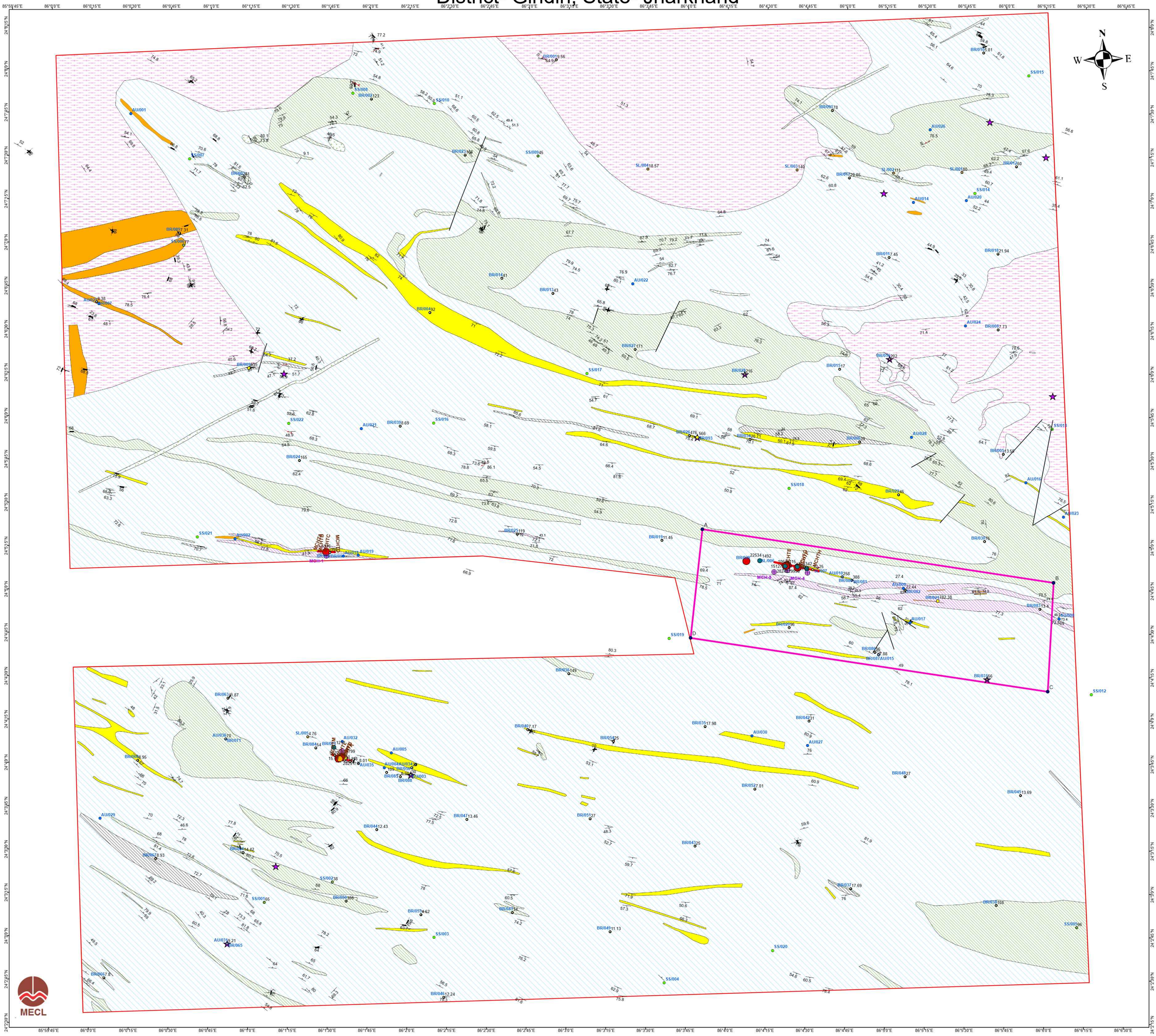
Legend

- Cardinal Points
- Jharidih Pipardih Block Boundary

Cardinal Point	Geographic Coordinate System WGS-84 Datum D M S		Area
	Latitude	Longitude	
A	24° 5' 11.986" N	86° 3' 57.628" E	4.45 Sq. Km
B	24° 4' 49.003" N	86° 6' 9.277" E	
C	24° 4' 11.425" N	86° 6' 5.552" E	
D	24° 4' 34.521" N	86° 3' 51.705" E	

MECL

Geological map of proposed Jaridih-Pipradih G-3 Block for Copper
District- Giridih, State- Jharkhand



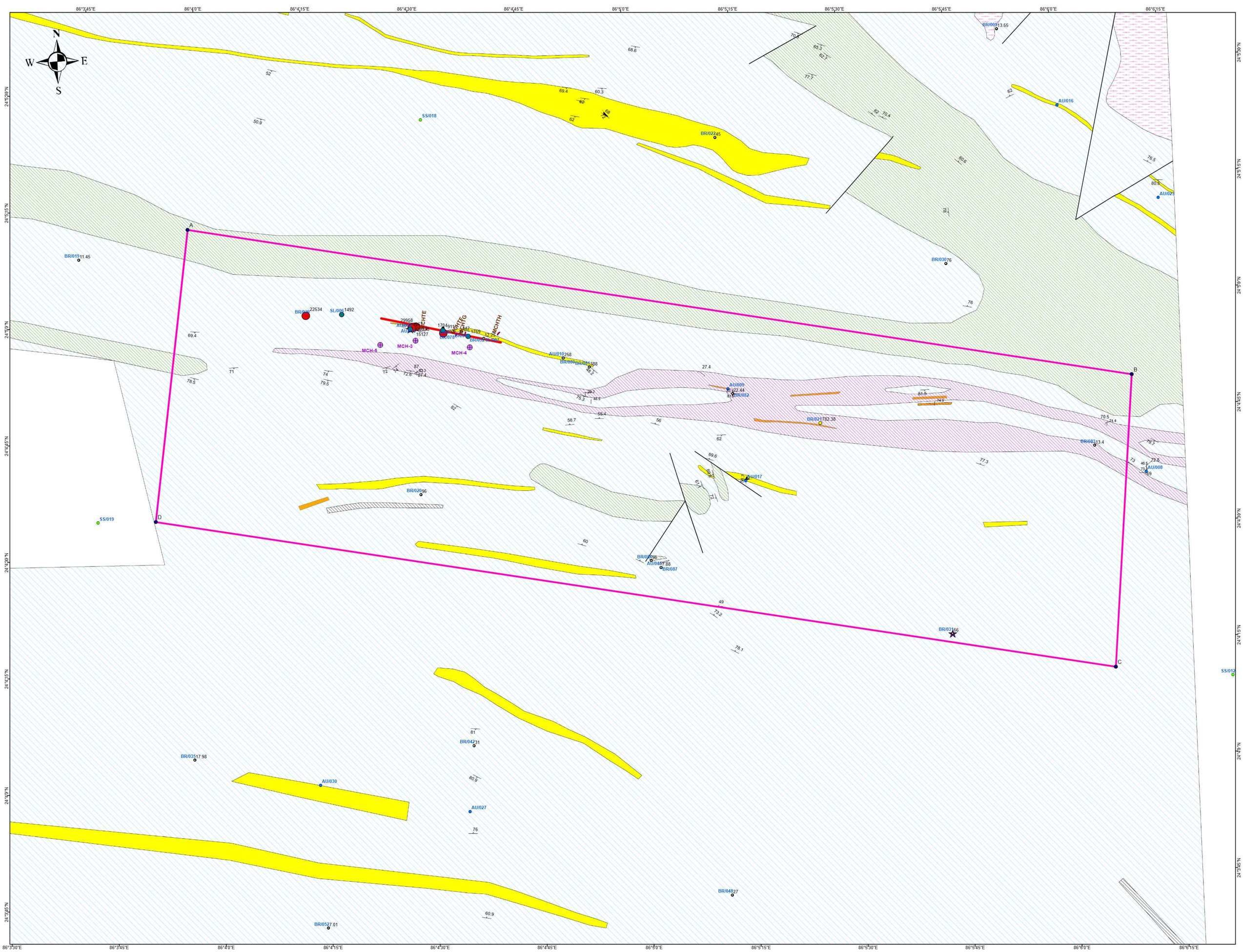
Legend

- Boundary Points
- Proposed Jaridih-Pipradih Block
- 4.620000 - 500.000000
- 500.000001 - 1000.000000
- 1000.000001 - 2000.000000
- 2000.000001 - 5000.000000
- 5000.000001 - 29958.000000
- TRENCH LOCATION
- BOREHOLE LOCATION
- BEDROCK SAMPLE
- GOLD SAMPLE
- SOIL SAMPLE
- STREAM SEDIMENT SAMPLE
- PETROGRAPHY/ MINEROGRAPHY SAMPLES
- MINERALIZED STRIKE
- FOLIATION
- JOINT
- LINEATION
- FAULT
- CHALIMA BLOCK BOUNDARY (G-4)
- DOLERITE
- HBL SCHIST-HBL MICA SCHIST-AMPHIBOLITE
- MASSIVE GRANITE-GRANITE GNEISS
- MICA SCHIST
- PEGMATITE & QTZ VEIN
- QTZ HBL SCHIST
- QTZ MICA SCHIST
- TALC SCHIST-TALC TREM SCHIST-TREMOLITE SCHIST
- QUARTZITE

1:12,500

0.7 0.35 0 0.7 1.4 2.1 2.8 Kilometers

Geological map of proposed Jaridih-Pipradih G-3 Block for Copper
District- Giridih, State- Jharkhand



Legend

- Boundary Points
- Proposed Jaridih-Pipradih Block
- 4.620000 - 500.000000
- 500.000001 - 1000.000000
- 1000.000001 - 2000.000000
- 2000.000001 - 5000.000000
- 5000.000001 - 29958.000000
- TRENCH LOCATION
- BOREHOLE LOCATION
- BEDROCK SAMPLE
- GOLD SAMPLE
- SOIL SAMPLE
- STREAM SEDIMENT SAMPLE
- PETROGRAPHY/ MINEROGRAPHY SAMPLES
- MINERALIZED STRIKE
- FOLIATION
- JOINT
- LINEATION
- FAULT
- HBL SCHIST-HBL MICA SCHIST-AMPHIBOLITE
- MASSIVE GRANITE-GRANITE GNEISS
- MICA SCHIST
- PEGMATITE & QTZ VEIN
- QTZ HBL SCHIST
- QTZ MICA SCHIST
- TALC SCHIST-TALC TREM SCHIST-TREMOLITE SCHIST
- QUARTZITE

1:5,000

0.25 0.125 0 0.25 0.5 0.75 1 Kilometers

MECL